Transforming Agricultural Production and Rural Education through Schools:

Evidence from Liberia

A Cost-effectiveness Analysis

This brief explores the cost-effectiveness of a school-based agricultural education (SBAE) program, which builds on the long-established U.S. agricultural education system, including 4-H and Future Farmers of America, and was adapted to the West African context by AgriCorps in partnership with 4-H Liberia. AgriCorps led the technical adaptation and implementation design of the model and provided ongoing technical oversight, while 4-H Liberia implemented the program in schools.

Motivated by declining soil fertility and high rates of student dropout, the SBAE program integrates experiential science education with improved agricultural technologies. Specifically, the program trains agriculture and science teachers to implement a system of four components: experiential instruction of scientific knowledge, student-led school farms, student home projects, and extra-curricular activities to cultivate leadership and agribusiness skills. This system is then supported by regular visits from extension officers. The full, optimized version of the program used for this analysis also included two parental engagement components: promotional video sessions and invitations to annual farmer field days.

A three-year randomized evaluation provides proof of concept for establishing a cost-effective system at scale. Researchers found substantial increases in both students' and parents' adoption of agricultural technologies, reductions in student dropout and absenteeism, and improvements in students' aspirations for higher education and savings. The cost per student participant was USD 42 (in 2026 currency). Every USD 100 spent on the program led to an additional **0.3 parents adopting promoted techniques, 0.18 additional years of education for students,** and an increase of **USD 8 in students' annual savings.** This makes the program relatively cost-effective compared to other agricultural extension programs in Sub-Saharan Africa.

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KEY TAKEAWAYS

- The program increased adoption of promoted soil management techniques by 15.7 percentage points among students and 13.6 percentage points among parents. At a cost of USD 141-263 per additional household adopting soil management techniques, the program compares favorably to other agricultural extension programs in Sub-Saharan Africa.
- The program reduced both student dropouts and absenteeism, adding an estimated 17.6 additional school days attended across two school years, or 0.18 additional years of education per USD 100 invested.
- Students experienced an increase of USD 4 in their annual savings.
- The program costs USD 42 per student — this could be reduced to USD 6 per student after the first three years, when the program minimizes external support for schools.

Assessing the Program's Costs

The school-based agricultural training program was implemented over three years between January 2021 and December 2023. The total cost of the intervention, adjusted for inflation to 2026 USD, was USD 812,136. Costs were relatively evenly distributed over three years, with USD 292,751 in Year 1, USD 267,882 in Year 2, and USD 251,503 in Year 3. With an estimated total of 19,500 targeted participants in 100 schools, this corresponds to a cost of USD 42 per student, or USD 8,121 per school.

The main individual cost drivers are the training sessions for agriculture teachers and the promotional sessions with parents, each comprising around 20 percent of the budget. Staff time is also an important part of the cost, comprising 30 percent of the budget.

Costs Not Included: These estimates do not include the value of any of the participants' time. They also do not include the management and coordination support 4-H received from AgriCorps, including technical assistance for program design, adaptation, strategic coordination, and quality assurance, as these functions supported broader program development beyond implementation of this intervention.

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COST COMPONENTS

These costs include:

Program administration and staff costs: 4-H staff time for management and monitoring of the intervention, as well as field staff time to visit schools and organize field days

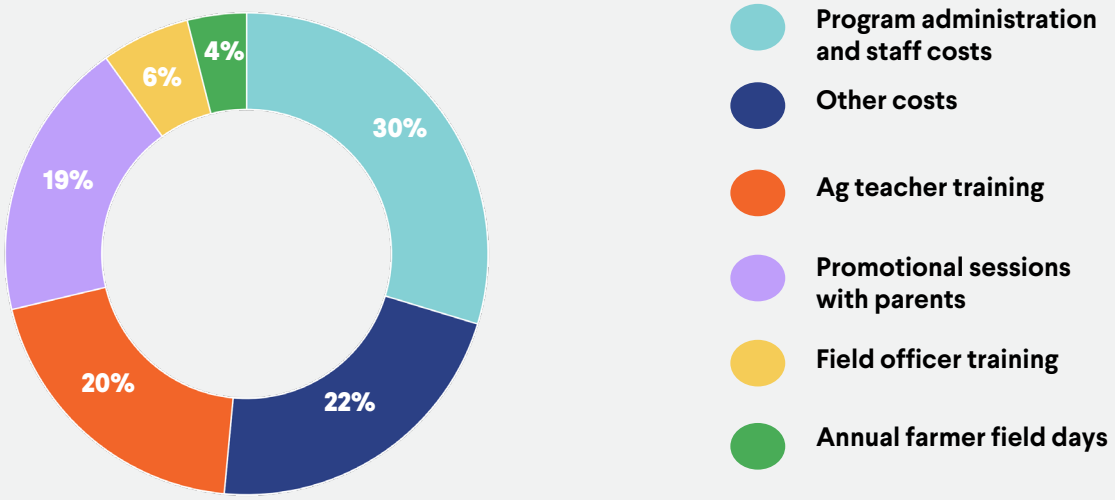
Training: training for project staff, including quarterly training for teachers and biannual" training for field staff

