

**The potential for homestead microplots to contribute to food security in rural  
West Bengal**

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## **Abstract**

Landesa's partnership with the Government of West Bengal on state land allocation and titling programs provides an extraordinary learning opportunity. This paper uses survey data gathered through a recent study of households across West Bengal to explore the relationship between newly gained tenure security and the potential for improving the food security of the household. It finds no titling effect on food security, nor does it find an effect when women's names have been included on the title. However, it does find a positive effect on food security when households engage in such livelihood activities as homestead kitchen gardening and animal husbandry. It concludes by exploring ways to improve the uptake of such activities at scale.

## **Key Words:**

Food security, Women's empowerment, Program evaluation, Microplots, Land-based livelihoods

## Introduction

Food security continues to be a key concern of policy makers and practitioners at both global and local levels. While clear progress has been made in recent years, current figures remain staggering. According to data provided by a recent report by the United Nations, over 790 million people across the globe do not have access to sufficient nutritional sources of food.<sup>1</sup> Furthermore, nearly 25% of children under the age of five suffer from stunted growth due to the effects of undernutrition and infection.

Clearly the lack of adequate food supply deserves global attention and has rightly been incorporated into the Sustainable Development Goals (SDGs) adopted by the United Nations in 2015. Specifically, the second goal aims to “end hunger, achieve food security and improved nutrition and promote sustainable agriculture.” However, recently published notes about progress express a concern that “If current trends continue, the zero hunger target will be largely missed by 2030” (Report of the Secretary-General, 2016).

Households in India are particularly afflicted by hunger and malnourishment. The World Food Program (2012) recently reported that almost 25 percent of the global population suffering from hunger resides in India.<sup>2</sup> Furthermore, approximately 43% of children under the age of five are malnourished, making India a key priority for development practitioners across the globe.

Increasingly, policy makers and implementers are looking to landlessness as a key driver of the related outcomes of poverty and household food insecurity. As Jeffery Sachs proclaimed in 2015, “Land rights, both for individuals and for communities, are critical for achieving sustainable development” (Cordes & Sachs, 2015), with the specific understanding that for rural households, tenure security is often the crucial link to sustained food security and the right to food. Research and advocacy on this topic proved convincing enough to include an explicit recognition within the second SDG that ending hunger involves ensuring equal access to land, which can be used to increase the “agricultural productivity and incomes of small-scale food producers.”

Similarly, a World Bank report found that more than caste or illiteracy, landlessness remains the best indicator for rural poverty in India (World Bank, 1997). Combined with the knowledge that India has the largest number of landless households across the globe (Hanstad et al. 2008), resolving landlessness has quickly made its way to the forefront of policy initiatives to end the incidence of poverty and hunger in the country. In particular, the hope is that secure rights to land will enable land-based livelihood activities that can smooth consumption and create new sources of revenue generation. Many of the relevant land

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<sup>1</sup> <https://sustainabledevelopment.un.org/sdg2>

<sup>2</sup> <http://www1.wfp.org/countries/india>

reform programs in India also emphasize the importance of including women, in the hopes that granting land rights to women would empower them to sway land-use strategies to maximize benefits across family members. This includes decisions about what to grow on the land, how much to consume, and how much to sell for revenue.

Landesa, is an international NGO that aims to improve land tenure security for impoverished women and men across the globe by supporting governments, through advocacy and program design, in their efforts to reduce landlessness across rural and poor communities in developing countries.<sup>3</sup> Recently, Landesa has been providing substantial advisory and technical assistance to land-related authorities in the eastern Indian state of West Bengal where almost 200,000 households have been granted legally recognized documented rights to homestead plots of land between 2011 and 2015.<sup>4</sup> The program, Nijo Griha Nijo Bhumi<sup>5</sup> (NGNB), is based on the premise that households which are granted secure rights to even a small plot of land, can confidently establish a permanent residence and use the remaining land to engage in vegetable gardening or small-scale livestock raising which can help make them less vulnerable to economic and environmental shocks and contribute to long term food stability.

During the course of its work in West Bengal, Landesa engaged in a large scale mixed-methods evaluation effort to understand the effect that having title might have on various socio-economic outcomes, including food security. This paper discusses the results from that study, with the ultimate objective of providing evidence-based recommendations to improve such programs' abilities to bring about the change that they desire. It starts by providing some contextual background to land reform in West Bengal, with a specific focus on the land titling program currently being implemented by state authorities. The paper then describes the underlying theory of change, and existing research which supports the overall programmatic strategy. Details about the evaluation follow, first with a discussion about how the study was designed to test the theory of change, and then with a discussion of the results. The discussion section then provides recommendations based on the research findings.

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<sup>3</sup> For more information about active programs in India that are supported by Landesa, please visit: [www.landesa.org](http://www.landesa.org).

<sup>4</sup> <https://wb.gov.in/portal/web/guest/nijo-griha-nijo-bhumi>

<sup>5</sup> This is a Bengali term that roughly translates to “My home, My land”.

## Background to land reform in West Bengal

West Bengal is the fourth most populous state in the nation, with 7.54% of India's population residing within its borders.<sup>6</sup> The density of the population rests at 1028 persons per square kilometer, which is high, compared to the national average of 382 persons per square kilometer. The terrain across the state varies widely with forest and high elevations present in the northern Jalpaiguri Division, dry and barren land across the western Bardhaman Division, and waterlogged areas across the south-eastern Presidency Division. This complicates the development of land-related services and assistance, since standardization across the state is not possible.

Nevertheless, West Bengal is widely recognized as one of the most progressive states in redistributive land reform. In the decades since Independence, West Bengal has achieved notable progress in redistributing agricultural land through enacting ceiling laws which cap the size of land a person can own, regulating sharecropping relationships and providing legal tenure over homestead plots (Hanstad & Brown, 2001).

