The Effects of Land Title Registration on Tenure Security, Access to Credit, Investment and Production: Evidence from Ghana

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Abstract

We use a regression discontinuity evaluation design combined with three rounds of household survey data collected over a period of six years to evaluate a pilot land titling intervention in the Awutu-Effutu-Senya area of the Central Region of Ghana. We find that there are strong markers that the land titling program was successful in reaching the target population through measuring, demarcating and ultimately titling land in the treatment group. These first-order outcomes translate into a number of impacts of the titling program on asset holdings which vary substantially by the gender of the owner. We also find evidence of increased engagement in self-employment and business profits among women while agricultural production at the household level remains constant.

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1.   Introduction

The importance of well-defined property rights in stimulating access to credit and investment is well recognised in the literature (De Soto, 2000). There are several avenues through which property rights achieve this. For example, property rights more generally and secure land tenure allows households to collateralize loans and thus obtain financing for investments. The additional capital obtained this way can drive both farm and non-farm investment and has been found to trigger labor productivity and income (Field & Torero, 2005). This link has become a key argument for the role of land security in promoting development (Besley, 1995). Consequently, the link between land titling, access to credit and investment has been targeted as an intervening point for policies and programs by several governments and development organisations.

However, several empirical studies have failed to confirm the positive impacts of land titling programs on access to formal credit (Deininger & Chamorro, 2004; Galiani & Schargrodsky, 2010; Zegarra et al, 2008). In addition, those studies that have found empirical support for this relationship frequently qualify their findings in several ways. In particular, these evaluations of land titling programs highlight impact heterogeneity and the importance of the implementation approach (Mushinski, 1999; Dower & Potamites, 2005). Taken together, the findings of these studies confirm that credit markets thrive within a plethora of enabling factors, of which land titling, and thus the ability to use real estate as collateral, is an important but not the sole driver to access to credit.

Despite these mixed empirical results, theoretical arguments for the existence of a multitude of social, environmental and economic benefits stemming from secured property rights cannot be overlooked (Besley, 1995). In light of this, the Millennium Development Authority (MiDA) and the Government of Ghana (GoG) rolled out a pilot land titling program in the Awutu-Effutu-Senya area of the Central Region of Ghana in 2009. The primary objective of this program was to encourage land users in the pilot district to register their claims to parcels they controlled either through deeds or titles if claims were existent for at least three years prior to the start of the intervention. By enhancing the bundle of informal rights possessed by land holders through formal land titles, it was anticipated that the valuations of these parcels would appreciate and increase owners' access to credit and thus remove

one cause of the liquidity constraints faced by the target population. Ultimately, the program was intended to stimulate agricultural and non-agricultural investment in order to reduce poverty and spur economic growth in the long run.

We use a regression discontinuity evaluation design (RDD) combined with three rounds of household survey data collected over a period of six years to evaluate this pilot intervention. We find that there are strong markers that the land titling program was successful in reaching the target population through measuring, demarcating and ultimately titling land in the treatment group. These first-order outcomes translate into a number of impacts of the titling program on asset holdings which vary substantially by the gender of the owner. For example, while women decrease their amount of outstanding credit in the short run, men increase the amount of outstanding credit in the long run.

This evaluation contributes to the literature linking property rights more generally and land titles in particular to investment and access to credit as well as household decision behaviour. In addition, while most studies investigating the effects of land titling on credit concentrate on either rural or urban households, this study builds on data collected in a peri-urban setting. In the study location there is considerable competition among alternative land uses: agricultural, commercial and housing. In addition, the dataset on which this study builds on has sex-disaggregated information on plot ownership and thus identifies which plots are controlled by men or women in the study households. This allows us to examine the sex-disaggregated impacts of land titling on investment and credit.

The remainder of the report is organised into four sections. Section 2 presents background information on land tenure in the Ghanaian context and elaborates on the implementation arrangements of the MiDA Land Titling Project. In Section 3 we proceed to discuss our data and the analytical methods we employ for our estimations. Section 4 is organized into two parts. The first part provides descriptive statistics of variables of interest and balance tests. In the second part we estimate the impact of the land titling project on tenure security, investment and measures of household welfare. Section 5 discusses proposals for further work.

2.   Land Tenure in Ghana and the MiDA Land Titling Project

In Ghana land is categorized into four different types: Stool, Family, State-owned and Freehold. Stool and Family land constitute about 78 percent of all land while State-owned and Freehold land form the remaining 20 percent and 2 percent respectively (Deininger, 2003; Kuntu-Mensah, 2006; Awuah et al, 2013). With regards to Stool and Family land, the Ghanaian legal framework allows for customary freehold, stranger usufruct rights, sharecropping and leasehold of less than 100 years to be held by individuals. The Ghanaian Land Title Registration Act of 1985 specifically permits the above rights to be formally registered so that any interests held by individuals on any parcel of land can be protected (Sittie, 2006). However, poor record keeping (emanating from the oral nature of transactions associated with land controlled by Stools and Families),[2] process complexities and associated costs have inhibited title registration in the past. Additionally, cost of land titling is relatively high and often connected with extensive time lags (Awuah et al, 2013)

To streamline land titling in Ghana, the Land Title Registration Act 1985 was introduced. Although the new Act did not represent a dramatic deviation from prevailing practices, it was intended to address the weaknesses of land related laws (PNDC Law 152). Prior to the enactment of the Land Title Registration Act in 1985 (and the accompanying law: PNDC Law 152), there already existed legal instruments which supported deeds registration in Ghana (Zevenbergen, 1998). The operation of the deeds registry helped to identify transactions related to land, but failed to confer title on the individual who held the deed. Cadastral maps which accompanied such deeds were also frequently inaccurate or, in some instances, not required and thus missing (Kuntu-Mensah, 2006). Therefore, the system failed to address the issues of multiple claims to the same parcel of land. To address these challenges, legislative reforms were initiated in 1987 and backed by the Land Title Registration Act of 1985. More specifically, these reforms were meant to introduce a system that allowed the registration of land titles across the country in a stepwise manner.[3] This system was designed to

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[2] To improve efficiency of record keeping within the customary system (stool and family lands) the Customary Land Secretariat was established in 2004 with 38 branches throughout the country. Although potentially beneficial the state of operation of the various branches have been mixed – some functioning fully whilst others are yet to take off.

[3] That is after the declaration of a registration district by the lands commissioner at least 75% of parcels within that district were to be accurately registered before another district was declared. A t the same time Deed Registration was to continue operation in other parts of the country.

operate side by side with the deeds registration processes that were already in place. Naturally, the main objective of the title registration system was to confer title to the holders of the certificate and assure the holders that in times of any threat to their rights, the government will ensure that they are protected. Any title issued under this law could only be nullified by a court of law (Sittie, 2006).

Population growth, urbanisation and expansion of commercial agriculture over the past decades have increased scarcity of land in Ghana. These developments pose challenges to the traditional way in which land ownership and land use rights have been managed even in the face of the laws discussed above. Traditionally, Chiefs were in charge of the allocation of land to ensure equity in access to land (Udry, 2010; Onoma, 2010). In the face of the new dynamic presented by increased demand for land, some Chiefs have taken advantage of the situation and sold land multiple times to different buyers especially in the urban areas. Of course, such practices can create an array of conflicts, disputes and ownership insecurity, as for example shown in Kuntu-Mensah (2006), which have resulted in numerous litigations in the courts (Aryeetey & Udry, 2010). As noted by Jones-Casey & Knox (2011), the Ghanaian courts were clogged with 35,000 land disputes in 2006.

Narrative evidence suggests that in urban centres the impact of insecure land tenure rights is felt by households through high prices of housing for residential uses and offices for businesses. Given the lack of clear land rights, investments in housing provision and mortgage markets have been inhibited, causing the rental costs of housing to rise rapidly as a result of insufficient supply. In 2010 for example when the housing stock deficit stood at 1,200,000 houses, only 199,000 units of houses were built (Afrane et al, 2016). In rural areas, insecure land tenure often manifests itself in lacking agricultural investment. That is, farmers appear to be less willing to make long-term investments, in for example, tree crops. Soil investments, such as extended fallow periods, are also curtailed in light of insecure land tenure (Goldstein & Udry, 2008). In the wider international context, tenure insecurity particularly discourages investments by multinational companies in Ghana and thus the national economy forgoes potential positive effects from additional job creation and technology transfer (Barthel et al, 2011).

It has become clear in Ghana that the existing customary tenure systems mainly administered by Chiefs and family heads is a crucial building block to resolve the challenges related to insecurity of land tenure. To bring clarity and transparency into the customary land rights institutions 38 Customary Land Secretariats have been set up as part of a strategy to help streamline and address some of these challenges being faced by the sector. These secretariats are intended to improve the efficiency of record keeping by managing land allocations and transactions within the customary setting (Biitir & Nara, 2016).

It is noteworthy that although registration of land titles has been enabled in Ghana for nearly three decades, very few land titles have been issued. As of 2006, only 42,000 registration applications had been submitted and of these a mere 30 percent had been granted (Kuntu-Mensah, 2006). This situation suggests that there are impediments preventing progress in Ghana's attempt to give titles to land owners and users. In the light of this, the Government of Ghana and other development agencies have undertaken several interventions in the last decade to remove some of the barriers which are preventing progress and improve the title registration processes (Jones-Casey, 2011). Despite these reforms being undertaken by the government, the lack of transparency and lack of institutional commitment has remained and the system of land administration and registration is still relatively weak. Other private sector participants, non-governmental organizations (NGOs) and bilateral partners have also initiated programs to speed up and improve the titling process on pilot bases. Notable among these efforts is the MiDA program that targeted a comprehensive pilot titling program in the Central Region of Ghana (Jones-Casey & Knox, 2011).

The experiences and outcomes of these interventions especially those by MiDA, which is at the center of this evaluation, should guide future decisions on which approaches appear to be most beneficial, scalable and practical in the context of the existing legal framework and land administration system. As of 2011 the MiDA Land Titling Project succeeded in issuing land titles to about 270 parcels (Jones-Casey & Knox, 2011). The nature of the project and the innovations which accompanied this pilot program makes it quite attractive for scaling up. The fact that the program created a new registration district and an office with state of the art equipment for land data collection, processing

and storage removes some of the bottlenecks associated with previous attempts. The program also created an incentive structures to nudge officials to maintain a constant workflow. Finally, the program facilitated negotiations with Chiefs and family heads who hold allodial titles to land in order to ensure consent for the issuance of titles.

The process of land titling has ten steps which include: filling out land registry forms; lodging the application; issuing acknowledgement notes; entering certificate numbers; drafting certificates; typing and checking land registers; preparing files for signing by the appropriate Land Administration Director; plotting parcels and binding certificates. The MiDA intervention made it possible to undertake all these processes within 31 days – a benchmark which was hoped to be adopted elsewhere in the country.

The aim of this evaluation is to assess how effective this intervention was during the early stages of implementation in terms of benefitting households in the targeted areas measured by a wide array of outcomes related to investment, asset ownership, agricultural production and welfare.

3. Data and estimation

3.1 Data

This impact evaluation mainly builds on household-level panel data that was collected over a period of five years from both households that were targeted by the MiDA land titling pilot intervention as well as those households located just outside the intervention area. In total, there were three survey waves conducted in 20 communities located around a main road that divides many of the sample communities into two halves. This road forms a loop (see Figure 1). Households within the loop (area shaded blue in Figure 1) were eligible to participate in the MiDA land titling pilot while the households outside of the loop were not eligible in the first phase of the program. The physical demarcation of the road dividing communities into two, forms the bases for our empirical evaluation strategy.

In a nutshell, households located within the loop of the road and not more than 200 meters away from the road (marked as A in Figure 1) qualify as the treatment group in our study. On the other hand, we

7

sampled from two sets of control groups: a short term control group and a long term control group. At the time of project initiation, it was anticipated that households just outside the loop would be the most likely future recipients of the land titling assistance. We refer to households outside of the loop but within 200 meters of the road as the short term control group (marked as B in Figure 1). Households outside the loop and located more than 500 meters away from the road constitute the long-term control group as these household were unlikely to benefit from the MiDA pilot programme during the evaluation phase (marked as D in Figure 1). Consequently, there was a buffer of about 300 metres between the short-term and long-term control groups (marked as C in Figure 1). From each of these three groups all households were chosen for the first round of data collection. The locations of sample household around the round used to distinguish between treatment and control households is also shown in Appendix Figure 1.
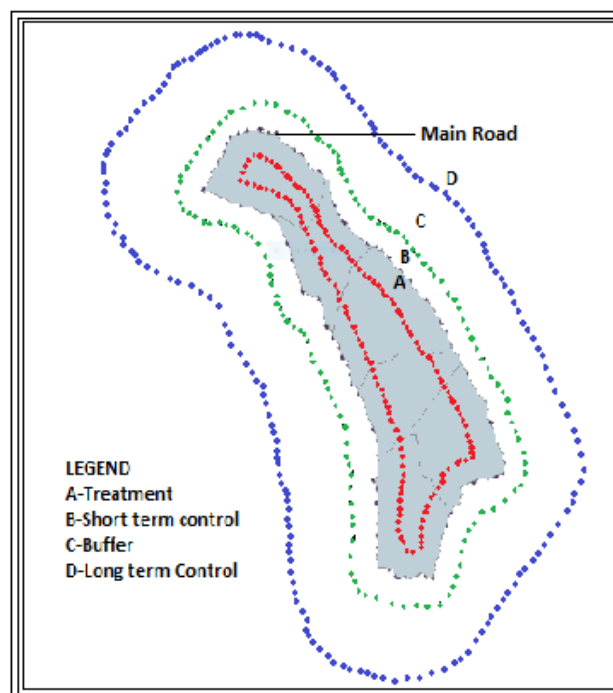

Figure 1: Sampling and data collection design

Box 1: The survey instruments consisted of seven modules

*Module 1***:** Seeks the household's consent to participate in the data collection exercise and also captures information on the household roster and members.

