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## **Can Government-Allocated Land Contribute to Food Security?**

**Intrahousehold Analysis of West Bengal's  
Microplot Allocation Program**

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## **INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE**

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## ABSTRACT

Secure land rights are a critical, but often overlooked, factor in achieving household food security and improved nutritional status in rural areas of developing countries. This study evaluates the impact of India's land-allocation and registration program in West Bengal, a program that targets poor populations and promotes the inclusion of women's names on land titles. We use mixed methods data collected between 2010 and 2012 to examine the program's selection of beneficiaries and a set of outcomes that are expected to lay the foundation for future food security, as well as short-term food security indicators. Our results indicate that the program's implementation at the block level allowed for considerable variation in the processes used to select beneficiaries, to demarcate plots, to distribute titles and to provide infrastructure support. Although we were unable to detect statistically significant program effects on current household food security, we find that the land-allocation and registration program has had an impact on a range of outcomes that are expected to lead to future food security: beneficiary households report stronger security, and they are more likely to take loans for agricultural purposes, to invest in agricultural improvements, and to involve women when making decisions related to food and agriculture. These effects vary with plot size—larger plots lead to larger benefits—and depend on whose names are included on the land documents; the effects are larger if women's names are recorded on the land titles.

**Keywords: food security, gender, land rights, intrahousehold dynamics, West Bengal, India**

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# 1. INTRODUCTION

Despite rapid economic gains over the last decade, India continues to struggle with hunger and undernutrition. India is home to the largest number of malnourished children in the world, and its Global Hunger Index score has stagnated for the past 17 years in spite of a concurrent near doubling of its gross national income (von Grebmer et al. 2012). The Indian paradox, whereby high levels of hunger persist despite solid state-level economic performance, holds true in West Bengal, a state that, with an 18.5 percent prevalence of undernourishment, 38.5 percent of children under five underweight, and a 5.9 percent under-five mortality rate, ranks eighth among the 17 Indian states in the State Hunger Index (Menon, Deolalikar, and Bhaskar 2009).

This lack of significant progress on food security is not for want of effort. National and state governments have implemented various public programs with mixed results, underscoring the complexity of India's food security situation (Deaton and Drèze 2009). The Public Distribution Program, for example, is a massive government intervention that distributes staples to India's poor through Fair Price Shops. Although implementation varies by state, in most cases, the Public Distribution Program is a perennial political target for its various failings and abuses, such as black marketing of foodstuffs, *ghost* ration cards, distribution of inferior quality goods, and misidentification of beneficiaries (Food Corporation of India 2010). The Integrated Child Development Services and the Mid-Day Meal are two national initiatives targeted at children's food security, the former for children under the age of six and the latter for all children in primary school. A recent evaluation of the Integrated Child Development Services food supplement found 65.8 percent effective coverage rate (India, Programme Evaluation Organisation, 2011) and the most recent work plan from the northeastern state of West Bengal acknowledged that the Mid-Day Meal program implementation varied greatly in quality by administrative area (India, Ministry of Human Resource Development 2011).

In parallel to a number of food distribution programs, state governments have invested considerable efforts on a wide range of training and asset-based interventions meant to improve food security by decreasing poverty and improving livelihoods. In rural communities, the menu of interventions often includes programs that allocate or regularize homestead land, such as the Nijo Griha, Nijo Bhumi (NGNB) program, which is the immediate successor to a related homestead allocation program launched in 2006 under another name by the Department of Land and Land Reform in West Bengal.<sup>1</sup> According to the Indian National Sample Survey Organization's 2004 report, 427,000 households in the state were landless and homesteadless. Under the program, the government purchases tracts of land and provides microplots, only a fraction of an acre in size, to landless rural families. The microplots are intended for building a homestead, cultivating a small vegetable garden, planting fruit and wood trees, and raising livestock. These plots, documented with *pattas* (land titles) issued by the state, are expected to enhance families' ability to access government services, agricultural inputs, and financial resources, thereby enhancing families' income, reducing their vulnerability, and improving their food security. Recognizing the pervasive additional constraints that women often face in accessing economic resources and acknowledging the key role women can play in their households' well-being, NGNB explicitly stipulates that *pattas* issued to dual-headed households should be issued in the woman's name only or jointly titled to the male and female heads.

Landesa, a nongovernmental organization focused on land legislation and programming among poor populations, has provided technical support to the Department of Land and Land Reform since 2009 to pilot changes to the NGNB program (and, earlier, the Cultivation and Dwelling Plot Allotment Scheme), identify best practices, and facilitate scaling it up to reach 100,000 households. In addition, and as part of an umbrella initiative to study the gender gap in asset ownership, Landesa has partnered with the International Food Policy Research Institute (IFPRI) to evaluate this land-allocation program. This paper evaluating linkages between homestead allocation and food security is a result of this collaboration.

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<sup>1</sup> The earlier program was known as the Cultivation and Dwelling Plot Allotment Scheme.

This study is particularly timely, given that the Government of India has recently promulgated a food security ordinance concerned with household-level food security that will soon be considered by Parliament; that the Government of India has to craft and approve its 13th Five Year Plan, which is bound to propose avenues for enhancing these same outcomes; that the Government of India is committed to passing a national rural homestead bill entitling landless households in rural areas to a homestead plot of 10 decimals; that India's minister of Rural Development has recently signed an agreement to fund state-level land-allocation programs; and that India's civil society is playing a critical role in advocating and monitoring for inclusive land rights.

Using mixed methods data collected between 2010 and 2012, we explore three sets of questions. We start by briefly examining who becomes a beneficiary of the NGNB program, drawing on key informant interviews with government officials involved in the process at all administrative levels from village to district and on interviews with the beneficiaries themselves. We then assess program outcomes such as household tenure security, household agricultural investments, and women's involvement in food and agriculture decisionmaking—outcomes that when enhanced are expected to lead to increased household production and long-term food security. Lastly, we examine whether the NGNB program has already yielded some of its expected long-term food security benefits by considering households' vulnerability to hunger, their dietary diversity, their protein consumption, and how food is distributed within the household.

Our results indicate that the program's implementation at the block level allowed for considerable variation in the processes used to select beneficiaries, to demarcate plots, to distribute titles, and to provide infrastructure support. Compared to eligible nonbeneficiary households, we find that NGNB households are significantly more likely to have improved intermediate outcomes, including reports of tenure security, use of credit for agriculture, investments on improved agricultural inputs, and women's decisionmaking over household food and agriculture. We find that the size of the plots matters and that the inclusion of women on titles is instrumental in achieving these improved outcomes. Although these results are very encouraging and expected to improve future food security, we found no evidence of significant improvement in current food security among beneficiary households. Our study finds results similar to those of Li, Rozelle, and Brandt (1998), with tenure security having an impact on longer time horizon investments, and empirically shows the gendered link between land-tenure security and a number of agricultural inputs and outcomes.

In the following sections, we describe why and how agricultural production and tenure security relate to food security more generally and provide context with brief descriptions of the land situation in West Bengal and the NGNB program. We describe the data collection, methodological approach, and key indicators used in the analysis. We then use qualitative data to portray the process by which the NGNB program selected beneficiary households and rely on quantitative analysis to test NGNB's impact on households' pathways to future food security (intermediate outcomes) as well as their current food security status. We conclude with a discussion of results, recommendations for land and food policy, and suggestions for further research.



## 2. FOOD SECURITY AND LINKAGES WITH LAND AND AGRICULTURE

At the World Food Summit in 1996, it was agreed that “food security exists when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life.” Food security thus comprises three so-called pillars: food availability, food access, and food use (Quisumbing et al. 1995). Food availability requires that enough food of adequate quality is produced, purchased, or received on a consistent basis. Food access requires having the economic, social, or political means to obtain nutritious food on a continuous basis. Food use refers to the knowledge and complementary conditions required to appropriately consume food that meets nutritional needs. This extends to issues such as sanitation, food preparation, healthcare, and water safety. These pillars are applicable from the global level to each individual within a household. Thus each unit of aggregation—a nation, a region, a household, an individual—is considered food secure only if its food availability, access, and use requirements are met.

Agricultural advancements in more nutritious crops and improved yields have the potential to secure the availability of a larger supply of more affordable, healthier food. Studies such as those by Li, Rozelle, and Brandt (1998) and Deininger et al. (2008) explored direct links between land-rights security and agricultural production, finding that land-rights security will positively affect long-term land saving investments and induce new investment in land, which leads to higher production. Studies by Kyomugisha (2008), Deininger (2003), and Besley (1995) looked at linkages between land-rights security and factors such as access to credit and technology adoption that are hypothesized to improve agricultural production, finding that land security is an important aspect of these processes.

However, food production is only one aspect of food security. Most of the rural poor in developing regions continue to experience difficulties accessing food due to poverty. Since their livelihood strategies tend to rely heavily, directly or indirectly, on agricultural activities, their income is more responsive to growth in the agricultural sector than in any other sector (Ligon and Sadoulet 2011; Christiaensen, Demery, and Kuhl 2011). This argument for supporting smallholder-inclusive agricultural investment seems particularly relevant in the context of India, where remarkable economic growth at the national level has not trickled down to the rural poor (FAO, WFP, and IFAD 2012).

Furthermore, there has been increasing, yet far from sufficient, acknowledgment that gender differences, social norms, and intrahousehold dynamics can affect whether and to what extent households’ rights to land affect food security. The literature suggests that reducing the gender gap by enhancing women’s control over resources can yield increases in agricultural production (Quisumbing 1996; Allendorf 2007; Fletschner 2008) and that, compared with men’s income, women’s income has a greater effect on their households’ calorie consumption, on the share of the family budget allocated to staples, on food expenditures, on children’s weight-for-height, and on preschoolers’ weight-for-age (Quisumbing et al. 1995).