West Bengal's commitment to land reform provided an extraordinary opportunity for partnership with Landesa. As mentioned, between 2011 and 2015, the state government of West Bengal reports providing *patta* – a distinct form of legal title issued by the government for beneficiaries of this program – to almost 200,000 households. Most of these beneficiaries received *patta* for land already in their possession (a process known as “regularization”). However, about a quarter of the beneficiary households received *patta* for a fresh plot of land onto which they were expected to move and establish a new homestead (a process known as “allocation”).

Two important aspects of NGNB are worth noting. First, in order to reach more landless households in areas with high population density<sup>7</sup> and attendant low levels of land availability<sup>8</sup>, the government has placed a cap of .05 acres of land over which households can claim ownership. These homestead

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<sup>6</sup> <http://censusindia.gov.in/2011-prov-results/indiaatglance.html>

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<sup>8</sup> The terrain across the state varies widely, with forest and high elevations present in the northern Jalpaiguri Division, dry and barren land across the western Bardhaman Division, and waterlogged areas across the south-eastern Presidency Division.

“microplots” are not intended to fully support the household’s livelihood, but rather provide sufficient space for a house, latrine and a kitchen. Important to the focus of this study, there is also an explicit preference that additional space on these homestead plots is reserved for some combination of a home garden, high-value trees, and shelter for poultry or livestock.

Second, there is an explicit mandate that the titles include women’s names in hopes of empowering women and motivating them to exert greater control over land-related resources. Indeed, this constitutes one clear success of NGNB, as a recent study by Landesa found that 76% of beneficiary households received *patta* with a woman’s name listed as a land owner. This gender-progressive effort is particularly valuable considering that very few women in India are given the option to own land: patriarchal traditions favor sons over daughters for land inheritance and designate widows and women abandoned by their husbands as social outcasts. Without secure rights to land, rural women can easily lose access to the plots on which they have lived and worked for years. This is because a woman who becomes widowed, divorced or abandoned may be dispossessed by her husband or in-laws, and even women who remain married are left in a vulnerable position.

A key tenet of NGNB is that the *patta* that beneficiaries receive constitutes a legal protection against involuntary dispossession. During the course of our research, we did not encounter any examples of challenges to legal ownership after the household received *patta*. Nevertheless, we did ask questions to understand whether having *patta* changed households’ perceptions of tenure security. For the most part, our survey respondents reported feelings of secure rights over the land, both when asked about household tenure rights as well as female tenure rights more specifically. However, to find out whether any changes occurred in the psychological ties to the land, we approached several beneficiaries qualitatively, which confirmed our beliefs. The majority of respondents mentioned that the *patta* instilled a sense of confidence and that they were now less concerned about land-related conflicts with others in their community and that now they are less concerned about evictions or about being dispossessed without compensation. How this increased sense of tenure security is supposed to translate to improved socioeconomic outcomes, specifically with regards to food security, is covered in the next section.

### **Theory of change**

Increased tenure security is thought to improve food security in a number of different ways. First, documented title is thought to heighten confidence in the household’s ability to remain on the land without fear of an abrupt eviction or dispossession. Assuming that beneficiaries are aware of legal protections associated with *patta* - that they have access to the institutions responsible for enforcing these

protections, and that they trust that these institutions would enforce their rights - having a *patta* should improve beneficiaries' sense of tenure security, allow them to develop stronger ties to the land, and allow them to approach land-related livelihood decisions with a long-term horizon. Indeed, numerous studies have found that land tenure security is a critical catalyst to enable farmers to access necessary credit, adopt efficiency-boosting technology (Holden et al. 2009, Smith 2004, Deininger 2003, Besley 1995), and invest in various land improvements (Deininger et al., 2008; Thiesenhusen (1995), all of which can lead to improved agricultural production.

Specifically at the homestead level, NGNB implementers hope that improved perceptions of tenure security brought about by the *patta* will motivate beneficiaries to invest in small home gardens and animal husbandry, a theory which is also supported by existing research. In Odisha, a study conducted by Landesa, for example, found a statistically significant link between legally recognized tenure security over homestead plots and home-based livelihood strategies (Savath 2014).

Home gardens and animal husbandry are widely considered critical strategies to remedy food unavailability, alleviate hunger and malnutrition, and contribute to livelihoods, particularly in the face of global food crises (Alemu et al, 2000). Indeed, several studies confirm that that home gardens can contribute to the diversity of foods necessary to maintain household members' health and wellbeing. Furthermore, these gardens need not be large. Marsh (1998) reports that "very small mixed vegetable gardens can provide a significant percentage of the recommended dietary allowance for protein (10 to 20 percent), iron (20 percent), calcium (20 percent), vitamin A (80 percent) and vitamin C (100 percent)." Specifically for children, numerous studies reported by Girard et al (2012) indicate a positive correlation between home gardening and increased intake of vitamin A and iron.

Families who are able to combine home gardening with animal husbandry provide extra security through the ready supplies of milk, eggs, and meat (Galhena, 2013). They are also able to use the animal manure as fertilizer for their gardens and fuel for their stoves (Mitchell, 2007).

The effect of legal land documents on food security is hypothesized to be stronger when land reform programs, like NGNB, require women's names to be included on the title. Including a woman's name on the household title is expected not only to generally promote women's security over the land, but also specifically to give license to women to exert control over important land-related decisions which will improve agricultural outputs. In Burkina Faso, for example, a study found that women's choice of cropping patterns were different from men, and the output on lands owned by them were higher than those controlled by men (Agrawal 2004). A study in Kenya similarly found that in fields controlled by women maize yields were 7% more when women had equal access to extension programs (Dey 1992).