Implementation and program material costs: expenses associated with the promotional sessions with parents, farmer field days, student events, and program launch

Transportation: purchase of vehicles and motorcycles

Office costs: overhead

FIGURE 1: DISTRIBUTION OF PROGRAM COSTS



Cost-Effectiveness: A relatively cost-effective way to increase technology adoption and improve rural education

This cost-effectiveness analysis (CEA) focuses on **100 schools,** assuming that they received the full version of the program. Researchers estimate that each school had about 65 students per year in the grades that were offered the program. The impact estimates used for this analysis represent the average effect on all students who were offered the program, whether or not they took part. Assuming one household per student, the effects apply to 19,500 households across 100 schools over three years.

The program increased adoption of the promoted soil management techniques to reduce erosion, including lower-density cropping, composting, and improved bed preparation, among both students and parents. For comparison with other interventions that seek to improve agricultural practices, this analysis focuses on the effects on parents' parcels.

The full program, which included promotional video sessions and annual farmer field days, increased parents' use of promoted techniques by 13.6 percentage points. Over a group of 100 schools or 19,500 households, the 13.6 percentage point increase is equivalent to 2,652 additional parent households adopting bed preparation methods.

Dividing the total cost of the intervention by the total increase in the use of promoted techniques results in a cost of **USD 336 per additional household adopting promoted techniques**. This means that for **every USD 100 invested in the intervention, an additional 0.30 households** are adopting new soil management techniques.

However, focusing only on parents may underestimate the true impact of the program. As discussed in Beaman et al. (2021), research on technology diffusion shows that social relationships serve as important vectors through which individuals learn about and adopt new technologies. When parents learn and adopt new agricultural techniques, this knowledge can spread through conversations with neighbors, relatives, and other farmers in their community.

To account for these ripple effects, the study assumes that one to five percent of non-parent households within two kilometers of schools will also adopt one of the recommended combinations of techniques. This essentially estimates how information diffuses beyond the direct participants to create broader community impact through social

learning. Incorporating these indirect individuals leads to a **cost of USD 141-263 per household adopting promoted techniques**, or, equivalently, to **0.38-0.71 households adopting promoted techniques** per **USD 100** spent.

Comparison to other programs: Other examples of interventions that promote agricultural practices in Sub-Saharan Africa can be seen in Figure 2. The effects of the program on parent households were comparable to those of farmer field days in Kenya, where the intervention increased the number of households using fertilizer by up to 0.35 households per USD 100 spent, and larger than those observed in central training for contact farmers in Mozambique.

When considering indirect benefits on non-parent households, the program is comparable to an agricultural extension video intervention in Uganda that increased the use of recommended seed spacing by 0.51 households per USD 100 spent, and an intervention in Malawi that trained peer farmers and provided them with an incentive. That intervention increased the adoption of pit planting by 0.41 households per USD 100 spent, a figure similar to this program's effects. It did achieve larger impacts on the adoption of composting—which reached 1.06 additional households for the same investment—though as an adult-targeted extension program it did not measure effects on students.

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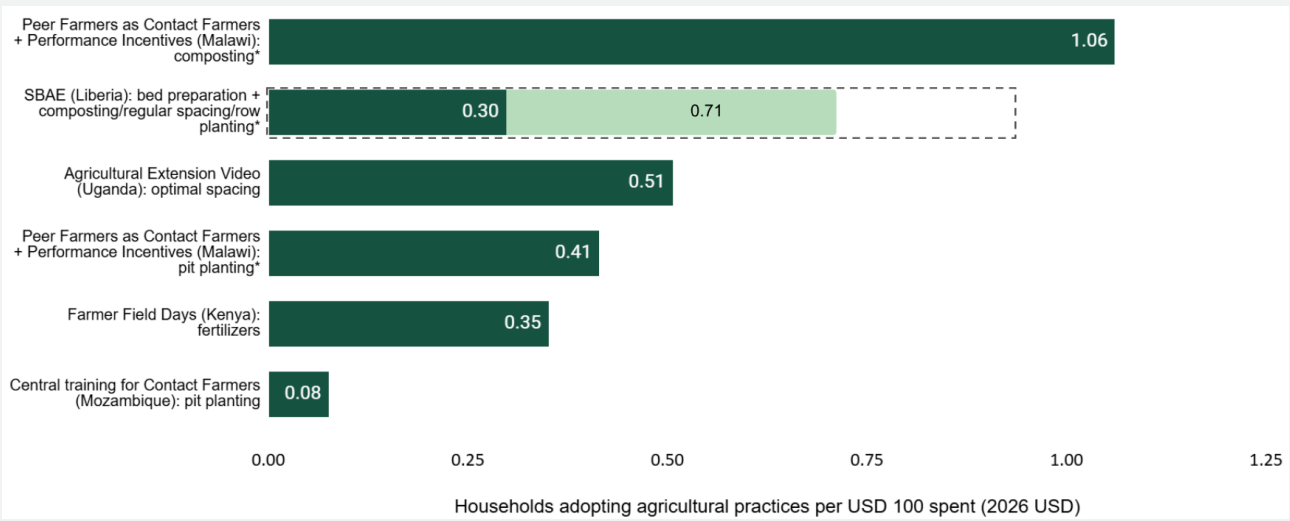
FIGURE 2: COMPARISON WITH OTHER TECHNOLOGY ADOPTION PROMOTION PROGRAMS