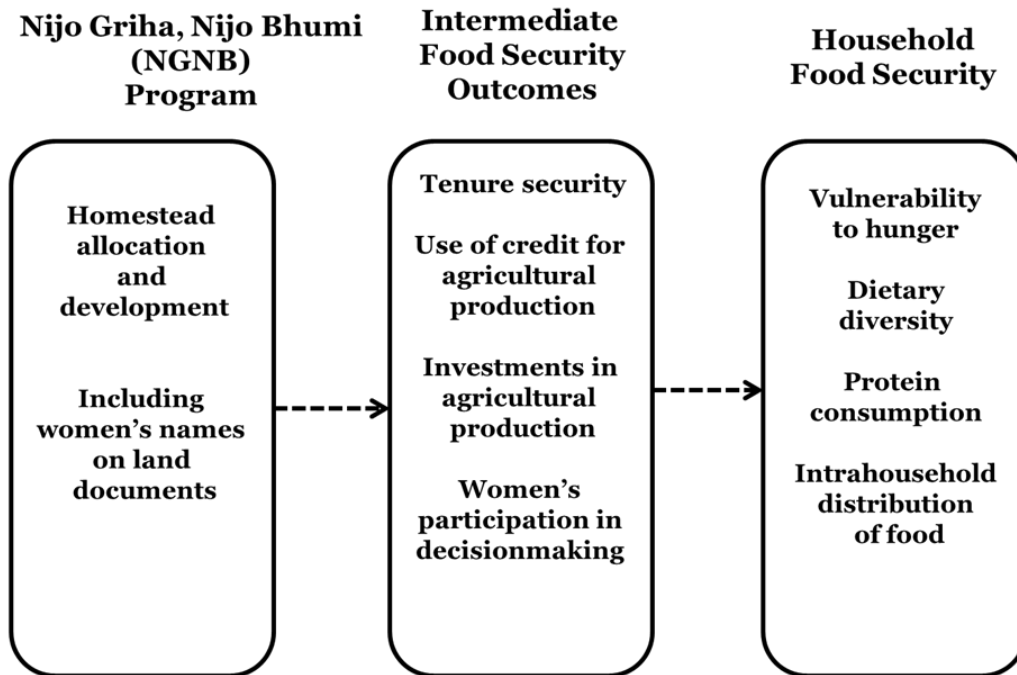
When it comes to land, it is often assumed that strengthening women’s rights to land can improve their ability to exercise control over those plots, can enhance women’s tenure security, and can strengthen their position within their households, giving them the power to influence how resources are allocated, what is produced, and who consumes what. Unfortunately, robust evidence to support the latter is still scarce,<sup>2</sup> and as national, regional, and global actors prioritize efforts to reduce hunger and undernutrition, there is a growing demand for robust, nuanced, and gender-sensitive evidence informed by intrahousehold dynamics on the links between land tenure and food security. It is within this context that we chose to examine whether and to what extent the NGNB land-allocation program is poised to improve the food security of its beneficiaries. The links we examine are depicted in Figure 2.1. We start by exploring NGNB effects on a host of important intermediate food security outcomes such as households’ and

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<sup>2</sup> Important exceptions include Goldstein and Udry (2006), Allendorf (2007), Katz and Chamorro (2002), and Quisumbing and Maluccio (2003).

women’s perceptions of tenure security<sup>3</sup>; households’ access to financial resources; households’ agricultural investments and practices<sup>4</sup>; and women’s participation in food and agriculture decisionmaking. These outcomes are considered intermediate because they are expected to impact a household’s future food security. Although we realize that statistically observable improvements in food security may take more time to materialize, we also run preliminary analysis to assess NGNB effects on households’ vulnerability to hunger, their dietary diversity, their consumption of proteins, and intrahousehold patterns of food distribution.

**Figure 2.1 Hypothesized linkages between NGNB and food security**



Source: Conceptual framework developed by the authors.

Before we proceed with the analysis, we provide a brief overview of key features of the NGNB program and the context in which it operates.

<sup>3</sup> Studies from India have found evidence that owner-cultivated land and land under secure tenure arrangements tend to be the most agriculturally productive (Banerjee, Gertler, and Ghatak 2002; Shaban 1987).

<sup>4</sup> Banerjee and Iyer (2005) link different historical tenure systems to technology adoption, including fertilizer use, and find a resulting legacy of differences whereby landlord-controlled areas were less productive than areas where land was owned by the tillers.

### 3. WEST BENGAL AND THE NIJO GRIHA, NIJO BHUMI PROGRAM

In West Bengal's precolonial period, land was administered by *zamindars*, a class of Indian aristocratic landlords, and worked by rent-paying cultivators. The *zamindar* system was characterized by a series of intermediaries responsible for tax collection, and this hierarchy was preserved when the British instated the *zamindars* as the land proprietors under their Permanent Settlement. Two important legacies of the colonial period were increasing layers of rent-collecting intermediaries and an emergence of a new class of wealthy landholders, *jotedars*, who were able to claim large tracts of land outside of the British Permanent Settlement. These factors caused much peasant unrest, which set the trajectory for West Bengal's post-independence land reforms (Hanstad and Brown 2001; Bardhan and Mookherjee 2003).

West Bengal is widely recognized as one of the most progressive states in redistributive land reform, and one of the more successful implementers of national-level *land to the tiller* efforts. Behind this success are the West Bengal Land Reforms Act and the strong political will to implement its provisions. Beginning in 1978, the Marxist Left Front-led government launched Operation Barga, a statewide effort to document and enumerate West Bengal's *bargadars* (sharecroppers), thus providing them with greater tenure security under the law. West Bengal was also at the fore among states in terms of effective distribution of ceiling-surplus land,<sup>5</sup> having taken control of and allocated 1.04 million acres by 2001 (Hanstad and Brown 2001). These redistribution efforts did not explicitly confer rights upon individual women in married households, assuming their interests were subsumed under the household. Only decades later would the West Bengal government adopt an explicit policy of joint titling when allocating land under these acts (Brown and Das Chowdhury 2003).

The Government of West Bengal launched the homestead allocation program in 2006 (amended in 2009 and then renamed Nijo Griha, Nijo Bhumi<sup>6</sup> in 2011) to provide land for the poorest landless and homesteadless agricultural-laborer households. The NGNB program is mainly implemented by the Department of Land and Land Reforms, with major roles for the Block Development Office and Panchayati Raj Institutions. West Bengal's land policy is notable for allowing the government to purchase land for redistribution in addition to reallocating vested ceiling surplus land. The program established a Land Purchase and Land Distribution Committee at the block administrative level, responsible for finding large tracts of land available for purchase at government-defined rates. This committee solicited a list of recommended eligible families from *pradhans*, or heads of the local *gram panchayat* (village-level government). Eligible families were defined as those that relied on daily agricultural wage labor, food gathering from common property, or menial labor, and that lived below the poverty line. Households were then selected in order of priority, where priority was given to agricultural-laborer and rural-artisan households that have been landless for two generations, women-headed households, and households having only daughters and no sons. The selected families were then relocated in clusters to those purchased tracts of land on household plots of 10 to 16 decimals (a decimal = 1/100 acre). In some cases, the Block Development Office and the Panchayati Raj Institutions then supported the cluster with additional infrastructure, housing programs, and agricultural extension services. The land documents were to be issued in the woman's name only or jointly with the woman's name first for married couples. Land issued through this program was restricted from alienation, sharecropping, or the use of hired labor (West Bengal 2006). After the pivotal 2011 elections, the State Government of West Bengal under the new Trinamul Congress leadership relaunched the homestead allocation program as the NGNB program with a revised parcel size of a maximum of 5 decimals.

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<sup>5</sup> Land-ceiling laws are a key legislative tool in Indian land reform. In principle, land in excess of the legislated ceiling (6 to 7 standard acres, depending on family size in West Bengal) is vested by the government and redistributed to the landless (Binswanger-Mkhize, Bourguignon, and van den Brink 2009).

<sup>6</sup> This translates to "My Home, My Land."

## 4. PROGRAM PARTICIPATION

Qualitative information provides important context and helps understand the process by which NGNB selected beneficiary households and the factors that influenced how land was allocated. We gathered this data in the postmonsoon season, September and October 2012, one to two years after beneficiaries received patta. We conducted 12 key informant interviews with implementers of the NGNB program to acquire a better understanding of its processes and how it has been implemented; 11 life-history interviews with beneficiaries to gather insights into possible changes to food security at the household and individual levels; and 8 focus-group discussions to obtain a view of community-level norms about landownership and use, as well as how food is allocated within families. Participants for the qualitative work were purposefully sampled from one district, Coochbehar, to gain an in-depth perspective in a specific locality. Key informant interviews were sampled to include perspectives from all levels of implementation, from the village to the district administrative level. For the life histories and focus-group discussions, we purposefully selected representatives of diverse demographic categories, such as single women, Muslims, and Scheduled Castes. Categorizations of interviews and focus-group discussions conducted are detailed in Appendix Table A.1.<sup>7</sup> We analyzed the resulting data with NVivo, using NGNB's published guidelines as the framework for our deductive analysis of program implementation as we identified cases of adherence to or deviations from these prescribed steps. We looked for underlying patterns in program implementation by matching these cases with the geographic and demographic data we had collected.

