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Innovations in Food Value Chains: Dynamics of Participation and Welfare Effects

Institute of Economic Growth, New Delhi

आर्थिक विश्लेषण एवं अनुसंधान विभाग

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Innovations in Food Value Chains: Dynamics of Participation and Welfare Effects

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About NABARD Research Study Series

The NABARD Research Study Series has been initiated to enable wider dissemination of research conducted/sponsored by NABARD on the thrust areas of Agriculture and Rural Development among researchers and stakeholders. The current study titled 'Innovations in Food Value Chains: Dynamics of Participation and Welfare Effects' completed by Institute of Economic Growth (IEG), New Delhi is the forty-seventh in the series.

Organised retailers (supermarkets), e-commerce firms, startups in food and agriculture, logistic firms, and online platforms by the central government like the electronic National Agricultural Market (e-NAM) are some of the innovations driving transformations in food value chains in India. This study aims to analyse the impact of farmers' participation in procurement systems on their profitability with variations across states, farm size, social categories, participation determinants, employment, consumption, and pandemic effects. It examines the rise of the direct procurement systems of organized retailers in the country by building a panel data of 836 vegetable-growing farm households surveyed from four states, ten districts, and 62 villages in 2013-14 and 2020-21 that can help understand dynamic changes in farm economy which can be attributed to modern food value chains.

Hope this report would make a good reading and help in generating debate on issues of policy relevance. Let us know your feedback.

Kuldeep Singh
Chief General Manager
Department of Economic Analysis and Research

DISCLAIMER

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Chandra S.Nuthalapati

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Executive Summary

Innovations have been driving transformations in food value chains in all the nodes from producer to consumer, and this has been manifesting in the emergence of several new actors like organised retailers (supermarkets), e-commerce firms, startups in food and agriculture, logistic firms, and online platforms by the central government like the electronic national agricultural market (e-NAM). It is well-known that the retailing end of the food value chain has been gaining more importance since the dawn of the new Millennium because of demand factors like income increase, urbanization, larger entry of women into the workforce, and policy changes favouring this transformation. Consequently, marketing decisions in demand-driven modern value chains significantly influence all farm decisions, including what, when, and how to produce. Besides, the retailers consolidate the market and develop direct procurement systems from the farming community directly for a seamless flow of fresh produce and to maintain the quality standards that the rising middle class demands.

There have been concerns over this transformation process and the likely plight of the resource-poor smallholders and their sustainability in developing countries. The sudden onslaught of COVID-19 as a pandemic has made things difficult for the marketing of agricultural produce, though production has been, by and large, insulated. Nevertheless, the agri-food system transformation has yet to be studied at an all-India level, barring a few regional, state-specific, or crop-specific studies.

The extant literature and evidence show contrasting trends in impacts. A serious methodological flaw is that the extant literature relies on the analysis of cross-section household data, making the findings inconclusive as controlling for self-selection bias is difficult without panel data. Further, building a medium-term panel can only unravel the adoption dynamics. Therefore, the jury is still out on the impacts of the rise of organised retailing on the farming community in the world. The evidence so far is mixed, and therefore an empirical question to be investigated in the specific socioeconomic milieu. Also, the experiences of several developing countries show that there can be winners and losers in this process of agri-food system transformation (Reardon and Gulati, 2008). Therefore, it is compelling to study the impacts of innovations in food value chains in a dynamic framework. It is crucial in large countries like India, which has over 100 million farm households and family members.

The present study examines the rise of the direct procurement systems of organized retailers in the country and builds on an earlier study. The study aims to analyze the impacts of participation in these procurement systems on farmer profitability with variations across states, farm size, social categories, participation determinants, employment, consumption, and pandemic effects. It resurveys the earlier surveyed farmers duly making for the attrition. The field study was conducted for the 2020-21 agricultural year using physical survey methods. The final sample comprises 836 vegetable-growing farm households in four states, ten districts, and 62 villages. Among them, 42% of farmers sell to the direct procurement systems of retailers and various online marketing companies. One-sixth of them are from the Muslim community, while 8% are disadvantaged SCST social categories. Field data reveal that at least one family member for around 10% of households is directly impacted by Coronavirus infection. However, everyone

was affected by lockdowns, social distancing norms, drastically reduced transportation modes, and widespread fear of the COVID-19 infection.

The sample farmers are small farmers with an average owned land of 3.17 acres, primarily irrigated, with state-wise variations and no significant difference across marketing channels in terms of land ownership. The vegetable farmers in West Bengal own less than one acre on average. However, supermarket-selling farmers own significantly higher valued farm and non-farm assets, including machinery like tractors, than their traditional marketing counterparts. Analysis of intermediate input applications reveals that modern market farmers spend more on new technologies like seeds, mulching, and crop support, apart from investing more in repairing and maintaining farm assets. Vegetable cultivation entailed intensively applying all the inputs except fertilizers, irrigation, and machinery use relative to the average spending for all crops. Interestingly, marginal farmers leverage higher input applications, except pesticide chemicals, to earn more and uplift their welfare through vegetable cultivation.

The participants in supermarket collection centres must endure the additional burden of far too many marketing transactions with smaller quantities per transaction than the traditional market farmers. Their endurance in doing so pays off with significantly higher prices for their vegetable produce on average, even though some of it is sold in *mandis*. It is heartening to note that even disadvantaged social groups receive higher prices through selling to supermarkets. The farmer-producers will have to weigh the time and cost spent in transacting their produce in the market, apart from the higher prices.

Because farm households will be short of time during the busy crop season to attend to various production activities, especially as vegetable cultivation is labour intensive with multiple harvestings and enhanced plant protection requirements. Our analysis shows that vegetable growers are better off on both these counts by selling to modern markets. The transaction time and costs for selling a unit quantity of vegetables plummet significantly by 81% and 60%, respectively. Their spending on transportation, market fees, etc., goes down drastically in the process. Further, they do not need to wait inordinately for the buyers to take their produce and give money in traditional markets. The rejection rates in collection centres are approximately the same as in traditional markets. However, 85% of farmers report taking A-grade produce to supermarkets, while the same for traditional markets only 20%.

The analysis of costs and returns shows that the vegetable growers accrue Rs. 54052/- net income per acre of cultivation. In contrast, vegetable cultivation leads to a 17% higher return per acre over the crop average. Vegetable cultivation also entails a 25% elevated expenditure on intermediate inputs. On a per-farm basis, the sample farmers get an annual income of Rs.285751/- from crop cultivation with wide statewise variations. The farmers in West Bengal and Telangana earn only 52% and 53% of the all-India crop average, while those in Delhi-NCR and Maharashtra get 194% and 155% of this, respectively. Hired human labour constitutes the major expenditure, with one-third of crop cultivation for both groups of farmers. Meanwhile, supermarket farmers spend slightly more on seeds and less on machinery use.

Every second vegetable grower in the sampled farmers owns livestock, while this ownership goes to as high as 72% in Delhi-NCR and the lowest with 30% in West Bengal. Our sample farmers get a net income of Rs.23783/- from livestock rearing during the pandemic year. While this income is Rs.78059 in Delhi-NCR, it is only Rs.452 in West Bengal and Rs.7711 in Telangana. Apart from crop cultivation and livestock rearing, the sampled farmers received income from wages, salary from semi-skilled jobs, business ventures, and transfer payments from

central and state governments. We calculated all that and estimated that a farmer gets, on average, Rs.144138/- from non-farm sources. Combining all three sources, an average farmer typically gets Rs.453672/- from crop (63%), livestock (5%), and non-farm (32%) sources. The share of non-farm sources is higher in Telangana (48%) and West Bengal (43%), where farm size is small. Understandably, non-farm employment is more distress-driven than rewarding and productive jobs.

We have leveraged panel data from the survey conducted in 2013-14 and analysed farmers' welfare during the pandemic year. The results indicate that the farmers' incomes in 2020-21 are the same as in 2013-14 in constant terms. However, the share of livestock and business plummeted due to the coronavirus-related restrictions and difficulties. The farmers could still manage the income level of 2013-14 due mainly to various governmental transfers and higher wage incomes. Econometric analysis, controlling for confounding factors, reveals that vegetable growers selling to supermarkets had higher incomes than those selling to traditional markets.

Cultivating vegetables created total employment of 101 man-day equivalents (MDEs), 10% higher than all crop averages of 77 MDEs. Supermarket-selling farmers employ a greater number of both hired and family labour, especially female hired labour and both male and female family labour. The expenditure on labour follows similar patterns. This is even though farmers selling to both markets are identical regarding land ownership. Marginal farmers' family members made more intensive use of family labour for vegetable cultivation. Modern market sellers earning a higher income spend 13% higher amounts, totaling Rs.4035 on monthly per capita consumption (MPCE) compared to traditional market farmers. They spend more on education and other expenses like conveyance, entertainment, and eating out. Unfortunately, marginal farmers spend lower amounts on education. The lower education expenditure changes for the better when they start selling to modern markets, probably because they earn more.

Around half of the vegetable growers are part of community-based organizations (CBOs) like self-help groups, cooperatives, and farmer-producer organizations. The state plays a significant role in improving the social capital of the farmers. Even then, these CBO's role is mainly in providing loaning facilities except for the provision of inputs like fertilisers and seeds in a small number of cases with a minor role in marketing farmers' produce. Extension services reach 52% of the farmers, and the government contributes 35%. Institutional sources provided 79% of the total credit received by the vegetable growers during the agricultural year with wide state-wise variations. Those in Delhi-NCR received less than 10% of their credit from government sources and 42% from commission agents. Disadvantaged social category farmers could source only half of the all-farmer average credit.

The supermarket-selling farmers' perceived advantages of participating in their direct procurement system are- transparent weighing, better prices, low transport costs, and flexible timing. However, some farmers do not sell to supermarkets because of high-quality standards, small quantities, and not regular buying. Alternative markets like Haats in West Bengal and Rytu Bazaar in Telangana provided another source for vegetable growers to sell to consumers directly. COVID-19 impacted the vegetable area for 45% of cases, with 26% reporting a net decline. In other words, some vegetable growers ramped up the area to exploit the supply situation. Though marketing and transport are the major bottlenecks, the difficulties spanned everything from seeds to labour. Harvesting got affected for vegetables due to labour unavailability. Some part of production is not marketed for 28% of farmers due to pandemic-related issues, with supermarket farmers leveraging the advantage of selling to collection centres close to the village.

Farm households, *on average*, are better off with vegetable cultivation and emerging innovative direct procurement systems. The total farm household income from all sources comes to Rs.453672/- as explained above among the sampled vegetable growers. Vegetable cultivation contributes to 40% of the total farm income on average and is much higher in West Bengal and Telangana and among small farmers. The household food and non-food consumption come to Rs. 225720/. The total loans taken during the year, along with interest, will be Rs.140 000/- Therefore, the vegetable farmers will cover all the expenses comfortably. However, the marginal farmers, disadvantaged social categories, and farmers from West Bengal and Telangana will only cover some costs and face difficulties in making both ends meet.

