CoFTI
Coalition for Food-Systems Transforma(c)tion in India

SEPTEMBER 2026

WORKING PAPER

Gendered Dimensions of Peri-Urban Agriculture: Livelihood Practices, Market Linkages, and Coping Strategies in Delhi - NCR's Farming Clusters

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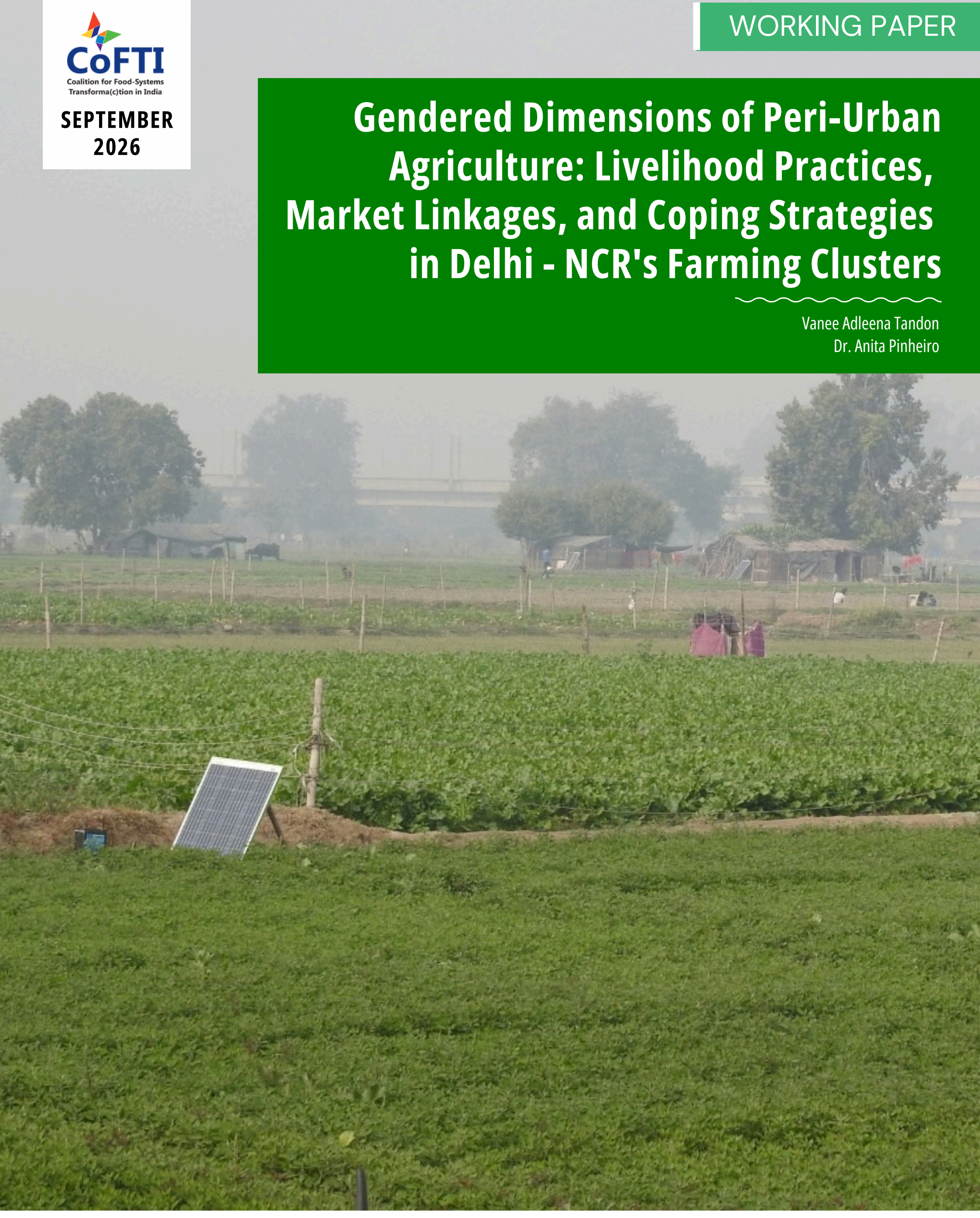

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Tandon, Vanee Adleena, and Anita Pinheiro. *Gendered Dimensions of Peri-Urban Agriculture: Livelihood Practices, Market Linkages, and Coping Strategies in Delhi-NCR's Farming Clusters.* Working Paper. New Delhi: Coalition for Food-Systems Transforma(c)tion in India (CoFTI), September 2026.

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Cover Photograph:
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Cover Photo:
The photograph reflects the spread of agricultural fields along the banks of the Yamuna in Delhi.

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About CoFTI

The **Coalition for Food-Systems Transforma(c)tion in India (CoFTI)** was born out of the United Nations (UN) Food Systems Summit 2021 with a commitment to reshaping India's food system so that safe and nutritious food is accessible to all. Its mission addresses hunger and malnutrition while championing biodiversity, climate resilience, and the protection of livelihoods. By bringing together diverse stakeholders, CoFTI works to create sustainable and equitable solutions that balance the needs of people, planet, and economy. Grounded in the Sustainable Development Goals (SDGs), the Coalition drives positive change across seven key areas of work, ensuring that India's food systems remain resilient for both present and future generations.

CoFTI's approach is anchored in **three core objectives**.

1 **THOUGHT LEADERSHIP**	**USING RESEARCH, INNOVATION, AND EVIDENCE-BASED INSIGHTS TO SHAPE EFFECTIVE POLICIES AND GUIDE THEIR IMPLEMENTATION.**
2 **COLLECTIVE ACTION**	**OFFERING A COLLABORATIVE SPACE WHERE STAKEHOLDERS CAN UNITE, SHARE RESOURCES, AND WORK TOGETHER ACROSS ITS AREAS OF FOCUS.**
3 **BUILDING CONNECTIONS**	**FOSTERING STRONG LOCAL AND INTERNATIONAL NETWORKS TO ENABLE THE EXCHANGE OF KNOWLEDGE AND STRENGTHEN PARTNERSHIPS**

Through these objectives, CoFTI serves as both a catalyst and a convener, ensuring that India's journey towards a just, sustainable, and nourishing food future is grounded in shared purpose and actionable solutions.

CoFTI Core Group comprises of Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Welthungerhilfe India (WHH), Food Future Foundation (FFF), and Watershed Support Services and Activities Network (WASSAN), which hosts the Secretariat of CoFTI.

The Core Group has evolved to CoFTI's Transformation Council (2025–26), a strategic advisory body driving high-potential initiatives through a cross-sector cohort. It unites civil society, government, academia, and private sector stakeholders to advance collaborative food systems transformation in India.

The CoFTI Fellowship Programme

The CoFTI Fellowship Programme (2025) was conceptualized to nurture early-career researchers in India by supporting them to explore and generate evidence on critical food systems issues. Designed as a structured three-month fellowship, it combined rigorous selection, thematic focus, and a mentorship model curated, hosted, and implemented by CoFTI Secretariat with support from WASSAN and Welthungerhilfe (WHH) India. Through guided research and collaborative knowledge creation, the programme culminated in the Fellows producing six working papers, an Issue Brief, and a detailed survey-based analytical report.

The CoFTI Fellowship Programme was carried out from August to November 2025 followed by a rigorous process of review and finalisation of the outputs. Applications were invited from early career researchers for specific thematic areas identified through consultations with CoFTI members. The programme received nearly 500 applications from which eight fellows were selected by a panel including the CoFTI Core group members and other subject experts who are also members of the Coalition. A team of subject experts was invited to mentor the Fellows. The CoFTI Fellows received an honorarium to support their research during the Fellowship, and the final topics were decided jointly by the Fellows and their assigned mentors.

Of the eight fellows selected, seven successfully completed the CoFTI Fellowship programme. Five Fellows undertook original research projects from conceptualisation to manuscript preparation, while two contributed to the development of a CoFTI Issue Brief and a survey-based analytical report.

Voluntary mentorship by CoFTI members: A defining feature of the fellowship was its mentorship model. Members of CoFTI, Core Group, and the Secretariat have voluntarily mentored the fellows throughout the programme.

The fellowship culminated in the presentation of findings, followed by review, revision, and publication as part of the CoFTI Working Paper Series, with opportunities for further research collaboration and publication.

The CoFTI Secretariat was responsible for the overall design and coordination of the fellowship programme. This included developing the fellowship framework, managing the selection process, facilitating mentor–fellow engagement, and coordinating the review, editing, design, publication, and communication of the fellows' outputs. As the institutional anchor of the Secretariat, WASSAN also played a significant role in the operational management and smooth implementation of the fellowship programme by providing administrative, human resource, and design support, which was instrumental in ensuring the effective delivery of the programme.

ACKNOWLEDGEMENTS

This working paper was developed as part of the CoFTI Fellowship Programme (August–November 2025). Through mentorship, financial support, and opportunities to undertake primary research, the Fellowship provided the foundation for the conceptualisation, fieldwork, and development of this paper.

The first author would like to express our heartfelt gratitude to the CoFTI Fellowship Programme for providing her with this valuable opportunity to engage with farming communities and diverse stakeholders working towards sustainable and inclusive food and agricultural systems.

This working paper presents findings from field-based research conducted across seven peri-urban farming clusters in Delhi-NCR. We extend our sincere gratitude to the farmers and community members of Najafgarh, Kanjhawala-Bawana-Narela, Alipur, Pooth Khurd, Okhla, Chhatarpur, and Mehrauli for generously sharing their time, experiences, knowledge, and perspectives. Their openness and participation form the foundation of this Study.

We are grateful to Umesh Tiwari for his dedicated support during the field visits and for facilitating engagement with farming communities across the study locations. His assistance and on-ground support were invaluable during the fieldwork and data collection
Process.

We are thankful to Anshuman Das, Welthungerhilfe India and Core Group member of CoFTI, for his constant feedback and valuable inputs throughout the CoFTI Fellowship Program.

We are grateful to Priyamvada Kowshik, Team Lead of CoFTI Secretariat, for her sustained support throughout the CoFTI Fellowship Programme. Her continued engagement was central to the development and finalisation of the Working Paper Series.

We would like to express our sincere gratitude to other members of the CoFTI Secretariat - Jyoti Prasad, Pallavi Shankar, Dinesh Balam, and Jitendra Kar - for their support throughout the CoFTI Fellowship Programme.

We thank Payal Thakur for her editorial assistance in finalising the Working Paper.

We would like to extend our sincere gratitude to WASSAN (Watershed Support Services and Activities Network) for hosting the fellowship and providing the necessary organisational framework to support this research.

We also extend our appreciation to fellow CoFTI Fellows, for their valuable discussions and shared reflections, which contributed to refining the arguments presented in this paper. The first author is also grateful to her friends and family for their constant encouragement and support throughout this journey.

We also extend our sincere gratitude to Nemani Chandrasekhar for his thoughtful and creative design contributions, which have enhanced the presentation and overall quality of this Working Paper.

The views expressed in this working paper are those of the authors and do not necessarily reflect the views of all contributors, participants, or partner organisations.

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List of Abbreviations

ABBREVIATION	FULL FORM
CSA	Community-Supported Agriculture
DIY	Do It Yourself
FPOs	Farmer Producer Organisations
NCR	National Capital Region
NGOs	Non-Government Organisations
OBC	Other Backward Classes
PKVY	Paramparagat Krishi Vikas Yojana
SC	Schedule Caste
ST	Schedule Tribe



Photo Credit: Anita Pinheiro

Executive Summary

Peri-urban agriculture in Delhi-NCR exists within a landscape marked by rapid urbanisation, environmental stress, and shifting market geographies. As villages are absorbed into expanding city boundaries, farmland becomes fragmented, labour intensifies, and market access becomes increasingly uncertain. Within this transforming setting, gender emerges as an important axis shaping participation, mobility, and decision-making in agriculture. Existing research highlights similar patterns, feminisation of labour, fragmentation of agricultural land, dependence on intermediaries, and heightened ecological risks, yet these insights remain largely scattered and rarely grounded in multi-site field evidence from Delhi-NCR. Despite growing academic attention, limited scholarship captures how gendered agricultural roles intersect with market constraints and environmental pressures in specific clusters such as Najafgarh, Kanjhawala-Bawana-Narela, Alipur, Okhla, Chhatarpur, and Mehrauli. This study addresses that gap by offering empirical evidence from the field on livelihood practices, market linkages, and coping strategies among peri-urban farmers, emphasizing women's and men's differentiated experiences under changing agrarian conditions.

Drawing on a mixed-methods approach involving surveys and qualitative interactions with 71 farmers, the study captures detailed accounts of cropping practices, labour divisions, transport dependence, market participation, environmental challenges, and household-level adjustments during shocks such as floods, heatwaves, and price fluctuations. The findings reveal that farmers navigate multiple market channels, from local vendors and village markets to direct-to-consumer sales and mandies, yet remain constrained by volatile prices, high transport costs, and continued reliance on middlemen. Many report that their share of the final consumer price remains disproportionately low. Respondents associated urban expansion with reductions in cultivable land, field fragmentation, and changes in irrigation access. Soil degradation, flooding, pest attacks, and waste dumping were reported as additional pressures on production. These disruptions appear to influence cropping choices, increase workload, and require constant adaptation.

Gender differences were evident across several reported experiences . Women manage sowing, weeding, irrigation, harvesting, sorting, packing, feeding livestock, and household responsibilities, often without recognition or control over market decisions. Men typically handle sales, transport, and negotiations, reflecting mobility constraints and gendered divisions of labour. Coping strategies vary but remain limited: households adjust labour distribution, shift to high-yielding or short-duration crops, rely on informal networks, and selectively participate in some supportive programs. Several respondents describe losing land to housing developments, roads, industrial sites, or commercial construction, leading many respondents to cultivate smaller plots or travel farther to scattered fields. These shifts intensify workloads for both genders, though women frequently report increased workloads due to overlapping farm and domestic roles.