The qualitative information we gathered strongly suggests that at a more local level, the pradhans and the gram panchayats played a critical role in the selection of NGNB beneficiaries. Block-level officers relied on the gram panchayats' local knowledge to compile a list of potential beneficiaries, which was later verified. The opinion of higher-level administrative officials was that only the active pradhans took the necessary initiative to participate in NGNB and help identify land and beneficiaries. These officers would comment that it was not possible to implement the program properly without cooperation from the gram panchayats. Given the key role the pradhans played, it is important to note that even the more *active* ones differ in the process they followed to create the list of potential beneficiaries. For example, one pradhan said that he consulted widely with other political leaders and schoolteachers to identify the landless, and others held community meetings based on the existing government Mahatma Gandhi National Rural Employment Guarantee Act list.<sup>8</sup>

A portion of beneficiaries indicated some degree of self-selection onto beneficiary lists, although others said that they were unaware of the program until the gram panchayats notified them of their beneficiary status. However, there did not appear to be a clear pattern of self-selection at the gram panchayat level.<sup>9</sup>

*As soon as we learned that land will be distributed, we visited to them (the pradhan's office) in a group to know who will be getting land. They went through the list and said that there are names of these eight families. Then we started pursuing the process because if we receive some land, we can plant some trees there. Our children are growing [and] we need some place to live there, therefore we pressured the pradhan to distribute the land. He also gave a time period and promised to give land within that time. He kept his promise and gave us patta, then we requested them to show us the plot.*

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<sup>7</sup> The tools used for this study are available from the authors upon request.

<sup>8</sup> We did not hear reports of purely political decisions over the beneficiary lists in the four gram panchayats where we did the qualitative interviews. Results from our representative quantitative survey indicate that only 7.5 percent of the respondents who knew of the NGNB program reported that the program had not been implemented "fairly" in their village—although over 20 percent mentioned that there had been disagreements in their village about who was included.

<sup>9</sup> Although the complex politics of the gram panchayat system, involving class and caste, are of relevance to this type of program, studying them is beyond the scope of our study. By design, our modest qualitative exploration focused on only four gram panchayats, which limits our ability to identify generalizable patterns.

*Then they came here and showed us our plots.*—Female head of household beneficiary, focus group

*Panchayat gave this land, I did not ask for it. I was in Assam at my son's place there [when] I got the message that land is going to be allotted in our names and I have to be present that time. Nobody else could collect that on my behalf. Therefore I returned back.*—Female head of household beneficiary, life history, age 60

Prior to the program, most of the households participating in qualitative focus-group discussions were living with relatives. Tight quarters and family dynamics were a source of daily disputes and an uncomfortable living situation. In many cases, those cohabiting relatives were the primary source through which landless households learned of, and were motivated to apply for, the NGNB program.

The verification and distribution of patta was also done at the block level. First, members of a land committee comprised of block-level development and land officers personally visited the identified households to verify their status. Block-level officers we interviewed indicated a difficult trade-off between reaching the largest number of beneficiaries and demarcating larger plots for fewer beneficiaries, and found themselves opting for including the maximum number of eligible beneficiaries. Personal safety and political reasons related to West Bengal's history of land-related agitation were among the key motivating factors for appeasing the largest numbers of landless.

*Selecting beneficiaries was the most difficult work. There are many landless people here; selecting only few out of them on the basis of their needs was a difficult job. Moreover, there are many other issues, like politics. We need to come here from a distant place, and if by chance I get attacked by any mob, assistance from department will reach there after my death. Since the land availability is limited, we face such situations. If there would have been enough to distribute among all, then it would have been easier.*—Revenue inspector, Key Informant Interview, age 56

Other block-level officers decided that in peri-urban areas, beneficiaries do not need cultivable land beyond the footprint of a house—one Block Land officer recalled distributing one acre of peri-urban land among 50 beneficiaries, resulting in plots of 2 decimals each. These accounts suggest potential block-level differences in the criteria used to pare down the beneficiary list and consequently how much land was allocated. Land availability appears to be a major contributing factor in these decisions. Several block-level officers mentioned that the government rates for purchasing land to allocate to beneficiaries were too low compared to actual land market values in the area. Selling land to the government at those rates is spoken of by both beneficiaries and officials as a charitable transaction, not a regular market transaction.

Once the final selection of beneficiaries was agreed upon, the actual plots were distributed according to a lottery. How pattas were distributed seemed to vary by location. In some cases, the pattas were distributed from the Block Development Office or gram panchayat office with little ceremony. In other cases, the respondents recalled a large function in their area with political speeches and distribution of tiffin, seeds, and saplings.

*On the day of lottery, there was a big function. Many people came here . . . They offered us tea and biscuits. They called our name on the mike, and we went there and picked up one chit [piece of paper] from the basket . . . On the next day, staffs from BLLRO [Block Land and Land Reforms Officer] came to do the land measurements and showed us which area belongs to us as per the lottery. They gave us Singara [snacks] on that day.*—Married female beneficiary, focus group

## 5. ECONOMETRIC STRATEGY

### Data

We collected a quantitative baseline by interviewing NGNB households after they received their homestead plots and obtained their pattas but before they moved to their new plots. Because the implementation of NGNB is affected by monsoon rains between June and September, data collection for our baseline took place in two rounds: May–June of 2010 and January–June of 2011. We surveyed a sample of 1,373 households in three districts: Coochbehar, Bankura, and Jalpaiguri. Of these, 803 households are NGNB beneficiaries, and the remaining 570 households serve as the control group. For the control group, we chose households who made it to the list of NGNB-eligible households but did not benefit from the program. Throughout this study, we use district-level survey weights to consider the population distribution of eligible NGNB beneficiaries and ensure that statistics computed from this sample are representative.

The baseline survey targeted a head of household if available, with a subset of questions repeated for the female spouse if the identified head of household happened to be male. The instrument used included questions on demographics, schooling, housing condition, physical infrastructure, water and sanitation, participation in decisionmaking, income-generating activities, expenditures and debt, membership and participation in local social institutions, household food security, home garden cultivation, and livestock assets.

We visited these households for a second time between October and November of 2012, this time targeting the interviews to the adult woman. We were unable to interview 338 of these women and had to replace their households because their entire household had migrated out of the block or because there was no adult female member in the house capable of answering most of our questions without the assistance of a man. At 24.62 percent, this relatively high attrition rate between the two surveys could cast doubts on the reliability of any inferences based on the second round of data. To rule out biases that could result from differential attrition, we conducted t-tests between the households in the full panel and those who attrited. We find no significant differences when looking at the food security outcomes of interest, but as the results included in Appendix Table A.2 indicate, the two samples differ in a few characteristics. Compared to those in the full sample, attriting households were more common in Coochbehar, where out-migration is high; men from attriting households were younger and less likely to be married, characteristics that make them more likely to out-migrate; and female respondents from attriting households were slightly more educated. To further test whether attrition is random, we ran an attrition probit. We found that caste, household size, religion, and district are significant predictors of attrition. (See Appendix Table A.3 for the attrition probit results.) Although the model explains 14 percent of the attrition, we chose not to rely on it to adjust for attrition in the rest of the analysis because missing information for some of the explanatory variables used would reduce our sample size considerably, and earlier studies on selectivity in attrition suggest that attrition will not be a severe problem for obtaining consistent estimates of the coefficients of interest for this study (Alderman et al. 2000). Still, we note the need for caution in interpreting our results.

### Balancing Treatment and Control Groups

After eliminating attrited households, the sample consists of 1,035 households: 671 NGNB beneficiaries and 364 that serve as the control group. We compare beneficiary and control households in Table 5.1.

**Table 5.1 Description of NGNB<sup>a</sup> beneficiary and control households sample**

Description	Unmatched sample (N=1,035)		
	Control (N=364)	Beneficiaries (N=671)	Significance
Location			
Jalpaiguri district	0.27	0.29	
Bankura district	0.38	0.29	***
Coochbehar district	0.35	0.42	**
High population density block <sup>b</sup>	0.13	0.22	***
Medium population density block <sup>b</sup>	0.37	0.31	**
Low population density block	0.50	0.48	
Caste			
Scheduled Caste <sup>b</sup>	0.61	0.60	
Scheduled Tribe <sup>b</sup>	0.09	0.11	
Other Backward Castes <sup>b</sup>	0.26	0.17	***
General Caste	0.04	0.12	***
Religion			
Hindu <sup>b</sup>	0.79	0.85	**
Muslim	0.19	0.10	***
Christian	0.02	0.04	**
Other household characteristics			
Household size at baseline <sup>b</sup>	3.94	3.84	
Household size at midline	4.19	4.02	
Maximum education in the household at midline <sup>b</sup>	5.85	5.99	
Living with relatives at baseline <sup>b</sup>	0.26	0.35	**
Landless <sup>b</sup>	0.67	0.64	
Primary income from agriculture or artisan at baseline <sup>b</sup>	0.36	0.36	
Individual characteristics of female respondent			
Age	38.99	37.00	
Education (standard level)	1.79	37.98	
Married	0.84	0.83	
Single, divorced, or widowed	0.16	0.17	

Source: Authors' computation.

Notes: <sup>a</sup> Nijo Griha, Nijo Bhumi, which translates to "My Home, My Land." <sup>b</sup> Indicates variable was included in the propensity score model. \*\* significant at 0.05, \*\*\* significant at 0.01.

Control and beneficiary households should be statistically similar for the characteristics that determine NGNB program eligibility, but Table 5.1 shows that they differ in characteristics such as caste and religion, and on factors related to their location. As a result, simply comparing outcome variables across the two groups of households can yield biased estimates of the NGNB program effects. To address this concern, and as suggested in Rosenbaum and Rubin (1983), we analyze the determinants of NGNB program participation and construct a propensity score model.

