

From Practice to Impact: Women Leading Watershed Restoration Efforts

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ABSTRACT: Rural female farmers produce 50% to 80% of the world's food, yet they often gain fewer benefits from agricultural extension programs compared to men. This study examined a rural development program focused on three areas: economic empowerment through village savings associations, environmental restoration via regenerative agriculture training, and "spiritual renewal" to enhance participants' agency and mutual aid. The research evaluated its impact on multidimensional poverty among smallholder farmers in Burundi, the Democratic Republic of Congo, Ethiopia, and Tanzania, using an adapted index (Alkire & Santos, 2014). Results showed that women benefited significantly from the program, experiencing even greater positive changes than men in all three areas. This highlights the importance of tailored interventions that address the specific needs of female farmers, ensuring they receive equitable support and resources in agriculture.

Keywords: Regenerative Agriculture, Gender, Social Cohesion, Poverty Alleviation.

■ INTRODUCTION

Rural female farmers produce 50% to 80% of food around the world (FAO, 2023). However despite a variety of interventions targeted to small farm holders, research indicates that women consistently realize fewer benefits from agricultural extension programs than their male counterparts. This disparity highlights the need to understand how we can better support rural female farmers to thrive. One such approach is an innovative rural development program that is based on three key program areas:

- economic empowerment by means of village-level savings associations
- environmental restoration through regenerative agriculture training

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- “spiritual renewal,” designed to increase participants’ sense of agency and propensity to provide mutual aid

In particular, this study examined the impact on multidimensional poverty among smallholder farmers in four African countries, Burundi, Democratic Republic of Congo, Ethiopia and Tanzania. Essential to understanding more effective anti-poverty approaches, and more specifically, as they relate to gender equality and women’s empowerment, is this study’s ability to measure interventions’ gender impact in relation to the three program components. Understanding whether, and to what extent, the program is helping to advance the first and fifth Sustainable Development Goals, #1 No Poverty & #5 Gender Equality is essential to moving closer to eradicating poverty and enabling prosperity for all people (UN, 2023).

We begin this article by examining constructs of gender mainstreaming, women’s empowerment, and explaining essential rural agricultural development intervention methods. We then describe our unique, innovative agroforestry training and village-level savings groups intervention strategies and the methods used to evaluate their efficacy. Findings are presented and analyzed, along with recommendations for promising next steps. Results from this study indicate that female farmers benefit tremendously from this three-part approach to development including environmental restoration and exponential gains in economic empowerment and spiritual renewal.

Much attention has been given to intervention strategies aimed to assist the estimated 600 million smallholder farming households worldwide (World Economic Forum, 2022), and particularly those from low and middle income countries, to foster food security while also reducing the poverty gap (World Economic Forum, 2022; Issahaku, Abdul-Rahman & Amikuzuno, 2021). Nevertheless, progress toward eradicating food insecurity, for example, in Sub Saharan Africa has been on the rise since 2015 and is worsening as a result of the war in Ukraine (Wudil *et al.*, 2022). Further, the 2023 Global Gender Gap score by the Economic Participation and Opportunity subindex has declined since last year (World Economic Forum, 2022). Using annual data dating back to 2006, it is anticipated that it will take 131 years to close the Global Gender Gap and 169 years to close the Economic Participation and Opportunity gap. In examining this data, it indicates that on average, the reduction in these gaps decreases by merely 0.24 percentage points annually (World Economic Forum, 2022). This is insufficient to meet the Sustainable Development Goals, #1 No Poverty

& #5 Gender Equality, and implies that our current interventions are drastically inadequate.

Throughout the past few decades, interventions have targeted five key areas in order to boost economic development and gender equity. These areas include gender mainstreaming, women’s empowerment, women and agricultural development, women and agricultural training, and village savings and loans associations. Nevertheless, these interventions have fallen short of their promising projected outcomes.

■ GENDER MAINSTREAMING

For more than thirty years, international development research, policy, and practice have strived to help women in low-income countries lead flourishing lives. In this century alone, gender mainstreaming, focused on gender equality and women’s empowerment, gained prominence in the wake of the Fourth World Conference on Women in Beijing in 1995 (UN Women, 2024; Acosta *et al.*, 2019). Yet as early as a decade after the Beijing Declaration and Platform for Action (UN Women, 1995), gender mainstreaming began to be widely seen to have failed, and subsequent years only confirmed that assessment (Alkire *et al.*, 2013; Guthridge *et al.*, 2022; Lau *et al.*, 2021).

Analysts offer different explanations for the failure of gender mainstreaming (Alkire *et al.*, 2013, Milward *et al.*, 2015; Gupta *et al.*, 2023; Moser & Moser, 2005). One explanation is that gender mainstreaming abandoned its original roots, whereby it was intended to shift power toward impoverished women in the developing world (Mukhopadhyay 2006, Roggeband 2014, in Milward *et al.*, 2015). Some argue, for example, that this may be the result of interventions focused solely on the macro level and disregarding some key determinants of gender equality promotion, such as interventions that specifically consider men’s emotional responses in the journey toward achieving gender equality (Guthridge *et al.*, 2022). Others, principally practitioners from multilateral institutions, maintain that gender mainstreaming suffered from technical deficits overall (AfDB 2011, UNDP 2006, in Milward *et al.*, 2015). Finally, the alignment of gender mainstreaming with bureaucratic structures of international development has been recognized as significantly hindering its transformative potential (Moser & Moser, 2005). Policies failed to address the systemic and complex interrelationship that surfaces with the interface of P3 (public, private and non-profit) partnerships. Consequently, progression toward SDG #5 slowed tremendously.

