

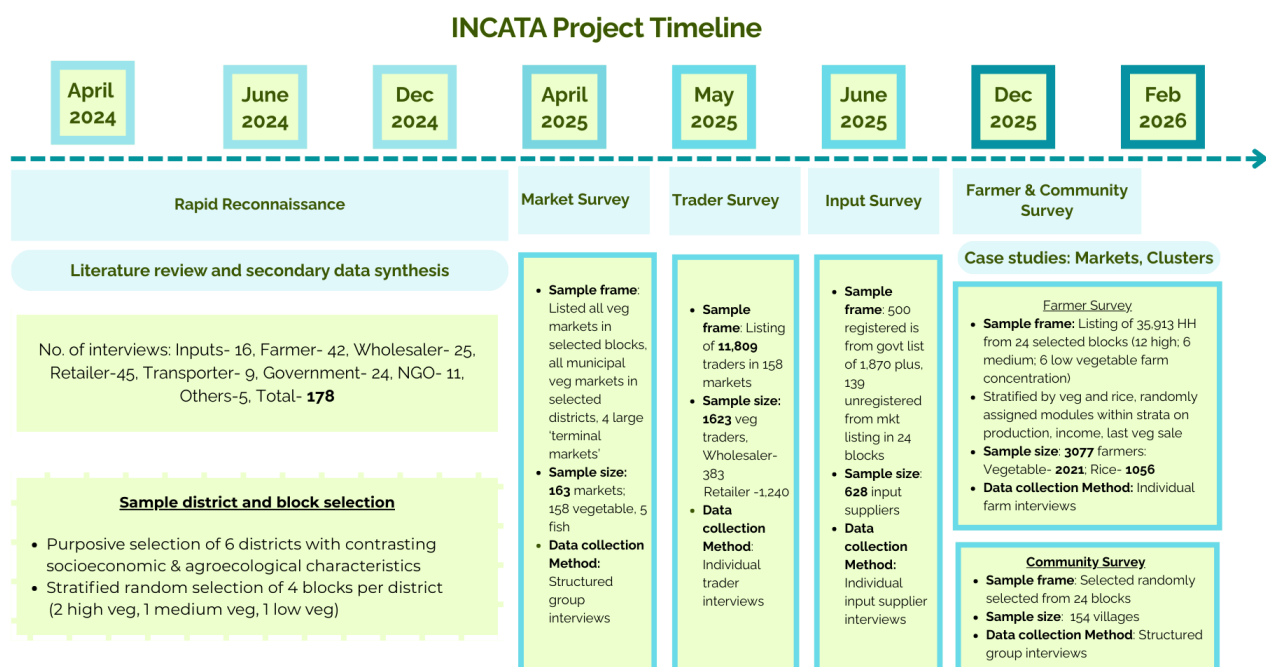
Small-scale Commercial Vegetable Farming in Odisha:

Who is involved, how is it changing, and how inclusive is it?

Ben Belton and Sudha Narayanan

The research project “*Tracking commercial small-scale producers for inclusive agricultural transformation*” (INCATA) studied the relationships between commercial small-scale producers (farmers) and micro, small and medium enterprises (MSMEs), to understand whether and how these relationships could contribute to inclusive agricultural transformation.

Figure 1: Timeline of INCATA project activities in Odisha.

