

Commercial small scale vegetable producers and inclusive agricultural transformation in Odisha

An introduction to the methods and hypotheses of the INCATA project

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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) in horticulture value chains in Odisha, India. The goal was to understand whether and how these relationships could contribute to inclusive agricultural transformation.

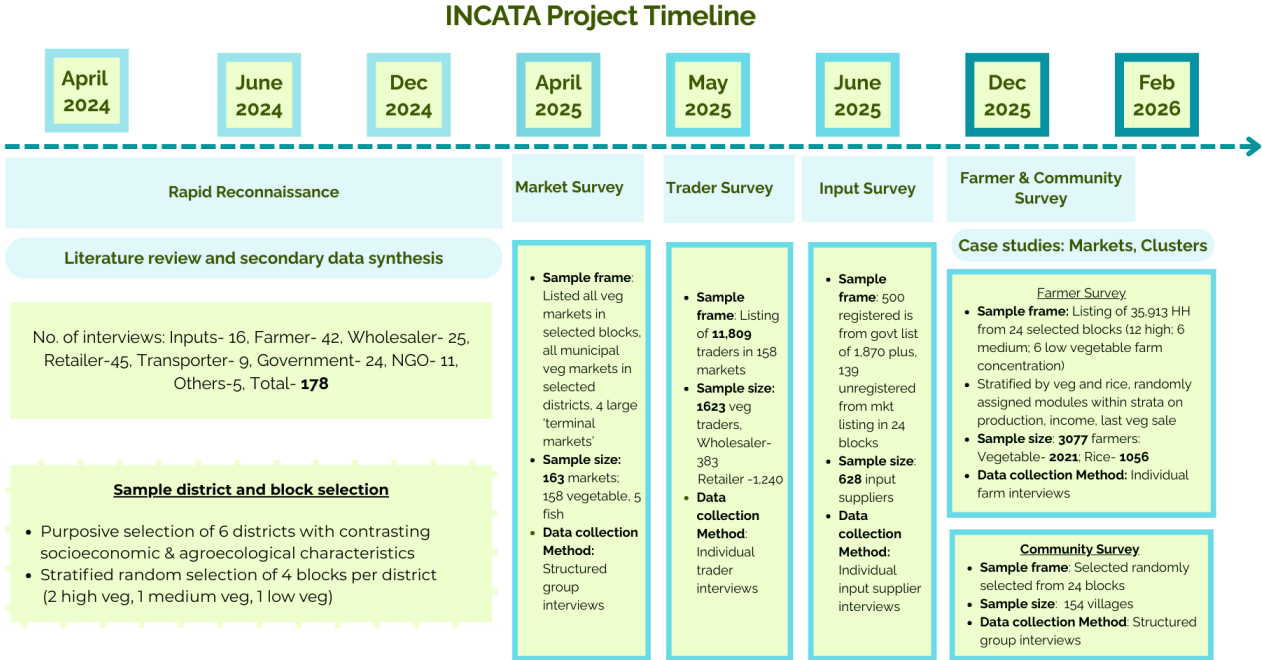
The project was designed to address several questions. This was based on the assumption that improved understanding of these dynamics will inform more effective policy design and implementation in support of inclusive agricultural transformation:

- 1) What factors kickstart agricultural commercialization? How do small-scale producers become commercial, how do MSMEs upstream and downstream of the farm get started, and how do these two sets of actors co-develop together?
- 2) To what degree does the co-development of commercial small-scale farms and supporting MSMEs translate into poverty reduction and women’s economic empowerment? Who is included, and who is excluded, or gets stuck at low levels of inclusion, or slips backward? What are the economic opportunities available for youth in the transformation process?
- 3) What policies and investments have the potential to accelerate the symbiotic co-development of commercial small-scale producers and MSMEs, and the inclusive effects of their co-development?

To address these 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

the 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. In the sections below, we set out in sequence the unique research methodology implemented in Odisha over the course of the project. The project timeline and research activities are illustrated in Figure 1.

Figure 1: Timeline of INCATA project activities in Odisha.