■ EMPOWERMENT THEORY

A key factor of empowerment theory is the participatory practices in which persons may engage to improve quality of life. Social cohesion, a documented outcome of the participatory process (Burchi *et al*, 2022; Feinberg *et al*, 2020), is a burgeoning framework that connects notions of trust, shared emotional commitment and reciprocity. Moreover, ongoing research reveals that the effects of social cohesion on interpersonal empowerment are different for females and males. (Peterson & Hughey, 2004). This observed difference of social cohesion on interpersonal empowerment may be an explanatory construct for the difference observed in impact for males and females in our study. The difference in reported impact between female and male participants prevailed through each element of the holistic program.

Specifically, the effect of participation on women's intrapersonal empowerment was stronger when they experienced a higher sense of community. One feasible reason for this research observation concerns the longstanding imbalance in power and resources that have existed between women and men globally. Women's historically underprivileged status may have required them to develop a deeper understanding of the value of close interpersonal relationships ~i.e., shared emotional commitment and reciprocity needed in maneuvering through difficult socio-political conditions. This understanding may explain why women's intrapersonal empowerment appeared to increase more from participation when they also experienced a higher sense of community (Peterson and Hughey 2004).

Further, Peterson and colleagues strongly suggest that important differences may exist between women and men in the ways they achieve their empowerment in community-based, participatory contexts and that the concept of social cohesion may help us to understand these differences (Peterson & Hughey, 2004). Furthermore, women may gain greater empowerment benefits from community based participatory contexts than men. The implications for agricultural outreach programming targeting women in agriculture, with its emphasis on social cohesion elements, may yield greater benefit for women's success in improved agriculture efforts.

■ WOMEN'S EMPOWERMENT

In the wake of widespread recognition that gender mainstreaming had stalled, the field of gender in development began to see the emergence of a number of different indices to measure women's empowerment

(Alkire *et al.*, 2013, Malapit *et al*, 2019; Quisumbing *et al.*, 2023). The empowerment concept itself was salient as far back as the Beijing Conference and even earlier – having come to the fore in the 1980s and early 1990s (Batiwala, 2007, p. 113). However, because it measured outcomes in real women's lives, it became newly relevant as an aspirational goal.

Just as the concept of empowerment was beginning to hit its stride, gender equality and more specifically, women's empowerment became pivotal points in the Millenium Development Goal (Alkire *et al*, 2013). Through the evolution of MDGs to the Sustainable Development Goals, women's empowerment continued to exhibit prominence in the fifth Sustainable Development Goal, adopted (with the other SDGs) in September 2015 and officially came into force on January 1, 2016, as part of the 2030 Agenda for Sustainable Development (UN, 2016). Particularly relevant to our focus here is the proliferation of indices and approaches to measuring women's empowerment, specifically in the field of agricultural development. While this has occurred throughout the past decade, only recently have internationally validated measures been developed (Quisumbing *et al.*, 2023). Rich as these approaches are, it is important to note the distinctions between types of empowerment being measured (Kabeer, 1999; Quisumbing *et al.*, 2023; Rowlands, 1997; Batiwala, 2007).

Our unique intervention approach discussed below, not only comprises interventions intended to change the material circumstances of its participants (such as the agroforestry training and village-level savings groups) but also includes a component designed to increase participants' sense of agency through the mobilization of local leaders in churches who lead trainings on a "Spiritual Renewal Curriculum". Consequently, it arguably captures all three of the most commonly understood dimensions of empowerment, which Quisumbing *et al.* (2023) explain as a typology of power set forth by Rowlands, "juxtapos[ing] the notion of dominating or exerting "power over" others with generative forms of empowerment, including "power within" (involving self-respect, self-efficacy, and an awareness of rights), "power to" (enacting personal goals) and "power with" (acting collectively toward shared interests)."

■ WOMEN AND AGRICULTURAL DEVELOPMENT INITIATIVES AND INDICES

The gender gap in agriculture has been widely documented (Adegbite & Machethe, 2020; Anderson *et*

al., 2020; Buehren, 2023; Huyer 2016; FAO 2011; Takeshima, 2024; UN Women 2015; Nyasimi & Huyer 2017). In response to the food crises in 2007-2008 and again in 2011, the US government's Feed the Future Initiative launched the Women's Empowerment in Agriculture Index (WEAI), developed in collaboration with the United States Agency for International Development (USAID), the International Food Policy Research Institute (IFPRI, and the Oxford Poverty and Human Development Initiative (OPHI), in 2012 to monitor and evaluate changes in women's empowerment over time and evaluate variations across different countries, regions, and population subgroups (Alkire *et al.*, 2013; Boutreau & Cohen, 2020; Malapit *et al.*, 2019). Yet, the WEAI's data is insufficient to understand the context for intervention efficacy or failure. Such indices must be paired with qualitative research to better understand the context of outcomes in order to further plan interventions (Quisumbing *et al.*, 2023).

Recognizing some of the limitations of the WEIA, the original architects of the index collaborated with thirteen partner projects from the Gender, Agriculture, and Assets Project, Phase 2 (GAAP2) to adapt and enhance the index to assist with assessing women's empowerment in agriculture through monitoring twelve indicators, including: income autonomy, self-efficacy, views about intimate partner violence, participation in productive decision-making, land and other asset ownership, credit access and decision-making over credit, control over income use, work-life balance, ability to visit locations of significance, group membership, involvement in influential groups, and respect within the household. This 2018 revised index, the Pro-WEAI, considers these indicators within three essential domains: intrinsic agency (power within), instrumental agency (power to), and collective agency (power with) (IFPRI, 2018).

Interestingly, in McCarthy and Krause's study (2024) of a comprehensive program among livestock communities with the Maasai tribe of northern Tanzania and southern Kenya, they found that while most indicators among the Pro-WEAI showed gains for young women (aside from their attitudes toward intimate partner violence), they found no changes in empowerment across the entire sample women. They argue that their findings indicate that programs aimed at women's empowerment have varying impacts throughout different stages of a woman's life.

