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A mixed methods assessment of technical and financial assistance to small- and medium-sized enterprises in Kenya´s food sector

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JEL Codes: D22, L25, L66

First submission: April 2, 2023
Manuscript accepted: February 16, 2024

Funding information: Global Alliance for Improved Nutrition (GAIN), Grant/Award Number: GLM4NP34

Editor in charge: Travis Lybbert

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This is the author manuscript accepted for publication and has undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version of Record. Please cite this article as doi: 10.1002/aepp.13426

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Abstract

We study the impact of providing consulting services and major capital infusions to small- and medium-sized enterprises (SMEs) in the food sector in Kenya. We exploit a quasi-experimental design that matches treated firms with comparable firms that applied for the same support but were just short of scoring sufficient points to receive this support. Using mixed methods, this quantitative analysis is supplemented by in-depth qualitative interviews, which provide further insights into the workings of the program. The program helped SMEs launch new products and increased numbers of employees. Interviewees described higher sales resulting from the major capital infusions they received.

Keywords: Small and medium-sized enterprises, technical assistance, business grants, nutritious food, mixed method, Kenya

Introduction

In sub-Saharan Africa, small-and medium-sized enterprises (SME) make up most of the private sector involved in processing, distributing, and retailing foods (Demmler 2020; Liverpool-Tasie and Reardon 2021). With an interest in strengthening the capacity of SMEs to produce nutritious foods and make them available to consumers (Reardon et. al. 2021), the Global Alliance for Improved Nutrition's (GAIN) Marketplace for Nutritious Foods (MNF) project in Kenya provided SMEs with a range of assistance that they believed would lead to expanded production of nutritious food and sales to low-income consumers at presumably affordable prices.

In this paper, we focus on one component of the MNF called the 'Innovation Accelerator' (IA), that provided personalized technical assistance (TA) to competitively selected SMEs in product formulation, quality control, and market expansion. A subset of these firms also received a major capital infusion to expand production and accelerate innovation.

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Interventions of this type are often justified on the grounds that SMEs face diseconomies of scale, and lack adequate market information, access to new technology, and finance compared to larger counterparts (Levy 1993; Schiffer and Weder 2001; Beck and Demirguc-Kunt 2006; Bloom and Van Reenen 2010). What if one were to address these constraints head on by providing firms with in-depth market research and major capital infusions aimed at achieving scale economies? Would we see firms expanding into new products and markets?

Our aim is to address these two research questions by examining the impact of MNF's IA program on targeted firms. We investigate whether, when compared to similar firms who were not supported by the IA program, firms that receive support are better able to launch new products. We examine whether these firms also hire new employees and see increased sales.

We use a mixed methods approach to quantify program impacts and deepen our understanding of the mechanisms behind these impacts. Using a quasi-experimental design, we compare firms that received TA (with or without FA) to firms that received no support. We do so prior to and following the IA interventions. In additional qualitative research, we identify key staff members (i.e., *index respondents,* usually owners or managers) in firms that benefited from TA and FA, and we conduct in-depth semi-structured interviews to capture their experiences with each type of assistance.

Prior literature on the impact of general business training programs[1] has primarily addressed managerial constraints of micro-entrepreneurs and has generated conflicting findings (Cho and Honorati 2014; McKenzie and Woodruff 2014; Cravo and Piz 2016). Some of these interventions may have failed because their approach was too generic to address the specific needs of the entrepreneurs. Individualized training may be more effective. Valdivia (2015) and Lafortune et al. (2018) complement group-based training with individual meetings and find evidence of adoption of improved practices and increased sales. Bloom et al. (2013) and Bruhn et al. (2018) investigate the effect of intensive one-on-one consulting services[2] and find impacts on adoption of improved business practices, productivity, and profits.

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Other studies analyzed the effect of relaxing credit constraints among SMEs (e.g., McKenzie 2017; Blattman et al. 2014; Fafchamps et al. 2014; Fafchamps and Quinn 2017; Arraiz et al. 2014). In a meta-analysis of finance interventions to SMEs in developing countries, Kersten et al. (2017) found improvements in investments and employment, but no impact on profitability or wages. However, previous research suggests that the impact of grants on SMEs depends on the amount of funds provided; that is, small grants may be insufficient to change firms' performance (Shroj et al. 2021).

To our knowledge, one prior study – conducted by Karlan et al. (2015) - addressed both managerial and credit constraints as we do here.[3] Our work differs from Karlan et al. (2015) in several dimensions.

First, whereas Karlan et al. (2015) targeted individual tailors (averaging 0.35 employees), we focus on a set of larger SMEs with an average or 12 employees. The findings in Karlan et al. (2015) cannot be generalized to the broader population of SMEs. Microentrepreneurs face more constraints in expansion compared to firms with several employees. The larger scale of production of the latter should be more conducive to innovation.

Second, the financial assistance provided by the IA was a significant capital infusion. Awarded amounts in our study were more than 500 times larger than those in Karlan et al. (2015) (averaging US $75,000 vs. US$ 133 in the latter). Small grants are unlikely to change a business's trajectory in the way that a large influx of funding could.

Third, in contrast to prior studies, GAIN restricted the use of grants to specific purposes. In Karlan et al. (2015), microentrepreneurs were allowed to use their grants for purposes other than their businesses and, in fact, the authors found that average short-run investments were notably lower than granted amounts. In contrast, the SMEs in our study could use their grants solely for business purposes. Consultants helped SMEs identify the equipment needed for product expansion, and GAIN procured this equipment for those selected to receive FA. This equipment represented the bulk of the FA, and GAIN ensured that any remaining funds were used strictly for business-related services.

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Fourth, the aim of our study is distinct from that of prior studies, and we therefore focus on different outcomes. Whereas prior studies focused on firm profitability and business practices, the aim of MNF's consulting services was to expand firms' product base and consumer base. Rather than receiving help with, for instance, bookkeeping practices or management training (as in Karlan et al. (2015)), firms in our study received support in market research and product development.

Most prior studies have focused on quantitative analysis to assess the impact of technical and/ or financial assistance on firm practices and performance. In this study, we use quantitative analysis to estimate the impact of technical assistance on easily measured outcomes. But in addition, we rely on qualitative data to understand the mechanisms that led firms to change behavior. We also rely on these in-depth interviews to understand outcomes that are not easily measured and that have a high variance, such as sales, production efficiency, and owners' perceptions of profitability. Because the large size of GAIN's grants limited the number of beneficiary firms in the program, the use of qualitative data helps us to examine outcomes of financial assistance, which would not be possible otherwise.