Formative research

The first year of the project was devoted to formative research that allowed for the formulation of precise research questions and a robust sampling strategy for subsequent surveys. This was comprised of two parts: (1) a literature review and synthesis of secondary data, and (2) rapid reconnaissance field-work.

Secondary data

The project team reviewed prior literature on horticulture and markets in Odisha, and India more broadly, to identify key themes that could be used as hypotheses to be tested empirically by quantitative surveys in the second half of the project. With the support from the Government of Odisha, the project team collated and synthesized large amounts of published and unpublished secondary data from Odisha. Datasets compiled included the following: time series district-wise horticultural production from the Directorate of Horticulture, district-wise land use statistics, information on quantities and prices of vegetables delivered to markets in Odisha, and a complete list of registered agricultural input suppliers. These data compilation and synthesis activities supported subsequent sampling strategies and sample frame development.

Rapid Reconnaissance

Rapid reconnaissance is a technique for systematically understanding the ‘lay of the land’ in a value chain in a specific region. It is based on in depth, semi-structured field interviews with actors in the value chain of interest. This approach allows for triangulation of data collection and information across actors from multiple locations, value chain segments, and scales of operation on the nature of their day-to-day business operations, and longer-run changes occurring in the sector.

The information collected during rapid reconnaissance is synthesized qualitatively to: (1) arrive at a basic understanding of local conditions and how actors in the value chain operate, (2) inform decisions on sampling strategy, (3) refine research questions to reflect dynamics observed in the field. Information acquired and hypotheses developed during rapid reconnaissance thus provide the foundation for the design of all subsequent quantitative research activities, as well as the detailed contextual knowledge needed to correctly interpret their results.

The locations visited during rapid reconnaissance fieldwork are presented in Figure 2. The fieldwork covered three large circuits, each focused on a distinct geography: the coastal plain (the most prosperous part of the state), the southern uplands (the least economically developed and most hilly part of the state, with a high concentration of tribal communities), and the northern uplands (an intermediate area in terms of socioeconomic conditions).

We visited 19 of Odisha’s 30 districts, and 35 markets during the rapid reconnaissance, spending around 120 person days in the field in total. Interview respondents were selected opportunistically but purposively, based on a mix of introductions made via personal contacts of the project team, and ad hoc interviews. We conducted 178 interviews with actors associated with Odisha’s vegetable value chains (Table 1).

Table 1: Summary of vegetable value chain actors interviewed during the INCATA rapid reconnaissance in Odisha

| Input supplier | Farmer | Wholesaler | Retailer | Transporter | Government | NGO | Others | Total |
|----------------|--------|------------|----------|-------------|------------|-----|--------|-------|
| 16 | 42 | 25 | 45 | 9 | 24 | 11 | 5 | 178 |

Source: INCATA Odisha Rapid Reconnaissance, 2024-25.

The interviews followed semi-structured guidelines containing open-ended questions about the microeconomic conduct of each type of actor interviewed, organized with reference to (1) business assets owned or accessed by the respondent (2) input acquisition behavior; (3) value addition, (4) disposal of outputs, (5) access to services and amenities, and changes in numbers of value chain actors over time.

After reflecting on findings from the rapid reconnaissance, we developed a refined set of core research questions that reflected our observations of how vegetable value chains in Odisha were developing. These questions are set out in Box 1. They cover issues related to transformations in value chain structure, changes in the conduct of small-scale vegetable producers, inclusion, smallholder commercialization, symbiosis, clustering, and market formation. These questions informed our design of all subsequent research (questionnaire and sample design).

We attempt to answer each question in the project notes in this series, drawing on results of our research activities across all value chain nodes. These research activities are elaborated in the following sections.

Box 1: Research questions arising from the rapid reconnaissance

- How are vegetable markets transforming?
- Who grows vegetables?
- How are the production practices of vegetable farmers transforming?
- Does commercial small-scale vegetable farming production enhance farmer welfare?
- Are the relationships between actors in Odisha's vegetable value chains parasitic or symbiotic?
- Who is included in the vegetable value chain, and on what terms?
- How do spontaneous vegetable production clusters form, and how inclusive are they?
- How do "organized" vegetable clusters impact women's voice and agency?