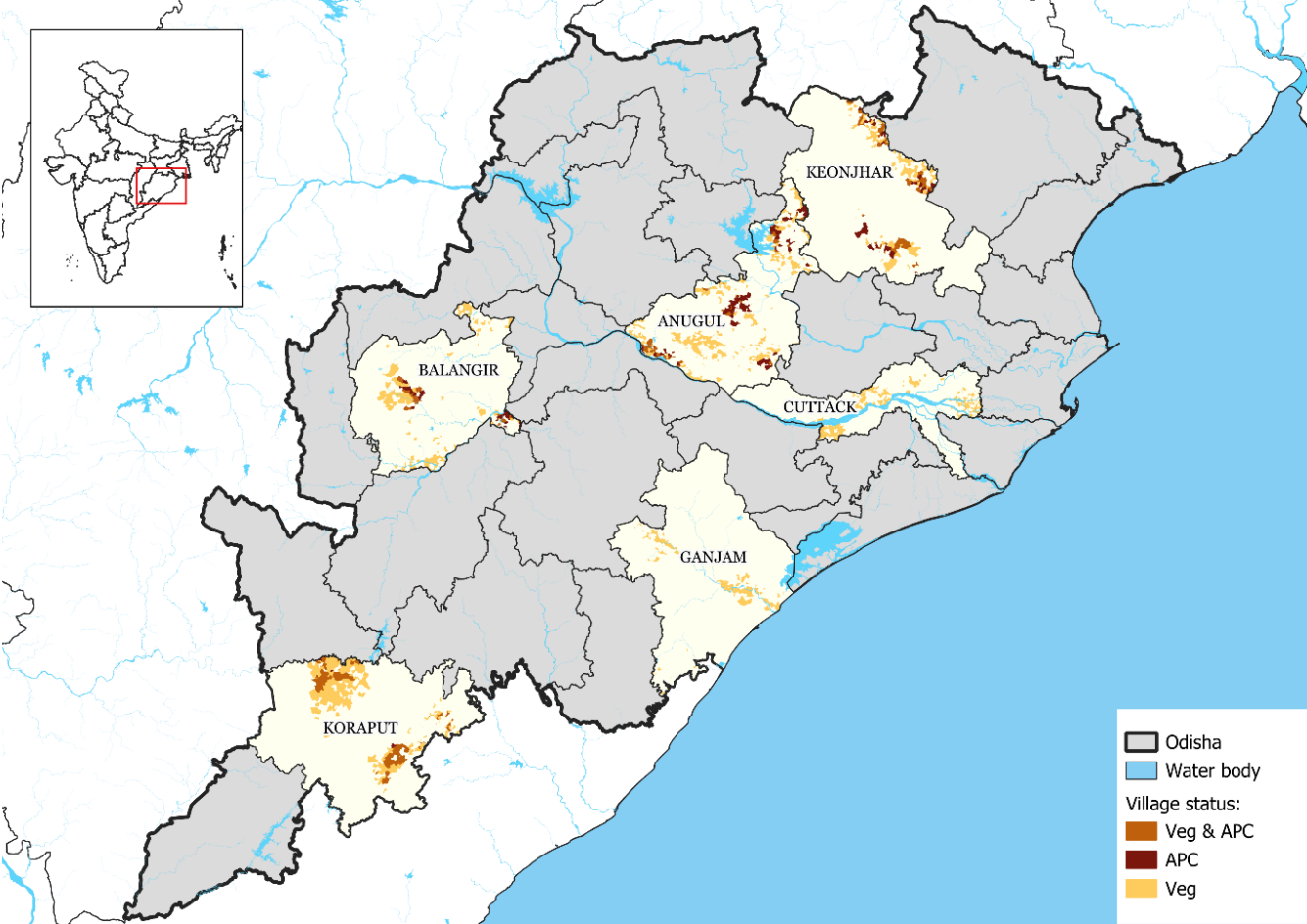


To address the questions, INCATA focused on the value chain associated with commercial small-scale horticulture (vegetable cultivation) in Odisha. The vegetable value chain was selected because of a high level of participation and commercial orientation among small-scale vegetable producers, the high value of vegetable crops relative to staples, and the importance of vegetables for nutrition.

Figure 1 summarizes INCATA research activities in Odisha. Between June and December 2024 we conducted ‘rapid reconnaissance’ research comprised of 178 interviews with actors in the vegetable value chain, covering 19 of Odisha’s 30 districts and 25 markets. This allowed us the understand the broad “lay of the land”, refine research questions, and design effective sampling strategies and questionnaires for a series of integrated “stacked surveys”.

Between April and December 2025 we implemented six linked surveys - of vegetable markets (158), farming communities (154), agricultural input suppliers (628), farmers (3,077), vegetable wholesalers (383) and vegetable retailers (1,240): 5,640 interviews in total. The surveys were conducted in six districts, selected purposively for their contrasting socioeconomic and agroecological conditions. In this research brief, we focus on key results from the farm survey. Survey locations are depicted in Figure 2.

Figure 2: Map of Odisha showing the districts and villages included in the INCATA surveys



The farm survey was designed to capture statistically representative data that would allow us to answer the research questions set out in Box 1. Each question is answered in the following subsections of this brief.

