INCATA PROJECT NOTE 8 JANUARY 2026

Spontaneous vegetable production clusters:

How do they form, and how inclusive are they?

Papesh Kumar Lenka, Bibhuti Bhusan Mohanty, Sudha Narayanan, Ben Belton

Key findings

- A prominent but understudied aspect of Odisha's recent agricultural transformation has been the emergence of spontaneous vegetable clusters. We summarize preliminary findings from three case studies, eggplant in Nayagarh, pointed gourd and cauliflower in Cuttack.
- Our three case studies suggest that the pathways to becoming a cluster can be diverse: emerging from traditional knowledge of a niche crop that sees a spurt in demand, an externally initiated cluster seeded by distant traders and a coevolution of local trader-farmer relationships.
- Each cluster exhibits its own configuration of social dynamics relating to caste, class, gender and generation in ways that can reinforce historical inequities even as they can 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 met with success.
  - Women's involvement, when permitted, is mostly restricted to farm work with little executive agency or say in decisions.
  - Generational renewal is a challenge to varying degrees across the three clusters.
- The role of the state is potentially important, for example, via the provision of irrigation and enabling the acquisition of a Geographical Indication (GI) tag, though with varying effectiveness.
- To understand the emergence and viability of clusters, we need look beyond a purely economic lens of agglomeration economies and transactions costs to one that incorporates social dynamics.

Introduction

A prominent but understudied aspect of Odisha's recent agricultural transformation has been the emergence of spontaneous vegetable clusters. We summarize preliminary findings from three case studies of clusters that emerged organically – eggplant in Nayagarh district, pointed gourd and cauliflower in Cuttack district. The aims of this research effort are four-fold: How did these clusters emerge? How do these production clusters link with mid-stream actors and how do they co-evolve? What are the social dynamics of inclusion – across caste, class, gender and generation? What roles do these different groups perform in these production clusters and on what terms?

The study

The study on which this note is based was commissioned to examine the characteristics, performance and inclusivity of vegetable clusters in Odisha, based on comparative case studies of three spontaneously formed and three organized vegetable clusters in Odisha.[1] In this note, we describe the findings of the spontaneous clusters (See Project note 11 for a discussion of Organized vegetable clusters).

We selected the three clusters to represent different vintages, to represent at least two districts within Odisha and to represent commodities that were at different stages of the product life cycle. Eggplant is a niche commodity, cauliflower is a standardized commodity and pointed gourd too, while like cauliflower, is sought after when it comes from this cluster.

The fieldwork was conducted in two phases in December 2025-January 2025 and Figure 1 shows the sites of these clusters. In each of the clusters, an attempt was made to delineate the extent of the cluster and identify the origin in terms of both the farmers who first began cultivating the commodity and the first villages where the cluster was born. Key informant interviews via a semi-structured interview guide were conducted with multiple farmers and traders. Table 1 summarizes the salient features of these clusters.