Moreover, farmers' income stagnated at the 2013-14 level with lower earnings from livestock and business. State transfers under various schemes and wage earnings enabled even to maintain incomes at that level. The newer marketing opportunities with the rise of demand-driven value chains and their innovative direct procurement systems can enhance resilience against shocks like COVID-19.

The government and regulatory agencies may rethink the food system incentives and financial architecture to make the agri-food transformation seamless and equitable. Policymakers may consider providing incentives to direct procurement systems of supermarkets as it enhances income and consumption. Membership in farmer organizations enables linking them to supermarkets and therefore deserves support. Importantly, it is not land ownership but irrigation facilities and their efficiency are driving participation in modern market channels. The study findings have implications for promoting irrigation through credit and other government investments. Also, education facilitates selling to modern chains, and therefore, vocational training in related issues for the rural population will upgrade their skills.

Several unemployed youths have started acting as a direct link between farmers and disparate modern and online sellers like startups and quality-conscious urban consumers. Apex financial development institutions like NABARD need to take initiatives to promote the agri-food system's modernization by promoting direct procurement systems of companies and individuals, community-based organisations, irrigation, high value crop cultivation, and short-term credit to strengthen resilience against shocks through modernisation. This study conclusively proved that household incomes of small and disadvantaged social category farmers do not cover the consumption expenditure if not for the state transfer payments. Therefore, various forms of safety nets and money transfers must continue in the medium term for social welfare.

Chapter 1
Introduction

1.1. Innovations in food value chains

Innovations have been driving transformations in food value chains in all the nodes from producer to consumer, and this can be seen in the emergence of several new actors like organised retailers (supermarkets), e-commerce firms, start-ups in food and agriculture, logistic firms, and online platforms by the central government like the electronic national agricultural market (e-NAM) (Nuthalapati, Sutradhar and Reardon, 2017; Nuthalapati, Srinivas, Pandey and Sharma, 2020; Nuthalapati, Bhatt, and Beero, 2022). While the consistent rise in income has been around 5% over the last two decades, rising middle classes, urbanisation, diet diversification, and globalization are at the core of this transformation, and several policy measures have been facilitating this process. Some of the recent measures include- permission for 100% foreign direct investment in multi-brand retail and online food trade, push to digital transactions through demonetisation, and proposed draft model Agricultural Produce Marketing Act (APMC) Act 2017, apart from measures like the introduction of GST, and push to digital payments that can have economy-wide impacts.

The marketing of agricultural produce is carried out through a fragmented supply chain, often in regional boundaries without any pan-Indian nature, too many intermediaries without any investment capacities, and poor market integration due to high transportation costs[1]. On the other hand, the average income per agricultural worker was lower by 3.12 times in 2011-12 relative to the non-agricultural workers, and growth of their income was just 0.44% per annum since 2011-12, while non-agricultural income has been growing at a robust 5% per annum. Contrary to popular perception, the poverty of farming households is significantly high at 22.5% in the latest round of NSSO study, and the situation in some of the states like Jharkhand, with 45% of them below the poverty line, needs policy correctives (Chand, 2017). The government's above measures aim to reduce intermediaries in value chains through investments in modernizing and are part of the government's explicit strategy for 'doubling farmers' income' by 2022 (Chand, 2017a).

Modern organised retailing started in the initial years of the new millennium in the country and has been growing at higher rates (compared to traditional retail) with several innovations like an early foray into fresh produce and direct procurement from farmers relative to other developing countries (Reardon et al., 2012). The entry of supermarkets leads to a structural transformation in the agri-food system and, in the process, alters production patterns, technology, prices, and related things (Reardon et al., 2009). This transformation impacts all the actors in the value chain, including wholesalers, processors, farmers, downstream consumers, and traditional retailers. The implications of the rise of supermarkets for farmers come from the methods of procurement used and the quality and safety standards applied. It is feared that the resource-poor farmers, unable to make substantial capital investments to upgrade, might not be able to sell to these organised retailers and benefit from it (Singh, 2012; WB, 2007). The COVID-19 crisis has been accelerating this process further by 'pivoting' by food industry firms (Reardon et al., 2021) and fast-tracking adaptation strategies by e-commerce firms (Reardon et al., 2021a).

[1]Mattoo, Mishra, and Narain (2007) examined the state of supply chains and associated costs in their study. Chand (2012) also shows issues with marketing inefficiencies and the necessity to correct them to enable better prices and welfare for the farming community.

There has been a rapid spread of modern retail in India over the past decade to the point where supermarkets are spreading faster in India than anywhere in the world. This spectacular growth has occurred in two phases (Rao et al., 2017). The first phase started in the mid-1990s, with the emergence of the Food World chain in the south, in a joint venture with the Hong Kong-based multinational Dairy Farm International. This and a few others emerged in South India at that time, as the chains themselves note, because of a combination of the rapid growth in the middle class fueled by the economic boom in financial services, telecommunication, and eventually IT in that region and H1 visa remittances, apart from having lower real estate costs at that time.

The second phase started in the early 2000s and can be called the start of the "supermarket revolution" in India, with massive investment by several kinds of players:
(1) several corporates that are either conglomerates heavily involved in the boom sectors (such as Reliance forming Reliance Fresh, Bharti forming Easy Day, Aditya Birla forming the chain More, RPG with Spencer's); (2) companies that were mainly non-food retailers (such as Pantaloons) that moved into food retail; (3) several agribusiness forward-integrated companies (like Namdhari seeds forming the chain Namdhari Fresh, or Hyderabad-based ITC forming Choupal Fresh); (4) regional chains (like Big Apple in Delhi, or Trinethra that started in Hyderabad but was bought by Aditya Birla and became More, or Apna Bazaar and Magna chains based in Hyderabad); (5) global multinationals such as Wal-mart, Carrefour, and Metro that have come in as "cash & carry" chains, with the first in joint venture with Bharti, the second coming in December, and the second in sole stance; (6) e-commerce companies and start-ups investing significantly in grocers with direct procurement systems. Big Basket and Flipkart are major domestic e-commerce firms, while Amazon is the multinational entering the services. While there are some foreign players, most of the growth is from domestic modern retail chains. Several start-ups like *Ninjakart, TheAgrihub, SVAgri, Sabziwala,* the output-based start-ups, connect the farmer with the buyer of farmer produce and, in some cases (*Ninjacart and Bigbasket*) buy directly from farmers in collection centres like supermarkets. Besides these start-ups, online retailing companies like *Amazon* started buying directly from farmers, replicating the *Amazon Fresh* model for its grocery business in a tie-up with 12500 *kirana* stores since 2016 (Ganguly, 2016).

This organised retail started to grow again after restructuring and consolidation after 2015. After slipping since 2009 in the global retail development index developed by A T Kearney, India is again back in the top ranking in the global retail development index developed by A T Kearney in 2016, after China and ahead of Malaysia. There has been some consolidation in the sector, with Future Group merging with Bharti Retail and acquiring many small chains like EasyDay, Nilgiris, Heritage, BigApple, and Sangam Direct, as well as expanding their network of shops across all states. The Reliance company, bolstered by its telecom foray, is trying to expand its footprint in grocery retailing through online entry. As of June 2015, there were 8157 modern retail stores (USDA, 2020), and numerous e-commerce door delivery firms are propelled by logistic startups. These supermarkets (or organised retailers) contribute to the food segment, which is estimated to be 10 percent of the 360 billion food market. Given the underlying demand side factors, domestic investment, and FDI regulations, it is likely to grow faster.

At the current pace, modern food retail will be an essential force in India's food economy over the next 5-20 years, with investments mostly from domestic players and some contributions from multinationals. The great majority of supermarkets' effect on the domestic food economy in India, as in other countries, is on processed and semi-processed products (staples, oil, condiments, dairy, meat, fish), simply because typically, across countries, 85% of the sales of supermarkets are in these items; about 15% of supermarket sales internationally is in fresh

produce (fruits and vegetables). That roughly mirrors the share of produce in diets in developing countries (The share of produce in Indian food consumption is 17%). Thus, the effects of supermarkets on farmers in all but fresh produce are indirect, as the effects are first on processors and, in turn, from processors to farmers. It will be helpful to take a bird's eye view of empirical evidence from extant literature to lay out research questions.

With this, the second stage of supermarket emergence since 2002/3, mainly since 2008, has led to intense debate and excitement in some corners (Singh, 2011). Notwithstanding the apprehensions about small farmer exclusion in dualistic agrarian structures[2], experiences vary across countries and regions within countries.
These fears are serious because the rise of supermarkets also happens when the country's agriculture is going through a crisis. However, the empirical evidence generated through dispassionate research on the nascent phenomenon and its impacts on incomes, technology adoption, and participation is scarce or non-existent.

1.2. Survey of Literature: A considerable body of literature on the impacts and inclusiveness of modern marketing channels is emerging in other developing countries, while research is in the nascent descriptive stage in India. Empirical evidence suggests that participation in supermarket procurement has benefited the cultivators through income gains, higher and stable prices, employment, and technology adoption (Minten et al., 2009; Miyata et al., 2009; Neven et al., 2009; Rao and Qaim, 2011,2013; Rao et al., 2012; Bellemare, 2012, 2015; Michelson et al., 2012; Michelson, 2013; Rao et al., 2017). Our study showed that a 1% increase in selling to supermarkets increased farmers' income by 0.38% and an overall increase of 23% in Telangana (Rao et al., 2017), compared to 48% growth in Kenya (Rao and Qaim, 2011). Earlier studies in countries like Nicaragua reported that only farmers with advantageous geography and water will likely participate in these channels (Barrett et al., 2012; Michelson, 2013). The literature has been moving gradually towards analysing broader impacts like employment, poverty, gender dimensions, and nutrition, with positive outcomes in all of these except in the case of gender dimension (Neven et al., 2009; Rao and Qaim, 2013; Chege et al., 2015). However, some studies have also shown that selling to modern marketing channels does not fetch higher returns (E.g., Schipmann and Qaim, 2010 in Thailand; Hernandez et al., 2007 in Guatemala). Moreover, several studies with insignificant differences in impacts or negative impacts may not be published (Bellemare, 2015).

It is a matter of concern to note that small farmers are mostly excluded in dualistic agrarian structures (Rao and Qaim, 2011 in Kenya; Berdegue et al., 2005 in Guatemala; Reardon et al., 2009 in Mexico), and possession of non-land assets like irrigation hold the key even when they are included in countries like Indonesia, China and Nicaragua (Reardon et al., 2009; Michelson et al., 2012). Reardon et al (2009) hypothesise that four pathways can help small farmer inclusion viz., perception of large farmers as riskier options, availability of family labour, organizing into cooperatives and resource provision contracts. Within India, available studies show higher returns in Karnataka, Haryana, HP, Punjab, AP, and Telangana and evidence of exclusion in Karnataka and Telangana (Dev and Rao, 2005; Rao et al., 2016; Rao et al., 2017). Our earlier study in Telangana found a 23% increase in net income that was also statistically significant (Rao et al., 2017) and significant positive returns in our pan-Indian study in 2014 (Rao, 2016). Very few exploratory studies conducted have also reported higher net returns in the supermarkets in

[2]Several scholars and international organizations articulate these fears. See, for example- Hazell et al. (2010), Reardon et al. (2009), WB (2007).