This paper makes several contributions to the literature. First, the aim of the program studied here differs from programs evaluated in the past, which had focused on attaining profitability and improving business practices. Instead, the MNF IA provided firms with individually tailored technical assistance related to market research and product development in the food sector. Second, while prior studies provided small unrestricted grants, we study the impacts of a major capital infusion that firms were required to use for specific capital investments. Third, we exploit the program's competitive selection process using a quasi-experimental design in which we pre-select a set of relevant control firms as counterfactuals for firms who received GAIN's assistance. We use a mixed methods strategy, complementing our quantitative findings with in-depth qualitative interviews to understand the mechanisms behind our findings. Mixed methods are useful to understand different aspects of a program and its impact, and they can

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strengthen a paper when findings from different methods are in line with one another (Leeuw and Vaessen 2009; Bamberger et al. 2010).[4]

The remainder of this article is organized as follows. In Section 2, we describe the context in which the IA operated, and GAIN's selection process for choosing beneficiary firms (of TA and FA). In Sections 3 and 4, we discuss our quantitative and qualitative research approaches and findings, respectively. Section 5 concludes.

Context

In Kenya, about one quarter of under-five children are stunted. Stunting is particularly prevalent among poor populations. Among children of mothers who had not completed primary education, the stunting rate is 34%. Similarly, 36% of children in the lowest income quintile are stunted (Kenya National Bureau of Statistics et al. 2015).

Kenya is also experiencing large increases in obesity, over-nutrition, and non-communicable diseases (such as diabetes, cardiovascular diseases, and hypertension). By 2014, among women between ages 15 and 49 years of age, 20.5% were overweight and 9.1% were obese (Mkuu et al. 2018). In a study in two slums of Nairobi, Haregu et al. (2018) found that among adults between 40 and 60 years of age, 19.9% were overweight and 25.6% were obese.

Increases in obesity are associated with urbanization, where most of the population lives in overcrowded slums with limited access to public services. Urban populations typically have more sedentary lives than in rural areas, and they have access to cheap, highly processed foods (dense in saturated fats and sugars) and lack access to adequate healthcare (Reardon et al. 2021).

While there is ongoing debate about policies to address nutrition-related problems, recent research urges the adoption of a "food systems" (rather than a "food security") focus in Kenya (Breisinger et al. 2022). Such a food systems policy approach would include industrializing agricultural value chains and providing financial support to the agrifood sector to increase access to diverse (and high quality) diets.

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In this context, GAIN launched the MNF program in Kenya in 2013 to improve the supply-side of the food system. Its aim was to increase the consumption of nutritious foods among low-income populations by making such foods more available and affordable.

To select firms that would receive assistance from the MNF, GAIN issued calls for proposals from SMEs. SMEs' proposals were evaluated by a Technical Assistance Committee (TAC), which scored them on six criteria (each worth 5 points): (1) nutritional benefits of the company's product and whether they would be widely available for low-income consumers; (2) innovation (i.e., are there similar products already available in Kenya?); (3) track record of entrepreneurial success / failure; (4) product availability in areas that are at risk for malnutrition; (5) adequate supply of inputs for production and adequate demand for the product; and (6) whether the SME is able to attract external investments for sustained expansion. Firms that received high scores were invited to pitch their plans to the TAC. GAIN shortlisted a subset of them for business visits, and if these visits confirmed operations as stated in the applications, GAIN awarded the firms with TA.

GAIN then hired consultants to identify the type of TA needed for each firm. The TA could include assistance for new product development, support in modifying product formulas to make them more nutritious, and other assistance in product and market expansion (e.g., organizational capacity building, connections to investors, business modeling, assistance in developing business plans, support for market research / marketing strategy). Additionally, a subset of the most promising firms was selected to receive FA to implement their business plans. The maximum grant awarded was U.S.$90,000.

We focus on three rounds of this program implemented from January 2018 to January 2019. The first round was launched January to February 2018. GAIN received 132 applications and 12 SMEs were invited to pitch their business proposals. From these 12 firms, the committee identified 8 viable proposals and visited these firms for further evaluation. These 8 firms were ultimately awarded TA. The second call for proposals was released May to June 2018 and received 83 applications. The TAC (same three members across all rounds) identified 15 SMEs to present their

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business plans. Eleven of these SMEs received on-site visits and 9 were awarded TA. GAIN launched the third round of the IA December 2018 to January 2019 and received 103 applications. From these applications, 15 SMEs were shortlisted and pitched proposals to the TAC. Eleven firms were chosen for on-site visits but only 4 firms were awarded TA.

Quantitative Research Design and Analysis

Research Design

Since firms receiving TA might have been different from those with little chances of winning the award (e.g., larger, more experienced, more entrepreneurial), we cannot compare firms receiving TA to all firms who were not selected. Instead, we identified control firms that were as similar as possible to the firms receiving TA. For each firm with a sufficiently high score to present at the TAC meeting, we chose control firms from the same round of the IA using the following criteria: (1) manufactured a similar product: we matched firms that had proposed to launch the same (or very similar) products (e.g., yogurt, tilapia, chicken meat, dehydrated fruit, etc.)[5]; (2) operated in the same county: we matched firms by production or sales locations[6]; and (3) received relatively good TAC scores: we matched treated firms with firms whose TAC scores were similarly favorable, but not high enough to receive TA. See Figure 1 for the distribution of TAC scores.

We outline our sampling approach in Appendix Figure A1. We started with 30 firms that successfully pitched their proposals in the TAC meetings. Following our baseline surveys, GAIN conducted on-site visits to the 30 selected firms to confirm whether they met the necessary conditions to receive assistance. Two of these firms declined to participate in our study due to time constraints. For each of the remaining 28 firms, we identified between one and five corresponding SMEs for the control group, which included 43 firms (i.e., there were on average 1.53 control firms for each eligible firm identified to receive TA).

In 2019, we partnered with IPA-Kenya to survey these 71 firms. We collected baseline information on firm characteristics, size, and performance. Respondents were the firms' owners and / or managers. As we surveyed firms across multiple competition rounds, firms that applied for TA in Rounds 1 and 2 of the IA were surveyed in February 2019, while firms in the third round

were surveyed in April through July 2019[7]. After the baseline, GAIN conducted on-site visits to the 28 selected firms to confirm that they met the necessary conditions to receive TA. Based on these visits, only 19 of the originally selected 28 firms were in fact awarded TA.