Furthermore, there is some evidence to suggest that when women share rights to family land and are involved in land-related decisions, the family is more likely to use the land in ways that improve the wellbeing of the entire household (Quisumbing et al. 1995, Allendorf 2007). For example, in rural Ghana, increases in the share of household land owned by women are associated with a higher apportionment of household expenditures spent on food (Doss, 2006). In Nepal, children in households with plots owned (solely or jointly) by a woman were less likely to be severely underweight than those in households with plots that were not owned by women (Allendorf, 2007).

In fact, Landesa already undertook an evaluation of food security impacts in West Bengal (Santos 2013). The study leveraged panel data collected from beneficiaries and non-beneficiaries of The Cultivation and Dwelling Plot Allocation Program (CDPA) which was implemented across West Bengal but replaced by NGNB in 2011.<sup>9</sup> The two programs differ from each other in a number of respects, including processes of identification and selection of beneficiaries, allotments of land, and caps placed on the amount of land for which a household could receive *patta*. Since the Government of West Bengal has discontinued CDPA, we felt justified in conducting a new cross-sectional study on NGNB beneficiaries.

Nevertheless, it is worth discussing the findings of the previous evaluation for obvious parallels. The study reported findings from an econometric analysis of survey data found that program beneficiaries were more likely to experience outcomes that are expected to support eventual food security at both the household and individual levels. Specifically, beneficiary households were more likely to “access credit for agriculture, more likely to invest in agriculture, and more likely to use improved inputs”, all of which are likely to lead to increased food production. It also found that beneficiary women are more involved in making decisions about food purchasing and consumption when their names are included on the title, suggesting that the pathway to improved food security had at least been initiated by the time of the survey.

These findings highlight the importance to maintain realistic expectations about the amount of time required to notice significant changes in outcomes like food security. For some households they require uprooting a livelihood, however insecure, and starting from scratch in a new homestead plot, building a house, moving, developing a new network, getting to know their communities and adjusting to their new

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<sup>9</sup> The Cultivation and Dwelling Plot Allocation Program (CDPA) was implemented across West Bengal in 2009 . Under the program, the government allotted eligible households between 0.10 and 0.16 of an acre of homestead land. Importantly, the household beneficiaries under CDPA were not previously living on the land to which they received title.

reality. But even for regularized households, who received *patta* for a homestead plot they had already been occupying and do not have to move or invest in new housing, seeing changes will take a while. Change will not start until beneficiaries internalize the legal power of the *patta* they have received and believe that the communities and authorities recognize their new rights. This is no small feat given that beneficiaries are among the most marginalized in their communities. Beneficiaries also need to have information about the options available to them. And they have to gain access to other resources, apply for those resources and obtain them. Finally, most livelihood activities take time to yield returns so there is an additional delay between when beneficiaries might be psychologically ready and economically equipped to invest in a new or enhanced livelihood strategy and when beneficiaries can start enjoying the returns of these activities.

On average, the beneficiaries in our study received *patta* only one to three years prior to the time of data collection. Arguably, for many of them it is too soon to already expect food-security improvements from *patta*, but given the critical nature of this development goal it is worth exploring whether any progress has been made.

## **Analytical Strategy**

We base the majority of our analysis on household level survey data collected between June and August 2015, which we use to: 1) develop a summary profile of target population of households, and 2) provide input into regression models that have been designed to estimate the effect of documentation on food security. When appropriate, we also draw insights from two other research efforts. The first, which we call household diaries (Diaries) are monthly interviews to a small subset of surveyed households that, while not representative, offer nuanced insights into questions that were difficult to pose in a one-off-survey and also into fluctuations over time. The second used qualitative interviews and focus group discussions to elicit information from community members about changes they experienced due to receiving *patta*.<sup>10</sup>

### *Household survey methodology*

In order to estimate the effects of having legal documents for a homestead plot, we designed the household survey sample to allow us to compare households with title against those that do not across a number of different outcomes. This section will detail the sampling, survey and analytical methodology that we implemented to facilitate this comparison.

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<sup>10</sup> Additional details about the sampling and analytical methodologies are available upon request.

## Sampling

To create the list of newly titled households, we relied on government lists of *NGNB* beneficiaries who had received *patta* between 2011 and 2015. We further stratified this sample across two types of beneficiaries – households that received title for land already in their possession (*regularized*) and households that received title for new land (*allocated*). This distinction bears significant import for two primary reasons. First, households that received new land were intentionally targeted by officials due to extremely poor socio-economic living conditions. Many such households, for example, were members of communities which traditionally earned income and through begging.<sup>11</sup> These households' baseline level of food security is therefore assumed to be lower than the beneficiaries who received regularization benefits through the program. Second, while new land allocation is a significant benefit, particularly in land scarce areas like West Bengal, it often is not without significant costs. These households likely experienced difficulties with the transition, including social disruptions and financial expenses associated with establishing a new homestead. Nevertheless, beneficiaries of allocated plots often formed discrete new communities, which along with their highly vulnerable status, often attract attention from other government agencies with additional services to distribute. These services could include agri-extension support, housing, water and sanitation, and others. Therefore, we expect that there would be differences in the outcomes associated with these two categories of beneficiaries.

