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Who grows vegetables?

Smallholder commercialization in Odisha, India

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Key highlights

- We analyze data from a house listing exercise, conducted as part of the INCATA project, covering 35,913 households across 154 villages in 24 blocks in six districts in Odisha, to assess the extent, patterns, and growth of vegetable farming.
- We successfully listed 27,189 of the 35,913 households; 69% of those we successfully listed reported being engaged in cultivation in the past year. Of these, 95% grew paddy, the most important staple grain in the state, while only 22% grew vegetables (this is equal to 15% of all those listed). A larger share of listed households (34%), however, had a kitchen garden; 24% of listed households had both a vegetable farm and a kitchen garden. Only 14% of those with kitchen garden also sell from the kitchen garden.
- Although only 15% of all those listed grew vegetables themselves, thrice as many had worked on others' vegetables vegatable fields, highlighting the wider implications of vegetable cultivation for employment.
- Vegetable cultivation has a non-linear relationship with landholding size, with those owning around 2-5 acres (small farmers) or 10-12 acres (medium farmers) having a higher proportion of vegetable cultivators than others. This suggests that vegetable cultivation is both inclusive while also permitting larger - scale commercialization. Land leasing is widespread.
- Over 85% of those who began growing vegetables after 1950 started selling vegetables that same year, underlining the commercial orientation from the start. At the same time, growing for own consumption is an important driver for vegetable farming.
- The recent spurt in the numbers of vegetable farmers has been disproportionately in high “intensity” blocks, i.e. where there are more vegetable farmers, implying a clustering effect. Regionally, the recent growth is relatively greater in the coastal districts (Ganjam, Cuttack) and in what we refer to as the central spine (Anugul, Keonjhar and Koraput).

- Irrigation appears to be by far the most important correlate of vegetable cultivation. Contrary to popular perception that marketing constraints deter diversification into vegetables, water and land constraints prevent uptake; further, the most frequent reasons for those who give up vegetable production are water constraints and animal conflict. Further analysis will investigate in detail the enablers of and barriers to commercial vegetable cultivation.

Introduction

To what extent is vegetable cultivation a pathway to agricultural commercialization in Odisha, and can such a process be inclusive of smallholders? This project note draws on an extensive house listing exercise (INCATA Odisha House listing) that covered 35,913 households in 154 villages across 24 blocks and six districts in Odisha, India, to ascertain the extent to which farmers participate in vegetable farming. We ask: How many rural households grow vegetables? Who and where are they? Why do others not grow vegetables? We supplement our analysis with insights from a community survey (INCATA Odisha Community Survey) conducted concurrently with the house listing exercise.

Both the house listing exercise and the community survey were undertaken as part of a larger research effort under a project called INCATA in Odisha India, (See Project Note 1), As part of the house listing, we documented some key characteristics to be able to establish the scale of vegetable cultivation. The community surveys conducted in each of the 154 villages documented a range of characteristics of the sample village, including socio-demographic characteristics, infrastructure, government programs, and shocks, etc. and to map the transformation within the village between 2015 and 2025 across various spheres of economic life, especially within agriculture.

Findings

How many households farm vegetables?

As part of the house listing process, we counted 35,913 households in the study area. Of these, we were able to speak with 78% of the households during our survey window; the others were unavailable due to various reasons (About 3% of all those engaged in cultivation were members of producer groups of any type.

Table 1:); 97% of those we contacted agreed to listing, totaling 27,189 households. Of those listed, 69% farmed in the past year, of whom virtually all (i.e. 95%) grew paddy. About 22% of these households who engaged in cultivation in the past year grew vegetables. This proportion is significantly higher than national surveys estimate for Odisha overall, likely because we focused on vegetable growing regions.

We asked both those who farmed and those who did not (i.e. for all 27,189 we listed successfully) if they had a kitchen garden where they grew vegetables. More households (34% of all listed) had a kitchen garden relative to those who farmed vegetables. Only 14% of those with a kitchen garden also sell from the kitchen garden. In general, it does not seem to be the case that kitchen gardens are a first step towards commercialization.

Among those who declared that they currently had neither kitchen gardens nor were active in agriculture, only 7% had ever grown vegetables either on farms or as part of kitchen gardens. We will discuss the reasons later and focus now on employment.

