RESEARCH AND IMPACT REPORT

Ghana

Rural Enterprise Programme (REP) – Phase III

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List of acronyms

ATET	Average Treatment Effect on the Treated
BAC	Business Advisory Centre
BDO	Business Development Officers
BDS	Business Development Services
BRC	Business Resource Center
CAPI	Computer Assisted Personal Interview
MT	Mainstreaming Themes
DA	District Assembly
EBE	Enabling Business Environment
GHC	Ghanaian Cedi
GLSS	Ghana Living Standards Survey
GoG	Government of Ghana
IA	Impact Assessment
ICT	Information and Communication Technologies
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
IPW	Inverse Probability Weighting
IPWRA	Inverse Probability Weighting with Regression Adjustment
LCU	Local Currency Unit
MGF	Matching Fund Grant
MSE	Micro and Small Enterprises
MT	Mainstreaming Theme
NGO	Non-Governmental Organization
OG	Overarching Goal
PCA	Principal Component Analysis
PFI	Participating Financial Institutions
PMU	Project Management Unit
PSM	Propensity Score Matching
RIA	Research and Impact Assessment
RCB	Rural Community Bank
REDF	Rural Enterprises Development Fund
REP	Rural Enterprise Program
RTF	Rural Technology Facilities
RTSC	Rural Technology Service Center
SO	Strategic Objectives
TOC	Theory of Change
TTP	Technology Transfer and Promotion
UPS	Unequal Probability Sampling
WEAI	Women's Empowerment in Agriculture Index

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Executive Summary

As in many developing countries, rainfed agriculture remains the main source of income, livelihoods, and employment in Ghana. Despite its impressive economic progress in recent decades, sharp income inequality, limited access to economic opportunities, and narrow intergenerational mobility, especially for the rural poor and vulnerable groups, are among the most severe challenges in the country. One of the policy options pursued by the Government of Ghana (GoG) to spur sustainable and equitable growth as well as poverty reduction is the development of the micro and small enterprises (MSEs) sector, which has not delivered as expected due to various limitations including financial constraints and lack of business management skills that hamper the efficient performance of MSEs.

Ghana's Rural Enterprises Programme (REP) is part of the GoG efforts to reduce poverty and improve living conditions in rural areas. It is an example of the commitment of the GoG and its development partners to scale up successful projects to achieve Ghana's development plan. REP aims at enhancing the contribution of the MSEs to poverty reduction. The development objective of the program is to increase the number of rural MSEs that generate profit, growth, and employment opportunities to subsequently improve people's livelihoods and incomes. The program targeted the entrepreneurial poor with the potential to convert program's capacity building support into productive assets. Core elements of the program include provision of business advisory and facilitation services, provision of technical skills training and dissemination of relevant technologies, support to access to finance through matching grant funds and refinancing facilities for participating financial institutions, and strengthening the capacity of MSEs supporting institutions.

REP was implemented in three Phases. Phases I & II were implemented from 1995 to 2012 in 66 districts nationwide. REP I and REP II contributed to the successful implementation of Ghana's strategies for MSEs promotion. The third phase (REP III) has been implemented since 2012 to upscale and mainstream a district based MSEs support system implemented during REP I &II. The program's original completion date of 2020 has been extended until 2024 after this Impact Assessment (IA) has been conducted.

The current report presents results from the IA of REP III, which was conducted as part of the IFAD11 IA agenda, through which IFAD is analysing the impacts of a sample of 24 projects (that closed between 2019 and 2021) to learn lessons for improved programming as well as to estimate the overall impact of its portfolio using an aggregation analysis. This study was implemented by the Research and Impact Assessment (RIA) Division of IFAD in collaboration with the International Food Policy Research Institute (IFPRI). Using household survey data collected nationwide, program impacts were estimated on program-related indicators as well as several other indicators of economic mobility, productive capacity, resilience, food security, and women's empowerment. Average treatment effects were estimated by comparing average outcomes associated to REP clients with those associated to REP non-beneficiaries using statistical quasi-experimental matching techniques.

Overall, REP III has largely achieved its objective of enhancing the business management skills and financial integration of the rural poor, which are essential ingredients for a sustainable poverty reduction. Beneficiary households are 16 percentage points more likely than control households to use essential business skills to manage their activities. Moreover, the likelihood of applying for a loan as well as the odds of getting it approved is higher for beneficiary households by 18 and 13 percentage points, respectively, relative to the comparison group. The program also had a positive impact on overall household (gross and net) income and asset accumulation. In absolute terms, being a REP III client is associated with an increase in net annual household income by GHC 4,105 ($2,089), representing a 50% change. This positive impact mostly derives from enhanced contribution of self-employment to total household income, larger by 18 percentage points in beneficiary households compared to the comparison

group. Given that we do not find statistically significant income difference at the intensive margin (*i.e.*, among a sub-sample of households with self-employment), the income effect is mostly driven REP III's effect on the likelihood of being self-employed and not on the profitability of self-employment activities, the shift in household income structure away from less profitable crop activities towards non-agricultural income did generate substantial overall income gains. REP III has also had a significant positive impact on household food security, measured using household dietary diversity score (HDDS) as well as food insecurity experience scale (FIES). Moderate and severe food insecurity decreased by 14 percentage points in beneficiary households with their HDDS increased by 10%.

Finally, impact estimates show that the likelihood to achieve empowerment was higher by 13 percentage points among women in beneficiary households compared to control. Consistently, the intra-household inequality score has been improved for program participants.

1. Introduction

Off-farm employment is increasingly becoming an important instrument of economic growth and development in many developing countries including Ghana (Bezu et al., 2012; Diao & Silver, 2017; Nagler & Naudé, 2017; Oppong et al., 2014; Owusu et al., 2011). In addition to benefiting individuals and households engaged in the sector, off-farm employment contributes to the development of agricultural and service sectors through forward and backward linkages (Larson & Shaw, 2001).

In Ghana, even though the majority of rural population earns their income directly from agriculture, rural households are progressively more likely to diversify their primary occupation and engage in non-farm MSEs, mostly in the informal sector (Diao & Silver, 2017; Oppong et al., 2014; Osei-Boateng & Ampratwum, 2011). Rural MSEs development in Ghana is compromised by low access to finance linked to underdeveloped and imperfect financial markets, lack of liquidity (especially for long-term lending) in many Rural Community Banks (RCBs), and structurally high real interest rates, as well as by weak capacities of MSEs to meet creditworthiness criteria. Moreover, women and youth (defined as those between the ages of 18 and 35, YSEG (2021)) are further disadvantaged, respectively, by socio-cultural Similar to most countries in sub-Saharan Africa, Ghana has a young age structure with an estimated 55% of the population under the age of 25. Given the low education and experience levels of this age group, Ghana's youth face high market entry barriers. Unemployment rate among Ghana's youth is significantly higher than the national rate, with a large segment of youth out of the labor force as discouraged.

The definition of Micro and Small Enterprises (MSEs) in Ghana varied over time and according to various institutions (Oppong et al. 2014). Both the amount of investment in machinery and equipment as well as capital cost and turnover have previously been used to define MSE. The National Board for Small Scale Industries (NBSSI)[1] defines MSE as enterprises employing 29 or fewer workers and further classifies MSEs with less than 5 employees as micro enterprise and those with 6 – 29 employees as small enterprise. MSEs account for about 92% of all businesses in Ghana, approximately two thirds of all non-agricultural jobs, and as much as 20% of Ghana's GDP (Oppong et al., 2014). They are thought to comprise around 80% of the service and manufacturing sectors, covering a wide variety of economic activities such as trading, agro-processing, traditional catering, metal work, carpentry, tailoring, car mechanics and repair, and personal services (e.g., hairdressing or beauty care). Ghana's rural MSE sub-sector is characterized by low productivity and competitiveness levels, with entrepreneurs often undertaking informal labor-intensive, self-employment activities, making use of traditional technologies and unskilled labor or family members, and having little or no access to basic financial services. As in most developing countries, MSEs in Ghana operate mostly in the informal sector that is characterized by low productivity and efficiency, absence of social security and other social protection mechanisms for workers, and low (or zero) access to credit are all typical aspects of the informal sector (Mahadea & Zogli, 2018; Osei-Boateng & Ampratwum, 2011).

The Rural Enterprises Programme (REP) is part of Ghana Government's efforts to reduce poverty and improve living conditions in rural areas. REP aims to serve as a foundation for long term results by facilitating the creation of sustainable MSEs in the rural sector. REP is addressing existing market imperfections (i.e., low access to finance, entry barriers for sub-groups of the population) through its components and activities. A stronger enabling environment for MSEs, coupled with the empowerment of most vulnerable groups, is expected to promote better livelihoods through the increase of household incomes and lead to secondary benefits such as increased school enrolment and food security. In its third phase, the program is part of the Government strategy for MSEs promotion in Ghana and is incorporated in the Ghana Poverty Reduction Strategy (GPRS) I and II with the overall objective to achieve equitable economic growth and accelerated poverty reduction. It also aims to contribute to the Medium-Term

[1] http://www.nbssi.org/

National Development Plan (MTNDP) 2010-2019 called "An Agenda for Shared Growth and Accelerated Development for a Better Ghana".

REP was implemented in three phases, with phase one (REP I) implemented from 1995 to 2002 in 13 districts in the Ashanti and Brong-Ahafo regions; phase two (REP II) implemented in 66 districts across the country from 2003 to 2011; and phase three (REP III), implemented from 2012 and until 2022. REP III was implemented to scale up the district based MSE support system within the public and private institutions and covered all rural districts in Ghana, including the 66 REP I and II districts. Its specific goal was to improve the livelihoods and incomes of rural poor micro and small entrepreneurs by increasing the number of rural MSEs that generate profit, growth and employment opportunities. REP III primarily targeted the entrepreneurial poor, ranging from rural people interested in self-employment but requiring some entrepreneurship and financing training, to vulnerable individuals or groups such as women, youth, disabled, or people living with HIV/AIDS. REP III had four different complementary components, aiming to provide the necessary technical support to the clients not only at the start of their activity but also in subsequent stages.

This report presents results from the impact assessment (IA) of REP III conducted between 2019 and 2021. Initial preparation for data collection was paused in March 2020 following the outbreak of the Coronavirus disease (COVID-19). Survey staff trainings (for those already trained in 2020 and for new staff) was resumed in January 2021 upon securing IRB approval from IFPRI and locally. The remainder of the report is structured as follows. Section 2 describes REP III (e.g., program components, target population, and theory of change) and outlines the main research questions answered by the IA. Section 3 describes the IA design, data, and identification strategy used. Section 4 describes the profile of the project area and study sample. Section 5 discusses the implications of COVID-19 for the IA and presents descriptive statistics on the effects of COVID-19 outbreak. Section 6 presents and discusses IA results on intermediate program outcomes and core economic indicators, and section 7 concludes with recommendations for future program design.

2. Theory of Change and Main Research Questions

2.1 REP III Theory of Change

Figure 1 shows the Theory of Change (TOC) of REP III consisting of four main inputs: 1) Business Development Services; 2) Technical Skills and Technologies; 3) Access to Finance; and 4) Institutional Support. Activities under inputs 1 and 2 included trainings in managerial and technical skills based on clients' needs (e.g., training of literate youth in agri-business at the farm institutes or training of apprentices on production of equipment for agribusiness). These interventions are expected to enhance entrepreneurial skills, enhance access to technologies, market platforms and workshop businesses, and enhance the overall performance of the rural entrepreneurial sector

Inputs 3 and 4 focused on improving MSEs access to credit and supporting institutions. Activities under these two categories focused on enabling REP clients to access different rural funds and strengthen the capacity of support institutions including district assemblies. These interventions are expected to enhance the number of enterprises; their access to credit, productivity, profitability; create employment opportunities; and improve various economic outcomes including income, livelihoods, resilience, and empowerment of women and youth. Ghana has low level of financial inclusion with only 40% of adults owning an account at a formal financial institution and 23% of small and medium firms having a bank loan or line of credit (World Bank Group, 2016).

Figure 1. REP III's Theory of Change

2.2 Programme Coverage and Targeting

To develop the full potential of rural MSEs in Ghana, a district-based model for MSE promotion has been piloted by REP since 1995. The REP model is based on three main components: (i) promoting access to Business Development Services (BDS) through a district-based Business Advisory Centre (BAC); (ii) enhancing Technology Transfer and Promotion (TTP) through technical skills training and demonstrations, mainly delivered by Rural Technology Facilities (RTF); and (iii) creation of Enabling Business Environment (EBE), which includes access to rural finance and institutional capacity building and policy dialogue as subcomponents.

The first (BDS) component aims at upgrading the technical and entrepreneurial skills of rural MSEs. It is being implemented through the Business Advisory Centers (BACs), which are being upgraded into Business Resource Centers (BRCs), to establish a more sustainable district level business development service delivery system. The transformation foresees the establishment of 67 BRCs and the upgrade of the remaining 97 BACs. Beneficiaries of this component received various types of trainings on technical and management skills, as well as individual and group start-up kits. Moreover, this component sought to consolidate its gains by supporting the creation of profitable and viable agricultural and rural enterprises, such as e-commerce platforms and a premium equity greenhouse vegetable chain, for the youth.

The second (TTP) component aims at upgrading the level of technology of the rural MSE sector by facilitating promotion and dissemination of appropriate technologies in the form of skills training (e.g., in technology improvement; apprentices on production of equipment for agribusiness; and usage, maintenance and servicing of agribusiness equipment); manufacture of processing equipment, testing and promotion of prototypes. Under REP I, three Rural Technology Service Centers (RTSCs) were established. Under REP II, 18 Rural Technology Facilities (RTFs) were established in collaboration with GRATIS Foundation and the District Assemblies (DAs). Both the RTSCs and RTFs are essentially engineering workshops equipped with relatively modern machines for welding and fabrication, wood-working and carpentry. REP III has established 5 new RTFs, which together with existing 21 RTFs of REP I and REP II, serve as focal points for delivery of services.

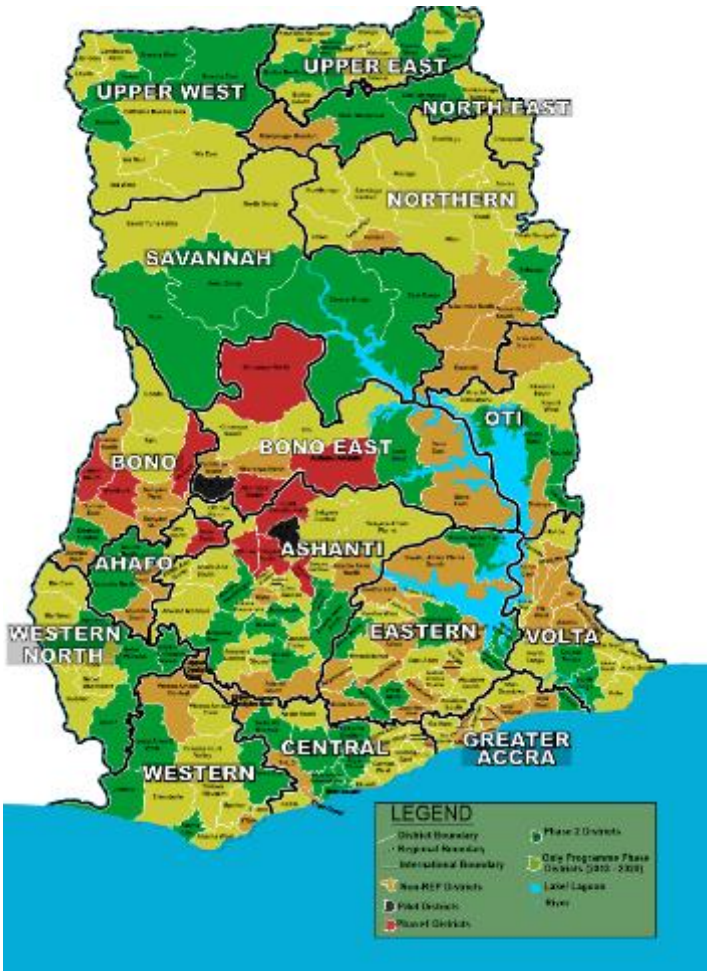
The third (EBE) component aims to promote access to rural finance by facilitating linkages with participating financial institutions (PFIs), including Rural and Community Banks (RCB) and their ARB Apex Bank, and training clients in financial literacy for credit. Credit sources include financial institutions' own funds; Rural Enterprises Development Fund (REDF), and Matching Grant Fund (MGF). MGF were established to enhance access to and the social benefits of economic and financial groups (especially women) and to facilitate a graduation process for youth, i.e. from apprenticeship or training to profitable business ownership through start-up kits and financing to invest in productive assets. In addition, for REP III, the Youth Business Development Fund and the Graduate Youth Challenge Fund have been created for youth. The former seeks to facilitate access to a loan worth 30% of the investment from the PFIs for participating youth. The latter targets innovative and scalable projects in the agribusiness/value chain and information and communications technologies (ICT) that have the potential to solve problems within the agricultural value chains and create jobs for the benefit of rural communities. Interest rates for all these products range between 22% and 44%. The EBE component has a sub-component aimed at institutional capacity building and policy dialogue.