Karnataka, Punjab, and Gujarat states of India[3] (Mangala and Chengappa, 2008; IIMA, 2011; Singla et al., 2011; Bathla, 2016; Ghosh and Vadivelu, 2016).

The evidence reviewed shows contrasting trends in impacts. A serious methodological flaw is that the extant literature relies on an analysis of cross-section household data, making the findings inconclusive as controlling for self-selection bias is difficult without panel data (Barrett et al., 2012; Dedehouanou et al., 2013). Further, the adoption dynamics can only be unraveled through building a medium-term panel (Andersson et al., 2015). Therefore, the jury is still out on the impacts of the rise of organised retailing on farming communities around the world. The evidence so far is mixed, and it's an empirical question in the specific socioeconomic milieu. Also, the experiences of several developing countries show that there can be winners and losers in this process of agri-food system transformation (Reardon and Gulati, 2008). Further, literature in India is much scarcer, and hard evidence is still to come by for the policymakers to take appropriate measures to make the process more equitable. The lack of empirical evidence makes it a compelling case to study the impacts of innovations in food value chains in a dynamic framework.

1.3. Research Questions: The study examines the marketing of vegetables in the country, focusing on the emergence of innovative direct procurement systems of a host of new players, including organised retailers and several online companies and startups. Specifically, it aims to analyse the new procurement systems' impacts on farmer profitability, determinants of participation, chances of including small farmers, statewise and size category-wise variations, employment, consumption, and COVID-19 impacts. It generates a medium-term panel by resurveying earlier surveyed farmers and analyses using econometric models to control for possible endogeneity and self-selection bias to find out the net impact of participation on farmers' profitability and consumption.

i. What are the effects of market participation in these supermarket-targeted value chains on farmers' net incomes, risks faced, and technologies used? Do these modern channels help farmers increase their profits, productivity, and quality? Are there gains or tradeoffs in risk management relative to traditional markets in terms of access to credit, access to preferred supplier relationships or contracts, and transaction costs? Are there differential effects comparing men and women? Do the farmers in the north and south significantly differ in gains? Do these new market channels lead to the intensification and erosion of natural resources like land and water?
ii. What are the determinants of farmer inclusion in value chains (VCs) ending in supermarkets as retailers? Specifically, what determines whether (and on what terms) farmers market to supermarket collection centers (CCs) for produce in rural areas feeding major cities in India? How do these determinants differ from those for access to the most traditional market channel, which sells at the farm gate to a rural broker, versus a traditional-intermediate channel, such as selling directly at the mandi via a commission agent (CA)? How do these determinants differ over various retail chains' CCs and states?
iii. Is there a differentiation among vegetable trader scales and practices (such as grading, sorting, credit, market and technical information, and transaction cost) that affect small farmers' requirements for and access to quality-differentiated urban vegetable

[3]However, these studies suffer from a tiny sample size of supermarket farmers.

markets? How do these practices and relative benefits compare to those of supermarket collection centers?

iv. How do the vegetable value chains intermediated by supermarket chains versus traditional market channels (such as the vegetable mandi) differ from the perspective of prices paid for vegetables and the quality of those vegetables?

v. What role can new-age institutions like farmer-producer organisations (FPOs) play in connecting smallholders with modern marketing channels?

vi. How can modern retail spread impact household consumption and employment?

1.4. Nature and Scope of Study: Modernisation of food value chains is both a consequence and cause of development. However, this development process has some adverse consequences in small farmer-dominated developing countries (Hazell et al., 2010) and India, particularly, as it has 90.2 million farm households. These concerns are so severe that international organizations like FAO and World Bank suggested institutional and policy support suitable for a specific agro-economic and socioeconomic milieu to tide the transition out without much welfare loss (WB, 2007). On the one hand, the modernisation of value chains can bring in much-needed investments for upgrading infrastructure and are essential. On the other hand, the inclusiveness and impacts of these value chains on resource-poor farmers are issues of enormous policy relevance for rural economic growth and poverty reduction in a dualistic economy like India. The study is likely to throw open nodes of policy interventions to address issues of equity and efficiency in agricultural marketing when the country is reforming this segment. On the other hand, permission for foreign direct investment in multi-brand retail and e-commerce presents investment opportunities for experienced players worldwide. Some retail giants like Walmart, Amazon, and others are firming up investment plans (USDA, 2015).

This study can pave the way for locally popularising new impact assessment methods sweeping the Western world and, most importantly, universities in the USA. There is little expertise in India on impact assessment of agri-food system transformation with innovations, especially in the organized retail segment, and far too little with advanced econometric tools in a cross-country perspective. I have been involved in a study of the impacts of organized retailing (supermarkets) and undertook two rounds of field studies and published on organized retailing (supermarkets) in India on the income effects and inclusiveness (Rao et al., 2016; Rao, 2016; Nuthalapati et al., 2017, 2018, 2020). This pursuit must be taken forward to a higher level by bringing in dynamic analysis that can also factor in the fast-changing roles of various players in value chains with disruptive innovations.

Further, fresh produce farming is an essential subject in India, as a crucial key to agricultural diversification for risk management and income increase by small farmers (net income per acre is two to three times higher in horticulture than in grains, two times as direct-employment-creating (and more with spinoff employment). It is part of the centre's agricultural development plan, as well as that of states' agricultural diversification objectives. Second, the effect of supermarkets on fresh produce farming is a crucial subject in India and other developing countries.

On the one hand, in India, even at the stage of supermarkets' early take-off in general and in produce in particular, supermarkets' actual or potential effects already stir controversy, debate, and passions – some worried, some hopeful. There is concern that large-scale industries will gain overwhelming market power without accountability and exploit small farmers and consumers through contract farming by locking them into paying "the only game in town" for expensive, shoddy goods. There is hope that the modern food industry will reward small farmers for quality

differentiation and thus induce modernizing investment at the farm level and will prune unnecessary costs from supply chains to provide consumers with good quality food at lower prices.

1.5. Knowledge gaps: Surprisingly, despite the rapid growth of modern retail, despite the controversy surrounding modern retail's effects on farmers and consumers – both in worries and hopes- and despite the importance of policymakers' goals for modernization of horticultural supply chains and farming to take place and for consumers to access cheaper and better quality produce for nutrition - there has been little empirical research (and no statistically significant sample survey research) on India's supermarkets' effects on horticulture farmers or producer prices paid by consumers.

To our knowledge, there have been very few survey-based studies of India's supermarkets' effects on produce farmers and consumers (although there have been scores of one-off anecdotal accounts in the press and in various academic papers (See for e.g. Singh (2012); Shah (2011)). (1) The first of these studies is that of Mangala and Chengappa (2008) in Bangalore. He did an exit-interview survey of 300 consumers and a survey of 49 farmers, of which 19 farmers sold to Spencer's (supermarket chain) collection center (CC) in Hoskote (in 2004, a year after it started). In the consumer study, he did not test the hypothesis of whether, controlling for quality, prices paid for fruits and vegetables differed between supermarkets and traditional markets. Moreover, due to the tiny sample of farmers selling to the CC, he could test no hypothesis on effects on farmers or differences between strata of farmers selling to the mandi versus the CC. (2) The second of these studies is that of ICRIER in 2008 (Joseph et al., 2008), which featured a 2007 exit interview survey of 1000 consumers in various cities and 200 farmers in Hoskote near Bangalore. While the study helped explore consumer shopping habits, it did not examine consumer prices for produce in modern retail versus traditional retail (hence, in the end, segments of modern and traditional value chains for produce). Moreover, the study had a sample of only 24 supermarket CC suppliers of the 200, so no statistically significant test of the hypothesis of the impact of the CC on farmers was possible or done in the study. (3) Pritchard et al. (2010) studied the vegetable growers supplying supermarkets in Bangalore and found higher prices and revenues (Pritchard et al., 2010). This study is also based on a small sample and does not control confounding factors. All the extant research into these issues in India and developing countries rely on cross-section data that poses severe difficulties in isolating the selection bias to arrive at precise estimates of impacts. Besides, the adoption of new practices like selling to modern marketing channels requires study over the medium term at least to discern the patterns as disadoption, re-adoption, and delayed adoption, as well as non-adoption, can pose significant problems in understanding the dynamics. Our study aims to build a panel to address these issues.

An extensive field survey was conducted by this author representing all parts of the country, with 795 vegetable farmers selling to both supermarkets and traditional markets (Nuthalapati, 2016) with funding from the Indian Council of Social Science Research. This study brought out positive impacts on income, technology, and the exclusionary nature of participating in these markets for resource-poor farmers (Nuthalapati et al., 2017, 2018, 2018a). They also analysed a large number of market transactions by these farmers and concluded that direct procurement reduces the transaction costs and enables 20% higher farmgate prices (Nuthalapati et al., 2020). However, this is still a single-year study and does not provide a solid basis to come to valid conclusions on the impacts unless there is at least a medium-term panel, as argued by Barrett et al. (2012), Dedehouanou, Swinnen, and Maertens (2013) and Andersson et al., (2015).

Thus, there has not yet been a study in India that has addressed our research questions and brought statistically defensible, evidence-based research to bear. Such research is needed to inform policymakers and civil society on these issues and to inform the design of practical methods to include small farmers. We turn next to a discussion of the design of that research for our proposed project.

1.6. Sampling Methodology: The wide diffusion of organized retailing in India and significant heterogeneity in terms of agro-climatic, soil, and socioeconomic conditions in different states, any study on the impacts of organized retailing in India needs to be carried out in at least a few states to have a potential for generalization at all-India level. Moreover, the existing infrastructure and marketing channels for agricultural produce in different states are in varying levels of development. The present study undertakes a study in four states viz., the Delhi-National Capital Region, Telangana, W.Bengal, and Maharashtra, representing the country's north, south, east, and west parts. It builds on a survey conducted in the four states in 2013-14 to have a panel data set to be built up for analyzing the dynamics of participation and welfare effects.

The study focuses on these four locations and identifies the vegetable market catchment zones for the cities in respective states, viz., New Delhi, Hyderabad, Kolkata, and Mumbai. The core vegetable cultivating villages located close to the collection centres of organised retailers, such as Reliance Fresh, More, Spencer, BigBasket, Amazon, and Flipkart are selected for the study. In the selected villages, the census was collected to know who among them cultivated vegetables along with the harnessed marketing channels. Vegetable growers in the selected village will be our population universe for the study. We differentiate villages into supermarket villages and traditional marketing villages, depending on the number and proportion of vegetable growers selling to supermarket collection centres. We randomly selected ten supermarkets and five traditional market farmers from the former villages and ten traditional market villages from the later villages. To be more explicit, we define farmers selling to collection centers of organised retailers like Reliance Fresh, More, Spencer, BigBasket, Metro, Amazon, and others and processing companies directly as supermarket farmers. The traditional market farmers are those selling to conventional markets such as Mandis (State government-regulated markets), Haats, weekly markets, Rythu Bazaars, and Mother Dairy. The field surveys are conducted by well-trained field investigators using Tabs containing farm household questionnaires in soft form. I supervised field surveys in the village with a team of Research Assistants. The field surveys are supplemented by focus group discussions and village information collection on general information and marketing-related details.