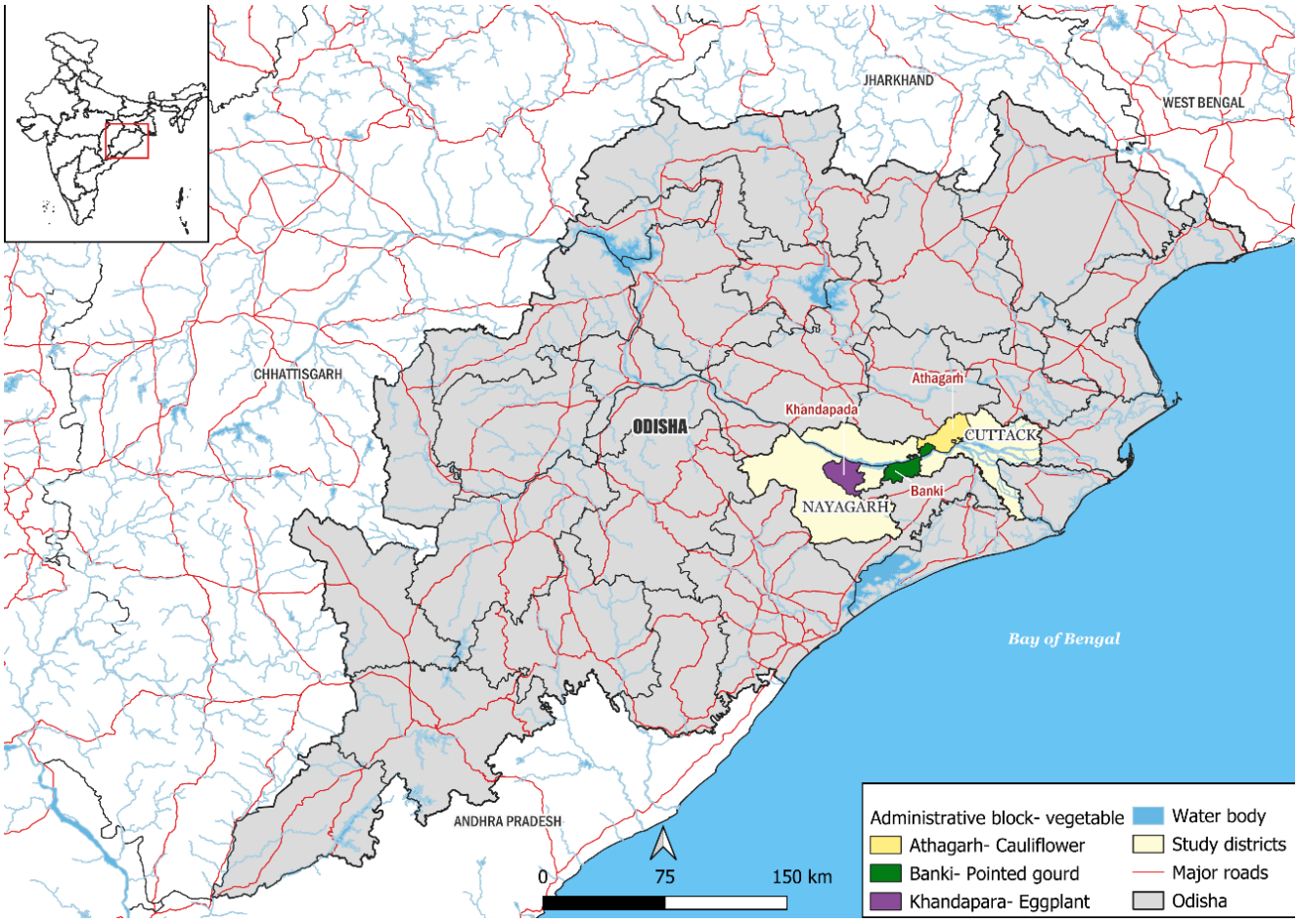
Table 1: Clusters covered in the study

Vegetable	Region (District)	Scale	Origin year	Area under commodity (as % of veg area)	Number of key Informant Interviews
Kanteimundi baingana (Eggplant)	Kumundi (Nayagarh)	4 Villages, > 120 farmers, > 80 acres	>100 years	50-70%	12 farmers. 3 traders, 1 input supplier, 4 farm workers,1 public official
Cauliflower	Jenapada (Cuttack)	9 villages, > 400 farmers, > 250 acres	1978	83-100%	12 farmers, 3 traders, 3 input suppliers, 4 farm workers, 1 public official
Pointed gourd	Kuspangi (Cuttack)	3 villages, > 130 farmers, > 100 acres	2017	71-82%	12 farmers, 7 traders, 2 input suppliers, 2 farm workers, 2 public officials

Source: Based on INCATA case study on Clusters, 2025-26

[1] By organized clusters, we refer to clusters of vegetable production implemented as part of the Government of Odisha's Agriculture Production Cluster (APC) programme.

Figure 1: Location of the clusters



Source: Authors

Emergence and evolution

The three vegetable commodity clusters – *kanteimundi baigana* i.e. eggplant in Kumundi (Nayagarh), cauliflower in Jenapada (Cuttack), and *potal* (pointed gourd) in Kuspangi (Cuttack) represent distinct pathways of vegetable-centered agrarian commercialization in Odisha. Each cluster has evolved under different ecological conditions, market trajectories, and social structures, resulting in divergent scales of operation and contrasting social dynamics.