Therefore, research still indicates a significant road ahead to close the gender gap in agrifood systems. For example, Huyer (2016) observes that significant gender

disparities persist in access to, and control over, six essential agricultural resources and inputs: land, labor, credit, information, extension, and technology, which are essential resources (Sheahan & Barrett, 2014; World Bank, 2012; Huyer, 2016). These problems are exacerbated for women without husbands (for example, widows). Farms managed by female-headed households generally have less labor available for agricultural work due to their smaller household sizes and because women often have unpaid domestic responsibilities, such as fetching fuelwood and water, which divert them from income-generating activities (Huyer 2016). Further, Takeshima (2024) also points specifically to the role of agricultural mechanization as a contributing factor to gender inequality as the role of female farmers shifts more to non-farm activities compared to their male counterparts. Programs that address deficits in any, or all, of these resources and inputs merit evaluations of their outcomes so that women's empowerment with respect to their material circumstances can be strengthened – if not also their intrinsic sense of agency. Boutreau and Cohen (2020) note that, a dozen years after the food shocks of 2007–2008 and 2011, women remain as badly off as ever because the interventions that governments devised in the wake of those shocks did not target them as women. This is notable given that the literature finds an association between women's empowerment and improved food security (Aziz *et al.*, 2022).

■ WOMEN AND AGRICULTURAL TRAINING

The differential impacts of agricultural extension services on men and women have been amply documented, with women having less access to such services than do men, and realizing fewer benefits from what access they do have (Duffy *et al.*, 2020; Cohen & Lemma, 2011; Doss & Morris, 2000; Tambo *et al.*, 2021). This is important because plots owned or managed by women show lower productivity, even when accounting for factors other than gender (Peterman *et al.*, 2011). In addition, gender makes a difference in a variety of agricultural extension programs; for example, women have been found to benefit less than men in programs for pest management (Tambo *et al.*, 2021) and in integrated soil fertility management (Lambrecht, 2016.) Access to and/or ownership of assets are important conduits through which women benefit from agricultural extension services or agricultural development programs (IFPRI, 2011). Increasing attention is being paid to climate-smart agriculture (CSA), which can be described as a strategy that “aims to improve the attainment of national food security and strategic development goals by sustainably

boosting outputs and incomes, promoting resilience (adaptation), and reducing greenhouse gas emissions (mitigation)” (Mutengwa *et al.*, 2023). However, the provision of climate-smart agricultural extension services can have differential impacts on women and men; analysts have found that this “can hamper productivity, income, nutrition, and ultimately adoption outcomes (Peterman, Berhman, & Quisumbing, 2014, cited in Duffy *et al.*, 2020; Tsige *et al.*, 2024). Teklewold’s recent study (2023) further confirmed that the adoption of CSA practices based on gender is more probable when plot management rights coincide with land ownership and gender-based control of economic benefits from the land.

■ VILLAGE SAVINGS AND LOANS ASSOCIATIONS

Coinciding with the proliferation of indices of women’s empowerment, the 2010s saw the emergence of village savings and loans associations (VSLAs) as one vehicle for promoting the prosperity and well-being of impoverished rural people, largely though not exclusively women. Microenterprise lending had enjoyed increasing, and eventually overwhelming, levels of public and then private support since the time of its development as a technology for promoting savings and the establishment of small businesses, starting with the Grameen Bank model in Bangladesh in the 1970s (Alam, 2023). However, rigorous testing of microenterprise lending using randomized control trials (RCTs) has found mixed results (Duflo *et al.*, 2013; Banerjee *et al.*, 2015).

Subsequent failures of the microenterprise model, stemming from indebtedness and the involvement of large commercial banks, led to nongovernmental organizations (NGOs) promoting VSLAs as a more accessible alternative with less risk. The basic VSLA model was developed in the 1990s in Mali by CARE and built on traditional savings vehicles (Karlan *et al.*, 2017). Savings associations promised economic results without the risk of indebtedness that microenterprise carried, although inflation across many countries of Sub-Saharan Africa mitigated their impact and attractiveness to a certain extent (Steinert *et al.*, 2018; Allen & Hobane 2004). Steinert and colleagues’ research found that “demand-based interventions [consisting of such elements as financial literacy training, for example] result in little in the way of outcomes” (Steinert *et al.*, 2018). Instead, they conclude that it is supply-based interventions, comprising those that consist of components such as start-up funding, that offer some modest hopes of success; interventions that target women and their husbands together particularly have a

greater chance of success. However, because positive effects have a tendency to fade over time, it may be necessary to “caution against predictions of a savings-driven ‘revolution’ in the global fight against poverty. And yet, they are promising enough to position saving promotion somewhere at the top of the agenda in international development” (Steinert *et al.*, 2018, p. 254). Karlan *et al.* found that VSLAs’ greatest impact was felt with respect to women’s empowerment: using a women’s empowerment index, results showed that after two to three years of operation, VSLAs saw women increase their impact in household decision-making, their control over food expenditures, and their influence on education expenses. There was also improvement in non-farm business outcomes (Karlan *et al.*, 2017).

■ THE PROGRAM: COMMUNITIES RESTORING WATERSHEDS

In an effort to better equip small farm holders with the skills necessary for rural development, an innovative approach to addressing rural development was developed that integrates three principal areas: economic empowerment by means of village-level savings associations; environmental restoration through regenerative agriculture training; and a component called spiritual renewal, designed to increase participants’ sense of agency and propensity to provide mutual aid. All three elements of the program are delivered through a community group of 20-30 members, called a Purpose Group. In the Purpose Group, members undertake the program activities of saving/lending, agricultural training including farmer field schools and spiritual renewal activities aimed at promoting agency and social cohesion. In working together over time, the Purpose Group becomes a powerful mechanism of social support within the community. This approach has been developed over 40 years of learning and testing by the implementing organization, Plant With Purpose. The model has been shown to have significant positive impact on the landscape, community relationships, and resilience (Kaiser *et al.*, 2018, Sabin *et al.*, 2022, 2019). In particular, the study examined the impact on multidimensional poverty among smallholder farmers.