Taken together, the study illustrates how peri-urban agriculture in the study clusters is shaped by the interlinked pressures of gendered labour, uncertain market access, and environmental degradation. These domains reinforce one another: limited market control heightens women's dependency and invisibility; environmental pressures were associated with increased labour demands and shrinking farmland restructures household strategies for survival. The findings suggest that while peri-urban farmers continue to adapt through flexible cropping, labour reorganisation, and selective engagement with schemes, their livelihoods continue to face considerable uncertainty. Understanding these interconnected dynamics can help explain how rural-urban transitions are reshaping everyday agricultural life in Delhi-NCR.

1

INTRODUCTION

CONTEXT

Urban growth in India has blurred some of the distinctions between rural and urban, as well as created vibrant peri-urban spaces (inhabiting both rural and urban qualities) that encounter competing land uses, environmental challenges, and increasingly complex livelihoods (Marshall *et al.* 2024; Patil et al. 2023). Indifferent urban growth, such as in cities like Delhi and Chennai, peri-urban spaces become an important food system space for fresh produce, income for smallholder farmers, and a space of competing land uses, environmental challenges, and increasingly complex livelihoods. Peri-urban spaces are also experiencing land transformation, water challenges, pollution, and other pressures that pose challenges to the sustainability of local farming spaces (Nashier 2021; Cook *et al.* 2015).

Besides food production, peri-urban agriculture plays an important role locally by providing job opportunities, enhancing urban resilience, and providing ecosystem services, such as carbon sequestration, flood management, and biodiversity enhancement (Marshall et al., 2024; Gunapala et al., 2025). Even with these benefits, they often receive limited consideration in planning and policy processes, which prioritize industrial, infrastructure, and real estate development (Patil *et al.,* 2023). As a result, marginalization trends exist, whereby smallholder farmers have limited or eliminated access to land, institutional support, and security of land tenure (Cook *et al.,* 2015; Nashier, 2021). The layers of these networks of marginalisation may disproportionately affect women farmers, whose contributions are vital but remain under-recognised.

Gender is an important dimension of the organisation of agricultural labour within peri-urban areas. Women play an important role in planting, harvesting, sorting, and marketing, and rarely have formal consideration in decision-making, nor control over the income from agricultural products (GEAG, 2020; Jacob et al, 2025). Studies in northern India show that women contribute to both agricultural work and household responsibilities, while also facing limited access to credit, land titles, and formal markets (GEAG, 2020). Likewise, from Kerala, it is noted that women's engagement in urban or peri-urban agriculture contributes to household food security nd sustainability, in spite of continued institutional and systemic barriers in relation to the distribution of resources based on gender (Jacob et al., 2025). To understand these arrangements is to begin to understand how gendered livelihoods intersect with some of the spatial and economic changes associated with urbanisation.

Research on peri-urban areas in India has mainly concentrated on ecosystem degradation, ecosystem service valuation, and planning problems (Marshall *et al.,* 2023; Patil *et al.,* 2023), and little attention is given to the lived experience of farmers, especially women, living and working in these urban-peri-urban spaces. They are supporting local markets and providing food for urban consumers (Nashier, 2021) within the Delhi context, but "increasing insecurity over land and income has been associated with pressures linked to urban expansion. Cook *et al.* (2015) have similarly found that peri-urban farms produce a sizable chunk of Delhi's fresh produce; however, these farms are also informal, which suffers from price instability, limited access to markets, and environmental degradation. This limited recognition may affect gender equity and the achievement of sustainable food systems.



Photo Credit: Anita Pinheiro

OBJECTIVES

The major objectives of the study are:

1. Explore the gendered dimensions of agricultural production, including how women and men contribute to and benefit from farming, how labour is distributed among them, and how women's contributions are recognised at the household and community levels.

2. Understand how peri-urban farmers navigate formal and informal markets, with attention to gendered differences in market participation and the barriers and opportunities they encounter in accessing markets and resources.

3. Explore how farmers cope and adapt to changing agrarian conditions in the peri-urban areas, particularly in relation to land use, livelihoods, and market activities.

By examining these questions, this study contributes to understanding peri-urban agriculture and its intricate connections with inclusive and sustainable urban development.



Photo Credit: Anita Pinheiro

2 METHODOLOGY

Research Design

This study adopts a mixed-methods approach, combining structured questionnaire surveys with qualitative interviews, field observations, and field notes to examine the realities of peri-urban farmers in Delhi-NCR, with particular emphasis on gendered participation, livelihood transitions, and access to markets. The quantitative and qualitative data are analysed descriptively and interpreted through a gender-focused analytical lens. The methods were designed to get at both the structural aspects of their farming systems and the lived experiences of men and women who farm as a livelihood at the urban frontier.

Study Area

The primary study was conducted at peri-urban farming sites across Delhi, including Najafgarh (South-West Delhi), Kanjhawala - Bawana - Narela (North-West Delhi), Alipur, Pooth Khurd, Okhla, Chhatarpur, and Mehrauli. These study sites represent diverse socio-spatial settings at the interface between built-up areas and agricultural peripheries, where agricultural production continues alongside expanding urban land uses. Fieldwork for data collection was conducted over one month in September 2025.

Sampling

A purposive sampling strategy was used to select 71 respondents across different socio-demographic categories.The sample included both migratory and settled households, as well as respondents with different landholding size, farming practices, and levels of access to markets and livelihoods. This approach enabled the study to capture variation across respondents and understand how gender, migration, and spatial context influenced peri-urban agriculture.

Data Collection

A mixed-methods approach was adopted, combining structured surveys, semi-structured and in-depth interviews, and participant and non-participant observations to develop a diverse dataset on peri-urban farming livelihoods. The quantitative and qualitative components were used in combination to examine patterns of agricultural participation, market access, livelihood practices, and gendered experiences.

- **In-depth semi-structured interviews:** In-depth interviews with male and female farmers were employed to engage topics of labour division, decision making, gendered participation in production and marketing, reaction to price changes, and adaptive strategies based on environmental or economic shocks. These interviews provided contextual depth to the social organization of farming families and how they adapt to changing contexts.
- **Structured questionnaire surveys:** Structured questionnaires were used to collect household demographic data, land ownership and farming activities, linkages to markets, and distribution of income and women's contributions to working in agriculture. The questionnaires also captured information on where the produce was sold, including local markets, informal vendors, Delhi mandis, or directly, as well as the barriers farmers faced in accessing markets.
- **Direct observations:** Participant and non-participant observations were conducted in selected villages and in nearby mandis. These observations focused on the day to day functioning of markets, gendered roles in trading and sorting processes, and the broader physical context of farming. Field notes were used as contextual data alongside interviews and survey findings, so as to situate the responses within the lived experience.

Data Collection Tools

Kobo Toolbox was used to administer and record survey responses in the field to allow organised and efficient data collection. In addition, field notes and written observations were recorded to document non-verbal communication cues, environmental circumstances, and spontaneous interactions that could not be fully articulated through survey items. These qualitative field notes offered insight into uneven gendered participation in informal and market spaces.

Limitations

The fieldwork was conducted during the monsoon season, which affected the researcher's mobility and the farmers' availability. Time and logistical constraints also limited the possibility of repeated visits and longitudinal observation. However, the use of multiple methods and data sources enabled triangulation of findings and provided a broader basis for interpreting the field data.

Ethical Considerations

Participants were invited to voluntarily participate and informed about the purpose of thestudy and their right to withdraw at any point. Efforts were made to maintain the confidentiality of the responses by reporting them anonymous. The study also sought to ensure that women's responses were captured, particularly in contexts where social and household dynamics may have constrained their participation or ability to express their views.

Photo Credit: Anita Pinheiro



3

SOCIO-DEMOGRAPHIC AND LIVELIHOOD PROFILE

The demographic characteristics of respondents provide an overview of the socio-economic and gendered profile of peri-urban farming households in Delhi. The study included 71 respondents from peri-urban crop growing cluster locations in and around Najafgarh, Kanjhawala-Bawana-Narela, Alipur, Pooth Khurd, Okhla, Chhatarpur, and Mehrauli. The respondents included residents and migrant farmers engaged in small and medium crop production.

Gender and Age Representation

Women constituted nearly two-thirds of the study sample, indicating substantial fema;e participation among the respondents. Women farmers contributed to a range of agricultural activities, including sowing, weeding, irrigation, post-harvest sorting, and other farm-related tasks, along with their household responsibilities, and many of these roles receive limited recognition within household-level farming activities.

Respondents ranged in age from 22 to 56 years, with the large proportion falling in the 30-45 age group. The age distribution provides an overview of the respondents across different stages of working and family life. The findings also indicate that many women often combine household responsibilities with participation in agricultural activities, with younger women also supporting routine farming activities and household agricultural tasks. (Further details are provided in ***Appendix - A1 & A2***).

Composition by Caste and Community

Among the households we spoke with, there was a considerable representation from OBC households, SC households, ST households, and Unreserved (General) households. The small number of Scheduled Tribe respondents reflects the composition of the surveyed locations.

The findings suggest variation in land ownership patterns, market participation and risk exposure across respondent groups. Most of the families from OBC & SC backgrounds were engaged in small-scale or sharecropping, often with some reliance on seasonal labour and/or leased plots. In contrast, the households from unreserved caste backgrounds tended to own larger land parcels and were better connected to formalised market systems. (For more details, refer to the ***Appendix - A3***).

Local and Migrant Farmers

Of the 71 individuals surveyed, 53 were residents and 18 were migrants, who reflected a mixed settlement profile typical of peri-urban farming clusters in Delhi. Among these respondents, migrant farmers were more likely to cultivate leased or shared land, indicating a more recent settlement and less tenure security than residents. Their farm activities often depended on temporary access to land, which was associated with differences in crop choices and investment decisions and whether they could invest money into the crops.

In contrast, local farmers cultivated family-owned or inherited land, providing more stability and flexibility for land access and tenure. Despite these differences in tenure, both local and migrant farmers reported common challenges such as, rising input costs, declining soil productivity, and uncertain market conditions amid urban expansion and land-use change.

Marital Status and Household Composition

Of 71 respondents, 69 were married, and two were single. The household size ranged from 3 to 12 members, with an average household size of six members. Respondents described varying degrees of reliance on family labour for agricultural activities, particularly during periods of intensive farm work such as sowing.

The survey indicated a consistent pattern where male family members supported household income from off-farm work, such as dairy, industrial, government work, or other private employment, while the female family members undertook daily farming activities of crop maintenance and marketing tasks. This mix of engagement in agricultural and non-agricultural livelihoods shows the income diversity in the peri-urban households, with women continuing to contribute to farming activities to ensure food and market access to support income security even when male family members engage in off-farm work. (For more details, refer to the ***Appendix - A4***).

4

GENDER ROLES IN PRODUCTION & LIVELIHOOD

Across the surveyed clusters around Delhi, several aspects of the agricultural process (from ploughing to market) revealed distinct gendered patterns of labour allocation. All respondents from Najafgarh, Kanjhawala-Bawana-Narela, Alipur, Pooth Khurd, Okhla, Chhatarpur, and Mehrauli,described agriculture as a productive activity, while a few had other occupations such as working in industry, dairy, private jobs, and so on. Farming was not only seen as a source of income but also a family activity where every family member participates; however, the type of work done may not be the same or visible along gender lines.

Women participants described their participation as an important component of household farming activities, but had their efforts mostly defined in terms of 'helping' or 'assisting' and not as independent or major. Daily work routines for women generally lasted from dawn until sunset, involving household, care work, and productive labour. Owing to this initial mixing of cooking, cleaning, and childcare, a woman's work each day started hours ahead of a workday in the fields. Women's farming work entailed a sequence of tasks: seeding, weeding, watering, harvesting, cleaning, and packing *(**Figure No. 1**)*.

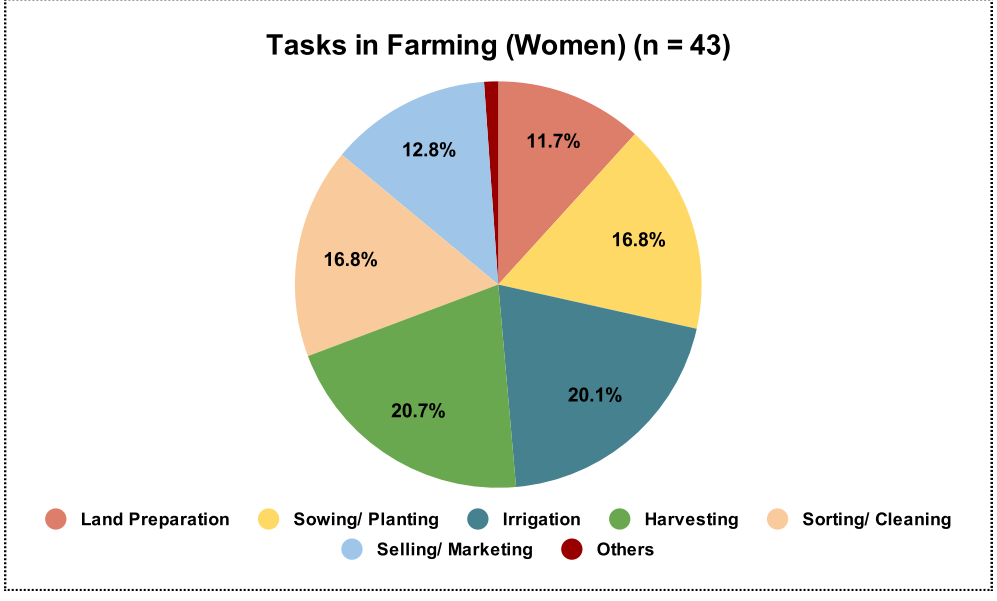


Figure No. 1 *Farming tasks Performed by women*

In contrast, men performed most of the farm-related work, including land preparation, irrigation upkeep, pesticide spraying, and the transportation and marketing of produce to the mandis (***Figure No. 2***). These activities often involved greater physical mobility, access to external markets, or interactions outside the household, making men's economic contributions more visible. Men also reported greater involvement in decisions related to crop selection, input purchases, and price negotiation. However, this distribution of tasks should not be interpreted as indicating that men performed the majority of agricultural labour overall. Women were involved in several stages of production, particularly sowing, weeding, harvesting, sorting, cleaning, and other post-harvest activities, while also undertaking domestic and care responsibilities. Many women reported working for longer hours across the combined household and farm workload, although their contributions were less likely to be separately recognised as agricultural work. Women also reported limited direct participation in market transactions and received little or no direct payment for much of their agricultural labour. Thus, the gendered division of labour was characterised not simply by differences in the amount of work performed, but by differences in the type, visibility, recognition, and decision-making authority associated with agricultural work.