Study area and district and block selection

Six districts—Cuttack, Ganjam, Angul, Keonjhar, Balangir, and Koraput—were purposively selected from Odisha's 30 districts, to ensure agroclimatic, socio-economic, and institutional diversity in the areas studied (Figure 2).

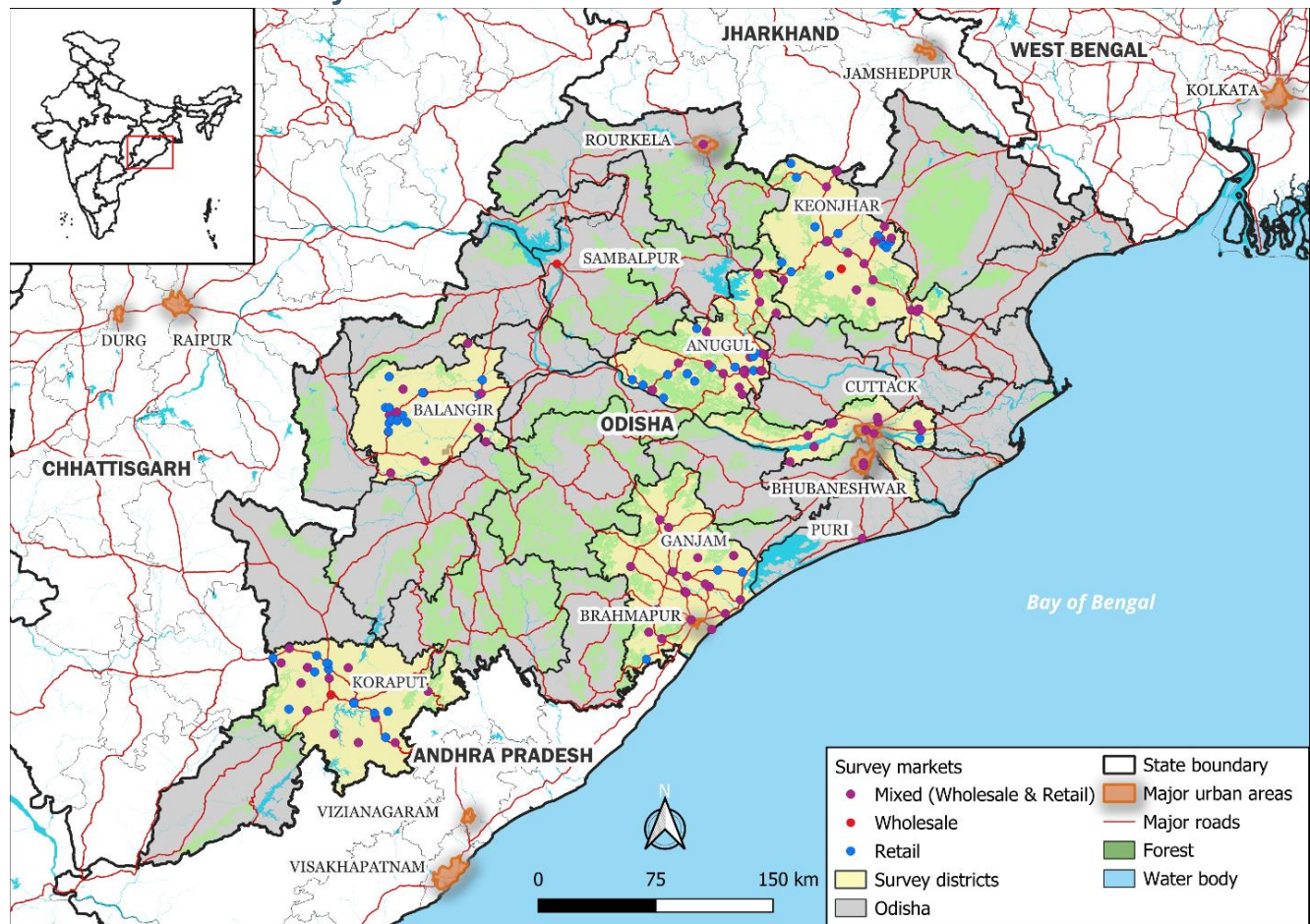
Selection criteria included representation of varied agroclimatic zones, inclusion of tribal and non-tribal regions, and heterogeneity in vegetable cultivation intensity and recent trends. Vegetable cultivation intensity was measured using a district-level vegetable concentration index that we constructed based on district level data on vegetable production over a 10-year period.