Between May and August 2020, we conducted our endline survey with the 71 baseline firms[8]. We surveyed firms about their business performance before and during the SARS-CoV-2 pandemic[9]. We asked each respondent about their firm's products and business outcomes before (i.e., in February 2020) and at the onset (i.e., in March 2020) of COVID-19. We also asked about the number of employees hired in the week prior to the survey. Eight firms declined to participate in our survey, resulting in an endline sample of 63 firms and an attrition rate of 11%.

In most specifications we use the "full sample," which includes 19 treated firms and 44 untreated firms (N=63) surveyed at baseline and endline. In these specifications, we include in the control group firms that were selected for on-site visits (and their corresponding paired firms that did not score high enough in the TAC meetings), but ultimately did not receive any assistance.

In other specifications, we follow the original impact evaluation design and limit the control group to include only the pool of untreated firms that had been paired with the 19 treated firms. This approach reduces our sample size (N=44). All in all, there were 19 treated firms (and their corresponding 25 paired controls) in this "paired sample."

Sample Characteristics

We summarize baseline characteristics of the full sample of respondents and surveyed firms in Table 1.[10] We present statistics by treatment status: control firms, firms that received TA (either by itself or combined with FA), and firms that received both TA and FA.

Respondent characteristics were similar across the three groups. While there were more women in the control group (50% vs. 37% in TA and 36% in TA with FA treatment), these differences were not statistically significant. Respondents were on average 41 to 42 years of age and had relatively high levels of education; all had a secondary degree, and most had a college or post-graduate degree. Most respondents were either owners or managers of targeted firms.

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Firm characteristics were also similar across the three groups. On average, firms had been operating for about 5.9 years. Roughly one third of surveyed firms were in Nairobi. Between 9 and 26% of firms were agro-input suppliers, while 37-46% were aggregators. Very few firms were brokers. More commonly, 64% to 68% of firms were involved in processing; 26% to 37% of firms were in wholesale; and 27% to 48% of firms were in retail.

There were some notable differences in baseline characteristics between SMEs receiving GAIN assistance and the control set of firms (see Table 1). While 69% of control firms received training from an NGO, around 45% to 47% of treated firms received such training (with $p<0.1$). Fewer control firms received private sector training (23% vs. 37% and 45%) or other training (17% vs. 32% and 27%); but these differences are not statistically significant (with $p>0.1$).

The most notable differences between treated and control firms regarded participation in other MNF programs (see Table 2). GAIN also developed a Community of Practice (COP) in which SMEs received basic training and informal networking opportunities. Nearly all treated firms (95% and 91%) were COP members, while 79% of control firms were members ($p>0.1$). More treated firms participated in COP events; 95% of firms receiving TA and 91% of firms receiving TA and FA had attended one or more COP events; but only 56% of control firms had done so ($p<0.01$). Treated firms rated these events as more useful. These differences may reflect the fact that firms receiving TA were also vying for financial assistance from GAIN; they may have felt that their participation was helpful to them in being competitive for a grant from GAIN.

We present summary statistics for business performance indicators at baseline and endline in Table 3. At baseline, similar shares of treated and control firms had launched a new product in the 12 months prior to being surveyed (42-55%). At endline, while 39% of control firms had launched a new product, 68-73% of treated firms had done so ($p<0.05$). While treated firms had a larger number of products at baseline, both groups were similar in their degree of innovation (indicated by their ability to launch new products in the 12 months prior to being surveyed). Additionally, the share of revenues from new products was similar across treated and control firms at baseline. But by the endline, this share had increased considerably for treated firms: whereas

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less than 8% of revenues of control firms was due to new products, the share was 20% among firms receiving TA and 11% among firms who also received FA. Only the difference between firms receiving TA and control firms is statistically significant, with $p<0.05$.

Treated firms hired roughly 50% more employees than control firms at baseline. These differences increased further at endline, but particularly prior to the Covid-19 pandemic, by which time treated firms had hired about twice as many employees as control firms.

Estimation Methods

To estimate the impact of the MNF program while controlling for differences at baseline, we estimate the following Analysis of Covariance (ANCOVA) regression:

$$\mathrm{Y_{i,t=1}} = \alpha + \beta \mathrm{TA_i} + \gamma \mathrm{Y_{i,t=0}} + \delta \mathrm{X_{i,t=0}}, + \varepsilon_{\mathrm{i,t=1}} \quad (1)$$

where $Y_{i,t=1}$ is the outcome of firm i in the endline ($t = 1$). As suggested by McKenzie (2012), ANCOVA is a more efficient estimator than differences-in-differences. TA_i is an indicator variable for treatment. In our main set of results TA_i is 1 if the firm had received technical assistance (with or without financial assistance) or 0 otherwise. We group both treatments due to our limited number of treated firms. β is the parameter of interest, capturing the outcome differences between treatment and control groups. Table 3 suggests that some business performance measures (i.e., number of products and workers) of treated and control firms at baseline were somewhat different. To account for this, we control for outcome values at baseline $Y_{i,t=0}$. We also control for a vector of firms' baseline characteristics ($X_{i,t=0}$)[11]. The vector $X_{i,t=0}$ includes: respondent characteristics (age, sex, level of education, and whether the respondent is the manager or owner of the firm); firm characteristics (age, whether it is located in Nairobi or elsewhere); indicators for the firm's sector in the agricultural value chain (agro-input supply, aggregator, broker, processor, wholesale, retail); prior business training (via NGOs, consulting firms, or others); participation in MNF's community of practice (a networking platform, that was a part of MNF project in Kenya); and indicator variables for the months of the endline survey.

In addition, we estimate the following model to make use of our paired research design:

$$Y_{ip,t=1} = \theta_p + \beta TA_i + \gamma Y_{ip,t=0} + \varepsilon_{i,t=1} \quad (2)$$

where Y_{ipt} is the outcome for firm i in period $t = \{0,1\}$ that belongs to pair p. In contrast to (1), we include pair fixed effects (θ_p). Recall that the pairs were constructed by selecting control SMEs for each treated firm (that produce comparable products, are in nearby counties, and achieved relatively high scores despite not being awarded GAIN's support). By including pair fixed effects, we can interpret the results from (2) as a within-estimator. The parameter β reflects average within-group differences between treated and control firms in each pair.

Due to our small sample, for (1) and (2) we estimate p-values with randomization inference (Gerber and Green 2012) for our coefficient of interest β. Finally, $\varepsilon_{i,t=1}$ is a zero-mean error term.