Interestingly, overall, 45% of all those listed had worked on others' vegetable fields. This therefore suggests that although only 15% of all those listed grew vegetables themselves, thrice as many had worked on others' vegetable fields, underscoring the potential positive implications for employment when vegetables are the pathway to agricultural commercialization. About 3% of all those engaged in cultivation were members of producer groups of any type.

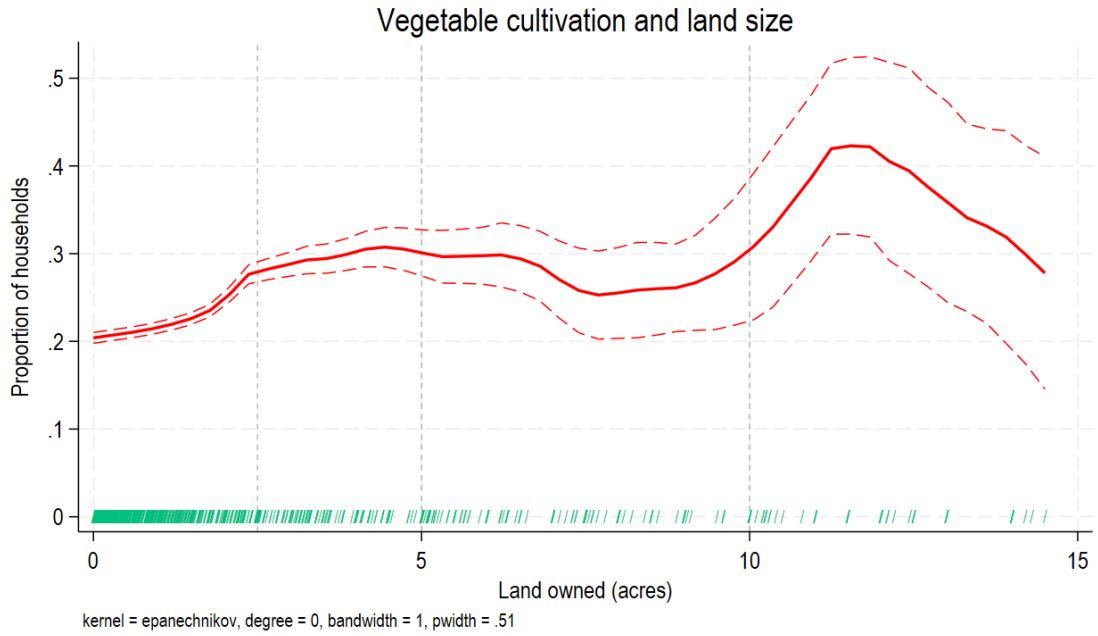
Table 1: A profile of the households in the study area

Details	Number	Proportion	Proportion of all listed households
Found household	27,905	0.78	
Agreed to listing	27,189	0.97	
Engaged in cultivation the past year	18,876	0.69	
Of which: Grew paddy the past year	18,002	0.95	0.66
Grew vegetables the past year	4,196	0.22	0.15
Grew vegetables in kitchen garden the past year	9,299	0.34	0.34
Ever grew vegetables on farm or kitchen garden (among households who did not farm or did not grow vegetables this past year)	584	0.07	0.02
Has worked on vegetable fields of others (all listed households)	12,115	0.45	0.45

Who grows vegetables?

Figure 1 represents a local polynomial regression of the share of households who farm and also grow vegetables against reported land owned. The relationship between the likelihood of farming vegetables has a non-linear relationship with land owned. Those with land sizes between 2 and 5 acres (i.e. small farmers, according to official definitions in India) are the most likely to grow vegetables; farms that are smaller i.e. marginal farmers, are much less likely to grow vegetables. Medium-sized farmers with 10-12 acres also seem likely to grow vegetables, though as farms get larger, the proportion of households growing vegetables declines again. These data suggest that vegetable farming can be inclusive of small farmers, while at the same time also accommodating larger scale commercialization.

Figure 1: How is land size correlated with vegetable cultivation?



Source: INCATA Odisha House listing, 2025. Notes: the rug plot shows the distribution of the sample across different landholding sizes. The vertical lines represent different cutoff for classifying farmers into marginal (<2.5 acres), small (2.5 to 5 acres), semi-medium (5 to 10 acres).