Districts with and without exposure to the state's Agricultural Production Cluster (APC) program - designed to accelerate the expansion of commercial vegetable cultivation in economically deprived areas of Odisha - were selected to reflect the state's efforts to support vegetable production. Together, the selected districts account for approximately 30 percent of Odisha's reported vegetable cultivation area and production and 29 percent of its population.

Within each district, all blocks (sub-districts) were stratified by vegetable production concentration (high, medium, low) in consultation with the Department of Horticulture. From each district, four blocks were selected randomly—two high-concentration blocks, one medium, and one low—yielding 24 blocks in

total. This stratification permitted comparison across production intensities and between APC and non-APC blocks.

Figure 2: Map of Odisha showing the location of markets and traders selected for inclusion in INCATA surveys



Source: Authors

Market identification

A comprehensive effort to list all vegetable markets¹ in the six selected districts was undertaken. A list of markets was obtained from the Government of Odisha and validated in the field. We selected all rural markets in the 24 selected blocks and all urban markets in the 6 selected districts. In addition, four ‘terminal markets’ (major wholesale markets receiving deliveries from out of state) located outside our sample districts were included in the sample because of their importance as regional aggregation and distribution hubs for horticultural produce.

Initially, 154 vegetable markets were identified across the six districts. Markets with fewer than 20 retailers were excluded from the final sample due to their small size, irregular operation, and limited relevance for studying value chain dynamics. During survey implementation, we identified additional markets selling vegetables within our study area, bringing the number of markets in the sample to 158.

¹ We did not adopt a specific definition of market to ensure that we did not exclude those that the communities in the study area deemed to be markets.