Module 2: This module is administered to individuals and is designed to gather basic demographic information on household members, on employment and the different sources of income for the male spouse only.

Module 3: These modules are designed to collect data on assets owned by the household and individuals within the household. The main sub-sections include tools, durable goods, farm assets, as well as financial assets.

Module 4: The purpose of this section is to collect data on the household's agricultural activities. It covers agricultural assets such as land, livestock and equipment. Furthermore, it provides data on agricultural production technology and processing, marketing, input use, output and incomes.

Module 5: This module is designed to gather information on employment, time use and different sources of income for the household head and spouse either as individual owners or jointly owned businesses which are not farm based.

Module 6: In this module the goal is to appraise the level of financial knowledge among respondents.

Module 7: The marital module aims to understand the relations between husband and wife/wives and to study how households in Ghana function.

The first of the three surveys was conducted in 2010; the second in 2011; and the third in 2014.[4] Therefore, all three survey waves were collected after the land titling intervention was initiated in 2009. The first two survey waves allow us to understand the short-term effects of the land titling program immediately after program initiation and the third survey wave is informative about the medium-term program impacts. Each of the three survey waves covered seven specific areas of interest. These areas included demographic characteristics of sampled households; paid employment engaged in by household members; individual and household assets; agricultural production and land titling; non-farm

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[4] Although the entire survey in the third round were stipulated to be undertaken in the year 2014, not all the targeted households could be contacted for interviews in 2014. Thus in the first half of 2015, a tracking exercise was undertaken to mob-up as many households as possible which were missed in the 2014 episode of data collection.

enterprises; marital history of household heads and spouse(s); and financial literacy training. The survey team also collected data on household and plot locations using Global Positioning Systems (GPS).

During the first survey round in 2010, a sample of 2,450 households was interviewed which represents households from the treatment (790), short-term control (862) and long-term control (798) groups. The second survey round in 2011 reached a total of 2,099 households in the treatment (693), short-term control (724) and long term control (682) groups. Finally, the third and final survey round was collected in 2014 and a total of 1,714 households were traced in the treatment (553), short term control (619) and long term control (542) groups.

Box 2: Field Work

During the first round of field survey in 2010, a total of 65 enumerators were trained over a period of six days. Out of this number, 54 enumerators were selected for field work. The selection was based on the outcome of a test conducted to examine enumerator competence with regards to the questionnaire administration. In addition, a language fluency examination was also undertaken to ensure that enumerators had command over the Twi Language which was going to be the main medium of communication with respondents. From the set of 54 enumerators, three working teams of 18 members were created. Each team consisted of a Supervisor, a Field Editor, 2 Plot Mapping Experts and 14 Enumerators. The Supervisor was the team leader and was responsible for overseeing, monitoring and, where necessary, correcting the work of the interviewers and the Field Editor. The Enumerators conduct daily interviews with the head and spouse of sampled households. The Plot Mapping Experts were responsible for demarcating boundaries within which enumeration should be conducted based on the three terms and also to map or take waypoints of plot location (treatment, short term and long Term). A similar strategy was adopted in the second and third rounds of survey.

This means that between Round 1 and Round 2, 351 households representing about 14 percent of the original sample could not be reached. Furthermore, between Round 1 and Round 3, a total of 736 households which represented about 30 percent of the initial sample could not be tracked. This resulted in a one-year and four-year tracking rate of above 85 percent and 70 percent respectively[5].

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[5] A randomized control trial in Uganda which sought to examine women empowerment over a period of four years and with an initial sample of 5,966 adolescent girls, achieved a two-year tracking rate of 82 percent and a four-

The first panel of Table 1 presents the sample frequencies by treatment and round of survey. The second panel presents the balanced sample across the three rounds of survey by treatment status. A similar presentation is made for plots in Table 2.

Next, we examine whether specific household characteristics as well as the treatment status are important determinants of attrition. To do this we create a dummy variable for attrition which equals 1 if the household form a panel or does not attrit (between Round 1 and Round 2/3) and 0 if they attrit. We regress this dummy variable on combinations of the household characteristics and the treatment status. In Table 3 and Table 4, we present estimates from OLS regressions in columns 1 to 5 and estimates from a Probit regression in column 6.

Based on the results of the OLS and Probit regressions shown in Table 3, we find that between survey Round 1 and Round 2, household size, age of household head and treatment affected a household's likelihood of forming part of the panel significantly. Treatment households have a 1.1 percentage point (pp) higher probability to remain in the panel between survey Rounds 1 and 2. A unit increase in household size also increases the probability of the household remaining in the panel by close to 1pp and an increase of the household head's age decreases the same probability by 0.1pp. Similarly, comparing the treatment group only to the short-term control group, Column (3) indicates that the probability of panel inclusion is 1.5pp higher for households in the treatment group. However, there is no difference in the likelihood of panel inclusion between the short-term and the long-term control group.

Table 4 shows the results from the equivalent regressions for panel inclusion focussing on Rounds 1 and 3 only. The results indicate that between Round 1 and Round 3, the age of the household head, household size and an indicator for whether the household head has ever attended school affect the likelihood of panel inclusion. Contrary to the analysis between Round 1 and Round 2, a year increase

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year tracking rate of 59 percent (Bandiera et al, 2015). Similarly, in a study investigating the impacts of education a sample of female youth were followed-up after a period of four years and 81.6 percent were tracked (Friedman, et al., 2011). Also, when the impact of education on health outcomes were followed up after seven years in Kenya, 55 percent of the initial sample of 19,289 boys and girls contacted in 2003 were tracked in 2010 (Duflo et al, 2014). These studies suggest that our own tracking rate of 86 percent after one year and 70 percent after four years compares well.

in the household head's age now increases the likelihood of a household to form part of the panel. Consistent with the findings from before, larger households increase are more likely to form part of the panel between Round 1 and Round 3 (by nearly 2pp per unit increase). Households whose heads have ever attended school were also about 3pp more likely to remain in the panel compared to those whose heads have never attended school. Treatment negatively affects the likelihood of panel inclusion when the treatment group is compared to only the short term control group. In contrast, there is no statistical difference between the treatment and the long term control group as can be seen from column 2 in Table 4.

3.2.   Empirical Approach

Our empirical work is based on the natural experiment generated by the allocation of households into treatment and control based on their location on one side or the other of the road which divides the communities in our sample into two halves. We focus on impacts using intention-to-treat (ITT) estimates. That is, although the program targeted all households in the geographic that were eligible for land title issuance, participation was entirely of voluntary nature – households had to decide whether to participate or not. Not all the households with parcels in the treatment area participated. In addition, not all households or individuals who possessed land in the treatment area were able to negotiate approval for the titling process with local authorities such as chiefs. There were others whose interest in the land did not exceed the minimum of three years required before parcels could be issued. Given that these issues are likely to involve significant degrees of endogeneity, we will rely on estimating the impact of the intention to title in this report.

The particular nature of program implementation, whereby a major road separates treatment and control groups allows for a rigorous impact assessment an RDD methodology. The key identifying assumption that needs to be maintained is that conditional on community fixed effects, unobserved determinants of the outcomes we measure are on average the same for households on either side of the road. Of course it can be argued whether this assumption is valid. Therefore, it is worth noting that the road was used as a convenient and apparently arbitrary boundary to delineate an area in which to pilot

this systematic land title registration intervention. Indeed, as program implementation started, it was discovered that a significant number of chiefs of the study villages actually lived outside of the treatment area. This observation provides us with confidence that the boundary choice (conditional on community) can be treated as exogenous.

We concentrate on estimating program impacts for the sample of households located closest to the road, i.e. households located within 200 meters on either side of the road. Consequently, all households are located close to the boundary. We include community fixed effects in all specifications, thus limiting comparisons of outcomes to households on either side of the road within a single community. Appendix Figure A1 makes the identification assumption clear. Almost each cluster of points around the project boundary represents a single community. We compare outcomes of households within one of those communities and inside the boundary with those of other households in the same community but outside the boundary. These FE OLS estimates present the most robust impact estimates in our view.

However, it is possible that even within a single community, households which are closer to one another in geographical terms face similar geographically determined conditions and shocks. Thus clusters of households are potentially affected by the same (unobservable) influence factors. In order to address these local correlations, and improve estimation efficiency we use a spatial autoregressive (SAR) estimation specification as a robustness check for our main impact estimates. Moreover, there may be omitted variables which are correlated within neighborhoods. Hence, we also plan to use spatial fixed effects estimates to control in a further iteration of this report.

Ordinary Least Squares (OLS)

Our basic OLS specification to examine the impact on the variable y_{it} for household i at time t is:

$$y_{it} = \alpha + \beta X_{i0} + \tau_1 treat_i * time_1 + \tau_2 treat_i * time_2 + \tau_3 treat_i * time_3$$

$$+\mu_1 time_2 + \mu_2 time_3 + \theta V_i + \varepsilon_{it} \tag{1}$$

Where X_{i0} denotes the characteristics of the household at Round 1.[6] $treat_i$ is an indicator variable that equals one if the household is located in the treatment are which is demarcated by the main road dividing each community. $time$ represents a dummy variable capturing the year of the survey round in which the observation is measured. Finally, V is a vector of village dummy variables that will control for local, time-invariant effects. At the centre of our interest, of course, is τ_t which denotes the coefficient that measures the ITT impacts of the MiDA Land Titling Pilot for each survey round separately. The standard errors are clustered by village.

Spatial Autoregressive Regression (SAR)

The first step of our second approach is to define the nature of expected spatial interdependencies among households. There can be three different interaction effects: (i) endogenous - where the dependent variable of one household depends on the dependent variable of another and vice versa; (ii) exogenous - where the dependent variable of a unit depends on the independent variable of other units; and (iii) interactions are among the error terms of nearby units. In our present analyses we concentrate on the first type of interactions that takes into account potential spill overs or correlated shocks in outcome variables as a result of proximity between households.

The SAR is based on the OLS specification in equation (1) and introduces an additional term which accounts for endogeneity among outcomes of spatially distributed households based on their proximities with the use of a spatial weights matrix. Equation (1) becomes:

$$y_{it} = \alpha + \sum_{j=1}^{N} \rho w_{ij} y_{jt} + \beta X_{ij_0} + \tau_1 treat_i * time_1 + \tau_2 treat_i * time_2 + \tau_3 treat_i * time_3$$

$$+ \mu_1 time_2 + \mu_2 time_3 + \theta V_i + \varepsilon_{it} \qquad (2)$$

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[6] More specifically, the baseline control variables include household size, number of female household members, number of householder member aged 5 or younger, an indicator for male household head, the age of the household head and whether the household has ever attended any school.

Where all variables are defined as before except w_{ij} which are elements of a spatial weight matrix W, which forms together with the y_{jt} the endogenous interaction effects. W is an N by N inverse distance matrix or an inverse distance matrix with a certain cut-off point.[7] ρ is referred to as the spatial autoregressive coefficient and, essentially, our model would reduce to an OLS if ρ were to equal zero.[8]

In estimating equations (1) and (2) we limit the sample to households to those located in a 200 meter band to the main road. This sub-sample is further refined by mostly focusing on panel households. Panel households are those households which we observe in all three survey rounds. To account for the possible imbalances caused by differential attrition between treatment and control households we also employ inverse probability weighting (IPW) as a robustness check.

4. Results and discussions

In this section we present and discuss our main results for outcomes measured at the household level. Several outcomes, however, are reported by different individuals within households which allows us to explore gender-differentiated impacts of land titling. We begin by providing descriptive statistics of all variables which are used in our empirical estimations.