As part of the house listing, we recorded whether households grow paddy. We find that 74.7% grow paddy but no vegetables, 20.7% grow both, and just 1.5% grow vegetables but no paddy, with the rest (3.1%) growing neither. Virtually everyone grows paddy, not only because it is a staple that farmers may use for their own consumption, but also because of a robust public procurement system. We compare some of the characteristics between vegetable growers and non-vegetable growers. The choice of what to grow is imbricated with irrigation access.

- Farmers without access to irrigation are more likely to grow only paddy, but no vegetables. Those with irrigation are disproportionately likely to grow both vegetables and paddy.
- A greater proportion of non-vegetable growers have kitchen gardens for self-consumption relative to vegetable growers (37% versus 21%), and also more of them have kitchen gardens whose produce is for sale (7% versus 2.4%), emphasizing that kitchen gardens may expose paddy farmers to vegetable markets even if this is not a significantly large number.

Patterns of growth

A majority of vegetable growers (55%) stated that their family or household had been growing vegetables for longer than they can recall. Among the others, close to a quarter began vegetable growing after 2015, with several taking to vegetables after 2020. Over 85% of those who began growing vegetables after 1950, commenced the sale of vegetables the same year, underlining the commercial orientation of vegetable cultivation.

Spatially, there are interesting patterns (The reasons for quitting vegetables and never having grown them are somewhat different, despite the large overlaps. Water constraints and access to irrigation are

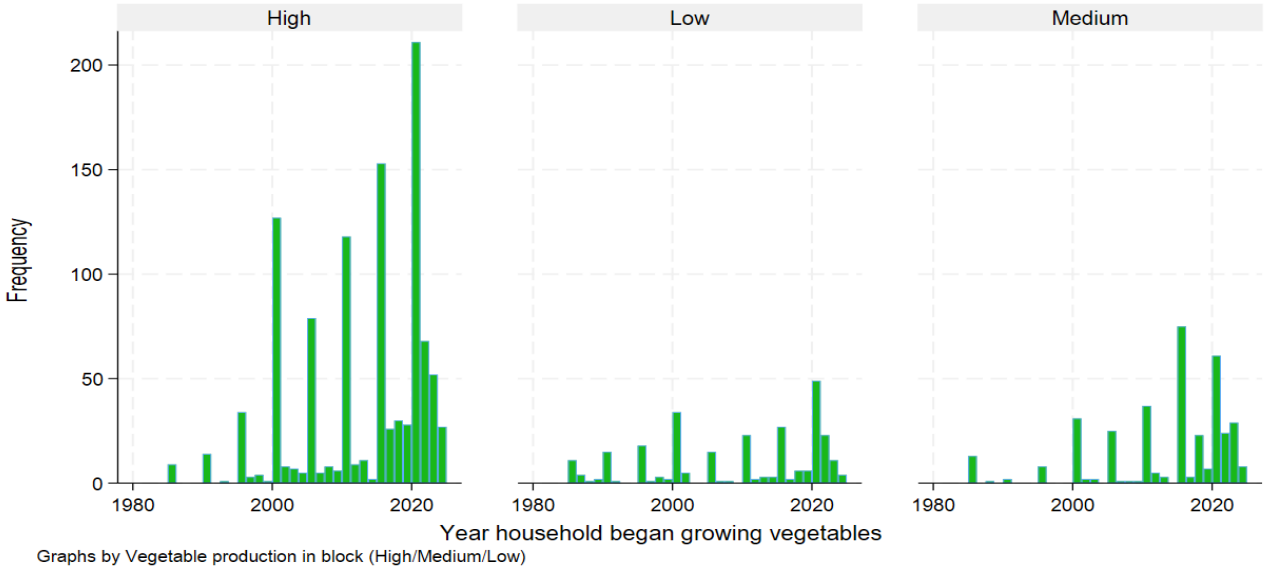
common constraints. Popular perception in the context of India is that marketing challenges for vegetables are the main deterrent for farmers. Here we have a somewhat different story. Farmers who quite cite animal conflict as the second most important reason. Our field visits also revealed that monkeys, wild boar/bisons, and elephants, depending on the area, make it very challenging to grow vegetables. Poor quality inputs also emerge as a factor for giving up vegetable cultivation. Financial constraints and market access, popularly viewed as the binding constraints for diversification, are barely mentioned by the farmers themselves.