In addition, the program has co-ordination and management component to facilitate program activities and effective project monitoring and evaluation (M&E). Key innovations of M&E are: (i) the use of web-based technology for decentralized project data entry; (ii) monitoring of institutional performance of BACs and RTFs, combined with performance counselling; and (iii) monitoring of the efficiency and effectiveness of REP tools.

REP has three main targeting strategies. The first is geographic targeting involving an expansion strategy to cover all rural districts nationwide under phase III, including the 66 districts targeted by REP I and II

(Figure 2). This geographic expansion is implemented on a demand-driven basis based on criteria that include: (i) importance of agriculture in the district; (ii) district poverty level; and (iii) DA's willingness to participate as well as their readiness and capacity to establish BRCs. The REP district- based model for MSE development is perceived as an effective tool for rural MSE development and poverty reduction by the Government of Ghana, the DAs, IFAD, as well as the African Development Bank. Through the help of DA members, opinion leaders, local organizations, communities in target districts were sensitized, and potential target groups were identified.

Figure 2. REP coverage and implementation in Ghana



Source: REP PCMU

The second strategy is self-targeting, where program participation is open to all eligible clients, and BRCs are expected to create an enabling environment to facilitate their access to business support services through the promotion of BRC activities using various communication channels (e.g., local, social, and business organizations, local radio stations, bills boards) and supporting services that are adequately tailored to the needs of the target population. However, inclusion and selection of clients was subject to individuals' capacity to contribute a small amount to the cost of REP services provided. The third targeting strategy involves direct targeting of specific sub-groups to identify marginalized groups including women, youth, the disabled, and people with HIV/AIDS.

2.3 Research questions

Based on REPs III TOC, this quantitative IA aims to answer the following key questions.

1. Did REP III enhance self-employment opportunities and MSEs development?
2. Has REP III improved access to rural finance for MSEs?
3. Has REP III empowered women and youth?
4. Has REP III improved beneficiaries' livelihoods including income, market access, resilience, food security and overall wealth?

Table 1 shows how key research questions relate to IFAD's strategic objectives (SOs), the overarching goal (OG) and mainstreaming themes (MT).

Table 1. Matrix of research questions and IFAD's goal, strategic objectives (SOs) and mainstreaming themes

Research question	OG	SO1	SO2	SO3	MT
	Economic Mobility	Productive Capacity	Market Access	Resilience	Gender, youth, nutrition, climate
Did REP III enhance self-employment opportunities and MSEs development?		X	X		X
Has REP III improved access to rural finance for MSEs?			X		X
Has REP III empowered women and youth?					X
Has REP III improved beneficiaries' livelihoods including income, market access, resilience, food security and overall wealth?	X		X	X	X

3. IA Design: Data and Methodology

3.1 Data

This *ex-post* IA uses a quasi-experimental design, which requires the construction of a comparison group at the end of the program to serve as a counterfactual, i.e., to represent on average the experience of households that closely resemble REP III beneficiaries but did not receive REP III services. Given the nation-wide coverage of the program and the progressive enrollment of districts over time in REP I and II, a clear definition of the population of interest, i.e., the treatment group, comes with challenges. This is because the main objective of this study is to provide a full and representative estimate of impacts attributable to REP III *only*, excluding any confounding effects of previous phases of the program. In other words, the effect of the REP III should be isolated from that of phases I and II, as well as other programs that affect the outcomes of interest.

The evaluation strategy therefore entailed the use of information about enrollment from program M&E data at the client level to define REP III treatment group. This group consists of clients, who enrolled to

REP for the first time between 2012 and 2019 (that is, in phase III). This choice implied excluding REP clients, who participated in phases I and/or II. The sampling frame for REP III evaluation included only *clients* and excluded *participants*. According to REP M&E team, clients were participants, who were upgraded to a "stronger" level of participation based on their willingness to have a prolonged engagement with the BRC.[2] The level of involvement of participants was limited to community-based training and, in most cases, to just one training. Therefore, the impact of the program for participants is expected to be relatively negligible and, in any case, difficult to quantify. The sampling frame also excluded clients, who enrolled after the end of 2019, since this group would unlikely have been fully involved in the business by the time of data collection, given the time needed for setting up a new MSE and making it fully operational.

Implementing these strategic decisions yielded a population of interest for the IA of round 56,000 households located in about 5,693 communities spread across all the 161 rural districts. The identification of a valid counterfactual for REP III was particularly challenging given the national coverage and the self-targeting strategies discussed above. The construction of the counterfactual group for REP III clients involved the following key steps.

1. Using secondary data on the geospatial location of the universe of communities in Ghana and the list of REP III communities, the universe of communities in which there were no REP clients (of any phase), or participants were identified.
2. To minimize potential contamination/spillovers, physical distance buffers were set to restrict the universe of potential control communities based on two conditions:(i) they should be located at least 20 kilometers (kms) away from REP Business Resource Center (BRC); and (ii) at least 3 kms away from the nearest REP III community that may fall outside the buffer.[3] See Figure A 1 in the Appendix.
3. Propensity Score Matching (PSM) was used to identify the best control matches for treated communities. Matching variables included a mix of geospatial data (temperature, precipitation, market access, population density, elevation) as well as key socio-economic variables (poverty rate, mobile and electricity coverage, education, and religion) from the sixth round of the Ghana Living Standards Survey (GLSS6), conducted in 2012/13 (Ghana Statistical Office, 2014).
4. Based on the statistical matching, communities comparable to REP III were identified.
5. Based on the power calculations done (discussed below), control communities were randomly sampled from the list created in step (4).
6. Household listing was conducted in sampled control communities, which, together with the list of REP III clients obtained from the M&E team, formed the sampling frame.

To determine the optimal sample size, statistical power calculations were conducted (see Winters et al., (2010) for details) using data from household food consumption expenditure data from GLSS6. GLSS6 sample was restricted to rural households distributed across all the regions of Ghana.[4] Power calculations were conducted assuming six households per cluster/community, an intra-cluster correlation of 0.35, and minimum detectable effect size of 20%. This resulted in a sample of 1,780 households and 320 communities, split equally between treated and comparison group.

The sampling strategy aimed at ensuring that sampled households were distributed across all the 16 regions. This choice was made to ensure representation of treatment effects by considering the broad geographic coverage of the program. Therefore, starting from the full list of matched treatment and control communities (as described in previous section) and from the results of the power calculations, the

[2] Email communication with REP M&E team.
[3] When defining a buffer of 5km around REP communities (instead of 3km), the number of eligible control communities declined significantly, therefore we use 3 kms buffer instead.
[4] It has to be noted that, as a result of a referendum held in 2018, the Government creatd six new regions that were carved out from four of the existing ones. In particular, the Northern region was split into Northern, North East and Savannah, the Volta region was split into Volta and Oti, the Western region was split into Western and Western North, and the Brong-Ahafo region was split into Brong-Ahafo, Ahafo and Bono East.

treated sample was obtained by randomly selecting 160 communities using unequal probability sampling (UPS) so that clients in districts with large number of clients have a higher probability of being selected. The main (and replacements) sample of REP clients were randomly sampled from the REP client lists provided by the PMU. The control sample was randomly selected in similar proportion as the REP clients within each region as Table 2 shows. Final household data were collected from 1,738 households (817 treated and 921 control).

Table 2. REP-III evaluation survey sample distribution (by region and treatment status)

	Control		Treated		Total	
Regions	**# obs.**	**%**	**# obs.**	**%**	**# obs.**	**%**
Ahafo	28	3.0	17	2.1	45	2.6
Ashanti	220	23.9	196	24.0	416	23.9
Bono East	41	4.5	29	3.5	70	4.0
Bono	28	3.0	24	2.9	52	3.0
Central	89	9.7	166	20.3	255	14.7
Eastern	103	11.2	60	7.3	163	9.4
Greater Accra	20	2.2	16	2.0	36	2.1
North East	70	7.6	6	0.7	76	4.4
Northern	42	4.6	30	3.7	72	4.1
Oti	0	0.0	12	1.5	12	0.7
Savanna	0	0.0	4	0.5	4	0.2
Upper East	49	5.3	80	9.8	129	7.4
Upper West	70	7.6	48	5.9	118	6.8
Volta	42	4.6	18	2.2	60	3.5
Western North	54	5.9	47	5.8	101	5.8
Western	65	7.1	64	7.8	129	7.4
Total	921	100.0	817	100.0	1738	100.0

3.2 Questionnaire and Impact Indicators

The main data collection instruments for REP-III IA were household- and community- level questionnaires. Data were collected through Computer Assisted Personal Interviews (CAPI) using the Survey Solutions software.

The main survey respondent for each module was the household member who was the most familiar with the topic discussed, who in most cases was either the household head or the spouse. The household questionnaire collected information on household demographics, income generating activities, asset ownership, food consumption, access to financial services, and social capital, in addition to pro-WEAI stand-alone modules. As the program targeted actual or potential rural entrepreneurs, a considerable weight was given to the household businesses on which specific details were asked to measure indicators of interest to REP (see below). The pro-WEAI modules were administered to the main adult male and

female in the household. Ideally, the administration of these modules would concurrently happen with a female enumerator interviewing the female respondent and a male enumerator interviewing the male respondent. Whenever this approach could not be adopted, due to logistical or organizational constraints, the same enumerator interviewed consecutively and separately the male and female respondents. In addition, a community survey was administered to key community informants to gather information on access to infrastructure and basic services, economic activities, social capital, and women and youth participation. Information on the distance from the community to the nearest large town, motor road, weekly market, school, and health center were used in the matching algorithm (see section 6).

According to IFAD11 reporting requirements, the household survey collected data on IFAD's goal and SOs, namely: economic mobility (OG), productive capacity (SO1), market access (SO2), and resilience (SO3). In addition, data were also collected to report on household food security and nutrition, status of persons with disabilities, youth and gender (MTs). The survey had a particular focus on women's empowerment measured using an integrated version of the project-level Women's Empowerment in Agriculture Index (pro-WEAI) (Malapit et al., 2019). The index was calculated based on 12 equally weighted indicators mapped to three domains: intrinsic agency (*power within*), instrumental agency (*power to*), and collective agency (*power with*).

The integrated-WEAI (i-WEAI) is a first attempt to integrate the 12 pro-WEAI indicators into "standard" household surveys for project evaluation. The aim is to reduce the interview time of the traditional pro-WEAI approach, while keeping consistency in its 3 domains and 12 indicators. This is done by including as many indicators as possible in the "standard" sections of the household-level questionnaire leaving out only few original questions asked in add-on modules. The i-WEAI developed for the present study is also piloting two new modules designed to measure i) collective agency and ii) time-use agency.

To assess women's empowerment, we calculate (i) the woman's empowerment score, defined as the sum of the indicators; and (ii) the woman's empowerment status, which classifies her as empowered (=1) if he or she achieves adequacy in at least 9 of the 12 indicators. To assess gender parity, we calculate (i) the intra-household inequality score, defined as the difference in the empowerment scores between the two respondents and equal to 0 if the woman is empowered; and (ii) the household's gender parity status, which classifies a household as achieving gender parity (=1) if the woman is empowered or if her empowerment score is at least as high as the empowerment score of the male respondent in her household. Full definitions of the indicators is given in Appendix 5, Table A1. Table A2 gives the survey questions used for the I-WEAI indicators.

Following the TOC presented in Figure 1, additional indicators were also constructed on access to and utilization of credit, employment creation as well as on other dimensions that are important in understanding the specific mechanisms through which the program achieved (or not) its intended impacts. Table 3 presents the list of impact indicators, while
Table 4 illustrates the specific components of the i-WEAI.

Table 3. Key indicators of impact

IFAD Reporting	Theme	Indicator
OG	Economic mobility	• Asset index and changes over time: durables, productive, housing, land, livestock, overall • Household income: gross, net, shares, diversification
SO1	Productive capacity	• Productivity of on-farm and off-farm household business • Adoption of good business management practices

SO2	Market participation	• Business sales and marketing channels
SO3	Resilience	• Ability to recover from shocks • Resilience index
MT	Food security and Nutrition	• Household Dietary Diversity Score • Food insecurity experience scale raw score
	Gender	• Pro-WEAI Indicators • Labor participation in household business
	Youth	• Labor participation in household business

Table 4. i-WEAI indicators

Domain	Indicator
Intrinsic agency (from pro-WEAI)	• Autonomy in income • Self-efficacy • Attitudes about domestic violence • Respect among household members
Instrumental agency (from pro-WEAI)	• Input in productive decisions* • Ownership of land and other assets* • Access to and decisions on credit* • Control over use of income* • Work balance • Visiting important locations
Collective agency (from pro-WEAI)	• Group membership* • Membership in influential groups*
Pilot indicators	• Time use agency • Collective agency, as derived from social networks

Source: Adapted from Malapit et al., 2019
* Denotes indicators that have been adapted from their original form in pro-WEAI.

3.3 Impact Assessment Design

The methodology of this IA can be formalized within the potential outcome framework for a binary treatment case (Rubin, 1974). Let h be an index for household ($\forall\ h = 1, 2, \dots, N$); T_h is an indicator such that $T_h = 1$ if h is a beneficiary and $T_h = 0$ otherwise (as defined above); and y_h^1 and y_h^0 represent the outcomes when $T_h = 1$ and $T_h = 0$, respectively. Unit $h's$ observed outcome (y_h) is given by $y_h^0 + \Delta_h T_h$, with $\Delta_h = y_h^1 - y_h^0$ measuring treatment effect on h. Since we only observe either y_h^1 or y_h^0 and not both ($\forall\ h$), we cannot observe Δ_h. The main parameter of interest is the average treatment effect on the treated (ATET) given by $(y_h^1 - y_h^0 | T_h = 1, \boldsymbol{X})$, where E is the expectation operator. While the expected value of an indicator for the treated group, i.e. $E(y^1 | T = 1, \boldsymbol{X})$, can be identified from data

from the treated group, assumptions are needed to identify the counterfactual mean, i.e. $E(y^1 | T = 0, \boldsymbol{X})$.

One assumption needed to identify ATET is conditional mean independence of y^0 (Heckman et al., 1998), while a stronger assumption is needed to identify the average treatment effect (i.e. conditional mean independence of both y^0 and y^1). Instead of conditioning treatment selection based on a high-dimensional $\boldsymbol{X}$, Rosenbaum & Rubin (1983) suggest conditioning on the conditional treatment probability given $\boldsymbol{X}$ known as the propensity score: $Pr(T = 1|\mathbf{X} = x)$. The second assumption needed to identify ATET is the existence of control units for each value of x ($x \in \boldsymbol{X}$) or the propensity score (Heckman et al., 1997, 1998; Smith & Todd, 2005), while a stronger assumption is needed to identify the average treatment effect for the whole population (i.e. the need for both treated and control units for each value of x ($x \in \boldsymbol{X}$) or value of the propensity score).

The preferred identification strategy for this IA is the inverse probability weighting with regression adjustment (IPWRA) (Cattaneo, 2010). This estimator allows us to address the endogeneity associated with self-selection into treatment by modelling both treatment selection and outcome variables, which is particularly relevant in the context of non-random treatment assignments as in the case with REP. Let the matrix $\boldsymbol{X}$ represent a vector of observed covariates that may affect REP III participation decision and/or subsequent outcomes but are unaffected by REP III participation. Our corrections to observable differences are based on Equations 1 and 2 that we estimate using probit (for selection into REP III) and ordinary least squares (for outcomes) regressions, respectively.

$$\Pr(T_h = 1) = g(\boldsymbol{X}_h; \boldsymbol{\theta}) + \varphi_h \quad (1)$$

$$y_h = f(\boldsymbol{Z}_h; \boldsymbol{\beta}) + \varepsilon_h \quad (2)$$

where $g(\cdot)$ and $f(\cdot)$ are assumed functional forms; $\boldsymbol{Z}$ is a vector of covariates affecting y (and whose elements may overlap with those of X); $\boldsymbol{\beta}$ and $\boldsymbol{\theta}$ are vectors of unknown parameters; φ is selection model error term assumed to have a normal distribution; ε is outcome model error assumed to be independent and identically distributed (i.i.d.) with zero conditional means. Given that survey data were collected at the end of the program, Equation 1 controls for retrospective variables about baseline status or variables captured during the survey but are unlikely to have been affected by the program (see list of variables below). Propensity score matching (PSM) of REP III households with households in comparison group is performed using kernel methods (Epanechnikov kernel and a bandwidth of 0.06).