The propensity score we estimate is the probability that an NGNB-eligible household becomes a beneficiary, given a set of variables related to the NGNB program eligibility criteria described by the Government of West Bengal: completely landless<sup>10</sup> and homesteadless agricultural-laborer and artisan families of rural West Bengal. Results from the propensity score model allow us to form a control group that is, on average, observationally equivalent to the NGNB households. The characteristics that are now balanced include those capturing the program eligibility criteria as well as other variables that serve as proxies for land pressure in the block, for households' likely demand for land, and for sociocultural characteristics that might affect households' ability to take part in this program (see Appendix Table A.4 for the propensity score model results).

Thus, to estimate unbiased NGNB program effects on intermediate and current food security outcomes, we use regression analysis in which we weigh observations from NGNB households by the following equation as recommended by Emsley et al. (2008) and Hirano, Imbens, and Ridder (2003):

$$W_h = \frac{1}{p_h} (T_h) - \frac{1}{1-p} (T_h - 1), \quad (1)$$

where  $W_h$  is the weight of the observation,  $p_h$  is the propensity score, and  $T_h$  is the treatment status of the household, which is equal to 1 for NGNB households and 0 for control households.

### Measuring Intermediate Outcomes and Food Security Outcomes

Summary statistics of all the variables are presented in Table 5.2. We considered four intermediate outcomes that are expected to contribute to future food security: perceptions of tenure security, use of credit for agricultural production, investments in agricultural production, and women's participation in decisionmaking. We identified between three and six indicators as proxies for these outcomes. See Table 5.2 for a full list of these indicators with their descriptive statistics.

We also examine household-level current food security indicators that can serve as proxies for households' vulnerability to hunger, their dietary diversity, and their protein consumption. As a proxy for households' vulnerability to hunger, we use a binary indicator that captures whether households reported experiencing times when they did not have food or money to buy food in the last three months. To capture dietary diversity, we use the Household Dietary Diversity Score, an indicator that summarizes the total number of food groups (out of a possible 12) consumed by members of the household in the last 24 hours (Swindale and Bilinsky 2006). Finally, to capture households' protein consumption, we rely on a binary measure indicating whether any household member consumed protein in the last 24 hours.

To account for the possibility that food security may vary systematically for individuals within a household, we constructed four additional indicators of food consumption that refer to the adult females, adult males, young females, and young males in the household (where adults are age 12-plus and the youth are age 4–11). We collected the number of *full meals* consumed by each household member in the last seven days, where full meals were previously defined by the respondent. With this information, we calculated the gap between the average number of full meals consumed by each demographic group (adult females, adult males, young females, and young males) and the most food-secure person in the household.<sup>11</sup>

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<sup>10</sup> In contrast to the definition of landless used by the National Sample Survey Organization, which is households owning less than 0.02 hectares of land (about 5 decimals).

<sup>11</sup> More precisely, the variable we used is calculated as full meals consumed by the average person in each group divided by the highest number of full meals consumed by any one member of the household.



**Table 5.2 Description of outcomes and independent variables**

<b>Description</b>	<b>Dummy variable</b>	<b>Mean</b>	<b>Standard Error</b>
Intermediate outcomes			
Tenure security			
Woman reports being concerned that household could be asked to vacate the plot	Y <sup>a</sup>	0.17	0.01
Woman reports that her household will have same or more access and control over the plot in 5 years	Y	0.84	0.01
Woman reports that she will have same or more access and control over the plot in 5 years	Y	0.86	0.01
Woman reports that she could convince other decisionmakers not to sell the plot	Y	0.91	0.01
Use of credit for agricultural production			
Household has taken out a loan since 2009	Y	0.12	0.01
Household has taken out a loan from a bank since 2009	Y	0.11	0.03
Household used loan for agriculture	Y	0.13	0.03
Agricultural Investments			
Change in household's livestock ownership since 2010 (tropical livestock units)		0.17	0.02
Change in household's productive asset ownership since 2010 (tools/machines)		0.21	0.04
Household used fertilizer (inorganic or organic) or pesticide in last year	Y	0.10	0.01
Household used seedlings, seeds, or stems in last year	Y	0.11	0.01
Household rented tools, machines, or other agricultural equipment in last year	Y	0.06	0.01
Women's Participation in Decisionmaking			
Woman respondent is a decisionmaker over:			
Whether to take loans from a Self-Help Group or microfinance institution	Y	0.83	0.01
Whether to purchase productive assets	Y	0.83	0.01
Household food purchase and consumption decisions	Y	0.84	0.01
Share of household land over which woman respondent decides:			
How to use the plot		0.77	0.02
What to grow on the plot		0.78	0.01
Whether to sell the produce from that plot		0.76	0.02
Food security outcomes			
Food security		0.58	0.02
Household Dietary Diversity Score		4.18	0.04
Protein consumption dummy	Y	0.63	0.02
Average adult female food share		0.96	0.00
Average adult male food share		0.96	0.00
Average young female food share		0.97	0.00
Average young male food share		0.97	0.01

**Table 5.2 Continued**

Description	Dummy variable	Mean	Standard Error
Independent variables			
Average NGNB <sup>b</sup> plot size (in decimals)		7.48	0.12
Caste			
Other Backward Castes	Y	0.23	0.01
Scheduled Caste	Y	0.61	0.02
Scheduled Tribe	Y	0.10	0.01
General	Y	0.06	0.01
Religion			
Christian	Y	0.04	0.01
Muslim	Y	0.15	0.01
Hindu	Y	0.81	0.01
(2010) Highest education within the household (years)		5.32	0.13
Age of female respondent		38.44	0.41
(2012) Household size		4.13	0.06
(2012) Number of children aged 0–3		0.25	0.02
(2010) Number of household assets		1.32	0.02
(2010) Number of valuable assets		0.34	0.03
(2010) Number of productive assets		3.44	0.06
(2010) Number of large livestock		0.16	0.02
(2010) Number of medium livestock		0.15	0.03
(2010) Number of small livestock		0.13	0.02
Bankura district	Y	0.33	0.02
Coochbehar district	Y	0.37	0.02
Jalpaiguri district	Y	0.29	0.02

Source: Authors' computation.

Note: <sup>a</sup> Y = Yes. <sup>b</sup> Nijo Griha, Nijo Bhumi, which translates to “My Home, My Land.”

### Stages of Program Intervention

Our data show that implementation of the NGNB program varied beyond the selection process. NGNB beneficiaries interviewed for the baseline were at the same stage—they had received pattas but had not moved yet. However, two years later, about a quarter of them had relocated to their new plot, but the others had not. The qualitative evidence we gathered supports this pattern of slow transition, with many beneficiaries claiming that they are waiting for complementary housing and infrastructure services to be delivered before relocating.

We also found that, despite the provision that pattas needed to be issued in the woman's name only, or jointly for married couples, only 75 percent of the pattas issued include the woman's name. Our qualitative research provides some insight into this pattern, showing a number of instances where pattas were allocated according to the local officials' discretion and their understanding of each family, as well as instances where beneficiaries were asked whose names they would prefer to include on the titles. For example, in a village where households were given documents in their husbands' names only—conforming to social norms but not to program guidelines—officials made an exception and allocated land solely in the name of the woman if officials determined that the husband had “*bad addiction and (sic) can destroy the property if he gets a chance*” (married female beneficiary, focus group). Although

family preferences and community norms appear to play a role in how land is allocated and whether the allocation conforms to program guidelines, our interviews suggest that the first, and arguably stronger, determinant of whose names are included on the documents are the officials who ultimately choose whether to invite, listen to, and accept the families' opinion.

Recognizing that the NGNB program has not reached all beneficiaries in the same way, we separately explore its impact on households that have been allocated land, on households that have moved to their new plots, and on households in which women's names were included on the pattas.

## Regression Equation

We use inverse-propensity-score weighted-regression models to assess the NGNB effects on each of the intermediate outcomes of interest (perceptions of tenure security, use of credit for agricultural production, investments in agricultural production, and women's participation in decisionmaking) as well as on the food security outcomes (households' vulnerability to hunger, their dietary diversity, their protein consumption, and intrahousehold distribution of food).<sup>12</sup> Specifically, for outcomes at the household level, we estimated:

$$Y_h = \beta_0 + \beta_1 * NGNB_h + \beta_2 X_h + \epsilon_h, \quad (2)$$

where  $Y_h$  is the specific outcome being tested for household  $h$ ;  $NGNB_h$  is a dummy indicating whether or not the household is an NGNB beneficiary;  $X_h$  is a vector of control variables capturing respondents' caste, religion, age, households size, whether there are children under four in the household,<sup>13</sup> whether the household owns livestock, jewelry, or other assets, and the district in which they live; and,  $\epsilon_h$  is the robust error term. We later expanded (1) to test whether the size of the plot they received matters and whether having a woman's name on the document matters, as follows:

$$Y_h = \beta_0 + \beta_1 * NGNB_h + \beta_2 * NGNBplotsize_h + \beta_3 X_h + \epsilon_h, \quad (3)$$

$$Y_h = \beta_0 + \beta_1 * NGNB_h + \beta_2 * NGNBplotsize_h + \beta_3 * WomanTitle_h + \beta_4 X_h + \epsilon_h. \quad (4)$$

For the plot-level outcomes, namely those related to perceptions of tenure security, we use similar specifications:

$$Y_{hp} = \beta_0 + \beta_1 * NGNB_{hp} + \beta_2 X_{hp} + \epsilon_{hp}; \quad (5)$$

$$Y_{hp} = \beta_0 + \beta_1 * NGNB_{hp} + \beta_2 * NGNBplotsize_{hp} + \beta_3 X_{hp} + \epsilon_{hp}; \quad (6)$$

$$Y_{hp} = \beta_0 + \beta_1 * NGNB_{hp} + \beta_2 * NGNBplotsize_{hp} + \beta_3 * WomanTitle_{hp} + \beta_4 X_{hp} + \epsilon_{hp}, \quad (7)$$

where  $Y_{hp}$  is the specific outcome being tested for household  $h$  and plot  $p$ ,  $CDPA_{hp}$  is a dummy indicating that the plot was obtained through the NGNB program,  $X_{hp}$  is a vector of control variables, and,  $\epsilon_{hp}$  is the robust error term.