As for those who do not take to vegetable growing, apart from access to irrigation, space constraints, and land availability are the second most frequently expressed constraint. The INCATA Odisha Community Survey (whose respondents are members of the community) are mostly consistent with these individual level responses. In general, low-lying lands that are prone to waterlogging are allocated to rice (unless expensive investments render them more suitable for cultivation) and upland and midlands are more suited to vegetables. Land markets too are key. In many parts of Odisha, land leasing and tenancy are restricted, a constraint where the transfer of land from marginal to more advantaged communities is forbidden to protect the former. Extreme weather events also render vegetable cultivation risky and 65% of the villages noted that they had experienced at least one extreme weather event in the past decade.

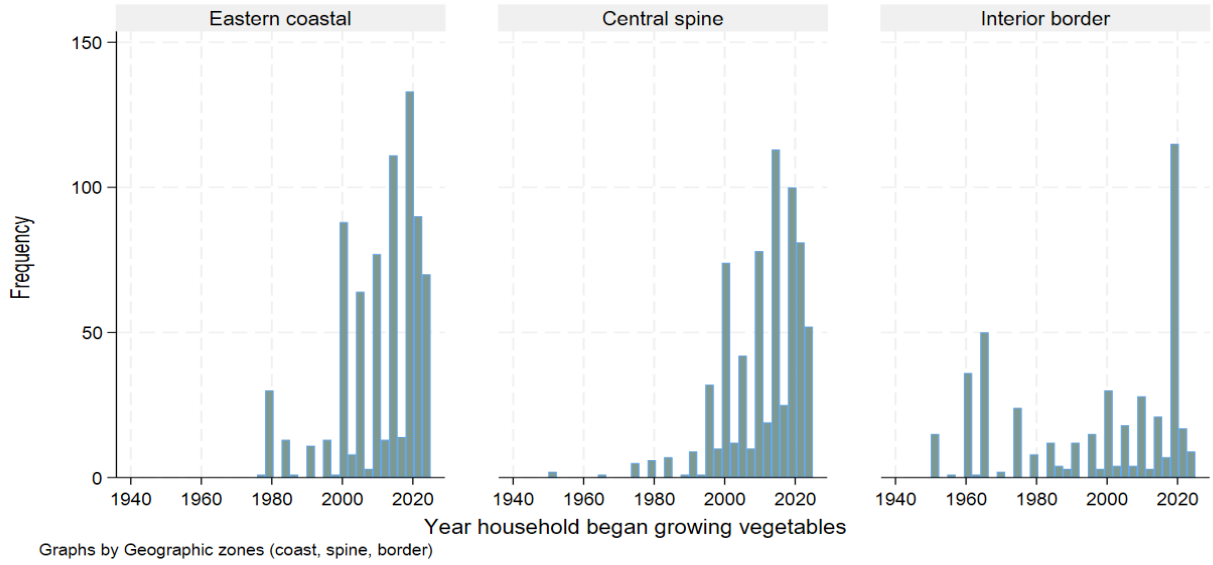
). First, growth of vegetable farming households has been disproportionately higher in high intensity blocks suggesting a clustering effect. Second, there appears to be evidence of sub-state specialization. We group our sample districts into three regions: Eastern Coastal (Ganjam, Cuttack), interior border (Balangir) and Central Spine (Koraput, Anugul, Keonjhar). There has been a pronounced spurt in new vegetable growers in the Eastern coastal as well as the Central Spine. Our hypothesis is that while the former is home to teeming and growing cities representing a strong demand pull, the central spine is emerging as a hub for vegetable production.

Figure 2: Entry into vegetable farming

(a) By intensity of vegetable farming



(a) By region



Source: INCATA Odisha House listing, 2025

The community survey suggests that across the villages, while the number of households growing vegetables has increased, as have those growing rice and cotton, those growing sugarcane and maize have declined, the former dramatically. To the extent that farmers choose from among several cash crops, this seems to suggest that the ascendance of vegetables may coincide with the shrinking of sugarcane, in particular.

