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Graduation programming and household asset accumulation: Evidence from Tanzania's productive social safety net beneficiary households

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Abstract

Persistent poverty in sub-Saharan Africa remains closely linked to limited household ownership of productive assets. While social safety nets have expanded across the region, evidence on whether their graduation programming generates sustainable productive outcomes remains mixed and context-specific, particularly in Tanzania. This study assesses the impact of graduation programming on household asset accumulation among beneficiaries of Tanzania's Productive Social Safety Net (PSSN). A quasi-experimental design was employed, drawing on a sample of 400 households (160 treatment and 240 control) randomly selected from four purposively selected councils in the Dodoma, Morogoro, Singida, and Iringa regions. Propensity Score Matching, using nearest-neighbor matching on a logistic-regression-estimated propensity score, was combined with regression analysis on log-transformed total assets to estimate the Average Treatment Effect on the Treated. After achieving satisfactory covariate balance, graduation programming exerted a positive and statistically significant effect on asset accumulation (β=0.826, p=0.009), with treated households possessing approximately 128.4 percent higher asset values than matched controls. Age, agro-pastoral occupation, and household size were significant positive determinants. Findings demonstrate that integrated cash-plus interventions generate transformative livelihood outcomes, justifying the expansion, tailoring, and sustained financing of graduation programming within national social protection systems.

Keywords: graduation programming; productive social safety nets; asset accumulation; propensity score matching

1. Introduction

Poverty remains a persistent development challenge in low- and middle-income countries, particularly in sub-Saharan Africa, where it is often chronic, multidimensional, and linked to limited access to productive resources. Although global extreme poverty has declined substantially in recent decades, progress has been uneven, with sub-Saharan Africa continuing to account for a disproportionately large share of the world's poor (World Bank, 2022; Sulaiman, 2018). Poverty in the region extends beyond inadequate income to include food insecurity, unemployment and underemployment, low agricultural productivity, limited access to finance, vulnerability to climatic and economic shocks, and inadequate ownership of productive assets (Dercon, 2004; Barret and Carter, 2013; World Bank, 2022). These interrelated constraints can reinforce cycles of vulnerability and restrict poor households' capacity to build sustainable livelihoods. Consequently,

social protection has increasingly been recognized as an important instrument for protecting vulnerable households and enabling investment in human and productive capital. Whereas social safety nets were traditionally viewed primarily as mechanisms for consumption smoothing and short-term relief, contemporary approaches emphasize their protective, productive, and transformative functions, including facilitating investment, preventing distress asset sales, and strengthening household resilience (Devereux and Sabates-Wheeler, 2004; Barrientos, 2012).

Within this broader evolution of social protection, graduation programming has emerged as an approach to support poor households in transitioning to more sustainable livelihoods. Graduation programming typically combines consumption support with productive assets, livelihood and entrepreneurship training, saving promotion, financial inclusion, coaching, and access to markets and services (Hashemi and de Montesquiou, 2011; Banerjee et al., 2015). Their underlying premise is that persistent poverty results from multiple and mutually reinforcing constraints, including inadequate capital, limited skills, weak market access, financial exclusion, and exposure to livelihood risks. Evidence from several contexts indicates that such integrated interventions can strengthen household productive capacity and welfare. For example, Banerjee et al. (2015) reported improvements in consumption, income, food security, savings, and productive asset ownership across multiple countries, while evidence from Bangladesh's Targeting the Ultra Poor programme indicates sustained improvements in income, assets, consumption, and occupational opportunities (Hashemi and de Montesquiou, 2011). Similarly, evidence from Ethiopia suggests that predictable social protection transfers, particularly when complemented by livelihood support, can improve food security, livestock ownership, and agricultural investment (Gilligan et al., 2009; Barhane et al., 2014). Collectively, these findings suggest that social protection can contribute to longer-term poverty reduction when it enhances rather than merely protects household productive capacity.

In Tanzania, the Productive Social Safety Net (PSSN), implemented through the Tanzania Social Action Fund (TASAF III), represents a major national social protection intervention targeting poor and vulnerable households. The programme combines conditional cash transfers, public works, and graduation-related interventions to improve household welfare, strengthen livelihoods, promote savings, and enhance resilience. Previous evaluations have documented improvements in consumption, food security, access to education and health services, and household assets among PSSN beneficiaries (URT, 2019; World Bank, 2019). However, despite the emphasis placed on livelihood enhancement within the programme, empirical evidence on whether and to what extent graduation programming contributes specifically to productive asset accumulation remains limited. This gap is important because asset accumulation provides an indication of whether social protection is facilitating a transition from short-term welfare support towards more sustainable livelihood capacity. Productive assets such as livestock, agricultural equipment, business capital, and other income-generating resources can provide households with opportunities to diversify income, withstand shocks, and strengthen their longer-term economic position.

Against this background, this study examines the impact of graduation programming on household asset accumulation among beneficiaries of Tanzania's PSSN. Specifically, it assesses whether participation in graduation programming is associated with greater ownership of

productive assets and, consequently, stronger household economic resilience. By focusing on the productive dimension of social protection, the study contributes to the growing literature on graduation programmes, social protection, and asset-based poverty dynamics in sub-Saharan Africa. The findings provide empirical evidence relevant to policymakers, programme implementers, and development partners seeking to strengthen graduation pathways and enhance the capacity of poor and vulnerable households to accumulate productive assets and achieve more sustainable livelihoods.

2. Theoretical and Conceptual Framework

This study is grounded in three complementary theoretical perspectives: Asset-Based Theory, Theory of Change, and the Sustainable Livelihoods Framework. Together, these perspectives explain why graduation programming is expected to influence productive asset accumulation among poor households and how such accumulation contributes to improved livelihood outcomes and resilience

2.1 Asset-Based Theory

Asset-Based Theory provides a useful foundation for understanding poverty as a condition associated with limited ownership and control of productive resources. According to this perspective, household welfare depends not only on current income or consumption but also on the stock of assets that households can use to generate future income, manage risk, and pursue livelihood opportunities (Moser, 1998; Carter and Barrett, 2006). Assets may include physical assets such as livestock, agricultural tools, and housing; financial assets such as savings and credit; human assets such as skills and labour capacity; natural assets such as land; and social assets such as networks and group membership.