IPWRA estimator is said to be "doubly robust" meaning that only one of the two models (treatment or outcome) must be correctly specified to consistently estimate treatment effects (Bang & Robins, 2005). IPWRA is consistent if either $f(\cdot)$ or $g(\cdot)$ is correct and is more efficient, especially relative to weighting adjustment, if $f(\cdot)$ is correct (Cattaneo, 2010; Zhao, 2004). On the other hand, IPWRA does not necessarily produce better results if both $f(\cdot)$ and $g(\cdot)$ are misspecified (Kang & Schafer, 2007; Tan, 2010). To verify the robustness of the results, impact estimates from two additional approaches are also computed[5]: propensity score matching based on kernel method (KMATCH), and inverse probability weighting (IPW). While the conditional mean independence is inherently untestable, we assess match quality by examining the balance of covariate distribution between groups using different statistics, which are presented and discussed in Section 6.

[5] These estimates are not presented in the official appendix, but are available upon request from the authors and at the following link: https://www.dropbox.com/s/8p0gzi6f4l54akt/Ghana_appendix4.xlsx?dl=0

4. Profile of the Program Area and Sample

This section discusses the profile of the study sample, which supports the contextualization of impact estimates. To recall, REP aims at improving the living conditions and increasing the incomes of rural poor micro and small entrepreneurs, especially women, youth and people with disabilities. In particular, the development objective of the program is to increase the number of rural MSEs that generate profit, growth and employment opportunities. Statistics on general demographics and involvement in entrepreneurial activities of the final sample are presented in Table 5. Given that respondents were randomly sampled, our descriptive statistics should be representative of the universe of beneficiaries. Given that control households were randomly sampled from a list of households from sampled control communities produced during the household listing exercise, control households are representative of households in target communities.

Table 5. Sample pre-matching characteristics

	Treated mean	Control mean	Diff. (T-C)	p-value
Demographics				
Size of HH	5.1	5.2	-0.0	0.86
Age of HH head (years)	47.5	49.8	-2.3	0.00***
% of youth headed HH (age of head < 33)	11.6	12.8	-1.2	0.45
% of female headed HH	30.0	18.7	11.3	0.00***
% of HH with at least one member with disability	12.0	11.5	0.5	0.75
Self-employment and HH business enterprises				
% of HH with self-emp. Activities	64.4	30.2	34.2	0.00***
% of HH with self-emp. activities in agro processing	11.4	4.0	7.4	0.00***
% of HH with self-emp. activities in manufacturing	21.9	5.4	16.5	0.00***
% of HH with self-emp. activities in services	38.9	22.4	16.6	0.00***
Gender; decision maker on the use of income from self-employment activities				
Only male	18.6	28.1	-9.4	0.00***
Only female	63.5	55.8	7.7	0.03**
Male and Female	17.9	16.2	1.7	0.55
Gender; management of HH self-employment activities				
Only male	20.0	29.5	-9.5	0.00***
Only female	65.0	60.4	4.6	0.20
Male and Female	15.0	10.1	4.9	0.05**

*Note: HH(s) means household(s). Asterisks indicate the level of statistical significance from the t-test of mean differences: * < 0.10; ** < 0.05; *** < 0.01.*

The percentage of female headed households in the treated group is 1.5 times that in the comparison group. In contrast, the proportion of youth headed households (i.e., REP III age cut-off of 33, considering household heads that were less than 25 when the project started in 2012) and families with disabled dependents are similar for both control and treated.

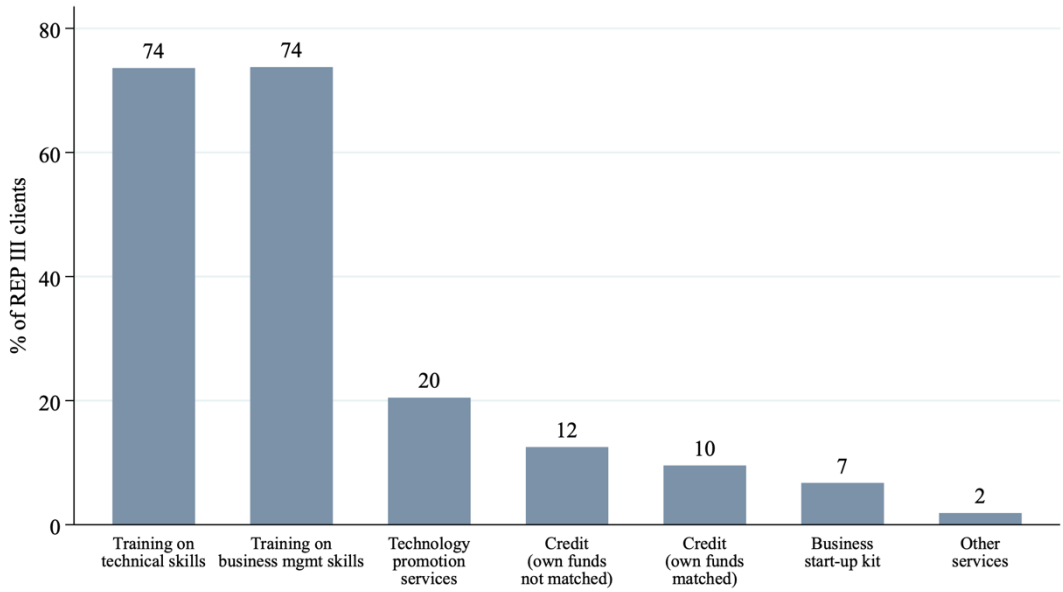
The pre-matching sample mean comparison indicates that REP III clients have been noticeably more involved in self-employment activities in the last 12 months compared to the comparison group. On average, 64% of the treated own a household business enterprise, as opposed to 30% in the comparison group. The business sectoral composition remains roughly similar across the two groups with a higher proportion of MSEs in the service sector. Gender roles in the entrepreneurial sphere also differ between the two groups. On average, in 80% of treated households the family business is managed by females either solely or jointly, compared to 70% for the comparison group. A similar difference is found when looking at only female and joint decision making on the use of income from self-employment activities for the treated (81%) and the control (72%).

Focusing on REP III clients, the survey also gathered data on services received from REP that include: 1) trainings on technical skills, 2) trainings on small business management skills, 3) technology promotion services, 4) financing services with matching grant fund (MGF), 5) financial services without matching grant, 6) business start-up kits and 7) other services. It is worth noting that different REP components were not always delivered sequentially and that clients received services once or multiple times throughout the period 2012 to 2019. While all clients received advisory services during initial contact with officers, they have received different mixes (e.g., training only, training with startup kits, training with microfinance, training with startup kits and microfinance). Treatment intensities, based on the number of times and the initial year respondents received trainings, technology promotion services and credit were computed. The survey also collected data on clients' satisfaction with REP that we also analyze.

Figure 3 gives the proportion of households that received each of the services while

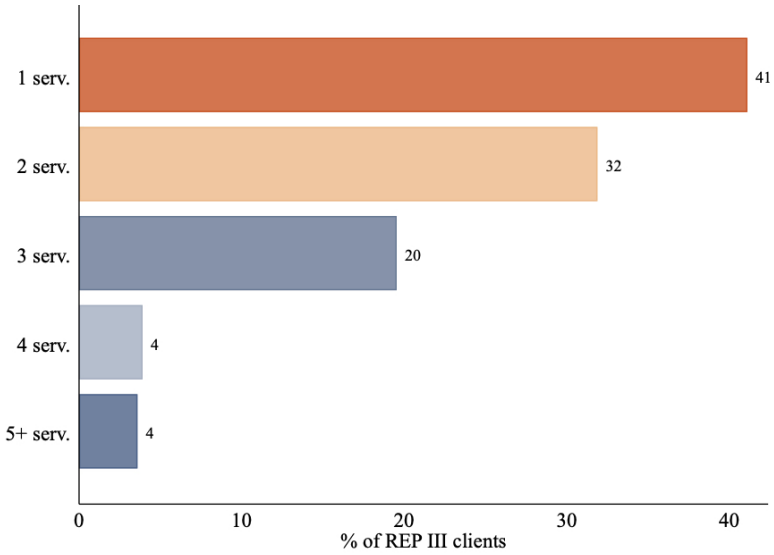
Figure 4 summarizes the total number of REP services received by clients.

Figure 3. Services received from REP III



Note: Some clients have received multiple services, and different mixes.

Figure 4. Number of REP services received, 1 to 5+ (% of clients)



Trainings in technical skills and business management represent by and large the bulk of services provided by REP through the Business Advisory Centers and Rural Technology Facilities. Only 4% of clients benefited from the entire range of services offered by REP. This does not come as a surprise considering that not all REP components were available in all REP-targeted districts. In fact, most clients (75%) received up to 2 services implying that only trainings were offered or paired with one additional service. These different mixes along with statistics on program intensity and satisfaction are summarized in Table 6.

Table 6. REP III clients' characteristics[6]

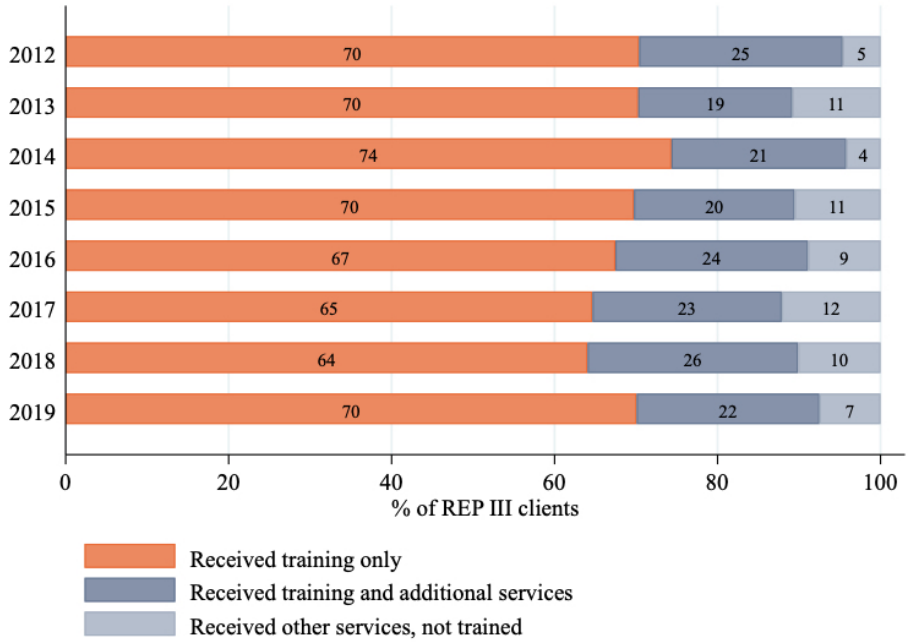
	N	Mean
REP characteristics - services received (mutually exclusive)		
Received training only	640	63.8
Received training and additional services	640	32.5
Received other services, not trained	640	3.8
Clients' satisfaction and intensity of treatment		
Services received assisted with establishing a new business	640	29.7
Number of years household received training	616	1.4
Number of years household received technology promotion	131	1.2

[6] The ex-ante treatment variable was collected among 817 treated households, and was computed based on the listing exercise described in section 3.1 combined with information provided by program implementers. At the fieldwork phase, however, information on the interaction with the project was collected among 640 treated households only. The mismatch between ex-ante treatement status and self-reported treatment status could be due to mismatch between the actual program beneficiary in the client database and the person who responded to questions in the program module and who may not be fully aware of the detials about program particpation. It is not uncommon for there to be a mismatch between M&E data and self-reproted data collected during household surveys. A sensitivity analysis of program impacts according to the two definitions (available upon request) was conducted, yielding similar results.

Number of years household received credit	95	1.1

While nearly two thirds of clients only benefited from REP trainings, the rest of the treated received more comprehensive services including, in particular, microfinance. This service mix remained broadly constant throughout the years (Figure 5). It is worth noting that the microfinance component appears to have faced the most implementation-related challenges, ranging from high attrition of participating rural banks to high cost of microfinance (collateral and interest rate) especially with the MGF. These challenges have also been reported to have negatively impacted the technology promotion component, which might explain the much lower proportion of households receiving services other than trainings.[7]

Figure 5. REP III clients' service mix, 2012-2019



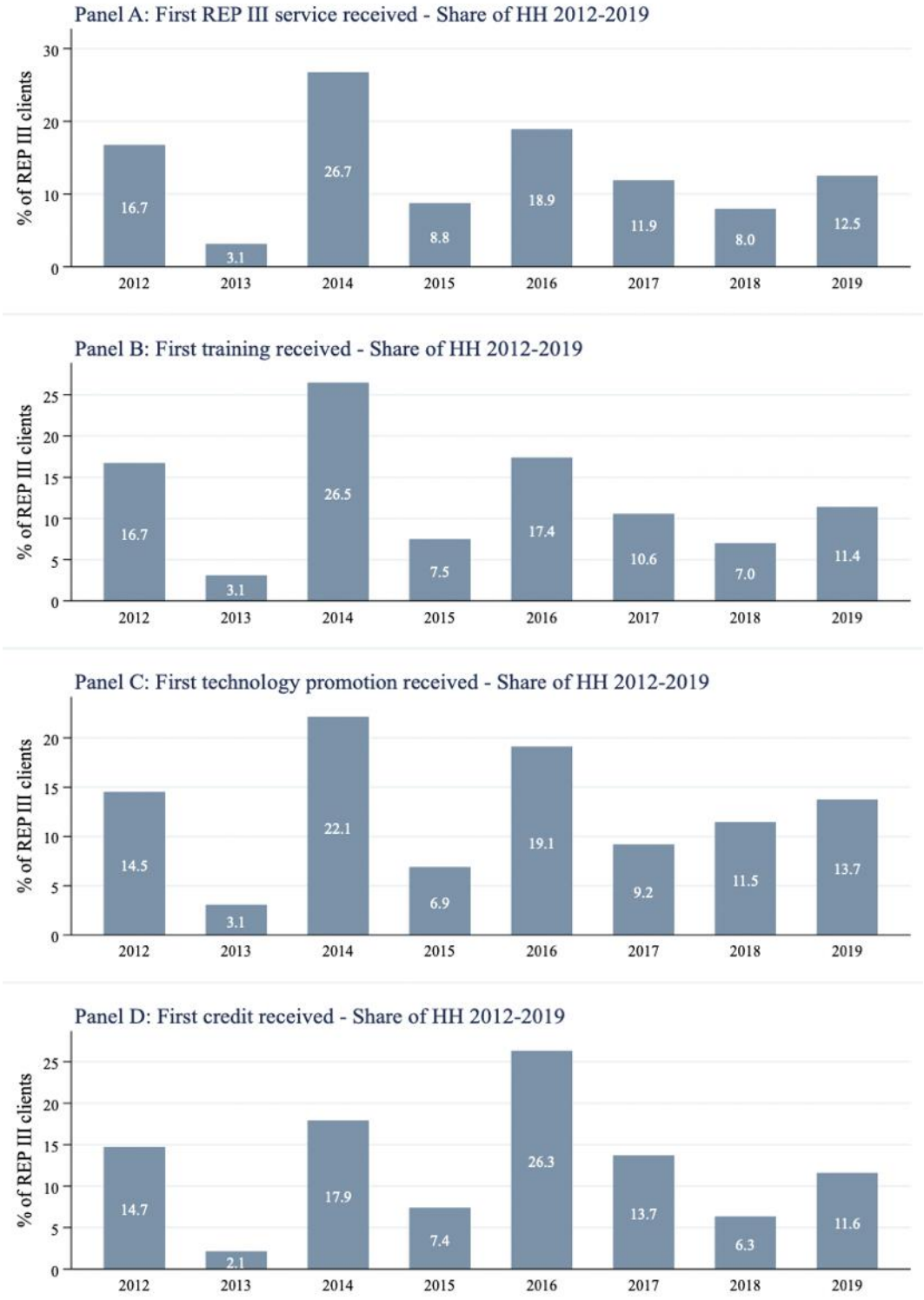
Based on information gathered during the scoping mission, another constraint to REP implementation has to do with the capacity of BACs and other implementation units due to staff shortages following departure of Business Development Officers (BDOs) in Phase III. The PMU noted that BAC could not hire new staff due to the freeze on public sector hiring The freeze in public sector employment started in 2009 and renewed in 2011 till 2015 (Nlenkiba, 2015).

Capacity was also an issue with most REP clients in terms of seeking out and following up with the different REP services. Capacity challenges were compounded by the constant evolution of REP to better align with national level policy changes. In any case, 30% of the respondents found REP III services helpful to start up a new business.

In so far as the intensity of program participation is concerned, clients usually received services only once between 2012 and 2019 and in half of the cases in the first four years of the program period, by 2015 (75% by 2016), as shown in Figure 6. For example, only 12.5% of the beneficiaries were first exposed to REP III in 2019 (Panel A).

[7] Implementation challenges with the microfinance component were related on information provided by financial institutions and clients during the scoping mission.