Cluster 1: Eggplant cluster: An indigenous crop with gradual expansion and uncertain future

The *kanteimundi baigana* cluster in Kumundi represents a long-standing, indigenous, and ecologically embedded production system. Brinjal itself is a widely cultivated crop across India, but the *kanteimundi* variety is distinctive in its adaptation to the soils of the banks of the river Mahanadi, its resistance to pests, drought tolerance. Its unique taste profile makes it a niche commodity. The variety originated

since time immemorial (maybe more than 100 years) in specific pockets of Nayagarh district, particularly Badabanapur, Ratanpur, Dhanchangda, Laxmiprasad, Kumundi, and Fatehgarh. For decades it remained geographically concentrated.

The emergence of this cluster was organic and caste-led, driven primarily by the Oda Chasa cultivating caste, who identify themselves as the "true" cultivators and custodians of the variety. Cultivation practices were transmitted intergenerationally, with seed preservation remaining tightly controlled within the community. Unlike technology-driven clusters, the *kanteimundi baigana* cluster evolved slowly, anchored in local ecological knowledge and low-input practices. Lift irrigation, provided by the state in 2021, from the Mahanadi river enabled expansion along the riverbanks. Its expansion was enabled by the fact that the thorny plant prevented animals from raiding the fields, reducing the production risk that thwarts vegetable cultivation across Odisha (See Project Note 5).

In terms of scale, the cluster can be regarded as moderate – encompassing an estimated 80 acres. On average, vegetables account for roughly 17–20 percent of gross cropped area, but Kanteimundi baigana constitutes between 50 and 77 percent of vegetable area, depending on farm size. Cultivation cuts across landholding classes, though in Kumundi, relatively larger farmers dominate. Even large farmers, i.e., those cultivating more than four acres, rarely expand area under *kanteimundi baigana* on a large scale since harvesting is both laborious and risky on account of the thorns.

The cluster's evolution accelerated sharply after the Geographical Indications (GI) tag was awarded in 2024. It transformed a subsistence-oriented, locally consumed vegetable into a branded regional product. Demand surged, prices stabilized at ₹80–90 per kg year-round. Farmers from other communities sought to enter brinjal cultivation. Younger Chasa traders leveraged connectivity and the presence of tourist towns in the vicinity to access urban markets. As one 34-year-old trader explained, "I collect the brinjal directly from the farms of large farmers… I earn a good amount of profit due to the minimal transportation cost."

Despite this market success, the cluster faces a severe generational challenge. Older farmers dominate cultivation, while youth increasingly migrate to Bhubaneswar and Puri, viewing vegetable farming as socially demeaning. This has created anxiety around knowledge transmission. As a 65-year-old farmer reflected, "I have learned about the cultivation of this variety of eggplant from my father… Who will teach my son?" Thus, while the cluster is commercially viable and has been resilient, its future is uncertain due to threats to generational renewal.

Cluster 2: Cauliflower Cluster of Jenapada: Induced by traders, rapid scaling and market channel diversity

The cauliflower cluster in Jenapada represents a technology-driven and externally initiated pathway of cluster formation. Cultivation began in 1978, when itinerant input suppliers from Bihar introduced cauliflower saplings and production techniques. Over time, cultivation expanded rapidly to eight neighboring villages, transforming Athagarh block in Cuttack district into one of Odisha's major cauliflower belts. Today, more than 200 acres in Jenapada alone are under cauliflower cultivation, making this the largest and most spatially dense cluster among the three studied.

The cluster's growth was enabled by assured canal irrigation from the Rengali Canal, which reduced climatic risk and allowed farmers to intensify vegetable production. Unlike *kanteimundi baigana*, cauliflower cultivation is highly input- and knowledge-intensive, involving precise timing and higher exposure

to market volatility. First-generation adopters are now in their 70s, while the second generation, currently in their early 50s, control most production decisions.