The relevance of Asset-Based Theory is particularly strong in contexts where households face poverty traps. Carter and Barret (2006) argue that poor households may remain trapped below critical asset thresholds because they lack sufficient resources to invest in higher-return activities. When households own very few assets, they may be forced to rely on low-productivity livelihood strategies that generate insufficient income to support accumulation. Shocks can further deepen this trap by eroding existing assets and preventing recovery. In such situations, social protection interventions can play a transformative role if they help households protect existing assets, acquire new productive assets, and move above minimum thresholds necessary for sustainable income generation.

Graduation programming is consistent with this theory because it aims to strengthen the asset base of poor households through direct and indirect support. Consumption support protects households from selling assets to meet basic needs. Productive asset transfers increase the stock of income-generating resources. Skills training and coaching improve the capacity to use assets effectively. Saving promotions strengthen financial resilience and support future investment. Therefore, from an asset-based perspective, graduation programming is expected to increase productive asset accumulation by relaxing capital constraints, reducing vulnerability to distress sales, and enabling households to engage in more profitable livelihood activities.

2.2 Theory of Change

The Theory of Change for this study conceptualizes graduation programming as a multidimensional intervention that addresses the multiple constraints limiting asset accumulation among PSSN beneficiary households. Poor households often face simultaneous barriers, including inadequate consumption, lack of start-up capital, limited technical skills, weak financial inclusion, low savings, exposure to shocks, and limited access to markets. A single intervention may not be sufficient to overcome these constraints. Graduation programming is therefore expected to produce change through a combination of mutually reinforcing pathways.

The proposed causal pathway begins with programme inputs, including cash transfers, public works income, livelihood training, savings promotion, coaching, financial inclusion, and support for income-generating activities. These inputs are expected to relax household liquidity constraints and improve access to productive opportunities. In the short-term, beneficiaries may use transfers to meet basic consumption needs, reduce reliance on negative coping strategies, and stabilize household welfare. In the medium term, training, savings mobilization, and coaching are expected to improve financial behavior, entrepreneurial capacity, and livelihood planning. These intermediate outcomes may then encourage investment in livestock, farming tools, small businesses, savings groups, and other productive assets.

The expected long-term outcome is improved productive asset accumulation and enhanced household resilience. Productive assets increase households' capacity to generate income, diversify livelihoods, and cope with shocks. In turn, improved resilience reduces the likelihood that households will fall back into extreme poverty. The Theory of Change, therefore, assumes that graduation programming affects asset accumulation through several linked mechanisms: increased liquidity, improved skills, enhanced savings, better access to financial services, stronger livelihood planning, and reduced vulnerability to shocks.

However, this causal pathway is not automatic. The strength of the relationship between graduation programming and asset accumulation may depend on programme implementation quality, regularity, and adequacy of transfers, local market conditions, household labour capacity, gender dynamics, access to land, exposure to climatic shocks, and availability of complementary services. Therefore, the study recognizes that graduation programming may produce different outcomes across households and communities depending on contextual conditions.

2.3 Sustainable Livelihoods Framework

The Sustainable Livelihoods Framework provides a broader analytical lens for examining how households use different forms of capital to construct livelihood strategies and achieve welfare outcomes. The framework argues that sustainable livelihoods depend on access to five major forms of capital: human capital, financial capital, physical capital, natural capital, and social capital (Ellis, 2000). These assets are influenced by vulnerability context, including shocks, seasonality, and trends, as well as by institutions, policies, and social relations that shape access to resources and opportunities, as illustrated in Figure 1.

In this study, graduation programming is understood as an intervention that strengthens multiple livelihood capitals. Cash transfers and savings promotion enhance financial capital. Support for productive assets contributes to physical and financial capital. Training and coaching improve

human capital. Group-based savings and community participation may strengthen social capital. Public works may improve community-level physical or natural capital through infrastructure and environmental conservation activities. Through these pathways, graduation programming can expand the range of livelihood strategies available to beneficiary households.

The Sustainable Livelihood Framework is especially relevant because asset accumulation does not occur in isolation. A household may receive livestock, for example, but the sustainability of this asset depends on access to grazing land, veterinary services, labour, markets, and knowledge of animal husbandry. Similarly, a household may start a small enterprise, but business growth may depend on market demand, financial services, transport infrastructure, and social networks. Therefore, the framework helps explain why the impact of graduation programming may vary across households and locations. Differences in household composition, gender, education, labour availability, land access, market proximity, and exposure to shocks may influence the extent to which programme support translates into asset accumulation.

Accordingly, the study is guided by the proposition that participation in graduation programming improves the capacity of PSSN beneficiary households to accumulate productive assets. However, the strength of this relationship depends on the extent to which programme components are effectively implemented and supported by favourable household and contextual conditions. Therefore, based on the theoretical and conceptual arguments, this study hypothesizes that participation in graduation programming has a positive and significant effect on productive asset accumulation among PSSN beneficiary households. A related analytical expectation is that households exposed to more complete or intensive graduation support are likely to report higher levels of productive asset ownership than households receiving only basic safety net support.

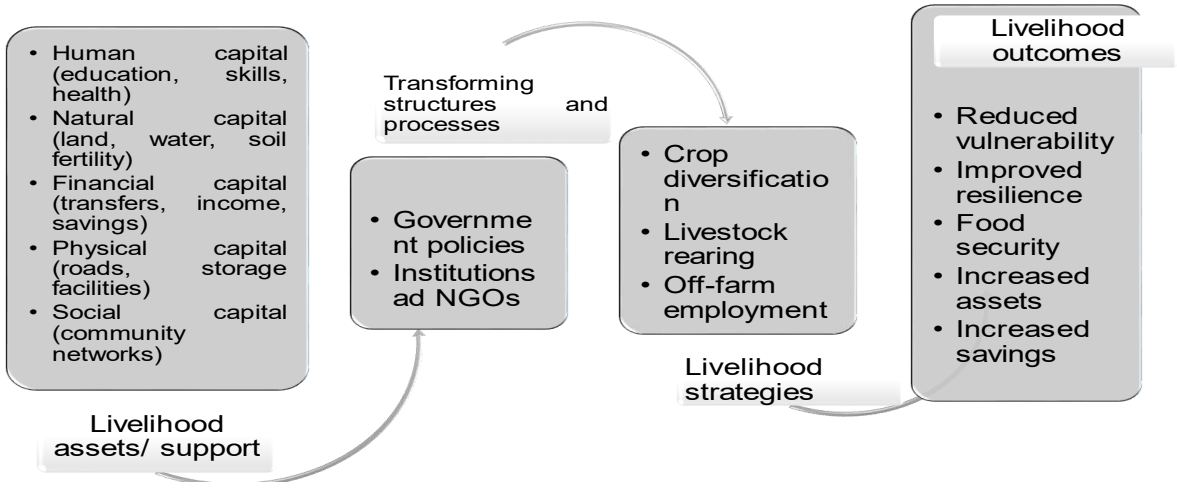


Figure 1: Sustainable Livelihood Framework

2.4 Rationale for Using Three Complementary Theoretical Frameworks

The use of Asset-Based Theory, the Theory of Change, and the Sustainable Livelihoods Framework is justified by the multidimensional nature of graduation programming and the process of productive asset accumulation among poor households. These three perspectives address