■ METHODOLOGY

Measuring gender impacts of interventions along the three pillars of the model will help to address whether, and to what extent, the model is helping to advance the fifth Sustainable Development Goal; to achieve gender equality and empower all women and girls (United Nations, 2016).

This study used a mixed methods approach and drew from three distinct data sources, including household surveys, participatory workshops, and VSLA records.

The study examined the impact on multidimensional poverty among smallholder farmers of a rural development program comprising three principal areas: economic empowerment by means of village-level savings associations; environmental restoration through regenerative agriculture training; and a component called “spiritual renewal,” designed to increase participants’ sense of agency and propensity to provide mutual aid. Multidimensional poverty was measured by adapting the Multidimensional Poverty Index (Alkire & Santos, 2014). The results were then disaggregated by gender to explore whether program impacts differed for women and men.

■ DESCRIPTION OF STUDY AREAS

Data was collected from sites in four countries: Burundi, Democratic Republic of Congo, Ethiopia, and Tanzania. All study sites are rural areas where the majority of the population are smallholder farmers with typically less than 2 hectares of land. Study sites are usually located in areas of high slope, high deforestation, and high levels of poverty.

■ VILLAGE SAVINGS AND LOANS GROUPS

Smallholder farmers at all sites in this study voluntarily participate in VSLA groups. These groups not only actively mobilize their own resources for savings and credit activities but also study regenerative farming practices such as agroforestry, soil conservation, reforestation, and conservation agriculture; subsequently, farmers apply these practices on their own farms and communities. While self-managed, VSLA groups collaborate with local NGOs who provide training and technical support on themes such as saving group formation, regenerative agriculture practices, and data collection. Groups are typically 20-30 members in size,

self-selected, and meet on a regular basis – usually once per week or once per two weeks – in order to conduct savings and loans activities. At the time of this study, there were approximately 1,800 VSLA groups across the eight countries and 63% of savings group members were female.

■ DATA COLLECTION AND ANALYSIS TECHNIQUES

This study used a mixed methods approach and drew from three distinct data sources as follows:

1. Household Survey: A random sample of both treatment watersheds where local NGOs were collaborating with and training communities--applying the CDR model--and comparison watersheds where the CDR model was not applied. This resulted in a global random sample of 4,225 households, each of whom were asked a series of questions on environmental, economic, and social themes. All survey questions were administered by independent enumerators who were contracted for the survey. Surveys took place between July and November 2020 and the survey process at each site was typically completed in 2 weeks or less.
2. Participatory Workshops: Workshops were held at each study site to map environmental change and community change. Community members were invited to these participatory exercises representing various constituencies such as men, women, youth, elders, farmers, and pastors. These exercises encourage dialogue among community members as well as provide insights into causes and driving factors behind observed change.
3. VSLA records: Savings groups gather information every three months on metrics such as attendance, membership, savings amount, and loan amount. This data is collected from all groups and can provide important insights into group function.

Table 1: Data collection methods applied in this study

Method	Description	Frequency	Dates
Household Survey	Random sample of households in comparison and treatment watersheds covering questions on 3 themes, environmental, economic, and social/spiritual	Every 3 years	2020
Participatory Workshops	Community members in comparison & treatment watersheds discuss & analyze change	Every 3 years	2020
VSLA records	Data collected on savings group attendance, savings, loans	Quarterly	on-going

Survey data was tested for statistical significance of the difference between the treatment group (CDR participants) and comparison group using the Student's t-test for continuous variables and the chi-squared test for discrete variables. The R statistical platform was used for these tests (R Core Team, 2024).

An impact ratio was calculated by comparing the proportional difference between comparison and treatment group disaggregated by gender as per the following formulae:

P = Participant | NP = Nonparticipant

$$\begin{aligned} \text{Female \% Change: } \frac{(P_f - NP_f)}{NP_f} &= F_{\Delta} \\ \text{Male \% Change: } \frac{(P_m - NP_m)}{NP_m} &= M_{\Delta} \end{aligned} \quad > \quad \frac{(F_{\Delta} - M_{\Delta})}{M_{\Delta}} = \text{Impact Ratio}$$

RESULTS

The percent change calculation compares expressed results of female and male respondents over the study period. Females indicated a greater percent change from the comparison in each of the three program areas: environmental restoration/agroforestry, economic empowerment/VSLA and attitudinal/spiritual renewal.

ENVIRONMENTAL RESTORATION

When asked, "Please specify the types of soil improvement techniques you are applying on your land", female participants showed an increased ability to learn/implement multiple techniques simultaneously versus their male counterparts. Female nonparticipants technique diversity is half of male nonparticipants while

female participants technique diversity exceeds male participants netting a 220% impact ratio (Figure 1).