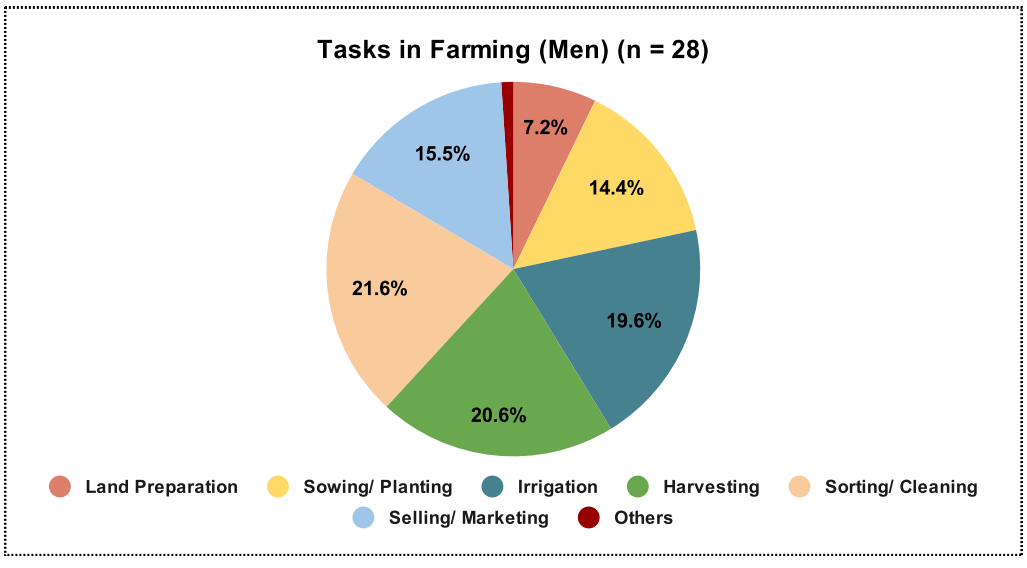


Figure No. 2 *Farming tasks performed by men*

The interviews revealed a consistent pattern in the women's use of time that was influenced by both household structure and labour availability. Larger households, especially with older children or elders, tended to offer equitable division of farm responsibility, while smaller households relied more on women's continuous involvement. In larger households (six or more), women's time spent on farm work often benefited from support from their daughters or mothers-in-law, while men more commonly undertook market and input-based tasks. In nuclear or small families, women usually still shared both farm and household duties without a significant labour division. Seasonal patterns were also pointed out in time-use stories: women discussed working extra hours on the farm during transplanting and harvest months, while men reported their most labour-intensive hours during irrigation or the carrying of goods.

When asked specifically about their direct roles in preparing land, sowing, and irrigation, most women said that they helped or they split the effort, but reported limited participation in independent decision-making. They further admitted that ploughing as well as spraying pesticides were still considered "men's" work. Activities such as seed cleaning, weeding, and monitoring irrigation were encompassed in their daily work. In addition, they were responsible for animals, compost, and small household kitchen gardens. While these activities greatly contribute to household food security and supplemental income, they were still not documented as primary economic activities. According to a 33 years old woman in the Najafgarh cluster, *'jo bhi kheton mein hota hai, sab milke karte hain, par likha naam sirf mardon ka hota hai'* (Whatever happens in the fields, everyone does it together, but only the names of men are written).

Decision-making patterns varied across different aspects of farming rather than reflecting a uniform division of authority. As shown in ***Table No. 1***, crop-selection decisions were relatively distributed across the three categories: women alone made the decision in 25 of the 71 cases, men alone in 21 cases, while 25 decisions were made jointly. In contrast, men had greater individual decision-making authority over the use of agricultural inputs, such as fertilizer, seeds, and water, with men alone making these decisions in 38 cases compared with 22 cases where women decided and 11 cases where decisions were made jointly. A similar pattern was observed for selling location or market choice, where men alone made the decision in 38 cases, compared with 18 cases where women decided and 15 cases where decisions were made jointly. These findings suggest that gender differences in agricultural decision-making were particularly evident in decisions concerning input use and market engagement, while crop selection involved greater participation by women and joint decision-making.

Table - 1: Decision-making in Crop Selection (n=71)

Decision-making areas	Men	Women	Both
Crop Selection	21	25	25
Use of Inputs (fertilizer, seed, water, etc.)	38	22	11
Selling Location/ Market Choice	38	18	15

The study found differences in access to and control over resources such as land, credit, and agricultural inputs. Land ownership among surveyed households was more commonly recorded in men's names. Although women often played a key role in cultivation, many women respondents reported not being listed as landowners in official land-titles and related eligibility documents. These respondents reported that having land and scheme-related documents primarily recorded in men's names created difficulties in accessing government programmes, subsidies, training, and farm-related financial support.In particular, the study identified challenges in accessing initiatives such as the Paramparagat Krishi Vikas Yojana (PKVY) and organic certification processes, where participation could require existing collective membership or institutional linkages. These conditions were reported to limit women's direct control over farm-related investments and market decisions. Similarly, respondents frequently reported greater male control over agricultural income and major expenditures. Some households reported joint decision-making for smaller operational expenses, while major expenditures such as fertilisers, machinery, or livestock were typically decided by men.

Field observations indicated that, on average, women worked 7-9 hours a day between domestic and agricultural work, while men tended to work 5-7 hours of agriculture and farm-related labour, based on season and task. Women had more fragmented schedules and were working both shifts in farm-related work in the early morning and evening hours, followed by extensive, ongoing domestic work. The adaptability created by women's time was important to the household's economy and sustainability, but these accounts suggest that women's time was divided across agricultural and domestic responsibilities, leaving limited discretionary time. Some women expressed a sense of satisfaction or attachment to their agricultural work, while also describing the workload as physically exhausting and leaving little time for rest or leisure. These experiences indicate that women's participation in farming was closely intertwined with household responsibilities, care work, and broader livelihood arrangements.

The imbalance is further reflected in income and wages. Most women mentioned that agricultural income was pooled within the household rather than individually assigned. Even if women contributed to selling vegetables or paid for products from the sale of dairy products or other goods, men usually handled the cash transactions (***Figure No. 3***). Respondents indicated that women's contributions were often less visible in formal economic activities or they became indirectly dependent upon male economic control. The economic interdependence of male and female labour was also evident. Women's unpaid labour may reduce households' reliance on hired labour and mitigate pressures on small-scale peri-urban farming. Many respondents stated that women's continued participation was important for maintaining both cultivation and household activities.

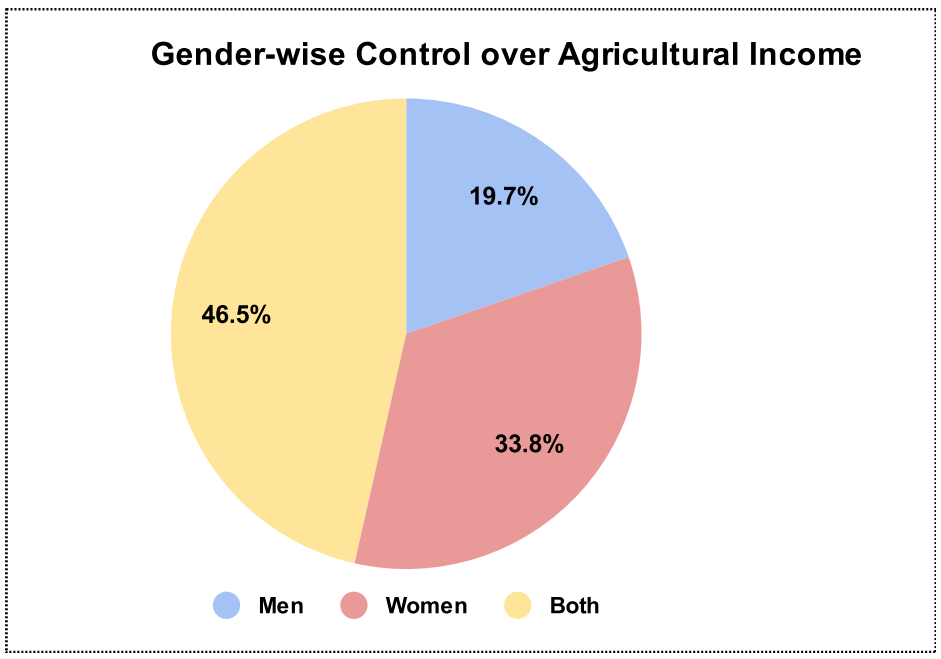


Figure No. 3 *Gender-wise Control over Agricultural Income*

In discussions on recognition, most women interviewees said that their contributions were appreciated within the family but received limited recognition beyond it. They noted that men's work was more visible in market settings, while women's agricultural contributions were primarily recognised within the household and on the farm. Recognition was often expressed through appreciation rather than through greater participation in decision-making or monetary compensation. The cultural framing of women's labour as *sahbhagita* (participation), instead of *kamai* (income), operated within social norms that framed their work as moral, and not legitimised through value. These patterns of recognition also appeared to shape younger generations, with some young women describing farm work as a necessary responsibility, while young men were more likely to consider livelihood opportunities outside agriculture.

Balancing farm-related and domestic labour was another frequently reported challenge that faced these women. Many spoke about dual workload obligations as if they were not a decision, but an obligation. Their information contained a mixture of resilience and exhaustion. One woman described her modification of schedule: *'jab kheton mein zyada kaam hota hai, toh ghar ka kaam raat ko karte hain'* (When there is a lot of work in the fields, we do the housework at night). This represents the tight schedules and continual adjustments involved in balancing household and agricultural production. Male respondents likewise acknowledged that 'women do more work,' however, this did not equate to shared responsibility. There was a consistent social expectation of women to perform domestic tasks regardless of their agricultural workload across clusters.

The findings highlight the substantial contribution of women to agricultural and household activities across the surveyed clusters, alongside reported differences in access to resources, market participation, and decision-making. Respondents' accounts indicate that women's agricultural roles often intersect with domestic responsibilities and changing land and market conditions. These findings suggest that gendered divisions of productive and reproductive labour remain an important feature of farming livelihoods within the study sites.



Photo Credit: Anita Pinheiro

5

SUPPLY CHAINS & MARKET ACCESS

The pathway from farm to market illustrates the complexity and multi-layered aspects of peri-urban agriculture economies around Delhi, where farmers identified various, and occasionally overlapping, routes to market depending upon the type of the produce, buyer profiles, and access to transport.

Data shows that most farmers were operating under a mixed marketing methods for marketing that included local village markets, informal vendors, mandis in Delhi (Azadpur, Okhla, and Ghazipur), and direct marketing to customers at the farm gate, weekly haats, or community-supported agriculture (CSA) sales. Fewer farmers, and only sometimes, claimed to use cooperatives and farmer-producer organisations (FPOs), but these sources of market were component destinations rather than a primary sales pathway. Local village markets and informal vendors were the most common selling points, but often together; respondents suggested that these outlets offered greater flexibility and the possibility of selling produce quickly after harvest, at least relative to other channels, even if monetary returns were low. For example, many smallholders suggested that local vendors and pushcarts were readily available and easily accessible, without requiring formal registration or incurring transportation costs. This was particularly important for women farmers and households where women were involved in marketing, as respondents reported mobility and bargaining constraints during marketing activities.

Conversely, Delhi's wholesale mandis, particularly Azadpur and Okhla, represented regulated market spaces that respondents described as involving greater negotiation, transport and price-related risks, and where men were more commonly involved. Thus, in many surveyed households, men were reported to undertake market visits, while women primarily carried out preparatory tasks such as sorting, grading, and packing. Middlemen emerged as a consistent presence across the larger sample - when farmers stated they sold directly to mandis, they did not mean they were the final seller to the consumer.

Direct selling, while not as frequent, was rated higher in value and satisfaction than selling to a middleman. Farmers who sold directly through local haats or farm-gate sales often stated better price returns, less reliance on middlemen, and a higher sense of control over product and prices. Direct sales were reported to depend on reliable consumer networks and consistent produce quality; some smallholders reported difficulty sustaining these conditions. In contrast, cooperatives and FPOs were mentioned in a fair number of responses, although some farmers indicated that their participation was intermittent or exploratory. A small number of farmers noted they were members of local FPOs, but the degree of aggregation and collective marketing were reported to be limited among participating respondents, based on coordination difficulties and a lack of guaranteed procurement (***Figure No. 4***).