distinct but interrelated dimensions of the phenomenon. Asset-Based Theory establishes that the acquisition and accumulation of productive assets are important for improving household economic capacity; the Theory of Change explains the causal pathways through which graduation programs, such as livelihood support, training, coaching, and productive investments, are expected to generate asset accumulation and subsequent livelihood outcomes; and the Sustainable Livelihoods Framework extends the analysis by recognizing that the ability of households to acquire, utilize, and sustain productive assets is shaped by their access to multiple forms of livelihood capital, exposure to shocks, and the institutional and policy environment. Taken together, these three perspectives provide a comprehensive theoretical basis for examining not only whether graduation programming contributes to productive asset accumulation, but also how and under what livelihood conditions such accumulation can enhance household resilience and sustainable livelihoods.

3. Literature Review

Social protection has become an important instrument for addressing poverty, vulnerability, food insecurity, and exposure to livelihood shocks in low- and middle-income countries. In sub-Saharan Africa, social safety nets have increasingly evolved from narrowly protective interventions towards approaches that combine consumption support with livelihood promotion, productive investment, and resilience building (Devereux and Sabates-Wheeler, 2004). This shift reflects growing recognition that sustained poverty reduction requires not only protecting household consumption but also strengthening the resources through which households generate income and withstand shocks. Within this perspective, household assets are particularly important because they constitute a stock of resources that can support income generation, livelihood diversification, consumption smoothing, and recovery from adverse events (Moser, 1998; Carter and Barrett, 2006). Productive assets, including livestock, land, farm equipment, irrigation facilities, and business capital, can increase returns to labour and expand livelihood opportunities, while financial assets such as savings and credit can relax liquidity constraints and facilitate investment (Siegel, 2005; Kumaraswamy et al., 2020). Asset accumulation may therefore represent both an outcome of improved welfare and a mechanism through which households strengthen their longer-term economic resilience.

The asset-based poverty literature further suggests that inadequate asset endowment can perpetuate poverty by restricting households' ability to adopt productive technologies, diversify livelihoods, and absorb shocks without selling productive resources. Carter and Barrett (2006) argue that households below critical asset thresholds may become trapped in low-return activities, implying that poverty-reduction interventions need to strengthen productive asset bases rather than focus exclusively on current consumption. Social safety nets can contribute to this process by providing predictable resources that allow households to smooth consumption, avoid distress asset sales, and potentially invest in productive activities. Evidence from sub-Saharan Africa indicates that cash transfers can improve food expenditure, dietary diversity, consumption, and access to education and health services, particularly where payments are sufficiently regular and adequate (Davis et al., 2016; Handa et al., 2018). However, these productive effects are not consistent across settings. Gilligan et al. (2009) found limited average effects on some asset outcomes under Ethiopia's Productive Safety Net Programme (PSNP), while Beegle et al. (2018) emphasize that small transfer values, irregular payments, and weak integration with livelihood

services can constrain productive investment. Thus, the capacity of safety nets to generate asset accumulation depends on transfer adequacy and predictability as well as household characteristics, market opportunities, exposure to shocks, and access to complementary services (Sabates-Wheeler et al., 2021).

In response to these limitations, graduation and livelihood-promotion approaches seek to address the multiple constraints underlying persistent poverty through integrated and sequenced support. Graduation programmes commonly combine consumption assistance with productive asset transfers, technical training, savings promotion, financial inclusion, coaching, and market linkage (CGAP, 2016; Banerjee et al., 2015; Hashemi and de Montesquiou, 2011). The rationale is that cash support alone may relieve immediate liquidity and consumption constraints without necessarily overcoming limited skills, capital, market access, and exposure to livelihood risks. Evidence from several countries provides support for the potential of integrated interventions to strengthen productive capacity. Banerjee at al. (2015), for example, documented a significant increase in household and productive assets across six countries, while evidence from Bangladesh's Targeting the Ultra Poor programme showed improvements in income, consumption, occupational stability, and asset ownership (Hashemi and de Montesquiou, 2011). Similarly, studies of Ethiopia's Productive Safety Net Programme indicate that predictable transfers can contribute to food security and asset protection, while positive effects on livestock holdings emerge particularly where support is sustained over time (Berhane et al., 2014). Nevertheless, graduation outcomes remain heterogeneous. Evidence also indicates limited or mixed effects where transfer levels are inadequate or where beneficiaries face persistent shocks, weak markets, limited labour capacity, or inadequate access to technical, financial, and productive services (Gilligan et al., 2009; Tadesse and Zeleke, 2022; Sabates-Wheeler et al., 2021). Kidd and Athias (2019) similarly caution that graduation may be constrained by structural conditions such as land scarcity, old age, disability, and limited labour opportunities. These findings suggest that graduation should be understood as a process of strengthening livelihood capacity and resilience rather than simply existing social assistance.

Tanzania's experience provides an important context for examining this relationship. The Productive Social Safety Net (PSSN) combines conditional cash transfers, public works, and graduation programming interventions and seeks to improve welfare while strengthening household resilience and productive capacity. Evidence from the PSSN midline evaluation reported improvements in selected productive and durable assets, including transport, furniture, and communication assets, suggesting that predictable programme support may enable some households to acquire or protect (URT, 2019). However, subsequent evidence indicates that many beneficiary households continue to possess limited productive and higher-value assets, while ownership of transport and other durable assets remains relatively low (URT, 2023). The coexistence of improvements in selected asset indicators and persistent asset deprivation points to an unresolved question concerning the extent to which PSSN support, particularly its graduation component, generates sustained productive asset accumulation. Existing Tanzania's evidence has largely examined overall programme participation and welfare outcomes, with comparatively limited attention to specific effects of graduation programming and to differences between households receiving graduation support and those receiving basic programme support. This constitutes an important empirical gap because aggregate programme effects may obscure

the contribution of more intensive livelihood interventions. Accordingly, this study estimates the impact of graduation programming on asset accumulation among PSSN beneficiary households by comparing graduation-supported households with comparable non-supported beneficiaries using Propensity Score Matching (PSM). By focusing specifically on productive asset accumulation, the study extends the literature from short-term welfare protection towards the longer-term productive and livelihood-transformative dimensions of social protection in Tanzania.