The report is presented in 12 chapters. After the introduction, sample farmer characteristics, livelihood patterns, and asset ownership are given. The input utilization, marketing, costs, and returns are examined in the following chapters. The subsequent chapters analyse livestock rearing and non-farm income, employment, and household consumption. Next, agricultural services, perception of vegetable growers are brought out. We leverage panel data models to examine relative farmer welfare in the following chapter. The last chapter concludes with policy suggestions.

Chapter 2
Characteristics of Sampled Vegetable Growers

2.1.Sample farmers' distribution, activity status, age, and education

It is of crucial relevance to understand the socio-economic context of the sampled households before we analyse their vegetable cultivation, marketing, consumption, and related issue to determine the impacts of participation in modern market channels. Therefore, we present in this chapter the distribution of sampled households across study regions, religion, gender, social categories, activity status and education in the first section. The second section presents vegetable growers' ownership of land and irrigation facilities, while the third section elucidates possession of farm and non-farm assets.

The sample farmers consist of vegetable growers from 62 villages in 10 districts of all four regions of the country, viz., Haryana and Delhi, Telangana, West Bengal, and Maharashtra (Table 2.1). Among them, 42% of the farmers sell to collection centers or supermarkets, with minor variations across the states. There are more sample farmers from Telangana, as more farmers switched from supermarkets to traditional markets from the previous survey time. Therefore, new farmers are taken to have a reasonable treatment group proportion for comparison purposes. We define farmers selling to collection centres of organised retailers such as Reliance Fresh, More, Big Basket, Metro, and others as supermarket farmers. The farmers selling to conventional markets such as Mandis (regulated markets), Haats, weekly markets, Rythu Bazaars, Mother Dairy, etc, are considered traditional marketing farmers.

Table 2.1. Sample distribution across states and districts

State	Supermarket farmers (SF)	Traditional market farmers (TF)	Total sample	Districts	Villages
Delhi-NCR	69 (44)	89 (56)	158 (100)	4	13
Telangana	122 (36)	219 (64)	341 (100)	3	27
W. Bengal	82 (44)	87 (56)	168 (100)	1	9
Maharashtra	82 (49)	87 (51)	169 (100)	2	13
All-India	347 (42)	489 (58)	836 (100)	10	62

Note: Values in parenthesis indicate percentage to state total sample farmers

The sampled vegetable growers comprise mainly Hindus, with one-sixth (16%) coming from Muslim communities (Table 2.2). It is still a representative sample, given the fact that the Muslim population hovers around 15% in the country. However, the sample average of 16% Muslims is because of a large number of minority community farmers in West Bengal despite being non-existent in Maharashtra and Telangana. Around two-fifths of both groups of farmers sell to supermarkets.

Table 2.2. Distribution of religious profile across marketing channels (%)

State	Hindu			Muslim		
	SF	TF	Overall	SF	TF	Overall
Delhi-NCR	44.06 (63)	55.94 (80)	100.00 (143)	40.00 (6)	60.00 (9)	100.00 (15)
Telangana	36.20 (122)	63.80 (215)	100.00 (337)	100.00 (4)	0.00 (0)	100.00 (4)
W. Bengal	38.46 (20)	61.54 (32)	100.00 (52)	46.55 (54)	53.45 (62)	100.00 (116)
Maharashtra	48.52 (82)	51.48 (87)	100.00 (169)	0.00 (0)	0.00 (0)	0.00 (0)
All-India	40.94 (287)	59.06 (414)	100.00 (701)	51.72 (60)	55.56 (75)	100.00 (135)

Note: Values in parenthesis indicate frequency

Unfortunately, the vegetable growers sample consists of only 8% SCSTs of the total 836 farmers (Table 2.3). The share of SCSTs is much lower than the share of 25% of SCSTs in the country's population. The relatively higher capital and supervision required for growing vegetables, coupled with the knowledge intensity in production and marketing, might be deterring these disadvantaged groups from cultivating vegetables and earning higher farm incomes. Another distressing aspect is that only 24% of those SCSTs cultivating vegetables sold to supermarkets. Most socially disadvantaged groups cultivating vegetables are from Telangana state.

Table 2.3. Distribution of social profile across marketing channels (%)

State	SC		ST		BC		OC	
	SF	TF	SF	TF	SF	TF	SF	TF
Delhi-NCR	0.00 (0)	100.00 (5)	0.00 (0)	100.00 (1)	34.21 (13)	65.79 (25)	49.12 (56)	50.88 (58)
Telangana	17.31 (9)	82.69 (43)	0.00 (0)	100.00 (1)	32.48 (51)	67.52 (106)	47.33 (62)	52.67 (69)
W. Bengal	0.00 (0)	100.00 (1)	0.00 (0)	100.00 (0)	47.50 (19)	52.50 (21)	43.31 (55)	56.69 (72)
Maharashtra	50.00 (2)	50.00 (2)	0.00 (0)	100.00 (2)	46.30 (25)	53.70 (29)	50.46 (55)	49.54 (54)
All-India	17.74 (11)	82.26 (51)	0.00 (0)	100.00 (4)	37.37 (108)	62.63 (181)	47.40 (228)	52.60 (253)

Note: Values in parenthesis indicate frequency

Notwithstanding women's more prominent role in agricultural activities, less than 2% of all the randomly selected vegetable growers are women (Table 2.4). Even this limited participation arises from the few women cultivating vegetables in the state of Telangana. Limited chances of obtaining working capital and lacking knowledge in production and marketing skills prevent women from moving toward high-value crop production.

Table 2.4. Distribution of gender profile of household heads (%)

State	Male			Female		
	SF	TF	Overall	SF	TF	Overall
Delhi-NCR	43.67 (69)	56.33 (89)	100.00 (158)	0.00 (0)	0.00 (0)	0.00 (0)
Telangana	34.65 (114)	65.35 (215)	100.00 (329)	66.67 (8)	33.33 (4)	100.00 (12)
W. Bengal	44.05 (74)	55.95 (94)	100.00 (168)	0.00 (0)	0.00 (0)	0.00 (0)
Maharashtra	48.81 (82)	51.19 (86)	100.00 (168)	0.00 (0)	100.00 (1)	100.00 (1)
All-India	41.19 (339)	58.81 (484)	100.00 (823)	61.54 (8)	38.46 (5)	100.00 (13)

Note: Values in parenthesis indicate frequency

The sampled vegetable growers also work as agricultural labourers, as seen in Table 2.5. One in every five farm households works as wage labourers in agriculture, and almost the same percentage works as MGNREGA workers. Our data do not allow us to verify how many work in both activities. The data from the table also revealed that participation in local farm wage labour and MGNREGA works has plummeted from around 23% in 2015-16 to 20% in 2020-21. Within the states, farmers from West Bengal predominate farm wage work among 43% of vegetable growers, while participation in MGNREGA works is the highest in Telangana state at 35%.

Table 2.5. Percentages for heads of households working as labourers during 2020-21and 2015-16 (%)

State	2020-21			2015-16	
	Own farm	Local farm wage	MGNREGA	Local farm wage	MGNREGA
Delhi-NCR	91.14 (144)	8.86 (14)	1.27 (2)	8.86 (14)	0.63 (1)
Telangana	96.19 (328)	21.41 (73)	34.60 (118)	22.29 (76)	34.02 (116)
W. Bengal	99.40 (167)	42.86 (72)	27.38 (46)	54.17 (91)	38.10 (64)
Maharashtra	95.27 (161)	5.33 (9)	0.59 (1)	7.10 (12)	0.59 (1)
All-India	95.69 (800)	20.10 (168)	19.98 (167)	23.09 (193)	21.77 (182)

Note: Values in parenthesis indicate frequency

Non-farm activities support farm households in supplementing their incomes and in smoothening consumption, especially as the farm incomes are seasonal. There has been a debate on the number of people participating in non-farm activities among farming communities going up in recent years. Our data indicate that only 20% of the vegetable growers had at least one family member working in non-farm activities in 2020-21. This increased from 17% in 2015 to 16 (Table 2.6). Non-agricultural labour, business, and salaried jobs occupy the major share of these activities.

Table 2.6. Non-farm activity wise heads of households' distribution (for 2020-21)

Non-farm activities	State wise				Marketing channel		Overall	Overall, in 2015-16
	Delhi-NCR	Telangana	W.Bengal	Maharashtra	SF	TF		
No non-farm activity	83.54 (132)	77.42 (264)	67.86 (114)	82.25 (139)	79.83 (277)	76.07 (372)	77.63 (649)	80.02 (669)
Labour	1.27 (2)	4.69 (16)	10.12 (17)	4.14 (7)	3.75 (13)	5.93 (29)	5.02 (42)	4.31 (36)
Business/enterprise	1.90 (3)	1.47 (5)	10.71 (18)	2.96 (5)	3.46 (12)	3.89 (19)	3.71 (31)	2.87 (24)
Salary job	3.80 (6)	2.35 (8)	2.98 (5)	2.96 (5)	2.02 (7)	3.48 (17)	2.87 (24)	1.67 (14)
Dependant	2.53 (4)	3.23 (11)	0.60 (1)	0.00 (0)	2.59 (9)	1.43 (7)	1.91 (16)	1.67 (14)
Housewife	0.00 (0)	2.64 (9)	0.60 (1)	0.59 (1)	1.44 (5)	1.23 (6)	1.32 (11)	1.32 (11)
others	6.96 (11)	8.21 (28)	7.14 (12)	7.10 (12)	6.92 (24)	7.98 (39)	4.78 (40)	8.13 (68)
Overall	100.00 (158)	100.00 (341)	100.00 (168)	100.00 (169)	100.00 (347)	100.00 (489)	100.00 (836)	100.00 (836)

Note: Labour category indicates non agriculture labour, construction labour, factory worker, earth work labour and other wage labour. Business/enterprise indicates small trader (<25000), medium trader (25000-75000) and private enterprise. Salary job category indicates driver of motor vehicle, government job, home tutor, other salaried worker and NGO worker. Values in parenthesis indicate frequency

The vegetable farmers sampled are educated up to 7 years in school, 51 years old, and have a family size of five members (Table 2.7). Among them, those selling to supermarkets are significantly younger with higher levels of education, though with similar family size relative to their counterpart vegetable growers selling to traditional markets. Education level is slightly higher in Maharashtra (9 years), followed by Delhi-NCR (8 years).