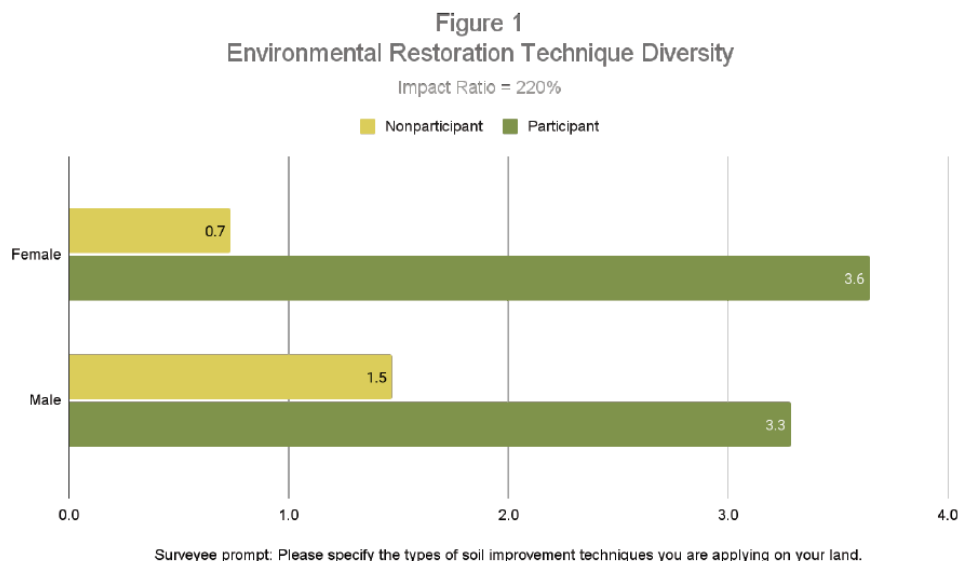
Percent of Land Protected (Figure 2) has similar results with an impact ratio of 408%. Female participants are protecting 0.42 ha of land more than female non-participants while male participants are protecting 0.35 ha of land more than male non-participants. This represents an increase of 574% land protected by females versus an increase of 134% increase for males.

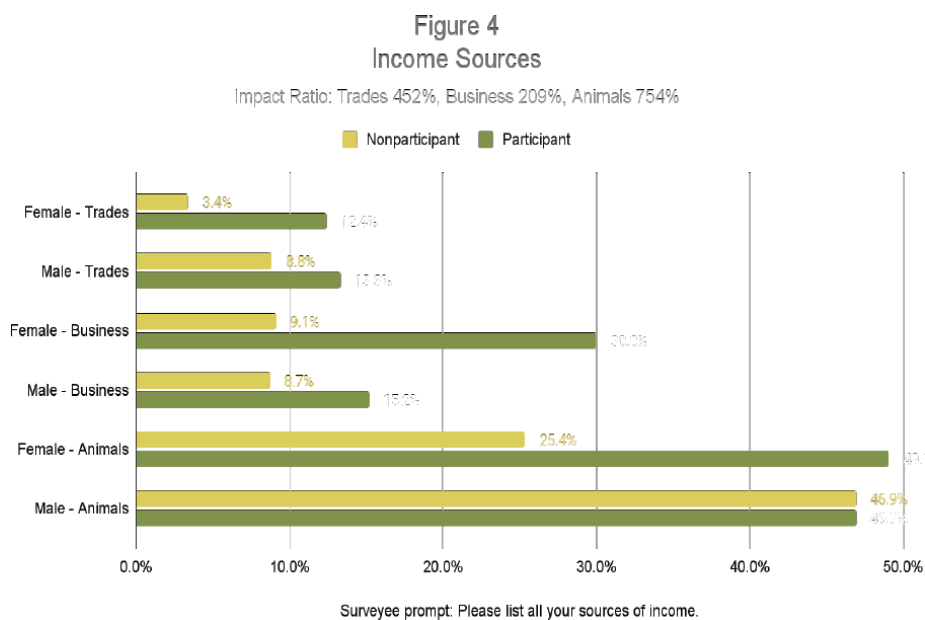
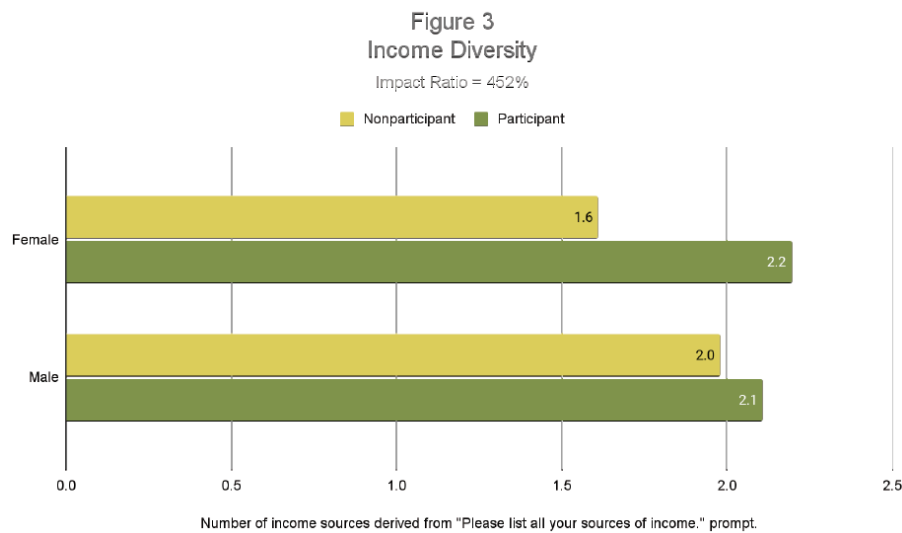
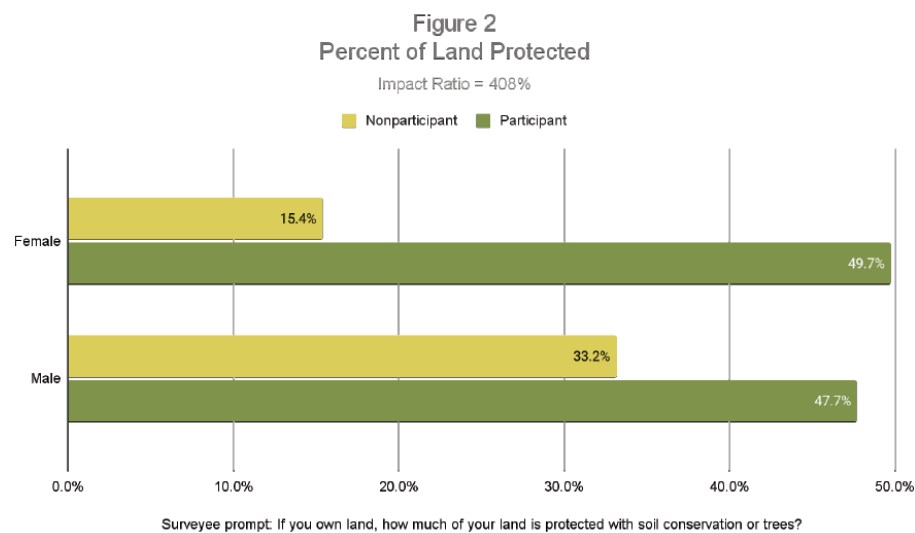
Participatory workshop results, where community members conduct their own analysis of change, draw a strong link between program involvement and environmental change. For example, in Burundi, community analysis showed that [program] training related to environmental protection has resulted in increased tree planting and tree cover.