<sup>12</sup> For more on inverse-propensity-score weighted regression, see Hirano, Imbens, and Ridder (2003), Emsley et al. (2008), and Kreif et al. (2012).

<sup>13</sup> This could grant the family access to the ICDS supplementary nutrition assistance.

## 6. NGNB PROGRAM EFFECTS ON INTERMEDIATE FOOD SECURITY OUTCOMES

We summarize our findings in Table 6.1 We report marginal effects based on inverse propensity weighted models within the region of common support for the two rounds of data, and in parentheses we report the standard errors clustered by block. We chose to simplify the presentation by focusing our discussion and reporting only the results associated with the land-related variables of interest for this study. Full results from these 54 regressions are available upon request.

The results of our analysis are very encouraging: we find statistically significant NGNB program effects on the four intermediate food security outcomes under consideration. This is particularly promising, given that most households in our sample, regardless of whether they are NGNB beneficiaries, had access to some land, however insecure that access might have been, and that these program effects are being statistically identified, despite this being a relatively recent allocation of land.

Results from Model 1 (first column of numbers in Table 6.1) indicate that respondents perceive NGNB plots as more secure, that NGNB beneficiary households are more likely to access credit for agriculture and to invest in agricultural improvements, and that women in NGNB beneficiary households are more likely to participate in food and agricultural decisions.

Controlling for the host of socioeconomic and demographic variables enumerated in the previous section, women report significantly higher levels of tenure security for NGNB plots than for non-NGNB plots. More specifically, the women interviewed are (1) 8 percent less likely to report being concerned about having to vacate NGNB plots; (2) 18 percent more likely to report that they expect their households to have retained access and control over NGNB plots five years from now, with this number dropping slightly, to 17 percent, when women referred to their own personal access and control; and (3) 7 percent more likely to report that they could convince other decisionmakers in the family not to sell the NGNB plot against their will.

Similarly, households that are NGNB beneficiaries are significantly more likely to access financial resources from the formal system and to allocate them to agriculture. Compared with those who did not make it into the program, the average NGNB household is 12 percent more likely to report taking out a loan from a formal bank since 2009 and 88 percent more likely to use a loan for agricultural purposes.

NGNB households are also more likely to invest in agriculture. During the year before the survey, NGNB households were (1) 11 percent more likely to have used fertilizer or pesticides; (2) 11 percent more likely to have used seedlings, seeds, or stems;<sup>14</sup> and (3) 7 percent more likely to have rented tools, machines, or other agricultural equipment than eligible households that did not become NGNB beneficiaries.

Finally, our results indicate that if their households are NGNB beneficiaries, women are more likely to be involved in important food and agriculture decisions. Compared to their non-NGNB peers, women in NGNB households are (1) 12 percent more likely to be involved in decisions to take loans from Self-Help Groups or microfinance institution; (2) 12 percent more likely to be involved in decisions on whether to purchase productive assets; (3) 9 percent more likely to be involved in decisions related to food purchase and consumption; and (4) more likely to be involved in decisions about the family land. The share of the family land over which they are involved in decisions increased by 15 percent for how to use the land, 14 percent for what to grow on it, and 11 percent for whether to sell produce from it.

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<sup>14</sup> This suggests that NGNB households are more likely to undertake new plantings and/or annual crops, rather than only caring for already existing trees and perennials.

**Table 6.1** NGNB effects on intermediate food security outcomes

Outcomes	Propensity-weighted regressions Marginal effects at Mean (Robust Standard Error)					
	Model 1 <sup>b</sup>	Model 2 <sup>b</sup>		Model 3 <sup>b</sup>		Woman on the title
	NGNB <sup>a</sup>	NGNB <sup>a</sup>	NGNB <sup>a</sup> plot size	NGNB <sup>a</sup>	NGNB <sup>a</sup> plot size	
<b>Tenure security<sup>c</sup></b>						
Woman reports being concerned that household could be asked to vacate the plot	-0.08*** (0.01)	0.04 (0.04)	-0.02*** (0.00)	0.06* (0.03)	-0.01*** (0.00)	-0.04*** (0.02)
Woman reports that her household will have same or more access and control over the plot in 5 years	0.18*** (0.01)	-0.00 (0.02)	0.03*** (0.00)	-0.04* (0.02)	0.03*** (0.00)	0.08*** (0.02)
Woman reports that she will have same or more access and control over the plot in 5 years	0.17*** (0.01)	-0.01 (0.02)	0.03*** (0.00)	-0.04 (0.02)	0.02*** (0.00)	0.10*** (0.02)
Woman reports that she could convince other decisionmakers not to sell the plot	0.07*** (0.01)	0.01 (0.02)	0.01* (0.01)	-0.01 (0.02)	0.01 (0.01)	0.03** (0.02)
<b>Use of credit for agricultural production</b>						
Household has taken out a loan since 2009	0.01 (0.04)	0.02 (0.06)	-0.00 (0.01)	0.03 (0.05)	0.00 (0.01)	-0.02 (0.04)
Household has taken out a loan from a bank since 2009	0.12** (0.06)	0.09** (0.05)	0.00 (0.00)	0.07 (0.04)	0.00 (0.00)	0.02 (0.03)
Household used loan for agriculture	0.88*** (0.13)	0.31 (0.43)	0.00 (0.00)	0.47 (no se)	0.00 (no se)	-0.00 (no se)
<b>Agricultural investments</b>						
Change in household's livestock ownership since 2010 (tropical livestock units)	0.02 (0.06)	-0.07 (0.10)	0.01 (0.01)	-0.11 (0.09)	0.01 (0.01)	0.11 (0.07)
Change in household's productive asset ownership since 2010 (tools/machines)	-0.10 (0.06)	-0.09 (0.15)	-0.00 (0.02)	-0.07 (0.16)	0.00 (0.02)	-0.05 (0.11)
Household used fertilizer (inorganic or organic) or pesticide in last year	0.11*** (0.04)	0.04 (0.04)	0.01* (0.00)	0.05 (0.04)	0.01** (0.00)	-0.01 (0.02)
Household used seedlings, seeds, or grafted stems in last year	0.11*** (0.04)	0.03 (0.04)	0.01** (0.00)	0.04 (0.05)	0.01** (0.00)	-0.02 (0.02)
Household rented tools, machines, or other agricultural equipment in last year	0.07*** (0.03)	0.03* (0.02)	0.00 (0.00)	0.03* (0.02)	0.00 (0.00)	-0.00 (0.01)

**Table 6.1 Continued**

Outcomes	Propensity-weighted regressions <i>Marginal effects at Mean</i> <i>(Robust Standard Error)</i>					
	Model 1 <sup>b</sup>	Model 2 <sup>b</sup>		Model 3 <sup>b</sup>		Woman on the title
	NGNB <sup>a</sup>	NGNB <sup>a</sup>	NGNB <sup>a</sup> plot size	NGNB <sup>a</sup>	NGNB <sup>a</sup> plot size	
Women's participation in decisionmaking						
Woman respondent is a decisionmaker over:						
Whether to take loans from an Self-Help Group or microfinance institution	0.12*** (0.04)	0.10* (0.05)	0.00 (0.01)	0.05 (0.04)	-0.00 (0.01)	0.14*** (0.03)
Whether to purchase productive assets	0.12*** (0.03)	0.01** (0.05)	0.00 (0.01)	0.04 (0.04)	-0.01 (0.01)	0.15*** (0.04)
Household food purchase and consumption decisions	0.09*** (0.04)	0.07* (0.04)	0.00 (0.01)	0.03 (0.04)	-0.00 (0.00)	0.13*** (0.04)
Share of household land over which woman respondent decides:						
How to use the plot	0.15*** (0.04)	0.12** (0.05)	0.00 (0.01)	0.07 (0.06)	-0.00 (0.01)	0.13* (0.07)
What to grow on the plot	0.14** (0.06)	0.16*** (0.05)	-0.00 (0.01)	0.10* (0.06)	-0.01 (0.01)	0.15** (0.07)
Whether to sell the produce from that plot	0.11* (0.06)	0.05 (0.06)	0.01 (0.01)	-0.02 (0.07)	-0.00 (0.01)	0.17** (0.08)

Source: Authors' computation.

Notes: <sup>a</sup> Nijo Griha, Nijo Bhumi, which translates to "My Home, My Land." <sup>b</sup> Other control variables not shown. <sup>c</sup> Tenure security regressions were estimated at the plot level.

\* significant at 0.1; \*\* significant at 0.05; \*\*\* significant at 0.01.

In an attempt to understand some of the factors underlying these results, we ran two additional sets of regressions. First, we explored whether the size of the allocated plot matters—an important question, given the scarcity and cost of land in this region. To do this we expanded the model to include a variable that captures the size of the NGNB plot, as specified in equations (3) and (6). This allows us to distinguish benefits in tenure security, agricultural finance and investments, and women’s decisionmaking that stem from being an NGNB beneficiary and receiving a documented plot of land, regardless of the size of this plot, from benefits that are sensitive to the plot’s size. Results from this second model are reported under Model 2 in Table 6.1.