To create the sample of households without ownership documents, we relied on lists created by government officials of households identified as *eligible* to receive *patta* under *NGNB*. According to the information given to us at the time of the survey, while these households had been identified, the process for *patta* issuance had not yet commenced. Admittedly, due to the fact that they had already been identified, it is possible that they received some information about the program and knew about the intention of the government to provide them with land titles. Therefore, to the extent that the measured outcomes are influenced by perceptions of tenure security, this formation of the control group might not perfectly estimate the effects associated with titling since households without any introduction to the program might experience lower levels of tenure security. While ideal, developing a control group without any ties to the program proved logistically difficult, as we had limited ability to find such households. More importantly, it would have been analytically imprudent. Households included in the current control group underwent similar vetting by government officials as those households who already benefitted and therefore assumedly share similar observed and, more importantly, unobserved

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<sup>11</sup> For more information about begging as a livelihood mechanism, see: MASSEY, D., RAFIQUE, A., & SEELEY, J. (2010). Begging in Rural India and Bangladesh. *Economic and Political Weekly*, 45(14), 64-71.

characteristics since they were likely identified and targeted using the same criteria. Developing a control group independent of government efforts might have missed some key elements that would ultimately bias the results. We nevertheless tried to mitigate the potential bias by removing from the control all households that explicitly stated that they were expecting *patta* from the government and also placing them into the treatment group. This adjustment is supported by recent research which suggests that expectation of titling and receiving actual title yields similar effects on perceptions of tenure security and resulting land use (Persha, et al. 2016).

After these adjustments, the sample consists of 1,320 randomly selected households, 973 of which serve as the treatment and 347 serve as the control. We use district-level survey weights to further ensure that the statistics reported are representative of the population distribution of NGNB beneficiaries.

#### Ensuring the comparability of documented and non-documented households

Admittedly, our identification methodology strays from the gold standard of randomizing treatment and control assignment, which would help mitigate the risk of selection bias and reduce the effect of unobserved characteristics influencing the regression results. One concern involves the risk of endogeneity in that the treatment villages and households may have advanced in the process for reasons that might also relate to the outcomes focused on in this study. For example, households in receipt of a *patta* might have had influence to expedite the process or might have been located in villages with more efficacious administrators, both of which might also influence food security. We tried to mitigate the possibility of such bias by selecting treatment and control households from similar administrative blocks across six districts in West Bengal (Bardhaman, Purba Medinipur, Maldah, South 24 Parganas, North 24 Parganas, and Jalpaiguri). These districts were chosen specifically to account for state-wide differences in topography, traditions associated with land use, administrative organization, and political willingness to implement reforms.

At the very least, documented and non-documented household groups should be statistically similar across the variety of observed socio-economic characteristics that are considered when determining eligibility. Such a comparison is displayed in Table 1.

The figures suggest that, by and large, the documented and non-documented households in our sample are statistically similar for the characteristics that are used to determine NGNB eligibility. The only observable difference is between the percentage of Scheduled Tribe (ST) households in the treatment and the control groups. We are not too concerned about this difference because so few ST households overall

made it into our sample.<sup>12</sup> We have also controlled for caste identification in our regression model in order to mitigate any skew caused by the difference.

### *Women-Centric Questionnaire*

As mentioned earlier, a key objective of the NGNB program is to secure the women's rights to their land. Indeed, targets under NGNB counted not only the number of titles distributed, but also the number of titles that included women's names on them, both jointly with their husband and independently. For that reason, the study intentionally collected responses from women within the sampled household. Across households with *patta*, enumerators either sought out the woman whose name had been included on the title or the wife of the man who was listed. This allowed us to gather information about the woman's perspective, but also may have affected the accuracy of information about topics about which men usually control.

### *Estimation Strategy*

Food security is defined loosely as having secure and sustainable access to diverse array of nutritious food. To be considered food *secure*, it is generally believed that success is required across three pillars: food availability, food access, and food use (Quisumbing et al. 1995). "Food availability" encompasses the idea that "enough food of adequate quality is produced, purchased, or received on a consistent basis." "Food access" requires having the means, whether economic or otherwise, to obtain nutritious food on a regular basis. Finally, "food use" measures the knowledge and ability to consume food that meets certain nutritional standards (which extends to issues around sanitation, food preparation, healthcare and water safety).

Our analysis adopts a proxy of the first two pillars with a measure of the household's ability to regularly provide food for all members. This is informed by self-reported instances during the last three months when there was insufficient food to feed the entire family. We last pillar of "food use" through a proxy which tracks household protein consumption, which is considered to be an indication of nutritional completeness and diet quality. For this we asked households whether any of their members had consumed animal or vegetable sources of proteins in the last 24 hours. To facilitate analysis, we constructed both variables as binaries, such that a positive response suggests food *insecurity* and a negative response suggests food security. In other words, if the respondent reports that the household did suffer food unavailability during the last three months or did not consume any protein during the last 24 hours, they

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<sup>12</sup> According to the latest Census only 7% of the population in West Bengal is considered ST.

are considered to have experienced food *insecurity*. Conversely, negative responses reflect the desired outcomes of the programs.

We use several logistic models to estimate the likelihood that households are food secure based on both outcome variables.

One set of models focuses on household participation in either the regularization or the new land allocation programs. In this model, the main independent variable *Program* indicates whether the household has received title under either of these programs or is part of the control group. The second set of models adds in a variable to indicate whether or not the title received includes the woman's name on the title. The model incorporates this variable by interacting it with *Program*.

In addition, the models consider a number of other explanatory variables that are believed to affect the household's food security. These variables include measures of socio-economic status, household composition, current livelihood practices and geographic location. Socio-economic characteristics include *Caste*, which is a useful predictor of household vulnerability and *PPI* (Progress out of Poverty Index), which is a probability measure for poverty based on answers to a series of ten questions. A higher PPI score suggests a lower likelihood that the household lives below the poverty line.<sup>13</sup> The models also include measures for household composition. *Household members* reports the total number of people living within the household, which provides an indication of the number of people that the household is responsible for feeding. *Adult men* reports the number of men in the household who are 16 years or above, the importance of which is based on the assumption that men within the household are the primary income earners. Therefore, the number of men is likely to act as a proxy for income generating options. *Married* captures whether the woman respondent is married, which is relevant because based on existing research, unmarried women (likely widowed in our sample) are more likely to be economically vulnerable and food insecure overall. Measures of livelihood strategies include whether the household owns any livestock or grows crops on the homestead plot. Finally, *District* captures any effects associated with the household's location. As discussed above, these effects might reflect geographic differences related to topography, land use traditions, administrative efficacy and political will.