Figure 6. Participation to REP III, 2012-2019



5. COVID-19 Outbreak

Data collection for REP III IA was originally planned to be conducted in the second quarter of 2020. Starting March 16, 2020, the Government of Ghana (GoG) introduced several restrictive measures for COVID-19 containment, causing the suspension of all field operations. At the time when the government enacted the COVID-19-related measures, IA activities of REP III were already at an advanced stage. The IA team had already conducted and completed several key activities including training of enumerators, field pre-testing and piloting of the questionnaire, household listing in control communities and validation of household lists in treatment communities, and qualitative survey data collection. Specifically, as of March 9, 2020, the supervisors and enumerators were ready to travel to the communities to begin the data collection. Given the increase in COVID-19 cases in the country and while waiting for a decision from the government about possible introduction of containment measures, deployment operations were put on hold. Based on the government decision, field operations were suspended on March 16, 2020 and only resumed almost 11 months later in February 2021.

From March 2020, the GoG's response to the pandemic took several forms, including temporary and partial lockdowns in certain regions and border closings, measures that lead to both demand and supply shocks for self-employment activities and agribusinesses in particular. The Ghana Statistical Service (GSS) together with the German Ministry for Economic Cooperation and Development (BMZ) and in partnership with the United Nations Development Programme (UNDP) estimated that "20.9 percent of agribusiness firms were closed during the lockdown and 11.6 percent remain closed after the lifting of the lockdown," which translated in job losses for 78,412 individuals and extensive wage reduction (GIZ, GSS, UNDP 2021). These findings followed the report of the second wave of the Ghana Business Tracker Survey, fielded between August and September 2020, that emphasizes the dire consequences of the pandemic on Ghanian firms' total revenues from sales (World Bank *et al.*, 2020).

Despite the pervasive effects of the pandemic, cross-country consistency in IA designs and scope led to small changes in the evaluation design, the target groups, and the fielded questionnaire.[8] To assess COVID-19 related disruptions to MSE, the quantitative survey included a set of COVID-19-related questions from which indicators were constructed and included in the impact estimation. Table 7 summarizes relevant data by treatment status. A clear difference is observed in terms of the COVID-19 related assistance received by the treated group, which is significantly higher than that of the comparison group. One third of REP III clients reported receiving assistance to help them cope with the negative effects of the pandemic, while only 7% of the comparison group ended up receiving a similar assistance. At the same time, REP beneficiaries report a larger reduction in their subjective well-being following the outbreak.

[8] For example, expanding the treatment sample to include clients who enrolled throughout 2020 was not recommended.

Table 7. COVID-19 Outbreak: Outcome variables, Treated vs Control (unmatched)

	Treated		Control			
	N. obs	Mean	N. obs	Mean	Diff. (T-C)	p-value
Transfers related to COVID-19 – last 12 months						
HH has income from COVID related transfers (%)	817	33	921	7	26.3	0***
Share of COVID-related transfers over total transfers (%)	397	57	243	17	40.0	0***
Income from public COVID related transfers (LCU)	247	285	43	160	124.5	0***
Income from private COVID related transfers (LCU)	211	222	57	136	85.4	0***
Total Income from COVID related transfers (LCU)	272	431	64	229	201.6	0***
Cash assistance: friends/relatives	25	461	13	502	-40.5	0.74
Food assistance: friends/relatives	11	205	6	158	48.0	0.62
In-kind assistance: friends/relatives	2	100	6	89	11.5	0.85
Cash assistance: Government	58	959	1	600	359.3	0.43
Food assistance: Government	3	1,182	0	.	.	.
In-kind assistance: Government	26	56	10	39	17.1	0.45
Food assistance: NGO/Religious groups	7	131	0	.	.	.
In-kind assistance: NGO/Religious groups	6	10	3	8	2.0	0.84
Water/electricity subsidy: Government	183	168	36	151	16.9	0.49
COVID-19 impact on Self employment						
HH self-employment activities were impacted by the COVID-19 outbreak (%)	817	17	921	5	11.1	0***
Shocks related to COVID-19						
Experienced shocks due to COVID 19 outbreak (%)	817	5	921	3	2.4	0.01***
High prices of agricultural inputs (%)	817	0	921	0	-0.2	0.5
Low prices/demand for agricultural output (%)	817	1	921	1	0.3	0.43
Low prices/demand for non-agricultural output (%)	817	1	921	0	0.6	0.02**
High prices/demand for agricultural output (%)	817	0	921	0	-0.1	0.35
Business failure (%)	817	3	921	1	1.5	0.03**
High prices of major food items (%)	817	1	921	0	0.3	0.38
End of assistance (%)	817	0	921	0	0.1	0.29
Loss of employment (%)	817	0	921	0	0.1	0.29
Illness of hh member (%)	817	0	921	0	0.2	0.13
Theft (%)	817	0	921	0	-0.1	0.35
Subjective well-being before/after COVID-19 outbreak						
Step of the ladder on which HH stood just prior to the COVID-19 outbreak	817	5.0	919	4.3	0.8	0***
Step of the ladder on which HH stands at present after the COVID-19 outbreak	817	4.4	921	4.0	0.5	0***
Subjective well-being before/after COVID-19 outbreak: difference	817	-0.6	919	-0.3	-0.3	0***

*Note: HH(s) means household(s). Asterisks indicate the level of statistical significance from the t-test of mean differences: * < 0.10; ** < 0.05; *** < 0.01. Values are expressed in local currency unit (GHC).*

6. Results

In this section, we present ATET estimates on impact indicators of key project outcomes and impact indicators identified above. To better contextualize impact estimates, we consider first the potential outcome mean, which represents the base case scenario of what would have happened if beneficiaries did not participate in REP III. We then focus on the ATET estimates from IPWRA that show the difference between averages for the beneficiary and comparison groups. As described earlier, outcome and impact indicators are assessed using a matching procedure to ensure comparable baseline and exogenous observed characteristics. The covariates utilized to control for confounding conditions that could influence REP III's impact are identified in the table below.

Table 8. Comparison of Covariates, Pre- and Post-Matching

	Pre-matching			Post-matching		
	Treated	Control	StdDif	Treated	Control	StdDif
Household Demographics						
Size of HH	5.14	5.18	-0.01	5.12	5.6	-0.18
Nb of male HH members of labour age (15-60)	1.36	1.41	-0.04	1.36	1.51	-0.12
Nb of female HH members of labour age (15-60)	1.58	1.47	0.11	1.57	1.64	-0.07
Ratio of children to adults in the HH	0.68	0.64	0.06	0.69	0.67	0.03
Female headed HH	0.3	0.19	0.26	0.29	0.26	0.07
Years of education of household-head	6.75	4.06	0.52	6.65	6.24	0.08
Age of HH head	47.52	49.72	-0.16	47.45	51.03	-0.27
Religion of HH head: Christianity	0.79	0.69	0.23	0.79	0.72	0.15
HH head speaks official language (English)	0.6	0.33	0.56	0.59	0.54	0.11
Ethnicity of HH head: Akan	0.55	0.33	0.46	0.55	0.53	0.03
Baseline Assets						
Livestock asset index owned at baseline: PCA	0.03	0.03	0.02	0.03	0.04	-0.15
Livestock diversification index at baseline: Gini Simpson index	0.29	0.34	-0.12	0.3	0.31	-0.03
Productive asset index owned at baseline: PCA	0.07	0.07	0	0.07	0.09	-0.24
HH owned durable assets at baseline (no land)	0.9	0.86	0.11	0.9	0.97	-0.29
Log of sum of area of parcels owned at baseline (HA)	0.55	0.78	-0.2	0.58	0.51	0.06
Services at baseline						
Distance (km) from the community to the nearest large town	11.48	13.59	-0.18	11.48	11.67	-0.02
Distance (km) from the community to the nearest motorable road	3.53	4.43	-0.14	3.54	3.41	0.02
Distance (km) from the community to the nearest weekly market	4.53	7.93	-0.47	4.58	4.95	-0.06

Distance (km) from the community to the nearest Basic school	1.84	2.07	-0.12	1.85	1.96	-0.07
Distance (km) from the community to the nearest Health center	2.93	4.04	-0.26	2.96	2.88	0.02
Average time (minutes) from the homestead to the main source of drinking water at baseline	8.64	11.2	-0.27	8.71	8.76	-0.01
Bio-Physical						
Log of Average yearly precipitations 1981-2012 (mm)	3.56	3.56	0.01	3.56	3.55	0.06
Log of Elevation (meters)	5.01	4.89	0.15	5.01	5.1	-0.14
Log of Average yearly temperature 1981-2012 (°C)	3.3	3.3	-0.25	3.3	3.3	-0.11

Note. HH(s) means household(s); km: kilometer; HA: hectares; PCA: principal component analysis; StdDif: standardized mean difference.

The final specification of the PSM probit model was assessed for each covariate, using the standardized difference in means presented in Table 8. The standardized mean differences between the treated and comparison groups are small, signaling a negligible bias in the distributions of the covariates after matching. A similar finding can be obtained from graphs presented in Appendix 2. To assess the overall quality of the match, we considered the Rubin's bias (B) and ratio of variances (R) statistics, along with the thresholds outlined in Rubin (2001). Rubin's R refers to the ratio of beneficiary to control variances of the propensity scores while Rubin's B refers to the absolute standardized difference of the means of the propensity score in the beneficiary and comparison groups. The rule of thumb is that Rubin's R statistic should be below 2 to avoid over-correction of bias and above .5 to prevent under-correction while Rubin's B should be below 25. As shown in Table 9, Rubin's B and R after matching are within the recommended thresholds. Ultimately, the estimation sample for the treated versus comparison group comprises a sub-sample of matched households that fall within the common support (783 treated and 886 control).

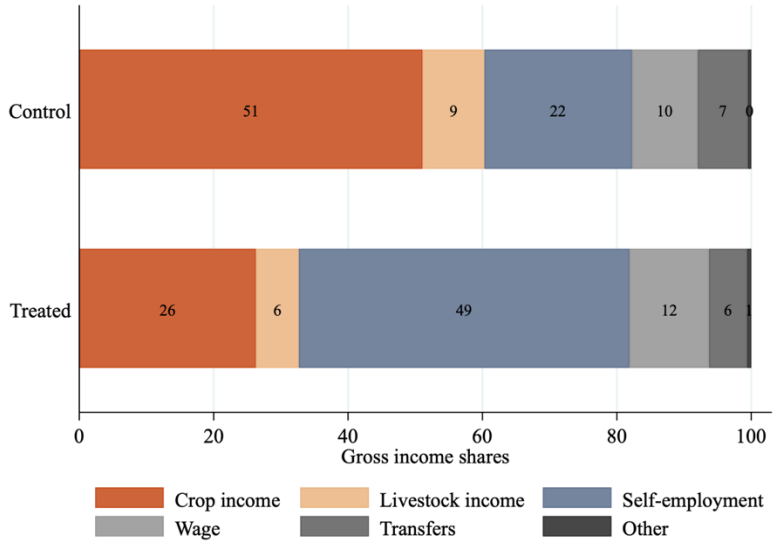
Table 9. Rubin's statistics, matched and unmatched sample

	Rubin's B	Rubin's R
Unmatched	113.36	0.90
Matched	23.22	1.03

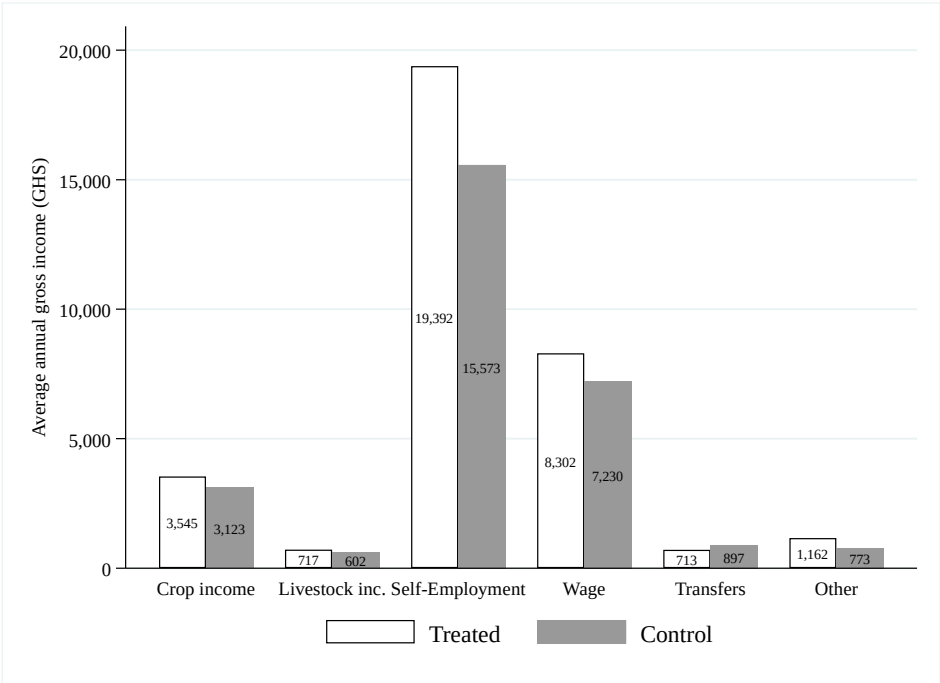
Household livelihoods are predominantly agriculture- and business-based, with the rest of the categories (wage, transfers, and other income) contributing to about 20% of total gross income with strong differences by treatment status. About 60% of gross income among control household is obtained from crop and livestock activities, while 22% is from self-employment business. On the other hand, 49% of REP-III beneficiaries' gross income is from self-employment with agriculture contributing to just 32% (Figure 7 Panel A). In terms of income levels, average self-employment income for REP-III beneficiaries is about 1.2 times more than that for the comparison group (Figure 7 Panel B). The service sector accounts for the lion's share of self-employment accounting for 73% and 54% for, respectively, the beneficiary and comparison groups (see details in Appendix 3).

Figure 7. Gross income sources (matched sample)

Panel A: Gross income shares, treated vs control



Panel B: Gross income in levels, treated vs control



6.1 Overall impacts of REP III

Impact on Program Outcomes

Before presenting overall impact estimates on core indicators, we present ATET estimates on indicators of access to financial services and business management skills.[9] To recall, the primary hypothesis of REP is that giving the chance to rural entrepreneurial poor to convert their capacity-building support into sustainable businesses paired with facilitated financial inclusion will lead to welfare improvements, through higher self-employment income and employment generation.

The positive impact of REP III on financial inclusion and capacity building of rural entrepreneurs is evidenced in Table 10. Firstly, REP III clients significantly more likely to own a bank account. Furthermore, the likelihood of applying for a loan as well as securing a loan is higher for beneficiary households by 18 and 13 percentage points, respectively, relative to the comparison group. Moreover, not only did participation in REP III helped MSEs meet credit worthiness criteria, but it also enabled REP III clients to access loan sizes that are more than 92% bigger than the amount taken up by control[10] households. These estimates are consistent with REP efforts to facilitate access of MSEs to rural finance and are observed despite the seemingly challenging implementation of the credit component noted in section 4. This is an important contribution of REP III in light of financial market realities of Ghana where cost of credit is often cited as one of the important impediments to investments and private sector development (Kwakye, 2010)

For business management skills, which are one of the two training modules provided by REP, results are once again as expected. Within the self-employment category, all indicators examined point to an increased business literacy by about 16 percentage points among rural entrepreneurs partaking in REP. In other words, beneficiary households are more likely to develop essential business skills such as the basics of small business bookkeeping, report keeping, and financial management than households belonging to the comparison group.

Table 10. ATET Results for credit and business management skills

Indicator name	Impact (% /pp.)	PO mean	Nb. of obs.
HH has a bank account (0/1)	13.6***	75.3	1,698
HH has applied for a loan since baseline (0/1)	18.4***	17.9	1,698
HH obtained a loan since baseline (0/1)	12.7***	14.7	1,698
HH had a loan application rejected (0/1)	2.5*	3.5	1,698
Total amount in loans taken out by the HH since baseline (GHC)	92.5***	2,365	320
HH keeps financial records of business/enterprise (0/1)	16.8***	12.3	803
HH records every purchase and sale made by business/enterprise (0/1)	16.3***	9.4	803
HH is able to use records to easily control cashflows (0/1)	17.4***	7.1	804
HH knows which goods make the most profit per item in selling (0/1)	15.7***	29.2	803

*Note: impacts on all variables measured in shares and dummy variables (0/1) are reported in percentage points (pp). Asterisks indicate the level of statistical significance from the t-test of mean differences: * < 0.10; ** < 0.05; *** < 0.01; HH: household; s.-e.: self-employment; GHC: Ghanaian Cedi*

[9] In all tables of results, the ATET using the IPWRA algorithm is presented in percentage change except for variables expressing shares or dummies (0/1) for which estimates are presented in percentage points.

[10] Throughout the result section, averages for the comparison group are denoted as potential outcome means under potential treatment and used interchangeably with control means to describe the impact of project participation.