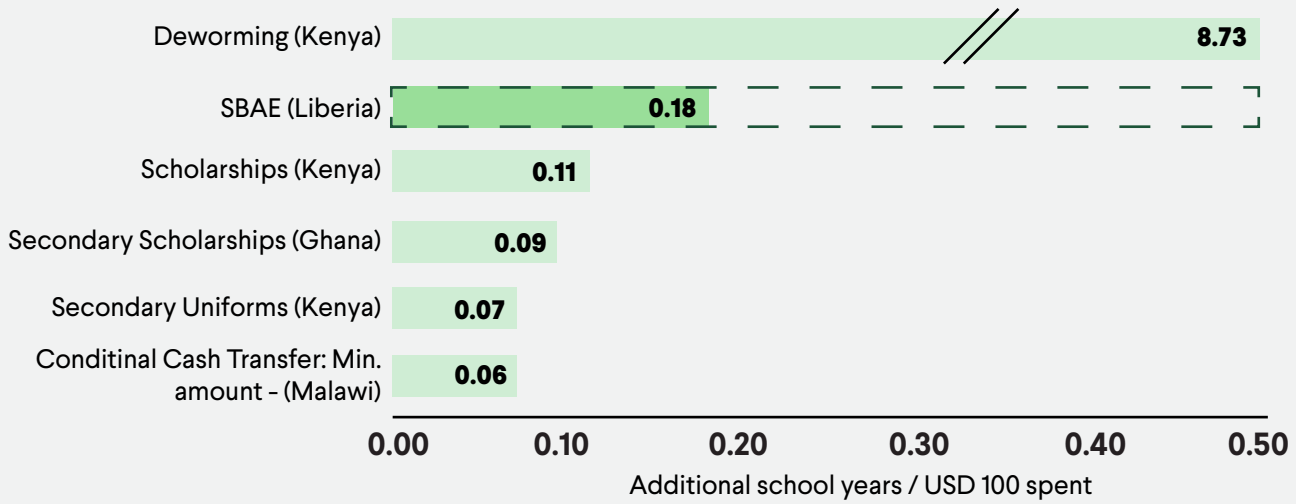
**These interventions consider effects on other farmers that indirectly benefited from the intervention. Note: For SBAE (Liberia), the solid bar shows the direct effect on participating (parent) households (0.30). The shaded range illustrates how the total effect could vary if nearby non-parent households also adopt the practices through social learning.*

Attendance improved. The full version of the program increased student attendance by 17.6 days on average over two years, which is equivalent to 0.09 years of additional education. That in turn means that for each USD 100 invested in the program, students gain 0.18 additional years of education.

Comparison to other programs: This approach is more cost-effective than most of the interventions focusing on Sub-Saharan Africa analyzed by J-PAL in "Roll call: getting children into school" (Figure 3), with the exception of deworming in Kenya. This makes the intervention a comparatively cost-effective alternative to increase student participation in school.

Savings Increased. The combination of the school-based agricultural training with the parental engagement components increased students' savings in the second year by 21 percent on average, which is equivalent to USD 4 per student in annual savings. This represents an increase of USD 8 in savings per USD 100 invested in the program.

FIGURE 3: COMPARISON WITH OTHER PROGRAMS PROMOTING SCHOOL PARTICIPATION



Source: J-PAL Conducting cost-effectiveness analysis (CEA); adjusted to 2026 USD

Cost Considerations for Policy and Scale

Some program costs could be reduced from the outset when replicating the intervention. The costs of parental and community engagement, two significant cost drivers, could be significantly reduced at scale when conducted by schools rather than enumerators outside the communities, but more testing is needed to find the optimal approach.

After three years in the program, participant schools are "graduated" and continue independently with only minimal external support, reducing costs to just biannual monitoring, teacher refresher training, and 4-H events (such as the national agriculture fair). Once schools start running the program independently, training activities can be reduced to two refresher sessions at a total cost of USD 50 per school per year; three monitoring visits at a total of USD 50 per school per year; and USD 300 per school per year for participation in regional and national events. This would reduce the annual cost to close to **USD 400 per school**, or **USD 6 per student**, not including the parental engagement components.

Another potential way to reduce costs could be to leverage existing government programs, such as enrolling country- and district- level agricultural extension officers to handle school visits or farmer field days, which would enable more efficient use of existing staff time.

Conclusion

The full version of the school-based agricultural training program is a relatively cost-effective intervention for both improving school participation and promoting agricultural technology adoption among parents, with estimates comparable to other rigorously evaluated programs in both areas, while also increasing students' savings. Importantly, it has the potential to become even more cost-effective over time as schools build the capacity to implement it more independently.

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