According to the respondents in of the INCATA Odisha Community Survey, in villages where the number of vegetable growers increased, the key reasons were increase in the prices of vegetables, expanded access to irrigation, and better transport and connectivity. As Figure 3 shows, there has been an increase by several fold in the ownership of vehicles increasingly used to transport vegetables and the time taken to travel to market by the most common mode has declined by 36%. The INCATA Odisha Farmer Survey too reveals motivations for starting vegetable cultivation were high vegetable prices (38%) and to provide for their own consumption (84%) (Figure 4). It is apparent that vegetable cultivation is driven both by the motivation to sell and to consume, for the sample farmers overall, suggesting diverse motivations across farmers.

To more systematically uncover the strength of the correlates of vegetable farming, we combined data from the house listing exercise with village characteristics compiled from the INCATA Odisha Community Survey. We then estimated a linear probability model (LPM) regressing the variable indicating whether or not a household undertakes vegetable farming or not as a function of a set of household characteristics (for example, social group, irrigation access, land owned and operated, etc.) and village characteristics (the proportion of operated area in the village that is upland, its distance to highways, village and district headquarters, the number of traders, input dealers and markets that households in the village have access to and land tenancy and sale restrictions. The results are presented in Figure 5. Irrigation access is by far the most important predictor of vegetable farming. While having a kitchen garden is positively associated, growing paddy is somewhat negatively associated with vegetable farming; villages with land tenancy restrictions are likely to have fewer vegetable farmers whereas those with restrictions on sale are more likely to have more vegetable farmers, likely reflecting the prevalence of

vegetable farming in tribal areas. The number of input suppliers and traders that households in the village use/access also has a bearing on the uptake of vegetable farming. While the results from the regressions show associations, these reveal interesting patterns.

Constraints

The reasons for quitting vegetables and never having grown them are somewhat different, despite the large overlaps. Water constraints and access to irrigation are common constraints. Popular perception in the context of India is that marketing challenges for vegetables are the main deterrent for farmers. Here we have a somewhat different story. Farmers who quite cite animal conflict as the second most important reason. Our field visits also revealed that monkeys, wild boar/bisons, and elephants, depending on the area, make it very challenging to grow vegetables. Poor quality inputs also emerge as a factor for giving up vegetable cultivation. Financial constraints and market access, popularly viewed as the binding constraints for diversification, are barely mentioned by the farmers themselves.