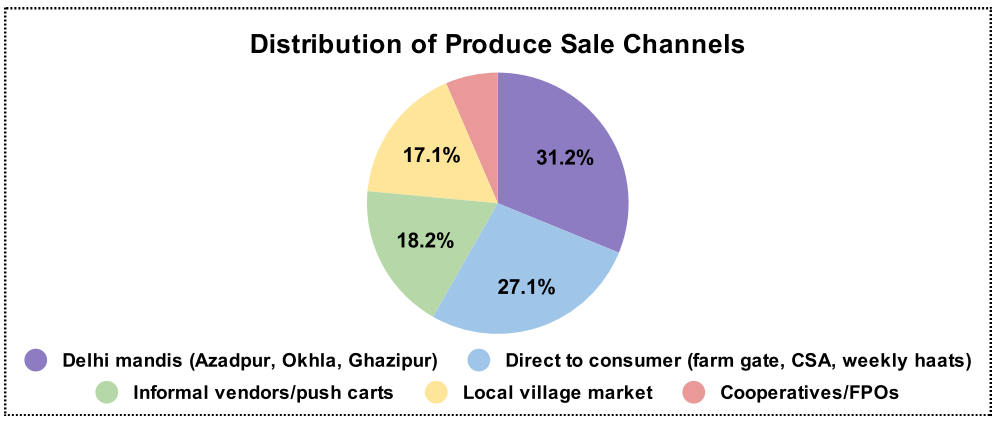


Figure No. 4 *Distribution of Produce Sale Channels (n=71)*

Gender differences were observed in market participation. When asked who typically sold the produce, results indicated that men sold in most cases, then men and women sold together in some, and women sold alone in fewer instances (***Table No. 2: A & B***). The gender differences in market participation were considerable. Men sold produce in most cases, while some households reported selling jointly and fewer reported women selling alone. Men were more likely to travel to Delhi's wholesale mandis and negotiate with traders or buyers, whereas women who participated in selling were more likely to use local or informal

markets, including village markets, nearby vendors, local haats, and farm-gate sales. These nearby market channels were more accessible to women in circumstances where mobility, household responsibilities, and time constraints limited their participation in distant markets. In households where men and women participated jointly in marketing, women commonly contributed to the initial processing of produce, including cleaning, bundling, grading, or weighing, but were less likely to undertake the market transaction themselves.

Several respondents also reported that decisions about where to sell were influenced by men's assessment of market demand and transportation (For more details, refer to the ***Appendix - B***). In cases where women sold directly, including through local haats or farm-gate sales, they expressed greater satisfaction with the immediate receipt of payment, even when these sales were described as smaller in volume or scale. Some respondents also perceived these local sales as offering lower returns than sales through larger markets, although the study did not independently measure or compare profit margins across market channels. As one woman farmer explained, *'Yahan bechne par paisa turant mil jaata hai, aur humein pata hota hai kisne kharida'* (When we sell here, we get the money immediately, and we know who has bought it). Respondents described immediate cash payments as beneficial because they provided quicker access to income and compared to the delayed payments through larger mandis and intermediate networks, where women would receive partial advance payments before the sale.

Table - 2: Gender and Role-based Distribution of Market Participation

(A) Overall Market Channels (n=71)

Category	No. of respondents
Direct Market	30
Middelmen	4
Both	37

(B) Direct Market Channels (n=30)

Category	No. of respondents
Male	15
Female	13
Both	2

Frequency of use of different market channels was influenced by factors including perishability, market access, and seasonality. While local markets and informal vendors were used regularly, often several times a week, for perishable crops, particularly leafy vegetables and tomatoes, mandis were less frequently used, generally once or twice a week, depending on the scale of production and transportation logistics. Direct sales to consumers followed a less consistent pattern, with some participants reporting weekly or fortnightly sales through haats or local CSA arrangements. Respondents generally identified formal mandis and direct markets as important channels for income generation, while local and informal markets were valued for their accessibility, reliability, and more immediate cash flow. However, the study did not record the underlying responses or the number of respondents contributing to the five-point income-potential ratings. These ratings are therefore treated as respondents' reported perceptions rather than as population-level quantitative estimates or comparisons.

Some households that primarily sold through mandis also reported smaller, concurrent sales through local vendors, which respondents described as a way of diversifying market-related risks (***Figure No. 5: A, B & C***). Respondents who accessed three different market channels were better able to manage surplus and rejected produce. This multi-channel approach provided greater flexibility in marketing produce and helped minimise potential revenue losses.

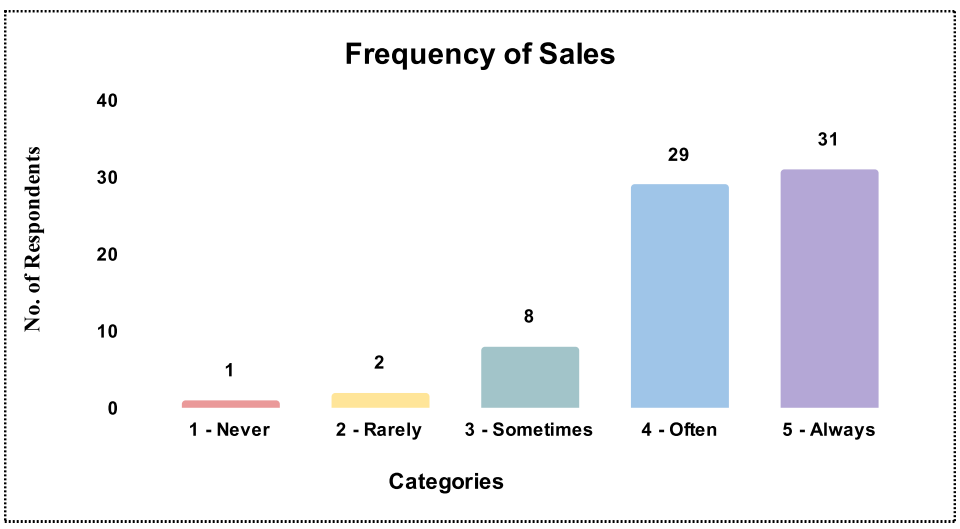
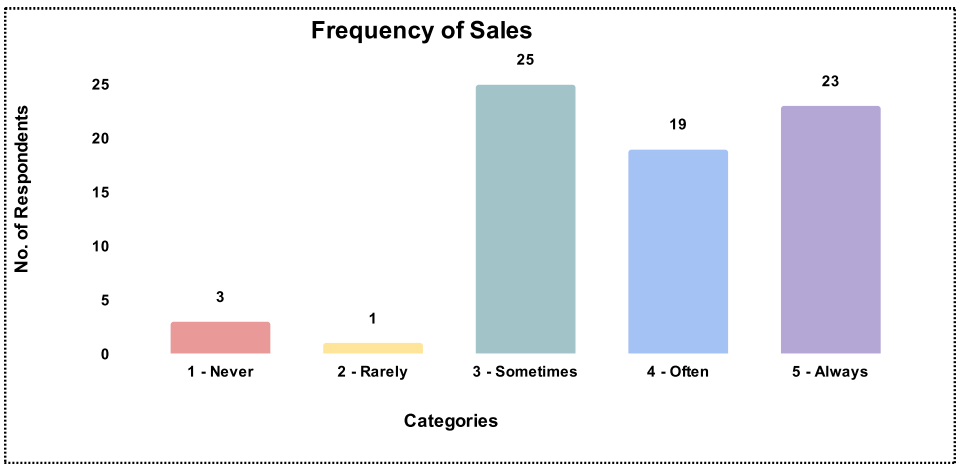
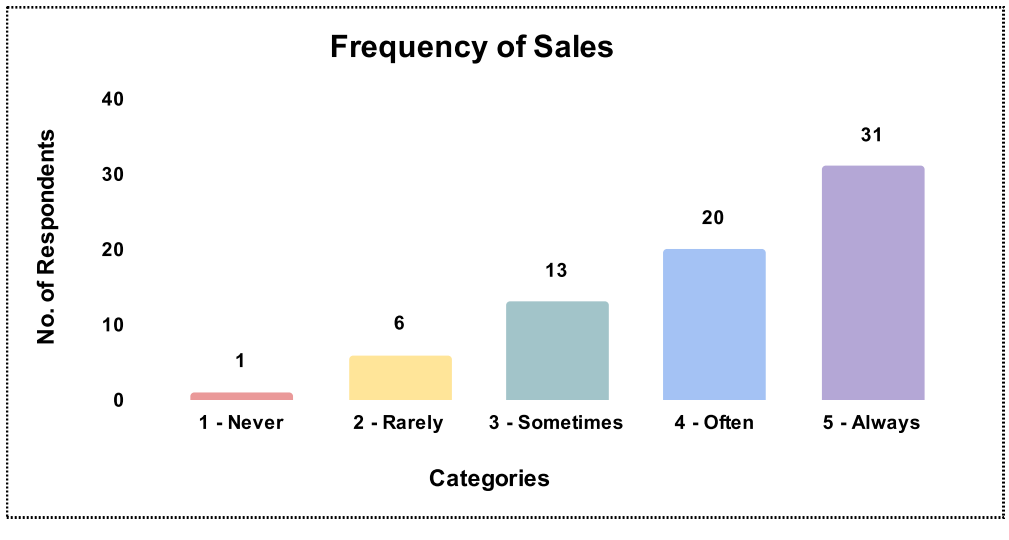


Figure No. 5 *Selling Frequency - Different Market Channels*

(A) Frequency of sales - Formal Mandis (n=71)



(B) Frequency of sales - Informal Mandis/ Local Vendors (n=71)



(C) Frequency of sales - Direct to Consumers (n=71)

When it comes to earnings from the final consumer price, there were varying perceptions among respondents, but a shared dissatisfaction with how value is allocated along the chain. Many farmers recognised they received only a small amount, or about half, of the final consumer price, especially for the produce they sell through intermediaries or wholesale mandis. Middlemen were consistently referenced as a key issue in diminishing returns. Repeated statements like *'aadha paisa beech mein chala jaata hai'* (half of the money goes in between), or 'humse sasta lete hain or mehenga bechte hain' (they pay us less and sell it for more), were similar to comments made by respondents who engaged in direct marketing or shorter supply chains that indicated a greater satisfaction regarding earnings, often stating that they received 'most of the consumer price' (***Figure No. 6***). Some of the participants, particularly those who sold through weekly haats or similar CSA arrangements, noted that buyers were more flexible, payment was immediate, and waste was less. Nevertheless, these farmers recognised the ongoing difficulties associated with keeping a consistent relationship with consumers, engaging in marketing, and managing logistics. For women sellers, the benefits of directly selling were not only financial, but they were also intangible; it provided visibility, agency, and a recognition of their contribution to agricultural production and distribution.

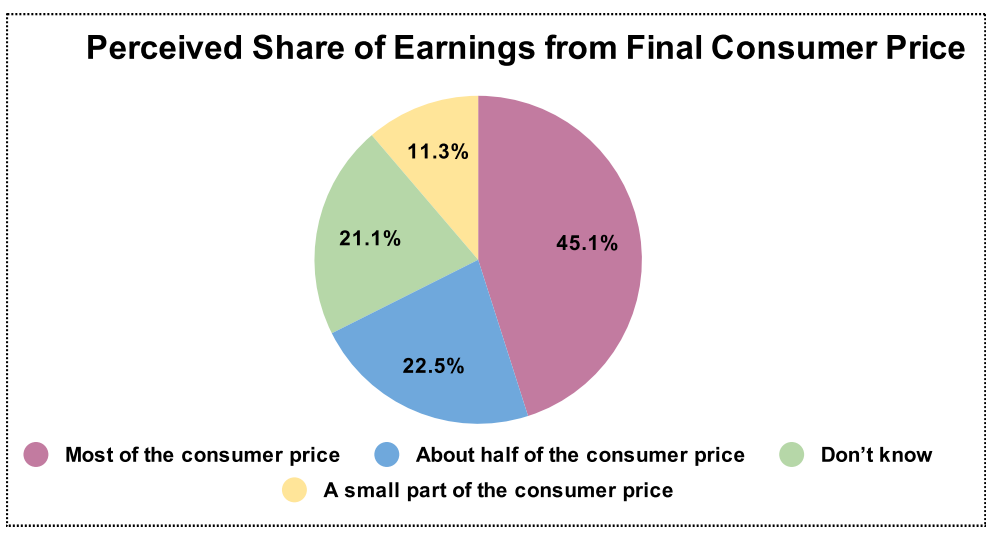


Figure No. 6 *Perceived Share of earnings from the Final Consumer Price*

Control over earnings was another area where differences between women and men were observed. Even when women participated in selling, respondents reported that men generally retained control over the income earned. Several women mentioned giving the day's earnings to a man in the family or using small amounts for household items and allowing men to take care of most of the agricultural income. Conversely, both partners reported greater agreement in decisions related to reinvesting farm income, making purchases of inputs, or budgeting household expenses, with both partners indicating that these decisions were made jointly.

Aside from gender, several respondents spoke of barriers to market access and income, naming high transportation fees, price fluctuation, and reliance on intermediaries as undermining those conditions. Farmers selling their produce to Delhi mandis acknowledged shallow and unpredictable price saturation, given that traders predominantly establish prices. For some small producers, the additional loading, transportation, and labour costs involved in selling that produce at city-level markets did not guarantee farmers would receive increased returns. One or two producers described incurring losses once they were unable to sell or traders rejected their perishable produce. Contrarily, informal vendors and local markets were limited in sales, but they established a consistent demand every week and provided a regular flow of cash, which was important for households balancing farm and domestic resources. The timing of the sale was another reason for preferences. Local channels allowed producers to sell their produce at times that worked better for the household, while mandi sales required sales in the early morning or late at night travel and transactions, which could conflict with women's caregiving and household responsibilities. These differences in the timing and accessibility of markets reinforced gendered divisions of labour within peri-urban farming households.