4. Study Methodology

4.1 Study Area

The study was conducted in four administrative regions of Tanzania: Dodoma, Morogoro, Sindida, and Iringa. These regions represent diverse agro-ecological and socio-economic environments, thereby providing a suitable context for evaluating the effectiveness of livelihood support interventions under the Productive Social Safety Net (PSSN) programme. One Project Area Authority (PAA) was purposively selected from each region, namely Chamwino District Council (Dodoma), Kilosa District Council (Morogoro), Sindida Municipal Council (Singida), and Mufindi District Council (Iringa).

The councils were purposively selected on the basis that they contained both households receiving livelihood enhancement support under the Productive Social Safety Net programme and comparable households receiving only regular cash transfers. The presence of both categories of households within the same administrative and socio-economic settings was essential for constructing a credible comparison group.

This selection strategy was methodologically appropriate because impact evaluation requires a counterfactual condition, that is, an estimate of what would have happened to treated households in the absence of the intervention. Since the livelihood support component was not randomly assigned, the coexistence of treatment and comparison households in the same localities helped to reduce contextual differences that could otherwise bias the estimated programme effects. By selecting councils where both groups were exposed to broadly similar institutional, market, environmental, and administrative conditions, the study improved the plausibility of attributing observed differences in asset accumulation to the livelihood support intervention rather than to location-specific factors.

4.2 Research Design

The study employed a quasi-experimental research design using Propensity Score Matching (PSM) to estimate the causal effect of livelihood support interventions on household asset accumulation. Experimental approaches such as randomized controlled trials were not feasible because programme implementation arrangements had already determined programme participation. Consequently, PSM was adopted as a rigorous non-experimental evaluation method capable of reducing selection bias arising from non-random assignment to treatment (Rosenbaum and Rubin, 1983).

The approach involved matching households that received livelihood support with statistically comparable households that received only cash transfers based on a set of observed pre-treatment characteristics. By creating comparable treatment and control groups, PSM facilitates

estimation of the Average Treatment Effect on the Treated (ATTE), which captures the net contribution of livelihood support interventions to asset accumulation among beneficiary households. The ATTE was appropriate because the primary interest of the study was not to estimate the effect of the programme on all households, but rather to assess whether households that participated in the livelihood support component experienced higher asset accumulation than they would have achieved without the intervention.

4.3 Study Population

The target population comprised households enrolled in the Productive Social Safety Net programme in Tanzania. According to official programme records, the total number of beneficiary households in 2022 was estimated at 1,371,038 households. From this broader population, the study focused on two categories of Productive Social Safety Net beneficiary households. The first category consisted of households that received cash transfers together with graduation programmes support, hereafter referred to as the treatment group. The second category consisted of households that received regular cash transfers only, without graduation programmes support, hereafter referred to as the control group. This classification allowed the study to isolate the additional contribution of livelihood support beyond the basic cash transfer component.

The choice of control households from the Productive Social Safety Net beneficiary population was methodologically important. Since both treatment and control households were identified through the same programme targeting mechanism and administered under the same institutional framework, they were likely to share similar poverty and vulnerability profiles. This reduced the risk of comparing fundamentally different households and strengthened the internal validity of the study. The comparison, therefore, focused on the marginal effect of the graduation programmes support component rather than the general effect of being enrolled in the Productive Social Safety Net programme. This design enabled the study to answer the central impact question: whether households receiving graduation programmes support under the cash-plus component accumulated significantly more productive and non-productive assets than comparable households receiving cash transfers only.

4.4 Data Sources and Data Collection Techniques

The study used both quantitative and qualitative data sources. The primary source of quantitative data was a structured household questionnaire administered to both treatment and control households. The questionnaire collected information on household demographic characteristics, socio-economic status, livelihood activities, programme participation, asset ownership, access to services, and other factors relevant to asset accumulation.

The use of structured questionnaires ensured standardization of responses across households and allowed the generation of comparable quantitative data suitable for Propensity Score Matching analysis. The same data collection instrument was administered to both treatment and control households to minimize measurement differences and improve the reliability of the comparison.

In addition to household survey data, qualitative information was collected through Key Informant Interviews (KIIs). Key informants included council officials, programme implementers, and community leaders. The qualitative component was used to contextualize and interpret the quantitative findings, particularly in relation to programme implementation processes, beneficiary selection, livelihood support delivery, and local factors influencing household asset accumulation.

The combination of quantitative and qualitative data strengthened the study through methodological triangulation. While the household survey provided measurable evidence of programme effects, the qualitative interviews helped explain why and how such effects occurred. This mixed evidence base improved the robustness and policy relevance of the study findings.

4.5 Sampling Techniques and Sample Size

The study employed both probability and non-probability sampling techniques. Non-probability sampling was used in the purposive selection of regions, councils, and Key Informants. This was justified by the need to select study sites where both treatment and control households existed within the same administrative areas. Such purposive selection was necessary for implementing a credible quasi-experimental design.

At the household level, probability sampling was applied through simple random sampling. Lists of eligible treatment and control households were obtained from programme records in the selected councils. From these lists, households were randomly selected for an interview. Random selection at the household level minimized sampling bias and ensured that each eligible household within the sampling frame had a known and non-zero chance of being included in the study.

The sample size was determined using Yamane's formula for sample estimation:

$n = \frac{N}{1 + N(e)^2}$, where ***n*** is the required sample size, ***N*** is the study population, and ***e*** is the margin of error. Using a 95 percent confidence level and a margin of error of 5 percent, with a population of 1,371,038 Productive Social Safety Net beneficiary households, the sample size was computed as follows;

$n = \frac{1{,}371{,}038}{1 + 1{,}371{,}038(0.05)^2}$ = 399.88

Thus, the minimum required sample size was approximately 400 households.

The study therefore sampled 400 households, comprising 160 treatment households and 240 control households. Requirements of Propensity Score Matching justified the large number of control households. In matching-based impact evaluation, having a larger pool of control households increases the likelihood of identifying suitable matches for treated households within the region of common support. This improves matching quality and reduces the risk of excluding treated households due to a lack of comparable controls.