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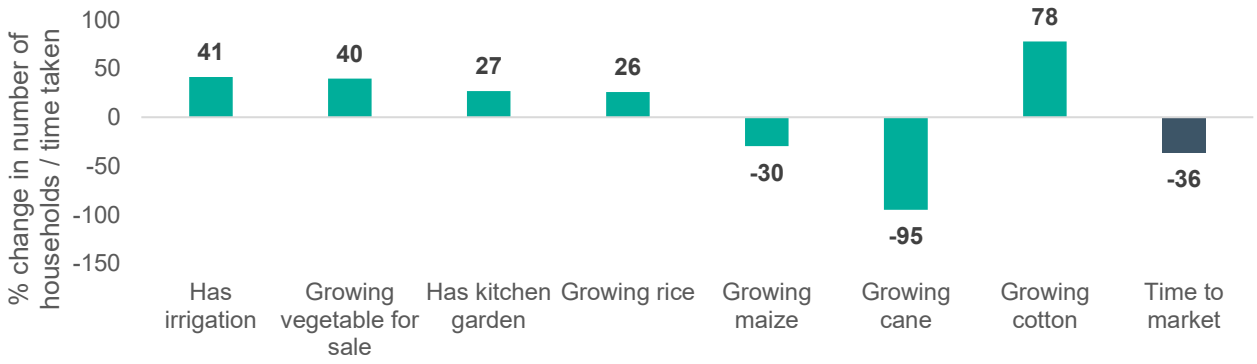
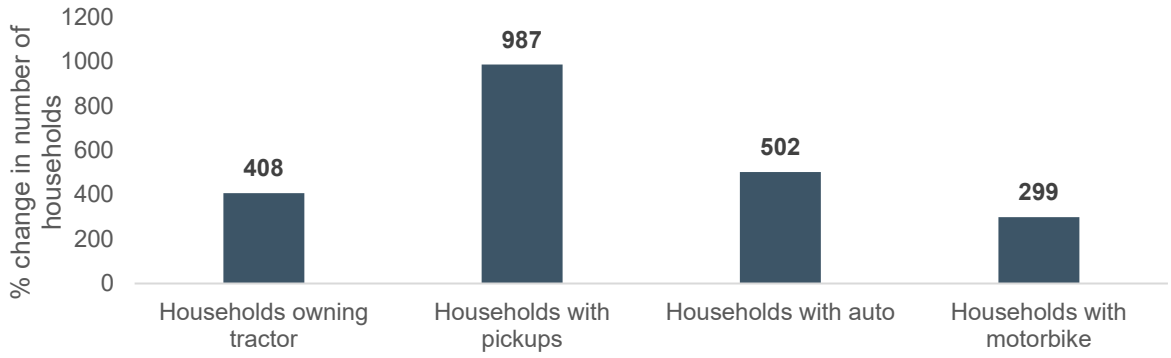
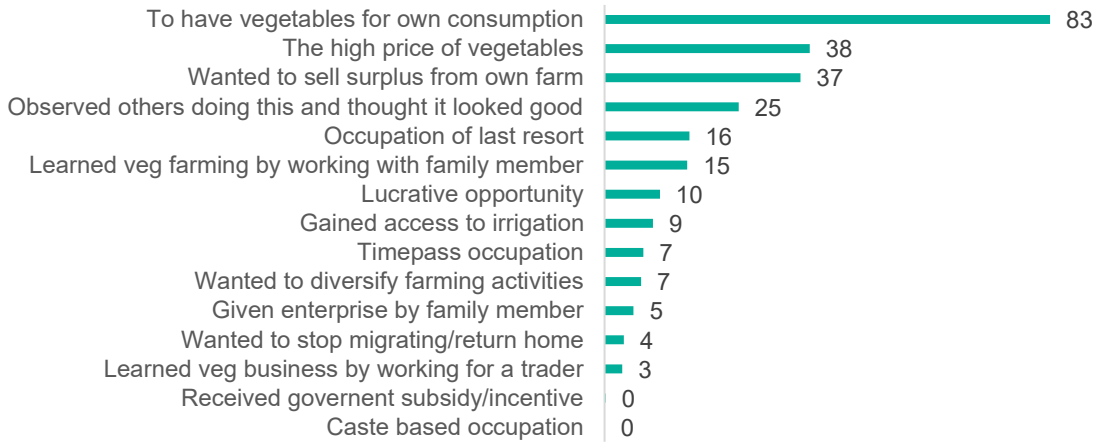
Figure 3: Some changes in the village





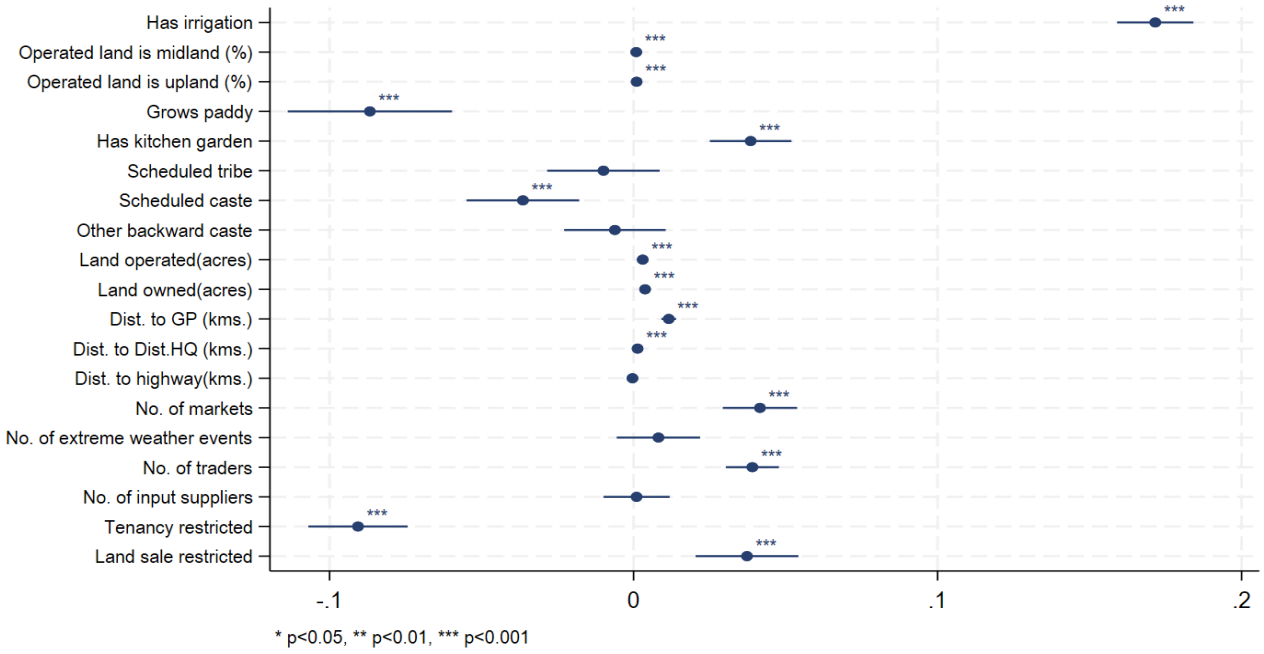
Source: INCATA Odisha Community Survey, 2025