4.1. Descriptive statistics

In Appendix Table 1 we present basic descriptive statistics for each variable of interest. The table is too extensive to be discussed in detail. The control variables used in estimating Equation (1) and (2) are listed in Table 5 partitioned by the treatment status and the difference between treatment and control for Round 1. Statistical significance of the difference is indicated where *** denotes significance at 1 percent, ** at 5 percent, and * at 10 percent. We do not expect the program to have impacts on these variables (especially in Round 1). However, the significant difference in the number of female

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[7] The distance decay can also be formulated as a power function and the elements of W matrix can be inverse distances with a distance decay factor, γ, $\emptyset = \frac{1}{d_{ij}}$, where d_{ij} denotes the distance between units i and j.

[8] Eventually, we plan on adding a specification that builds on spatial fixed effects (Conley & Udry, 2010).

household members between the treatment and the control group indicates that the two groups may differ in basic observable characteristics and underlines the importance of controlling for these variables in the regression.

4.2.   Impact analysis

In Table 6 and 7 we present estimation results of the Land Titling Program in Ghana using the natural experiment. All tables follow a similar format. Column (1) provides the Round 1 mean of the dependent or outcome variable of interest in the control group. The number of observations used in the regression is reported in Column (2). Columns (3) through (5) report the impact estimates for each survey round separately which correspond the coefficients on the interaction terms in Equation (1). Columns (6) through (8) report the equivalent estimates using the SAR specification from Equation (2). We consider these estimates as a robustness check. The stated coefficients capture the ITT impact estimates for the program. Again, *** denotes significance at 1 percent, ** at 5 percent, and * at 10 percent level.

In the discussion, we focus our attention on outcome variables that are intended to directly capture land investments and to investigate whether the land titling intervention had any impacts on asset ownership.

First, we concentrate on outcomes related to land owned by women. A first-order condition for program impacts to materialize and to validate the evaluation strategy is that the program reached the target population. Table 6a shows that on various metrics, the intervention reached a significantly higher proportion of households with plots owned by women in the treatment group relative to the control group. Across all three survey rounds, there is a consistent and significant impact of the program on all three main indicators of program implementation: land registered, measured and demarcated.

These strong indications for successful program implementation and targeting, however, do not appear to translate into immediate measures of land investment such as the construction of buildings or fallowing of land as can be seen from Table 6b. However, women are more likely to have obtained the land through purchase in the short run (Round 1) which may be seen as improved female land market participation.

In terms of outcomes capturing asset holdings shown in Table 6c, women appear to benefit from the land titling intervention through accumulating higher stocks of durable assets at least in the long run, i.e. in Round 3. This effect is particularly strong, in terms of the level effect, when concentrating on the winsorized monetary amount in cases where a female respondent was present which constitutes our preferred outcome measure.[9] However, other asset holdings do not seem to be affected. Instead, however, women appear to decrease the value of their outstanding loan in response to the program as shown in Table 6d. This effect is restricted to the intensive margin, i.e. women reduce the amount of currently outstanding loans they need to repay while they do not appear to be less likely to have an outstanding loan in the first place. These impacts can only be observed in the short-run, i.e. in Round 1 and in Round 2. The data also hints at an increase on current lending in Round 1, as shown in Table 6e, even though this impact disappears when the outcome variable is winsorized.

Finally, there is weak evidence that women decrease their saving stock in the longer term. Table 6f indicates that total savings decrease in Round 2 for the un-winsorized variable. If anything, this effects seems to stem from a decrease in savings held in more formal financial institutions.

Turning to men, we see equivalent strong impacts on land registration, demarcation and measurement in Table 7a even if the impacts on land registration in Round 2 statistically do not differ from zero. Similarly, we also do not observe any strong marker for direct investments into the land such as planting trees or construction. However, there is an interesting pattern of impacts on the self-assessed total value of land as can be seen from Table 7b[10]. While these self-evaluations decrease in Round 1, there is a sizable increase in Round 3. Contrary to women, men are not more likely to have obtained the land through purchases but instead are more likely to have accessed land through renting and free allocations in the short run and inheritance in the long run.

There is a stark increase in livestock ownership for men which can be observed for both the extensive and the intensive margin in Round 3 (Table 7c). This finding stands in contrast to the decrease in the

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[9] Winsorizing refers to the limiting of extreme values at the top and at the bottom of the distribution. In general, we winsorize at the 1 and 99 percentile.

[10] We had a surveyor value a small number of parcels in round 3. We are in the process of comparing those values with reported values of the land holders.

value of livestock in the short run in Round 1. Both the decrease as well as the increase in the total value of livestock is substantial.

In contrast to the women, men appear to increase current borrowing (Table 7d). This is true for the likelihood of currently having outstanding credit (in Round 2) as well as for the value of current outstanding credit (in Round 3). Hence, both of these effects appear to be at play in the longer term. Interestingly, this finding is paired with an enormous increase in outstanding lending in the short run (shown in Table 7e) and in increase in savings in the long run (shown in Table 7f).

5. Future work

The analysis so far has revealed a number of interesting patterns with substantial gender differences in the data. In the next iterations of the analysis, it will be important to expand the breadth as well as the depth of dataset where possible especially in terms of outcomes. In particular, preliminary results show that women are more likely to be engaged in self-employment activities and are able to increase business profits in response to treatment. These impacts are achieved despite the fact that households' agricultural production remains constant. These findings are not yet reflect in the analysis presented in this draft. In addition we plan on refining some of the estimation methodologies such as using inverse probability weighting (IPW) in order to account for the possible imbalances caused by differential attrition between treatment and control households as a robustness check as well as dealing with spatial correlations between outcomes by using, for example, spatial fixed effects regressions..

Table 1: Unbalanced and balanced household samples by treatment and wave of survey

Round	Treatment	Short Term	Long Term	Total
All Households				
1 (2010)	790	862	798	2,450
2 (2011)	693	724	682	2,099
3 (2014/15)	553	619	542	1,714
Total observations	2,036	2,205	2,022	6,263
Panel Households				
1 (2010)	549	615	542	1,706
2 (2011)	549	615	542	1,706
3 (2014/15)	549	615	542	1,706
Total observations	1,647	1,845	1,626	5,118

Source: Generated from the Ghana Land Titling Datasets, 2010, 2011 and 2014

Table 2: Household plots treatment and wave of survey (Frequency)

Time	Treatment	Short Term Control	Long Term Control	Total
All Plots				
1 (2010)	1,130	1,299	1,149	3,578
2 (2011)	1,185	1,314	1,247	3,746
3 (2014/15)	984	1,150	990	3,124
Total observations	3,299	3,763	3,386	10,448

Source: Generated from the Ghana Land Titling Datasets, 2010, 2011 and 2014/15

Table 3: OLS and Probit regression for attrition between 2010 and 2011 (dependent variable: panel inclusion)

	(1)	(2)	(3)	(4)	(5)	(6)
	OLS 1	OLS 2	OLS 3	OLS 4	OLS 5	dProbit
Treatment	.011*				.011*	.011*
	(.001)				(.006)	(.006)
Number of household members					.007**	.007**
					(.003)	(.003)
Number of female household members					-.001	-.001
					(.004)	(.004)
Number of household members (below 5years of age)					-.004	-.004
					(.005)	(.005)
Male household head [yes=1]					.001	0.01
					(.007)	(.007)
Age of household head					-.001*	-.001*
					(.000)	(.000)
Household head attended any school [yes=1]					-.001	-.001
					(.007)	(.007)
Treatment v. long term control		.008				
		(.008)				
Treatment v. short term control			.015**			
			(0.007)			
Short term control v. long term control				-.007		
				(.007)		
Constant	.939***	.943***	.936***	.943***	.939***	
	(.003)	(.005)	(.005)	(.005)	(.013)	
Observations	6,262	4,057	4,240	4,227	6,253	6,253
R-squared	.001	.000	.001	.000	.004	

Notes: *** denotes significance at 1% level; ** at 5%; and * at 10%. The dependent variable is a dummy that is equal to 1 if a household attrit between the baseline and endline surveys and 0 otherwise. The standard errors in parenthesis are clustered by community*

Source: Generated from the Ghana Land Titling Datasets, 2010, 2011 and 2014

Table 4: OLS and Probit regression for attrition between 2010 and 2014 (dependent variable: panel inclusion)

VARIABLES	(1) OLS 1	(2) OLS 2	(3) OLS 3	(4) OLS 4	(5) OLS 5	(6) dProbit
Treatment	-.011				-.014	-.013
	(0.0105)				(.010)	(0.010)
Number of household members					.018***	.019***
					(.005)	(.005)
Number of female household members					-.006	-.007
					(.007)	(.007)
Number of household members (below 5years of age)					-.004	-.005
					(.008)	(.008)
Male household head [yes=1]					.019	.019
					(.012)	(.012)
Age of household head					.001***	.001***
					(.000)	(.000)
Household head attended any school [yes=1]					.029***	.030***
					(.011)	(.011)
Treatment vs. long term control		.008				
		(.012)				
Treatment vs. short term control			-.029**			
			(.012)			
Short term control vs. long term control				.036***		
				(.012)		
Constant	.823***	.804***	.840***	.804***	.694***	
	(.006)	(.009)	(.008)	(.009)	(.021)	
Observations	6,262	4,057	4,240	4,227	6,253	6,253
R-squared	0.000	0.000	0.001	0.002	0.010	

*Notes: *** denotes significance at 1% level; ** at 5%; and * at 10%. The dependent variable is a dummy that is equal to 1 if a household attrited between the baseline and endline surveys and 0 otherwise. The standard errors in parenthesis are clustered by community*

Source: Generated from the Ghana Land Titling Datasets, 2010, 2011 and 2014

Table 5: Mean comparisons of variables of control variables in Round 1

Topic	Variable	N	Treatment mean	Control mean	Difference
		All households within 200m bandwidth (panel)			
		Round 1			
Household characteristics	Number of household members	1,057	3.42	3.15	.274 (.158)
	Number of female household members	1,057	1.81	1.66	.152* (.080)
	Number of household members (below 5years of age)	1,057	.505	.435	.070 (.041)
	Male household head [yes=1]	1,057	.571	.567	.004 (.031)
	Age of household head	1,057	45.7	45.3	.492 (.892)
	Household head attended any school [yes=1]	1,057	.673	.632	.041 (.029)

Table 6a: Program impacts on female respondents

		Round 1 mean (control group)	N	All households within 200m bandwidth (panel)					
				OLS			SAR		
Topic	Variable			Round 1 treatment	Round 2 treatment	Round 3 treatment	Round 1 treatment	Round 2 treatment	Round 3 treatment
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Plot/land characteristics (female)	Any land registered [yes=1]	.059	1,299	.136*** (.039)	.176*** (.043)	.207*** (.048)	0.135*** (0.0335)	0.175*** (0.0340)	0.206*** (0.0349)
	Any land registered, conditional on female plot existing [yes=1]	.059	1,298	.136*** (.039)	.176*** (.043)	.207*** (.048)	0.136*** (0.0335)	0.175*** (0.0340)	0.206*** (0.0349)
	Proportion of plots registered	.054	1,299	.130*** (.038)	.147*** (.033)	.179*** (.047)	0.129*** (0.0308)	0.147*** (0.0312)	0.178*** (0.0321)
	Proportion of plots registered, conditional on female plot existing	.054	1,298	.130*** (.038)	.147*** (.033)	.179*** (.047)	0.129*** (0.0308)	0.147*** (0.0312)	0.178*** (0.0321)
	Land measured [yes=1]	.050	1,060	.406*** (.096)	.246** (.093)	.165** (.073)	0.383*** (0.0467)	0.263*** (0.0477)	0.186*** (0.0420)
	Land measured, conditional on female plot existing [yes=1]	.050	1,060	.406*** (.096)	.246** (.093)	.165** (.073)	0.383*** (0.0467)	0.263*** (0.0477)	0.186*** (0.0420)
	Proportion of plots measured	.047	1,060	.338*** (.082)	.208** (.090)	.173** (.062)	0.322*** (0.0431)	0.225*** (0.0442)	0.186*** (0.0388)
	Proportion of plots measured, conditional on female plot existing [yes=1]	.047	1,060	.338*** (.082)	.208** (.090)	.173** (.062)	0.322*** (0.0431)	0.225*** (0.0442)	0.186*** (0.0388)
	Plot demarcated [yes=1]	.092	576	.570*** (.060)	.292** (.108)	.193** (.069)	0.552*** (0.0567)	0.295*** (0.0548)	0.197*** (0.0671)
	Plot demarcated, conditional on female plot existing [yes=1]	.092	576	.570*** (.060)	.292** (.108)	.193** (.069)	0.552*** (0.0567)	0.295*** (0.0548)	0.197*** (0.0671)
	Proportion of plots demarcated	.086	576	.536*** (.060)	.271** (.103)	.174** (.070)	0.522*** (0.0559)	0.272*** (0.0540)	0.175*** (0.0661)
	Proportion of plots demarcated, conditional on female plot existing	.086	576	.536*** (.060)	.271** (.103)	.174** (.070)	0.522*** (0.0559)	0.272*** (0.0540)	0.175*** (0.0661)