The allocation of 160 treated households and 240 control households also reflected the expectation that not all control households would be successfully matched to treated households after imposing the common support condition. Assuming that the matching ratio and power determination indicate that approximately 80 percent of the total sample would fall within the acceptable matching region, the effective matched sample was expected to include about 320 households, consisting of 160 treated households and 160 matched control households. The additional 80 control households (20 percent), therefore, provided a buffer to improve the probability of achieving adequate matches for the treated group.

This sampling strategy was appropriate for the study design because it balanced statistical requirements with practical field considerations. It ensured sufficient treated households for estimating the effect of livelihood support while maintaining a large comparison pool to strengthen the credibility of the counterfactual.

4.6 Measurement of Variable

The outcome variable of interest was household asset accumulation. Asset accumulation was measured using household ownership of selected productive and non-productive assets. Productive assets included items such as livestock, farming tools, business equipment, and other assets directly linked to income generation. Non-productive or household assets included durable goods and household items that reflect improvements in welfare and economic security including items such as radio, bicycle, household furniture, and mobile phones, among others.
The main treatment variable was participation in the graduation programmes support component of the Productive Social Safety Net programme. Households that received graduation programmes support in addition to regular cash transfers were coded as treated households, while households that received cash transfers only were coded as control households.

Covariates used in the propensity score estimation included household and socio-economic characteristics that could influence both participation in graduation programmes support and asset accumulation. These may include household head characteristics, household size, education level, dependency ratio, land ownership, baseline livelihood activities, access to credit, membership in community groups, and location-related factors. Including such covariates helped to improve comparability between treatment and control groups.

4.7 Data Analysis

Data were coded on the R statistical software Version 2025. Quantitative data were analysed using descriptive and inferential statistics techniques. Descriptive statistics were first used to summarise household characteristics, programme participation, and asset ownership patterns among treatment and control households. Frequencies, percentages, and standard deviations were computed.

Thereafter, the study used propensity score matching (PSM) to address potential confounding in the observational data, we performed. The outcome variable, total assets, was found to be highly skewed; therefore, we applied a natural logarithmic transformation to stabilize variance and improve model interpretability.

$$\ln(Y_i) = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \cdots + \varepsilon_i$$

$\ln(Y_i)$: Natural logarithm of the dependent variable (outcome) for observation i.

β_0: Intercept term.

β_1: Coefficient of X_{1i}.

X_{1i}: First independent variable (predictor) for observation i,

$\beta_2 X_{2i}$: Effect of the second predictor variable X_2.

ε_i: Error term capturing all unobserved factors affecting Y

The propensity score was estimated using a logistic regression model where the treatment variable (Category) was the dependent variable and covariates, including age, sex, marital status, education, occupation, and household size.

The propensity scores were estimated using a binary logistic regression model with the dependent variable representing treatment participation (participation in a program = 1, otherwise = 0).

The model was specified as:

$In\frac{pi}{1-pi}$=β0+β1Agei+β2Maritali+β3Educationi+4 β Headi+β5HHsizei+β6Occupation

Where:

- P_i= probability that household $i$participates in the treatment
- X_i= vector of observed covariates
- β_0= intercept
- $\beta_1 \ldots \beta_9$= coefficients to be estimated
- ϵ_i= error term

The propensity equation

$$PS_i = P(T_i = 1 \mid X_i)$$

$$X_i = (Age_i, Marital_i, Education_i, Head_i, HHsize_i, Occupation_i, Land_i, Credit_i, House_i)$$

$$PSi = \frac{e\text{^}(\beta 0 + \beta 1X1_i + \beta 2X2_i + \beta 3X3_i + \beta 4X4_i + \beta 5X5_i + \beta 6X6_i + \beta 7X7_i + \beta 8X8_i + \beta 9X9_i)}{1 + e\text{^}(\beta 0 + \beta 1X1_i + \beta 2X2_i + \beta 3X3_i + \beta 4x4_i + \beta 5X5i + \beta 6X6_i)}$$

Where

Psi is the estimated propensity score, the predicted probability that the household participates in the treatment given its observed characteristics.

X1 to X 6(Age, Marital status, Head, Household size, Occupation, Education, House ownership)

After matching, the treatment effect was then estimated as the difference in mean asset accumulation outcomes between treated households and their matched control. The Average Treatment Effect on the Treated was computed as:

ATT= E[Y1−Y0|T=1]=$\frac{1}{NT}\sum_{iTi=1} P\left(Yi - \sum_{jTj=0} wijYj\right)$

Where:

- Yi*Yi* = outcome of unit i*i*
- wij*wij* = matching weight assigned to control unit j*j* matched with treated unit i*i*
- NT*NT* = number of treated units

Conversely, the matching was conducted using the nearest neighbor method with the logit of the propensity score as the distance metric. This approach pairs each treated observation with the most similar on the untreated observation based on predicted propensity scores, reducing bias due to confounding.

To complement and contextualize the quantitative findings, Key Informant Interviews (KIIs) were conducted with 16 purposively selected informants drawn from the four study councils, including TASAF Council Coordinators (n=4), Community Management Committee (CMC) members (n=4), Village/Ward Executive (n=4), and Livelihood Enhancement Facilitators (n=4). Qualitative data from Key Informant Interviews were analysed thematically. Responses were organized around themes such as programme implementation, beneficiary targeting, utilization of livelihood support, constraints to asset accumulation, and perceived programme outcomes. These qualitative findings were used to complement and interpret the quantitative results.

5. Results and Discussion

5.1 Covariate Balance Assessment After Matching

Before estimating programme impacts, the quality of the matching procedure was assessed to determine whether treatment and control households were sufficiently comparable. The balance diagnostics presented in annex 1 and 2 that Propensity Score Matching substantially reduced observable differences between households that received graduation programming and those that received cash transfers only.

The standardized mean differences for most covariate were below the commonly accepted threshold of 0.10, while the remaining variables exhibited only marginal deviations from this benchmark. Variables such as sex, marital status, and occupation achieved perfect balance, indicating that treated and matched control households had identical distributions for these

characteristics. Furthermore, variance ratios for continuous variables were generally close to unity, suggesting similar dispersion across the two groups.

Additional balance diagnostics based on empirical cumulative distribution function (eCDF) statistics confirmed satisfactory matching performance. Although age and household size exhibited slightly higher standardized pair distance, the overall balance statistics suggest that systematic differences between treatment and control households were substantially minimized. Consequently, the matched sample provides a credible counterfactual for estimating the impact of graduation programming on household asset accumulation.