Ultimately, when respondents were asked to rank the importance of various marketing channels, a layered picture came to light. Formal mandis continued to rank highest in terms of overall earnings potential for most households, but respondents included informal vendors and direct markets in terms of reliability, agency, and lower risk. In households where both male and female household members participated in marketing, it was described as an intentional choice to diversify across channels as a strategy to access liquidity at local sales while pursuing higher margins by acting in urban markets. A few respondents also noted seasonal shifts: while bulk sales to mandis were preferred at harvest time, local sales (and direct sales for perishable vegetables) provided variability during lean months. These adaptive patterns demonstrate the

dynamic nature of peri-urban agricultural economies, where farmers, particularly smallholders, continually negotiate access, control and vulnerability. The gendered aspects of these negotiations point towards how access to markets is not simply, or only, economic, but both social and spatially situated, and dependent on who can travel, who can negotiate, and whose physical labour is seen or rewarded.



Photo Credit: Anita Pinheiro

6

GENDERED RESPONSES TO MARKET & ENVIRONMENTAL CHALLENGES

The pressures shaping agricultural livelihoods in the study location are not experienced equally; they interact with external pressures, such as urban migration, environmental degradation, and infrastructure changes, as well as internal coping strategies developed within households and communities to sustain agricultural livelihoods. The intersection between these processes has different implications for men and women who farm. Respondents conveyed multiple barriers to maintaining production and accessing the market, noting a range of pressures, including transportation access, the extent of middlemen, and changes in land tenure and environmental sustainability. The experiences of male and female farmers provide insight into how these pressures are experienced and negotiated through the everyday practices of agricultural work (For more details, refer to the ***Appendix - C***).

Market Access Barriers and Gendered Challenges

Analysis of market access constraints revealed a range of structural and logistical obstacles faced by farmers in selling their produce. Transportation difficulties, reliance on wholesalers, and limited access to storage were among the most frequently reported constraints. These barriers also had gendered dimensions, particularly in relation to mobility, time availability, and social expectations around market participation.

Transportation issues were particularly important. Farmers without their own mode of transportation hired drivers to travel to formal mandis or local markets. Many respondents highlighted the high cost of transportation, noting that transport expenses could substantially reduce already limited profit margins. Others described difficulties in coordinating transport with neighbouring farmers, which sometimes resulted in delays and spoilage, particularly for perishable produce. Limited storage infrastructure, especially access to cooling solutions, further constrained farmers' ability to time their sales. Respondents reported that inadequate storage facilities often required them to sell produce immediately after harvest, even when prices were low or likely to decline.

Female respondents also reported social and household-related barriers that affected their access to markets. Some of them said that domestic responsibilities and social norms around mobility limited their ability to travel to distant mandis. As a result, women who participated in agricultural production often relied on male family members or local intermediaries to transport and sell produce on their behalf. Some women also reported that they primarily sold their produce at informal or weekly markets closer to home. Some women stated they were limited to selling their products at informal or weekly markets close to their homes, and received lower payments for their products, but they could travel safely to those markets.

The role of middlemen was another persistent barrier identified in the respondents' narratives. Many participants described how middlemen influenced pricing and controlled aspects of the sales process, particularly at formal mandis.

Although a minority of farmers were beginning to explore direct-to-consumer channels, dependence on middlemen continued, often because farmers had received cash advances or loans from traders before the harvest. This created a financial dependence that could make it difficult to shift to other buyers or markets. The narratives also suggested some differences across age and gender. Younger farmers and women working collectively described efforts to negotiate better terms and prices, while older male farmers were more likely to remain dependent on established relationships with middlemen or traders.

Thus, while the challenges to market access were logistical, they also had social and gendered dimensions. Many women respondents reported limited participation in mobility and marketing decisions. These barriers also reflect broader structural vulnerabilities faced by smallholder producers in peri-urban agricultural systems increasingly shaped by changing market demands.

Urban Development and Reduced Farmland Access

Urban development and its effects on accessing farmland were another key issue across the data set. Many respondents noted that the amount of land available for farming and/or supporting their households had decreased over the past decade, which they attributed to the construction of homes and other buildings, as well as road expansion. Land that was previously used for agriculture has increasingly been converted to homes, commercial buildings, and institutions, fragmenting agricultural holdings and reducing the land available for cultivation. Respondents reported that this has sometimes pushed farmers towards less fertile plots and farming areas farther from their primary production areas.

Respondents described these changes in personal terms, noting that some families who had once cultivated several acres were now farming much smaller areas, in some cases around one acre or less than half an acre. It is often not enough to even feed their families in many cases. Some farmers reported leasing additional land to compensate for reduced access to their own land, which added to the financial burden of farming. Rising land rents and insecure tenure further increased the risks associated with cultivation, particularly where farmers lacked formal documentation of their land rights. Several women shared that their families often negotiated with landowners for seasonal access, creating dependence on informal agreements that could change at any time.

The push toward urban growth also altered the spatial relationship between village and city markets. Formerly, there was a direct relationship between producers and local buyers, which became more competitive and uncertain over time. With urban sprawl, farmers in villages now faced traveling longer distances to mandis and more expensive logistics. The narratives also pointed toward the psychological aspect of the encroachment of the city/urban settlements. For some farmers, their narrative indicated an acceptance that the growth of urban space was inevitable. In the words of one farmer, *'Zameen bachti nahi hai, har saal kuch na kuch chala jaata hai'* (There is no land left, every year something or the other is lost), illustrating that the loss of agricultural space had a cumulative effect on the loss of agricultural space and reluctantly on agricultural identity.

While gendered reactions to the pressure of space are significant in the process of urban growth. Male farmers looked for other sources of income through wage labour, driving, or other forms of non-farm work, while many women increased their income potential through the production of small-scale cultivation and through the utilisation of the home and the field. Many women reported that they performed tasks such as cleaning, grading, or marketing of vegetables in nearby places. This increased their labour, as they combined farming with traditional household care. However, even with increased participation in income potential, women's opportunities for income from the agriculture sector as decision-makers and landowners remained diminished.

The coping responses identified in some households primarily involved reallocating labour and adjusting farming practices. Households adapted by redistributing work, increasing reliance on women's unpaid or underpaid labour, and diversifying crop production towards crops with shorter growing cycles and lower water requirements. These responses demonstrate the ways households adapt to changing conditions, while also highlighting the constraints under which such adaptations occur. In the absence of more secure land access and institutional support, household-level responses may have limited scope to address the underlying structural challenges. Taken together, these responses reflect fragmented access to land and resources, increased competition, and uneven adaptation amid urban expansion, shaped by existing gender relations.

Environmental Stress and Adaptive Responses

Another important aspect of external pressure identified in the data involved environmental degradation of agricultural productivity. Farmers highlighted water scarcity, soil degradation, pollution, and flooding as key concerns, all of which affected agricultural productivity, and in some cases, increased production costs (***Figure No. 7***).

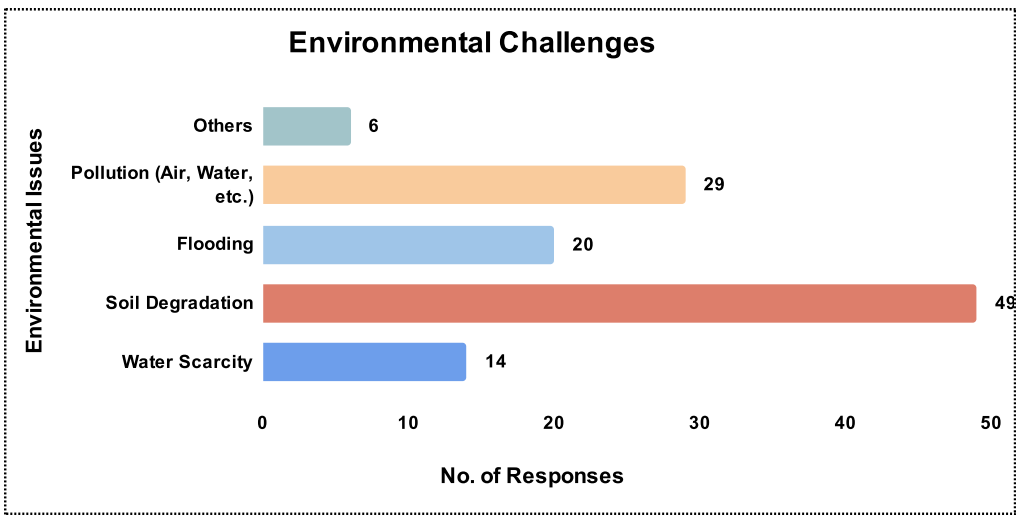


Figure No. 7 *Environmental Issues/ Challenges faced by Peri-Urban Farmers (n=71)*

Water scarcity was widely recognised as the dominant and most important limiting factor. All interview participants mentioned declining groundwater levels, uneven rainfall distribution, and reliance on costly tankers or boring well water systems as increasingly pressing issues. The observations made by respondents emphasised the relationship between the availability of water and production reliability. For farmers who have leased the land, this was compounded by the additional costs of irrigating, even because farmers may purchase additional access to irrigate land from the landlord. Many participants indicated that in the past shallow wells provided ready access to groundwater, but in recent years reliance on shallow wells were exhausted by greater reliance on deeper bored wells or shared water access.

The second major issue, soil degradation, was mostly a function of overreliance on chemical fertilisers and pesticides. Participants stated that the soil quality had degraded to the point that the number of inputs for production was increased every season to achieve the same yields. Thus, there were both economic and environmental ramifications, as costs of inputs increased while production remained stagnant. A few people discussed trying organic manure but commented on the limited supply and the amount of work involved in using organic manure to justify changing practices.

Pollution and flooding were observed mostly by farmers who live close to the urban edge or close to drains or construction sites. For example, wastewater and the dumping of solid waste led to pollution of soil and crop quality. Flooding generally took place on land where stormwater channels had become blocked, and flooding ruined standing crops when it occurred. Continued exposure to environmental shocks was inhibiting unpredictable crop cycles, delaying crop sowing, and increasing the risk of loss.

Despite barriers that these respondents faced, the data highlighted a range of internal coping strategies that showed both ingenuity and constraint. Several observations focused on crop diversification to pivot away from water-dependent crops to short-cycle crops. In addition, women were often responsible for managing scarce water for irrigation and household use, including deciding which crops to water first and reusing kitchen water for kitchen gardens. A range of group strategies were mentioned by respondents, such as collective or cooperative well water use, or creating a rotating schedule to access irrigation, though these group approaches relied heavily on an agriculture-based social fabric.

The gendered dimensions of these responses were also evident in the data. Women described immediate and practical responses to resource constraints, including managing water, adjusting planting times, and reusing wastewater. Men described responses that involved wage work outside farming, revisiting lease agreements, and negotiating with neighbours over land arrangements. These differences suggest that women and men responded to changing conditions through different forms of labour and decision-making. Women's adaptive labour helped households manage immediate constraints, but also added to their unpaid workload.

Environmental stress also influences social conditions in communities. Competing for water access, utilising shared pumps, or trapping drainage along boundary drains were common sources of disputes. Therefore, water drainage, pollution, and flooding have had sociological and ecological implications, changing the configurations of conflict and cooperation.

Although the stories demonstrate considerable capacity to adapt, they also illustrate the limits of household-level responses. Many of the coping strategies described were reactive, shaped by the need to address immediate resource constraints rather than prevent longer-term risks. Without adequate institutional support (such as a reliable irrigation system, restoration of soil, or market practices to stabilize life), those strategies internal to the community may not last for long. The coupling of environmental degradation with the already gendered burden of labour, therefore, highlights the need to examine how smallholder farmers negotiate livelihood security despite compounding ecological and spatial stress.

Intersecting Pressures and Gendered Adaptation

Across the themes of access to markets, land use changes, and environmental change, the findings show how external pressures intersect with household-level responses in gendered ways. Women's labour was central to managing agricultural production, household upkeep, and informal market activities. However, their contributions across both formal and informal agricultural activities were not always acknowledged or adequately compensated.

The coping strategies described, including shared transport, cooperative marketing, and rotational irrigation, demonstrate forms of community-level coordination and mutual support, while also highlighting underlying vulnerabilities. These strategies rely on social trust and informal coordination, which may become difficult to sustain under conditions of heightened stress or resource scarcity. At the same time, the continued reliance on middlemen, loss of agricultural land, and declining productivity associated with pollution point to broader structural constraints that shape everyday agricultural practices and farmers' capacity to adapt.

In conclusion, the respondents find themselves trapped in cycles of dependence and adaptation to survive, relying on systems, land tenure, markets, and intermediaries over which they have little to no control. The ongoing intersection of both urbanisation and environmental degradation has transformed what can be said to be 'agricultural', previously a stable way of life, into a nuanced, precarious balancing act for farmers.

Gender is an important dimension of this transition. While both men and women experience pressures associated with changing agrarian conditions, their experiences and responses may differ. According to the responses, men's coping strategies are often oriented toward substituting capital and/or mobility, while women's coping strategies are dominated by maintenance, adjustment, and sustaining. This contradiction illustrates that resilience is not a neutral position, but it is shaped by existing divisions of labour and hierarchies in decision-making within a household.