Table 6b: Program impacts on female respondents

		Round 1 mean (control group)	N	All households within 200m bandwidth (panel)					
				OLS			SAR		
Topic	Variable			Round 1 treatment	Round 2 treatment	Round 3 treatment	Round 1 treatment	Round 2 treatment	Round 3 treatment
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Plot/land characteristics (female)	Number of female plots, conditional on female respondent present	.896	2,387	.099 (.061)	-.004 (.056)	-.094 (.068)	0.0928 (0.0583)	0.00109 (0.0583)	-0.0785 (0.0561)
	Any female owned plot, conditional on female respondent present [yes=1]	.653	2,373	.020 (.034)	-.012 (.021)	-.010 (.026)	0.0161 (0.0275)	-0.0117 (0.0274)	-0.00180 (0.0264)
	Worried to lose plot if left empty, conditional on female plot existing [yes=1]	.326	1,386	.054 (.074)	.048 (.035)	.005 (.054)	0.0523 (0.0405)	0.0446 (0.0412)	-0.00223 (0.0441)
	Any disagreement ever over this plot, conditional on female plot existing [yes=1]	.042	1,378	.033 (.031)	.006 (.037)	.012 (.033)	0.0303 (0.0249)	0.00319 (0.0251)	0.0110 (0.0269)
	Any part of plot fallowed, conditional on female plot existing [yes=1]	.195	1,370	-.023 (.040)	.045 (.044)	-.022 (.037)	-0.0287 (0.0339)	0.0392 (0.0339)	-0.0280 (0.0363)
	Trees planted in past year, conditional on female plot existing [yes=1]	.184	1,212	.045 (.049)	.073 (.047)	-.031 (.058)	0.0430 (0.0370)	0.0770** (0.0368)	-0.0293 (0.0491)
	Any structures on land, conditional on female plot existing [yes=1]	.631	1,383	-.016 (.059)	.012 (.048)	-.012 (.039)	-0.0117 (0.0424)	0.0209 (0.0429)	-0.00208 (0.0460)
	Any improvements to structures [yes=1]	.199	898	-.061 (.078)	.045 (.066)	.009 (.113)	-0.0614 (0.0512)	0.0472 (0.0496)	0.0121 (0.0549)
	Any improvements to structures, conditional on structures existing [yes=1]	.195	887	-.042 (.082)	.047 (.066)	.010 (.113)	-0.0414 (0.0524)	0.0486 (0.0497)	0.0130 (0.0551)
	Any improvements to structures, conditional on female plot and structures existing [yes=1]	.195	886	-.041 (.082)	.047 (.066)	.008 (.114)	-0.0412 (0.0524)	0.0491 (0.0497)	0.0108 (0.0551)
	Any chemicals applied in past major season [yes=1]	.178	1,236	-.002 (.048)	.018 (.022)	-.026 (.050)	-0.0236 (0.0397)	0.0135 (0.0320)	-0.0221 (0.0345)
	Any fertilizer applied in past major season, conditional on any chemicals answered [yes=1]	.105	1,226	-.065** (.031)	.008 (.019)	.010 (.030)	-0.0630*** (0.0223)	0.00530 (0.0179)	0.00868 (0.0192)
	Any herbicides applied in past major season, conditional on any chemicals answered [yes=1]	.075	1,225	.048 (.034)	.010 (.020)	-.036 (.047)	0.0212 (0.0359)	0.00943 (0.0286)	-0.0272 (0.0308)
	Any other chemicals applied in past major season, conditional on any chemicals answered [yes=1]	.006	1,219	.004	-.004	-.0009	0.00191	-0.00533	-0.0000875

Topic	Variable	Round 1 mean (control group)	N	All households within 200m bandwidth (panel)					
				OLS			SAR		
				Round 1 treatment	Round 2 treatment	Round 3 treatment	Round 1 treatment	Round 2 treatment	Round 3 treatment
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				(.010)	(.007)	(.006)	(0.00886)	(0.00707)	(0.00763)
	Value of land [in cedis]	2,230	1,409	-45.4	3,425	299	77.56	3126.7**	200.5
				(671)	(2,036)	(1,452)	(1349.1)	(1394.1)	(1488.1)
	Value of land [in cedis, winsorized]	2,175	1,409	-124	2,435	-605	-3.633	2167.7*	-654.0
				(553)	(1,605)	(1,501)	(1075.2)	(1111.2)	(1185.9)
	Value of land, conditional on female plot existing [in cedis, winsorized]	2,215	1,402	-164	2,418	-625	-42.02	2157.7*	-668.2
				(541)	(1,599)	(1,493)	(1085.1)	(1113.9)	(1188.9)
	Plot was obtained through purchase, conditional on female plot existing [yes=1]	.289	1,228	.078*	.004	.058	0.0865*	0.00988	0.0691
				(.039)	(.047)	(.079)	(0.0447)	(0.0464)	(0.0534)
	Plot was obtained through inheritance, conditional on female plot existing [yes=1]	.357	1,228	-.018	.052	-.033	-0.0306	0.0514	-0.0331
				(.067)	(.052)	(.080)	(0.0445)	(0.0462)	(0.0531)
	Plot was obtained through renting, conditional on female plot existing [yes=1]	.188	1,228	-.011	-.002	-.007	-0.0100	0.00109	-0.0106
				(.032)	(.033)	(.023)	(0.0322)	(0.0335)	(0.0385)
	Plot was obtained through sharecropping, conditional on female plot existing [yes=1]	.102	1,228	.006	.005	.006	0.00396	0.00360	0.00134
				(.027)	(.035)	(.020)	(0.0237)	(0.0246)	(0.0283)
	Plot was obtained through (free) allocation, conditional on female plot existing [yes=1]	.244	1,228	-.021	.005	-.064	-0.0258	0.000195	-0.0705
				(.041)	(.086)	(.050)	(0.0387)	(0.0402)	(0.0464)

Table 6c: Program impacts on female respondents

Topic	Variable	Round 1 mean (control group)	N	All households within 200m bandwidth (panel)					
				OLS			SAR		
				Round 1 treatment	Round 2 treatment	Round 3 treatment	Round 1 treatment	Round 2 treatment	Round 3 treatment
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Individual assets (female)	Owns any livestock, conditional on female respondent present [yes=1]	.364	2,294	.032 (.055)	.021 (.055)	.086 (.066)	0.0310 (0.0356)	0.0238 (0.0353)	0.0861** (0.0345)
	Value of livestock, conditional on screening question asked [in cedis]	68.6	2,338	-9.79 (11.2)	5.56 (27.8)	-77.6 (69.4)	-8.944 (38.85)	3.661 (38.74)	-77.97** (37.21)
	Value of livestock, conditional on screening question asked [in cedis, winsorized]	59.1	2,338	-1.48 (8.82)	-4.06 (19.6)	-11.5 (40.6)	-0.0538 (21.53)	-6.715 (21.49)	-10.28 (20.62)
	Value of livestock, conditional on screening question asked and female respondent present [in cedis]	69.7	2,290	-11.2 (11.5)	5.45 (27.5)	-90.9 (67.8)	-10.36 (39.22)	3.901 (38.87)	-93.25** (38.16)
	Value of livestock, conditional on screening question asked and female respondent present [in cedis, winsorized]	59.9	2,290	-2.34 (9.13)	-3.95 (19.3)	-21.1 (38.0)	-1.060 (21.40)	-6.065 (21.23)	-21.40 (20.82)
	Value of tools, conditional on screening question asked [in cedis]	5.76	2,293	1.55 (1.14)	.261 (.923)	7.65 (5.67)	1.602 (2.972)	0.307 (2.874)	7.736*** (2.761)
	Value of tools, conditional on screening question asked [in cedis, winsorized]	4.66	2,293	.836 (.963)	.298 (.569)	4.50 (3.05)	0.806 (1.797)	0.283 (1.738)	4.551*** (1.670)
	Value of tools, conditional on screening question asked and female respondent present [in cedis]	4.76	2,246	.793 (.980)	.290 (.569)	4.57 (3.26)	0.731 (1.845)	0.263 (1.775)	4.525*** (1.742)
	Value of tools, conditional on screening question asked and female respondent present [in cedis, winsorized]	5.87	2,246	1.50 (1.15)	.236 (.921)	7.75 (5.95)	1.524 (3.016)	0.271 (2.902)	7.706*** (2.848)
	Value of durable goods, conditional on screening question asked [in cedis]	74.6	2,337	-11.8 (14.4)	-7.68 (19.6)	199*** (60.4)	-14.82 (43.65)	-11.65 (43.50)	208.9*** (41.95)
	Value of durable goods, conditional on screening question asked [in cedis, winsorized]	272	2,337	-52.8 (226)	-67.4* (36.8)	393* (195)	-37.06 (176.5)	-83.04 (175.8)	405.8** (168.8)
	Value of durable goods, conditional on screening question asked and female respondent present [in cedis]	76.0	2,290	-14.8 (14.4)	-9.52 (19.1)	211*** (62.4)	-18.27 (46.28)	-13.72 (45.89)	220.4*** (45.24)
	Value of durable goods, conditional on screening question asked and female respondent present [in cedis, winsorized]	277	2,290	-57.5 (228)	-69.0* (37.1)	407* (201)	-42.13 (179.3)	-85.51 (177.8)	417.9** (174.4)

Table 6d: Program impacts on female respondents

				All households within 200m bandwidth (panel)					
				OLS			SAR		
Topic	Variable	Round 1 mean (control group)	N	Round 1 treatment	Round 2 treatment	Round 3 treatment	Round 1 treatment	Round 2 treatment	Round 3 treatment
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Individual credit (female)	Any repaid loan in the last 12 months, conditional on female respondent present [yes=1]	.176	2,279	-.009 (.030)	-.034 (.032)	-.029 (.039)	-0.00911 (0.0306)	-0.0313 (0.0302)	-0.0271 (0.0298)
	Any current outstanding loan, conditional on female respondent present [yes=1]	.251	2,246	.014 (.029)	-.038 (.035)	.026 (.043)	0.0118 (0.0337)	-0.0366 (0.0324)	0.0258 (0.0319)
	Value of current outstanding loan, conditional on female respondent present and zeros imputed [in cedis]	132	2,245	-90.1*** (28.6)	-68.7 (40.6)	66.1 (58.5)	-91.01* (48.83)	-71.39 (46.95)	63.40 (46.27)
	Value of current outstanding loan, conditional on female respondent present and zeros imputed [in cedis, winsorized]	85.0	2,245	-41.0* (22.3)	-73.7* (37.9)	50.4 (52.7)	-41.39 (35.01)	-74.99** (33.68)	48.82 (33.19)
	Value of current outstanding loan, conditional on female respondent present and any loan amount recorded [in cedis]	579	565	-382*** (114)	-234** (97.7)	133 (109)	-368.0** (180.2)	-217.0 (174.8)	135.9 (150.7)
	Value of current outstanding loan, conditional on female respondent present and any loan amount recorded [in cedis, winsorized]	466	565	-263*** (73.3)	-318*** (98.2)	98.4 (102)	-249.4* (143.5)	-304.0** (139.3)	101.9 (120.1)

Table 6e: Program impacts on female respondents

Topic	Variable	Round 1 mean (control group)	N	All households within 200m bandwidth (panel)					
				OLS			SAR		
				Round 1 treatment	Round 2 treatment	Round 3 treatment	Round 1 treatment	Round 2 treatment	Round 3 treatment
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Individual lending (female)	Any lending fully repaid in the past 12 months, conditional on female respondent present [yes=1]	.103	2,281	.010 (.025)	.010 (.029)	-.008 (.016)	0.0116 (0.0241)	0.0121 (0.0239)	-0.00546 (0.0236)
	Any outstanding lending, conditional on female respondent present [yes=1]	.143	2,235	.042 (.034)	.010 (.037)	.025 (.037)	0.0434 (0.0284)	0.0124 (0.0272)	0.0265 (0.0268)
	Value of outstanding lending, conditional on female respondent present and zeros imputed [in cedis]	13.2	2,198	4.89 (5.95)	18.3* (9.92)	6.86 (7.54)	5.835 (9.543)	19.70** (9.673)	7.949 (9.621)
	Value of outstanding lending, conditional on female respondent present and zeros imputed [in cedis, winsorized]	11.6	2,198	1.22 (3.16)	6.00 (4.66)	6.42 (5.31)	2.214 (5.767)	7.473 (5.845)	7.589 (5.818)
	Value of outstanding lending, conditional on female respondent present and any lending amount recorded [in cedis]	203	343	-55.5 (101)	70.8 (51.8)	-24.4 (70.4)	-46.93 (95.49)	70.56 (104.0)	-20.33 (82.38)
	Value of outstanding lending, conditional on female respondent present and any lending amount recorded [in cedis, winsorized]	203	343	-57.0 (101)	22.4 (47.4)	-37.3 (68.7)	-47.80 (86.58)	22.97 (94.30)	-33.25 (74.72)