Summary statistics for all variables are presented in Table 2.

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<sup>13</sup> For more information, visit: <http://www.progressoutofpoverty.org/>.

### *Regression Equation*

We use logistic weighted<sup>14</sup> regression models to assess the various NGNB effects on the two Food Security outcome indicators. Specifically, for outcomes associated with household level participation in the program, we estimated:

$$FS_h = \beta_0 + \beta_1 NGNB_h + \beta_2 X_h + \epsilon_v,$$

Where  $FS_h$  is the specific measure of food security being measured,  $NGNB_h$  represents participation in the program,  $X_h$  represents a vector of other explanatory variables included within the model, and  $\epsilon_v$  represents a robust error term at the village level.

We also estimate outcomes associated with the household having *patta* that includes the woman's name. For this, we estimated:

$$FS_h = \beta_0 + \beta_1 NGNB_h + \beta_2 NGNB_h * WN_h + \beta_3 X_h + \epsilon_v,$$

Such that  $WN_h$  interacts with  $NGNB_h$  to estimate any additional effect associated with including the respondent's name on the title. Importantly, this analysis restricts the documented sample to those who have already received documents, since it is not certain whose name(s) will be included on the *patta* that have yet to be delivered.

## **Results**

We summarize all regression results in Tables 3 and 4, which report the marginal effects resulting from the logistic weighted regression models and include the standard errors within parentheses.

### *NGNB Titling Effects*

We first look at effects of having documented, or regularized, rights over homestead plots. For that, we turn to models 1 and 2 in Table 3 which suggest that documentation has had no significant effect on food security. This finding holds regardless of whether we focus on households' ability to avoid hunger during the previous three months (first measure) or on our very rough indicator of their protein consumption during the previous 24 hours (second measure).

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<sup>14</sup> All estimates have been estimated to improve representativeness of NGNB targeted across West Bengal.

While perhaps not surprising considering the similarly insignificant effects found by previous research efforts, it is worth noting that those who engaged in either crop cultivation or animal husbandry were less likely to report food insecurity. Specifically, households which engaged in crop cultivation were 12% less likely to report food unavailability during the previous three months and 21% less likely to report a lack of protein consumption during the previous 24 hours.<sup>15</sup> While animal husbandry did not significantly affect food availability during the previous three months, it did reduce the likelihood that a household would not consume protein by 8%.

Despite the clear benefits, our findings suggest that the vast majority of households which had received *patta* through NGNB are *not* engaging in such efforts on their homestead plots. In fact, only about 5% of NGNB beneficiaries (both regularized and allocated) are growing crops on their homestead plot. The incidence of animal husbandry is similarly low, especially among the allocated beneficiaries.<sup>16</sup> Given that they are otherwise comparable to those whose plots were regularized through the same program, we suspect their low uptake of animal husbandry has to do with the investments and delays related to moving and settling in a new place.

It is worth exploring what might explain such a low take-up of livelihood activity on the homestead plot. Worryingly, depending on the program, 68% of beneficiaries said they were not capable of growing a vegetable garden on their homestead plot. The reasons for this inability are listed in Table 5, namely: (i) the water supply is inadequate (plot is too dry and/or there are no water facilities nearby), (ii) that the plot needs fencing, and (iii) that the plot is too small to accommodate a kitchen garden.

The survey instrument did not include similar questions about animal husbandry, though it is likely that similar obstacles, especially lack of water and infrastructure, have had a similar negative influence on the ability for livestock to thrive.

The next set of models presented in Table 3 compares allocated beneficiaries to the control group, and yield similarly insignificant effects on food security, across both measures. However, an interesting finding emerges from the results related to livelihood strategies. First, we see no effect on food availability that can be attributed to crop cultivation. Crop cultivation, however, does positively affect

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<sup>15</sup> Additional research would help understand how crop cultivation contributes to protein consumption. One hypothesis is that these crops include lentils or pulses.

<sup>16</sup> Only 17% of allocated beneficiaries and 38% of regularized beneficiaries engage in animal husbandry.

protein consumption, though. Animal husbandry, on the other hand, does not seem to improve protein consumption, but does affect food availability.

When interpreting these results, it is important to keep in mind that these models exclude regularized beneficiaries and only include beneficiary households who have recently moved onto a new homestead plot (allocated). In addition to the financial and social hardships they likely incurred due to the move, these allocated beneficiaries also likely have not spent enough time on the plots to establish a viable home garden. The model compares these allocated beneficiaries to households that have likely been living on the same land for a longer period of time, but are untitled, and according to the above described pathways, lack the incentives and the access to services required to fully invest in home gardening.

Animal husbandry, particularly of larger animals, on the other hand, need not necessarily be tied to any specific plot of land. While animal sheds and other basic infrastructure are often helpful, animals themselves are relatively mobile. Therefore, beneficiary households required to move onto new plots of land can bring their animals with them. Further, information gathered through our qualitative and diaries studies reveal that animals are often kept off the homestead plot, for example on land that the household accesses either with (e.g. community land) or without (e.g. encroachment) permission. It is therefore easier for untitled households to benefit from keeping animals as well.