Given that we established that program participation has increased access to credit and helped improve business management skills, we move to the main research questions of this IA that are related to the ultimate impacts on higher level indicators of interest (summarized in Table 11 and Table 12). We do not find a statistically significant impact on household annual net income from self-employment for those that already have income from this source (Table 11). However, note that this finding is the result of a combined effect on the components of net income: a positive, large and significant increase in gross annual income of 25%, equivalent to GHC 3,888 ($1,978[11]), which is entirely offset by a significant increase in annual costs of self-employment activities of equal magnitude. Therefore, while participation to REP III boosted clients' sales, this positive impact did not translate into higher business profitability. The sectoral decomposition of income shares within the self-employment category offers another interesting result, albeit of low significance. We find that participation in REP III has encouraged engagement in the agro-processing and manufacturing sectors (although impacts are not significant) rather than in services, which is an expected finding given the focus of the program on agro-processors on the one hand and traditional craft, primary production and repairs and other CBTs on the other.

Table 11. ATET Results for self-employment (s.-e.) income

Indicator name	Impact (% / pp.)	PO mean	Nb. of obs.
Income from self-employment (s.-e.) activities			
Total HH gross annual income from s.-e. (GHC)	25.3**	15,390	804
Total HH net annual income from s.-e. (GHC)	24.2	10,125	804
Total HH annual costs of s.-e. activities (GHC)	27.4***	5,264	804
Income shares by sub-sectors of s.-e. activities			
Share of net income from agro-processing activities	1.8	13.6	804
Share of net income from manufacturing activities	6.6	21.6	804
Share of net income from services	-9.5**	64	804

*Note: Impacts on all variables measured by shares are reported in percentage points (pp). Asterisks indicate the level of statistical significance from the t-test of mean differences: * < 0.10; ** < 0.05; *** < 0.01; HH: household; s.-e.: self-employment; GHC: Ghanaian Cedi*

REP III specifically focused on setting-up new businesses and job creation for rural poor. Results in the top part of Table 12 indicate that program participation did foster the development of rural MSEs with 66% of beneficiary households involved in self-employment activities as opposed to 41% for the comparison group. The significant impact on business generation is also reflected by the increased number of family enterprises within beneficiary households (especially businesses that started operating after 2012) and the higher number of people hired (2 in the treated group vs. 0.5 in the comparison group on average), conditional on involvement in entrepreneurial activities. When considering these results in view of the ones presented in
Table 11 above, one possible interpretation is that the impact of REP III on the likelihood of participation in self-employment activities has been larger than that on the intensity and profitability of self-employment activities.

The second part of Table 12 focuses on the ATET results on net income shares. We find that the contribution of self-employment activities to overall annual net income increased by 18 percentage points for REP clients. The significant and negative impact observed for the share of income from crop activities

[11] GHC values were converted to 2015 USD in purchasing power parity (PPP) using the consumer price index (CPI) and PPP conversions from the World Bank using this formula: (CPI 2015 / CPI 2020)*(1/PPP 2015). The resulting exchange rate used is 1.97 Ghanian Cedi (GHC) per 1 US$.

(-11 percentage points) suggest a substitution effect, away from crop production into self-employment which might be considered as an unintended consequence of the program.

Table 12. ATET Results for employment generation and income component shares

Indicator name	Impact (% / pp.)	PO mean	Nb. of obs.
Employment generation			
HH has s.-e. activities (0/1)	24.4***	41.2	1,698
HH started operating a business after 2012 (0/1)	10***	28.8	1,698
Number of s.-e. activities per family	8.9***	1.1	804
Number of people (hired or apprentice) working for s.-e. activities	259.8***	0.5	804
Share of hired labor in total labor (including HH members) in s.-e. activities	5.4**	6.8	804
Income shares			
Share of income from s.-e. activities in total net HH income	18.1***	26.0	1,669
Share of income from crop activities in total net HH income	-11.4***	33.5	1,665
Share of income from livestock activities in total net HH income	6.5	1.6	1,676
Share of income from wage employment in total net HH income	-0.1	15.4	1,690
Share of income from transfers in total net HH income	-3	9.8	1,688
Share of income from other sources in total net HH income	-0.1	0.9	1,698

*Note: Impacts on all variables measured by shares and dummy variables (0/1) are reported in percentage points (pp). Asterisks indicate the level of statistical significance from the t-test of mean differences: * < 0.10; ** < 0.05; *** < 0.01; HH: household; s.-e.: self-employment; GHC: Ghanaian Cedi*

Impact on Additional Indicators of Economic Mobility (OG)

Table 13 presents ATET estimates on comprehensive indicators of overall economic mobility beyond self-employment, focusing on income (total and disaggregated by activity) and assets as per IFAD's economic goal. We find a positive impact on gross and net household income. In absolute terms, beneficiary households earned GHC 6,317 ($3,214) more per year (gross) and GHC 4,105 ($2,089) more per year (net) compared to control households, implying a sizeable percentage increase of 54% and 50%, respectively. This result needs to be examined considering the findings in Table 13 that point to no significant impact on household income from self-employment for those that already have income from this source. We do not find significant effect on income from crop production, livestock and wage employment.

One possible interpretation for this general pattern has three components: (i) as anticipated, participation in REP III did not impact the average income gains from non-entrepreneurial occupations; however (ii) it also did not necessarily enhance beneficiaries' new businesses profitability as it was initially expected; although (iii) the shift in household income structure away from less profitable crop activities and in favor of non-agricultural income emphasized in Table 12 did generate substantial income gains overall. Insights from the qualitative assessment further corroborate this interpretation. Qualitative findings highlight that "clients' adoption and utilization of the management training and technical skills acquired under the

program were evident in their business activities"[12] (Tagoe, 2020: pp 21) and resulted in the development of new businesses and enhanced employment opportunities for many participants. Furthermore, the certification provided attracted other individuals to join the program training. However, shortcomings of the rural finance component and lack of financial resources in some districts limited clients to achieve improved economic outcomes. Nevertheless, qualitative results point towards higher confidence and skills acquired through the trainings, which in turn also encouraged participants to seek loans elsewhere.

On a separate note, results show a higher total gross (79%) and net (169%) household income among youth-headed households compared to the comparison group. This finding is in line with the strong REP III support towards the most vulnerable groups, especially youth. This support included the provision of start-up kits to facilitate the graduation process from apprenticeship to business ownership and the implementation of the Youth Business Development Fund and the Graduate Youth Challenge Fund.

The bottom part of Table 13 presents ATET estimates for several asset indices (computed using PCA[13]). While the livestock and productive (agricultural) asset indices remained unaffected by participation in REP III, beneficiary households report a 55% improvement of their durable asset index with respect to the comparison group. This result suggests that the above-mentioned increase in earnings translated into higher accumulation of household assets.

Table 13. REPIII impacts on Economic Goal (OG)

Indicator name	ATET IPWRA (%)	PO mean	Nb. of obs.
Income			
Total gross household income (GHC)	54.3***	11,626	1,698
Total net household income (GHC)	49.8***	8,247	1,698
Gross income: Youth-headed households (GHC)	79.4**	9,444	211
Net income: Youth-headed households (GHC)	168.8***	4,509	211
Gross income from livestock activities (GHC)	13.9	627.1	902
Net income from livestock activities (GHC)	11.5	505	902
Gross income from crop activities (GHC)	6.2	3,324	1,317
Net income from crop activities (GHC)	5.3	1,766	1,317
Income from wage employment (GHC)	9.2	7,624	403
Income from transfers (GHC)	-11.2	809	640
Wealth			
Livestock asset index: PCA	-5.5	0.1	1,698
Productive asset index: PCA	3	0.1	1,698
Durable asset index (with land): PCA	54.9***	0.1	1,698

*Note: Impacts on all variables measured by shares are reported in percentage points (pp). Asterisks indicate the level of statistical significance from the t-test of mean differences: * < 0.10; ** < 0.05; *** < 0.01; HH: household; s.-e.: self-employment; GHC: Ghanaian Cedi. Youth headed households are defined as households headed by individuals younger than 33 years old.*

[12] REP III qualitative IA report can be found here.
[13] PCA stands for Principal Component Analysis, which is a statistical technique for data reduction. PCA constructs a series of uncorrelated linear combinations of the variables included. Usually, the associared index is calculated using the estimated coefficients of the first principal component -as weights- that contains most of the variance.

Impact on Productive Capacity (SO1) and Market Access (SO2)

The top part of Table 14 presents ATET results for productive capacity and market access indicators for a sub-sample of households engaged in crop production and sales. Results on agricultural productive capacity support earlier findings on absence of statistically significant impact on crop incomes. We find no statistically significant differences between beneficiary and comparison groups in the value of crops harvested and crop yields (harvest per hectare of cultivated land).[14] This implies that there was no gain or loss of agricultural production capacity due to participation in REP III activities that primarily focused on enhancing households' pursuit of entrepreneurial endeavors. Similarly, we find no impact on access to agricultural markets.

The bottom part of Table 14 reports some indicators on productive capacity of household businesses: net income per input expenditure and net income per various labour input (hours and days worked, respectively). While positive results suggest a greater efficiency of labour input and expenditure in the production process of REP III beneficiary enterprises (one additional unit of input generates higher income in treated households), ATET estimates are not statistically significant. Once again, we fail to find strong evidence supporting a positive impact of the programme on business profitability. The same conclusion is reached when focusing on business profitability of youth-headed households, despite the positive impact of the programme on total household income.

Table 14. Impacts on productive capacity (SO1) and market access (SO2)

Indicator name	ATET IPWRA (%)	PO mean	Nb. of obs.
Agricultural production and market access			
Value of total harvest (GHC)	-2.2	5,170	1,317
Kgs of crop harvested per HA: groundnut	-6.7	142	1,317
Kgs of crop harvested per HA: maize	-11.5	566	1,317
Kgs of crop harvested per HA: rice	27.5	91	1,317
Share of value of crop sales out of total harvest	-7.2	62.5	1,308
Total value of sales (GHC)	-3.1	3,535	1,308
Household businesses			
Net income (GHC) per …			
total input expenditure	52.9*	3	772
hours worked (average hours worked per person)	12.3	29	765
days worked (average number of days worked per person)	21.8	192	765
Youth-headed households: net income (GHC) per …			
total input expenditure	-49.4	9	114
hours worked (average hours worked per person)	-74.6	137	110
days worked (average number of days worked per person)	-68.9	886	110

*Note: Impacts on all variables measured by shares are reported in percentage points (pp). Asterisks indicate the level of statistical significance from the t-test of mean differences: * < 0.10; ** < 0.05; *** < 0.01; ha: hectare; Kg: kilogram; GHC: Ghanian Cedi.*

[14] Crop income takes into account the value of harvest used for sales, own consumption, agricultural inputs, animal feed and other uses together with the income generated from renting or sharecropping of agricultural parcels in the last 12 months.

Impact on Resilience (SO3) and Food security (MT)

Table 15 presents impact estimates on households' self-reported ability to recover from various shocks experienced during the last 12 months. It also reports impacts on the Gini Simpson income diversification index, relevant for the assessment of the level of vulnerability of households to adverse shocks. REP III has a positive effect on households' ability to recover from shocks. Moreover, as stated earlier, the average increase in the contribution of self-employment activities to total annual income was almost entirely offset by the decrease in the contribution of agricultural activities among beneficiary households. The impact on the Gini Simpson income diversification index pointing to a lower livelihood diversification among REP III clients confirms a higher concentration in self-employment activities. Note that these indices account for both the number of income sources and the evenness of their distribution in the overall income portfolio and therefore may not agree with expectations based on average values.

Table 15. ATET Results for Resilience (SO3)

Indicator name	Impact (%)	PO mean	Nb. of obs.
Corrected ability to recover from shocks (last 12 months)	5.9*	3.4	537
Corrected ability to recover from **climate** shocks (last 12 months)	5	3.3	331
Corrected ability to recover from **non-climate** shocks (last 12 months)	7.3	3.4	256
Gini Simpson index of income diversification (calculated with gross income shares)	-8.5*	0.3	1,698

*Note: Asterisks indicate the level of statistical significance from the t-test of mean differences: * < 0.10; ** < 0.05; *** < 0.01; HH: household; s.-e.: self-employment; GHC: Ghanaian Cedi*

Table 16 reports the impact of the program on indicators of nutrition and food security, which are part of IFAD's MTs. Results are significant and sizeable across the board. Overall, they convey a consistent message: the increase in overall income associated with participation in REP III has translated into improved nutrition and reduced food insecurity among beneficiary households. On one hand, participation in REP III reduced perceived food insecurity experience by 24%, which is reflected by the drop of the share of moderately and severely food insecure households by 5 and 9 percentage points, respectively, among REP beneficiaries. This reduction is matched by a 14 percentage points increase in the share of food secure households. These findings suggest that not only did program participation help narrow the gap between those who lacked consistent access to sufficient food and those who could afford adequate food, but it helped bridging it. Furthermore, REP beneficiaries have higher household dietary diversity score based on both 7-days and 24-hours recall by, respectively, 9% and 10%. While household dietary diversity measures do not inform about intra-household food distribution, they indicate that REP beneficiaries have access to a more diversified range of foods relative to the comparison group.

Table 16. ATET Results for Household Nutrition and Food Security (MT)

Indicator name	Impact (% / pp.)	PO mean	Nb. of obs.
NUTRITION			
Household dietary diversity score based on 7-day recall	9.3***	8.8	1,698
Household dietary diversity score based on 24 h recall	10.2***	7.1	1,698
FOOD SECURITY			
Food insecurity experience scale (FIES) raw score	-24.3***	3.4	1,698

HH is food secure (0/1)	14.3***	50.4	1,698
HH is moderately food insecure (0/1)	-5.2*	26.3	1,698
HH is severely food insecure (0/1)	-9.1***	23.4	1,698
Nb of months the HH experienced food shortage during the past 12 months	-14.3	1.6	1,698

*Note: Impacts on all variables measured by shares and dummy variables (0/1) are reported in percentage points (pp). Asterisks indicate the level of statistical significance from the t-test of mean differences: * < 0.10; ** < 0.05; *** < 0.01; HH: household*

Impact on Gender Disaggregated Variables and Women's Empowerment (MT)

REP III's emphasis on vulnerable groups including women calls for a gender-disaggregated analysis of outcomes to assess: *(i)* how participation in REP III impacted the gender roles in family business structures; and *(ii)* the annual income of female headed households. Previous evidence (IFC, 2011) suggests that women concentrate in small businesses that often fail to mature, more so than male-owned businesses. In Ghana, evidence suggests that women are more involved in self-employment activities than men, and particularly so in micro and small non-agricultural enterprises (Ghana Statistical Office, 2019). They are also more likely to apply for loans than men to sustain their businesses (ibid). We, therefore, analyze the gender of the primary decision maker for the management of household enterprises and the use of income derived from their activities and the annual income from self-employment activities based on the gender of the household head.

Results reported in Table 17 show that, for families with active businesses, management and finances mostly remained in the hands of women, who already managed 63% of the businesses and decided on the use of income for 58% of the businesses. Results on business management suggest that only male participation in family businesses has decreased by 9 percentage points, while collaborative arrangements have increased by 7 percentage points as a result of REP III participation. We find no statistically significant impact on the dynamics of gender specific decision making on the use of income from businesses. Furthermore, a positive and significant impact is observed on the annual income from self-employment activities generated by households where the female is the primary decision maker for self-employment activities. In this case, REP III client's earnings increased by 85%, equivalent to GHC 4,535 ($2,307). No statistically significant differences are found based on the gender of the household head.

Table 17. Gender-specific results for self-employment (s.-e.) income

Indicator name	Impact (% / pp.)	PO mean	Nb. of obs.
Management of HH s.-e. activities			
S.-e. activities managed by male (0/1)	-8.9**	28.8	804
S.-e. activities managed by female (0/1)	2.3	62.7	804
S.-e. activities managed by male and female (0/1)	6.5**	8.5	804
Decision maker on the use of income from s.-e.			
Male decision maker (0/1)	-5.3	24.0	804
Female decision maker (0/1)	5.1	58.4	804
Joint (male and female) decision maker (0/1)	0.3	17.6	804
Use of income from s.-e. by decision maker (GHC)			
S.-e. income with male decision maker	30.2	12,728	175
S.-e. income with female decision maker	85***	5,336	483
Male headed and Female Headed households			
Annual net income from s.-e. in male headed HH (GHC)	13	12,619	573
Annual net income from s.-e. in female headed HH (GHC)	-12.9	10,604	224
Annual gross income from s.-e. in male headed HH (GHC)	14.2	18,631	575
Annual gross income from s.-e. in female headed HH (GHC)	0.7	14,957	226

*Note: Impacts on all variables measured by dummy variables (0/1) are reported in percentage points (pp). Asterisks indicate the level of statistical significance from the t-test of mean differences: * < 0.10; ** < 0.05; *** < 0.01; HH: household; s.-e.: self-employment; GHC: Ghanaian Cedi*

Table 18 reports the program impact on core indicators of women's empowerment. The program shows significant positive impacts for all indicators. The mean empowerment score is a continuous indicator indicating women's level of empowerment, where those with scores of 0.75 or higher are considered empowered. The mean empowerment score has improved by 15% through participation in the program. Women who participate in the program are 13 percentage points more likely to have an empowerment score of 0.75 or higher and therefore achieve empowerment. In addition, the intra-household inequality score has decreased by 69% for program participants implying a decrease in the gender gap in empowerment at the household level.