Box 1: Research questions about vegetable farming arising from the rapid reconnaissance

- Who grows vegetables?
- How are the production practices of vegetable farmers transforming?
- Does commercial small-scale vegetable farming production enhance farmer welfare?
- How inclusive are spontaneous and organized vegetable production clusters?

Who grows vegetables?

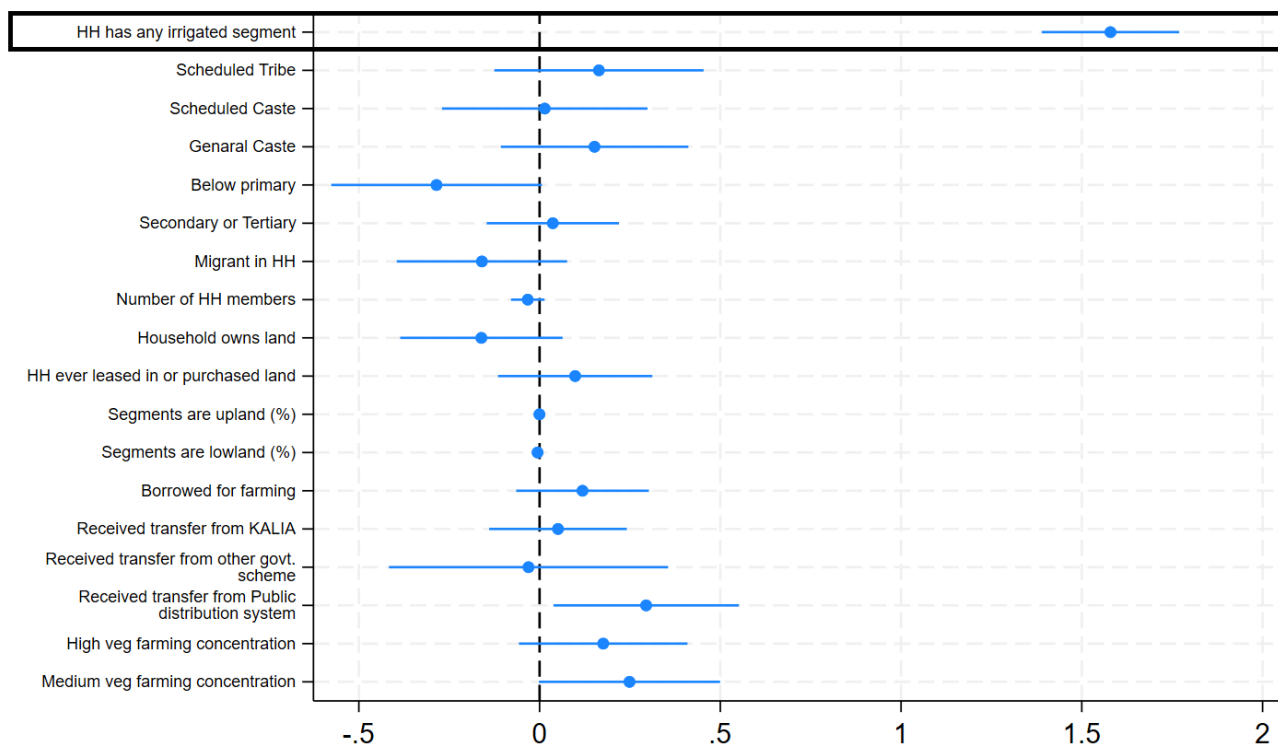
- ▶ **About one-quarter of farm households (22%) grow vegetables for sale crop**, selling 74% of what they produce; about double the marketed surplus of rice. Sixty-nine percent of households in surveyed districts farmed during the past year. Almost all of these (95%) grew paddy. One-third of households have a kitchen garden, but these are primarily for home use, with only 14% of production sold.
- ▶ **Vegetable farming households are of modestly higher socioeconomic status than non-vegetable farmers.** They are significantly better educated, more likely to belong to a general caste and less likely to belong to a scheduled tribe, but the size of differences in the characteristics of the two groups is not large.
- ▶ **Vegetable farming is smallholder dominated.** Vegetable farmers operate an average of 0.8 ha of land, of which 0.2 ha is allocated to vegetables and 0.6 ha to rice. Land rentals are widespread: 29% of vegetable farmers currently lease in one or more pieces of land.

How are vegetable farmers' production practices transforming?