Table 6f: Program impacts on female respondents

				All households within 200m bandwidth (panel)					
				OLS			SAR		
Topic	Variable	Round 1 mean (control group)	N	Round 1 treatment	Round 2 treatment	Round 3 treatment	Round 1 treatment	Round 2 treatment	Round 3 treatment
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Individual saving (female)	Any savings, conditional on female respondent present [yes=1]	.465	2,283	-.015 (.038)	.0008 (.059)	-.006 (.047)	-0.0235 (0.0362)	0.00575 (0.0358)	-0.00501 (0.0353)
	Value of total savings, conditional female respondent present and zeros imputed [in cedis]	113	2,291	-55.8 (63.7)	-54.2 (40.3)	-74.9 (68.2)	-56.67 (57.76)	-53.58 (57.63)	-68.61 (56.88)
	Value of total savings, conditional female respondent present and zeros imputed [in cedis, winsorized]	71.1	2,291	-33.1* (17.1)	-14.6 (24.2)	-42.7 (33.4)	-31.42 (24.81)	-11.06 (24.71)	-38.07 (24.42)
	Value of total savings, conditional on female respondent present and any total savings amount recorded [in cedis]	256	1,142	-41.2 (137)	-116* (64.0)	-116 (124)	-36.08 (117.7)	-120.1 (109.0)	-117.6 (107.4)
	Value of total savings, conditional on female respondent present and any total savings amount recorded [in cedis, winsorized]	182	1,142	-26.8 (42.0)	-53.4 (49.5)	-88.5 (55.7)	-22.24 (56.20)	-47.52 (51.99)	-84.59* (51.24)
	Value of savings at home, conditional on female respondent present and any total savings amount recorded [in cedis]	51.6	1,142	-1.10 (8.90)	-14.3 (23.8)	15.6 (13.2)	1.755 (18.87)	-9.491 (17.47)	18.41 (17.21)
	Value of savings at home, conditional on female respondent present and any total savings amount recorded [in cedis, winsorized]	47.9	1,142	3.62 (9.26)	5.90 (11.3)	18.9 (13.5)	6.363 (14.04)	10.81 (13.00)	21.83* (12.81)
	Value of savings at a financial institution, conditional on female respondent present and any total savings amount recorded [in cedis]	204	1,142	-40.1 (131)	-102* (57.2)	-131 (124)	-37.31 (115.7)	-110.2 (107.2)	-135.1 (105.6)
	Value of savings at a financial institution, conditional on female respondent present and any total savings amount recorded [in cedis, winsorized]	131	1,142	-27.7 (34.2)	-49.3 (39.5)	-105* (56.5)	-25.10 (54.32)	-48.16 (50.28)	-103.4** (49.54)

Table 7a: Program impacts on male respondents

				All households within 200m bandwidth (panel)					
				OLS			SAR		
Topic	Variable	Round 1 mean (control group)	N	Round 1 treatment	Round 2 treatment	Round 3 treatment	Round 1 treatment	Round 2 treatment	Round 3 treatment
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Any land registered [yes=1]	.068	1,612	.163**	.103	.235***	0.165***	0.102***	0.226***
				(.075)	(.066)	(.072)	(0.0313)	(0.0315)	(0.0320)
	Any land registered, conditional on male plot existing [yes=1]	.068	1,612	.163**	.103	.235***	0.165***	0.102***	0.226***
				(.075)	(.066)	(.072)	(0.0313)	(0.0315)	(0.0320)
	Proportion of plots registered	.059	1,612	.164**	.080	.177***	0.163***	0.0780***	0.174***
				(.070)	(.051)	(.048)	(0.0262)	(0.0264)	(0.0267)
	Proportion of plots registered, conditional on male plot existing	.059	1,612	.164**	.080	.177***	0.163***	0.0780***	0.174***
				(.070)	(.051)	(.048)	(0.0262)	(0.0264)	(0.0267)
	Land measured [yes=1]	.080	1,406	.541***	.230**	.233**	0.506***	0.249***	0.246***
				(.113)	(.093)	(.087)	(0.0389)	(0.0394)	(0.0359)
	Land measured, conditional on male plot existing [yes=1]	.080	1,406	.541***	.230**	.233**	0.506***	0.249***	0.246***
				(.113)	(.093)	(.087)	(0.0389)	(0.0394)	(0.0359)
	Proportion of plots measured	.064	1,406	.435***	.180**	.198**	0.407***	0.198***	0.208***
				(.100)	(.084)	(.070)	(0.0346)	(0.0351)	(0.0319)
	Proportion of plots measured, conditional on male plot existing [yes=1]	.064	1,406	.435***	.180**	.198**	0.407***	0.198***	0.208***
				(.100)	(.084)	(.070)	(0.0346)	(0.0351)	(0.0319)
	Plot demarcated [yes=1]	.119	828	.688***	.268***	.220***	0.672***	0.274***	0.231***
				(.060)	(.083)	(.062)	(0.0458)	(0.0441)	(0.0500)
	Plot demarcated, conditional on male plot existing [yes=1]	.119	828	.688***	.268***	.220***	0.165***	0.102***	0.226***
				(.060)	(.083)	(.062)	(0.0313)	(0.0315)	(0.0320)
	Proportion of plots demarcated	.106	828	.615***	.236***	.185***	0.603***	0.241***	0.202***
				(.072)	(.079)	(.063)	(0.0454)	(0.0437)	(0.0497)
	Proportion of plots demarcated, conditional on male plot existing	.106	828	.615***	.236***	.185***	0.603***	0.241***	0.202***
				(.072)	(.079)	(.063)	(0.0454)	(0.0437)	(0.0497)

Table 7b: Program impacts on male respondents

				All households within 200m bandwidth (panel)					
				OLS			SAR		
Topic	Variable	Round 1 mean (control group)	N	Round 1 treatment	Round 2 treatment	Round 3 treatment	Round 1 treatment	Round 2 treatment	Round 3 treatment
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Plot/land characteristics (male)	Number of male plots, conditional on male respondent present	1.63	1,846	.032 (.120)	.037 (.073)	.011 (.094)	0.0169 (0.0888)	0.0354 (0.0890)	-0.000796 (0.0874)
	Any male owned plot, conditional on male respondent present [yes=1]	.978	1,829	-.012 (.017)	.005 (.013)	.0003 (.030)	-0.0132 (0.0220)	0.000332 (0.0220)	0.00191 (0.0217)
	Worried to lose plot if left empty, conditional on male plot existing [yes=1]	.428	1,662	-.002 (.032)	-.022 (.045)	.011 (.043)	-0.00513 (0.0393)	-0.0242 (0.0398)	0.00480 (0.0414)
	Any disagreement ever over this plot, conditional on male plot existing [yes=1]	.054	1,666	.0001 (.015)	-.020 (.023)	-.010 (.037)	0.000913 (0.0239)	-0.0196 (0.0242)	-0.00960 (0.0252)
	Any part of plot fallowed, conditional on male plot existing [yes=1]	.222	1,658	.014 (.031)	-.016 (.025)	.046 (.053)	0.0150 (0.0323)	-0.0188 (0.0325)	0.0420 (0.0338)
	Trees planted in past year, conditional on male plot existing [yes=1]	.279	1,510	.005 (.045)	.080 (.064)	.002 (.058)	0.00702 (0.0373)	0.0822** (0.0376)	-0.00134 (0.0458)
	Any structures on land, conditional on male plot existing [yes=1]	.612	1,658	.102 (.058)	-.025 (.053)	-.007 (.044)	0.101*** (0.0361)	-0.0164 (0.0363)	0.00139 (0.0378)
	Any improvements to structures [yes=1]	.275	1,201	.011 (.047)	-.060 (.048)	-.026 (.057)	0.00933 (0.0486)	-0.0601 (0.0468)	-0.0253 (0.0471)
	Any improvements to structures, conditional on structures existing [yes=1]	.278	1,183	.021 (.050)	-.060 (.049)	-.025 (.057)	0.0197 (0.0498)	-0.0595 (0.0469)	-0.0241 (0.0472)
	Any improvements to structures, conditional on male plot and structures existing [yes=1]	.278	1,182	.022 (.051)	-.059 (.049)	-.025 (.057)	0.0201 (0.0498)	-0.0591 (0.0469)	-0.0250 (0.0472)
	Any chemicals applied in past major season [yes=1]	.296	1,489	.052 (.073)	-.047 (.045)	.023 (.043)	0.0413 (0.0449)	-0.0444 (0.0372)	0.0169 (0.0385)
	Any fertilizer applied in past major season, conditional on any chemicals answered [yes=1]	.141	1,488	.042 (.052)	.018 (.030)	.034 (.030)	0.0404 (0.0335)	0.0156 (0.0277)	0.0323 (0.0288)
	Any herbicides applied in past major season, conditional on any chemicals answered [yes=1]	.157	1,479	.041 (.048)	-.026 (.042)	.020 (.039)	0.0282 (0.0412)	-0.0230 (0.0337)	0.0150 (0.0349)
	Any other chemicals applied in past major season, conditional on any chemicals answered [yes=1]	.010	1,452	.007 (.013)	.006 (.007)	-.009 (.016)	0.00639 (0.0133)	0.00522 (0.0106)	-0.00813 (0.0110)

Topic	Variable	Round 1 mean (control group)	N	All households within 200m bandwidth (panel) OLS			SAR		
				Round 1 treatment	Round 2 treatment	Round 3 treatment	Round 1 treatment	Round 2 treatment	Round 3 treatment
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Value of land [in cedis]	5,677	1,687	-2,788*	-894	5,533***	-2169.3	-764.3	4654.5**
				(1,355)	(2,262)	(1,864)	(2196.8)	(2242.2)	(2314.0)
	Value of land [in cedis, winsorized]	5,495	1,687	-2,650*	-694	4,488**	-2015.3	-614.2	3589.2*
				(1,348)	(1,947)	(1,869)	(1857.4)	(1895.7)	(1956.4)
	Value of land, conditional on male plot existing [in cedis, winsorized]	5,495	1,687	-2,650*	-694	4,488**	-2015.3	-614.2	3589.2*
				(1,348)	(1,947)	(1,869)	(1857.4)	(1895.7)	(1956.4)
	Plot was obtained through purchase, conditional on female plot existing [yes=1]	.367	1,631	.046	.003	-.080	0.0454	0.0115	-0.0730*
				(.037)	(.054)	(.085)	(0.0413)	(0.0430)	(0.0433)
	Plot was obtained through inheritance, conditional on female plot existing [yes=1]	.224	1,631	.036	-.031	.091**	0.0333	-0.0356	0.0882**
				(.037)	(.028)	(.040)	(0.0368)	(0.0384)	(0.0387)
	Plot was obtained through renting, conditional on female plot existing [yes=1]	.208	1,631	.052**	-.034	.012	0.0529	-0.0416	0.0136
				(.020)	(.031)	(.032)	(0.0334)	(0.0351)	(0.0353)
	Plot was obtained through sharecropping, conditional on female plot existing [yes=1]	.169	1,631	-.031	-.046	-.027	-0.0314	-0.0489*	-0.0263
				(.022)	(.034)	(.030)	(0.0250)	(0.0261)	(0.0263)
	Plot was obtained through (free) allocation, conditional on female plot existing [yes=1]	.313	1,631	-.018	.107***	-.053	-0.0172	0.102***	-0.0539
				(.038)	(.036)	(.055)	(0.0361)	(0.0377)	(0.0380)