Estimation Results

We present results comparing all firms that received TA (either coupled with FA or by itself) with those that did not receive any support in Table 4. We present three columns with different specifications for each outcome of interest. In the first column, we estimate ANCOVA regressions where we only control for the baseline value of the outcome. In the second column, we add control variables (described above). Results for the pair fixed-effects regressions are in the third column.

When we ask directly whether the firm launched a new product in the 12 months prior to being surveyed (Table 4, Columns 1-3), we find a positive and statistically significant effect of GAIN's assistance in two specifications (ANCOVA and paired fixed effects). Treated firms were about 30 percentage points more likely to supply new products. In comparing treated firms to the control, new products account for a larger share of total revenue (Columns 4-6). However, this result is statistically significant only in our ANCOVA regression.[12]

We find that treated firms increased their number of hired employees pre-COVID (see Table 4, columns 7-9). However, the magnitude and statistical significance of this increase varies across specifications and the increase in the number of employees becomes negligible by March 2020 (columns 10-12; during the time when COVID restrictions were imposed in Kenya). As we will see in the qualitative surveys outlined below, the impact of the FA may depend on the degree to which the firms' newly acquired equipment is a complement or a substitute to labor.[13]

Robustness Checks

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Our findings are not driven by selective attrition. As previously mentioned, we could not reinterview 11% of the firms in our follow-up survey. These firms all belong to the subsample of firms that were either originally targeted to receive the program's TA (though eventually they were not selected upon GAIN's site visits) or were selected as their paired control firms (see Appendix Figure A1). However, as we interviewed all the firms in the "paired sample" at endline, our estimates based on this paired subsample are not driven by attrition and still have internal validity.

Estimation results are similar when we estimate differences-in-differences (DID):

$$Y_{it} = \alpha_i + \beta Treat_i \times Post_t + \gamma Post_t + \varepsilon_{it}, \quad (3)$$

where Y_{it} is the outcome in $t = 0$ (baseline) and $t = 1$ (endline), $Treat_i$ is an indicator for whether the firm was chosen to receive TA, $Post_t$ is an indicator for $t = 1$, α_i are firm-specific fixed effects, and ε_i is an error term (clustered at firm level). Results are similar to ANCOVA estimates, albeit with larger standard errors because DID is less powered (see Appendix Table A4).

Finally, we test whether any potential biases arise from the non-random nature of our treatment assignment. We purposely chose counterfactuals that shared similarities with treated firms, and we control for a rich set of observable characteristics. However, those who ended up receiving TA / FA from GAIN might still have been different along unobservable characteristics (i.e., perhaps more motivated, with higher ability, entrepreneurial, etc.). To account for this possibility, we follow Oster (2019) and test how unobservable characteristics (omitted from the regression) might affect our results. In particular, we focus on our paired sample and estimate two parameters. The first parameter is δ, which measures how large selection on unobservables needs to be relative to selection on observable control variables to make our effect disappear (i.e., make $\beta = 0$ in Equation 2). The second parameter measures how much β in Equation 2 would change in the presence of an arbitrarily large correlation between observables and unobservables. Following Oster (2019), we estimate the treatment effect β while setting the selection on unobservables parameter δ to one (i.e., under this assumption, the effect of unobservables is as large as the one from observables). We include these estimates in Appendix Table A6.

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Overall, we find that even if (omitted) unobservables were as important as our observable controls, most coefficients would be slightly larger than our estimates; only the coefficient for employees at endline would be slightly smaller than that of our original estimates. However, to completely rule out a positive treatment effect, the degree of selection on unobservables would need to be 1.8 times the degree of selection on observables (which is unlikely).

Qualitative Research Methods and Findings

Research Methods

We complement the findings from our quantitative research design with qualitative in-depth interviews with the subset of all 11 SMEs that received both TA and FA between 2018 and 2020. We chose to conduct in-depth interviews with these firms because they could provide insights into the effect of both types of assistance. These 11 firms share many similar characteristics with the eight firms who only received TA (Tables 1, 2, and 3). However, in comparison to the firms who received only TA, the firms who also received FA are somewhat more likely to be in Nairobi, operate in the agro-input supply sector, and manufacture a larger number of products at baseline. Thus, we urge caution in interpreting results from our qualitative research, as they apply to firms that *jointly* received FA and TA (and may not be generalizable to those that *only* received TA).

We partnered with trained qualitative researchers at Innovations for Poverty Action (IPA). Interviews were conducted between February and May 2021. By this time, most COVID 19-related restrictions were relaxed, and most interviews were conducted in person.[14] For each firm, we identified index respondents, or interview subjects, who were knowledgeable about their firm's operations and finances, and had close knowledge and experience related to the firm's interactions and experiences with the IA program. As SMEs have few employees, few personnel met these criteria; most interviews were conducted with firm owners or managers. Once we identified the index respondent in each firm, we applied a snowball sampling approach, asking each interviewee to recommend additional staff within the firm that met our inclusion criteria. Index respondents from four firms were able to provide recommendations for additional interview subjects.

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All interviewers used the same semi-structured interview guide (see Appendix 2, Supplementary Materials). The guide included questions about the interviewees' roles and responsibilities within their firms; descriptions of the TA and FA received by their firms; how the financial assistance was invested and why; how the technical and financial assistance affected firms' abilities to produce and market nutritious food products; and comparisons of the two forms of assistance. All interviews were conducted in English. Interviewers took manual notes while also recording interviews with handheld audio recorders. We coded transcripts into thematic areas and then analyzed the data for emergent patterns that aligned and contrasted across interviews.

In total, 17 interviews were conducted among all 11 firms. We interviewed one individual in seven firms, two in two firms, and three in the two remaining firms (Table A1). Eleven respondents (64.7%) were male. Six respondents were CEO, founder, or both; three were directors, and two were chairmen of the board. Others included acting general manager, accountant, innovation manager, chief financial officer, managing director, and production supervisor.

Findings from Qualitative Research Interviews

Respondents mentioned that they received one or more of the following types of assistance: (1) market research to assess consumer acceptability of and market demand for their food products, especially among low-income consumers; (2) development of business plans for the firm's nutritious product based on market research; (3) product development (e.g., refining the product formulation and/or manufacturing process for the nutritious food product, providing guidance on sourcing of raw materials); and (4) guidance on improving quality control and food safety practices related to the nutritious food product (see Table A2).