Of particular relevance to those involved in designing, funding, and implementing land-allocation programs, we find that the tenure-security benefits associated with the NGNB program and the increase in the use of fertilizers, pesticides, seedlings, seeds, or stems by NGNB beneficiary households do vary with the size of the plot. To put it simply, on average, respondents perceived NGNB plots as more secure than non-NGNB plots, but this gap in tenure security gets larger as the plot size increases—with tenure security improving 1 percent per decimal of land allocated (see the first 4 rows, column 3 of Table 6.1). This means that although the gap in tenure security between NGNB and non-NGNB plots is almost negligible when plots are 1 or 2 decimals in size, NGNB beneficiaries who received plots of 10 decimals can experience between a 10-percent and 30-percent improvement in their perceptions of tenure security. Similarly, the 1-percent marginal effect associated with the size of the NGNB plot when explaining households’ use of fertilizers, pesticides, seedlings, seeds, or grafted stems (rows 3 and 4 under Agricultural Investments, column 3) suggests a 10-percent increase in households’ investments in these agricultural inputs if the NGNB plot is 10 decimals in size, but almost none for plots that are only 2 decimals.

Lastly, to test whether including women’s names on the pattas—an important directive of the NGNB program—yielded some of the expected results, we ran a third set of regressions described by equations (4) and (7) that include an additional dummy variable indicating whether the woman’s name had been included. These results are listed under Model 3 (columns 4, 5, and 6 on Table 6.1). We find that including women’s names on the pattas matters—it significantly contributes to women’s perceptions of increased tenure security and to women’s involvement in food and agriculture decisionmaking. Women’s report on tenure security outcomes improves up to 10 percent when their names are included on the land documents (rows 1 to 4 under Tenure Security, column 6). When their names are on the pattas, women are 14 percent, 15 percent, and 13 percent more likely to participate in decisions about taking loans, purchasing productive assets, and food purchasing and consumption, respectively. Finally, women with land documents under their name have a say over a larger share of their households’ land when it comes to decisions on how to use the land, what to grow on it, and whether to sell the produce from that plot (rows under Women’s Participation in Decisionmaking, column 6).

## 7. NGNB PROGRAM EFFECTS ON CURRENT FOOD SECURITY

Results from our qualitative research suggest that land is seen as an important way to offset cash expenditure on food purchases.

*Yes, there are many families with small piece of lands like 1 or 2 bighas [1 bigha is approximately 1/3 acre], which is not enough to grow food for the whole year. They are poor too. But we are the poorest, we do not have any cultivable land at all. Whatever we eat, we need to buy those.—Female qualified nonbeneficiary, focus group*

The link between land and food security appears to be most relevant for women because of their limited mobility and outside cash-earning opportunities. Land, in addition to children, was seen as a source of social security for widows or women in old age.

*Having land in my own name is even more supportive than having sons. Sons will look after me as long as they are not married, but if I plant a tree in my land and take care of [it], that will give me money for purchasing food and medicines when needed in my old age.—Female beneficiary, life history, age 37*

However, as the results in Table 7.1 suggest, at this point in time we are unable to identify statistically significant NGNB effects on households' current food security. On average, households that are eligible for the program are just as likely to be food secure regardless of whether they became program beneficiaries (row 1, column 1 of Table 7.1). Since, arguably, the expected food security benefits would not materialize until households have relocated to their new plots and have had the opportunity to settle and adjust their livelihoods, we repeated the analysis, this time limiting the “beneficiary” category to households that had moved to their NGNB plot at least six months prior to the survey. We find no significant improvements in their food security (row 1, column 2 of Table 7.1). Finally, because the results described in the previous section indicated that women were in a stronger decisionmaking position when their names were on the land titles, and women tend to play a key role in their families' food security, we also checked whether including women's names on the pattas made a difference (Model 3, reported in columns 3 and 4 of Table 7.1). According to our results, this measure has yet to yield a significant impact on food security (row 1, column 4).

We repeated the same analysis to explore whether the program made a difference in the diversity of their diet (second row), their consumption of proteins (third row), and how food was allocated within the family (rows 4 to 7). There was no statistical difference in any of these cases, either.

Two factors might contribute to these results. First, not enough time has passed for the food security outcomes to materialize—therefore we identify intermediate effects that are expected to improve future food security, but cannot identify an impact on current food security. Although our data indicate that, on average, 29 months have passed since demarcation, suggesting ample time to plant, our qualitative research highlighted the fact that the parcels allocated were often of marginal quality. Many beneficiaries recounted the need to amend their soil and infill and level their new plots before the yard was cultivable. Second, not enough beneficiary households have moved. NGNB's expected effects are predicated on households relocating to the plot and cultivating a backyard garden, but only 25 percent of the beneficiaries in our sample have moved.

Full regression results, included in Appendix Table A.5, suggest additional patterns affecting the food security of households eligible for the NGNB. In particular, Muslim households appear to be more vulnerable to food scarcity than their Hindu peers; households with more valuable assets or with large- and medium-size livestock are more likely to be food secure; Scheduled Tribe households are less likely to consume proteins; and households with a larger number of young children appear to have a more diverse diet, perhaps because they qualify for food programs.



**Table 7.1 NGNB effects on food security outcomes**

	Propensity-weighted regressions			
	Marginal effects at mean (Robust Standard Error)			
	Model 1 <sup>a</sup>	Model 2 <sup>a</sup>	Model 3 <sup>a</sup>	
	NGNB <sup>b</sup>	Moved to NGNB <sup>b</sup> plot <sup>c</sup>	Moved to NGNB <sup>b</sup> plot <sup>c</sup>	Woman's name on the title
<b>Food security indicators</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>
Food security	-0.07 (0.07)	-0.05 (0.06)	-0.01 (0.07)	-0.06 (0.08)
Household Dietary Diversity Score	-0.100 (0.08)	0.16 (0.16)	0.19 (0.17)	-0.06 (0.10)
Protein consumption	-0.05 (0.06)	0.01 (0.06)	0.04 (0.06)	-0.07 (0.06)
Intrahousehold distribution of food (shares are relative to the family member with highest consumption)				
Average adult female food share	-0.01 (0.01)	-0.01 (0.01)	-0.00 (0.01)	-0.01 (0.01)
Average adult male food share	-0.01 (0.01)	-0.02 (0.02)	-0.02 (0.01)	-0.01 (0.01)
Average young female food share	-0.02 (0.01)	0.00 (0.02)	0.01 (0.02)	-0.02 (0.02)
Average young male food share	-0.01 (0.01)	-0.02 (0.03)	-0.01 (0.02)	-0.01 (0.01)

Source: Authors' computation.

Notes: <sup>a</sup> Other control variables not shown. <sup>b</sup> Nijo Griha, Nijo Bhumi, which translates to "My Home, My Land."

<sup>c</sup> Acknowledging that it would take time for families to settle and observe food-related changes, this variable is defined as a dummy that takes the value of 1 if the family relocated to their NGNB plot at least six months before they were interviewed. \* significant at 0.1; \*\* significant at 0.05; \*\*\* significant at 0.01.

## 8. DISCUSSION AND CONCLUSIONS

Our results suggest that although current food security might not have improved yet, the West Bengal NGNB land-allocation program has led to significant and positive impacts on outcomes that are expected to lay the foundation for future food security, both at the household and individual levels. More specifically, women perceive higher tenure security over NGNB plots, and NGNB households are more likely to access credit for agriculture, more likely to invest in agriculture, and more likely to use improved inputs—actions that are likely to lead to increased food production. This is similar to the findings of Li, Rozelle, and Brandt (1998), who reported that the short-term investments in land did not change with improved land-tenure security, but that long-term investments in land did.

Although resource constraints will strongly and undoubtedly encourage policymakers and program implementers to consider allocating very small plots, it is important that our study argues that the size of the plot matters. Even though our data do not allow us to predict the optimal plot size, our study provides evidence that the larger the plot, the stronger the program impacts.

Furthermore, the program's emphasis on allocating land jointly and including women's names on pattas has already yielded some of its expected benefits: women whose names are on a patta reported significant improvements in tenure security and were significantly more likely to report being active participants in family decisions, outcomes that are expected to improve household and intrahousehold food security. This is in alignment with results found by previous literature focusing on gender and tenure security, most notably Allendorf (2007). It is worth noting that these positive and significant impacts of naming women on the land documents do not hinge on whether their households have relocated to the new plots.

Given that homestead development requires the convergence of other government services (roads, water, extension work, seeds, and so forth) as well as household investments that may take time to bear results, a full assessment of the program's impact would benefit from additional data gathered after one or two more years have passed. In addition, taking advantage of the variation in program implementation, researchers could examine what aspects worked well and identify best practices that can be put in place as the program is scaled up. Furthermore, given the government's recognition of the importance of ensuring that women in beneficiary households are fully included, it will be helpful to explore which processes and decisions resulted in 25 percent of the pattas not including a woman's name and why. Although we recommend further analysis of the questions outlined above, we believe the findings presented in this study are of immediate relevance to the Indian government, which is currently weighing a national Homestead Act and laying plans for strategies to address food security.

