



Impact of alternative livelihood interventions on household welfare: Evidence from rural Ethiopia[☆]



E. Kebebe^{a,*}, F. Shibru^b

^a Ethiopian Environment and Forest Research Institute, Addis Ababa, Ethiopia

^b ChildFund Ethiopia, Addis Ababa, Ethiopia

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ABSTRACT

Livelihoods of a large number of households in Ethiopia depend on environmental resources. On the other hand, excessive reliance of households on environmental resources for their sustenance has already led to high rates of deforestation and forest degradation in Ethiopia. A project was set out to provide alternative livelihood activities in order to improve the welfare of vulnerable families who derive their livelihoods mainly from selling firewood and charcoal. The project provided support to women groups to engage in income generating activities that create alternative means of livelihoods. This paper assesses the impacts of participating in alternative livelihood activities on household welfare and environmental protection in rural Ethiopia. The paper uses data from cross-sectional survey involving 450 sample households to examine the difference in household welfare between project participants and non-participants using propensity score matching and inverse probability weighting estimator with regression adjustment. Empirical results show that participation in alternative livelihood activities has contributed to increment in total grain production, increased household income and adoption of natural resources management technologies. Project households consumed more diverse food across food groups and earned an extra \$35 per month from local market sales of tree and fruit seedlings. The result was robust and consistent across models. The findings support the notion that new streams of income generating activities can lead to improvements in household's well-being as well as reduction in environmental degradation.

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1. Introduction

Agriculture is central to the Ethiopian economy and is intimately linked to food security, household income and poverty reduction (Admassie and Abebaw, 2014). While agriculture forms the base of livelihoods for the majority of households in Ethiopia, a significant number of households depend on forest environmental resources to meet subsistence needs and generate cash income. Like in many parts of the developing world, households in Ethiopia use food, fuel, fodder, construction materials, medicine and other products from forests and other natural environments to meet subsistence needs and generate cash income (Angelsen et al., 2014; Vedeld et al., 2007). Excessive reliance of households on environmental products for their sustenance has already led to high rates of deforestation and land degradation in Ethiopia (Babulo et al., 2008).

Factors that condition household's economic reliance on forest environmental resources may vary depending on the resource endowment of the household, the household's demographic and economic

characteristics and exogenous factors such as markets, quality of structures and policies (Barrett et al., 2001). Constraints imposed on some households in the form of access to livelihood assets can prevent asset-poor households from taking up economic activities with higher returns (Babulo et al., 2008; Wunder et al., 2014). There is a growing evidence which shows that the less a household has access to livelihood assets, the more it relies on forest environmental resources (Angelsen et al., 2014). Informed by these evidences, proponents of REDD+ (Reducing Emissions from Deforestation and Forest Degradation) are advocating for development interventions which allows households to create assets and pursue high return livelihood activities, thereby reduce the pressure on environmental resources. There is a need for effective strategy that can increase agricultural production, food security and off-farm income of households. The rationale behind this approach is that creating alternative livelihood opportunities to poor people whose livelihoods directly or indirectly depend on forest related resources could provide more money for them, limit cutting forests for fire wood and charcoal making and gives the natural resources a chance to recover.

Following this logic, some development organizations have been implementing alternative income generating activities for protection of environmental resources. For example, ChildFund Ethiopia has been implementing the project titled "Family Based Economic Strengthening

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* Corresponding author.

E-mail addresses: kebeberg@yahoo.com, pparkis@yahoo.com (E. Kebebe).

and Environmental Protection” in Silti and Boset districts from May 2013–December 2015. The objective of the project was enhancing the income and strengthening livelihood security of deprived, excluded and vulnerable women and their families in the two districts through sustainable asset creation and effective natural resource management interventions. Project implementers indicated that the target groups of the project were identified based on the level of vulnerability. Women were selected as most vulnerable groups owing to their limited access to resources, low empowerment and bargaining power. Women were forced to engage in fire wood collection, charcoal production and other petty trades. Hence, the project set out to find alternative means of income for those poor women. Some studies in Ethiopia show that Firewood was the most used forest product and constituted the largest proportion (79%) of the total forest income (Asfaw et al., 2013). Women were supported to engage in income generating activities that create an alternative means of livelihoods.

While family based economic strengthening approach could potentially enhance the livelihoods of vulnerable people and curb environmental degradation, there is little evidence about the relative effectiveness of such interventions. Project financing and implementing agencies seek empirical evidence that establishes if they are investing finite resources in the most efficient and effective projects. This assessment was done to provide rigorous evidence on whether the project has attained its intended objectives. We examined the difference in household income and nutrition between project participants and non-participants using propensity score matching, complemented with inverse probability weighting estimator with regression adjustment to check the robustness of results.