Table 2.7. Average values for household size, age, and education (across marking channels)(%)

	Household size				Age of household head				Years of education (for H of HH)			
State	SF	TF	overall	t& p	SF	TF	overall	t& p	SF	TF	overall	t& p
Delhi-NCR	7 (3) (69)	7 (3) (89)	7 (3) (158)	-0.28 (0.78)	50 (13) (69)	51 (12) (89)	51 (13) (158)	-0.48 (0.63)	9 (5) (69)	8 (4) (89)	8 (5) (158)	1.16 (0.25)
Telangana	5** (2) (122)	5 (2) (219)	5 (2) (341)	2.33 (0.02)	49*** (11) (122)	52 (12) (219)	51 (12) (341)	-2.48 (0.01)	6*** (5) (122)	5 (5) (219)	5 (5) (341)	2.58 (0.01)
W.Bengal	4 (1) (74)	5 (2) (94)	4 (1) (168)	-1.47 (0.14)	47*** (12) (74)	52 (12) (94)	50 (12) (168)	-2.73 (0.01)	5 (4) (74)	6 (4) (94)	6 (4) (168)	-0.97 (0.34)
Maharashtra	5*** (2) (82)	6 (3) (87)	6 (2) (169)	-2.67 (0.01)	50** (13) (82)	54 (13) (87)	52 (13) (169)	-2.01 (0.05)	10*** (4) (82)	8 (4) (87)	9 (4) (169)	3.16 (0.00)
All-India	5 (2) (347)	5 (2) (489)	5 (2) (836)	-0.02 (0.98)	49*** (12) (347)	52 (12) (489)	51 (12) (836)	-3.77 (0.00)	7*** (5) (347)	6 (5) (489)	7 (5) (836)	3.79 (0.00)

Notes: SF means supermarket farmers, TF means traditional farmers, values within the parenthesis indicates SD and frequency (top to bottom respectively), *** indicates significant at the 1% level, ** indicates significant at the 5% level and * indicates significant at the 10% level.

The survey year being the pandemic year, we asked the households when the head of household or any member fell sick with COVID-19, and the details are presented in Table 2.8. Nearly 10% of the sampled vegetable growers got infected with the Coronavirus during the period. Most infections were in the states of Maharashtra and Telangana. It is worth mentioning that these are only manifested cases of Coronavirus, and other symptomless infections could exist. Moreover, vegetable farmers faced difficulties with the fear of disease, transport breakdowns, and lockdown effects, making it challenging to procure inputs and sell produce in the markets.

Table 2.8. Average values for number of persons died with COVID-19

State	Infected with COVID in 2020			
	SF	TF	overall	t& p
Delhi-NCR	0	1	0	-0.48
	(1)	(1)	(1)	(0.65)
	(6)	(4)	(10)	
Telangana	1	1	1	-0.04
	(1)	(1)	(1)	(0.97)
	(13)	(21)	(34)	
W.Bengal	0	0	0	.
	(0)	(1)	(1)	.
	(1)	(5)	(6)	
Maharashtra	1	1	1	0.45
	(2)	(1)	(1)	(0.65)
	(15)	(17)	(32)	
All-India	1	1	1	0.22
	(1)	(1)	(1)	(0.82)
	(35)	(47)	(82)	

Notes: SF means supermarket farmers, TF means traditional farmers, values within the parenthesis indicates SD and frequency (top to bottom respectively), *** indicates significant at the 1% level, ** indicates significant at the 5% level and * indicates significant at the 10% level.

As we try to see systemic differences in profitability across marketing channels, it would be helpful to know the resource structure and governmental support received by the vegetable growers in the study area. The public distribution system is the foremost of such government support for poor households. Entitlements from the PDS depend on the kind of cards the household receives. The poorest of the poor receive the Antyodaya Anna Yojana (AAY) card, the poor get a Below Poverty Line (BPL) card, and the relatively better off get the Above Poverty Line (APL) card. Data from the field show that 66% received BPL and AAY cards, while 30% got APL cards (Table 2.9). It is striking that sample vegetable growers did not have APL cards in Telangana and West Bengal, indicating poverty among them. Further, 40% of West Bengal farmers have AAY cards indicating extreme poverty. The supermarket farmers have relatively more APL cards on the whole.

Table 2.9. Types of ration cards for vegetable farmers across states (%)

Type	Delhi-NCR	Telangana	W.Bengal	Maharashtra	SF	TF	Overall
AAY	0.00	0.29	39.29	0.00	6.34	9.20	8.01
	(0)	(1)	(66)	(0)	(22)	(45)	(67)
BPL	11.39	98.24	59.52	18.93	55.04	60.12	58.01
	(18)	(335)	(100)	(32)	(191)	(294)	(485)
APL	71.52	0.00	1.19	81.07	33.43	27.81	30.14
	(113)	(0)	(2)	(137)	(116)	(136)	(252)
Do not have a ration card	17.09	1.47	0.00	0.00	5.19	2.86	3.83
	(27)	(5)	(0)	(0)	(18)	(14)	(32)
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	(158)	(341)	(168)	(169)	(347)	(489)	(836)

Note: Values in parenthesis indicate frequency, SF means supermarket farmers and TF means traditional farmers

2.2. Ownership of Land and Irrigation: All the basic farm decisions on what, when, and how to produce and where to market are determined to a large extent by the asset ownership of the farmers in question. Therefore, we look at the ownership of land and farm and non-farm assets in this section. Later, livestock ownership is analysed in a separate section, along with costs and returns from animal husbandry.

First, we look at the land ownership pattern among the sampled vegetable growers (Table 2.10). We find that 94% possess some land with statewise variations. One-fifth of the farmers from West Bengal do not own land, and 60% lease land from neighbouring farmers to cultivate vegetables and other crops. One-sixth of these farmers from West Bengal also keep their lands

fallow due to lack of drainage and other issues. Among the sampled vegetable growers, 28% leased in land overall, indicating an active lease market in the study areas.

Table 2.10. Information on land during 2020-21 across states (%)

State	Owned land		Leased-in land		Leased-out land		Fallow land	
	Number owning land	Percent to total farmers	Number leasing in land	Percent to total farmers	Number leasing out land	Percent to total farmers	Number keeping land fallow	Percent to total farmers
Delhi-NCR	143	90.51	82	51.90	4	2.80	2	1.40
Telangana	338	99.12	46	13.49	6	1.78	31	9.20
W. Bengal	135	80.36	101	60.12	9	6.62	22	16.06
Maharashtra	168	99.41	4	2.37	4	2.38	18	10.71
All-India	784	93.78	233	27.87	23	2.93	73	9.30

Notes: SF means supermarket farmers, TF means traditional farmers, values within the parenthesis indicates frequency

The sampled farmers are basically smallholders with a meagre landholding of 3.17 acres overall, much smaller in West Bengal with small pieces of land of 0.51 acres per farmer (Table 2.11). We do not observe significant differences across farmers selling to different marketing channels except in the Maharashtra state, where farmers selling to supermarkets have slightly higher land ownership. Both marginal and socially disadvantaged groups of farmers possess smaller landholdings, except in West Bengal, where everyone has tiny landholdings.

Table 2.11. Total area owned by the respondents in 2020-21 (in acres)

	Market channels		Size categories		Social categories		
State	SF	TF	MF	Others	SCST	Others	Overall
Delhi-NCR	4.42	3.86	1.49***	4.75	2.50	4.16	4.11
	(4.96)	(3.7	(0.67)	(4.58)	(1.41)	(4.37)	(4.32)
	(64)	(79)	(28)	(115)	(4)	(139)	(143)
Telangana	3.83	3.62	1.61***	5.03	2.55***	3.91	3.69
	(2.77)	(3.6	(0.72)	(3.67)	(2.12)	(3.49)	(3.34)
	(120)	(218	(132)	(206)	(53)	(285)	(338)
W.Bengal	0.49	0.53	0.51	0.75	0.07	0.52	0.51
	(0.65)	(0.4	(0.54)	(1.06)	(0.00)	(0.55)	(0.55)
	(60)	(76)	(134)	(2)	(1)	(135)	(136)
Maharashtra	3.97**	3.00	1.68***	5.17	1.92	3.52	3.47
	(3.78)	(2.2	(0.81)	(3.50)	(1.59)	(3.13)	(3.10)
	(81)	(87)	(82)	(86)	(6)	(162)	(168)
All-India	3.37	3.03	1.22***	4.96	2.45*	3.23	3.17
	(3.62)	(3.3	(0.87)	(3.91)	(2.03)	(3.53)	(3.44)
	(325)	(460	(376)	(409)	(64)	(721)	(785)

Note: SF means supermarket farmers, TF means traditional farmers,MF means marginal farmers
SCST means farmers belongs to SC or ST category, values within the parenthesis indicates SD and frequency(top to bottom respectively),
***, ** and * indicates significant the 1%, 5% and 10% level respectively.

Table 2.12. Information on leased-in area in the year 2020-21 (in acres)

	Market channels		Size categories		Social categories		
State	SF	TF	Marginal farmers	Others	SCST	Others	Overall
Delhi-NCR	6.05	5.46	1.60***	6.52	1.83	5.83	5.68
	(5.96)	(4.44)	(0.54)	(5.15)	(0.29)	(5.08)	(5.04)
	(31)	(51)	(14)	(68)	(3)	(79)	(82)
Telangana	3.78	2.82	1.16***	3.65	1.75	3.36	3.22
	(3.18)	(2.10)	(0.44)	(2.67)	(1.19)	(2.67)	(2.61)
	(19)	(27)	(8)	(38)	(4)	(42)	(46)
W.Bengal	0.58	0.54	0.52***	2.75	0.33	0.56	0.56
	(0.57)	(0.36)	(0.36)	(0.82)	(0.00)	(0.49)	(0.48)
	(54)	(47)	(99)	(2)	(1)	(100)	(101)
Maharashtra	3.67	2.00	0.00	3.25	0.00	3.25	3.25
	(2.89)	(0.00)	(0)	(2.50)	(0)	(2.50)	(2.50)
	(3)	(1)	(0)	(4)	(0)	(4)	(4)
All-India	2.82	3.03	0.69***	5.36	1.60	2.98	2.93
	(4.23)	(3.69)	(1)	(4.54)	(0.95)	(4.00)	(3.94)
	(107)	(126)	(121)	(112)	(8)	(225)	(233)

Note: SF means supermarket farmers, TF means traditional farmers,
SCST means farmers belongs to SC or ST category, values within the parenthesis indicates SD and frequency
(Top to bottom respectively), ***, ** and * indicates significant the 1%, 5% and 10% level respectively.

The vegetable growers in the study area also leased 2.93 acres of land for cultivation in addition to the owned land (Table 2.12). Apart from owning a small landholding, those in West Bengal lease in only 0.51 acres on average. The smallholder cultivators in the state are too small, with far fewer resources to lease in and cultivate by investing the required sums of money. The marginal farmers also lease in only 0.69 acres of land, which is significantly lower.