Understanding the relevance of these possible pathways helps elucidate these results. Within this sample of allocated beneficiaries and non-beneficiaries, those that did engage in crop cultivation may not have yielded sufficient output due to lack of time, investment, or necessary infrastructure (like water) to affect food availability. The reasons for the significant effects on protein consumption, however, remain unclear, and would require additional research to understand.

The effects of animal husbandry across the allocated and non-beneficiary groups is also somewhat non-intuitive, in that having livestock seems to aid food availability, but not protein consumption. These results may find explanation in the way in which the animals are used, namely for revenue generation (which can be used to buy food when in need) and not for direct consumption.

#### *Effects of the gender inclusive mandate*

The NGNB program also required that all titles include a woman's name. The relevant theory of change is based on the idea that when women are documented as owners of land, they will feel empowered to influence decisions to effectively use the land to enhance the well-being of all household members. This includes decisions about crops to grow and animals to raise, as well as how the outputs of those efforts are

used – either for direct consumption or revenue generation. Past research on women beneficiaries suggests that women do enjoy increased decision-making power, which a majority of NGNB beneficiaries in our sample also mentioned as a benefit. This section, however, will look specifically into whether including their names on the *patta* has had any effect on the household’s food security.

We again start with effects associated with documents received through the regularization process, presented in Table 4. Consistent with the results described above, we continue to find no significant effect of titling on protein consumption, with or without the women’s name included on the title. However, controlling for the woman’s name suggests that the average program beneficiary is significantly less likely to experience consistent food unavailability than households without documentation.

The analysis of allocated beneficiaries similarly suggests an effect on food availability. However, this model suggests that there is an equally negative effect associated with the woman’s name. Moreover, while there is no overall titling effect detected for protein consumption, having a woman’s name included on the title makes a household almost 40% less likely to have consumed protein in the last 24 hours.

These results are concerning, as they suggest that including a woman’s name on the title might actually work towards the detriment of the household. Rather than titling effects, however, we believe that these findings reflect some observable differences between households whose *patta* include women’s names and those whose *patta* do not. Specifically, we suspect that households with gender inclusive *patta* have worse starting conditions. In other words, the results suggest that, on average, the beneficiary households in which women are named on *patta* were more food insecure households to begin with and that, as of now, the programs have not eliminated this food security gap. The data provide some indication of this. For example, the percentage of Muslim households with gender inclusive *patta* is significantly higher than of those with only men listed. As discussed above, Muslim households face high levels of discrimination and have been subject to historic economic vulnerability, both of which would have negatively impacted their levels of food security.

#### *Effects of Other Variables on Food Security*

The results indicate significant effects across two other categories of variables. We first find significant explanatory power across socio-economic characteristics. For example, examination of the PPI variable indicates a nominal, but significant, negative correlation between the PPI score and likelihood of food insecurity. The PPI score is based on answers to ten survey questions that render a household score ranging between 0 and 100. Higher scores indicate a higher probability of living above the poverty line. Similarly, membership in SC, ST, or minority groups, all of which are associated with economic

vulnerability, is significantly related to an increased likelihood of household food insecurity across all the models.

We also see significance across regional variation. In particular, households located in Jalpaiguri, South 24 Parganas, North 24 Parganas and Purba Mednipur have a significantly greater likelihood of food insecurity. Households located in South 24 Parganas have the highest likelihood of experiencing food insecurity. Across the models, the likelihood increases between 31-37% on average for households in this district. The effect on protein consumption seems to be the strongest in Jalpaiguri. Regional differences may be due to variations in program success, with programs working better in some districts than in others, or to variations between each district's starting point, with some districts targeting a population that is more vulnerable than others, either because district conditions are worse or because the officials in those districts have done a better job at targeting those who are vulnerable.

## **Discussion**

Food insecurity continues to be an issue across rural West Bengal. Between June and September of 2015, about 20% of households targeted by the NGNB program reported periods in which they neither produced nor were able to purchase sufficient food to feed their family, and over a quarter reported not consuming protein within the past 24 hours. This suggests that food security remains a key concern across households targeted by the program.

With additional support from the Bill and Melinda Gates Foundation, we revisited 150 of the survey respondents every month for nine months. In an effort which we called the household diaries, we tracked information on a variety of land-related topics including agricultural investments, financial inputs and outputs, and family welfare. Specifically on the topic of food security, we not only asked about food availability and protein consumption, but also collected information about coping mechanisms that the household undertook in times of food scarcity.

The coping mechanisms reported by the participating respondents are depicted in Figure 1. Several messages emerged. First, there are many coping mechanisms. Second, households tend to resort to a combination of measures each time they lack food, as shown by the fact that if one adds the coping mechanisms used for any given month the total far exceeds 100%.

A consistent 70-80% of respondents who experienced periods of food scarcity bought food on credit. The majority of respondents also received support from relatives. Neither of these findings is remarkable since both are common practices across rural communities even during periods of food abundance.

Yet some of the findings are troubling. The diaries revealed that many households, as many of 30% of the food insecure in our sample, opted for withholding food from women and girls. This disturbing trend is consistent with the gender discriminatory norms that the program is working to change. The diaries also revealed that a significant minority is either going to sleep hungry or skipping meals altogether.

Through the titling process, beneficiary households are expected to gain incentives to adopt economically superior livelihood strategies and access to resources and programs that allow them to undertake these new economic activities in order to reduce current levels of food insecurity. While the available data does not provide information about these beneficiaries over time, which might provide a longitudinal estimate of whether the program had an overall effect over food security, the cross-sectional comparison with non-beneficiaries suggests no average improvement.<sup>17</sup>

It is also clear from the regression results that kitchen gardening and animal husbandry can be key tools to reducing food insecurity. However, our findings suggest that the vast majority of program beneficiaries are *not* engaging in such efforts on their homestead plots. In fact, only 5% of NGNB beneficiaries—one out of 20 households who received *patta* and are in possession of their land—are growing crops on their homestead plot. The incidence of animal husbandry is similarly low, especially among the allocated beneficiaries. Given that they are otherwise comparable to those whose plots were regularized through the same program, we suspect their low uptake of animal husbandry has to do with the investments and delays related to moving and settling in a new place.