Table 7c: Program impacts on male respondents

Topic	Variable	Round 1 mean (control group) (1)	N (2)	All households within 200m bandwidth (panel)					
				OLS			SAR		
				Round 1 treatment (3)	Round 2 treatment (4)	Round 3 treatment (5)	Round 1 treatment (6)	Round 2 treatment (7)	Round 3 treatment (8)
Individual assets (male)	Owns any livestock, conditional on male respondent present [yes=1]	.452	1,782	-.007 (.025)	-.002 (.032)	.119*** (.041)	-0.00522 (0.0408)	0.000230 (0.0406)	0.119*** (0.0406)
	Value of livestock, conditional on screening question asked [in cedis]	62.7	1,952	-100.0** (35.1)	283 (248)	257*** (86.1)	-109.6 (169.5)	313.5* (187.5)	270.5 (184.6)
	Value of livestock, conditional on screening question asked [in cedis, winsorized]	51.9	1,952	-52.2* (29.4)	15.9 (74.0)	203** (71.1)	-48.96 (53.24)	17.24 (58.62)	199.3*** (58.13)
	Value of livestock, conditional on screening question asked and male respondent present [in cedis]	35.5	1,780	-99.6** (41.0)	279 (246)	261*** (87.8)	-107.2 (197.4)	310.7 (196.6)	274.7 (196.6)
	Value of livestock, conditional on screening question asked and male respondent present [in cedis, winsorized]	19.9	1,780	-51.0 (34.7)	12.2 (77.1)	231** (81.0)	-47.33 (65.53)	13.88 (64.96)	228.1*** (65.42)
	Value of tools, conditional on screening question asked [in cedis]	11.6	1,779	-2.79 (3.19)	-3.94 (4.03)	12.9 (11.7)	-2.615 (6.000)	-3.402 (5.850)	13.17** (5.781)
	Value of tools, conditional on screening question asked [in cedis, winsorized]	15.4	1,779	-8.95 (7.29)	-13.0 (12.2)	22.4 (21.6)	-8.961 (11.29)	-12.86 (11.03)	22.44** (10.88)
	Value of tools, conditional on screening question asked and male respondent present [in cedis]	11.7	1,752	-2.87 (3.32)	-3.96 (4.09)	13.6 (13.0)	-2.670 (6.298)	-3.417 (6.114)	13.85** (6.136)
	Value of tools, conditional on screening question asked and male respondent present [in cedis, winsorized]	15.6	1,752	-8.72 (7.20)	-13.0 (12.3)	22.5 (22.7)	-8.740 (11.43)	-12.89 (11.11)	22.57** (11.13)
	Value of durable goods, conditional on screening question asked [in cedis]	11.6	1,779	-2.79 (3.19)	-3.94 (4.03)	12.9 (11.7)	-2.615 (6.000)	-3.402 (5.850)	13.17** (5.781)
	Value of durable goods, conditional on screening question asked [in cedis, winsorized]	15.4	1,779	-8.95 (7.29)	-13.0 (12.2)	22.4 (21.6)	-8.961 (11.29)	-12.86 (11.03)	22.44** (10.88)
	Value of durable goods, conditional on screening question asked and male respondent present [in cedis]	11.7	1,752	-2.87 (3.32)	-3.96 (4.09)	13.6 (13.0)	-2.670 (6.298)	-3.417 (6.114)	13.85** (6.136)
	Value of durable goods, conditional on screening question asked and male respondent present [in cedis, winsorized]	15.6	1,752	-8.72 (7.20)	-13.0 (12.3)	22.5 (22.7)	-8.740 (11.43)	-12.89 (11.11)	22.57** (11.13)

Table 7d: Program impacts on male respondents

Topic	Variable	Round 1 mean (control group)	N	All households within 200m bandwidth (panel)					
				OLS			SAR		
				Round 1 treatment	Round 2 treatment	Round 3 treatment	Round 1 treatment	Round 2 treatment	Round 3 treatment
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Individual credit (male)	Any repaid loan in the last 12 months, conditional on male respondent present [yes=1]	.120	1,770	.031 (.023)	.045 (.033)	-.005 (.045)	0.0309 (0.0308)	0.0453 (0.0306)	-0.00707 (0.0309)
	Any current outstanding loan, conditional on male respondent present [yes=1]	.171	1,751	.057 (.039)	.051* (.027)	.014 (.037)	0.0555 (0.0352)	0.0494 (0.0342)	0.0141 (0.0345)
	Value of current outstanding loan, conditional on male respondent present and zeros imputed [in cedis]	64.3	1,750	5.44 (46.2)	69.7 (45.0)	98.3** (37.5)	6.454 (77.89)	72.34 (75.63)	99.97 (76.25)
	Value of current outstanding loan, conditional on male respondent present and zeros imputed [in cedis, winsorized]	45.0	1,750	27.1 (28.1)	-7.38 (32.3)	80.4** (36.2)	26.61 (45.16)	-5.824 (43.85)	81.15* (44.21)
	Value of current outstanding loan, conditional on male respondent present and any loan amount recorded [in cedis]	399	361	-80.0 (207)	310 (295)	187* (87.4)	-69.71 (360.4)	301.5 (353.9)	241.6 (306.2)
	Value of current outstanding loan, conditional on male respondent present and any loan and any loan amount recorded [in cedis, winsorized]	339	361	-18.3 (165)	314 (291)	156 (90.6)	-10.30 (343.8)	306.0 (337.4)	208.4 (292.0)

Table 7e: Program impacts on male respondents

Topic	Variable	Round 1 mean (control group)	N	All households within 200m bandwidth (panel)					
				OLS			SAR		
				Round 1 treatment	Round 2 treatment	Round 3 treatment	Round 1 treatment	Round 2 treatment	Round 3 treatment
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Individual lending (male)	Any lending fully repaid in the past 12 months, conditional on male respondent present [yes=1]	.165	1,770	.017 (.046)	.005 (.028)	-.014 (.028)	0.0188 (0.0293)	0.0111 (0.0290)	-0.0127 (0.0292)
	Any outstanding lending, conditional on male respondent present [yes=1]	.223	1,733	.006 (.041)	-.027 (.039)	.059 (.038)	0.00846 (0.0354)	-0.0253 (0.0340)	0.0620* (0.0342)
	Value of outstanding lending, conditional on male respondent present and zeros imputed [in cedis]	37.9	1,722	170** (64.1)	24.0 (21.6)	112 (92.4)	174.3** (70.13)	22.33 (70.03)	113.0 (71.97)
	Value of outstanding lending, conditional on male respondent present and zeros imputed [in cedis, winsorized]	35.0	1,722	37.9 (25.3)	14.8 (11.1)	9.46 (21.4)	40.17** (15.95)	18.35 (15.92)	12.07 (16.37)
	Value of outstanding lending, conditional on male respondent present and any lending amount recorded [in cedis]	241	356	1,006*** (303)	278 (190)	684 (573)	1009.6*** (384.3)	307.6 (382.4)	670.1* (352.8)
	Value of outstanding lending, conditional on male respondent present and any lending amount recorded [in cedis, winsorized]	241	356	735*** (209)	253 (186)	522 (443)	739.5*** (274.4)	293.5 (273.3)	502.0** (252.1)

Table 7f: Program impacts on male respondents

Topic	Variable	Round 1 mean (control group) (1)	N (2)	All households within 200m bandwidth (panel)					
				OLS			SAR		
				Round 1 treatment (3)	Round 2 treatment (4)	Round 3 treatment (5)	Round 1 treatment (6)	Round 2 treatment (7)	Round 3 treatment (8)
Individual savings (male)	Any savings, conditional on male respondent present [yes=1]	.593	1,772	.023 (.048)	.039 (.039)	-.005 (.040)	0.0212 (0.0392)	0.0334 (0.0389)	-0.00497 (0.0392)
	Value of total savings, conditional male respondent present and zeros imputed [in cedis]	184	1,565	-5.71 (48.5)	3.46 (61.0)	138** (64.2)	-3.125 (67.72)	10.86 (67.87)	145.7* (85.11)
	Value of total savings, conditional male respondent present and zeros imputed [in cedis, winsorized]	153	1,565	28.8 (45.6)	37.8 (46.1)	64.4 (52.8)	31.64 (46.79)	45.32 (46.94)	69.50 (58.83)
	Value of total savings, conditional on male respondent present and any total savings amount recorded [in cedis]	347	956	-47.4 (105)	-49.4 (104)	216* (121)	-38.80 (111.5)	-40.87 (102.6)	224.9* (130.5)
	Value of total savings, conditional on male respondent present and any total savings amount recorded [in cedis, winsorized]	312	956	5.70 (68.5)	.251 (85.8)	104 (107)	13.14 (82.62)	10.08 (76.00)	111.5 (96.65)
	Value of savings at home, conditional on male respondent present and any total savings amount recorded [in cedis]	58.2	956	12.8 (17.0)	-26.0 (28.7)	39.6** (17.6)	14.70 (29.06)	-18.60 (26.78)	45.12 (34.05)
	Value of savings at home, conditional on male respondent present and any total savings amount recorded [in cedis, winsorized]	58.2	956	9.81 (12.2)	-13.3 (18.4)	44.7*** (12.7)	11.34 (18.04)	-8.959 (16.63)	49.85** (21.17)
	Value of savings at a financial institution, conditional on malre respondent present and any total savings amount recorded [in cedis]	289	956	-60.2 (115)	-23.4 (104)	176 (119)	-54.51 (105.7)	-21.83 (97.23)	180.3 (123.7)
	Value of savings at a financial institution, conditional on malre respondent present and any total savings amount recorded [in cedis, winsorized]	254	956	-6.87 (75.2)	15.1 (86.1)	64.7 (99.5)	-2.654 (78.00)	18.05 (71.71)	68.45 (91.22)

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Appendix Figure 1: GPS Location of Sampled households
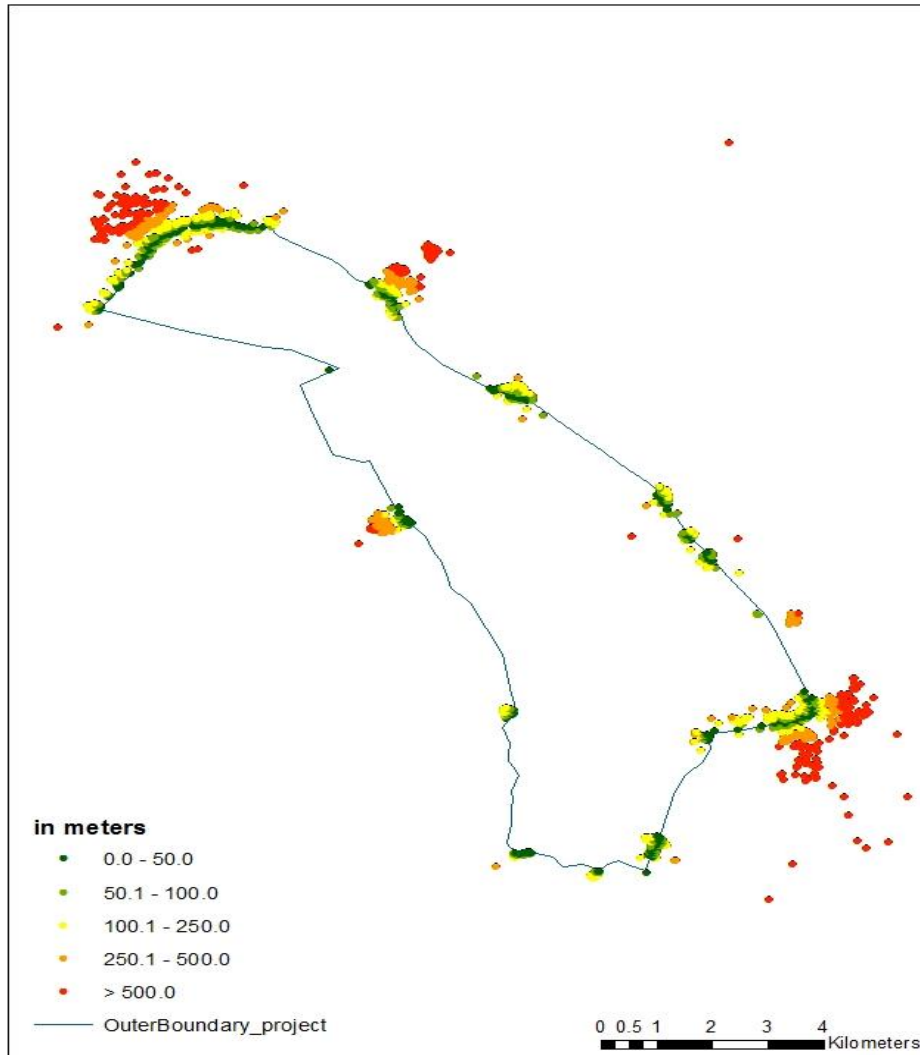
Appendix Table 1: Descriptive statistics of variables of interest by round of survey

Topic	Variable	Round 1						Round 2						Round 3					
		N	Mean	SD	Median	Min	Max	N	Mean	SD	Median	Min	Max	N	Mean	SD	Median	Min	Max
Individual assets (female)	Owns any livestock, conditional on female respondent present [yes=1]	746	.346	.476	0	0	1	761	.427	.495	0	0	1	787	.438	.497	0	0	1
	Value of livestock, conditional on screening question asked [in cedis]	757	57.8	190	0	0	2,000	762	118	349	0	0	4,300	819	183	794	0	0	14,000
	Value of livestock, conditional on screening question asked [in cedis, winsorized]	757	51.5	144	0	0	865	762	108	276	0	0	1,600	819	146	391	0	0	2,850
	Value of livestock, conditional on screening question asked and female respondent present [in cedis]	746	58.4	191	0	0	2,000	761	118	349	0	0	4,300	783	185	805	0	0	14,000
	Value of livestock, conditional on screening question asked and female respondent present [in cedis, winsorized]	746	51.9	144	0	0	860	761	108	276	0	0	1,600	783	146	386	0	0	2,850
	Value of tools, conditional on screening question asked [in cedis]	712	5.54	26.2	0	0	556	762	4.98	12.5	0	0	173	819	17.3	59.1	0	0	985
	Value of tools, conditional on screening question asked [in cedis, winsorized]	712	4.16	10.1	0	0	60	762	4.66	10.1	0	0	55	819	15.0	37.3	0	0	250
	Value of tools, conditional on screening question asked and	702	4.22	10.2	0	0	60	761	4.66	10.1	0	0	55	783	15.7	38.5	0	0	260