The data provide a detailed view of how agriculture is being reshaped by urban and environmental pressures. Market access, farmland loss, and environmental shifts all affect livelihoods. Their coping responses simultaneously reflect adaptation but also cultural or value-laden constraints. Women's expanding, albeit sometimes less recognized, role in managing these transitions sheds light on the necessity of a more inclusive understanding of adaptation that acknowledges their involvement not as secondary labour but as contributors to the existence of agriculture amidst change.

Photo Credit: Anita Pinheiro



7

COPING STRATEGIES: ADAPTIVE PRACTICES AND GENDERED RESPONSES IN A CHANGING AGRARIAN CONTEXT

Farmers at each study site expressed growing uncertainty around agricultural livelihoods due to environmental pressures such as unreliable rainfall, flooding, and especially increased heat, as well as social and economic factors, including market volatility, urbanisation, and inconsistent policy support. The responses reflected differences in agricultural practices, gender roles, and access to institutional and other resources. Women farmers described resilience as part of their everyday responsibilities, managing limited resources, borrowing items when needed, and reusing available materials to meet household and agricultural needs. Their accounts also showed how agricultural work was combined with domestic responsibilities as part of everyday life.

In general, men were more inclined toward technical practice/solutions, while the women continued to use market-oriented approaches as characterizing coping in resilience. The farming practices and actions described as coping responses reflect how farmers negotiate between structural constraints and locally available resources, knowledge, relationships, and capacities. Together, these responses provide a multidimensional understanding of how households cope with changing agrarian conditions.

In this broader context, the following sections analyse farmers' coping strategies across three interconnected aspects: participation in government and institutional initiatives, responses to environmental and market shocks, and gender-specific differences in adaptation and suggested pathways forward. All these aspects relate to our analysis of how resilience is built in the daily lives of rural residents, often quietly, collectively, and amid ongoing inequality. Meanwhile, men's recommendations centred on consultative input subsidies, transportation, and market reforms. They called for improved road connectivity, lower mandi commission rates, and access to timely fertiliser or irrigation equipment. However, they agreed that women's work was vital for maintaining the farm during difficult times, even if not formally acknowledged.

All respondents indicated that formalised structures for collectivised adaptation were limited. While informal support was prevalent, neighbours helped one another, shared tools, exchanged seeds, and forwarded a small loan of cash from work colleagues; the networks were limited, temporary, and inconsistent. Farmers consistently stated that institutional responses could better reflect local needs and respond better, including to gender issues. Another point that emerged was the awareness of declining traditional resilience systems. Older farmers recalled practices like mixed cropping, seed storage, and shared water management that once protected them from shocks. The market-driven monoculture approach and reliance on outside inputs have weakened these systems. Though farmers knew about coping strategies, they did not have any structural support to maintain them. As a result, gender coping strategies were unequal in visibility and recognition. Women focused more on household stability and continuity, whereas men were more driven by market participation and production. Both are essential, but neither can fully succeed without institutional support.

Access to Institutional Support and Government Programmes

Across the study sites, respondents reported mixed but notable levels of participation in government programmes such as Paramparagat Krishi Vikas Yojana (PKVY), Farmer-Producer Organisations (FPOs), and other local cooperative-type arrangements. While some respondents were aware of these programmes,

actual participation was limited. Many small and marginal farmers pointed to formal registration requirements, group formation, and bureaucratic procedures as barriers to participation. Respondents also reported that access to some programmes and certification-related processes was facilitated through existing farmer collectives or local organisations, including NGOs, where such linkages were available.

The data further suggest that women's engagement in these schemes was more symbolic than substantial. In many cases, the land titles and eligibility documents were filed in men's names; thus, women's involvement was only incorporated in name, even when women did most of the labour daily. A few women respondents mentioned that they had heard of government schemes, but they were not included in decision-making or benefited directly. Instead, women's labour was used to implement a plan once decided at the household or panchayat level.

Membership in FPOs emerged as an important support mechanism, albeit not uniformly. Farmers who belong to FPOs reported that they were able to debate prices and package products in bulk to secure better prices. However, this was not the experience of most farmers. Most farmers noted that FPOs in their area could not be counted on to function or did not have much reach. Many farmers suggested that communication gaps and a lack of confidence in group-based marketing were barriers to their engagement in FPOs. Further, farmers indicated that delayed payments also contributed to their inconsistent participation.

Male respondents were more likely to engage in meetings or liaise with extension agents, and female respondents were often indirectly engaged through their husbands or male relatives. Some women, especially those who had men in their household away at work, or in urban areas, reported accessing information and support through informal women's groups, rather than relying on formal state-led interventions.

Overall, the data from the field indicated that institutional coping strategies were in a state of development and did not yet have sufficient inclusivity and gender sensitivity. Many of the respondents thought of these schemes as top-down interventions that rarely engaged with their immediate needs, particularly needs related to rising costs of inputs, price fluctuations, and weather disruptions. Findings, therefore, point to an emphasis on personal networks, family support, and local knowledge systems rather than formalised state systems to facilitate daily resilience.

Managing Agricultural Shocks: Floods, Heat Waves, and Market Price Drops

The second sub-theme emerging from the responses focused on how both men and women farmers responded to intermittent environmental and market shocks. Respondents described recurrent problems due, at least in part, to flood events, erratic rain, and heat events that disrupted, and sometimes diminished, crop cycles and soil recovery. Heat waves were mentioned repeatedly as a novel but escalating stressor in their farming cycle that contributed to the wilting of crops, declining yields, and physical exhaustion of farmers from long days in the field.

Many farmers did openly state that when heavy rains or localised flooding occurred, there were no response options available to them. Given the lack of irrigation or water to drain it adequately or soil recovery support, some respondents stated they worked DIY fixes, such as growing less water-intensive crops the next season or working temporarily for wages. Though only a handful of men shared that they had tried using drought-resistant seeds, women reported more frequently modifying household budgets and cutting food costs to cope with income shocks.

During periods of price decline, particularly for perishable vegetables, farmers expressed a sense of helplessness, as many lacked adequate storage and reliable transportation that would allow them to delay sales until prices improved. In many cases, farmers reported having to sell their produce at very low prices. Female respondents shared many stories about walking or cycling for hours to access a local market, while the prices dropped to half the amount by the afternoon. In these instances, females often sacrificed selling quantitatively to mitigate losses, while male producers typically took a bulk of what they grew to the mandi market, regardless of the price received. Adaptation, while dealing with heat stress, was also continual and informal, such as starting sooner in the day or relying on my family to help when physical limits were reached. The pattern of men attempting farm-based adaptations (increasing irrigation/timing) and the women navigating household aspects like water hiking from not great distances, or storing, prepping, and managing leftover/batch cooking from what they grew, was the biggest underlying pattern between respondents. These differences identify and epitomise the gendered burden of coping, particularly when women's less formally recognised labour, commodified and managed stressors created at the intersection of the household and environmental and economic ecosystems.

Respondents who had suffered chronic shocks expressed a cumulative sense of fatigue, financial fatigue, and emotional fatigue. They noted that, unlike in earlier years when joint families could absorb losses collectively, the increasing shift towards nuclear households and urban migration had reduced the capacity of families to share and absorb such losses. One farmer stated, 'If loss happens now, it is just loss for us.'

Consequently, the coping matrix observed had components of both reactive strategies for affording financial losses (e.g., distress sales or new types of crops), along with very limited space for proactive planning. Although some farmers were interested in adopting sustainable strategies, very few of them had the means or institutional guidance to do so. In general, the narratives suggest limited coping capacity, centred on the immediate logic of survival rather than continuously planned adaptive capacity.

Gender Dimensions and Local Perspectives on Strengthening Resilience

The gendered aspect of coping appeared strongly in the field narratives. Women repeatedly said that they contributed equally, and in some cases more, to agricultural labour than men, but had less influence in the decision-making tied to coping regarding credit, inputs, or produce sales. Then, in environmental or price stress situations, their contributions went beyond agricultural labour to managing food security in their households and family well-being in general. For example, when there were floods or price crashes, women would first use the remainder of their produce for household consumption, seek small buyers for the remaining food, or engage in small processing work (e.g., drying vegetables or saving seed) to manage what food they could within household constraints.

Yet, those same women were unlikely to engage in negotiations of any type regarding the market or formal mechanisms for recovering after a crisis. Men solely engaged in financial conversations and negotiations with outsiders (e.g., mandis, agents, and government offices). This created an asymmetry in what were clearly resilient operations as far as coping with stressors were concerned, whereby women were consuming a lot of the burden of coping labour but received little attention or decision-making influence.

When asked how they handle temperatures that are too hot or working under physical duress, women discussed continuing to work in fields despite discomfort, and how they often transport food and water to the fields and modify their work to accommodate household chores. Men emphasised mechanisation, taking breaks in the shade, or scheduling the irrigation to address these issues. This difference was indicative of how gender roles influence the framing and experience of resilience. Men framed the adaptation in terms of productivity, while women framed it more in terms of continuing household care and maintaining household balance.

Despite these differences, women farmers were by no means passive. Several women voiced clear recommendations for improvements, most notably, a better mechanism for accessing small-scale credit, access to local storage of water, and better market infrastructure close to villages. Several women suggested that collective selling through women's groups or Farmer-Producer Organisations, if allowed by the local government, would improve their position relative to traders and middlemen. Others suggested training or awareness efforts in local languages about government programs would provide women, many of whom do not attend formal meetings, with the confidence to access and use the programs.

The field evidence has revealed a complex yet uneven picture of coping strategies among farming households. Institutional mechanisms such as PKVY and FPOs existed, but their connections and outreach at the ground level were limited and did not significantly address gender issues. Environmental and market shock management relied on reactive measures, which were often individualised and exposed structural weaknesses in resilience. The gender divide in coping was shown by women often bearing much of the unrecognised burden of adaptation without an equal informal decision-making role in the process. Overall, respondents' suggestions were for a more localised, accessible, participatory context- this includes on-site decentralised training, water and input support, and the support of women-driven collectives. In the end, the data showed that resilience, concerning institutions, is not so much the formal planning, but rather finding a coping mechanism in everyday situations involving adjustments, improvisation, and collective endurance.

8

SYNTHESIS: INTERLINKAGES OF GENDER, MARKET, AND ENVIRONMENT

The study indicates an interconnected relationship between gender, market engagement, and environmental change within agricultural systems at the peri-urban interface. While analytically distinct, these dimensions intersect in ways that shape everyday experiences of economic insecurity, gendered divisions of labour, and environmental pressures. The expansion of urban boundaries and the resulting conversion of agricultural land have not only altered the conditions of agricultural production but have also influenced gender relations within farming households. Women remain actively involved in agricultural production, yet their contributions continue to receive limited recognition in market participation and decision-making.

Across the study sample, the findings indicate a gendered division of labour in which men were more often involved in visible activities such as ploughing, irrigation, and marketing, while women participated in a broader range of agricultural and domestic tasks that received less recognition. Women's work extended across productive activities, including seed preparation, sowing, and weeding, as well as post-harvest handling and domestic responsibilities such as cooking, cleaning, and caregiving. This combination of agricultural and household responsibilities often resulted in longer working hours for women. The household interviews also captured the time spent on daily activities, with women in the study generally reporting longer working hours than men when agricultural and domestic responsibilities were considered together. Despite this greater workload, gender differences were also evident in control over key agricultural decisions, including crop selection, input use, and the management of farm income, which often remained with male household members. These patterns suggest that gender roles shape not only the distribution of agricultural labour but also access to decision-making and the benefits associated with that labour.

This gendered division of labour becomes more visible in market engagement. Although women make substantial contributions to agricultural production, men were more commonly involved in selling produce in mandis and dealing with intermediaries. Most respondents reported that men usually sold produce either directly in local mandis or through intermediaries, while fewer reported that women sold produce directly. The barriers to women's participation included social expectations around mobility, limited time, and unpaid domestic responsibilities. Women who participated in selling were more likely to use direct-to-consumer channels, informal vendors, or local markets, but their participation was also shaped by constraints on the scale of sales, bargaining opportunities, and control over earnings.

Environmental pressures further shaped these gendered patterns. Respondents identified declining soil fertility, variable rainfall, water scarcity, and rising irrigation costs as important pressures on agricultural production. Some reported increasing reliance on borewell water as other sources became less reliable, while changes in water availability influenced crop choices, labour requirements, and cultivation practices. In some households, women responded to these constraints by managing water resources or cultivating smaller areas, while men sought wage work outside agriculture or migrated intermittently. These responses suggest that environmental pressures are experienced through existing gendered divisions of labour, with women often taking on additional responsibilities within farming and household activities while men may respond through changes in income sources and mobility.

Taken together, the findings show that gender, market engagement, and environmental change are interconnected dimensions of peri-urban agricultural livelihoods. Limited market access can constrain

opportunities for income diversification, while environmental pressures can increase the costs and risks of cultivation. At the same time, gendered divisions of labour and decision-making influence who bears these pressures and who has control over the resources and income generated through farming. The findings therefore suggest that market-oriented policies and interventions in peri-urban agriculture need to consider farming not only as an economic activity but also as a social and ecological system, in which market access, environmental conditions, labour, and decision-making are closely connected.

Feminisation and Livelihood Diversification

The research indicates a gradual but significant move towards the feminisation of agriculture, which is taking place not because of empowerment, but out of necessity. As men increasingly engage in non-farming jobs, short-term migration, or transport work, women take responsibility for the daily agricultural operational activities. With women's agricultural labour even more feminized, it is still framed in a patriarchal context that has not changed, so while women may take on greater work, these same workloads do not have greater recognition or autonomy. Some women said they ploughed, managed irrigation, and even marketed small amounts, but still, the normal decisions and ownership were made by a male family member.