Table 2.13. Information on total operated area under all crops (2020-21) (in acres)

	All crops					Vegetables				
	Market channels		Size categories			Market channels		Size categories		
State	SF	TF	MF	Others	Overall	SF	TF	MF	Others	Overall
Delhi-NCR	12.73	13.43	3.62***	16.13	13.12	5.53	5.4	2.22***	6.48	5.45
	(11.52)	(11.47)	(1.48)	(11.60)	(11.46)	(5.16)	(5.60)	(1.16)	(5.79)	(5.39)
	(69)	(89)	(38)	(120)	(158)	(69)	(89)	(38)	(120)	(158)
	6.46**	5.32	2.46***	7.81	5.72	3.29***	2.4	1.37***	3.58	2.72
	(4.69)	(4.44)	(1.08)	(4.71)	(4.56)	(3.04)	(2.35)	(1.01)	(2.99)	(2.64)
Telangana	(122)	(219)	(133)	(208)	(341)	(122)	(219)	(133)	(208)	(341)
	1.84	1.29	1.49***	5.17	1.53	1.57****	0.76	1.07***	5.17	1.12
	(3.21)	(0.90)	(2.22)	(0.24)	(2.24)	(3.18)	(0.56)	(2.15)	(0.24)	(2018)
W.Bengal	(74)	(94)	(166)	(2)	(168)	(74)	(94)	(166)	(2)	(168)
	5.95***	4.26	2.65***	7.36	5.08	3.17	2.1	1.57***	3.61	2.62
	(4.98)	(2.77)	(1.14)	(4.50)	(4.07)	(2.35)	(1.67)	(0.93)	(2.38)	(2.09)
Maharashtra	(82)	(87)	(82)	(87)	(169)	(82)	(87)	(82)	(87)	(169)
	6.6	5.83	2.22***	10.1	6.15	3.34***	2.58	1.37***	4.43	2.89
All-India	(7.36)	(7.00)	(1.79)	(8.28)	(7.16)	(3.68)	(3.29)	(1.59)	(4.12)	(3.47)
	(347)	(489)	(419)	(417)	(836)	(347)	(489)	(419)	(417)	(836)

Note: SF means supermarket farmers, TF means traditional farmers,MF means marginal farmers,
SCST means farmers belongs to SC or ST category, values within the parenthesis indicate SD and frequency(top to bottom respectively),
***, ** and * indicates significant the 1%, 5% and 10% level respectively.

We then look at the total operated area, which is a sum of owned and leased in and subtracted by leased out and fallow land. Because this is the unit of cultivation irrespective of the size of land ownership, we find that the sample farmers have a total operated area of 6.15 acres under all crops and slightly less than half (47%) of those under vegetables (Table 2.13). Interestingly, supermarket farmers cultivate significantly more land under vegetables even though their total operated area is statistically the same. The share of vegetable cultivation is huge in West Bengal, with 73% of their total operated area under vegetables and plummets as we move to Telangana, Maharashtra, and Delhi-NCR. A similar conclusion can be drawn for the marginal farmers with 62% of the share of vegetables in the operated area. Understandably, the profitability of

vegetables matters more to farmers in West Bengal and Telangana and marginal farmers with less than one hectare of land.

Table 2.14. Information on net cultivated area (2020-2) (in acres)

	Marketing channel		Farm size holding		Social categories		
State	SF	TF	MF	Other	SCST	Other	Overall
Delhi-NCR	6.58	6.41	1.66***	8.01	2.58*	6.64	6.48
	(6.47)	(5.29)	(0.52)	(5.90)	(1.07)	(5.87)	(5.82)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)
Telangana	4.09	3.80	1.51***	5.44	2.50***	4.16	3.91
	(3.17)	(3.58)	(0.53)	(3.63)	(2.08)	(3.58)	(3.44)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)
W.Bengal	0.75	0.63	0.65***	3.50	0.40	0.68	0.68
	(0.63)	(0.43)	(0.43)	(0.24)	(0.00)	(0.53)	(0.53)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)
Maharashtra	3.94***	2.76	1.47***	5.09	1.75	3.39	3.33
	(3.76)	(2.08)	(0.55)	(3.40)	(1.70)	(3.09)	(3.06)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)
All-India	3.84	3.48	1.18***	6.10	2.41***	3.73	3.63
	(4.32)	(3.86)	(0.66)	(4.52)	(1.97)	(4.17)	(4.06)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)

Note: SF means supermarket farmers, TF means traditional farmers,MF means marginal farmers,
SCST means farmers belongs to SC or ST category, values within the parenthesis indicates SD and frequency(top to bottom respectively),
***, ** and * indicates significant the 1%, 5% and 10% level respectively.

Table 2.15. Frequency and percentages of respondents across farm-size holding(%)

State	Marginal (0.00 to 2.49)	Others (2.50 & above)	Small (2.50 - 4.99)	Others (Above 4.99)	Combined[#] (Below 4.99)	Others (Above 5.00)	Overall
Delhi-NCR	38	120	37	121	75	83	158
	(24.05)	(75.95)	(23.42)	(76.58)	(47.47)	(52.53)	
Telangana	133	208	110	231	243	98	341
	(39.00)	(61.00)	(32.26)	(67.74)	(71.26)	(28.74)	
W Bengal	166	2	2	166	168	0	168
	(98.81)	(1.19)	(1.19)	(98.81)	(100.00)	(0.00)	
Maharashtra	82	87	51	118	133	36	169
	(48.52)	(51.48)	(30.18)	(69.82)	(78.70)	(21.30)	
All-India	419	417	200	636	619	217	836
	(50.12)	(49.88)	(23.92)	(76.08)	(74.04)	(25.96)	

Note: [#]Combine indicates sum of marginal and small farmers. Values in parenthesis indicate percentages.

To understand the numbers of smallholders in the sample, we stratify them into marginal (<2.5 acres) and small farmer (2.5-5.00 acres) categories (Table 2.14& 2.15). We take the standard Indian definition of those with less than one hectare of land as marginal farmers and those with less than two hectares as small farmers. Three-fourths (74%) of the sample farmers are small, and 68% of the small farmers are marginal farmers. This situation mirrors the small farmer-dominated character of Indian agriculture, with nearly 80% being small. In that sense, the sample is representative of the country's agriculture. Our sample farmers in West Bengal are marginal farmers with a share of 99%.

Table 2.16. Percentage of the irrigated area to operated area under vegetables (2020-21) (%)

	Marketing channel		Farm size holding		Social category		
State	SF	TF	MF	Others	SCST	Others	Overall
Delhi-NCR	100.00	100.00	100.00*	100.00	100.00	100.00	100.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)
Telangana	96.59***	88.21	92.36	90.47	86.52	92.07	91.21
	(16.52)	(31.37)	(26.47)	(27.83)	(34.13)	(25.81)	(27.28)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)
W.Bengal	100.00	99.1	99.49	100.00	100.00	99.49	99.5
	(0.00)	(6.25)	(4.71)	(0.00)	(0.00)	(4.70)	(4.69)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)
Maharashtra	99.39	98.44	98.17	99.59	100.00	98.86	98.9
	(5.52)	(11.33)	(12.29)	(3.78)	(0.00)	(9.14)	(8.98)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)
All-India	98.66***	94.27	97.01	95.16	89.18***	96.68	96.09
	(10.25)	(22.36)	(16.42)	(20.26)	(31.00)	(16.85)	(18.45)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)

Note: SF means supermarket farmers, TF means traditional farmers, MF means marginal farmers, SCST means farmers belongs to SC or ST category, values within the parenthesis indicates SD and frequency (Top to bottom respectively), ***, ** and * indicates significant the 1%, 5% and 10% level respectively.

The irrigation coverage for the total operated area is high at 96% and varies significantly across marketing channels (Table 2.16). The farmers selling to supermarkets have a higher share of their total operated area under irrigation. Much of this difference emanates from Telangana state, where supermarket farmers have 97% of the irrigated area compared to only 88% for the traditional farmers. Interestingly, marginal farmers in vegetable cultivation also have similar levels of irrigation coverage.

2.3. Ownership of Farm and Non-Farm Assets: In order to understand the ownership of farm and non-farm assets, primary data were collected from 836 randomly selected farmer households. This section highlights the average value and percentage distribution of farm and non-farm assets across farmers of various marketing channels in four states and at all India levels.

Table 2.17 Average total value of the assets across marketing channels (in ₹)

State	SF	TF	Overall	t & p
Delhi-NCR	814585	629656	710416	-1.32
	(1062371)	(686496)	(872614)	(0.19)
	(69)	(89)	(158)	
Telangana	391686***	250764	301182	-3.17***
	(499201)	(320454)	(398881)	(0.00)
	(122)	(219)	(341)	
W.Bengal	74945	62478	67969	-0.85
	(81403.9)	(103723)	(94480)	(0.40)
	(74)	(94)	(168)	
Maharashtra	702986	543380	620822	-1.35
	(840974)	(696114)	(771652)	(0.18)
	(82)	(87)	(169)	
All-India	481795***	335591	396276	-3.38***
	(740184)	(509284)	(619518)	(0.00)
	(347)	(489)	(836)	

Note: SF means supermarket farmers, TF means traditional farmers, values within the parenthesis indicates SD and frequency (top to bottom respectively),
*** indicates significant at the 5% and * indicates significant at the 10% level

For all India and Telangana state, supermarket farmers possess significantly higher values for total value of assets than traditional farmers (Table 2.17). Meanwhile, in the remaining states, supermarket farmers report a similar value for the total value of assets to traditional farmers. Overall, Delhi-NCR farmers have the highest asset values, followed by Maharashtra and

Telangana states, respectively. The lowest level of assets in West Bengal shows the resource-poor status of the vegetable growers. On the other hand, farmers in the Delhi-NCR and Maharashtra have almost double the asset value of those from the south.

The average total value of assets across farm-size holdings is shown in Table 2.18. It is indicated from the table that for all India and selected states (except West Bengal), marginal farmers were observed with significantly lower values for total value of assets than large farmers. The marginal farmers in West Bengal state possessed non-significantly lower values for total value of assets (₹67177) than other farmers (₹133785). West Bengal state has no large farmers. Large farmers in all of India and selected states (except West Bengal) showed significantly higher values for the total value of assets than other farmers.