	N	Mean	SD			Max	N	Mean	SD			Max	N	Mean	SD			Max
female respondent present [in cedis]																		
Value of tools, conditional on screening question asked and female respondent present [in cedis, winsorized]	702	5.62	26.4	0	0	556	761	4.98	12.5	0	0	173	783	18.0	60.4	0	0	985
Value of durable goods, conditional on screening question asked [in cedis]	756	73.6	198	0	0	1,225	762	109	291	0	0	2,242	819	366	931	0	0	6,780
Value of durable goods, conditional on screening question asked [in cedis, winsorized]	756	267	3,023	0	0	66,012	762	125	470	0	0	8,670	819	482	2,680	0	0	67,210
Value of durable goods, conditional on screening question asked and female respondent present [in cedis]	746	74.6	199	0	0	1,225	761	110	291	0	0	2,242	783	385	999	0	0	7,567
Value of durable goods, conditional on screening question asked and female respondent present [in cedis, winsorized]	746	271	3,043	0	0	66,012	761	125	470	0	0	8,670	783	500	2,739	0	0	67,210
Individual assets (male) Owns any livestock, conditional on male respondent present [yes=1]	590	.434	.496	0	0	1	599	.499	.500	0	0	1	593	.484	.500	0	0	1
Value of livestock, conditional on screening question asked [in cedis]	741	52.3	186	0	0	2,000	600	395	3,692	3	0	89,000	611	442	1,530	0	0	24,000
	741	44.8	133	0	0	800	600	240	616	3	0	4,200	611	402	1,098	0	0	9,000

	N	Mean	SD			Max	N	Mean	SD			Max	N	Mean	SD			Max
Value of livestock, conditional on screening question asked [in cedis, winsorized]																		
Value of livestock, conditional on screening question asked and male respondent present [in cedis]	590	27.7	156	0	0	1,850	599	395	3,695	0	0	89,000	591	450	1,551	0	0	24,000
Value of livestock, conditional on screening question asked and male respondent present [in cedis, winsorized]	590	16.7	64.1	0	0	420	599	241	620	0	0	4,275	591	420	1,203	0	0	10,700
Value of tools, conditional on screening question asked [in cedis]	568	10.8	22.8	0	0	118	600	15.4	30.6	0	0	173	611	56.1	114	0	0	680
Value of tools, conditional on screening question asked [in cedis, winsorized]	568	13.0	51.7	0	0	1,076	600	22.7	137	0	0	3,091	611	62.9	173	0	0	2,628
Value of tools, conditional on screening question asked and male respondent present [in cedis]	562	10.9	22.9	0	0	118	599	15.4	30.7	0	0	174	591	58.6	120	0	0	743
Value of tools, conditional on screening question asked and male respondent present [in cedis, winsorized]	562	13.1	52.0	0	0	1,076	599	22.7	137	0	0	3,091	591	64.8	176	0	0	2,628
Value of durable goods, conditional on screening question asked [in cedis]	568	10.8	22.8	0	0	118	600	15.4	30.6	0	0	173	611	56.1	114	0	0	680
Value of durable goods, conditional on screening question asked [in cedis, winsorized]	568	13.0	51.7	0	0	1,076	600	22.7	137	0	0	3,091	611	62.9	173	0	0	2,628
	562	10.9	22.9	0	0	118	599	15.4	30.7	0	0	174	591	58.6	120	0	0	743

		N	Mean	SD			Max	N	Mean	SD			Max	N	Mean	SD			Max
	Value of durable goods, conditional on screening question asked and male respondent present [in cedis]																		
	Value of durable goods, conditional on screening question asked and male respondent present [in cedis, winsorized]	562	13.1	52.0	0	0	1,076	599	22.7	137	0	0	3,091	591	64.8	176	0	0	2,628
Individual credit (female)	Any repaid loan in the last 12 months, conditional on female respondent present [yes=1]	742	.181	.385	0	0	1	761	.208	.406	0	0	1	776	.267	.443	0	0	1
	Any current outstanding loan, conditional on female respondent present [yes=1]	709	.261	.439	0	0	1	761	.231	.422	0	0	1	776	.305	.461	0	0	1
	Value of current outstanding loan, conditional on female respondent present and zeros imputed [in cedis]	709	105	539	0	0	10,000	761	128	569	0	0	11,400	775	237	758	0	0	9,000
	Value of current outstanding loan, conditional on female respondent present and zeros imputed [in cedis, winsorized]	709	77.0	242	0	0	1,500	761	106	327	0	0	2,070	775	225	663	0	0	4,250
	Value of current outstanding loan, conditional on female respondent present and any loan amount recorded [in cedis]	164	454	1,050	161	2	10,000	167	582	1,104	280	3	11,400	234	786	1,214	310	4	9,000
	Value of current outstanding loan, conditional on female respondent present and any loan amount recorded [in cedis, winsorized]	164	391	633	161	2	3,600	167	543	790	280	3	4,900	234	771	1,134	310	4	6,000

Category	Variable	N	Mean	SD				N	Mean	SD				N	Mean	SD			
Individual credit (male)	Any repaid loan in the last 12 months, conditional on male respondent present [yes=1]	586	.130	.336	0	0	1	599	.164	.370	0	0	1	585	.188	.391	0	0	1
	Any current outstanding loan, conditional on male respondent present [yes=1]	567	.196	.397	0	0	1	599	.187	.390	0	0	1	585	.262	.440	0	0	1
	Value of current outstanding loan, conditional on male respondent present and zeros imputed [in cedis]	567	80.1	383	0	0	6,980	599	135	1,075	0	0	24,000	584	279	1,043	0	0	14,825
	Value of current outstanding loan, conditional on male respondent present and zeros imputed [in cedis, winsorized]	567	67.2	233	0	0	1,500	599	89.0	349	0	0	2,820	584	255	800	0	0	6,400
	Value of current outstanding loan, conditional on male respondent present and any loan amount recorded [in cedis]	103	441	808	200	7	6,980	108	748	2,449	200	6	24,000	150	1,087	1,837	500	5	14,825
	Value of current outstanding loan, conditional on male respondent present and any loan and any loan amount recorded [in cedis, winsorized]	103	412	597	200	7	4,000	108	748	2,449	200	6	24,000	150	1,067	1,693	500	5	11,730
Individual lending (female)	Any lending fully repaid in the past 12 months, conditional on female respondent present [yes=1]	745	.110	.313	0	0	1	761	.113	.317	0	0	1	775	.129	.335	0	0	1
		699	.162	.368	0	0	1	761	.125	.331	0	0	1	775	.196	.397	0	0	1

45

	N	Mean	SD	p50	Min	Max	N	Mean	SD	p50	Min	Max	N	Mean	SD	p50	Min	Max
Any outstanding lending, conditional on female respondent present [yes=1]																		
Value of outstanding lending, conditional on female respondent present and zeros imputed [in cedis]	745	15.5	83.4	0	0	1,296	725	19.9	155	0	0	3,600	728	23.1	131	0	0	1,700
Value of outstanding lending, conditional on female respondent present and zeros imputed [in cedis, winsorized]	745	12.4	53.2	0	0	360	725	13.2	62.2	0	0	400	728	20.4	105	0	0	850
Value of outstanding lending, conditional on female respondent present and any lending amount recorded [in cedis]	105	208	349	100	5	2,500	89.0	262	442	132	2	3,600	149	390	572	200	2	4,000
Value of outstanding lending, conditional on female respondent present and any lending amount recorded [in cedis, winsorized]	105	208	349	100	5	2,500	89.0	241	306	132	2	1,753	149	385	545	200	2	3,300
Individual lending (male) Any lending fully repaid in the past 12 months, conditional on male respondent present [yes=1]	586	.162	.369	0	0	1	599	.124	.329	0	0	1	585	.135	.342	0	0	1
Any outstanding lending, conditional on male respondent present [yes=1]	549	.213	.410	0	0	1	599	.199	.399	0	0	1	585	.234	.424	0	0	1
Value of outstanding lending, conditional on male respondent present and zeros imputed [in cedis]	586	114	975	0	0	20,000	586	29.0	164	0	0	1,800	550	105	1,035	0	0	22,500
Value of outstanding lending, conditional on male respondent	586	51.2	217	0	0	1,500	586	21.5	101	0	0	750	550	48.0	222	0	0	1,550

present and zeros imputed [in cedis, winsorized]

	N	mean	sd	p50	min	max	N	mean	sd	p50	min	max	N	mean	sd	p50	min	max
Value of outstanding lending, conditional on male respondent present and any lending amount recorded [in cedis]	108	660	2,201	150	1	20,000	114	484	1,122	106	4	8,000	134	967	2,397	300	5	22,500
Value of outstanding lending, conditional on male respondent present and any lending amount recorded [in cedis, winsorized]	108	549	1,357	150	1	8,000	114	481	1,105	106	4	7,700	134	892	1,802	300	5	12,450

Individual saving (female)	N	mean	sd	p50	min	max	N	mean	sd	p50	min	max	N	mean	sd	p50	min	max
Any savings, conditional on female respondent present [yes=1]	748	.480	.500	0	0	1	761	.556	.497	1	0	1	774	.559	.497	1	0	1
Value of total savings, conditional female respondent present and zeros imputed [in cedis]	757	109	638	0	0	12,030	761	153	521	15	0	7,000	773	269	1,061	25	0	18,666
Value of total savings, conditional female respondent present and zeros imputed [in cedis, winsorized]	757	69.8	176	0	0	1,100	761	126	293	15	0	1,900	773	213	466	25	0	3,000
Value of total savings, conditional on female respondent present and any total savings amount recorded [in cedis]	330	250	948	65	1	12,030	403	288	689	100	1	7,000	409	508	1,417	200	2	18,666
Value of total savings, conditional on female respondent present and any total savings amount recorded [in cedis, winsorized]	330	180	333	65	1	2,000	403	253	438	100	1	2,700	409	423	681	200	2	4,200
Value of savings at home, conditional on female respondent	330	52.4	112	15	0	1,000	403	85.1	217	30	0	2,500	409	74.4	159	0	0	1,200

	N	mean	sd	median	min	max	N	mean	sd	median	min	max	N	mean	sd	median	min	max
	present and any total savings amount recorded [in cedis]																		
	Value of savings at home, conditional on female respondent present and any total savings amount recorded [in cedis, winsorized]	330	49.8	96.3	15	0	500	403	71.2	120	30	0	600	409	73.9	156	0	0	1,000
	Value of savings at a financial institution, conditional on female respondent present and any total savings amount recorded [in cedis]	330	197	948	18	0	12,000	403	203	606	40	0	7,000	409	433	1,418	100	0	18,666
	Value of savings at a financial institution, conditional on female respondent present and any total savings amount recorded [in cedis, winsorized]	330	128	327	18	0	2,000	403	176	401	40	0	2,700	409	349	676	100	0	4,200
Individual savings (male)	Any savings, conditional on male respondent present [yes=1]	589	.604	.489	1	0	1	599	.678	.468	1	0	1	584	.673	.470	1	0	1
	Value of total savings, conditional male respondent present and zeros imputed [in cedis]	601	198	638	10	0	8,000	599	303	845	50	0	11,500	365	296	989	60	0	15,000
	Value of total savings, conditional male respondent present and zeros imputed [in cedis, winsorized]	601	178	459	10	0	3,000	599	283	677	50	0	4,425	365	247	498	60	0	3,000
	Value of total savings, conditional on male respondent present and any total savings amount recorded [in cedis]	331	359	825	100	1	8,000	391	464	1,010	150	5	11,500	234	461	1,204	200	2	15,000
	Value of total savings, conditional on male respondent present and	331	341	676	100	1	5,000	391	443	844	150	5	5,100	234	398	648	200	2	4,058

any total savings amount recorded [in cedis, winsorized]