The data also suggests that women's increased responsibilities are most evident in the maintenance of small kitchen gardens, vegetable production, and animal husbandry. While typically viewed as secondary, these activities play an essential role in buffering uncertain market futures and production failure. Many female respondents described tending small kitchen gardens or keeping poultry as a livelihood diversification strategy. This strategy also supports household food security in periods of agricultural uncertainty. The diversification of labour relies on women working for free or for wages below market level, but, as a form of adaptability, it is also a manifestation of resilience that stabilises household income in the face of market and environmental shocks.

Men's participation in alternative means of living, such as driving, construction, or petty trading, further indicates the interdependence of rural-urban economies. However, this further creates disparities in the visibility of women's contributions to the economy. Women's contributions remain mostly unpaid or informally positioned in institutional structures. When women do participate in collective farming opportunities and/or farmer-producer organizations (FPOs), the women are often represented through their male household head. Therefore, feminisation as a marker of development does not mean to "empower" women. It can simply reflect changes in structure and the corresponding interchanges due to agrarian decline and urban migration.

This change can also be observed in the patterns of market participation. Analysis of sale frequencies across sales channels indicates men are the primary transactors at formal mandi exchanges, while women are the preferred users of direct-to-consumer and local vending. These alternative channels provide convenience and proximity but generally offer lower prices and erratic demand. Despite the challenges, many women respondents noted they preferred these sales outlets because of minimized mobility issues and the option to sell products while managing home and family responsibilities. In some cases, women's participation in these informal markets also represented a mechanism to connect with other women and informally cooperate among women farmers in their communities, although the scale and reach of these networks are still limited.

Environmental Precarity and Urban Pressures

Additionally, the findings point to increasing tensions between urban territorial expansion and environmental sustainability, because the conversion of farmland to residential or industrial land reduces the availability of cultivable land, which has led countless smallholders to intensify their production on small plots of land. Respondents cited increasing uncertainty in the availability of land and irrigation several times, while they were facing smaller plot sizes and increased costs of inputs. Similarly, these stressors have compounded to affect farmers, especially smallholder households, to innovate through a variety of coping mechanisms, from seasonal diversification to greater engagement in informal work. Environmental degradation is damaging not only productivity but also increasing exposure to weather variability, including heat waves, flooding, and unseasonal precipitation. Many farmers recounted instances when crops were lost because of unexpected storms or dry periods, leading to cycles of debt or other distressed sales. Coping strategies are not the same by gender, where men will often take paid labour outside of agriculture, while women will increase home-based agricultural or livestock production to provide food. Women's flexibility in managing multiple livelihood strategies expresses resilience and constraint, resilience with meals on the table and constraint through diversity in low-paying or unpaid labour.

The gendered burden of environmental stress becomes even more noticeable in a moment of crisis. As an illustration, women in agricultural communities put in long hours when there is a heat event, but they may negotiate their work by doing so first thing in the morning or later in the evening, because of their care obligations (that are separate from their agricultural work). Even when minimizing their time, they are often not minimizing their work burden. This reinforces a pattern of overlapping, socially based pressures, which illustrates the tenuousness of women's adaptive space and the continual work of negotiation with social legitimization and limited economic resources.

Urban expansion was also raised by the respondents, who connected it to excess pollution and waste being generated in and around farmlands, especially along roads and in areas where construction is happening. Dust, runoff, and abandoned debris "mucked up" soil quality and crop yields. Many farmers (male and female) also raised questions about how environmental upheaval interacts with deteriorating water quality, worsening input costs, and diminishing profit for their agriculture. Due to these environmental challenges, together with an accelerated urban demand for land, farming households always felt a level of insecurity, and their fear of sustainability increased dramatically, being so deeply entrenched in an urban market.

Structural Inequalities and Emerging Directions

A major theme across all topics is that gendered inequalities are not simply encountered within the broader agrarian system. They are inscribed within the agrarian structure itself in peri-urban spaces. Women play a significant role in agricultural system production and sustainability, yet they are excluded from participating in formal recognition and control over resources. Men, though they may be vulnerable too, particularly when it comes to volatile markets and environmental shocks, may have greater access to institutionalized opportunities, credit, and decision-making control. This is reflective of heightened structural inequalities about whose labour is valued and whose voices are heard in the process of agrarian transformation.

The data show that limited access to stable markets enhances gendered inequalities. The dependence on middlemen and the fragmentation of marketing channels reduce farmers' bargaining power, particularly for those with smaller land holdings. Most women are excluded from market networks, which means that they also experience an extra level of invisibility as their work is economically less recognized and their contribution is observed and socially ignored. The belief that only a small fraction of the consumer price returns to farmers displays the disconnect between labour input and economic returns, producing dependence instead of empowerment.

Similarly, environmental precarity contributes to economic vulnerability. Decreasing soil fertility, limited water resources, and erratic weather patterns are all having a direct impact on productivity, which pushes households to take on temporary survival strategies. Households' engagement with government programs, such as FPOs or pledges to organic agriculture, is inconsistent, occurring through men or being limited to households with better access to networks. Women usually engage in these programs through informal or collective groups that often lack any formal linkage to institutions. While the newly emerging activities indicate some forms of adaptation, they do not yet disrupt established hierarchies governing access and decision-making.

Conversely, the findings also reveal some subtle processes of change. Increased participation of women in activities associated with the market, albeit still constrained, is a sign of a slow transformation in traditional gender roles. Younger generations, both male and female, show a willingness to share decisions and diversify livelihoods through education, albeit still in limited ways. The participation of women in informal networks, such as ladies engaged in social and collective activities and in some of the technical government-led activities to establish FPOs, suggests that the role of women as economic actors is gradually being recognized, as they are not simply viewed as helpers within the farming unit. Yet, these changes remain inconsistent and rely on some context or institutionalized support.

In conclusion, the relationship between gendered divisions of agricultural labour, access to markets, and environmental vulnerability creates the changing context of peri-urban agriculture. Agricultural labour being feminised is embedded within narrowing ecological and economic margins, while accessing a fractured market makes rural livelihoods less predictable. Collectively, these findings indicate a system under pressure where adaptation and resilience are determined more strongly by gender, in a system where environmental change only deepens inequalities that already exist.

Therefore, the new trends illustrate persistence and change: persistence in the patriarchal organisation of labour and market access and change in terms of women in the peri-urban context occupying new spaces of negotiation and visibility. These trends collectively underscore the imperative to think about peri-urban agriculture not merely through the lens of productivity and land use, but as a dynamic social field where gender, ecology, and markets intersect to shape the fields of rural-urban change.

9

FIELD REFLECTIONS: EVERYDAY EXPERIENCES OF PERI-URBAN FARMERS

The field narratives provide a closer view of how the patterns identified in the quantitative findings are experienced in everyday life. Rather than treating gender, market access, and environmental pressures as separate issues, the interviews show how these dimensions come together in the daily organisation of farming households. The accounts also illustrate how farmers negotiate responsibilities, resources, and changing conditions within the constraints of peri-urban agriculture.

Everyday Work and Decision-Making

Several women described long working days that combined agricultural and domestic responsibilities. One recurring expression captured this imbalance:

"Subah se shaam tak kaam hi kaam hai, kheton ka bhi aur ghar ka bhi, par faisla aadmi lete hain."

"From morning till evening there is work, work in the fields and at home, but the decisions are made by men."

The account reflects a distinction between participation in agricultural work and participation in farm decision-making. This distinction was also evident in the survey findings, where men were more commonly identified as decision-makers for crop selection, irrigation, input use, and marketing. One older woman explained:

]

"Main kheton mein rehti hoon, par beej kaun lega, paani kab chhodega, yeh unka kaam hai."

"I work in the fields, but deciding who will buy the seeds and when the water will be released is their work."

At the same time, male respondents acknowledged the importance of women's labour to the functioning of farms. One farmer noted that the farm would not operate if women stopped contributing even for a single day. Such accounts highlight the difference between recognition of women's contribution within the household and their participation in formal decision-making structures.

Market Engagements and Mobility

The field narratives also illustrate the gendered pattern of market participation identified in the survey. Men were more commonly involved in formal mandi transactions and dealings with intermediaries, while women more often participated in local or informal selling. Women described mobility, transport, distance, and household responsibilities as constraints on participation in distant markets.

One woman selling vegetables locally explained:

"Mandi jaana mushkil hai. Subah se shaam tak ghar ka kaam, bachon dekhna bhi hota hai. Yahan aas-paas bech leti hoon, thoda paisa mil jaata hai."

"It is difficult to go to the market. From morning till evening, I have household work and have to look after the children. I sell nearby and earn a little money."

Local selling, therefore, provided a way of combining agricultural activities with household responsibilities, although respondents also indicated that such channels could involve smaller volumes and lower returns.

Farmers also expressed concerns about the relationship between their effort and the prices received. One male farmer dependent on a middleman described the returns from farming as very low relative to the work involved. These accounts reinforce the quantitative findings on the different roles of men and women across market channels, while also illustrating the everyday constraints behind those patterns.

Urban and Environmental Pressures

The field narratives provided concrete examples of how urban expansion and environmental change are experienced at farm level. One frequently repeated observation was:

"Zameen kam pad gayi, paani bhi gehera ho gaya."

"The land has become less, and the water has become deeper."

Respondents described reduced agricultural land, declining water availability, pollution, and increasing production costs as interconnected pressures. Some farmers reported that fields located near roads, construction sites, or dumping areas were affected by dust and waste. One farmer observed:

"Mitti pe dhool girti hai, sabzi ka rang bhi kharab ho jaata hai."

"Dust falls on the soil, and even the colour of the vegetables gets spoiled."

The field accounts also showed how environmental pressures affected the organisation of household labour. During periods of heat or water scarcity, some women adjusted the timing of their work or spent additional time managing water and remaining plots. At the same time, some men sought wage work in nearby urban areas during periods when farming opportunities were limited. These accounts provide a more grounded understanding of the gendered responses identified in the broader analysis.

Coping, Adaptation and Changing Roles

Farmers described a range of household-level responses to economic and environmental uncertainty. These included changing crop varieties, cultivating crops requiring less water, storing grain or seed, exchanging local seed, diversifying livelihoods, and relying on family or community networks.

One farmer described changing cultivation practices after a poor season:

"Agle saal beej badal lete hain, kam paani wali fasal lagate hain."

"Next year, we change the seeds and plant crops that require less water."

Women also described informal savings and support networks. One participant explained how women contributed small amounts to a collective savings arrangement that could be accessed when a household faced an immediate need:

"Zyada nahi, par jab zarurat padti hai, to kisi ke paas se mil jaata hai."

"Not much, but when needed, I can get some from someone."

These examples show that adaptation is not limited to changes in cultivation. It also involves household budgeting, livelihood diversification, informal cooperation, and the use of social networks.

The narratives further point to gradual changes across generations. Younger women were described as taking an interest in market processes and digital transactions. One young woman supported her father with online orders and payments for a vegetable delivery activity, illustrating an emerging connection between agricultural production and urban markets. At the same time, older respondents described increasing migration, mechanisation, and reliance on family labour, which have altered how agricultural tasks are distributed within households.

Reflections from the Field

The field narratives add depth to the quantitative findings by showing how broader patterns are negotiated through everyday decisions and relationships. They demonstrate that peri-urban farming is sustained not only through land, labour, and markets, but also through household knowledge, informal cooperation, and continual adjustment to changing conditions.

The accounts also show that change does not occur uniformly. Women are taking on responsibilities in production, local marketing, household management, and, in some cases, new forms of economic activity. However, greater participation does not necessarily translate into greater control over land, income, or farm decisions. Similarly, household and community coping strategies provide important support, but do not remove the structural constraints associated with land loss, market uncertainty, environmental pressures, and uneven access to institutions.

Taken together, the field reflections provide a grounded account of the everyday negotiations through which peri-urban farming continues under changing agrarian conditions. They complement the synthesis presented in the preceding chapter by bringing the experiences and voices of farmers into the analysis.



Photo Credit: Anita Pinheiro

10 CONCLUSION

The study shows that peri-urban agricultural livelihoods are shaped by the interconnected pressures of urban expansion, changing land and environmental conditions, market uncertainty, and gendered divisions of labour. The findings do not point to a single defining challenge. Rather, farmers experience multiple pressures at the same time, with changes in land availability, water resources, markets, and household labour influencing one another. The proximity of Delhi creates both opportunities and constraints: access to large consumer markets and established mandis provides opportunities for selling produce, while urban expansion also contributes to the conversion of agricultural land, increasing competition for land and water and making cultivation more uncertain.

Gender is central to how these changes are experienced. Women contribute substantially to agricultural production, including sowing, weeding, irrigation, post-harvest handling, marketing, and household work. However, greater involvement in agricultural labour does not necessarily translate into greater control over farm decisions, income, or productive resources. Men were more commonly involved in crop and input decisions, mandi transactions, and dealings with intermediaries, while women were more likely to participate in local and informal markets where proximity and flexibility allowed them to combine selling with household responsibilities. This demonstrates that the increasing participation of women in agriculture should not automatically be interpreted as empowerment. In many cases, it reflects a redistribution of responsibilities without a corresponding shift in decision-making authority or control over income.

Market access was another important dimension of livelihood vulnerability. Farmers used multiple channels, including mandis, local markets, informal vendors, and direct sales, depending on the type of produce, perishability, transportation, storage, and immediate cash requirements. Formal markets provided access to larger volumes but also involved transportation costs, payment uncertainty, and dependence on intermediaries. Local and informal markets offered greater accessibility and quicker sales, particularly for women, but could involve smaller volumes and lower returns. The use of multiple market channels, therefore, reflected not simply flexibility but the need to manage uncertainty, limited storage, changing prices, and uneven access to transportation and buyers.