The IA program achieved its objective of delivering the agreed-upon assistance to SMEs. Firms reported receiving 8.27 million Kenyan shillings in FA from the MNF program (~US$ 75,000) on average. Following GAIN's restrictions, firms used the funds to either launch or expand production of the specific nutritious product they had described in their applications to GAIN. Nearly all the financial assistance was used to purchase equipment and contract services to install such equipment with the aim of establishing, modifying, or scaling up production of the previously

specified nutritious food product.[15] This adherence reflects the scrutiny by GAIN. Four of the 11 firms interviewed used part of their awards for additional purposes – at most 25% of the assistance was used for: market research, investment in a sales force, or advertising. One firm used half of the assistance to achieve compliance with legal and regulatory requirements (i.e., registering to meet standards set by the Kenya Bureau of Standards).

The most frequently reported benefits of TA (cited by nine firms) were: improved understanding of market demand for their product; assistance in identifying and reaching new and existing target markets; and better understanding of customer preferences and priorities. For example, one respondent remarked: "Initially we believed that the markets were institutions such as hotels and hospitals. But we realized that the rural households need and consume even more [nutritious food product] than the hotels. That's some information that would not have come to light without the [technical assistance]." Other firms reported changing the geographic focus of their sales from main towns to rural interior areas, shifting sales to retailers instead of direct to consumers, shifting sales from processors to low-income consumers directly, increasing the frequency of visits to markets, and marketing their product based on its nutritional value.

Most firms could not have launched new products without the specialized equipment purchased with IA funds. Eight firms noted this, describing benefits of automated production lines, higher processing speeds, elimination of production bottlenecks, automated packaging, and enhanced storage capacity. One respondent said: "it would have taken us maybe another two or three years on our own to get to this current production [without the assistance from the IA]."

The impact on the number of firm employees is heterogenous and depends on the degree to which the capital goods firms received were complements or substitutes to labor. Five firms mentioned that GAIN's FA helped them hire more employees, including production and sales staff. However, others did not hire additional workers. For example, one of the firms noted that, before GAIN's assistance, its production was highly manual. The IA benefits spurred automation, so a process that was previously done by two or three staff could be completed by one person. However, because their production had increased, the firm maintained the same staffing levels.

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Respondents reported increased sales due to expanded production capacity. For example, one of the respondents mentioned that: "There is a huge benefit from what we have gained from GAIN. Our process right now is seamless. We can [process] and put it on the machine, and we get it from this end in a packed product. So, it has really been transformational for us." The equipment expanded production and improved production efficiencies. One respondent noticed that "the machines also helped us in a big way to increase our efficiency because they are highly energy saving. Initially we were using a lot of water and electricity and firewood but right now that has really gone down. So overall even the cost of production has gone down." Other interviewees mentioned that the FA allowed them to buy a pickup truck that allowed the company to transport feed for their animals and avoid vehicle rental, which had been an important share of the firm's costs. Another respondent was able to purchase a cold storage facility, which allowed the firm to produce at a larger scale while preventing the product from spoiling.

Conclusion

We use a mixed methods approach to identify the impacts of an NGO program supporting SMEs in Kenya. In combining quantitative quasi-experimental data and qualitative in-depth surveys, we demonstrate the value of bringing such methods together to better understand the impact of a complex project that provided significant capital infusions along with technical assistance to a small group of firms.

Overall, we find that – through its technical support and large financial grants (on average US$ 75 thousand) – the IA improved the capacity for beneficiary firms to launch new products. We also find some short-term effects in terms of firm growth (at least measured through number of employees), but mixed results in terms of business sales.

We find that the NGO program provided valuable management tools to beneficiaries, and financial resources to purchase crucial equipment (e.g., climate controlled packhouses, semi-automatic processing lines, packaging machines, etc.). This support helped businesses launch new products. In comparison to control firms, firms who received TA (by itself or with FA) were about 30% more likely to introduce a new product.

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We also find that beneficiary firms were employing 7-15 more workers by February 2020 (the last business-as-usual month before the COVID-19 pandemic). However, this effect waned at the onset of COVID-19, likely due to the health crisis and the restrictions imposed by the Kenyan government (e.g, curfews, restrictions of movement, etc.). In qualitative surveys, some firms indicated that capital infusions led to increased automation and fewer employees.

We find mixed results on revenues. In our quantitative survey of all firms receiving technical assistance, we do not find significant effects on business revenues (though we are underpowered for this purpose). In contrast, in the qualitative interviews with firms who received financial assistance in addition to technical assistance, firms reported increased sales. These differences could be due to differences in the timing of data collection (qualitative interviews were conducted one year after the quantitative endline survey). But it is also likely due to the fact that the qualitative survey captured effects of large capital infusions, which were given to a small subset of firms who received technical assistance. Responses in the qualitative survey emphasize the significance of the FA to business operations of beneficiaries of the grants.

These findings highlight the opportunities and challenges of expanding food systems by supporting SMEs. Our findings indicate that targeted joint technical and financial support can be effective in encouraging SMEs to expand into new products or marketing strategies. Given that the financial support required significant capital infusions, it may be best to target SMEs who are most likely to substantively increase access to healthy foods in markets. These are valuable implications when considering whether and how to scale up a program such as this one.

Our study has limitations due to selection biases. First, we have a small sample size of firms that self-selected by applying for MNF support. There may be important differences between these firms and others in the food industry that might make it difficult to generalize results too broadly. Second, firms were not randomized to treatment and control groups. In the case of financial support, firms who were most likely to succeed were selected as recipients.

A couple of additional limitations bear noting. First, our study was conducted in a relatively short time frame, with multiple uncertainties facing firms during the evaluation period. It is unclear

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whether the program would have any sustained impact on firm performance. In a highly dynamic market, especially in the face of an unexpected pandemic and disruptions to the supply of inputs and manufacturing equipment, changes made in response to MNF-provided consultant studies may need to be followed by continual adjustment to changing circumstances. It is not clear that the program has equipped these firms to do a better job than in the past in this regard. Second, SMEs are risky ventures with high rates of failure or bankruptcy (Klapper and Richmond 2011). There is large heterogeneity across SMEs and in the competitiveness of the markets in which they operate. Some products have more substitutes than others. Highly competitive markets mean lower profitability for individual firms, so that firms must differentiate their products from others. Finally, given the small share each potential beneficiary SME has in the marketplace, expanding their production capacities may not be at a large enough scale to affect consumers or the quality of their diets.[16]

Our study highlights the need for further research on these types of interventions to affirm the generalizability and applicability of our findings to other markets and contexts. Future research is needed to evaluate such programs across several years (McKenzie 2012) and across many firms than the number studied here. To see significant effects on consumer diets will require multifaceted and innovative approaches on the demand side (e.g., consumer-oriented policies and educational campaigns supporting the purchase and consumption of nutritious foods, etc.), and the supply side (e.g., promoting partnerships with larger firms to take advantage of scale economies, etc.).