The extent to which farmers allocate areas to vegetables, specifically cauliflower varies across landholding classes. In this area, vegetables tend to dominate land use for all, except the large farmers (with over 4 acres), who maintain crop diversity. Cauliflower alone accounts for over 80 percent of vegetable area across all farm sizes and nearly 100 percent among medium farmers. Cultivation is seasonal (September–February), but large farmers stagger production across cycles, enabling year-round market participation. This transition from a seasonal crop to a crop grown through the year and staggered planting is a marker of commercialization and of farmers growing *for* the market.

The cluster's evolution has also been shaped by marketing stratification. Large farmers sell almost exclusively to traders and middlemen, maintaining distance from local *haats* to preserve social status. As one 56-year-old farmer noted, "I should not go to these local *haats*… I am considered a prestigious person in my village." Small farmers, by contrast, rely heavily on *haats* and roadside sales, facing lower prices, higher uncertainty, and limited bargaining power.

Generationally, the cauliflower cluster shows partial renewal. Youth participation is higher than in the other two clusters, particularly among medium and large farmers, because cauliflower provides lumpsum cash returns. A local saying captures this logic: "If you have to get the money in bundles, you must go for cauliflower." However, youth from smallholder households remain disengaged, perceiving farming as precarious and socially unrewarding.

Overall, the cauliflower cluster is economically significant and relatively dynamic, but deeply unequal, with small and Scheduled Caste (SC) farmers increasingly exiting due to marketing risks and in some cases the absence of storage infrastructure.

Case 3: Pointed gourd Cluster of Kuspangi: Young cluster, rapid growth, robust future

The *potal* (pointed gourd) cluster in Kuspangi is the youngest but most commercially reliable of the three clusters. Extensive cultivation began only around 2017, yet within a short period pointed gourd became the primary livelihood crop across all farm sizes. The cluster's emergence was driven by persistent urban demand. Pointed gourd was particularly suitable for the area with well-drained sandy loam soil, and the adoption of an innovative wire-trellis-based cultivation system that allows continuous harvesting and multi-cropping. Thus, once established, pointed gourd cultivation offers year-round income, with harvesting extending from February to September and continuing for up to two years from a single planting. This makes pointed gourd a "trouble-shooter vegetable". Its rapid uptake by farmers was in part to address the income uncertainty and volatility associated with other crops.

Vegetables occupy a smaller share of gross cropped area among large farmers, pointed gourd constitutes over 70–80 percent of vegetable area across all size classes. Though area under vegetables for large farmers constitute a small proportion to their gross cropped area, it covers a large area of the cluster.

Unlike the other clusters, market control in pointed gourd does not lie with cultivators but with a collective of Gouda (milkman caste) traders, who coordinate prices, procurement territories, and payment schedules. Their collective strategy keeps out competitors but ensures price stability. They have earned considerable trust with farmers in the cluster. Here is a case where traders collude but in ways that are

apparently welcomed by the farmers. As one trader explained, “We work collectively to defeat those who come in our way.”

Despite high returns, the cluster exhibits low youth and female participation. Pointed gourd cultivation requires constant attention, discouraging youth who seek flexible or off-farm employment. Older male farmers dominate production, while women are almost entirely absent due to norms around visibility and caste status. At the same time, SC farmers show strong interest in entering the cluster but are constrained by restricted access to irrigated land, which remains tightly controlled by Chasa households. Even successful SC cultivators with proven expertise are excluded from land leasing, as dominant castes seek to preserve their identity as a pointed gourd-growing community. Considering their interest, in every likelihood, the SC farmers may increasingly join pointed gourd cultivation with the expansion of area under irrigation, which is underway. We discuss these issues in detail in the next section.

Social dynamics in cluster participation

In this section, we elaborate on some of the social aspects of inclusion in these three clusters. The three vegetable commodity clusters – *kanteimundi baigana*, cauliflower, and pointed gourd – exhibit sharply differentiated patterns of participation by gender, caste, and age. While all three are dominated by cultivating caste (Chasa) farmers, the terms of inclusion for women, scheduled caste (SC) households, and younger or older farmers vary considerably by crop. Together, these clusters reveal that participation in agricultural commercialization goes beyond access to and availability of land or labor.