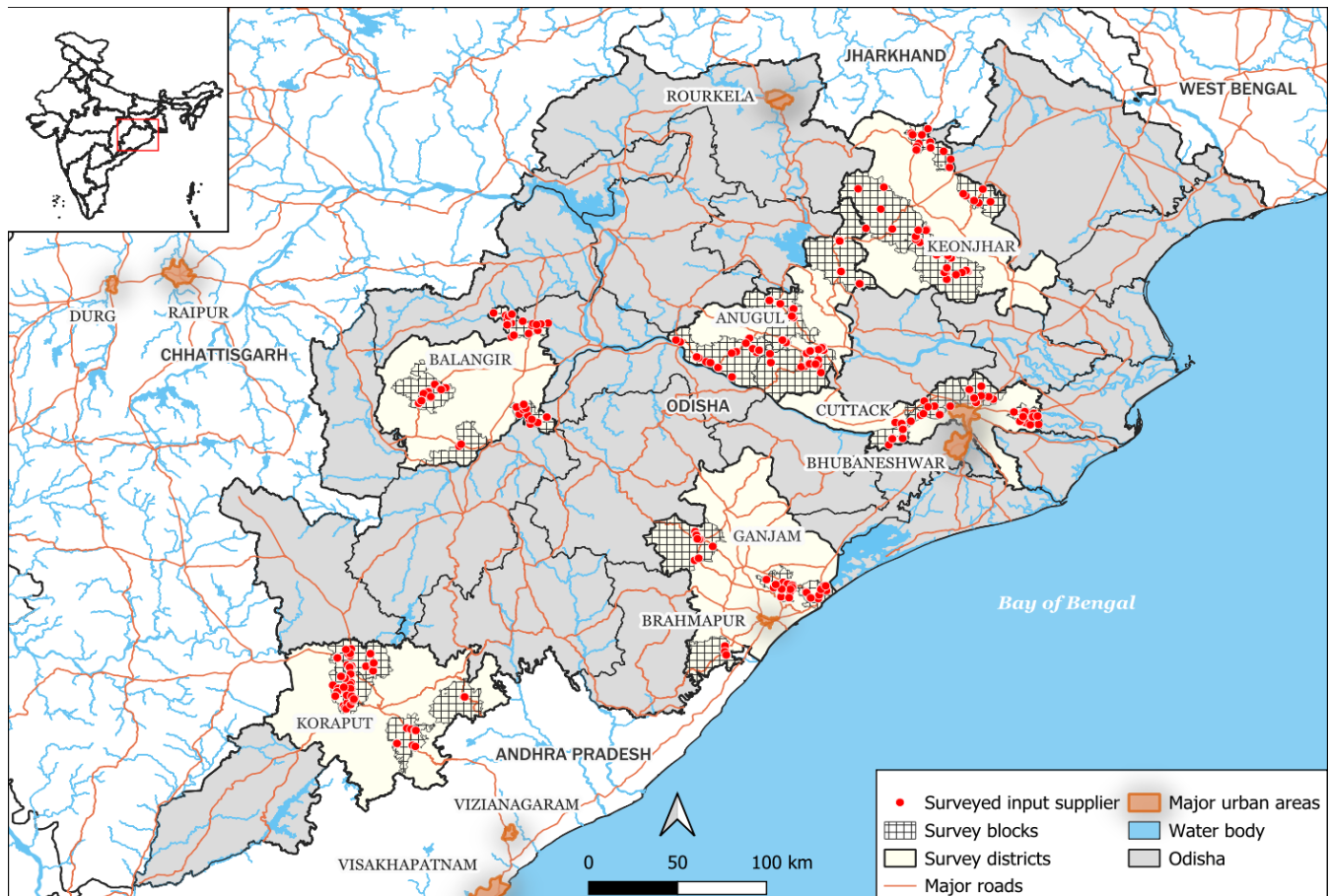
We conducted a survey in all 158 markets based on structured Focus Group Discussions (FGDs) to collect quantitative information on market origin, evolution, infrastructure, management and governance, the volumes of vegetables traded in high and low season, and the numbers of traders and ancillary businesses present in the market at the time of the survey and ten years prior.

Sampling of traders and input suppliers

Our surveys of off-farm vegetable value chain segments covered three categories of market actors: retailers (including farmer-retailers - farmers visiting markets to sell their own produce), wholesalers (including commission agents – wholesalers earning a fee for coordinating transaction among buyers and sellers), and agricultural input suppliers.

In each market, we conducted a census of all actors engaged in selling vegetables and/or agricultural inputs (seeds, fertilizers, or agrochemicals). These included all those operating within 50 meters of the “core” market area. In all cases, we considered the market to be the area defined by those who operated there. Traders specializing exclusively in sales of potatoes, onion, ginger, and garlic were considered out of scope for the survey and were excluded. We listed 11,809 sellers in all, representing the universe of traders operating in selected markets on the day of the listing. We drew on this list to select respondents for inclusion in the survey.

Figure 3: Map of Odisha showing the location of input suppliers selected for inclusion in the INCATA input supplier survey