Endnotes

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[1] These programs promote general management skills (Field et al. 2010, Calderon et al. 2019).

[2] Bruhn et al. (2018) provided training in: goal setting, developing business plans, and "optimizing the number and location of points of sale, quality control, access to credit or alternative financing solutions, pricing strategy, teamwork, and leadership training" (Bruhn et al. 2018, page 643).

[3] Some studies combined generic business training and financial capital (Berge et al. 2015; Giné and Mansuri 2021) but did not provide individualized assistance.

[4] Consistent with the objectives of our paper, mixed methods have been used in previous research to investigate the impact of employee training (e.g., Pelucha et al 2019) and how information technology relates to firm innovation (e.g., Curado et al 2018). They have also been applied to better understand how market conditions and nutritional programs affect food security (e.g., Bridle-Fitzpatrick 2015, Limon et al 2017, Jamaluddine et al 2019).

[5] For example, a firm that produced "yoghurt supplied to school going children" was matched to firms that produced "low sugar yoghurt for school children" and "a fortified whey-based yoghurt targeting low-income consumers." A high-scoring firm that produced "peanut butter packed in sachets for the bottom of the pyramid and low-income consumers predominantly mothers and young children" was matched to one that manufactured snacks with a similar target group.

[6] In cases without a county match, we searched for the closest county using Google Maps.

[7] These data were collected a few months after the TAC meeting which selected the firms to receive TA. None of the firms would have received any support prior to this baseline data collection.

[8] COVID-19 restrictions in Kenya prevented us from conducting in-person interviews in our follow-up survey. Our interviews were conducted through phone calls and MS Excel templates completed via email. We followed the same approach for firms in treatment and control groups.

[9] On March 17, 2020 the Kenyan government implemented a first set of restrictions on social gatherings. Later, the government also imposed curfews and domestic travel restrictions.

[10] Characteristics of our "paired sample" are summarized in Appendix Table A3. We find patterns that were similar to those in the "full sample." In terms of respondent characteristics, firm

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characteristics, and access to training programs (other than GAIN's training), we do not find statistically significant differences between treatment and control groups. Treated firms were more likely to have attended (and rated more positively) GAIN's COP meetings. Firms that ultimately received GAIN's assistance were more involved in COP meetings, perhaps to network with program managers and strengthen their applications for GAIN support. As in the "full sample," treated firms had a larger number of products than control firms at baseline. They are not more likely to have recently launched new products though. Treated firms also had more workers at baseline. However, our regression results show that in the endline survey, treated firms hired more workers than their counterparts. These results are robust to conditioning on unbalanced baseline outcomes (included as control variables in Table 4), and in regressions where we explicitly difference out baseline imbalances with a difference-in-difference estimator (Appendix Table A5).

[11] We find that despite our modest sample size and controls, there is considerable variability remaining in outcomes that could be explained by the IA treatment. We partial out the controls from the dependent variable following each specification in Table 4. We retain between 61-96% of the variability (i.e., standard deviation) of the original dependent variables after partialling out our set of controls (Appendix Table A4).

[12] We are sufficiently powered to detect such effects (see ex-post power calculations with baseline data in Appendix Figure A2). The proportion of firms that had introduced new products in the previous year at baseline was 44%. We would be able to detect an effect of about 50%. This would happen if the share of treated firms introducing new products was about 22 percentage points higher than the control group (our estimate for the TA / FA sample is about 30%).

[13] While we collected information about firms' sales and profits at endline, they exhibit considerable noise. We are underpowered to detect reasonable impacts on these variables (Appendix Figure A2). We rely on the findings from our qualitative research to gain some insights about the impact of GAIN's assistance on these variables.

[14] Two interviews were administered via remote video conference due to COVID restrictions.

[15] The types of equipment purchased varied widely based on the nutritious food product produced by the firm, the size of the firm, and their plans for scaling production. Examples of purchased equipment included materials or machinery to: 1) construct a climate-controlled pack house for storing and weighing fresh cut vegetables; 2) establish automated or semi-automated lines for processing peanuts, producing ready-to-eat fermented porridge, or pasteurizing milk or yogurt; 3) build an extrusion system for pre-cooking large volumes of blended maize flour; etc.

[16] In a companion paper (Maredia et al. 2023), we focus on one of the products produced by an SME that GAIN supported through the IA program, and we estimate the impact on consumers of increased availability of this specific food item. We find that this availability increased consumption of the GAIN-supported product. However, this shift mostly stemmed from households' substitution away from other brands, and not from overall increases in the consumption of the food.

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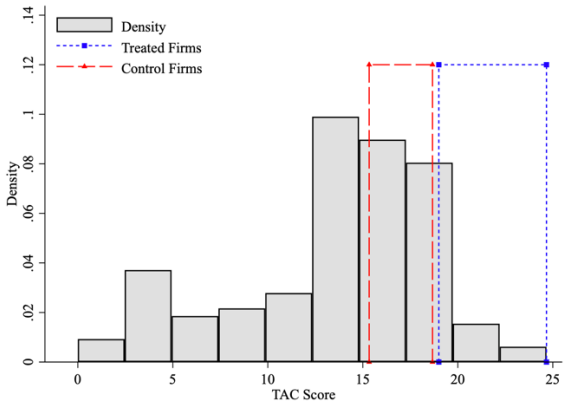
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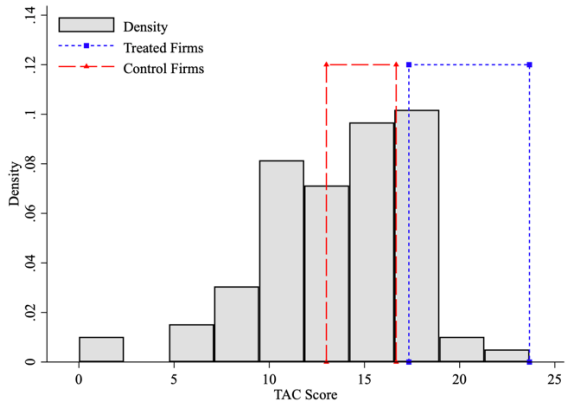
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Figure 1: Distribution of TAC scores by round and treatment status