Therefore, the low percentage of households growing crops on their homestead plots may be a reason for concern because crops can supplement households' livelihood strategies and improve their regular access to food. It is furthermore of concern because qualitative interviews with beneficiaries suggest that women are likely to be involved in decisions on what to grow, to invest labor in them, and to be involved in decisions on whether to sell or consume the crops, as well as on how proceeds from any sales are used.

It is worth exploring what might explain such a low take-up of livelihood activity on the homestead plot. Worryingly, depending on the program, 70-75% of beneficiaries said they were not able to grow a vegetable garden on their homestead plot. Those who said they cannot have a garden on their homestead mentioned the four obstacles reported in Table 5, namely: (i) that the water supply is inadequate (plot is too dry and/or there are no water facilities nearby), (ii) that the plot needs fencing, and (iii) that the plot is

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<sup>17</sup> Furthermore, on average, the beneficiaries in our study received *patta* only one to three years prior to the time of data collection. Arguably, for many of them it is too soon to already expect food-security improvements from the title.

too small to accommodate a kitchen garden. Field observations suggest that some of this gap may be attributed to cultural practices and that kitchen gardens may simply not be a common component of households' livelihood strategies in these areas.

Such understanding provides insight into possible improvements that could make such land reform programs much more effective at reducing levels of food insecurity by facilitating home-based livelihood activities. For example, land reform programs should ensure homestead plots are large enough to enable beneficiaries to supplement their livelihood strategies with land-related strategies, engaging in a combination of vegetable gardening, tree planting or animal husbandry that is appropriate for them. If larger homestead plots are not possible, either as a result of past decisions or because homestead land is scarce, the programs should then consider supplementing the homestead plots with suitable agricultural land nearby.

Land reform programs could also consider coordinating with agencies providing complementary services such as housing, water, sanitation, agricultural extension or training, seedlings, animal husbandry support, etc. Beneficiaries' adoption of land-based livelihood strategies is heavily influenced by their ability to access these services but our findings indicate that most beneficiaries are not receiving these services. Field observations suggest that this is unlikely to change organically and point instead for the need to coordinate with other agencies.

It is also important that these efforts target women, as they are more likely to stay at home and implement the necessary livelihood tactics. This could be addressed by increasing the number of model sites, promoting vegetable gardening through radio programs, Self-Help groups, and other channels, and by emphasizing livelihood training programs that encourage vegetable gardening. Qualitative field work also suggests that time is the biggest constraint. Many women are wage laborers and since many of their spouses migrate for work, they have to take care of all the household work in addition to their wage work.

## **Conclusion**

As mentioned, previously, developmental outcomes such as food security take time to develop, and are often influenced by a multitude of external factors. This research highlights the role that home-based livelihood strategies might be able to play in mitigating the risk of food security. However, many implementation challenges continue to prevent such efforts from being adopted at scale. Land reform programs interested in advancing goals of socio-economic improvement, in addition to legal protections against eviction and dispossession, should dedicate resources to removing those programmatic hurdles, or providing additional services to help promote these activities.

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**TABLES AND FIGURES:**

**Table 1: Statistical comparison of beneficiary and control households**

		<b>Control (n=347)</b>	<b>Treatment (n=973)</b>	<b>Significance</b>
Caste	SC	64%	57%	
	ST	5%	11%	***
	OBC/ General	14%	17%	
	Minority	18%	15%	
Religion	Hindu	82%	85%	
	Christian	0%	0%	
	Muslim	18%	15%	
Economic Status	Likely to be living below \$1.25 poverty line	40%	41%	
	Main income from casual or agricultural labor	72%	82%	

Notes: \*\* Significant at 0.05, \*\*\* Significant at 0.01.

**Table 2: Description of variables**

	Dummy?	Mean	Standard Error
<i>Food security outcomes</i>		0.21	0.02
Food unavailability in last 3 months		0.28	0.02
No protein consumption in 24 hours			
<i>Program participation</i>			
Regularized		0.61	0.02
Allocated		0.12	0.01
Control		0.26	0.02
<i>Gender inclusivity</i>			
Women's name included on <i>patta</i>		.49	0.02
<i>Socioeconomic characteristics</i>			
Caste			
SC	Y	0.59	0.02
ST	Y	0.10	0.01
Minority	Y	0.16	0.02
Gen / OBC*	Y	0.15	0.01
Income level proxy			
PPI		27.67	0.39
<i>Household composition</i>			
Number of household members		3.90	0.06
Presence of adult men in household	Y	0.94	0.01
Respondent is married	Y	0.89	0.01
<i>Livelihood strategies</i>			
Household owns livestock	Y	0.38	0.02
Household grows crops on homestead land	Y	0.06	0.01
<i>Location</i>			
Purba Mednipur	Y	0.08	0.01
Maldah	Y	0.12	0.01
South 24 Parganas	Y	0.28	0.02
North 24 Parganas	Y	0.05	0.00
Jalpaiguri	Y	0.17	0.01
Bardhaman*	Y	0.30	0.02