The successful balancing of observable characteristics strengthens the internal validity of the study and increases confidence that subsequent differences in asset ownership can be attributed to graduation programming rather than pre-existing household characteristics.

5.2 Household Asset Ownership

Annex 3 presents total household assets among treatment and control households. The results show that households receiving graduation support possessed higher average asset values (TZS 3,307,556) compared to households receiving cash transfers only (TZS 2,998,975).

Although the absolute difference suggests better asset outcomes among treatment households, the raw comparison was not statistically significant. On the raw scale, the difference between treatment and control groups was not statistically significant ($p>0.05$) (Annex 3). To address the skewness of the data, the natural logarithm transformation of total assets was used in the regression analysis. This outcome is not unexpected because household asset ownership typically exhibits considerable heterogeneity, particularly in rural economies where a small number of households often possess disproportionately large asset stocks. The large standard deviation observed among treatment households confirms substantial variation in asset holdings and indicates the presence of right-skewed asset distribution

The absence of statistically significant differences in the unadjusted comparison highlights the importance of controlling for observable household characteristics before estimating programme impacts. Without such controls, differences arising from demographic, socio-economic, and livelihood factors may obscure the true contribution of graduation programming. Therefore, the study employed Propensity Score Matching combine with regression analysis to isolate the net effect of graduation programmes support on household asset accumulation.

5.3 Impact of Graduation Programming on Asset Accumulation

The central objective of this study was to assess whether participation in graduation programming enhances household asset accumulation among Productive Social Safety Net beneficiaries. The regression results based on the matched sample provide strong evidence that graduation programming positively influences asset ownership. Annex 4 presents the regression results for the determinants of total household assets. The regression model explained 10.39% of the variance in the dependent variable (adjusted $R^2 = 8.09\%$), with an overall statistically significant model fit ($F = 4.51$, $p < 0.001$), indicating that while these factors are important also influence asset levels. The residual standard error of 2.82, the log-likelihood of −780.88, AIC of 1581.77, BIC of 1619.45, and deviance of 2467.50 (Annex 4).

After applying propensity score matching to control for observable differences between treatment and control households, the study estimated the Average Treatment Effect on the Treated (ATT) using a linear regression model with the log-transformed total assets as the outcome variable. The results indicate that the treatment group has significantly higher total assets compared to the control group.

The coefficient associated with programme participation was positive and statistically significant ($\beta = 0.826$, $p = 0.009$) Annex 5, indicating that households receiving graduation programmes support accumulated significantly more assets than comparable households receiving only cash transfers. Since the dependent variable was log-transformed, the estimated coefficient implies that graduation-supported households possessed approximately 128.4 percent higher asset values than their matched counterparts.

The positive impact of graduation programming observed in this study is consistent with a growing body of international evidence demonstrating the transformative potential of integrated social protection programmes.

For example, Banerjee et al. (2015), in a multi-country randomized evaluation of graduation programmes, reported significant increases in productive assets, savings, income, and consumption among poor households. Similarly, Hidrobo et al. (2018) found that social protection interventions combining consumption support with productive investments generated substantial gains in livestock ownership, productive assets and household savings. Evidence from Bangladesh's BRAC Targeting the Ultra Poor programme likewise demonstrated sustained increases in asset ownership and income-generating activities among programme participants (Hashemi and de Montesquiou, 2011).

The findings also support studies from sub-Saharan Africa showing that predictable transfers combined with complementary livelihood support can generate productive impacts. Berhane et al. (2014) reported positive effects of Ethiopia's Productive Safety Net Programme on livestock ownership and agricultural investment, particularly when beneficiaries received complementary livelihood packages. Hoddinot et al. (2012) found that predictable transfers under PSNP contributed to improved food security and asset protection. Berhane et al. (2014) reported that PSNP participation had positive impacts on food security and livestock holdings, particularly when households received support over multiple years. Hidrobo et al. (2018), examining social protection, food security, and asset formation, found increases in livestock, non-farm productive assets, farm productive assets, and savings in some contexts, but no significant effect on landholdings.

However, the findings contrast with studies reporting limited productive impacts of social safety nets. Gilligan et al. (2009) found modest asset accumulation effects under Ethiopia's PSNP, while Tadesse and Zeleke (2022) reported limited improvements in household assets despite gains in food security. These differences likely reflect variations in programme design, transfer adequacy, implementation quality, duration of support, access to complementary livelihood services, and study evaluation methods employed.

The stronger impacts observed in the present study suggest that Tanzania's graduation programming may be successfully addressing several of the structural barriers that often constrain productive investments among poor households. The results, therefore, contribute to the growing evidence that integrated cash-plus approaches are more effective than standalone cash transfer programmes in promoting sustainable livelihood outcomes.

The quantitative evidence is supported by insights from Key Informant Interviews (KIIs), which offer plausible explanations for the observed treatment effect. Across the four study councils, Informants consistently observed that, unlike control households whose transfers were largely absorbed by immediate consumption, graduation-supported households deliberately channeled a portion of their transfers into productive assets such as goats, chickens, and farm inputs. As one TASAF Council Coordinator from Mufindi District Council noted, "those who have received the livelihood training set aside a portion to buy goats, chickens, or farm inputs… you can see chicken coops and small gardens behind their houses." A Village Executive from Kilosa District Council added that "a household in the livelihood group will buy one or two goats, and after a year they may have three or four or five." This behavioral shift was reinforced by training and coaching, which built financial literacy and entrepreneurial confidence and provided sustained mentorship. A Livelihood Enhancement Facilitator from Mufindi District Council observed that "after training, they begin to think like small entrepreneurs," and a counterpart in Singida Municipal Council emphasized that "without follow-up, the asset they buy can easily disappear." These narratives explain the statistically significant increase in household asset ownership ($\beta=0.826$, $p=0.009$) by illustrating the behavioural changes induced by graduation programming. The qualitative evidence therefore, complements the quantitative findings by demonstrating that livelihood support influences not only access to financial resources but also the productive utilization of those resources.