Kanteimundi Baigana: Gendered skill, caste hierarchies, and generational anxiety

Among the three crops, *kanteimundi baigana* displays the highest level of women’s involvement, though this participation is highly circumscribed. Women are primarily engaged in harvesting, a task that is both labor-intensive and risky due to the prickly thorns on the plant.

Elderly women dominate this activity, while younger and newly married women are largely barred from it due to norms restricting their engagement in physically demanding or publicly visible farm work. As one 61-year-old Chasa woman explained, “Working in agriculture at an early age is socially prohibited here. Only young women from lower castes do this work.” Her narrative highlights how age intersects with caste to shape women’s agrarian roles.

Over time, the elderly women have acquired considerable skill in plucking the eggplant efficiently and safely. The Chasa woman we quote above noted that she began her involvement in harvesting only at age 48, and noted proudly that she embodied knowledge and mastery: “No one can do this work as I can… If you do not learn how to pluck, you will end up injuring yourself.”

Yet despite this expertise, women in general remain excluded from decision-making related to sale, pricing, or input purchases. Their participation is thus defined by manual skill without economic authority or executive agency.

Beyond harvesting, women from Scheduled Caste (SC) households play a crucial role as hired labor across other stages of eggplant cultivation, including land preparation and transplantation. SC women are preferred not because of inferior skill, but because they are cheaper and more readily available. With women laborers charging Rs. 350 per day compared to Rs. 450 for men, Chasa farmers rationalize this preference in ostensibly neutral terms, claiming no difference in quality or volume of work. Yet

the wage differential underscores how caste and gender jointly structure labor markets, normalizing lower remuneration for SC women.

At the same time, *kanteimundi baigana* shows early signs of social mobility, particularly after the crop received a GI tag and demand increased. A striking example is that of a Keuta (fisherman caste) household that transitioned into eggplant cultivation through the household women acquiring knowledge informally as a farm worker. The husband credits his wife's experience on others fields (and her covert transfer of saplings for trial for their success): "All credit goes to my wife." Their case illustrates one kind of resistance of how women's labor enables pathways of skill diffusion across caste boundaries, even as Chasa cultivators attempt to guard knowledge.

However, despite such openings, the crop remains largely dominated by cultivating castes. Moreover, the cluster faces a generational crisis. Younger people increasingly migrate or pursue non-farm livelihoods, viewing vegetable cultivation as socially degrading. Elderly farmers express deep anxiety about the loss of intergenerational transmission. As one 65-year-old farmer lamented, "Who will teach my son? If I tell him, he will start quarrelling with me." Here, older farmers participate actively but with a sense of futility, while youth disengagement threatens the continuity of the crop.

Cauliflower: Male control, skill gatekeeping and caste-based exclusion

The cauliflower cluster in Jenapada is marked by near-total male dominance and the most explicit exclusion of women from cultivation, even as workers. Chasa men justify women's exclusion by framing cauliflower as a technically complex and risky crop. Women's participation is reduced to domestic consumption, with one elderly farmer remarking sarcastically, "We engage them only for cooking of this vegetable, not for cultivation."

This discourse of skill operates as a gatekeeping mechanism, limiting women's entry into cultivation while reinforcing male authority over technical knowledge. It also extends to caste relations. Although SC men and women are extensively employed as wage laborers, very few SC farmers are allowed or enabled to cultivate cauliflower themselves. The stated reason is lack of skill, but the deeper logic is revealed by a retired Chasa farmer who admitted, "If we teach them how to cultivate cauliflower, who will work in our field?"

The wage structure further reflects caste and gender hierarchies. SC women earn the least – Rs. 200 for a morning session and Rs. 150 for an afternoon – while men earn Rs. 350 per session. Participation by older Chasa men is common, as they retain and exercise control over land and knowledge, whereas youth – both Chasa and SC – are largely absent as cultivators. Where SC farmers do acquire skills, it is exceptional rather than systemic, reinforcing the exclusivity of this cluster.

Pointed gourd: Respectability, access to land, exclusion through identity

Pointed gourd cultivation exhibits the lowest participation of women among the three clusters, even more than the case for cauliflower. All major tasks – from seedbed preparation to harvesting – are performed by men. Women's absence is not explained in terms of skill, but rather social respectability and visibility. Because pointed gourd fields are located along a main road and the cluster is dominated by Chasa farmers, women's fieldwork is seen as undermining household status. Engaging wives or daughters in farming is perceived as a loss of social esteem.