ECONOMIC EMPOWERMENT/VSLA

There was a universal increase in income diversity among all study participants compared to non-participants. However, female participants experienced a 452% greater increase in income diversity relative to their male counterparts. Female participants' trades, business, and livestock sources of income increase by 452%, 209% and 754%, respectively (Figures 3 and 4).

Participatory workshop results, wherein community members conducted their own analysis of change, demonstrated a strong connection between economic changes and program training. For example, in Democratic Republic of the Congo, community analysis indicated that joining a savings group resulted in greater





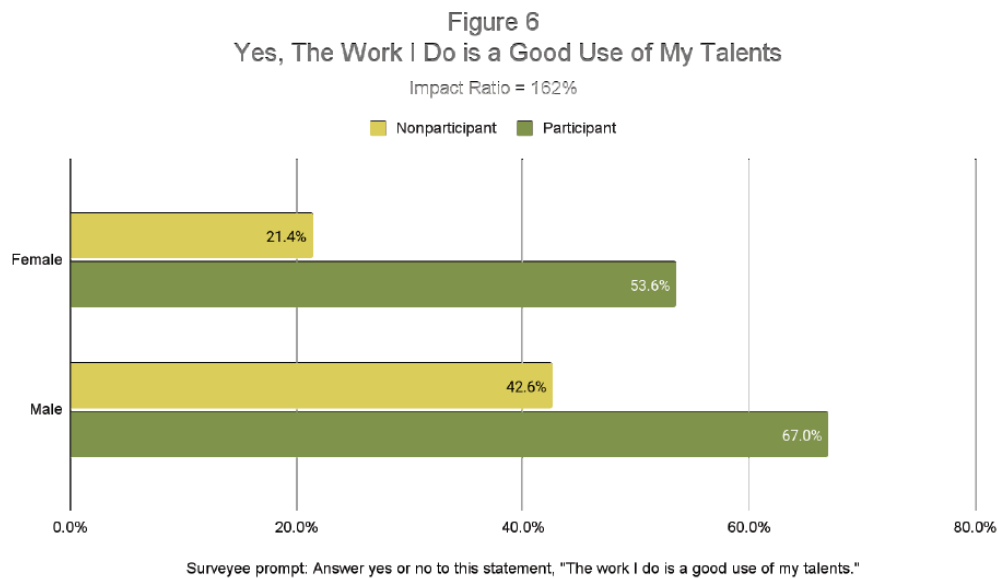
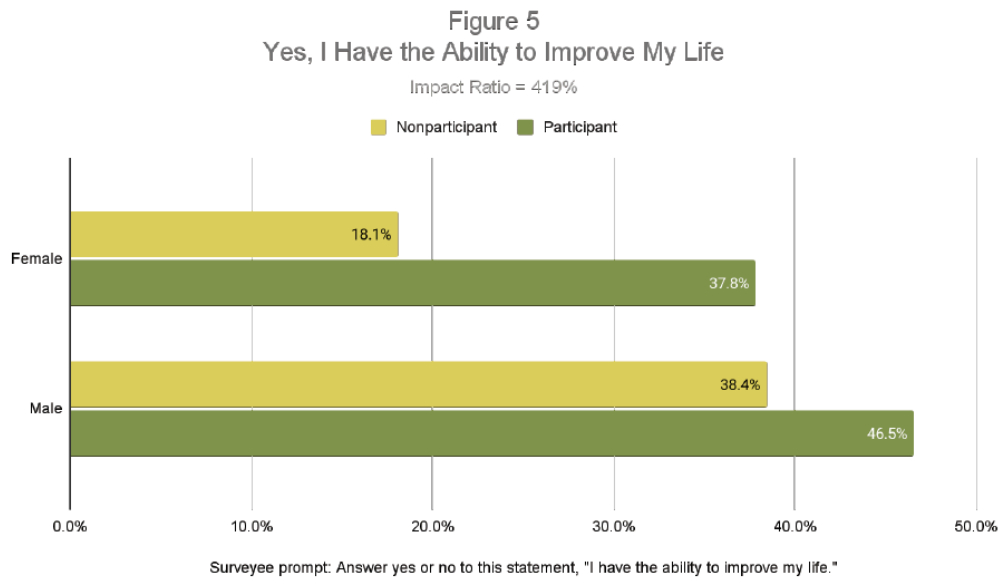
investment, financial gain, and ‘economic uplifting of the family.’