Table 18. ATET Results for Women's Empowerment Indicators

Indicator name	ATET IPWRA (%/pp.)	PO mean	Nb. of obs.
Empowerment Score (1)	15.3***	0.5	1,440
% Achieving Empowerment (2)	12.7***	9.9	1,440
Intra-household inequality score (3)	-68.9***	0.1	1,347
% Achieving Gender Parity (4)	23***	32.0	1,347

*Note: Impacts on all variables measured by shares and dummy variables (0/1) are reported in percentage points (pp). Asterisks indicate the level of statistical significance from the t-test of mean differences: * < 0.10; ** < 0.05; *** < 0.01.(1) % of WEAI indicators where the female respondent = 1 (2) Female respondent is empowered (adequate achievements in >= 75% of indicators) (3) man's - woman's empowerment score; ranging from -1 to 1 (4) The female respondent's empowerment score is >= than the man's.*

Table 19 reports the impact of the program on the 12 i-WEAI indicators of women and men's agency. Full definitions of all the indicators are given in Appendix 5, Table A1. Table A2 gives the survey questions used for the i-WEAI indicators. Among intrinsic agency indicators, we find that both men and women in beneficiary households are significantly more likely to be adequate in self-efficacy, though the effect for men is larger and more robust. No significant impact is observed for other intrinsic agency indicators.

The program had significant positive impacts on the instrumental and collective agency of women. Four of the six indicators of instrumental agency show a positive and significant impact: input in productive decisions, ownership of land and other assets, access to and decisions on financial services, and visiting important locations have all significantly increased for women in beneficiary households.

When asked about their membership in groups, respondents were asked whether they believe that their group can influence life in the community beyond the group activities. Both indicators of collective agency, i.e. overall group membership and membership in influential groups, are positively impacted by REP III at the 1% level of significance. The impacts on all indicators are sizeable, ranging between 5 and 22 percentage points.

Men who participated in the program are more likely to be adequate in access to and decisions on financial services (by 14 percentage points). However, men who participated in the program are less likely to provide input in productive decisions and have an adequate work balance[15]. The latter also applies for women (they are 7 percentage points less likely to have adequate work balance). The time commitment needed to participate in the program may explain the increased workload experienced by men and women alike. The decreased probability of providing input in productive decisions by men is offset by the

[15] Individuals are considered adequate in work balance if they work less than 10.5 hours per day.

increased likelihood of women in providing input in productive decision, consistently with the reduction in the inequality score and increase in gender parity due to greater women's empowerment.

Table 19. ATET Results for Empowerment Indicators for Men and Women

	Men			Women		
Indicator name	**Impact (pp.)**	**PO mean**	**Nb. of obs.**	**Impact (pp.)**	**PO mean**	**Nb. of obs.**
Intrinsic Agency						
Autonomy in income (0/1)	5.05	33.38	1,482	0.65	33.77	1,586
Self-efficacy (0/1)	7.31**	75.99	1,482	5.47*	70.19	1,586
Attitudes about intimate partner violence (0/1)	-0.45	93.61	1,482	0.2	92.07	1,586
Respect among household members (0/1)	-5	71.80	1,406	2.19	56.68	1,466
Instrumental Agency						
Input in productive decisions (0/1)	-15.55***	60.22	1,482	11.28***	36.50	1,586
Ownership of land and other assets (0/1)	0.94	87.39	1,482	17.19***	60.56	1,586
Access to and decisions on credit (0/1)	14.23***	78.13	1,482	15.63***	74.43	1,586
Control over use of income (0/1)	-5.92	34.29	1,482	3.23	24.38	1,586
Work balance (0/1)	-8.83**	48.87	1,482	-7.08**	36.66	1,586
Visiting important locations (0/1)	5.43	68.62	1,482	9.33***	71.43	1,586
Collective Agency						
Group membership (0/1)	-5.49	61.43	1,482	21.78***	30.06	1,586
Membership in influential groups (0/1)	-1.36	48.04	1,482	20.06***	23.13	1,586

*Note: All impacts are reported in percentage points (pp) as the indicators are dummy variables (0/1). Asterisks indicate the level of statistical significance from the t-test of mean differences: * < 0.10; ** < 0.05; *** < 0.01*

6.2 Impact heterogeneity

We explore potential differential impacts of the program depending on differences in the mix of REP III interventions received and in self-employment activity sectors. These analyses are done by splitting the sample into sub-samples, and therefore these heterogeneity analyses may not have enough power given the relatively small sample sizes, compared to the analyses on the entire sample.

Training only versus Training and Other Services

We focus on those households that only received trainings and those households that benefited from both trainings and additional services (such as credit, technology promotion, financial support). The hypothesis is that capacity building paired with practical material assistance should deliver a greater impact.

Table 20 presents the results for a series of indicators for the two types of REP III service mix received.

Table 20. ATET results for specific REP III service mix

	Received trainings only			Received trainings and other services		
	Impact (%)	PO mean	Nb. of obs.	Impact (%)	PO mean	Nb. of obs.
Income and Wealth						
Total HH net annual income (GHC)	58.5***	7,745	1,289	43.3**	9,659	1,103
Total HH net annual income from s.-e. (GHC)	26.4	9,634	550	7.8	12,944	412
Livestock asset index: PCA	-4.8	0.1	1,289	-5.6	0.1	1,103
Productive (Agricultural) asset index: PCA	0.6	0.1	1,289	9.8*	0.1	1,103
Durable asset index (with land): PCA	47.6***	0.1	1,289	85.7***	0.1	1,103
Income shares (% in total net HH income)						
Share of income from s.-e. activities	21.2***	25.1	1,271	14.8***	27.6	1,087
Share of income from crop activities	-15.5***	35.4	1,263	-10.7**	30.5	1,078
Share of income from livestock activities	6.4	2.7	1,274	3.4	2.5	1,089
Share of income from wage employment	0.8	14.6	1,284	2.8	16.6	1,096
Share of income from transfers	-3.4	9.6	1,282	-3.5	11.3	1,096
Share of income from other sources	-0.2	0.9	1,289	-0.1	1.3	1,103
Financial inclusion and Management skills						
HH has a bank account (0/1)	15.1***	73.5	1,289	13***	78.4	1,103
HH has applied for a loan since baseline (0/1)	15.9***	17.4	1,289	16.9***	21.2	1,103
HH keeps financial records of business/enterprise (0/1)	17.5***	11.3	549	27.6***	11.2	412
Nutrition & Food Security						
Household dietary diversity score based on 7-day recall	7.3***	8.6	1,289	11.9***	9.1	1,103
Food insecurity experience scale raw score	-21.7***	3.6	1,289	-45.5***	3.1	1,103
Resilience						
Gini Simpson Index (calculated with gross income shares)	-8.6	0.3	1,289	-8.1	0.3	1,103
Productivity - Self-employment: Employment generation						
HH has s.-e. activities (0/1)	28.9***	40.3	1,289	22***	42.8	1,103
Number of s.-e. activities per family	6.5**	1.1	550	13***	1.1	412
Number of people (hired or apprentice) working for self-employment activities	246.3***	0.5	550	301.3***	0.7	412
Productivity						
Value of total harvest (GHC)	0.1	4,836	1,046	-1.1	5,826	909
Net income per all input expenditure	59.1	3	524	58.6	2	396
Market access						
Share of value of crop sales out of total harvest value	-20.2***	0.6	1,039	-2.9	0.6	903
Total value of sales - Last 12 months (GHC)	-11.4	3,288	1,039	1.2	3,857	903

*Note: Impacts on all variables measured by shares and dummy variables (0/1) are reported in percentage points (pp). Asterisks indicate the level of statistical significance from the t-test of mean differences: * < 0.10; ** < 0.05; *** < 0.01; HH: household; s.-e.: self-employment; GHC: Ghanaian Cedi*

A critical finding from this exercise is that the general pattern of impact remains unchanged regardless of whether the clients have just received trainings, or trainings plus other services. REP III clients are better off in terms of both monetary (income and wealth) and non-monetary (nutrition and food security) metrics with respect to their counterparts and display a higher level of financial inclusion, entrepreneurial involvement, and management skills in both cases.

There are some differences in the magnitudes of estimated impact for the two groups. Contrary to our expectations, results point to average higher annual income for the treated that only benefitted from trainings. The overall picture in terms of welfare impact is not so clear cut, however. As a matter of fact, REP III clients that benefitted from both trainings and additional services saw a major improvement in the durable asset index with respect to the only trained group. This important increase in wealth was accompanied by a higher reduction of the food insecurity experience score paired with a more diversified diet. Overall participation in REP III through trainings and additional services do not seem to have represented an unequivocal advantage for program client's standard of living.

Agro-processing and Manufacturing Sector versus Service sector

We also investigated differential impact by sector of household enterprises. For ease of presentation, we considered self-employment activities in agro-processing and manufacturing on the one hand and in services on the other and report results in Table 21. In terms of economic mobility, the positive impact of the program on total annual net household income is larger by 5 percentage points for households involved in agro-processing and manufacturing. One explanation for this greater impact lies in the larger income share conversion (10 percentage point) from crop activities to family businesses of households engaged in this sector. Moreover, while the decrease in food insecurity for households in the service sector if more than 17 percentage points higher than that for agro-processors and manufacturers, the dietary diversity of the latter has shown further improvement, reflecting the higher impact of REP III on their living standards. Once again, increased financial inclusion and superior management skills seem to be at the root of this virtuous circle. Both groups present similar likelihood to have a bank account and to have applied for a loan in the last 12 months. The impacts of the program on their ability to keep financial records are also very similar to each other.

Another interesting result of the heterogeneity analysis is the 30% decline of the share of value of crop sales out of total harvest in beneficiary households engaged in agro-processing and manufacturing. According to data shared by the PMU on the distribution of clients by sector, agro-processing accounted for the highest share (23%) followed by community-based trainings (CBTs) (23%), and agro-industrial (15%). Given REP III's focus on the development of rural MSEs in general and agro-processing businesses in particular, one direct interpretation for this result is that a reallocation of productive resources naturally accompanied the shift in household income structure towards self-employment activities. This means that while agricultural outputs still heavily contribute to direct crop sales, they are now also likely to be used as raw materials for food, animal feed and animal-derived activities by entrepreneurs involved in agricultural commodity processing.

Finally, REP III agro-processors and manufacturers are the only group for which a positive, high and significant impact on net annual income from self-employment is observed, with a 40% increase with respect to the comparison group. Therefore, in contrast with earlier findings, the project also played an important role in improving business profitability for this sector. The important gains in labour productivity suggest that a greater efficiency in the production process might be at the root of the improved economic performance. Indeed, net income gains per expenditure among agro-processors and manufacturers participating in REP III are 105% higher than that among control households.

Table 21. ATET results for specific business sectors

	Agroprocessing and Manufacturing Sector			Service Sector		
	Impact (%/pp.)	PO mean	Nb. of obs.	Impact (%/pp.)	PO mean	Nb. of obs.
Income and Wealth						
Total HH net annual income (GHC)	89.3***	8,926	1,161	84.4***	9,701	1,213
Total HH net annual income from s.-e. (GHC)	40.1**	9,453	543	23	11,149	595
Livestock asset index: PCA	-5.1	0.1	1,161	-14.8**	0.1	1,213
Productive (Agricultural) asset index: PCA	-4.2	0.1	1,161	1.4	0.1	1,213
Durable asset index (with land): PCA	67.9***	0.1	1,161	76.7***	0.1	1,213
Income shares (% in total net HH income)						
Share of income from s.-e. activities	45.8***	26.6	1,140	37.4***	29.5	1,192
Share of income from crop activities	-25.4***	32.0	1,137	-15.3***	27.9	1,189
Share of income from livestock activities	1.5	0.3	1,144	2.8	0.3	1,198
Share of income from wage employment	-4	16.5	1,156	-4.7	16.6	1,205
Share of income from transfers	-2.9	8.1	1,156	-7.2***	10.7	1,206
Share of income from other sources	-0.2	0.8	1,161	-0.5	1.0	1,213
Financial inclusion and Management skills						
HH has a bank account (0/1)	18.9***	74.3	1,161	14.6***	78.2	1,213
HH has applied for a loan since baseline (0/1)	22.9***	17.1	1,161	24.7***	19.5	1,213
HH keeps financial records of business/enterprise (0/1)	18.4***	11.6	542	18.2***	12.8	594
Nutrition & Food Security						
Household dietary diversity score based on 7-day recall	15***	8.7	1,161	9.2***	9.3	1,213
Food insecurity experience scale raw score	-21.8***	3.4	1,161	-39.3***	3.3	1,213
Resilience						
Gini Simpson Index (calculated with gross income shares)	-14.2**	0.3	1,161	-8.4	0.3	1,213
Productivity - Self-employment: Employment generation						
HH has s.-e. activities	56.9***	43.1	1,161	55.4***	44.6	1,213
Number of s.-e. activities per family	18.1***	1.1	543	13.7***	1.1	595
Number of people (hired or apprentice) working for self-employment activities	355.9***	0.6	543	242.7***	0.5	595
Productivity						
Value of total harvest (GHC)	-14.6	4,564	935	-9.9	5,789	973
Net income per all input expenditure	104.7**	3	517	12.7	3	574
Market access						
Share of value of crop sales out of total harvest value	-29.8***	0.6	929	-5.3	0.7	965
Total value of sales - Last 12 months (GHC)	-25.8**	3,133	929	-3.3	4,064	965

*Note: Impacts on all variables measured by shares and dummy variables (0/1) are reported in percentage points (pp). Asterisks indicate the level of statistical significance from the t-test of mean differences: * < 0.10; ** < 0.05; *** < 0.01; HH: household; s.-e.: self-employment; GHC: Ghanaian Cedi*

7. Conclusions and recommendations

As in most developing countries, micro and small enterprises (MSEs) in Ghana operate mostly in the informal sector and often face challenges that include limited access to credit and low business management and entrepreneurial skills. These constraints limit their profitability, growth, and sustainability. To overcome these barriers, the third phase of Ghana's Rural Enterprises Programme (REP III), implemented between 2012 and 2020 with a national coverage, aimed at improving the living conditions of poor rural entrepreneurs by: *(i)* building capacity of rural MSEs through trainings in on-farm and off-farm agro-industry and traditional craftsmanship; *(ii)* creating a favorable environment for business generation and job creation; and *(iii)* facilitating access to rural financial services. The evidence presented in this impact assessment report suggested that REP III achieved a number of positive outcomes in line with its theory of change.

First, we show that participation in REP III has consistently and significantly enhanced the technical and entrepreneurial skills of beneficiaries mostly through the capacity building component of the program. REP III beneficiaries' ability to monitor cash flows, record financial data, and follow through loan application processes has increased by 16 percentage points on average. *Second*, REP III played a tangible role in fostering business development as evidenced by the increase in engagement in self-employment activities by 24 percentage points, whereas start-up creation after 2012 rose by 10 percentage points relative to the comparison group. It also helped create job opportunities as witnessed by a higher number of workers (hired and apprentice) engaged in self-employment. *Third*, REP III has enhanced the likelihood of loan application by 18 percentage points and loan access by 13 percentage points. Moreover, in addition to helping MSEs meet credit-worthiness criteria, participation in REP III also increased the loan amounts (when obtained) of REP III clients by more than double the amount taken up by control households. These estimates are consistent with REP III's efforts to facilitate access of MSEs to rural finance.

REP III also improved a series of monetary (measured by income and wealth) and non-monetary (measured by nutrition and resilience) welfare indicators. *First*, the total annual net income among REP III clients increased by 50%. This outcome is attributed more to the shift from agricultural activities towards self-employment in agro-processing and manufacturing, rather than an increase in the profitability of self-employment activities since there are no differences in self-employment income conditional on engaging in this activity. *Second*, REP III clients' resilience to shocks, measured by ability to recover from shocks also improved. This is despite REP III clients having lower income diversification relative to the comparison group due to the concentration on self-employment activities. *Third*, REP III reduced household food insecurity, gains that were substantial enough to reduce the incidence of moderate and severe food insecurity by 14 percentage points. *Fourth*, household dietary diversity scores based on both 7-day and 24-hour recall period were also higher among REP III beneficiaries by 9% and 10%, respectively, relative to the comparison group suggesting improvements in access to food.