Environmental pressures further intensified these vulnerabilities. Farmers reported water scarcity, declining soil fertility, pollution, flooding, heat, and variable rainfall, alongside rising costs of irrigation and other inputs. These pressures affected production decisions and increased the risks associated with cultivation. Household responses included changing crop choices, cultivating less water-intensive crops, diversifying livelihoods, reallocating labour, and relying on family and community networks. Men were more likely to respond through wage work, transport work, or temporary migration, while women often absorbed additional agricultural and household responsibilities. These responses demonstrate the capacity of households to adapt, but also highlight the limits of adaptation when underlying constraints related to land, water, markets, infrastructure, and institutional support remain unresolved.

The study also points to gradual changes alongside these continuing inequalities. Younger respondents showed some interest in non-farm livelihoods, digital technologies, and new forms of market engagement, while women were participating in local selling, collective activities, and other livelihood strategies. At the same time, traditional patterns of labour, decision-making, and control over resources remained evident. The transition from rural to peri-urban agriculture is therefore neither a straightforward process of decline nor a linear movement towards transformation. It is a negotiated process in which households adjust their livelihoods while continuing to work within existing social, economic, and ecological constraints.

Overall, the findings suggest that peri-urban agriculture needs to be understood as a social, economic, and ecological system rather than only through the lens of agricultural productivity or land use. The sustainability of these livelihoods depends not only on access to land and markets but also on water availability, environmental conditions, infrastructure, institutional support, and the distribution of labour, decision-making, and economic returns within households. Greater attention to these interconnected dimensions can help inform more inclusive approaches to peri-urban agricultural planning and support, particularly for smallholder households whose livelihoods are increasingly shaped by the processes of urban expansion.

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Photo Credit: Anita Pinheiro

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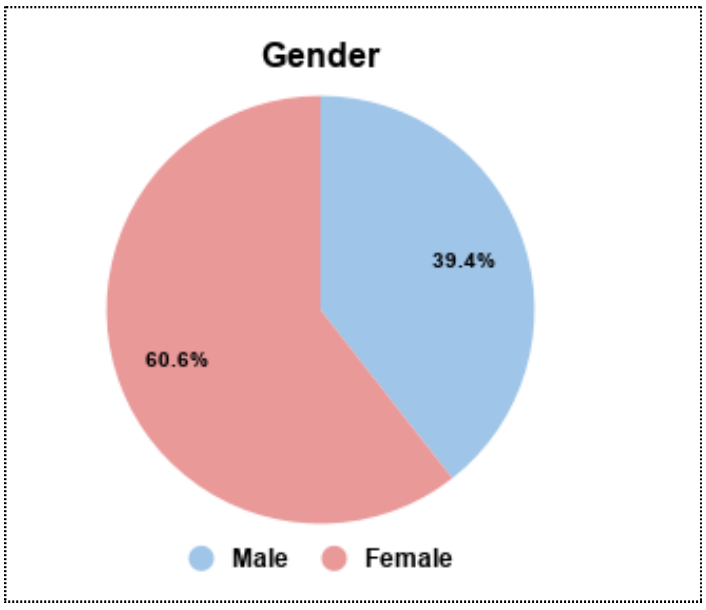
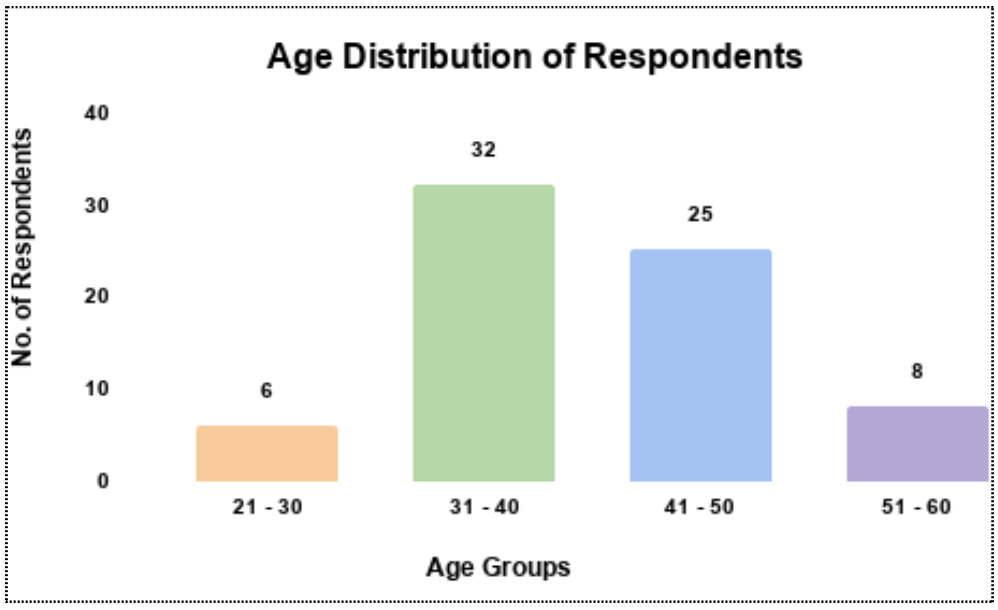
APPENDIX

A1. Demographic Profile of Respondents



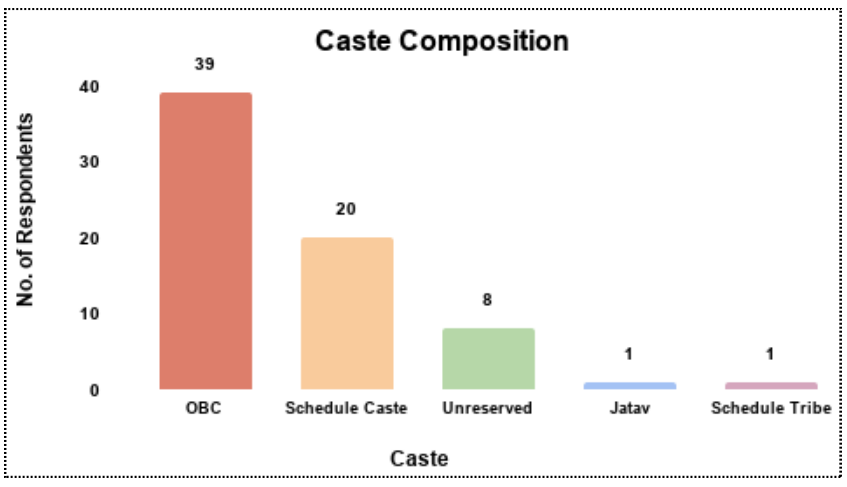
Source: First author, Primary Survey, 2025

A2. Age distribution of respondents



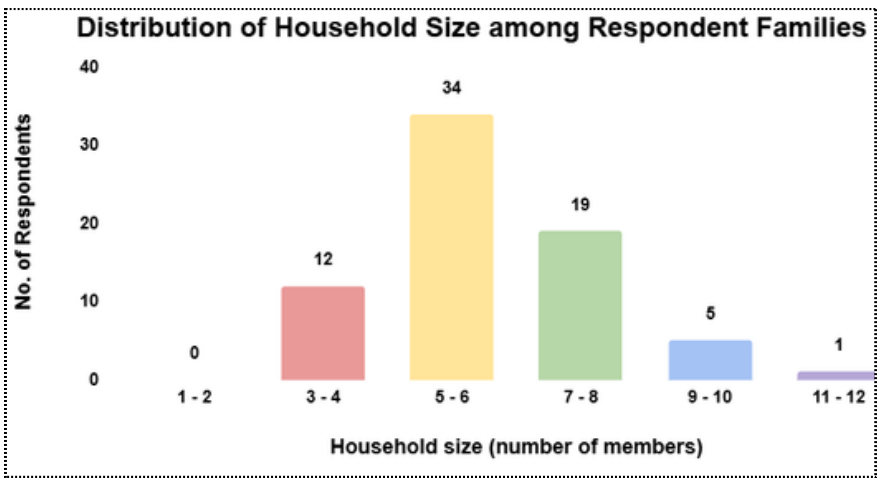
Source: First author, Primary Survey, 2025

A3. Caste composition of the respondents



Source: First author, Primary Survey, 2025

A4. Distribution of household size among respondent families



Source: First author, Primary Survey, 2025

B. Heat Map: Frequency of Produce Sales Across Market Channels* (n=71)

Formal Mandis	Informal/ Local Vendors	Direct to consumer	Others
4	2	4	0
2	0	3	0
3	4	0	0
4	0	3	1
2	3	3	0
4	3	0	1
4	3	0	1
1	3	4	0
4	3	4	1

Source: First author, Primary Survey, 2025

Formal Mandis	Informal/ Local Vendors	Direct to consumer	Others
3	2	4	3
2	3	3	2
4	2	3	3
2	3	4	3
3	4	2	3
3	4	2	2
0	2	3	2
4	3	2	2
3	2	2	2
4	2	4	2
2	3	4	2
4	2	3	2
4	2	4	2
4	2	3	2
4	4	4	2
3	4	2	3
4	2	4	2
3	4	3	2
3	4	4	2
3	2	4	2
4	2	3	3
3	4	3	2
3	2	3	2
4	3	2	4
2	4	3	2
4	2	3	2
2	3	2	3
3	4	2	2
3	2	4	2
4	3	4	3
4	2	4	2
3	4	4	2

Source: First author, Primary Survey, 2025

Formal Mandis	Informal/ Local Vendors	Direct to consumer	Others
3	4	4	2
3	4	2	2
4	2	2	2
4	2	4	2
3	4	2	3
4	3	4	2
4	2	4	2
4	3	3	2
4	4	4	2
3	2	3	2
4	2	4	2
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4	2	3	2
3	4	2	2
3	4	3	2
4	3	4	2
3	4	4	2
4	3	4	3

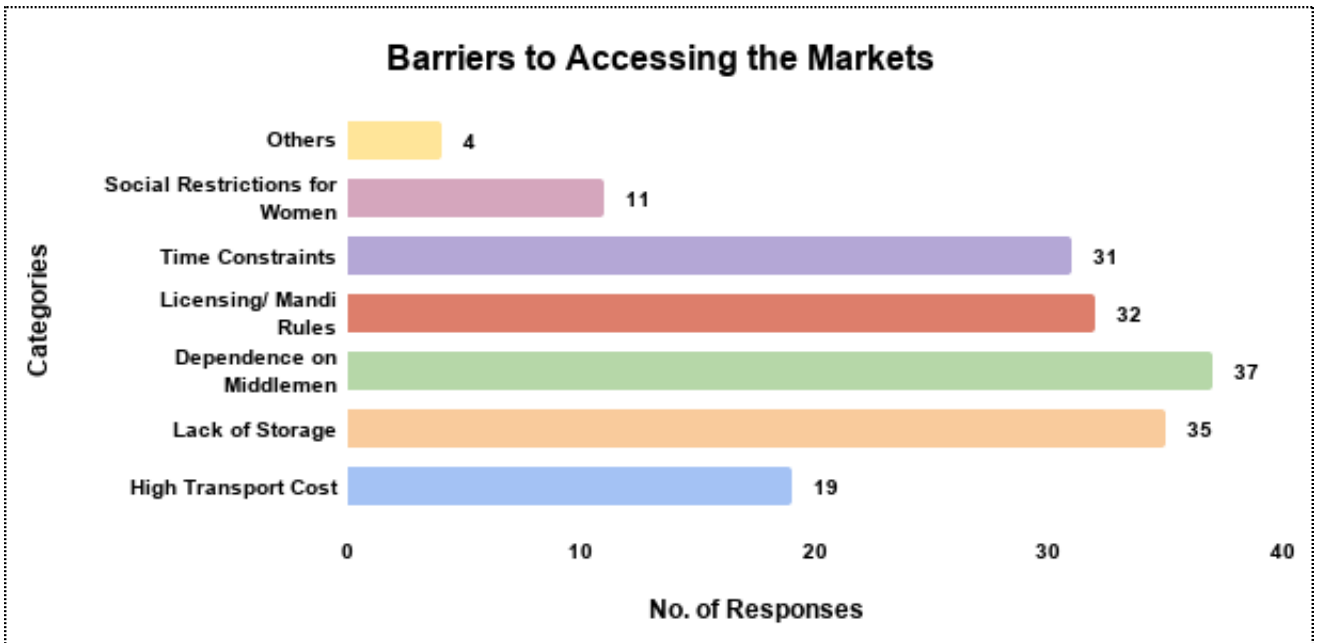
Source: First author, Primary Survey, 2025

*Heat map showing respondents' reported general frequency of produce sales across different market channels, based on their usual experiences, represented through a five-point scale ranging from 'Always' (red) to 'Never' (blue).

A heat map is a graphical data visualization technique that uses color intensity to represent numerical values across two dimensions.

Legend: Red – Always (4) Yellow – Often (3) Dark Gold – Sometimes (2) Teal – Rarely (1) Blue – Never (0)

C. Barriers to Accessing the Market



Source: First author, Primary Survey, 2025



Photo Credit: Anita Pinheiro

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SEPTEMBER 2026

WIORKING PAPER

Gendered Dimensions of Peri - Urban Agriculture: Livelihood Practices, Market Linkages, and Coping Strategies in Delhi - NCR's Farming Clusters



Photo Credit: Anita Pinheiro

Buffaloes grazing and resting in the wetland landscape of peri-urban Delhi-NCR, reflecting the coexistence of agricultural livelihoods, livestock, and changing urban environments.

COALITION FOR FOOD SYSTEMS TRANSFORMA(C)TION IN INDIA

CoFTI is supported by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH on behalf of the German Federal Ministry of Economic Cooperation (BMZ). The CoFTI Secretariat is managed by Watershed Support Services and Activities Network (WASSAN).

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