Table 2.18. Average total value of the assets across farm size holdings (in ₹)

	Marginal vs others		Large vs small farmers	
State	Marginal farmer	Others	LF	Others
Delhi-NCR	252638***	855379	1005904***	383409
	(337871)	(938619)	(1060388)	(404016)
	(38)	(120)	(83)	(75)
Telangana	174295***	382317	422427***	252285
	(189719)	(470555)	(537180)	(315468)
	(133)	(208)	(98)	(243)
W.Bengal	67177	133785	.	67969
	(94739.9)	(31133.9)	.	(94480)
	(166)	(2)	(0)	(168)
Maharashtra	358763***	867820	1346748***	424331
	(474580)	(907672)	(1058157)	(527572)
	(82)	(87)	(36)	(133)
All-India	175063***	618550	798944***	255115
	(283634)	(768587)	(932027)	(371566)
	(419)	(417)	(217)	(619)

Note: LF means large farmers, values within parenthesis indicates SD and frequency (top to bottom respectively), *** indicates significant at the 5% and * indicates significant at the 10% level

Table 2.19. Average total value of the assets across social categories (in ₹)

State	SC/ST	Others	Overall	t & p
Delhi-NCR	414720	722088	710416	0.85
	(378385)	(885076)	(872614)	(0.40)
	(6)	(152)	(158)	
Telangana	160078	327149	301182	2.83***
	(158467)	(423774)	(398881)	(0.00)
	(53)	(288)	(341)	
W.Bengal	29270	68201	67969	
	(0)	(94716.2)	(94480)	
	(1)	(167)	(168)	
Maharashtra	346570	630917	620822	0.89
	(325299)	(781886)	(771652)	(0.38)
	(6)	(163)	(169)	
All-India	198199	413254	396276	2.72***
	(217316)	(639605)	(619518)	(0.01)
	(66)	(770)	(836)	

Note: SCST means farmers belongs to SC or ST category, other means farmers belong to OC or OBC or remaining categories, values within the parenthesis indicates SD and frequency (top to bottom respectively), *** indicates significant at the 5% and * indicates significant at the 10% level

Table 2.19 reveals that SC/ST category farmers in all of India and Telangana state have significantly lower values for the total value of assets than other category farmers. Note that West Bengal state has reported with a single SC/ST category farmer, so a t-test is not possible.

Chapter 3
Expenditure on Intermediate Inputs for Agricultural Production

Vegetable cultivation is capital-intensive and knowledge-intensive in production, nutrient, pest, and weed management, apart from labour utilization. While efficient management of input use leads to resource use efficiency in production, it also can catapult higher yields and profits (Dutta and Dhar, 2023). Furthermore, their findings indicate that a higher usage of these inputs leads to a corresponding rise in agricultural income. In this chapter, we examine the input use pattern of vegetable growers in vegetables vis-à-vis all crop averages and across marketing channels in different states. We analyse for any systemic differences between that selling to supermarkets and traditional markets regarding the use of seeds, irrigation, manures and fertilizers, and pesticides and herbicides. Employment creation using hired labour and family labour are dealt with in a subsequent chapter in detail. The expenditure on seeds, irrigation and other items are analysed in the first section, followed by examination of vegetable growers spending on manures and fertilisers and chemicals (Pesticides and herbicides) in the second and third section, respectively. The fourth section presents details of expenditures on machinery use and associated monetary value.

3.1. Expenditure on seed, irrigation, and other items

This section aims to comprehensively examine the expenditures incurred by farmers on seeds, irrigation, repair and maintenance, crop support, and other miscellaneous items. The insights derived from this analysis will prove valuable in comprehending the economics of agriculture and the strategies farmers implement to address the difficulties they encounter.

Table 3.1. Information on seed expenditure across marketing channels (in ₹)

	All-crops						Vegetables					
	Total expenditure			Per acre expenditure			Total expenditure			Per acre expenditure		
State	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall
Delhi-NCR	61456	43751	51483	4608**	3571	4024	41414	30855	35466	8369**	5939	7000
	(114124)	(44172)	(82537)	(3393)	(2621)	(3017)	(68932)	(39625)	(54458)	(7757)	(5418)	(6631)
	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)
Telangana	26951**	20967	23108	4818	4372	4531	20028***	14069	16201	7092**	6094	6451
	(22160)	(22038)	(22235)	(4091)	(3421)	(3675)	(17366)	(15265)	(16276)	(5301)	(3441)	(4221)
	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)
W.Bengal	10119***	6998	8373	7466*	6186	6750	9741***	6515	7936	8948	9418	9211
	(7818)	(5608)	(6830)	(4809)	(4101)	(4459)	(7837)	(5439)	(6775)	(5629)	(5622)	(5613)
	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)
Maharashtra	48564*	35866	42027	8100	9103	8617	26842*	20810	23737	8975	10378	9697
	(55160)	(27331)	(43472)	(6161)	(5804)	(5983)	(24121)	(16478)	(20704)	(7637)	(5181)	(6508)
	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)
All-India	35330***	25080	29334	6116**	5417	5707	23697***	16871	19704	8187*	7467	7766
	(61603)	(29349)	(45841)	(4925)	(4388)	(4628)	(36053)	(22435)	(29053)	(6534)	(4985)	(5687)
	(347)	(489)	(836)	(347)	(489)	(836)	(347)	(489)	(836)	(347)	(489)	(836)

Note: SF means supermarket farmers, TF means traditional farmers, values within the parenthesis indicates SD and frequency (top to bottom respectively), ***, ** and * indicates significant at the 1%, 5% and 10% level, respectively.

The total and per acre expenditure presented in Table 3.1 reveals that farmers selling both markets spend more on seeds for vegetable cultivation than all crop average. The overall expenditure on seeds for vegetable cultivation was 36% higher than that for all crops. Further, supermarket sellers outspend traditional market farmers for seeds for the unit land area in the sample and Delhi-NCR and Telangana. Elsewhere, Rao and Qaim (2011) reported similar findings of 31% higher spending by supermarket farmers. The disparity in seed costs can be attributed to the sourcing of seeds, which is in line with Rao et al. (2012). Traditional channel suppliers predominantly obtain seeds from informal sources, which are inexpensive but not

treated or cleaned to protect against pests and diseases. In contrast, supermarket farmers source their seeds from formal sources, which are washed, treated, and stored in controlled conditions. This results in a significant difference in seed costs between the two groups of farmers.

Table 3.2. Information on irrigation cost across marketing channels (in ₹)

	All-crops						Vegetables					
	Total expenditure			Per acre expenditure			Total expenditure			Per acre expenditure		
State	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall
Delhi-NCR	17308**	11398	13979	2052	1543	1766	8546**	5158	6638	2241	1665	1917
	(18645)	(13402)	(16121)	(2474)	(2547)	(2520)	(12371)	(6865)	(9774)	(3780)	(2727)	(3231)
	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)
Telangana	444***	369	396	104	111	108	282*	244	258	158	160	159
	(236)	(192)	(212)	(92)	(107)	(102)	(193)	(165)	(176)	(301)	(162)	(221)
	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)
W.Bengal	1092	1437	1285	504	617	567	862	935	903	527	653	598
	(3757)	(4317)	(4072)	(1722)	(1779)	(1750)	(3011)	(3265)	(3147)	(1763)	(1845)	(1805)
	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)
Maharashtra	22580**	16175	19283	4415	4313	4362	12755***	8447	10537	4510	4641	4578
	(26298)	(13622)	(20946)	(3266)	(2594)	(2931)	(14045)	(7674)	(11398)	(3215)	(3236)	(3217)
	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)
All-India	9166***	5394	6960	1595**	1217	1374	4996***	2731	3671	1679*	1326	1473
	(18162)	(10503)	(14304)	(2701)	(2305)	(2482)	(10318)	(5587)	(7975)	(2996)	(2554)	(2750)
	(347)	(489)	(836)	(347)	(489)	(836)	(347)	(489)	(836)	(347)	(489)	(836)

Note: SF means supermarket farmers, TF means traditional farmers, values within the parenthesis indicates SD and frequency (Top to bottom respectively), ***, ** and * indicates significant at the 1%, 5% and 10% level, respectively.

The cost of irrigation encompasses the expenditures incurred to provide water using electricity and diesel. A comparison between supermarkets and traditional farmers reveals a significant increase in the spending on irrigation for cultivating all crops and vegetables at the all-India level (Table 3.2). Our analysis shows that supermarket farmers incur 27% higher expenditure per acre on irrigation facilities than traditional farmers for vegetable cultivation and 31% higher spending per acre for all-crops cultivation.

The Maharashtra state farmers were found to have incurred 2.11 times higher expenditures on irrigation per acre for vegetable cultivation than the average expenditure throughout India. This variation in spending was attributed to the fact that each farmer had their own irrigation motor facility and was charged for electricity based on the motor's discharge capacity, measured in horsepower. Farmers incurred electricity charges during all seasons, including *kharif*, *rabi*, and summer, but the facility was utilized only during the rabi and summer seasons. They relied on water from the Godavari canal for irrigation for the remaining seasons. According to Hernandez *et al*. (2007), the utilization of irrigation is significantly higher among supermarket-channel farms.

The electricity consumption in the agriculture sector is estimated, on an annual basis, to receive subsidies from the state government. The Maharashtra Electricity Regulatory Commission has established a norm of 1,093 kWh/HP/annum for the financial year 2018-19. In Haryana, the energy consumption of the previous year is used as a reference, with a 16% loss accounted for, to determine the energy available at the tube well end (Sawant and Hegde, 2022).

Table 3.3. Information on water purchased cost across marketing channels (in ₹)

	All-crops						Vegetables					
	Total expenditure			Per acre expenditure			Total expenditure			Per acre expenditure		
State	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall
Delhi-NCR	211	465	354	78	45	59	176	301	246	120	42	76
	(1090)	(2374)	(1921)	(561)	(233)	(409)	(1029)	(1769)	(1489)	(906)	(232)	(623)
	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)
Telangana	21	108	77	3	53	35	0	49	31	0	45	29
	(226)	(840)	(687)	(28)	(459)	(368)	(1)	(463)	(372)	(1)	(455)	(365)
	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)
W.Bengal	4849	4161	4464	3510*	4363	3987	4370**	2856	3523	4026	5064	4607
	(5098)	(3835)	(4435)	(2340)	(3955)	(3359)	(5060)	(2826)	(4026)	(3412)	(4755)	(4236)
	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)
Maharashtra	237**	25	128	42*	10	25	165**	8	84	39**	4	21
	(854)	(177)	(616)	(146)	(65)	(112)	(658)	(75)	(466)	(155)	(38)	(112)
	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)
All-India	1139	937	1021	775	872	832	**1006****	627	784	892	1002	956
	(3107)	(2577)	(2809)	(1805)	(2448)	(2203)	**(2965)**	(1838)	(2378)	(2301)	(2889)	(2660)
	(347)	(489)	(836)	(347)	(489)	(836)	**(347)**	(489)	(836)	(347)	(489)	(836)

Note: SF means supermarket farmers, TF means traditional farmers, values within the parenthesis indicates SD and frequency (top to bottom respectively), ***, ** and * indicates significant at the 1%, 5% and 10% level, respectively.

Table 3.3 presents the results on the expenditure incurred by farmers to purchase irrigation water from neighboring farmers or tractor-based water tank owners to mitigate the impact of prolonged dry spells on crop production. Of the 836 sampled farmers, 20% reported having purchased water for vegetable cultivation, with 46% being supermarket farmers and 54% being traditional farmers. There is No significant difference between supermarket and traditional farmers in terms of expenditure per acre on water purchase for all-crop and vegetable cultivation at the all-India level.