REP III also improved empowerment along several dimensions. To recall, REP III paid special attention to the most vulnerable, especially women, based on lessons and experiences from REP I and II as well as other similar programs. *First*, women REP III beneficiaries were 13 percentage points more likely to achieve empowerment *status* (achievement of empowerment *score* of 0.75 or higher) and had higher empowerment *scores* on average relative to women in the comparison group. *Second*, intra-household gender equality improved among REP III beneficiaries, especially in the area of women's instrumental and collective agency. Additional indicators of women's empowerment positively impacted by REP III include ability to provide input into productive decisions, ownership of land and other assets, access to and decisions on financial services, control over use of income, visiting important locations and membership in overall and influential groups. REP III's efforts to generate good job opportunities for the youth were also successful as we observe a strong, positive, and significant impact of the programme on both gross and net household income of youth-headed households, defined as households headed by

individuals younger than 33 years old. However, we find that business profitability remains a weak area in REP III's intervention for this sub-group as well. Finally, results that COVID-19 related assistance received by REP III beneficiaries is significantly higher than that of the comparison group. A third of REP III clients reported receiving assistance to help them cope with the effects of the pandemic, whereas only 7% of the comparison group reported receiving similar assistance.

Overall, REP III has largely reached the expected impacts per its theory of change. The following key lessons were learned for future program design.

Financial inclusion. REP III increased the likelihood of owning a bank account, applying for a loan, obtaining a loan, and the amount of loan received. Improved financial inclusion allows entrepreneurs, who otherwise have to rely on own capital and internal finance, to start and sustain their business. Credit constraints can be eased including through building capacity of rural financial institutions and establishing better linkages between businesses and rural financial institutions as was done in REP III. At the same time, the relatively small share of REP III clients that reported receiving credit (12% with own funds not matched with grants, 10% with own funds matched with grants) highlights the need to strengthen the credit component of programs such as REP III that aim to promote SMEs in resource-poor settings. As previously documented (Oladapo et al., 2019), complaints were raised by some MSEs about several restrictive conditions required for accessing credit facilities through REP III as well as about the exorbitant interest rates for those who met the requirements. These elements highlight the importance of enhancing credit market regulatory framework and its enforcement in order to narrow down wide interest margins offered by different segments of the financial market as well as reduce credit market transaction costs.

Business management skills. REP III beneficiaries had better business bookkeeping that is essential for the performance and survival of businesses. Indeed, poor entrepreneurial management has previously been linked to failure of Ghana's MSE sector to achieve its full potential (Yeboah, 2015). The evidence presented here emphasizes the need for strengthening business management skills of the rural entrepreneurs including through vocational trainings and apprenticeships. A case in point is Ghana's National Apprenticeship Program (NAP) that aims to harness the knowledge and experience of the private sector to deliver market-relevant skills to youth, who have not fully benefited from the formal education system and hence lack basic business management skills. Unlike the credit component of REP III that benefited a relatively small share of clients, trainings on technical and business management skills benefited about three-fourth of clients of which 63% received training only. The returns to skill development interventions in a resource-poor setting can be enhanced if accompanied by essential complementary services such as credit and business start-up kits[16], elements of REP III that were as not as strong as training service provision.

Incomes increased but profitability increases needed. REP III improved overall household income and durable assets, with income gains driven by self-employment. For households involved in self-employment, higher gross annual income from family businesses were accompanied by a significant increase in costs of self-employment activities keeping net household income constant. This combined effect suggests that while REP III boosted clients' sales, it did not translate into higher business profitability with implications for enterprise sustainability. This highlights the importance of creating better input and output market opportunities for MSE to reduce the costs of doing business and maximize sales revenue.

Resilience impacts are complex. REP III improved households' ability to recover from shocks, while it decreased income diversification as they concentrated on their business activities. This translates into an ambiguous impact on overall resilience. Projects that focus on one income source may decrease income

[16] Business start-up kits were provided through REP III but only 7% of the respondents reported receiving them. See Figure 3.

source diversification, which is a strategy that decreases vulnerability and contributes to resilience. Future projects should monitor complex impacts on resilience especially in high risk environments.

Local economy-wide effects should be captured. The development of MSEs sector with strong linkages with other (vulnerable) sectors as was done in REP III through its focus on agro-processing (e.g., processing of palm oil, cassava, and shea nut) will likely have indirect effects in the local economy. Future impact assessment of programs like REP III may therefore benefit from integrating local economy-wide impact evaluations (LEWIE) in order to understand the full impacts of program interventions on local economies through production, employment generation and trade linkages.

Women's empowerment success. REP III improved empowerment along several dimensions. This finding suggests that when rural women are provided with relevant business management and skills trainings as well as other complementary inputs, they are more likely to gain access to financial services, engage in and have control over income generating activities. These combined impacts support women improve their empowerment along multiple dimensions, making REP III successful in trying to close the gender gap.

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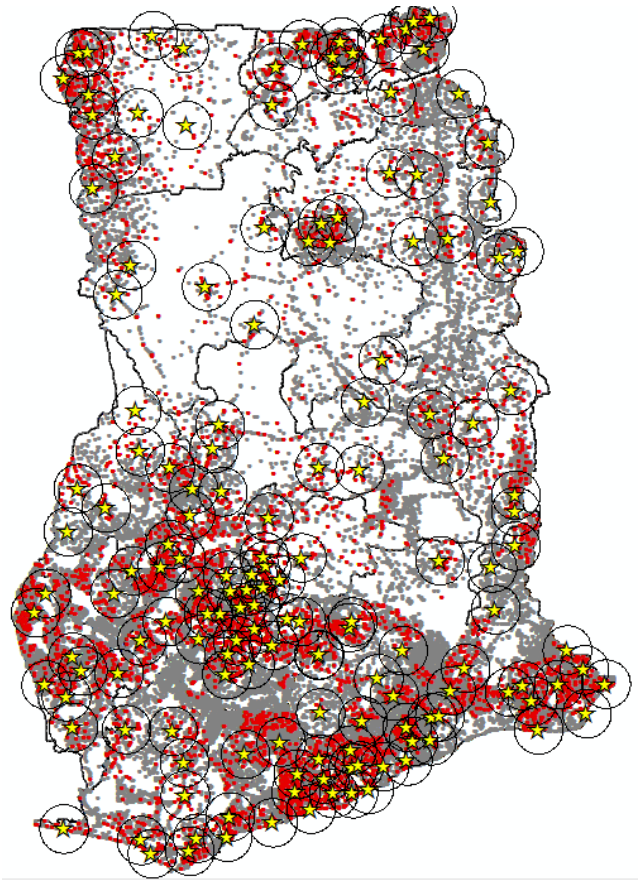
Appendix 1: Location of REP III Business Advisory Centers and communities

Figure A 1. Location of REP III Business Advisory Centers and communities



Note: Yellow stars represent location of REP Business Advisory Centers (BACs), circles represent buffer zones (with 20 kilometers diameters) defined around BACs. Red dots represent REP communities, gray dots represent all communities in Ghana.

Appendix 2: Matching diagnostics

Figure A 2. Standardized percentage bias reduction (kernel matching)

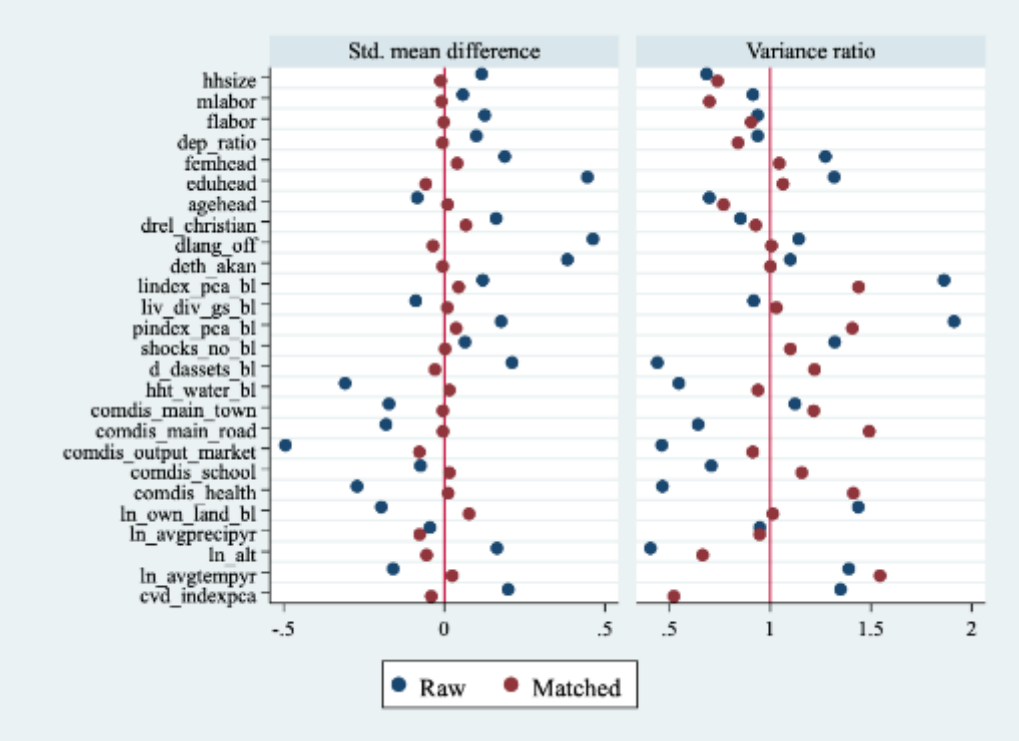


Figure A 3. Box plots of propensity score for raw and matched sample

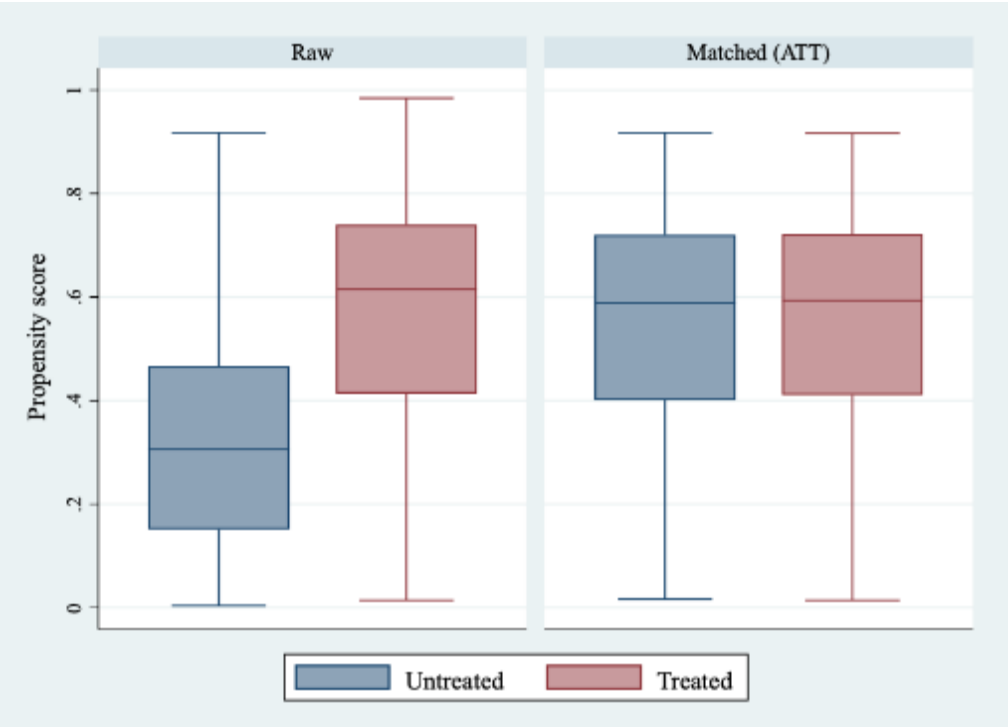
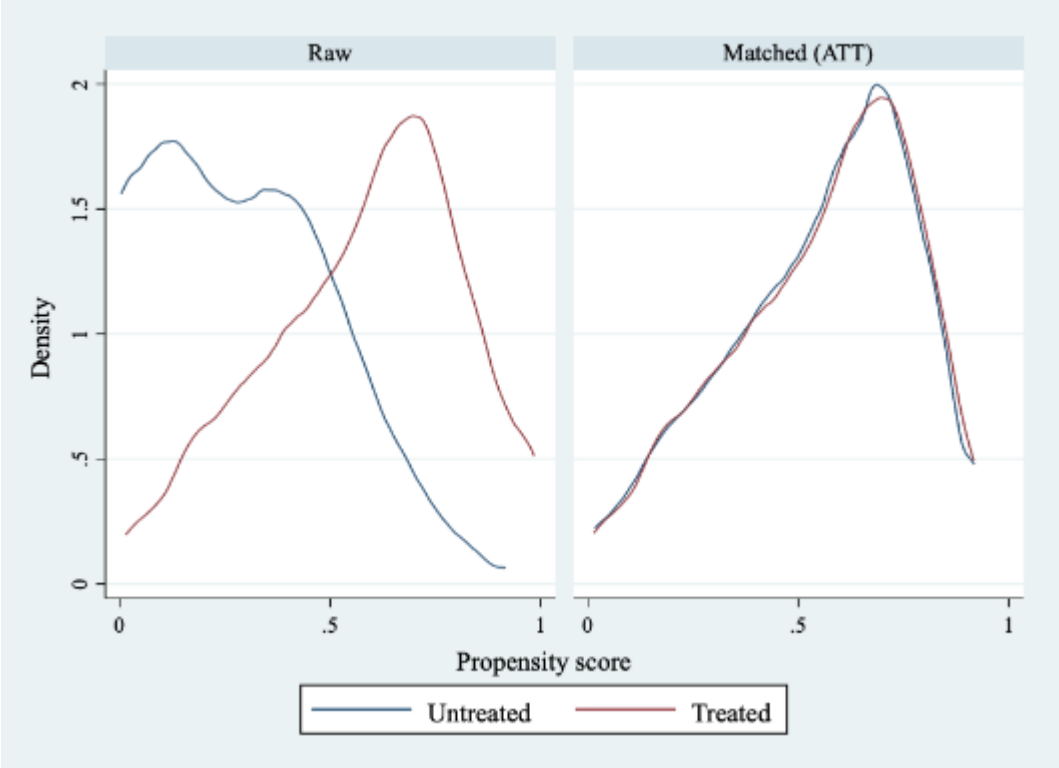
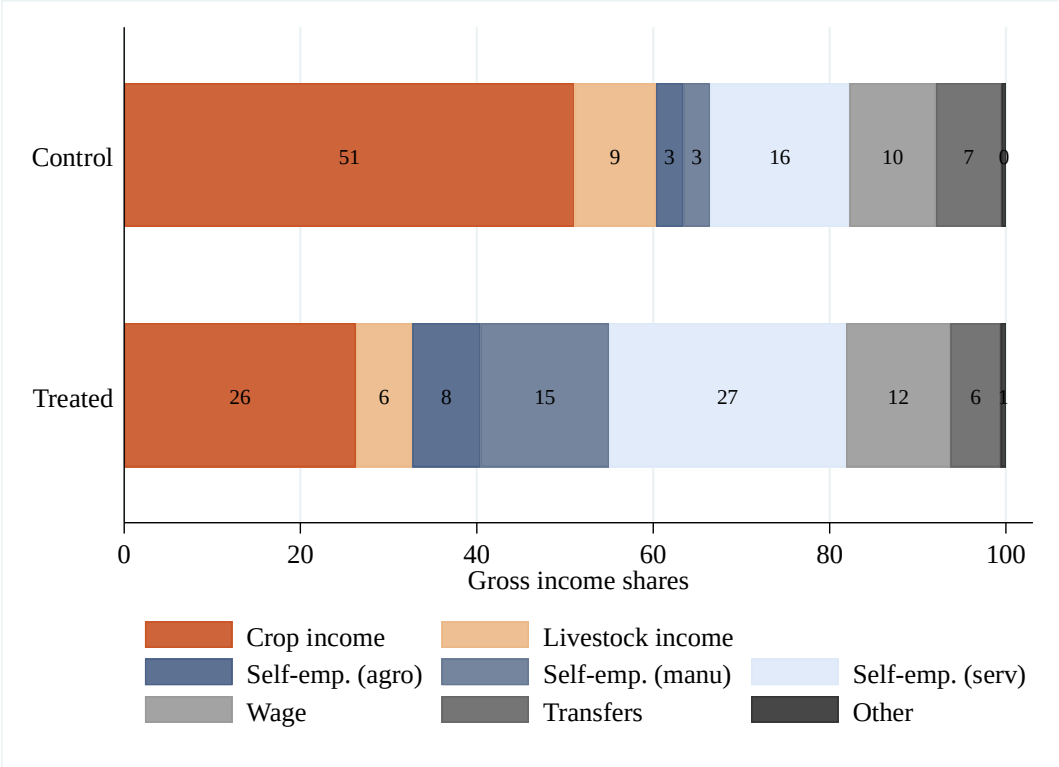


Figure A 4. Kernel density plots of propensity score for raw and matched sample



Appendix 3: Gross income shares with self-employment sub-sectors (matched sample)



Appendix 4: Detailed ATET results

The below tables present the full ATET results including actual coefficients, standard errors, sample sizes overall and for treated (T) and control (C). Asterisks indicate the level of statistical significance from the t-test of mean differences: * < 0.10; ** < 0.05; *** < 0.01