- ▶ **Vegetable farming is a long-standing activity that has been commercially oriented from the beginning.** Over 85% of households started selling vegetables in the same year that they began growing them. Most farmers entered vegetable cultivation over 20 years ago. New entrants into vegetable farming over the past two decades have been concentrated in certain blocks, instead of being widely distributed, leading to the formation of vegetable production clusters.
- ▶ **There is no tradeoff between vegetable commercialization and production for subsistence.** Most farmers are motivated to start producing vegetables for both home consumption and sale. Marketed surpluses of vegetables have risen gradually over time to more than 70%, but without displacing household self-provisioning. Own production accounts for around half of farmers' vegetable consumption.

- ▶ **Crop portfolios are both concentrated and diverse.** Production is dominated by a small set of “commodity vegetables” (most importantly brinjal and tomato, produced by 75% and 64% of households respectively), but farmers grow a wide array of “niche” vegetables in smaller numbers. Surveyed farms produced a total of 39 vegetable species.
- ▶ **Recent declines in crop diversity and off-season production signal rising climate stress.** Eighty-three percent of vegetable farming households grew vegetables in cool season in 2025, while 56% grew in cool season and 21% in hot season. The share of household growing vegetables in multiple seasons has fallen slightly since 2015, as has the number of crops produced per farm, dropping from 4.9 in 2015 to 4.3 in 2025. This pattern is consistent with increasing climate stress, as widely reported by farmers in qualitative scoping interviews.
- ▶ **Irrigation is the single most important catalyst of commercial smallholder vegetable farming.** Probit analysis shows that having an irrigated parcel of land is much more strongly correlated with adopting vegetable farming than any other factor (Figure 3).

Figure 3: Correlation coefficients of factors associated with adoption of vegetable farming.



Source: INCATA Odisha Farmer Survey, 2025

- ▶ **Vegetable farming has mainly been facilitated by private investments in irrigation,** while government irrigation schemes have mainly been targeted toward rice. The number of irrigated parcels of land operated by surveyed households grew 74 percent since 1980. Irrigation access increased rapidly after 2010, driven by both public sector (mainly canals and lift irrigation) and private (mainly open wells and borewells) investments. Access to private irrigation sources grew almost twice as fast as public irrigation.

- ▶ **Market access is not a major constraint to vegetable farming.** Lack of access to water and land, and animal conflict are the main factors that prevent households from adopting vegetable cultivation or cause them to abandon it. Issues related to marketing are very rarely reported as a constraint.
- ▶ **Adoption of productivity enhancing agricultural technologies is at a transitional stage.** Hybrid vegetable seeds, inorganic fertilizers, pesticides, and mechanized land preparation are very widely adopted, but uptake of more advanced technologies (e.g. seed trays, seedlings purchased from nurseries, plastic mulch, drip irrigation, drones) remains low, suggesting potential for greater commoditization, productivity gains, and adoption of more sustainable practices in future.
- ▶ **Rates of adoption of many technologies are higher in blocks with higher densities of vegetable farms,** suggesting a clustering effect, where access to service providers and information stimulates their uptake.

Does vegetable farming enhance producer welfare?