**Table 3: Regularized and Allocated titling effect on food availability and protein consumption**

	Regularized		Allocated	
	(1)	(2)	(3)	(4)
	Food availability	Protein consumption	Food availability	Protein consumption
Regularized NGNB	-0.04 (0.03)	-0.03 (0.06)		
Allocated NGNB			-0.04 (0.03)	0.09 (0.10)
Woman's name on the title				
Caste				
SC	0.10* (0.03)	0.08 (0.05)	0.12* (0.05)	0.07 (0.08)
ST	0.17* (0.05)	0.13 (0.09)	0.15* (0.08)	0.25 (0.22)
Minority	0.11* (0.05)	0.01 (0.05)	0.15* (0.07)	0.08 (0.09)
Number of household member	-0.01 (0.01)	-0.03 (0.02)	-0.01 (0.01)	-0.02 (0.03)
Any adult men in the HH	0.04 (0.05)	0.00 (0.08)	0.05 (0.06)	-0.05 (0.18)
Own any livestock	-0.01 (0.03)	-0.08* (0.04)	-0.07* (0.03)	-0.06 (0.06)
Grew any crops on homestead land	-0.12* (0.04)	-0.21* (0.05)		-0.26* (0.04)
Married	-0.14 (0.08)	-0.01 (0.08)	-0.06 (0.03)	-0.03 (0.14)
PPI	-0.00* (0.00)	-0.00 (0.00)	-0.00* (0.00)	-0.00 (0.00)
Agricultural labor	-0.07 (0.09)	-0.01 (0.07)	-0.12* (0.06)	0.15 (0.11)
District				
Purba Medinipur	0.29* (0.06)	0.10 (0.06)	0.20* (0.06)	0.23* (0.09)
Maldah	0.03 (0.02)	0.12 (0.06)	0.11* (0.03)	0.25* (0.06)
South 24 PGS	0.37* (0.06)	0.13* (0.06)	0.30* (0.07)	0.24 (0.17)
North 24 PGS	0.19* (0.06)	0.01 (0.06)	0.18* (0.06)	0.02 (0.07)
Jalpaiguri	0.26* (0.07)	0.19* (0.06)	0.26* (0.04)	0.34* (0.08)
Observations	1157	1157	500	510

Marginal effects; Standard errors in parentheses

(d) for discrete change of dummy variable from 0 to 1

\*  $p < 0.05$

**Table 4: Effect of women's names included on the *patta* on food availability and protein consumption**

	Regularized		Allocated	
	(5)	(6)	(7)	(8)
	Food availability	Protein consumption	Food availability	Protein consumption
Regularized NGNB	-0.18*	-0.10		
	(0.08)	(0.07)		
Allocated NGNB			-0.16*	-0.13
			(0.07)	(0.10)
Woman's name on the title	0.15*	0.06	0.16*	0.39*
	(0.06)	(0.05)	(0.07)	(0.10)
Caste				
SC	0.10*	0.06	0.10*	0.09
	(0.02)	(0.05)	(0.05)	(0.08)
ST	0.24*	0.11	0.14	0.31
	(0.06)	(0.10)	(0.07)	(0.24)
Minority	0.13*	0.01	0.14*	0.12
	(0.06)	(0.05)	(0.06)	(0.10)
Number of household members	-0.01	-0.03	-0.01	-0.02
	(0.01)	(0.02)	(0.01)	(0.03)
Any adult men in the HH	0.06	-0.03	0.05	0.02
	(0.04)	(0.09)	(0.05)	(0.16)
Own any livestock	-0.04	-0.08*	-0.06*	-0.04
	(0.03)	(0.04)	(0.02)	(0.06)
Grew any crops on homestead land	-0.12*	-0.20*		-0.25*
	(0.05)	(0.06)		(0.03)
Married	-0.20*	-0.00	-0.05	-0.04
	(0.08)	(0.08)	(0.03)	(0.15)
PPI	-0.00*	-0.00	-0.00*	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Agricultural labor	-0.08	0.00	-0.11*	0.16
	(0.11)	(0.08)	(0.04)	(0.11)
District				
Purba Medinipur	0.29*	0.13*	0.18*	0.24*
	(0.06)	(0.06)	(0.05)	(0.10)
Maldah	0.02	0.13*	0.10*	0.27*
	(0.02)	(0.06)	(0.03)	(0.06)
South 24 PGS	0.40*	0.15*	0.27*	0.23
	(0.06)	(0.06)	(0.07)	(0.16)
North 24 PGS	0.12*	0.04	0.15*	0.02
	(0.04)	(0.05)	(0.06)	(0.07)
Jalpaiguri	0.28*	0.20*	0.23*	0.34*
	(0.07)	(0.05)	(0.05)	(0.08)
Observations	1038	1038	500	510

Marginal effects; Standard errors in parentheses

(d) for discrete change of dummy variable from 0 to 1

\*  $p < 0.05$

**Table 5: Beneficiary reasons for not growing crops on homestead plots**

		<b>Beneficiary Households</b>	
		Regularized NGNB	Allocated NGNB
Not capable of growing crops on homestead plot		68%	75%
Why not capable?	The land is too dry	33%	62%
	There are no water facilities nearby	10%	2%
	The property needs fencing	27%	16%
	The land is not levelled	4%	3%
	The land needs to be cleared	6%	1%
	The land is too small <sup>(*)</sup>	19%	15%

<sup>(\*)</sup> Figures for “the land is too small” are likely to be a lower bound since it was not stated explicitly as an option in the survey instrument. It was created organically through mentions captured under the “other reasons” category.

**Table 6: Incidence of animal husbandry across beneficiaries**

<b>Percentage of Beneficiary Households with Livestock</b>		
	Regularized NGNB	Allocated NGNB
Households with draft animals (buffalos, oxen, horses)	1%	0%
Households with cows	25%	9%
Households with small animals (sheep, goats, pigs)	12%	7%
Households with poultry	20%	5%

**Figure 1: Coping strategies utilized by West Bengal households when insufficient food is available**

