Land Reforms and Women's Nutrition: Evidence from India

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Objective

Access to land is a crucial determinant of poverty in poor, agrarian communities of developing countries. Hence, redistributive policies in many countries have focused on land reforms to ensure a more equitable distribution of land among the rural population. India, for example, embarked on an ambitious and extensive program of land reforms from the 1950s onwards. Prior research suggests that land reforms in India did reduce poverty (Besley and Burgess, 2002). However, the effect of land reforms on hunger or the actual nutritional status of the rural poor has not been properly studied. This research therefore investigates whether land reforms in India led to an improvement in the long term nutritional status of rural women as measured by height. Specifically, it addresses the following questions:

- What is the overall effect of a woman's exposure to land reforms on her height?
- What is the effect of each additional year of exposure to land reforms during childhood or adolescence on a woman's height?
- Are there intergenerational effects of land reforms? Does mother's exposure to reforms improve nutritional status for 0-3 year old children?

Background

India is home to a significant fraction of the world's poor, and the bulk of India's population is dependent on agriculture for their livelihoods. Hence, under the system of planned development in post-independent India, land reforms were considered as being essential in eradicating rural poverty. Starting from the early 1950s, a considerable number of land reform legislations were enacted by most Indian states. These reforms can be grouped into the following four categories – tenancy reforms, which aimed to regulate tenancy contracts and/or transfer ownership to tenants; abolition of intermediaries that sought to abolish the hierarchy of proprietary interests that existed between the State and the actual cultivator; ceilings on landholdings that allowed for surplus land to be redistributed to landless households; and land consolidation reforms that sought to consolidate disparate or fragmented land holdings. However, this large volume of reforms has been the subject of widespread criticism because of the flaws in their design and the political failure to actually implement these reforms (e.g., see Thorner, 1962; Appu, 1996; Behuria, 1997, Mearns, 1998). Interestingly, the only comprehensive, quantitative evaluation of these reforms shows that in spite of all their limitations, land reforms did reduce poverty in rural India (Besley and Burgess, 2002). In their analysis, Besley and Burgess use data on the 16 major Indian states over a period of 35 years to estimate the effect of land reforms on rural poverty – as measured by the headcount index and the poverty gap index.

However, there is little or no empirical evidence on the effectiveness of land reforms in improving measures of individual well being, such as freedom from hunger and better nutrition. This research aims to fill that void by looking at the effect of land reforms on women's nutritional status in rural India. The focus on women is largely dictated by the lack of comparable data on men, and it does make it more challenging to find any significant effect of land reforms on nutritional status. This is because of the following reason: gender discrimination in intrahousehold resource allocation, including allocation of food is well documented in the context of India (Rosenzweig and Schultz, 1982; Behrman, 1988; Behrman and Deolalikar, 1990). Hence,

sons rather than daughters were more likely to benefit from a family's improved access to land and therefore, better command over food, if any, following land reforms. Therefore, any effect of reforms on the long term nutritional status of women are likely to be small, and can probably be interpreted as the lower bound on the actual nutritional benefit from these reforms.

The measure of nutritional status used in this research is the height of a woman. Adult height is an indicator of nutrition and health investments experienced in childhood, and growth deficits in childhood are largely responsible for short stature in adulthood (Martorell and Habicht, 1986). Height is also correlated with educational and labor market outcomes, and variations in adult height within countries have been found to be closely related to socio-economic status (Strauss and Thomas, 1998). Hence, if land reforms led to better access to land, and a lower likelihood of facing chronic hunger and malnutrition, we can expect to see an effect of these reforms on the long term nutritional status or the height of women who had exposure to such reforms. Assuming that height does not increase beyond age 18, I estimate the effect of being exposed to land reforms at any time during the first 18 years of life on a woman's height.

Data and methods

This research primarily uses data from wave 2 of the National Family Health Survey (NFHS-2) implemented during 1998-99 in India. NFHS-2 surveyed a nationally representative sample of more than 90,000 women between the ages of 15 and 49.[1] For each woman, we have information on her height, year of birth, age, region or state of residence, place of residence (rural / urban), etc.[2] I restrict the data to birth cohorts up to 1980 to ensure all women in the final sample are at least 18 years old. The individual level data was merged with a state level dataset on land reform legislations in India's 16 major states.[3] The final dataset used in this analysis has information on more than 70,000 women across 16 states and 32 birth cohorts (1949 to 1980).