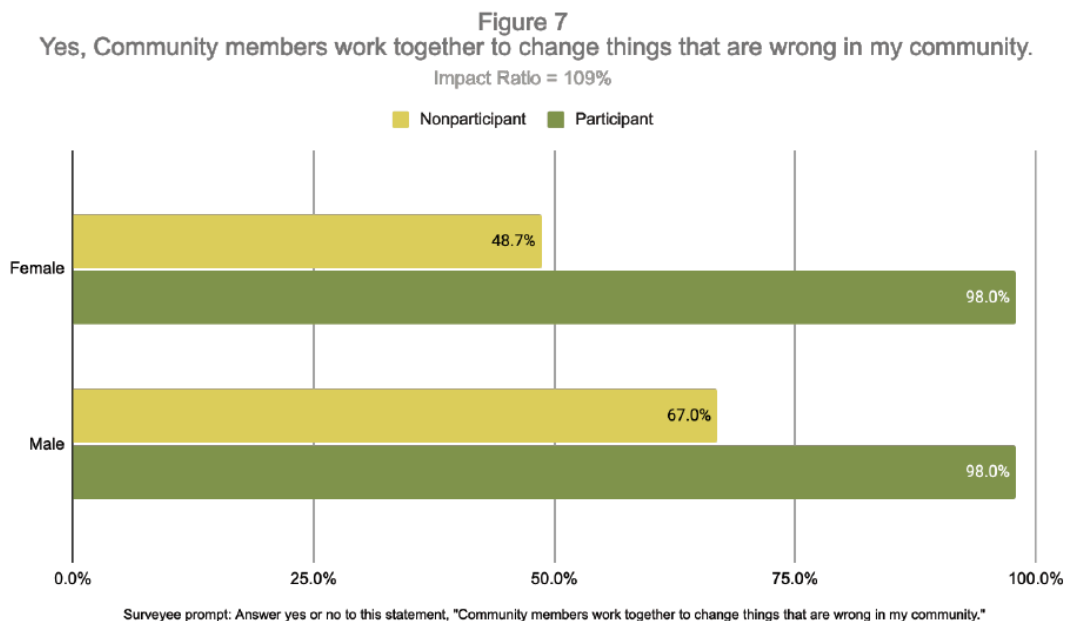
■ ATTITUDINAL/SPIRITUAL RENEWAL

Respondents answered the following two questions on a Likert scale: “I have the ability to improve my life” (Figure 5), “The work I do is a good use of my talents” (Figure 6). The Likert scale was from 1 to 5 where 1=strongly disagree, and 5=strongly agree. A third question was answered ‘yes’ or ‘no’-- “Community members work together to change things that are wrong in my community” (Figure 7). Female and male participant responses are reasonably comparable while female nonparticipant’s responses are approximately half of their male counterparts, resulting in Impact Ratios of 419%, 162%, and 109%, respectively.

■ DISCUSSION

Using an adapted version of Alkire & Santos’ (2014) Multidimensional Poverty Index, our study examined the impact of an innovative, comprehensive rural development program that focuses on village-level savings associations, regenerative agriculture training and spiritual renewal (social cohesion). The results were then disaggregated by gender to explore whether program impacts differed for women and men. Measuring gender impacts of interventions along the above three pillars demonstrates the extent to which the examined program is helping to advance the #5 Sustainable Development Goal to promote gender equality and empower women (United Nations, 2016). The findings of





this study counter the predominant trend in the literature which largely suggests that women derive fewer benefits from agricultural extension programs than do men. (Duffy *et al.*, 2020; Cohen & Lemma, 2011; Doss & Morris, 2000; Tambo *et al.*, 2021).

Moreover, the results of this initial study are encouraging and suggest that the holistic approach employed by the designated model has potential to produce demonstrated greater benefit for female participants. This is a critical finding in light of the differential impacts of agricultural extension services on men and women, with women having less access to such services than do men and realize fewer benefits from the access they do have (Duffy *et al.*, 2020; Cohen & Lemma, 2011; Doss & Morris, 2000; Tambo *et al.*, 2021). More specifically, as findings demonstrate, females indicated a greater percent change from the baseline in each of the three program areas: environmental restoration/agroforestry, economic empowerment/VSLA and attitudinal/spiritual renewal (social cohesion). This holistic approach, with its resulting increased sense of agency, financial literacy, and social cohesion, may account for the greater impact on women in comparison to their male counterparts implementing the same program. The observed difference of social cohesion on interpersonal empowerment may prove to be an explanatory construct for the difference observed in impact for males and females in our study. The difference in reported impact between female and male participants prevailed through each element of the holistic program.

Moreover, the finding that female participants demonstrated a greater ability to learn and implement multiple techniques simultaneously compared to their male counterparts is significant and warrants further investigation. This difference may suggest gender-related variations in learning and knowledge application. However, other factors could also explain this outcome, underscoring the need for continued research. The results of such studies could have important implications for training program strategies and curriculum development.

Another compelling finding is that while protected land under both female and male participants has increased, female participants are protecting 0.42 ha of land more than female non-participants while male participants are protecting 0.35 ha of land more than male non-participants. This represents an increase of 574% land protected by females versus an increase of 134% increase for males. The additional land protection by female small farm holders is a remarkable contribution to long term environmental restoration goals of participating communities in the nine countries where the program is currently being implemented.

Development in terms of economic empowerment also flourished. While income diversification expanded for all study participants, it did so at twice the rate for female participants relative to male participants. Their sources of income with regard to trades, business, and livestock increased significantly. Qualitative data attributed the tremendous growth to the impact of the training programs. Yet scaling tools and methodologies, such as agriculture development training, often leave women behind

(McGuire *et al.*, 2022). The findings therefore demonstrate the benefit of gender inclusivity in innovative training and call for the imperative inclusion of women in training programs to scale agriculture development across the globe. Furthermore, the integrated model that incorporates improved agricultural training with savings/loans activities and spiritual renewal elements that promote social cohesion/agency is a breakthrough modality in supporting women farmers to thrive at program implementation.