Our findings suggest that (1) homestead development programs can lay the foundation for long-term food security; (2) although microplots can enhance livelihoods, their potential benefits increase with the size of the plot and might be negligible if the plots are too small; (3) including women's names on the land documents can improve women's tenure security and their ability to influence household decisions; (4) due to the longer-term nature of this type of intervention, the government should consider pairing homestead development programs with complementary food distribution programs that ensure that immediate food and nutritional needs are met while the benefits of the homestead development programs mature and materialize; and (5) because a considerable number of the NGNB beneficiaries surveyed have not yet moved, it is important that homestead development programs proactively address concurrent financial constraints or lack of available housing to enable families to fully benefit and leverage the allocated plots.

As public and civil society actors in India continue to grapple with food security challenges, they must recognize and embrace the fact that these problems are complex and that addressing them requires integrated approaches that, at a minimum, combine strengthening land rights with adequate access to financial services, housing, extension services, and infrastructure support. We argue that a one-time, integrated, and well-executed homestead allocation and development program can lay the foundation for household and individual food security.

## APPENDIX: SUPPLEMENTARY TABLES

**Table A.1** Categorizations of qualitative interviews

Key informants	Life histories	Focus groups
<ul style="list-style-type: none"> <li>• Pradhan (4)</li> <li>• Karmadhakshya (1)</li> <li>• Revenue inspector (2)</li> <li>• Block development officer (2)</li> <li>• Block land and land reforms officer (2)</li> <li>• District manager (1)</li> </ul>	<ul style="list-style-type: none"> <li>• Single woman household (3)</li> <li>• Men (2)</li> <li>• Muslim women (2)</li> <li>• Scheduled/Backward Caste women (2)</li> <li>• Female headed household (1)</li> <li>• General Caste woman (1)</li> </ul>	<ul style="list-style-type: none"> <li>• Beneficiary married women (3)</li> <li>• Beneficiary married men (2)</li> <li>• Qualified, nonbeneficiary women (2)</li> <li>• Female heads of household (1)</li> </ul>

Source: Authors' compilation.

Notes: The pradhan is the head of the *gram panchayat*, the most local unit of self-government in West Bengal. The Karmadhakshya is the head of the standing committee at the *zilla parishad*, the district-level unit of West Bengal self-government.

**Table A.2** T-tests for differences in means in baseline for attritors versus nonattritors

	Nonattritors (N=1,035)	Attritors (N=338)	
	Mean	Mean	Significance
<b>District</b>			
Jalpaiguri	0.27	0.23	
Bankura	0.35	0.22	***
Coochbehar	0.38	0.53	***
<b>Household characteristics</b>			
Household size	3.59	3.13	***
Number of working members	1.67	1.53	***
Number of rooms in house	1.71	1.61	
Owns any livestock	0.32	0.33	
Income earned locally	3,258.27	2,436.26	
Household member works out of district	0.10	0.11	
Household member working in an agriculture or artisan trade	0.50	0.51	
Self-Help group member	0.18	0.13	**
Claims to be landowner	0.34	0.28	
<b>Respondent characteristics</b>			
Age of male respondent	44.17	42.08	*
Education of male respondent (standard level)	2.42	2.27	
Male respondent is married	0.92	0.75	***
Age of female respondent	37.30	37.09	
Education of female respondent (standard level)	1.36	2.05	***
Female respondent is married	0.88	0.84	
Age of marriage of female respondent	15.94	16.06	
<b>Food security</b>			
Experienced times with no food in past 3 months	0.52	0.48	

Source: Authors' computation.

Notes: \* Significant at 0.1; \*\* significant at 0.05; \*\*\* significant at 0.01.

**Table A.3 Attrition probit for food security outcomes**

	<b>Coefficient</b>	<b>Robust Standard Error</b>
Household characteristics		
Caste		
Scheduled Caste	-1.34	0.20***
Scheduled Tribe	-0.80	0.26***
Other Backward Castes	-2.33	0.53***
Minority	-0.93	0.26***
Religion		
Muslim	0.28	0.24
Christian	-0.36	0.40
Other	-0.79	0.38**
Household size	-0.08	0.04*
Number of working members	0.01	0.12
Age of male respondent	-0.01	0.01
Age of female respondent	-0.01	0.01
Education of male respondent	-0.03	0.02
Education of female respondent	0.01	0.03
(Related to) Asset ownership		
Owens livestock	0.15	0.15
Number of rooms in the current house	-0.08	0.09
Location		
Coochbehar	0.13	0.19
Jalpaiguri	-0.74	0.23**
Lagged value of the main dependent variable		
Food insecure	0.26	0.15
Number of observations	754	
Pseudo R2	0.14	

Source: Authors' computation.

Notes: \* Significant at 0.1; \*\* significant at 0.05; \*\*\* significant at 0.01.

**Table A.4 Propensity score model: NGNB participation**

	<b>Coefficient</b>	<b>Robust Standard Error</b>
NGNB <sup>a</sup> eligibility criteria		
Primary income from agriculture or artisan	0.03	0.15
Landless	-0.07	0.15
Land scarcity		
Medium population density block	-0.17	0.17
High population density block	0.51	0.21**
Household pressured for land		
Living with relatives	0.46	0.16 ***
Household size	-0.03	0.05
Expressed concerned about eviction	-0.09	0.14
Household characteristics		
Maximum education in the household	0.01	0.02
Caste		
Scheduled Caste	-1.23	0.29 ***
Scheduled Tribe	-1.01	0.34 ***
Other Backward Castes	-1.81	0.47 ***
Religion: Hindu	-0.15	0.42
Constant	0.63	0.57
Number of observations		1,035
Pseudo R2		0.04

Source: Authors' computation.

Notes: \* Significant at 0.1; \*\* significant at 0.05; \*\*\* significant at 0.01. <sup>a</sup> Nijo Griha, Nijo Bhumi, which translates to "My Home, My Land."

**Table A.5 NGNB program effects on household-level direct food security outcomes: Full results**

	Propensity-weighted regressions								
	Marginal effects at Mean (Robust Standard Error)								
	Food Security			Household Dietary Diversity Score			Protein		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
NGNB <sup>a</sup> beneficiary	-0.070 (0.07)			-0.095 (0.08)			-0.047 (0.06)		
Household has moved to the NGNB <sup>a</sup> plot		-0.046 (0.06)	-0.015 (0.07)		0.162 (0.16)	0.190 (0.17)		0.006 (0.06)	0.042 (0.06)
Woman's name on the NGNB <sup>a</sup> title			-0.063 (0.08)			-0.056 (0.10)			-0.070 (0.06)
<b>Caste</b>									
Other Backward Classes	-0.181 (0.11)	-0.176 (0.11)	-0.173 (0.11)	-0.208 (0.24)	-0.204 (0.24)	-0.201 (0.24)	-0.002 (0.12)	0.000 (0.11)	0.004 (0.12)
Scheduled Caste	0.083 (0.10)	0.086 (0.10)	0.082 (0.10)	-0.134 (0.19)	-0.131 (0.18)	-0.135 (0.18)	-0.036 (0.06)	-0.035 (0.06)	-0.039 (0.06)
Scheduled Tribe	-0.063 (0.12)	-0.059 (0.12)	-0.062 (0.12)	-0.274 (0.20)	-0.277 (0.20)	-0.279 (0.20)	-0.157 (0.09)	-0.156 (0.09)	-0.159 (0.09)
<b>Religion</b>									
Christian	0.080 (0.10)	0.084 (0.12)	0.076 (0.11)	-0.257 (0.23)	-0.380 (0.27)	-0.387 (0.27)	-0.024 (0.11)	-0.043 (0.12)	-0.053 (0.12)
Muslim	0.290*** (0.07)	0.293*** (0.06)	0.286*** (0.07)	-0.191 (0.22)	-0.180 (0.21)	-0.190 (0.21)	-0.038 (0.12)	-0.034 (0.12)	-0.046 (0.12)
(2010) Highest education in household (years)	0.011 (0.01)	0.011 (0.01)	0.011 (0.01)	-0.005 (0.01)	-0.005 (0.01)	-0.005 (0.01)	0.000 (0.01)	0.000 (0.01)	0.000 (0.01)
Age of female respondent	-0.002 (0.00)	-0.002 (0.00)	-0.002 (0.00)	-0.006 (0.00)	-0.005 (0.00)	-0.006 (0.00)	-0.002 (0.00)	-0.002 (0.00)	-0.002 (0.00)
(2012) Household size	0.005 (0.01)	0.004 (0.01)	0.004 (0.01)	0.044 (0.06)	0.042 (0.05)	0.042 (0.06)	0.019 (0.02)	0.018 (0.01)	0.018 (0.02)
(2012) Number of children aged 0–3	-0.011 (0.03)	-0.012 (0.03)	-0.010 (0.03)	0.258** (0.09)	0.259*** (0.09)	0.261** (0.09)	0.042 (0.03)	0.041 (0.03)	0.043 (0.03)
(2010) Number of household assets	-0.032 (0.03)	-0.031 (0.03)	-0.032 (0.03)	-0.014 (0.09)	-0.015 (0.08)	-0.016 (0.08)	0.034 (0.04)	0.035 (0.04)	0.034 (0.04)
(2010) Number of valuable assets	0.042* (0.02)	0.043* (0.02)	0.044* (0.02)	0.155*** (0.05)	0.154*** (0.05)	0.155*** (0.05)	0.033 (0.02)	0.034 (0.02)	0.034 (0.02)
(2010) Number of productive assets	-0.003 (0.01)	-0.001 (0.01)	-0.002 (0.01)	-0.016 (0.05)	-0.010 (0.05)	-0.011 (0.05)	-0.017 (0.01)	-0.016 (0.01)	-0.017 (0.01)
(2010) Number of large livestock	-0.019 (0.03)	-0.017 (0.03)	-0.019 (0.03)	0.172* (0.09)	0.176* (0.09)	0.175* (0.09)	0.026 (0.02)	0.027 (0.02)	0.026 (0.02)