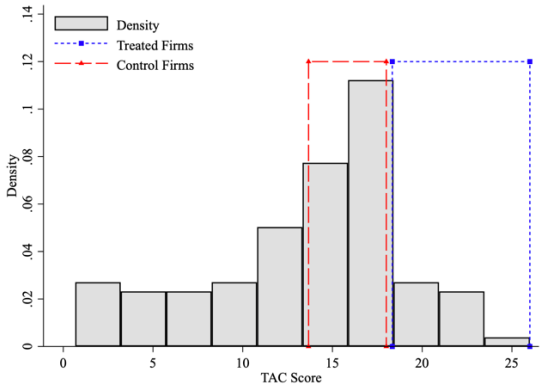
A. Round 1



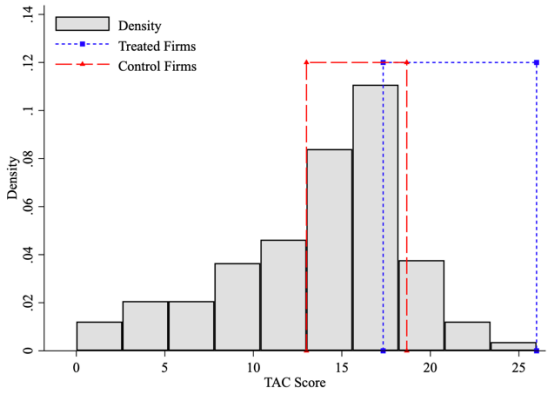
B. Round 2



C. Round 3



D. All rounds (combined)



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* Histograms of scores that firms received upon submitting their proposals to the TAC. The blue [red] area represents firms included in our survey in the treatment [control] group. Firms outside the blue and red areas were not surveyed.

* Figure 1 presents the distributions of scores that the TAC gave to applicant firms in each round of the IA. The blue area represents the range of scores among those firms that were selected for on-site visits. The red area includes control firms that met the two previous criteria and had relatively high scores, but ultimately were not chosen to receive TA. This process allowed us to increase the comparability between the treatment and control groups. For example, in Round 1 this process eliminated 106 firms out of the 132 applicants in this round. These firms would have been very unlikely to receive assistance based on their low quality of their application and would have constituted a poor comparison for the winning SMEs. Overall, we discarded 247 firms that would have been "poor controls" across the three IA rounds.

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Table 1: Baseline characteristics

	Control	TA (by itself or with FA)	Both TA/FA	Differences		TA Only	Diff
	(A)	(B)	(C)	(B) - (A)	(C) - (A)	(D)	(C)-(D)
Respondent characteristics							
Respondent is female	0.50	0.37	0.36	-0.13	-0.14	0.38	-0.01
	(0.50)	(0.50)	(0.50)	(0.13)	(0.17)	(0.52)	(0.24)
Respondent's age	42.40	41.63	40.91	-0.77	-1.49	42.63	-1.72
	(11.98)	(13.32)	(13.85)	(3.31)	(4.09)	(13.43)	(6.36)
Highest Level of Education							
Secondary education /	0.25	0.16	0.18	-0.09	-0.07	0.13	0.06
Diploma	(0.44)	(0.37)	(0.40)	(0.11)	(0.14)	(0.35)	(0.18)
College-educated	0.35	0.37	0.36	0.02	0.02	0.38	-0.01
	(0.48)	(0.50)	(0.50)	(0.13)	(0.16)	(0.52)	(0.24)
Postgraduate education -	0.40	0.47	0.45	0.07	0.05	0.50	-0.05
highest educ level	(0.50)	(0.51)	(0.52)	(0.13)	(0.17)	(0.53)	(0.25)
Respondent owns firm	0.77	0.68	0.73	-0.09	-0.04	0.63	0.1
	(0.43)	(0.48)	(0.47)	(0.12)	(0.14)	(0.52)	(0.23)
Respondent manages	0.75	0.79	0.82	0.04	0.07	0.75	0.07
firm	(0.44)	(0.42)	(0.40)	(0.12)	(0.14)	(0.46)	(0.20)
Firm characteristics							
Firm age	70.83	70.24	73.09	-0.59	2.27	65.00	8.09
(in months)	(40.94)	(48.55)	(56.50)	(12.53)	(15.17)	(33.29)	(25.36)
Firm is in	0.33	0.32	0.45	-0.01	0.13	0.13	0.33
Nairobi	(0.47)	(0.48)	(0.52)	(0.13)	(0.16)	(0.35)	(0.21)
Sector in value chain							
Agro-input	0.19	0.26	0.09	0.07	-0.1	0.50	-0.41**
supply	(0.40)	(0.45)	(0.30)	(0.11)	(0.13)	(0.53)	(0.19)
Aggregator	0.46	0.37	0.45	-0.09	-0.01	0.25	0.2
	(0.50)	(0.50)	(0.52)	(0.13)	(0.17)	(0.46)	(0.23)
Broker	0.02	0.05	0.00	0.03	-0.02	0.13	-0.13
	(0.14)	(0.23)	(0.00)	(0.04)	(0.04)	(0.35)	(0.11)
Processing	0.65	0.68	0.64	0.03	-0.02	0.75	-0.11

		(0.48)	(0.48)	(0.50)	(0.13)	(0.16)	(0.46)	(0.23)
	Wholesale	0.37	0.26	0.27	-0.1	-0.09	0.25	0.02
		(0.49)	(0.45)	(0.47)	(0.13)	(0.16)	(0.46)	(0.22)
	Retail	0.48	0.32	0.27	-0.16	-0.21	0.38	-0.1
		(0.50)	(0.48)	(0.47)	(0.13)	(0.17)	(0.52)	(0.23)
N		52	19	11			8	

Notes: Includes firms interviewed at baseline, regardless of their participation in the endline survey. We report standard deviations for means and standard errors for tests of differences in means in parentheses. * p <0.1, ** p<0.05, *** p<0.01

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Table 2. Experience with GAIN and other training programs at baseline