Land being a "state subject" in India, there is considerable variation across states and birth cohorts in the implementation of various land reforms. I utilize this variation to estimate the effect of a woman's exposure to land reforms on her long term nutritional status, i.e., height, in a difference-of-difference (DoD) framework – by controlling for state and cohort fixed effects. I follow two different approaches in implementing the DoD analysis. First, I estimate the effect of a woman's overall exposure to land reforms on her height, using equation 1.1 below –

$$H_{ics} = \tau_c + \mu_s + \sum_{j=1}^{4} \beta^j . REF_{ics}^{j} + \pi_1 . X_{ics} + \varepsilon_{ics} \quad \ldots\ldots \quad (1.1)$$

where *i*, *c*, and *s* are subscripts for individual, cohort, and state respectively; τ_c and μ_s denote cohort and state fixed effects; *X* is a vector of individual level controls that include dummies for caste and religion; REF^j is a dummy variable that is equal to one if woman *i* of birth cohort *c*, in state *s* was exposed to reform *j* before age 18, where *j* = 1, …4, for the four types of reforms; and ε_{ics} is an idiosyncratic error term. The estimates of β^j therefore provide us with the effect of

[1] Detailed information on the NFHS is available at: http://www.nfhsindia.org/

[2] Data on women's height was not collected in NFHS-1 (1992-93). Also, NFHS did not collect data on men's anthropometric measures in any of the waves so far.

[3] Data on various land reform legislations were obtained from the detailed list provided by Besley and Burgess (2002). For further details on land reform legislations in Indian states, see Appu (1996), Behuria (1997), and Mearns (1998).

being exposed to a particular type of reform before age 18 on a woman's height.[4] In other words, the β^j s are estimates of the overall *treatment effect* of land reforms. Equation (1.1) is estimated on the rural sub-sample, since women in rural areas were actually exposed to these reforms, and standard errors are clustered at the state level.

In the second approach, I estimate a dose – response type of a relationship, where the key regressors are each woman's years of exposure to a particular type of reform before age 18. Equation 1.2 shows this below, and is similar to equation 1.1, apart from the main regressors of interest that are now $REFYRS^j$ (years of exposure to reform *j*, before age 18) instead of REF^j.

$$H_{ics} = \tau_c + \mu_s + \sum_{j=1}^{4} \gamma^j . REFYRS_{ics}^j + \pi_2 . X_{ics} + \theta_{ics} \quad \ldots\ldots. \quad (1.2)$$

The estimates of γ^j therefore provide us with the effect of each additional year of exposure to a particular type of reform before age 18 on a woman's height.[5] As before, equation 1.2 is estimated only for women in rural India, and standard errors are clustered at the state level.

While the DoD analysis above accounts for state and cohort level heterogeneity, it still does not account for state level attributes that vary across cohorts, and are correlated with land reforms as well as nutritional status. To eliminate any bias arising from the omission of such variables, I extend the DoD analysis to include the urban sample – not likely to be affected by land reforms – and re-estimate equations 1.1 and 1.2 in a difference-of-difference-of-difference (DoDoD) framework, where the fixed effects and the reform variables are further interacted with a group (rural/urban) dummy. This is shown in equation 2.1 below as an extension to equation 1.1

$$H_{ics} = \tau_c + \mu_s + \sum_{j=1}^{4} \beta^j . REF_{ics}^j + \pi_3 . X_{ics} + R + R * \tau_c + R * \mu_s + \mu_s * \tau_c + \sum_{j=1}^{4} \delta^j . R * REF_{ics}^j + \phi_{ics}$$

…….. (2.1)

where *R* is a dummy variable that is equal to one for rural residents. Equation 2.1 therefore allows the state and cohort fixed effects to vary by residence (rural/urban), and also includes state-cohort interactions, which account for time varying state level attributes. The estimates of δ^j provide us with the differential effect of exposure to particular reforms on the height of a woman in rural India versus one in urban India. Similarly, equation 1.2 can be extended to estimate a DoDoD model for the effect of each additional year of exposure to reforms on a woman's height in rural versus urban India.

Finally, both sets of analyses described above can be extended to examine whether land reforms have any intergenerational effects. Specifically, given that NFHS-2 also collected anthropometric and health data on 0-3 year old children for women in both rural and urban India, the equations described above can be re-estimated to look at the effect of mother's exposure to land reforms on nutritional status in early childhood. A significant and positive relationship between mother's exposure and children's nutritional status would suggest that the benefits of redistributive policies that improve health and nutrition can spill over to successive generations.

Preliminary results suggest that land reforms, especially reforms targeting the abolition of intermediaries and imposition of land ceilings, did lead to a significant improvement in women's long term nutritional status or height. This implies that pursuing further land reforms can be effective in comprehensively dealing with poverty and hunger in rural India.

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[4] Note that reforms implemented before a woman's birth in her state of residence also count among reforms experienced before age 18.

[5] The maximum exposure to a particular reform is therefore 18, and this applies to reforms implemented before or at birth.

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