**Table A.5 Continued**

	Propensity-weighted regressions								
	Marginal effects at Mean (Robust Standard Error)								
	Food Security			Household Dietary Diversity Score			Protein		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
(2010) Number of medium livestock	0.008 (0.03)	0.010 (0.03)	0.008 (0.03)	0.028 (0.05)	0.028 (0.05)	0.026 (0.05)	0.047*** (0.01)	0.048*** (0.01)	0.046*** (0.01)
(2010) Number of small livestock	-0.009 (0.04)	-0.009 (0.03)	-0.008 (0.04)	-0.091** (0.04)	-0.093** (0.04)	-0.092** (0.04)	-0.029 (0.02)	-0.029 (0.02)	-0.028 (0.02)
Coochbehar district	-0.072 (0.09)	-0.066 (0.09)	-0.080 (0.11)	0.179 (0.17)	0.143 (0.16)	0.130 (0.17)	-0.062 (0.08)	-0.066 (0.08)	-0.082 (0.09)
Jalpaiguri district	0.036 (0.12)	0.039 (0.12)	0.027 (0.13)	0.028 (0.16)	0.007 (0.15)	-0.003 (0.16)	-0.065 (0.10)	-0.067 (0.10)	-0.080 (0.10)
Constant				4.347*** (0.28)	4.279*** (0.30)	4.312*** (0.28)	0.714*** (0.11)	0.684*** (0.10)	0.725*** (0.11)
Number of Observations	1,032	1,032	1,032	1,032	1,032	1,032	1,032	1,032	1,032
(pseudo) R-square	0.035	0.033	0.035	0.074	0.074	0.075	0.035	0.033	0.037

Source: Authors' computation.

Notes: \* Significant at 0.1; \*\* significant at 0.05; \*\*\* significant at 0.01. <sup>a</sup> Nijo Griha, Nijo Bhumi, which translates to "My Home, My Land."

**Table A.6 NGNB program effects on individual direct food security outcomes**

	Propensity-weighted regressions											
	Marginal effects at Mean (Robust Standard Error)											
	Adult female			Adult male			Young female			Young male		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
NGNB <sup>a</sup> beneficiary	-0.006 (0.01)			-0.007 (0.01)			-0.017 (0.01)			-0.007 (0.01)		
Household has moved to the NGNB <sup>a</sup> plot		-0.007 (0.01)	-0.004 (0.01)		-0.020 (0.02)	-0.016 (0.01)		0.005 (0.02)	0.014 (0.02)		-0.018 (0.03)	-0.011 (0.02)
Woman's name on the NGNB <sup>a</sup> title			-0.006 (0.01)			-0.008 (0.01)			-0.017 (0.02)			-0.015 (0.01)
Caste												
Other Backward Classes	-0.009 (0.02)	-0.009 (0.02)	-0.008 (0.02)	-0.012 (0.01)	-0.012 (0.01)	-0.011 (0.01)	-0.018 (0.01)	-0.023* (0.01)	-0.017 (0.01)	-0.051** (0.02)	-0.049** (0.02)	-0.048** (0.02)
Scheduled Caste	-0.003 (0.01)	-0.003 (0.01)	-0.003 (0.01)	-0.007 (0.01)	-0.008 (0.01)	-0.008 (0.01)	-0.027*** (0.01)	-0.027*** (0.01)	-0.026** (0.01)	-0.021 (0.02)	-0.022 (0.02)	-0.021 (0.02)
Scheduled Tribe	-0.002 (0.01)	-0.001 (0.01)	-0.001 (0.01)	-0.003 (0.01)	-0.003 (0.01)	-0.003 (0.01)	-0.009 (0.01)	-0.009 (0.01)	-0.011 (0.01)	-0.019 (0.01)	-0.018 (0.01)	-0.016 (0.01)
Religion												
Christian	-0.030 (0.02)	-0.028 (0.02)	-0.029 (0.02)	-0.055** (0.02)	-0.046** (0.02)	-0.047** (0.02)	0.006 (0.01)	0.003 (0.01)	-0.000 (0.01)	0.042* (0.02)	0.049 (0.03)	0.050 (0.03)
Muslim	-0.012 (0.02)	-0.012 (0.02)	-0.013 (0.02)	-0.006 (0.01)	-0.006 (0.01)	-0.007 (0.01)	-0.002 (0.01)	0.004 (0.01)	-0.003 (0.01)	0.030** (0.01)	0.029** (0.01)	0.029** (0.01)

**Table A.6 Continued**

	Propensity-weighted regressions											
	Marginal effects at Mean (Robust Standard Error)											
	Adult female			Adult male			Young female			Young male		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
(2010) Highest education in household (years)	0.000 (0.00)	0.000 (0.00)	0.000 (0.00)	0.001 (0.00)	0.001 (0.00)	0.001 (0.00)	0.002 (0.00)	0.002 (0.00)	0.002 (0.00)	-0.001 (0.00)	-0.001 (0.00)	-0.001 (0.00)
Age of female respondent	0.000 (0.00)	0.000 (0.00)	0.000 (0.00)	0.000 (0.00)	0.000 (0.00)	0.000 (0.00)	0.001* (0.00)	0.001* (0.00)	0.001 (0.00)	-0.000 (0.00)	-0.000 (0.00)	-0.000 (0.00)
(2012) Household size	-0.007 (0.00)	-0.007 (0.00)	-0.007 (0.00)	-0.005 (0.01)	-0.005 (0.01)	-0.005 (0.01)	0.003 (0.00)	0.002 (0.00)	0.003 (0.00)	-0.010* (0.01)	-0.010* (0.01)	-0.010* (0.01)
(2012) Number of children aged 0–3	-0.020* (0.01)	-0.020* (0.01)	-0.020* (0.01)	-0.020 (0.02)	-0.021 (0.01)	-0.021 (0.01)	-0.012 (0.01)	-0.013 (0.01)	-0.013 (0.01)	-0.026 (0.02)	-0.026 (0.02)	-0.024 (0.02)
(2010) Number of household assets	-0.006 (0.01)	-0.006 (0.01)	-0.006 (0.01)	-0.006 (0.01)	-0.006 (0.01)	-0.006 (0.01)	-0.002 (0.01)	-0.001 (0.01)	-0.002 (0.01)	0.009 (0.01)	0.009 (0.01)	0.099 (0.01)
(2010) Number of valuable assets	0.002 (0.00)	0.002 (0.00)	0.002 (0.00)	0.001 (0.00)	0.002 (0.00)	0.002 (0.00)	-0.005 (0.01)	-0.003 (0.01)	-0.004 (0.01)	-0.006 (0.01)	-0.005 (0.01)	-0.005 (0.01)
(2010) Number of productive assets	0.000 (0.00)	0.000 (0.00)	0.000 (0.00)	-0.003 (0.01)	-0.004 (0.01)	-0.008* (0.01)	-0.007* (0.00)	-0.007* (0.00)	-0.007* (0.00)	0.004 (0.00)	0.004 (0.00)	0.004 (0.00)
(2010) Number of large livestock	-0.003 (0.00)	-0.003 (0.00)	-0.003 (0.00)	-0.001 (0.00)	-0.001 (0.00)	-0.001 (0.00)	-0.003 (0.00)	-0.004 (0.00)	-0.004 (0.01)	0.001 (0.00)	0.001 (0.00)	0.001 (0.00)
(2010) Number of medium livestock	-0.001 (0.00)	-0.001 (0.00)	-0.001 (0.00)	0.001 (0.00)	0.001 (0.00)	0.001 (0.00)	0.004 (0.00)	0.004 (0.00)	0.004 (0.00)	0.008** (0.00)	0.008* (0.00)	0.008* (0.00)
(2010) Number of small livestock	0.004 (0.00)	0.004 (0.00)	0.004 (0.00)	0.004 (0.00)	0.004* (0.00)	0.005* (0.00)	0.008** (0.00)	0.009** (0.00)	0.008** (0.00)	0.000 (0.01)	0.001 (0.01)	0.000 (0.01)
Coochbehar district	-0.012 (0.01)	-0.011 (0.01)	-0.012 (0.01)	-0.014 (0.01)	-0.011 (0.01)	-0.013 (0.01)	-0.039** (0.02)	-0.042** (0.02)	-0.045*** (0.01)	-0.006 (0.02)	-0.003 (0.02)	-0.006 (0.02)
Jalpaiguri district	0.031*** (0.01)	0.031*** (0.01)	0.030** (0.01)	0.021 (0.01)	0.023* (0.01)	0.022 (0.01)	0.014 (0.01)	0.014 (0.01)	0.012 (0.01)	0.040** (0.01)	0.041** (0.01)	0.038** (0.02)
Constant	1.000*** (0.03)	0.996*** (0.03)	1.000*** (0.03)	0.997*** (0.02)	0.994*** (0.02)	0.998*** (0.02)	0.994*** (0.02)	0.986*** (0.02)	0.993*** (0.02)	1.020*** (0.04)	1.017*** (0.03)	1.025*** (0.04)
Number of observations	1,032	1,032	1,032	955	955	955	299	299	299	306	306	306
R-square	0.104	0.104	0.105	0.086	0.089	0.091	0.159	0.149	0.157	0.119	0.122	0.127

Source: Authors' computation.

Notes: <sup>a</sup> Nijo Griha, Nijo Bhumi, which translates to "My Home, My Land." \* Significant at 0.1; \*\* significant at 0.05; \*\*\* significant at 0.01.



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