2. Details of project interventions

The aim of “Family Based Economic Strengthening and Environmental Protection” project was enhancing the income and strengthen livelihood security of deprived, excluded and vulnerable women and their families while ensuring environmental protection. The project integrated livelihoods and poverty alleviation objectives with environmental conservation objectives. According to project implementers, Boset and Silti districts were chosen for project implementation as they are highly exposed to high level of degradation resulting from deforestation and soil erosion, which in turn result in low agricultural productivity and chronic food insecurity. Moreover, inefficient cooking methods commonly practiced in the area consume high volumes of wood and charcoal. The main target groups were vulnerable poor women. For this purpose, 450 women in 9 villages in Boset and Silti were organized into producer groups to establish an alternative livelihood and improve management of natural resources. The project was implemented by ChildFund Ethiopia in collaboration with Silti-Aynage and Boset Child and Family Development Organization in partnership with relevant stakeholders. The project has supported women to engage in income generating activities that create an alternative means of livelihoods to selling charcoal and firewood. Marketable products were identified and technical advice was given to set up businesses such as production and selling of energy saving stoves and tree seedlings. For this purpose, women were organized into groups for creating viable businesses and to learn new techniques in a group setting. Women groups were given technical and material support for stove and seedling production. Furthermore, capacity building was given on gender in natural resource management to take informed decisions on resource utilization complements the activities. The project also established school clubs, provided training on natural resource management and tree planting to students and teachers and facilitated re-forestation through providing seedlings and knowledge on how to do terrace cultivation, planting and management of the new forest. The women were supported with income generating activities and knowledge transfer on effective and sustainable natural resource management and benefit from other project components. These interventions were sought to increase the

women's status and bargaining power. Through women's improved empowerment level they were supposed to be able to contribute to the increased household income and wellbeing.

3. Theory of change and outcome indicators

The anticipated causal pathways between project interventions and each of the intended outcomes have been outlined in the attached theory of change. The project impacts on the environment and household welfare was examined using various indicators of natural resource management, agricultural production and household welfare. The theory of change traces if the project has made any change in beneficiary women's assets, crop production and income, improvement in household nutrition, adoption of natural resources management practices, etc. In the present study, we used household monthly income as a welfare measure. Household dietary diversity scores (HDDS) are increasingly used as measures of food security and as a proxy for nutrient adequacy in recent years (Beegle et al., 2012; Behnassi et al., 2013; Ruel, 2002; Swindale and Bilinsky, 2006; Thorne-Lyman et al., 2010). We included questions about the number of food types or food groups consumed during the last seven days in the questionnaire to estimate HDDS. Household Food Insecurity Access Scale (HFIAS) was calculated and used as proxy measures of household food insecurity (Swindale and Bilinsky, 2006). The HFIAS was assessed by asking a series of questions reflecting different domains of food security as experienced by the respondents (Swindale and Bilinsky, 2006). The HFIAS calculates as sum of the frequency-of-occurrence during the most food insecure month for the nine food insecurity-related conditions.

4. Methodology

4.1. Theoretical framework and estimation strategy

Our guiding principle in exploring the determinants of household technology adoption and impact evaluation is grounded in the theoretical model of the agricultural household (De Janvry et al., 1991; Singh et al., 1986). Theoretically, the decision to adopt technologies is considered under the general framework of utility maximization. It is assumed that farmers are expected to choose or adopt the technology that gives the largest expected discounted net return, or utility. Here we focus on the adoption of natural resource management technologies (e.g., implementation of soil and water conservation measures in degraded lands, planting fruit trees and afforestation of hillsides) and use of energy saving stove. We assume that a farmer chooses a natural resource management technology combination that maximizes utility subject to household demographic characteristics, household resource endowments and other determinants. The feasibility and attractiveness of any alternative within the choice set depends on access to livelihood assets (natural, physical, human, financial and social) as well as on the technical and financial performance of each alternative. The factors that are likely to affect adoption and impact of natural resource management technologies include household and farm characteristics age of the household head, education, household size, gender of household head and farm size; number of contacts with extension agents; and location characteristics (e.g., distance to output market and electric grid) (Feder et al., 1985).

4.1.1. Probit model

In this paper, we employ a probit model (Wooldridge, 2010) to estimate the influence of explanatory variables on adoption of natural resource management technologies. The probit model specification employs a latent variable y_i^* to an observable dependent variable y_i according to the rule:

$$y_i^* = x_i\beta_1 + \varepsilon_i$$

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