Indicator name	ATET IPWRA coef. (s.e.)	PO mean (s.e.)	Nb. of obs. (T;C)
ATET Results for credit and business management skills			
HH has a bank account	0.14*** (0.02)	0.75 (0.02)	1698 (802;896)
HH has applied for a loan since baseline	0.18*** (0.03)	0.18 (0.02)	1698 (802;896)
HH obtained a loan since baseline	0.13*** (0.03)	0.15 (0.02)	1698 (802;896)
HH had a loan application rejected	0.03** (0.01)	0.03 (0.01)	1698 (802;896)
Total amount in loans taken out by the hh since baseline (GHC)	2182*** (477)	2370 (382)	320 (220;100)
HH keeps financial records of business/enterprise	0.13*** (0.02)	0.06 (0.02)	1697 (801;896)
HH records every purchase and sale made by business/enterprise	0.13*** (0.02)	0.04 (0.01)	1697 (801;896)
HH is able to use records to easily control cashflows	0.13*** (0.02)	0.03 (0.01)	1698 (802;896)
HH knows which goods make the most profit per item in selling	0.16*** (0.02)	0.13 (0.02)	1697 (801;896)
ATET Results for self-employment (s.-e.) income			
Total HH gross annual income from s.-e. (GHC)	6557*** (1084)	6086 (898)	1698 (802;896)
Total HH net annual income from s.-e. (GHC)	4295*** (969)	3951 (812)	1698 (802;896)
Total HH annual costs of s.-e. activities (GHC)	2262*** (295)	2135 (215)	1698 (802;896)
share of net income from agro processing activities	0.05*** (0.02)	0.05 (0.01)	1698 (802;896)
share of net income from manufacturing activities	0.12*** (0.02)	0.07 (0.02)	1698 (802;896)
share of net income from services	0.07** (0.03)	0.29 (0.03)	1698 (802;896)

Indicator name	ATET IPWRA coef. (s.e.)	PO mean (s.e.)	Nb. of obs. (T;C)
ATET Results for employment generation and income component shares			
HH has self employment activities	0.24*** (0.03)	0.41 (0.03)	1698 (802;896)
HH started Operating a business after 2012	0.1*** (0.03)	0.29 (0.03)	1698 (802;896)
Number of s.-e. activities per family	0.1*** (0.03)	1.1 (0.03)	804 (526;278)
Number of people (hired or apprentice) working for self employment activities	1*** (0.2)	0.2 (0.1)	1698 (802;896)
Ratio of hired labor to total labor (including HH members) in self-employement activities	0.05*** (0.01)	0.03 (0.01)	1698 (802;896)
Share of income from s.-e. activities in total net HH income	0.18*** (0.03)	0.26 (0.03)	1669 (785;884)
Share of income from crop activities in total net HH income	-0.11*** (0.03)	0.34 (0.03)	1665 (790;875)
Share of income from livestock activities in total net HH income	0.06 (0.06)	0.02 (0.06)	1676 (791;885)
Share of income from wage employment in total net HH income	0 (0.02)	0.15 (0.02)	1690 (799;891)
Share of income from transfers in total net HH income	-0.03 (0.02)	0.1 (0.02)	1688 (797;891)
Share of income from other sources in total net HH income	-0.001 (0.004)	0.009 (0.004)	1698 (802;896)
ATET Results for Economic Goal (OG)			
Total gross household income (GHC)	6317*** (1237)	11626 (1089)	1698 (802;896)
Total net household income (GHC)	4105*** (1137)	8247 (1008)	1698 (802;896)
Gross income - Youth headed household (GHC)	7494** (2992)	9444 (2464)	211 (93;118)
Net income - Youth headed household (GHC)	7612*** (2378)	4509 (1812)	211 (93;118)
Gross income from livestock activities (GHC)	87 (54)	627 (45)	902 (403;499)
Net income from livestock activities (GHC)	58 (55)	505 (45)	902 (403;499)
Gross income from crop activities (GHC)	207 (211)	3324 (170)	1317 (536;781)
Net income from crop activities (GHC)	94 (186)	1766 (144)	1317 (536;781)
Income from wage employment (GHC)	702 (1059)	7624 (976)	403 (209;194)
Income from transfers (GHC)	-91 (86)	809 (81)	640 (397;243)
Livestock asset index: PCA	-0.01 (0)	0.1 (0)	1698 (802;896)
Productive asset index: PCA	0.003 (0.003)	0.104 (0.003)	1698 (802;896)
Durable asset index (with land): PCA	0.05*** (0.01)	0.09 (0.01)	1698 (802;896)

Indicator name	ATET IPWRA coef. (s.e.)	PO mean (s.e.)	Nb. of obs. (T;C)
ATET Results for productive capacity (SO1) and market access (SO2)			
Value of total harvest (GHC)	-113 (426)	5170 (391)	1317 (536;781)
Kgs of crop harvested per HA: groundnut	-9.5 (33.1)	142.2 (28.1)	1317 (536;781)
Kgs of crop harvested per HA: maize	-65.3 (128.1)	566.1 (116.9)	1317 (536;781)
Kgs of crop harvested per HA: rice	24.9 (34.4)	90.8 (28.1)	1317 (536;781)
Share of value of crop sales out of total harvest	-0.04 (0.03)	0.62 (0.02)	1308 (533;775)
Total value of sales (GHC)	-109 (304)	3535 (272)	1308 (533;775)
Net income (GHC) per …			
total input expenditure	1.6* (1)	3 (0.8)	772 (509;263)
hours worked (average hours worked per person)	3.6 (6)	28.8 (4.9)	765 (503;262)
days worked (average number of days worked per person)	41.8 (37.5)	191.7 (31.4)	765 (503;262)
Youth headed households, net income (GHC) per …			
total input expenditure	-4.6 (4.9)	9.3 (4.6)	114 (75;39)
hours worked (average hours worked per person)	-102.3 (85.8)	137 (86.1)	110 (72;38)
days worked (average number of days worked per person)	-610.5 (622.2)	885.7 (620.8)	110 (72;38)
ATET Results for Resilience (SO3)			
Corrected ability to recover from shocks (last 12 months)	0.2* (0.1)	3.4 (0.1)	537 (238;299)
Corrected ability to recover from climate shocks (last 12 months)	0.2 (0.1)	3.3 (0.1)	331 (136;195)
Corrected ability to recover from non-climate shocks (last 12 months)	0.2 (0.2)	3.4 (0.2)	256 (132;124)
Gini Simpson index of income diversification (calculated with gross income shares)	0* (0)	0.3 (0)	1698 (802;896)
ATET Results for Household Nutrition and Food Security (MT)			
Nutrition			
Household dietary diversity score based on 7 day recall	0.8*** (0.1)	8.8 (0.1)	1698 (802;896)
Household dietary diversity score based on 24 h recall	0.7*** (0.1)	7.1 (0.1)	1698 (802;896)
Food Security			
Food insecurity experience scale (FIES) raw score	-0.8*** (0.2)	3.4 (0.2)	1698 (802;896)
HH is food secure	0.14*** (0.03)	0.5 (0.03)	1698 (802;896)
HH is moderately food insecure	-0.05* (0.03)	0.26 (0.03)	1698 (802;896)
HH is severely food insecure	-0.09*** (0.03)	0.23 (0.03)	1698 (802;896)
Nb of months the HH experienced food shortage during the past 12 months	-0.2 (0.2)	1.6 (0.2)	1698 (802;896)

Indicator name	ATET IPWRA coef. (s.e.)	PO mean (s.e.)	Nb. of obs. (T;C)
Gender-specific results for self-employment (s.-e.) income			
Management of HH s.-e. activity(ies) (%)			
S.-e. activities managed by male	0.03 (0.02)	0.1 (0.02)	1698 (802;896)
S.-e. activities managed by female	0.16*** (0.03)	0.27 (0.03)	1698 (802;896)
S.-e. activities managed by male and female	0.06*** (0.01)	0.04 (0.01)	1698 (802;896)
Decision maker on the use of income from s.-e. (%)			
Male decision maker	0.04* (0.02)	0.09 (0.02)	1698 (802;896)
Female decision maker	0.18*** (0.03)	0.24 (0.03)	1698 (802;896)
Joint (male and female) decision maker	0.03* (0.02)	0.08 (0.02)	1698 (802;896)
Use of income from s.-e. by decision maker (GHC)			
S.-e. income with male decision maker	3846 (3454)	12728 (2858)	175 (98;77)
S.-e. income with female decision maker	4535*** (1408)	5336 (1123)	483 (330;153)
Male headed and Female Headed households			
Annual net income from s.-e. in male headed HH (GHC)	1636 (2239)	12619 (2017)	573 (357;216)
Annual net income from s.-e. in female headed HH (GHC)	-1368 (2354)	10604 (2103)	224 (165;59)
Annual gross income from s.-e. in male headed HH (GHC)	2646 (2404)	18631 (2179)	575 (359;216)
Annual gross income from s.-e. in female headed HH (GHC)	111 (2506)	14957 (2192)	226 (166;60)
ATET Results for Women's Empowerment Indicators			
Empowerment Score	0.08*** (0.01)	0.5 (0.01)	1440 (670;770)
% Achieving Empowerment	0.13*** (0)	0.1 (0)	1440 (670;770)
Intra-household inequality score	-0.07*** (0.01)	0.1 (0.01)	1347 (625;722)
% Achieving Gender Parity	0.23*** (0)	0.32 (0)	1347 (625;722)

Indicator name	ATET IPWRA coef. (s.e.)	PO mean (s.e.)	Nb. of obs. (T;C)
ATET Results for Empowerment Indicators for Men and Women			
Men			
Autonomy in income	0.05 (0.04)	0.33 (0.04)	1482 (679;803)
Self-efficacy	0.07** (0.03)	0.76 (0.03)	1482 (679;803)
Attitudes about intimate partner violence	0 (0.02)	0.94 (0.02)	1482 (679;803)
Respect among household members	-0.05 (0.04)	0.72 (0.03)	1406 (652;754)
Input in productive decisions	-0.16*** (0.04)	0.6 (0.03)	1482 (679;803)
Ownership of land and other assets	0.01 (0.02)	0.87 (0.02)	1482 (679;803)
Access to and decisions on credit	0.14*** (0.03)	0.78 (0.03)	1482 (679;803)
Control over use of income	-0.06 (0.04)	0.34 (0.03)	1482 (679;803)
Work balance	-0.09** (0.04)	0.49 (0.04)	1482 (679;803)
Visiting important locations	0.05 (0.04)	0.69 (0.03)	1482 (679;803)
Group membership	-0.05 (0.04)	0.61 (0.03)	1482 (679;803)
Membership in influential groups	-0.01 (0.04)	0.48 (0.04)	1482 (679;803)
Women			
Autonomy in income	0.01 (0.03)	0.34 (0.03)	1586 (764;822)
Self-efficacy	0.05* (0.03)	0.7 (0.03)	1586 (764;822)
Attitudes about intimate partner violence	0 (0.02)	0.92 (0.01)	1586 (764;822)
Respect among household members	0.02 (0.04)	0.57 (0.03)	1466 (688;778)
Input in productive decisions	0.11*** (0.03)	0.36 (0.03)	1586 (764;822)
Ownership of land and other assets	0.17*** (0.03)	0.61 (0.03)	1586 (764;822)
Access to and decisions on credit	0.16*** (0.03)	0.74 (0.02)	1586 (764;822)
Control over use of income	0.03 (0.03)	0.24 (0.03)	1586 (764;822)
Work balance	-0.07** (0.03)	0.37 (0.03)	1586 (764;822)
Visiting important locations	0.09*** (0.03)	0.71 (0.03)	1586 (764;822)
Group membership	0.22*** (0.03)	0.3 (0.03)	1586 (764;822)
Membership in influential groups	0.2*** (0.03)	0.23 (0.03)	1586 (764;822)

Appendix 5: IFAD i-WEAI Indicators

Table A1. Construction of indicators in IFAD I-WEAI

Indicator	**Definition of adequacy in pro-WEAI**
Intrinsic agency	
Autonomy in income	More motivated by own values than by coercion or fear of others' disapproval: *Relative Autonomy Index*[A] score>=1 RAI score is calculated by summing responses to the three vignettes (yes=1; no=0), using the following weighting scheme: -2 for vignette 2 (external motivation), -1 for vignette 3 (introjected motivation), and +3 for vignette 4 (autonomous motivation)
Self-efficacy	"Agree" or greater on average with self-efficacy questions: *New General Self-Efficacy Scale*[B] score>=32
Attitudes about intimate partner violence against women	Believes husband is NOT justified in hitting or beating his wife in all 5 scenarios:[C] 1) She goes out without telling him 2) She neglects the children 3) She argues with him 4) She refuses to have sex with him 5) She burns the food
Respect among household members	Meets ALL of the following conditions related to another household member: 1) Respondent trusts relation (MOST of the time) AND 2) Respondent is comfortable disagreeing with relation (MOST of the time)
Instrumental agency	
Input in productive decisions	Adequacy: Sole or joint decision making for at least ONE activity that the household participates in.
Ownership of land and other assets	Owns, either solely or jointly, at least ONE of the following: 1) Any THREE assets 2) At least TWO large assets 3) Land
Access to and decisions on financial services	Meets at least ONE of the following conditions: 1) Belongs to a household that used a source of credit in the past year AND participated in at least ONE sole or joint decision about it 2) Belongs to a household that did not apply for credit because they already had enough current loans, or had no need for external financing or did not like to be in debt. 3) Has access, solely or jointly, to a financial account
Control over use of income	Has input in decisions related to how to use BOTH income and output (if measured) from ONE of the agricultural or non-agricultural activities their household participates in, unless no decision was made
Work balance	Works less than 10.5 hours per day: Workload = time spent in primary activity + (1/2) time spent in childcare as a secondary activity
Visiting important locations	Meets at least ONE of the following conditions: 1) Visits at least TWO locations at least ONCE PER WEEK of [city, market, family/relative], or 2) Visits least ONE location at least ONCE PER MONTH of [health facility, public meeting]

Collective agency	
Group membership	Active member of at least ONE group
Membership in influential groups	Active member of at least ONE group that can influence the community to at least a MEDIUM extent

Table A.2: Survey questions used for IFAD I-WEAI indicators

Indicator	Questions used for i-WEAI
Intrinsic Agency	
Autonomy in income	For each case, are you like this person? 1. "[PERSON'S NAME] uses her (his) income how another person tells her (him) she (he) must use it." 2. "No one tells [PERSON'S NAME] how to use her (his) income. But, she (he) uses her (his) income in the way that her (his) family or community expects." 3. "[PERSON'S NAME] chooses to use her (his) income how she (he) personally wants to, and thinks is best."
Self-efficacy	How much you agree or disagree with the statement: 1. I will be able to achieve most of the goals that I have set for myself. 2. When facing difficult tasks, I am certain that I will accomplish them. 3. In general, I think that I can obtain outcomes that are important to me. 4. I believe I can succeed at most any endeavor to which I set my mind 5. I will be able to successfully overcome many challenges. 6. I am confident that I can perform effectively on many different tasks. 7. Compared to other people, I can do most tasks very well. 8. Even when things are tough, I can perform quite well.
Attitudes about intimate partner violence against women	In your opinion, is a husband justified in hitting or beating his wife in the following situations? 1. If she goes out without telling him? 2. If she neglects the children? 3. If she argues with him? 4. If she refuses to have sex with him? 5. If she burns the food?
Respect among household members	Do you trust your [RELATION] to do things that are in your best interest? When you disagree with your [RELATION], do you feel comfortable telling him/her that you disagree?
Instrumental Agency	
Input in productive decisions	Who in the household makes the decisions concerning crops to be planted, input use and the cropping activities on [PARCELNAME]? Who in the household generally makes decisions about [ASSET]? Who in the household manages [SELF EMPLOYMENT ACTIVITY]?
Ownership of land and other assets	Who in the household owns [PARCEL NAME]? Who in the household owns [ASSET]?

Access to and decisions on financial services	Who made the decision to apply for the loan? Why did you not apply for a loan? Who makes the decision about the use of the loan? Does anyone in your household, either by themselves or together with someone else, currently have an account at a bank or other formal institution?
Control over use of income	Who in the household makes the decision concerning the use of [CROP] harvested from [PLOT] during the last 12 months? Who in your household decided the use of the earnings from unprocessed [CROP] sales? Who in your household decided what to do with the earnings from [LIVESTOCK]? Who makes decisions about how to use profit generated from [SELF EMPLOYMENT ACTIVITY]? Who in the household controls / decides on the use of [MEMBER ID]'s earnings from their job?
Work balance	Time use module: how did you spend your time during the past 24 hours?
Visiting important locations	How often do you visit [LOCATION]?
Collective Agency	
Group membership	Which household members belong to [GROUP]?
Membership in influential groups	To what extent does this [GROUP] influence life in the community beyond the group activities?

Investing in rural people

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