Source: Authors

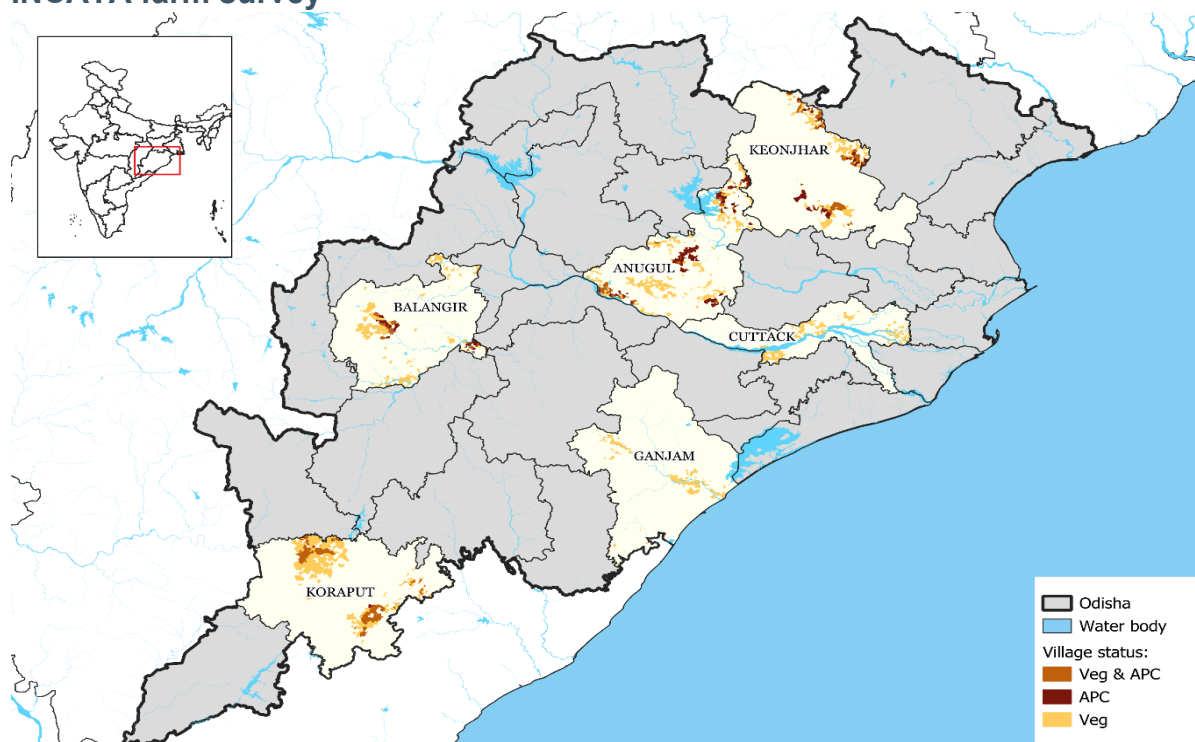
A stratified random sampling approach was used, with each of the markets serving as a stratum. Within each market, nine retailers were randomly selected from a complete market census list, resulting in a planned sample of 1,206 respondents. Sample size calculations assumed a prevalence of 0.5, a design effect of 2, a 5 percent margin of error, and a 70 percent response rate. The final achieved sample comprised 1,240 retailers.

For wholesalers, a census approach was adopted, reflecting their relatively small numbers and central role in aggregation. All wholesalers operating in surveyed markets were targeted, including unlisted actors identified during the survey. In total, 383 wholesalers/commission agents were interviewed. Around five percent of wholesalers who were approached declined to participate in the survey. Input suppliers were sampled using a mixed strategy. All input suppliers operating within the selected markets were surveyed (n = 139). To capture off-market input suppliers, a random sample of 500 registered input dealers was drawn from a government-provided list of 1,870 registered suppliers across the six districts. About three-quarters of licensed input suppliers selected from the list for inclusion in the survey were reached, and the rest were confirmed to have exited the business. The final sample included 628 input suppliers (Figure 3).

Sampling of communities and farmers

Within each of the 24 sampled blocks, all villages cultivating vegetables were identified in consultation with local horticulture officials. From these lists, six villages per block were randomly selected, yielding 144 villages. In addition, 10 villages with active APC-supported producer groups were randomly selected from APC blocks, identified through consultation with NGOs implementing the APC program, for a total of 154 villages (Figure 4).

Figure 4: Map of Odisha showing the location of villages selected for inclusion in the INCATA farm survey



Source: Authors

Villages with fewer than 30 households in total were dropped and replaced randomly from the list of villages within the block. Three villages were replaced in this way. In one block, one village was selected purposively to replace a village where there was deemed to be a security risk. A census of households was conducted in each selected village, to identify vegetable-growing households and paddy-growing households without vegetables that had cultivated within the previous 12 months. We listed 35,913 households.