Lastly, in terms of these findings regarding the third pillar (Spiritual Renewal), while there was similarity between both male and female study participants, there was considerable dissimilarity between the genders among the control group. Participants noted their agency over their lives and that the work they do is a good use of their talents. Perhaps most striking is that there was no differentiation between male and female respondents' overwhelming sense of inclusion and empowerment to transform ineffective aspects in their community and that nearly all participants felt empowered. Moreover, female participants expressed a greater sense of agency when collaborating with fellow community members to address issues within their community by nearly 50% compared to their non-participating female counterparts. Spiritual renewal, therefore, can be highlighted as a particularly effective benefit of programming for all participants while further illustrating this pillar as instrumental toward achieving SDG #5.

The impact survey results indicate that women realized comparatively greater benefit in all three components of the program. The holistic approach of the program and the resulting increased sense of agency, financial literacy, and social cohesion may account for the greater impact on women in comparison to their male counterparts implementing the same program.

■ RECOMMENDATIONS

This study provides much needed insight for how future agricultural extension programs may be designed and implemented in order to realize greater benefits for female participants. Interestingly, the finding that female participants showed an increased ability to learn and implement multiple techniques simultaneously compared with their male counterparts is particularly noteworthy. This particular finding has significant implications for curriculum development for extension services' training programs. Additionally, it can inform future research regarding gender differentiated instructional approaches in a variety of areas in addition to environmental

restoration and rural development. Further study is required on the emphasis of social cohesion elements as a catalyst for women to thrive in implementation of programs aimed at improved agricultural outcomes.

Impact evaluations are conducted every three years to assess the performance of the model in reducing multidimensional poverty, improving agricultural outcomes and environmental restoration efforts. The authors of this research will continue to monitor and analyze trends of available gender disaggregated data.

■ LIMITATIONS

This study is based on data collected from a household survey and insights gathered from participatory workshops. Such data collection methods provide a robust foundation for understanding community perspectives and experiences. However, as with any research relying on self-reporting, the evaluation is inherently susceptible to certain biases and limitations associated with self-reported data. Data can be influenced by response, social desirability and recall biases, for example, as well as participants' interpretation of questions. These limitations can affect the accuracy and reliability of the data in order to address and mitigate these potential issues and enhance the validity and reliability of the findings, several methodological strategies were employed:

Large Randomized Samples - By using large and randomized samples, this study aimed to ensure that the findings are generalizable and not skewed by a non-representative sample. Randomization helped minimize selection bias and ensured that every individual in the target population had an equal chance of being included in the study.

Comparison (control) and Treatment (experiential/program) Cohorts - The use of comparison and treatment cohorts enabled a more rigorous assessment of the intervention's impact. By comparing the outcomes of participants with non-participants, the study could better isolate the program's effects and control for confounding variables. By comparing the outcomes of those who participated in the program with those who did not, we could better isolate the effects of the intervention and control for confounding variables.

Careful Question Design Methods - The survey questions and workshop activities were meticulously designed to minimize biases and inaccuracies. This included using clear, concise, and neutral language, avoiding leading

questions, and ensuring that the questions were relevant and easy to understand. Pre-testing or piloting the survey and workshop questions on a small subset of the population helped identify and correct potential issues before full-scale implementation. Many of the questions used have been field tested and improved over nearly 2 decades and in multiple languages beginning in 2008.

By incorporating these strategies, we sought to enhance the validity and reliability of our study findings despite the inherent limitations of self-reported data. This comprehensive approach aimed to provide a more accurate and nuanced understanding of whether program outcomes differed by gender and if so, how? The methodology allowed more credible conclusions about the effectiveness of the interventions evaluated.

■ CONCLUSION

The results from this study shed light on the pathways through which village-led savings associations, combined with regenerative agriculture training and community mobilization for spiritual renewal/increased agency, can improve circumstances of the lives of women smallholder farmers in four countries in Africa. Findings provide insight into the effects on women's empowerment with respect to their material circumstances as well as their intrinsic power consistent with the literature (Andriamahery & Qamruzzaman, 2022; Quisumbing *et al.*, 2023; Rowlands, 1997;). This study of the impact of an innovative, comprehensive rural development program, an innovative and comprehensive rural development program, focused on village-level savings associations, regenerative agriculture training and spiritual renewal. Findings confirmed that this approach is an effective strategy to help advance the #5 Sustainable Development Goal to promote gender equality and empower women. Rural development training programs and policy development following this model will further empower women and advance progress toward achieving gender equality and establishing the foundation for a peaceful, prosperous and sustainable world.

■ AUTHOR'S CONTRIBUTION STATEMENT

Dr. Annah Amani, PhD, MPH, and Mr. Robert Morikawa contributed to the conceptualization of the study and data curation.

Dr. Amani served as lead author and contributed substantially to the development of the manuscript, synthesis of the literature, interpretation of findings and writing of the original draft. Dr. Julie Richards, PhD, MSW, as second author, contributed substantially to the

development, writing, editing, and revision of the manuscript. Mr. Robert Morikawa and Mr. Dave Luebckerman contributed to the development of the methodology and formal analysis of the data. Dr. Elena McCollim, PhD, MA, contributed to the literature review. Ms. Taylore Maxcy, MA, contributed to review of the manuscript. Dr. Amani, Dr. Richards and Mr. Robert Morikawa reviewed and approved the final version of the manuscript.

■ CONFLICTS OF INTEREST STATEMENT

At the time of this study, all authors, except Julie Richards (and the other literature review contributors) were employees of Plant With Purpose. The authors disclose this employment relationship as a potential conflict of interest.

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