Variable	N	Mean	SD	Median	Min	Max	N	Mean	SD	Median	Min	Max	N	Mean	SD	Median	Min	Max
Value of savings at home, conditional on male respondent present and any total savings amount recorded [in cedis]	331	68.7	159	20	0	2,000	391	123	362	30	0	4,500	234	66.1	147	0	0	1,000
Value of savings at home, conditional on male respondent present and any total savings amount recorded [in cedis, winsorized]	331	64.5	121	20	0	800	391	102	202	30	0	1,200	234	63.5	132	0	0	700
Value of savings at a financial institution, conditional on malre respondent present and any total savings amount recorded [in cedis]	331	291	823	18	0	8,000	391	341	873	50	0	9,000	234	395	1,204	100	0	15,000
Value of savings at a financial institution, conditional on malre respondent present and any total savings amount recorded [in cedis, winsorized]	331	273	672	18	0	5,000	391	326	756	50	0	5,000	234	332	640	100	0	4,058

Plot/land characterisitcs (female)

Variable	N	Mean	SD	Median	Min	Max	N	Mean	SD	Median	Min	Max	N	Mean	SD	Median	Min	Max
Number of female plots, conditional on female respondent present	775	.893	.876	1	0	5	776	.947	.952	1	0	6	836	.800	.981	1	0	7
Any femal owned plot, conditional on female respondent present [yes=1]	767	.644	.479	1	0	1	775	.634	.482	1	0	1	831	.514	.500	1	0	1
Worried to lose plot if left empty, conditional on female plot existing [yes=1]	490	.320	.467	0	0	1	477	.256	.437	0	0	1	419	.372	.484	0	0	1
	482	.060	.238	0	0	1	477	.065	.247	0	0	1	419	.112	.316	0	0	1

	N	Mean	SD	Median	Min	Max	N	Mean	SD	Median	Min	Max	N	Mean	SD	Median	Min	Max
Any disagreement ever over this plot, conditional on female plot existing [yes=1]																		
Any part of plot fallowed, conditional on female plot existing [yes=1]	474	.175	.380	0	0	1	477	.130	.337	0	0	1	419	.181	.386	0	0	1
Trees planted in past year, conditional on female plot existing [yes=1]	471	.191	.394	0	0	1	477	.161	.368	0	0	1	264	.265	.442	0	0	1
Any structures on land, conditional on female plot existing [yes=1]	487	.624	.485	1	0	1	477	.679	.467	1	0	1	419	.656	.476	1	0	1
Any improvements to structures [yes=1]	296	.186	.390	0	0	1	325	.243	.430	0	0	1	277	.404	.492	0	0	1
Any improvements to structures, conditional on structures existing [yes=1]	285	.189	.393	0	0	1	325	.243	.430	0	0	1	277	.404	.492	0	0	1
Any improvements to structures, conditional on female plot and structures existing [yes=1]	285	.189	.393	0	0	1	325	.243	.430	0	0	1	276	.406	.492	0	0	1
Any chemicals applied in past major season [yes=1]	318	.138	.346	0	0	1	492	.126	.332	0	0	1	426	.246	.431	0	0	1
Any fertilizer applied in past major season, conditional on any chemicals answered [yes=1]	315	.070	.255	0	0	1	487	.025	.155	0	0	1	424	.033	.179	0	0	1
	313	.064	.245	0	0	1	488	.102	.304	0	0	1	424	.226	.419	0	0	1

Variable	N	Mean	SD	p50	Min	Max	N	Mean	SD	p50	Min	Max	N	Mean	SD	p50	Min	Max
Any herbicides applied in past major season, conditional on any chemicals answered [yes=1]																		
Any other chemicals applied in past major season, conditional on any chemicals answered [yes=1]	308	.006	.080	0	0	1	487	.008	.090	0	0	1	424	.002	.049	0	0	1
Value of land [in cedis]	508	2,598	5,996	800	-18	66,000	478	7,291	14,333	3,000	0	175,000	423	10,741	22,843	3,500	-63	200,000
Value of land [in cedis, winsorized]	508	2,478	5,036	800	0	35,000	478	6,793	10,924	3,000	0	54,000	423	10,059	18,580	3,500	0	99,991
Value of land, conditional on female plot existing [in cedis, winsorized]	501	2,513	5,062	1,000	0	35,000	478	6,793	10,924	3,000	0	54,000	423	10,059	18,580	3,500	0	99,991
Plot was obtained through purchase, conditional on female plot existing [yes=1]	469	.343	.475	0	0	1	433	.386	.487	0	0	1	326	.426	.495	0	0	1
Plot was obtained through inheritance, conditional on female plot existing [yes=1]	469	.352	.478	0	0	1	433	.388	.488	0	0	1	326	.383	.487	0	0	1
Plot was obtained through renting, conditional on female plot existing [yes=1]	469	.162	.369	0	0	1	433	.164	.371	0	0	1	326	.120	.325	0	0	1
Plot was obtained through sharecropping, conditional on female plot existing [yes=1]	469	.094	.292	0	0	1	433	.069	.254	0	0	1	326	.058	.235	0	0	1
	469	.215	.412	0	0	1	433	.240	.428	0	0	1	326	.298	.458	0	0	1

Plot was obtained through (free) allocation, conditional on female plot existing [yes=1]

	N	Mean	SD	p50	Min	Max	N	Mean	SD	p50	Min	Max	N	Mean	SD	p50	Min	Max
Any land registered [yes=1]	442	.118	.323	0	0	1	435	.156	.364	0	0	1	422	.213	.410	0	0	1
Any land registered, conditional on female plot existing [yes=1]	441	.118	.323	0	0	1	435	.156	.364	0	0	1	422	.213	.410	0	0	1
Proportion of plots registered	442	.111	.311	0	0	1	435	.135	.326	0	0	1	422	.177	.361	0	0	1
Proportion of plots registered, conditional on female plot existing	441	.111	.311	0	0	1	435	.135	.326	0	0	1	422	.177	.361	0	0	1
Land measured [yes=1]	328	.232	.423	0	0	1	311	.370	.484	0	0	1	421	.387	.488	0	0	1
Land measured, conditional on female plot existing [yes=1]	328	.232	.423	0	0	1	311	.370	.484	0	0	1	421	.387	.488	0	0	1
Proportion of plots measured	328	.205	.390	0	0	1	311	.330	.451	0	0	1	421	.312	.427	0	0	1
Proportion of plots measured, conditional on female plot existing [yes=1]	328	.205	.390	0	0	1	311	.330	.451	0	0	1	421	.312	.427	0	0	1
Plot demarcated [yes=1]	197	.411	.493	0	0	1	216	.481	.501	0	0	1	163	.853	.355	1	0	1

Category	Variable	N	Mean	SD	p50	Min	Max	N	Mean	SD	p50	Min	Max	N	Mean	SD	p50	Min	Max
	Plot demarcated, conditional on female plot existing [yes=1]	197	.411	.493	0	0	1	216	.481	.501	0	0	1	163	.853	.355	1	0	1
	Proportion of plots demarcated	197	.388	.479	0	0	1	216	.435	.474	0	0	1	163	.848	.356	1	0	1
	Proportion of plots demarcated, conditional on female plot existing	197	.388	.479	0	0	1	216	.435	.474	0	0	1	163	.848	.356	1	0	1
Plot/land characterisitcs (male)	Number of male plots, conditional on male respondent present	612	1.59	.901	1	0	8	609	1.77	1.16	2	0	10	625	1.67	1.27	1	0	8
	Any femal owned plot, conditional on male respondent present [yes=1]	606	.967	.179	1	0	1	608	.938	.242	1	0	1	615	.850	.357	1	0	1
	Worried to lose plot if left empty, conditional on male plot existing [yes=1]	579	.390	.488	0	0	1	562	.349	.477	0	0	1	521	.376	.485	0	0	1
	Any disagreement ever over this plot, conditional on male plot existing [yes=1]	583	.062	.241	0	0	1	562	.077	.266	0	0	1	521	.129	.335	0	0	1
		575	.212	.409	0	0	1	562	.121	.326	0	0	1	521	.202	.402	0	0	1

Any part of plot fallowed, conditional on male plot existing [yes=1]

	N	Mean	SD	p50	Min	Max	N	Mean	SD	p50	Min	Max	N	Mean	SD	p50	Min	Max
Trees planted in past year, conditional on male plot existing [yes=1]	570	.282	.451	0	0	1	562	.185	.389	0	0	1	378	.328	.470	0	0	1
Any structures on land, conditional on male plot existing [yes=1]	575	.666	.472	1	0	1	562	.730	.445	1	0	1	521	.774	.419	1	0	1
Any improvements to structures [yes=1]	381	.294	.456	0	0	1	410	.300	.459	0	0	1	410	.524	.500	1	0	1
Any improvements to structures, conditional on structures existing [yes=1]	363	.300	.459	0	0	1	410	.300	.459	0	0	1	410	.524	.500	1	0	1
Any improvements to structures, conditional on male plot and structures existing [yes=1]	363	.300	.459	0	0	1	410	.300	.459	0	0	1	409	.526	.500	1	0	1
Any chemicals applied in past major season [yes=1]	390	.297	.458	0	0	1	571	.247	.432	0	0	1	528	.316	.465	0	0	1
Any fertilizer applied in past major season, conditional on any chemicals answered [yes=1]	390	.146	.354	0	0	1	570	.111	.314	0	0	1	528	.119	.324	0	0	1
Any herbicides applied in past major season, conditional on any chemicals answered [yes=1]	382	.152	.359	0	0	1	569	.197	.398	0	0	1	528	.275	.447	0	0	1
	358	.011	.105	0	0	1	566	.014	.118	0	0	1	528	.019	.136	0	0	1

	N	Mean	SD	Median	Min	Max	N	Mean	SD	Median	Min	Max	N	Mean	SD	Median	Min	Max
Any other chemicals applied in past major season, conditional on any chemicals answered [yes=1]																		
Value of land [in cedis]	592	5,701	14,680	1,000	0	145,000	563	11,771	21,199	4,000	0	190,000	532	23,690	39,380	9,500	0	364,998
Value of land [in cedis, winsorized]	592	5,451	12,946	1,000	0	80,000	563	11,187	17,942	4,000	0	90,000	532	22,725	33,431	9,500	0	187,800
Value of land, conditional on male plot existing [in cedis, winsorized]	592	5,451	12,946	1,000	0	80,000	563	11,187	17,942	4,000	0	90,000	532	22,725	33,431	9,500	0	187,800
Plot was obtained through purchase, conditional on female plot existing [yes=1]	581	.410	.492	0	0	1	528	.455	.498	0	0	1	522	.527	.500	1	0	1
Plot was obtained through inheritance, conditional on female plot existing [yes=1]	581	.246	.431	0	0	1	528	.303	.460	0	0	1	522	.215	.411	0	0	1
Plot was obtained through renting, conditional on female plot existing [yes=1]	581	.205	.404	0	0	1	528	.225	.418	0	0	1	522	.188	.391	0	0	1
Plot was obtained through sharecropping, conditional on female plot existing [yes=1]	581	.141	.348	0	0	1	528	.110	.313	0	0	1	522	.088	.284	0	0	1
Plot was obtained through (free) allocation, conditional on female plot existing [yes=1]	581	.286	.452	0	0	1	528	.280	.450	0	0	1	522	.364	.482	0	0	1
Any land registered [yes=1]	546	.159	.366	0	0	1	538	.182	.386	0	0	1	528	.252	.435	0	0	1

	N	Mean	SD	p50	Min	Max	N	Mean	SD	p50	Min	Max	N	Mean	SD	p50	Min	Max
Any land registered, conditional on male plot existing [yes=1]	546	.159	.366	0	0	1	538	.182	.386	0	0	1	528	.252	.435	0	0	1
Proportion of plots registered	546	.145	.342	0	0	1	538	.133	.306	0	0	1	528	.170	.327	0	0	1
Proportion of plots registered, conditional on male plot existing	546	.145	.342	0	0	1	538	.133	.306	0	0	1	528	.170	.327	0	0	1
Land measured [yes=1]	446	.336	.473	0	0	1	432	.417	.494	0	0	1	528	.473	.500	0	0	1
Land measured, conditional on male plot existing [yes=1]	446	.336	.473	0	0	1	432	.417	.494	0	0	1	528	.473	.500	0	0	1
Proportion of plots measured	446	.271	.411	0	0	1	432	.337	.434	0	0	1	528	.344	.413	0	0	1
Proportion of plots measured, conditional on male plot existing [yes=1]	446	.271	.411	0	0	1	432	.337	.434	0	0	1	528	.344	.413	0	0	1
Plot demarcated [yes=1]	275	.538	.499	1	0	1	303	.548	.499	1	0	1	250	.876	.330	1	0	1
Plot demarcated, conditional on male plot existing [yes=1]	275	.538	.499	1	0	1	303	.548	.499	1	0	1	250	.876	.330	1	0	1

Proportion of plots demarcated	275	.480	.476	1	0	1	303	.469	.462	1	0	1	250	.865	.334	1	0	1
Proportion of plots demarcated, conditional on male plot existing	275	.480	.476	1	0	1	303	.469	.462	1	0	1	250	.865	.334	1	0	1