From this frame, we targeted a minimum of 15 vegetable growers and six non-vegetable (paddy-only) farmers for random selection per village. In practice, it was not always possible to reach the number of respondents targeted per village, particularly in smaller villages and in some areas with low concentrations of vegetable farms. In these cases, sample numbers were adjusted by randomly selecting replacement farmers from other villages in the same block. This resulted in a final sample of 2,021 vegetable farmers and 1,056 non-vegetable farmers, bringing the total farmer sample to 3,077 households (an average of 515 per district).

In each of the 154 selected villages, we fielded a community survey through structured focus group discussions with knowledgeable residents. The survey covered information on the population of the village, its locality, access to information, services, infrastructure, institutions and government programs, irrigation, and numbers of farmers of different crops and other actors in the vegetable value chain present in the village —at the time of the survey, and 10 years prior.

Table 2: Complete summary of achieve survey samples

| Survey node | Sample size |
|-------------------|--------------|
| Vegetable market | 158 |
| Vegetable trader | 1,623 |
| <i>Wholesaler</i> | 383 |
| <i>Retailer</i> | 1,240 |
| Input supplier | 628 |
| Farmer | 3,077 |
| <i>Vegetable</i> | 2021 |
| <i>Rice</i> | 1056 |
| Community | 154 |
| Total | 5,640 |

Achieved sample

Table 2 summarizes the entire achieved sample across the six quantitative surveys implemented under the INCATA project in Odisha, totaling 5,640. We interviewed 1,623 vegetable traders (of which 1,240 were retailers and 383 were wholesalers), 628 agricultural input suppliers, and 3,077 farmers (2,021 growing vegetables, and 1,056 growing rice but no vegetables, for comparison with vegetable producers). Of all 3,077 farmers, 249 were located in villages where the Government of Odisha had implemented the Agricultural Production Cluster (APC)

program. Of these, 99 self-identified as belonging to an APC for either vegetables or livestock. We also conducted structured quantitative focus group interviews in all 158 sampled vegetable markets and 154 sampled villages.

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ACKNOWLEDGMENTS

The INCATA project was implemented under a Memorandum of Understanding between the International Food Policy Research Institute and the Government of Odisha. We gratefully acknowledge the guidance and strategic direction provided by Dr. Arabinda Kumar Padhee (IAS), Additional Chief Secretary to the Government, Department of Agriculture & Farmers' Empowerment (DA&FE), Government of Odisha. We also extend our sincere appreciation to Sri. Pawan Kalyan (IAS), Director of Horticulture, Government of Odisha, Smt. Dharitree Mishra, Managing Director, Odisha State Agricultural Marketing Board (OSAMB), Sri Shubhranshu Mishra (OAS), Additional Secretary to the Government, DA&FE, Government of Odisha, Dr. Sangram Kesari Pattanaik, Joint Director of Agriculture, DA&FE, Sri Nagendra Kumar Mallik, Dy. Director of Agriculture, DA&FE, Gouranga Chandra Swain, Dy. Director, Horticulture and other officials and staff of the Government of Odisha for their valuable advice, inputs, and support in facilitating field-level activities. We are grateful to GAPL Pvt. Ltd. and Academy of Management Services (AMS) and their staff, particularly Jatin Saini, P C Nayak, and Rakshit for anchoring the field surveys and to Debasish Das and Aman for coordinating field activities.

This work was supported by the Gates Foundation GRANT INV-066950, awarded to RIMISP and has not been independently peer-reviewed. Any opinions expressed here belong to the authors and are not necessarily representative of or endorsed by IFPRI or CGIAR. The conclusions and opinions expressed in this work are those of the authors alone and shall not be attributed to the Foundation. The INCATA Odisha study has been approved by the Institutional Review Boards (IRBs) of IFPRI (DSG-25-0511 IRB #00007490 on May 1, 2025 and a modification of the same, DSG-25-0511M IRB #00007490, on September 29, 2025), GAPL (GAPL/IRB/2025/001 on May 1, 2025) and AMS (AMS/IRB/2025-26/02 on December 1, 2025)

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