Figure 4: Motivations for taking up vegetable farming



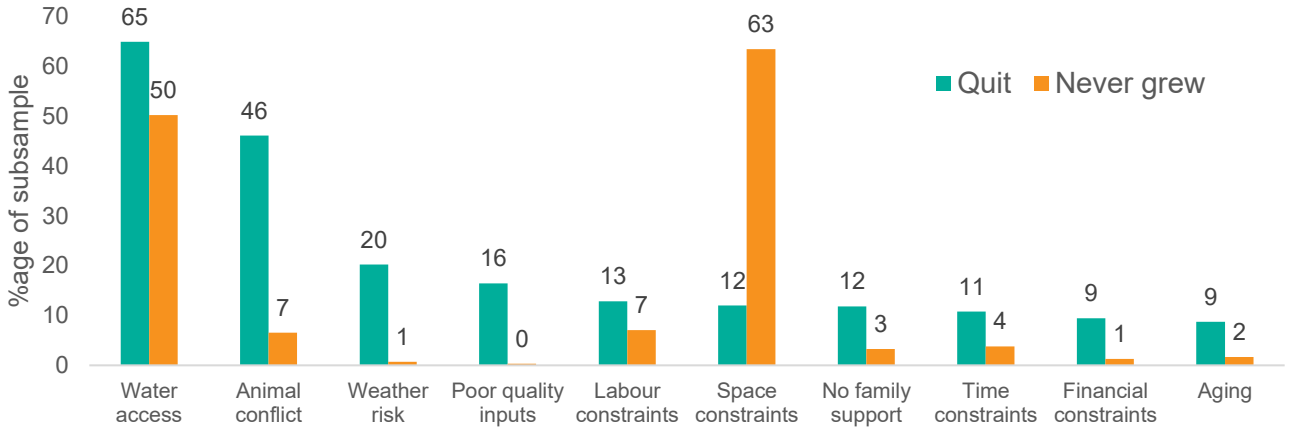
Source: INCATA Odisha Farmer Survey, 2025

Figure 5: Correlates of vegetable farming



Source: Based on the INCATA-Odisha House listing and Community Survey, 2025. Only select variables are plotted. The regression controls for districts and does not cluster standard errors.

Figure 6: Reasons for not growing vegetables or quitting



Source: INCATA Odisha House listing, 2025. Notes: These were administered to two distinct subsamples. Those who said they grew vegetable but quit and those who had never grown vegetables either on farm or kitchen garden.

Concluding Remarks

This note contributes to some key debates around why diversification into high-value crops, such as vegetables, is not happening more rapidly in India. The INCATA study in Odisha finds that vegetable growing in the state is widespread and has a long history. Further, vegetable farming has been conducted both for commercial purposes and for self-consumption. Commercial vegetable farming appears to be inclusive. Even amongst marginal farmers, vegetable farming is prevalent and rises as land sizes become larger within the smallholder category. There does not appear to be a higher proportion of vegetable farmers among the larger landowners, though there is some evidence that vegetables offer scope for medium farmers as well. Irrigation is by far the most important correlate of vegetable farming. In contrast to the popular notion that market access is a critical constraint that deters vegetable cultivation, water constraints, land availability, and animal conflict emerge as key barriers, with varying significance, depending on whether we examine disadoption or non-adoption of vegetables. There is a distinct spatial pattern for uptake, with suggestive evidence that existing vegetable clusters may be seeing greater uptake, as are regions with large urban centers and access to markets.

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