	Control	TA (by iself or with TA)	Both TA/FA	Differences		TA Only	Diff
	(A)	(B)	(C)	(B) - (A)	(C) - (A)	(D)	(C) - (D)
Experience w/ Community of Practice							
Member of GAIN's	0.79	0.95	0.91	0.16	0.12	1.00	-0.09
COP	(0.41)	(0.23)	(0.30)	(0.10)	(0.13)	(0.00)	(0.11)
Firm has attended a	0.56	0.95	0.91	0.39***	0.35**	1.00	-0.09
COP event	(0.50)	(0.23)	(0.30)	(0.12)	(0.16)	(0.00)	(0.11)
Rating of COP	1.24	2.28	2.09	1.04**	0.85	2.57	-0.48
event's usefulness	(1.60)	(1.18)	(1.38)	(0.41)	(0.52)	(0.79)	(0.57)
Other training							
Received training	0.69	0.47	0.45	-0.22*	-0.24	0.50	-0.05
from NGO	(0.47)	(0.51)	(0.52)	(0.13)	(0.16)	(0.53)	(0.25)
Received training from	0.23	0.37	0.45	0.14	0.22	0.25	0.2
a consulting firm	(0.43)	(0.50)	(0.52)	(0.12)	(0.15)	(0.46)	(0.23)
Other training (from	0.17	0.32	0.27	0.14	0.1	0.38	-0.1
univ., tech. school, etc.)	(0.38)	(0.48)	(0.47)	(0.11)	(0.13)	(0.52)	(0.23)
N	52	19	11			8	

Notes: Includes firms interviewed at baseline, regardless of their participation in the endline survey. We report standard deviations for means and standard errors for tests of differences in means in parentheses. * p <0.1, ** p<0.05, *** p<0.01

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Table 3: Summary statistics of firm performance at baseline and endline

A. Baseline

	Control	TA (by itself or with FA)	Both TA/FA	Differences		TA Only	Diff
	(A)	(B)	(C)	(B) - (A)	(C) - (A)	(D)	(C) - (D)
Number of products	8.04	14.47	17.91	6.44**	9.87***	9.75	8.16*
sold by the firm	(9.16)	(10.39)	(12.00)	(2.55)	(3.21)	(5.28)	(4.56)
Firm has launched new	0.44	0.42	0.55	-0.02	0.1	0.25	0.3
prod in last 12 months	(0.50)	(0.51)	(0.52)	(0.13)	(0.17)	(0.46)	(0.23)
Share of revenue from new	8.83	3.31	5.25	-5.52	-3.58	1.38	3.88
products (percent points)	(21.60)	(8.36)	(11.36)	(5.56)	(7.85)	(3.50)	(4.20)
Total employees at	10.35	15.63	17.73	5.28*	7.37*	12.75	4.98
baseline / endline	(10.81)	(13.01)	(14.51)	(3.07)	(3.83)	(10.87)	(6.10)
N	52	19	11			8	

B. Endline

	Control	TA (by itself or with FA)	Both TA/FA	Differences		TA Only	Diff
	(A)	(B)	(C)	(B) - (A)	(C) - (A)	(D)	(C)-(D)
Number of products	9.09	17.21	21.55	8.12***	12.45***	11.25	10.3**
sold by the firm	(6.16)	(11.37)	(12.54)	(2.21)	(2.62)	(6.14)	(4.83)
Firm has launched new	0.39	0.68	0.73	0.3**	0.34**	0.63	0.10
prod in last 12 months	(0.49)	(0.48)	(0.47)	(0.13)	(0.16)	(0.52)	(0.23)
Share of revenue from new	7.71	19.89	11.00	12.18**	3.29	32.13	-21.13*
products (percent points)	(16.24)	(27.22)	(14.55)	(5.59)	(5.39)	(36.16)	(11.96)
Total employees at	9.44	16.11	17.27	6.67	7.83	14.29	2.99

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baseline / endline	(16.01)	(16.20)	(17.67)	(4.54)	(5.55)	(14.74)	(8.04)
Total employees	9.85	19.53	19.00	9.68**	9.15*	20.29	-1.29
in Feb 2020	(13.32)	(16.09)	(16.10)	(4.10)	(4.91)	(17.32)	(8.18)
N	52	19	11			8	

We report standard deviations for means and standard errors for tests of differences in means in parentheses. * p <0.1, ** p<0.05, *** p<0.01.

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Table 4: Impact of GAIN's assistance on new products and number of employees

	Launched a new product in last 12 months 1/.			Share of revenue from new products 2/.			Employees (February 2020, Pre COVID)			Employees (at time of endline)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
TA / FA	0.314**	0.140	0.295*	12.874**	0.926	13.124	6.679*	4.868	15.317***	2.341	1.733	5.632
	(0.129)	(0.187)	(0.153)	(5.858)	(8.420)	(9.004)	(3.583)	(4.683)	(3.491)	(3.894)	(4.983)	(5.250)
Value of outcome	0.283**	0.218	0.559**	0.146	0.132	0.245	0.647***	0.569**	-0.338	0.774***	0.638**	0.466
at baseline	(0.119)	(0.183)	(0.209)	(0.148)	(0.234)	(0.413)	(0.142)	(0.209)	(0.250)	(0.153)	(0.234)	(0.375)
Observations	63	63	44	55	55	39	57	57	41	59	59	43
R-squared	0.154	0.384	0.290	0.093	0.471	0.108	0.343	0.691	0.468	0.338	0.669	0.155
Rand Inf p-val 3/.	0.016	0.446	0.0890	0.0210	0.922	0.142	0.0670	0.276	0.00	0.561	0.706	0.241
Control variables 4/.	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes	No
Group Fixed Effects	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Number of groups			17			17			17			17

In the first column of each outcome, we estimate ANCOVA regressions without any covariates. In the second column, we estimate ANCOVA regressions including controls. The third column is a fixed effects regression (based on the paired sample). Standard errors in parentheses. * p <0.1, ** p<0.05, *** p<0.01.

1/. Binary indicator for whether a firm had launched a new product in the past 12 months
2/. Share of revenue from new products (i.e., 1% =1, 2% = 2,…, 100% = 100).
3/. Due to our small sample size, we also estimate p-values based on randomization inference methods.
4/. Includes respondent characteristics (age, sex, level of education, and whether the respondent is the manager or owner of the firm), firm characteristics (age, whether it is located in Nairobi or elsewhere), indicator variables for the firm's sector in the agricultural value chain (agro-input supply, aggregator, broker, processor, wholesale, retail), previous business trainings (by NGOs, consulting firms, or other institutions), COP experience (whether the firm was a member of GAIN's COP, whether the firm had ever attended a COP meeting, and their rating of these meetings), and indicator variables for the months of the endline phone survey and the email.

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