Youth participation in pointed gourd cultivation is also limited. While young men may assist part-time, the crop's requirement for constant attention discourages sustained engagement. As with the other clusters, vegetable farming is seen as incompatible with youth aspirations.

In contrast, SC farmers express strong interest in pointed gourd cultivation, attracted by its profitability. Yet their participation is structurally blocked by restricted access to irrigated land, which remains firmly under Chasa control. A 48-year-old SC farmer, who left a private tutoring job to take up organic pointed gourd farming, exemplifies both entrepreneurial capacity and persistent exclusion. Despite nine years of successful cultivation and local recognition, he notes that Chasa landowners "did not consider me while leasing out their land to less-skilled farmers from their own community."

Here, caste exclusion is justified not by skill deficits but by the desire to preserve a collective caste identity as a "pointed gourd-growing community." Even in a context where land is increasingly leased to SC youth elsewhere due to declining agrarian interest, this particular cluster closes its doors to members of the SC community. Older Chasa farmers thus participate as gatekeepers, youth are marginal or absent, women are excluded for reasons of respectability, and SC farmers are denied entry despite demonstrated competence.

Conclusion

Together, they illustrate how commodity clusters are shaped not only by agro-climatic suitability and consumer demand, but also by caste-based land control, technological pathways and changing aspirations across generations.

The clusters in this case study illustrate contrasting trajectories of agrarian change. *Kanteimundi baigana* reflects an indigenous, culturally embedded system under commercial transition but facing generational decline. Cauliflower represents externally induced, technology-led commercialization with partial generational renewal but deepening inequalities. Pointed gourd demonstrates rapid, profitable expansion with strong market coordination but rigid social exclusion.

Across the three clusters, participation is shaped less by agronomic necessity than by social norms governing gender roles, caste hierarchies, and generational authority. Women's labor is most visible in *kanteimundi baigana* but largely confined to skilled yet undervalued tasks; it is marginal in cauliflower and nearly absent in pointed gourd. Scheduled caste households are essential as labor across all clusters but face systematic barriers to becoming cultivators, especially where crops are profitable or identity-defining. Older farmers dominate cultivation but are increasingly anxious about succession, while youth disengagement threatens the long-term sustainability of these systems. Together, these patterns reveal how commodity clusters can reproduce and selectively adapt deeply embedded social inequalities even amid market expansion and diversification.

Too often, the emergence and viability of clusters are discussed in purely economic terms of agglomeration economies and transactions costs. These three clusters underscore a need to expand our analytical lens to examine the social dynamics of cluster formation and evolution.

ABOUT THE AUTHORS

Papesh Kumar Lenka (papeshkumar@gmail.com) is Assistant Professor at Utkal University, Bhubaneshwar, India

Bibhuti Bhusan Mohanty (bibhutimohanty@hotmail.com) is Professor at Pondicherry University, Puducherry, India

Sudha Narayanan (S.Narayanan@cgiar.org) is a Senior Research Fellow in the Development Strategies and Governance (DSG) Unit at IFPRI.

Ben Belton (Ben.Belton@cgiar.org) is a Research Fellow in the Development Strategies and Governance (DSG) Unit at IFPRI.

ACKNOWLEDGMENTS

We thank Mr. Lohit Kumar Das and Dr. Bishnuprasad Mohapatra for their assistance in research fieldwork, especially in data collection and community engagement. 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 and other officials and staff of the Government of Odisha for their valuable advice, inputs, and support in facilitating field-level activities

This work was supported by the CGIAR Accelerator on Gender Equality and Inclusion and the Gates Foundation GRANT INV-066950 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. This work is a contribution to the CGIAR Accelerator on Gender Equality.

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

A world free of hunger and malnutrition

IFPRI is a CGIAR Research Center

1201 Eye Street, NW, Washington, DC 20005 USA | T. +1-202-862-5600 | F. +1-202-862-5606 | Email: ifpri@cgiar.org | www.ifpri.org | www.ifpri.info