Beyond confirming the statistical findings, the KIIs also provide insights into why the programme appears to generate stronger impacts than those reported in some previous studies. Informants repeatedly emphasized that livelihood training, continuous mentoring, and Community Savings and Investment Promotion (COMSIP) amplified these effects by enabling regular savings, internal lending, and collective investments, as pointed by a CMC Member in Chamwino who reported that *"members borrow from the group to start a small business, or pay for livestock,"* and a TASAF Coordinator in Mufindi who described groups jointly that *"members after joining savings groups starts purchasing oxen and ploughs and renting them out to other farmers."* According to Livelihood Enhancement Facilitator from Kilosa reported that *"regular coaching enhanced beneficiaries' financial literacy, business planning skills, and confidence to invest in income-generating activities rather than relying solely on transfers for consumption."* Similarly, Community Management Committee members indicated that COMSIP groups facilitated savings mobilization, internal lending, and collective investment, enabling beneficiaries to purchase livestock, agricultural equipment, and other productive assets that would otherwise have been unaffordable. These institutional mechanisms help explain why the present study found stronger productive effects than studies that implemented cash transfers without complementary graduation support.

The finding demonstrates that graduation programming contributes substantially to strengthening household productive capacity and economic resilience. The magnitude of the effect suggests

that livelihood support interventions provide benefits beyond immediate consumption smoothing and welfare protection. Rather, they appear to facilitate investment in productive resources capable of generating future income streams.

The findings support the theoretical proposition underlying graduation programming that poverty persists because poor households face multiple and interrelated constraints, including lack of capital, inadequate skills, limited access to financial services, and weak market integration. By simultaneously addressing these constraints through livelihood training, savings promotion, financial inclusion, coaching, and productive investment support, graduation programming creates conditions that enable households to accumulate assets and strengthen their livelihoods.

The results are particularly important because asset accumulation represents one of the most reliable indicators of sustainable poverty reduction. Unlike short-term increases in consumption, productive assets provide households with an enduring capacity to generate income, manage shocks, diversify livelihoods, and reduce future dependence on social assistance. Consequently, the observed increase in asset ownership suggests that PSSN graduation programming is contributing to long-term livelihood transformation rather than merely providing temporary welfare support.

These findings are consistent with Asset-Based Theory (Carter and Barrett, 2006; Moser, 1998), which argues that asset ownership is fundamental to escaping poverty traps. According to this perspective, households with inadequate productive assets remain locked into low-return economic activities and are highly vulnerable to shocks. Graduation programming appears to help households cross critical asset thresholds necessary for engaging in more productive livelihood strategies.

The finding also aligns with the Sustainable Livelihood Framework, which views livelihood improvement as a function of enhanced access to multiple forms of capital. Through savings groups, skills development, productive investments, and financial inclusion, graduation programming strengthens financial, physical, human, natural, and social capital, thereby expanding households' livelihood opportunities and resilience.

5.4 Determinants of Household Asset Accumulation

Beyond programme participation, several household characteristics significantly influenced asset ownership.

Age exhibited a positive and statistically significant relationship with asset accumulation ($\beta=0.034$, $p=0.007$). This finding suggests that older household heads tend to possess large asset stocks, likely reflecting cumulative investment over the life cycle. Older households may have had greater opportunities to accumulate livestock, agricultural equipment, savings, and housing assets through prolonged participation in economic activities.

Occupation also emerged as a strong determinant of asset ownership ($\beta=1.580$, $p=0.007$). Households engaged in agro-pastoral livelihoods possessed substantially higher asset holdings than households primarily dependent on casual labour. These findings are not unsurprising because agro-pastoral systems inherently involve ownership of productive assets such as livestock, farm equipment, and agricultural infrastructure. Moreover, households engaged in

agriculture and livestock production may be better positioned to utilize graduation support for productive investment.

The qualitative findings provide further insight into the observed relationship between occupation and asset accumulation. Informants consistently reported that graduation programmes generated greater returns when livelihood investments were aligned with households' existing production systems. Equally, informants emphasized that productive returns were strongest where supported activities matched prevailing agro-pastoral systems, directly explaining the highly significant occupation coefficient (β=1.580, p=0.007), with Ward Executive in Chamwino noting that *"when beneficiaries invest in goats, chickens, the assets multiply quickly because households already have the knowledge and environments support it."* These narratives collectively substantiate the quantitative finding that treated households possessed approximately 128.4 percent higher asset values than matched controls (β=0.826, p=0.009) and align with Asset-Based Theory (Carter and Barrett, 2006), Theory of Change underpinning graduation programming (Banerjee et al., 2015; Hashemi and de Montesquiou, 2011), and the Sustainable Livelihoods Framework (Ellis, 2000).

Household size similarly demonstrated a positive and significant effect on asset accumulation (β=0.227, p=0.005). Large households may benefit from greater labour availability, enabling participation in labour-intensive agricultural and non-farm activities. Increased labour resources may facilitate both income generation and asset acquisition, particularly in rural settings where household labour remains a critical production input.

Similarly, several key informants noted that larger households often benefited from greater family labour, allowing them to manage multiple livelihood activities simultaneously. According to Livelihood Enhancement Facilitators, households with more working-age members were able to combine crop production, livestock rearing, and small businesses while maintaining adequate labour for household responsibilities. These observations offer a practical explanation for the positive association between household size and asset accumulation identified in the regression analysis.

In contrast, sex, marital status, education, and household leadership/head were not statistically significant predictors of asset ownership. This suggests that asset accumulation among PSSN beneficiaries may be driven more strongly by livelihood opportunities and programme participation than individual demographic characteristics. It may also indicate that graduation programming has relatively inclusive effects across different social groups.

Notwithstanding these positive outcomes, key informants identified persistent structural and contextual constraints that continue to limit the full productive potential of graduation programming, including climatic shocks, weak market integration, livestock diseases, irregular transfer disbursements, and the modest size of asset transfers relative to household needs. A Ward Executive in Singida Municipal Council lamented that "*a household can build assets for two years, then lose half of its goats in one dry season…without insurance of veterinary support, recovery is very difficult,"* while a TASAF Council Coordinator in Kilosa observed that *"transfer amount is relatively small… and sometime beneficiaries lose momentum,"* and a Livelihood Enhancement Facilitator in Mufindi highlighted that *"a beneficiary may produce vegetables or*

raise chickens, but selling them at a fair price is another challenge and sometimes because of poor roads and few buyers." These accounts are consistent with Sabetes-Wheeler et al. (2021) and Slater and Holmes (2012), who emphasize that graduation outcomes are mediated by transfer adequacy, market access, and shock exposure, and they help explain the substantial within-group variation observed in the treatment sample (SD=TZS 3,640,099).

5.5 Conclusion

This study examined whether graduation programming under Tanzania's Productive Social Safety Net (PSSN) is associated with higher household asset accumulation among beneficiary households. The findings indicate a positive and statistically significant association after matching households on observed characteristics. Specifically, participation in graduation programming was associated with a coefficient of β=0.826 (p=0.009) in the log-transformed asset model, corresponding to approximately 128.4 percent high asset values among treated households relative to matched households receiving cash transfers only. The positive effect remained evident despite the absence of a statistically significant difference in the unadjusted comparison of mean asset values, highlighting the importance of accounting for observable differences between treatment and comparison households.