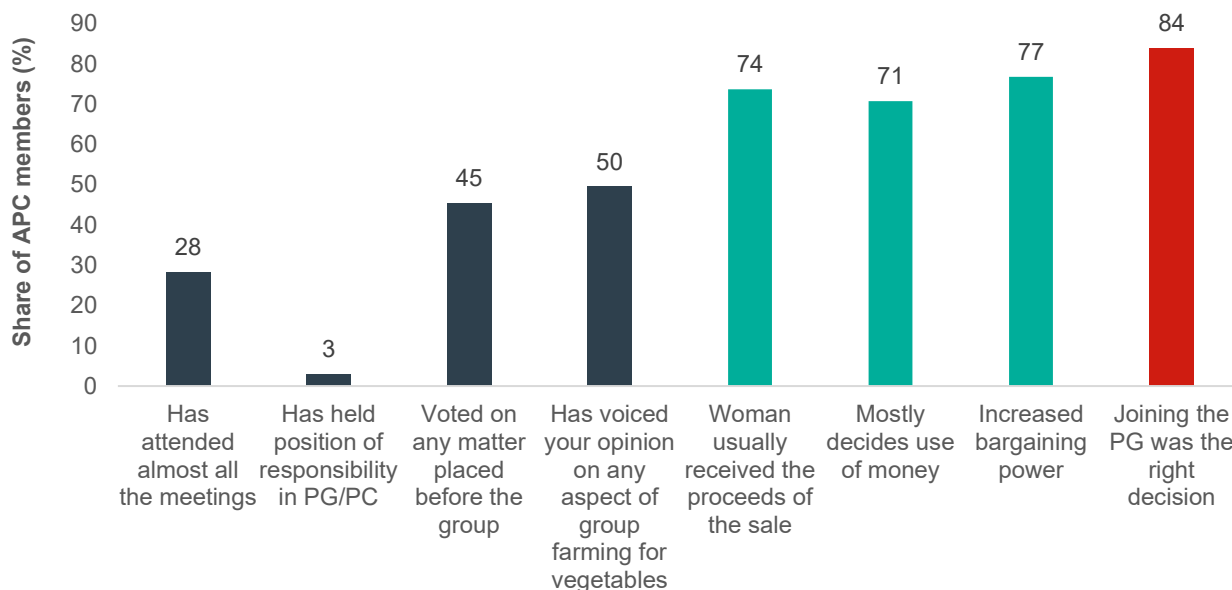
- ▶ **Vegetable farming raises agricultural income.** The per hectare cost of growing vegetables is 56% higher than that of rice, but the average profit per hectare from vegetables is 305% higher. Vegetable farmers' agricultural incomes are 24 percent higher on average than those of non-vegetable farmers.
- ▶ **Vegetable commercialization improves diet quality.** Vegetable farming households consume a greater diversity of vegetables more frequently and have significantly higher household diet diversity scores than non-vegetable farmers.
- ▶ **Spatial clustering of vegetable farms is associated with higher agricultural incomes.** Vegetable and non-vegetable farmers in blocks with high concentrations of vegetable farms have higher average agricultural incomes than those in blocks with less vegetable farming.

How inclusive are spontaneous and organized vegetable production clusters?

- ▶ **Many vegetable clusters have emerged spontaneously, while others have been deliberately established** under the government of Odisha's Agricultural Production Cluster (APC) program, which is targeted to assist women from marginalized communities, especially in tribal areas.
- ▶ **Pathways to cluster formation are diverse,** as demonstrated by qualitative in-depth case studies of three spontaneous clusters. In the cases studied, these included commoditization of a traditional niche crop, technology transfer by traders from another state, and the coevolution of local trader-farmer networks.
- ▶ **Each cluster has unique social dynamics** relating to caste, class, gender and generation, with potential to reinforce historical inequalities, as well as to erode them:
 - ▷ Landed castes tend to exclude marginalized communities from participating as cultivators by gatekeeping knowledge and skills and leasing out land to members for their own community. Yet, some farmers from historically marginalized communities have managed to overcome these constraints and have met with success.

- ▷ Women’s involvement, when permitted, is mostly restricted to farm work with little executive agency or say in decisions.
- ▶ **The state plays an important role in creating enabling conditions for spontaneous cluster development**, for example, provision of irrigation and establishing Geographical Indication (GI) tags that spur demand.
- ▶ **Organized APC clusters are inclusive by design.** Beneficiaries tend to be poorer on average and from marginalized communities. The APC program has been instrumental in getting women recognition as farmers and has facilitated access to government assistance for machinery, equipment and other subsidies.
- ▶ **Women who belong to APCs value the training they have receive.** APC members reported learning new vegetable cultivation methods such as trellising and grafting and receiving inputs more easily. They note that they have been able to expand vegetable production and now have the traders pick up produce from the village rather than having to sell these themselves in local markets.

Figure 3: Correlation coefficients of factors associated with adoption of vegetable farming



Source: INCATA farm survey

- ▶ **APC members have gained increased voice and agency.** Most women participate actively in the working of the producer group; speaking up at meetings, voting on matters and even representing the group. Many women note that although they faced resistance within the household, the attitudes of male spouses and other family members gradually shifted. A large majority of women APC members reported that they usually receive proceeds of vegetable sales, decided how to use the money earned, and had increased their bargaining power within the household (Figure 3). Nearly all APC members (96%) reported that they wanted to continue as producer group members.

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