The analysis also identified age, occupation, and household size as significant correlates of household asset accumulation. Older household heads, households engaged in agro-pastoral activities, and large households recorded higher asset values. In contrast, sex, marital status, education, and household headship were not statistically significant predictors in the estimated model. These findings suggest that the capacity to accumulate assets may depend partly on household labour availability and the compatibility of programme- supported activities with existing livelihood systems. Qualitative evidence further indicated that training, coaching, savings mechanisms and livelihood investments facilitated the use of programme resources for livestock, agricultural inputs and small-scale enterprises.

Taken together, these findings provide empirical support for the Asset-Based Theory and the Sustainable Livelihoods Framework, confirming that integrated, multi-component interventions can help poor and vulnerable households cross critical asset thresholds and strengthen multiple forms of livelihood capital. The study contributes to the broader literature on social protection and poverty graduation by offering rigorous, quasi-experimental evidence from Tanzania, a context where such evaluations have remained limited. The results affirm that predictable cash transfers, when combined with productive inclusion components such as livelihood training, savings promotion, coaching, and financial inclusion, can produce transformative rather than merely protective welfare outcomes. Consequently, PSSN graduation programming appears to be moving beyond consumption smoothing toward genuine livelihood transformation among poor and vulnerable households in Tanzania.

Overall, the study provides robust evidence that graduation programming under Tanzania's PSSN significantly enhances household asset accumulation. After controlling for observable differences through Propensity Score Matching, households receiving livelihood support possessed substantially higher asset holdings than comparable households receiving cash transfers only. These findings suggest that graduation programming contributes to sustainable livelihood

improvement by enabling poor households to acquire productive resources, strengthen resilience, and move beyond short-term welfare dependence.

5.6 Policy Implications

The findings of this study carry several important implications for the design, implementation, and scaling of social protection and graduation policy in Tanzania and comparable sub-Saharan African contexts.

First, the government, through the Tanzania Social Action Fund (TASAF) should expand and institutionalise the graduation component within the PSSN. The strong positive impact of graduation programming on asset accumulation demonstrates that integrated cash-plus approaches deliver substantially greater productive returns than stand-alone cash transfers. Policymakers should therefore progressively extend livelihood enhancement support to a larger share of PSSN beneficiary households, with particular priority given to those approaching the end of their cash transfer cycles, to ensure sustainable exit pathways from social assistance dependence.

Second, programme design should strengthen the complementarity and sequencing of graduation components. Since asset accumulation depends on the simultaneous relaxation of capital, skills, financial, and market constraints, TASAF and implementing partners should ensure that livelihood training, savings group mobilization, financial inclusion, coaching, and productive asset support are delivered in a coherent and well-sequenced manner. Weaknesses in any one component may undermine the productive returns of the entire package.

Third, graduation programming should be tailored to local livelihood systems. The strong asset-accumulation effects observed among agro-pastoral households suggest that programme design should explicitly align livelihood support with dominant local economic activities. In agro-pastoral zones, this may involve livestock-focused asset transfers, veterinary services, fodder management training, and market linkages. In areas where non-farm enterprise dominates, support should emphasize business skills, micro-enterprise development, and access to working capital. A one-size-fits-all graduation model is unlikely to maximize productive outcomes across Tanzania’s diverse agro-ecological zones.

Fourth, monitoring and evaluation frameworks for PSSN should incorporate asset-based indicators alongside consumption and food security measures. Because asset accumulation provides a more reliable indicator of sustainable poverty reduction than short-term consumption gains, TASAF should systematically track productive asset ownership, savings, and livelihood diversification over time. This will enable evidence-based refinement of programme design and demonstrate the long-term transformative value of graduation programming to policymakers and development partners.

Finally, the study underscores the need for sustained political and financial commitment to integrated social protection. Graduation programming requires more intensive resources than basic cash transfers, but the substantial productive returns documented in this study justify continued investment. The government of the United Republic of Tanzania, in partnership with

development partners, should secure predictable, multi-year financing for the graduation component and progressively domesticate funding to ensure long-term sustainability of the PSSN graduation agenda.

5.8 Limitations and Areas for Further Research

While this study provides robust evidence on the impact of graduation programming, it relies on a cross-sectional quasi-experimental design and matches households only on observable characteristics. Unobservable heterogeneity, such as differences in motivation or entrepreneurial ability, may still influence outcomes. Future research should employ longitudinal designs to capture the dynamics of asset accumulation over time, examine heterogeneity of effects across regions and gender, and assess the durability of graduation outcomes after programme exit. Further studies should also disaggregate asset categories (productive versus durable) to better understand which components of the asset portfolio respond most strongly to graduation support.

5.9 Ethical Approval

This study was conducted in accordance with the ethical principles and relevant guidelines governing research involving human participants. Ethical approval was obtained from the appropriate Soikone University of Agriculture Research Ethics Committee before data collection, and all research procedures complied with the approved ethical protocol (Ref. SUA/ADM/R.1/8/1239) and applicable institutional regulations as outlined in the Guidelines for Preparation and Submission of Dissertations/Thesis/Research Reports/Research Papers and Other Scientific Publications of 2022 of the Sokoine University of Agriculture.

5.10 Consent to Participate

Verbal informed consent was obtained from all participants before data collection. Verbal rather than written consent was prioritized because some participants had limited literacy, and requesting signatures could have caused discomfort or discouraged participation. In addition, the study posed minimal risk to participants, and the ethics review organs approved the use of verbal informed consent. Before data collection, prospective participants were provided with a detailed explanation of the study's purpose, procedures, and the authorization granted by the relevant authority to conduct the study and collect data from the selected households. Participants were then asked whether they were willing to participate, and verbal consent was obtained before data collection commenced. Verbal consent was not audio-recorded instead, a mark was put in questionnaire, because recording could have made participants uncomfortable and potentially influenced their willingness to participate. Participants were free to decline or withdraw from the study without penalty. Copies of the authorization issued by the relevant authority have been attached as supplementary materials in English and in the original language of the country in which the study was conducted.

5.11 Data Availability: "The data that support the findings of this research are available from the corresponding author (JC), up on reasonable request."

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- Annex1AssetValue.docx
- PSSNPhD.dta