Table 3.4. Information on repair and maintenance expenditure across marketing channels (in ₹)

	All-crops						Vegetables					
	Total expenditure			Per acre expenditure			Total expenditure			Per acre expenditure		
State	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall
Delhi-NCR	14194***	7875	10634	1618***	893	1209	6209***	3130	4475	1619**	907	1218
	(15580)	(8320)	(12402)	(2429)	(1154)	(1853)	(8672)	(3224)	(6383)	(2430)	(1152)	(1851)
	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)
Telangana	8254***	6115	6880	1649	1698	1681	4359***	3065	3528	1859**	1885	1876
	(7444)	(6466)	(6898)	(1418)	(2169)	(1932)	(4392)	(3702)	(4005)	(1691)	(2417)	(2182)
	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)
W.Bengal	2020	2109	2070	1710	1974	1858	1696	1361	1508	1713	1999	1873
	(1678)	(2368)	(2087)	(1424)	(1590)	(1520)	(1617)	(1921)	(1796)	(1422)	(1595)	(1523)
	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)
Maharashtra	7341	6818	7072	1524	1909	1722	4676	3281	3958	1544	1887	1721
	(10356)	(6596)	(8605)	(1452)	(1826)	(1661)	(8128)	(3537)	(6225)	(1443)	(1798)	(1640)
	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)
All-India	7890***	5790	6662	1626	1642	1636	4234***	2788	3388	1706	1729	1720
	(10402)	(6598)	(8447)	(1670)	(1884)	(1797)	(6305)	(3376)	(4862)	(1758)	(2014)	(1911)
	(347)	(489)	(836)	(347)	(489)	(836)	(347)	(489)	(836)	(347)	(489)	(836)

Note: SF means supermarket farmers, TF means traditional farmers, values within the parenthesis indicates SD and frequency (Top to bottom respectively), ***, ** and * indicates significant at the 1%, 5% and 10% level, respectively.

Table 3.4 presents the expenditures incurred for repairing and maintaining all implements and farm buildings. As seen from the table, there is no significant difference between the per acre expenditure on repair and maintenance by supermarkets and traditional market farmers for all crops and vegetables. However, a significant difference exists between the per acre expenditure on repair and maintenance by supermarket farmers in Delhi-NCR and Telangana for vegetable cultivation relative to traditional marketing farmers.

Table 3.5. Information on cost of plastic ground across marketing channels (in ₹)

State	All-crops						Vegetables					
	Total expenditure			Per acre expenditure			Total expenditure			Per acre expenditure		
	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall
Delhi-NCR	710	281	468	85	15	45	609*	34	285	100	5	46
	(3396)	(2350)	(2852)	(553)	(130)	(379)	(3309)	(318)	(2209)	(574)	(45)	(382)
	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)
Telangana	2107**	1005	1400	431**	197	281	2107**	1005	1400	643*	341	449
	(5643)	(3388)	(4356)	(1152)	(684)	(886)	(5643)	(3388)	(4356)	(1783)	(1223)	(1453)
	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)
W.Bengal	4	0	2	6	0	3	4	0	2	6	0	3
	(34)	(0)	(22)	(48)	(0)	(32)	(34)	(0)	(22)	(48)	(0)	(32)
	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)
Maharashtra	573	543	558	96	102	99	573	543	558	288	170	227
	(2315)	(2092)	(2196)	(441)	(382)	(411)	(2315)	(2092)	(2196)	(1624)	(633)	(1216)
	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)
All-India	1018*	598	773	192*	109	144	998**	553	738	315*	184	238
	(3920)	(2657)	(3246)	(776)	(495)	(628)	(3907)	(2473)	(3154)	(1365)	(873)	(1105)
	(347)	(489)	(836)	(347)	(489)	(836)	(347)	(489)	(836)	(347)	(489)	(836)

Note: SF means supermarket farmers, TF means traditional farmers, values within the parenthesis indicates SD and frequency (top to bottom respectively), ***, ** and * indicates significant at the 1%, 5% and 10% level, respectively.

The harnessing plastic ground cover is used as mulch to manage weeds and conserve soil moisture; vegetable farmers can benefit more from it. The sample vegetable growers have spent 65% more per acre on plastic mulch for vegetable cultivation than all crops (Table 3.5). The supermarket-selling farmers have harnessed mulching more by spending around three-fourths more than their counterpart farmers selling to traditional markets. The utilization of plastic mulch was found to be the highest in the states of Telangana and Maharashtra, whereas its usage was limited in the states of West Bengal and Delhi-NCR. This indicates better technology adoption in the Maharashtra and Telangana states.

Table 3.6. Expenditure on crop support, net, fence *etc*. across marketing channels (in ₹)

State	All-crops						Vegetables					
	Total expenditure			Per acre expenditure			Total expenditure			Per acre expenditure		
	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall
Delhi-NCR	635	972	825	101	137	121	635	972	825	137	247	199
	(3198)	(4433)	(3933)	(527)	(659)	(603)	(3198)	(4433)	(3933)	(599)	(1109)	(921)
	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)
Telangana	1661**	552	949	322	148	210	1661**	526	932	450	275	338
	(6838)	(2537)	(4588)	(1406)	(628)	(981)	(6838)	(2503)	(4577)	(1682)	(1140)	(1359)
	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)
W.Bengal	5260***	2894	3936	4705**	3081	3797	5260***	2894	3936	5557*	4229	4814
	(4294)	(3238)	(3910)	(4678)	(3964)	(4356)	(4294)	(3238)	(3910)	(5009)	(4761)	(4902)
	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)
Maharashtra	3379**	1104	2208	670	328	494	2733***	644	1658	1213***	199	691
	(10005)	(3981)	(7594)	(1929)	(1574)	(1759)	(7314)	(2625)	(5515)	(3504)	(762)	(2544)
	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)
All-India	2630***	1177	1780	1295***	742	971	2478***	1083	1662	1657***	1017	1282
	(6959)	(3459)	(5251)	(3071)	(2235)	(2627)	(6112)	(3219)	(4691)	(3674)	(2773)	(3192)
	(347)	(489)	(836)	(347)	(489)	(836)	(347)	(489)	(836)	(347)	(489)	(836)

Note: SF means supermarket farmers, TF means traditional farmers, values within the parenthesis indicates SD and frequency (Top to bottom respectively), ***, ** and * indicates significant at the 1%, 5% and 10% level, respectively.

Many vegetables need support in the form of pandals in case of creepers like bottle gourd, bitter gourd, beans and so on. And for plants like tomato, chillies and others, support is needed so that they do not fall on the ground making them susceptible to submergence damage. It is practiced with varying degrees by the vegetable growers in the study areas. The cost incurred for crop support is 32% higher than in case of vegetable crops (Table 3.6). Modern market selling farmers spend significantly more on this practice in the sample as a whole and particularly in Maharashtra and West Bengal. Furthermore, it is notable that supermarket farmers incurred 63% higher expenditure per acre on crop support than traditional farmers to produce quality vegetables in all-India.

Marginal farmers and high pay off inputs: How do marginal farmers manage agricultural practices, especially when there is a need for higher spending for modern high pay-off inputs? As examined in the previous chapter, marginal farmers operate relatively smaller holdings. This obviously reduces their overall spending for inputs compared to other farmers. But the point to be analysed is the per acre spending and how it varies. We look at this in the next few tables.

Table 3.7. Information on seed expenditure across farm size holdings (in ₹)

	All-crops						Vegetables					
	Total expenditure			Per acre expenditure			Total expenditure			Per acre expenditure		
State	MF	Others	Overall	MF	Others	Overall	MF	Others	Overall	MF	Others	Overall
Delhi-NCR	16925***	62427	51483	4725*	3802	4024	14744***	42028	35466	7480	6848	7000
	(13271)	(91819)	(82537)	(3259)	(2915)	(3017)	(12806)	(60673)	(54458)	(7966)	(6180)	(6631)
	(38)	(120)	(158)	(38)	(120)	(158)	(38)	(120)	(158)	(38)	(120)	(158)
Telangana	12274***	30036	23108	5201***	4103	4531	9410***	20543	16201	7150***	6005	6451
	(11331)	(24628)	(22235)	(4284)	(3163)	(3675)	(9570)	(18115)	(16276)	(5403)	(3185)	(4221)
	(133)	(208)	(341)	(133)	(208)	(341)	(133)	(208)	(341)	(133)	(208)	(341)
W.Bengal	8219***	21100	8373	6782	4041	6750	7778***	21100	7936	9273	4041	9211
	(6674)	(10607)	(6830)	(4474)	(1869)	(4459)	(6607)	(10607)	(6775)	(5616)	(1869)	(5613)
	(166)	(2)	(168)	(166)	(2)	(168)	(166)	(2)	(168)	(166)	(2)	(168)
Maharashtra	22021***	60882	42027	8782	8461	8617	15022***	31951	23737	9795	9605	9697
	(15508)	(52192)	(43472)	(6145)	(5858)	(5983)	(11248)	(24032)	(20704)	(5102)	(7629)	(6508)
	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)
All-India	12997***	45750	29334	6485***	4925	5707	10345***	29108	19704	8539***	6989	7766
	(12121)	(59426)	(45841)	(4882)	(4223)	(4628)	(9702)	(37720)	(29053)	(5794)	(5475)	(5687)
	(419)	(417)	(836)	(419)	(417)	(836)	(419)	(417)	(836)	(419)	(417)	(836)

Note: MF means marginal farmers, values within the parenthesis indicate SD and frequency
(Top to bottom respectively), ***, ** and * indicates significant at the 1%, 5% and 10% level, respectively.

Notwithstanding the resource crunch, marginal farmers spend significantly more on seeds per acre in the case of both vegetables (by 22%) and all crops (by 32%) (Table 3.7). As expected, the total expenditure of these marginal farmers falls short of other category of farmers by a considerable margin and is statistically significant.

Table 3.8. Information on irrigation cost across farm size holdings (in ₹)

	All-crops						Vegetables					
	Total expenditure			Per acre expenditure			Total expenditure			Per acre expenditure		
State	MF	Others	Overall	MF	Others	Overall	MF	Others	Overall	MF	Others	Overall
Delhi-NCR	11018	14916	13979	3344***	1266	1766	6379	6720	6638	3358***	1460	1917
	(11376)	(17291)	(16121)	(3973)	(1557)	(2520)	(7375)	(10445)	(9774)	(4018)	(2807)	(3231)
	(38)	(120)	(158)	(38)	(120)	(158)	(38)	(120)	(158)	(38)	(120)	(158)
Telangana	360***	418	396	176***	65	108	236*	272	258	245***	104	159
	(143)	(243)	(212)	(124)	(47)	(102)	(145)	(192)	(176)	(313)	(101)	(221)
	(133)	(208)	(341)	(133)	(208)	(341)	(133)	(208)	(341)	(133)	(208)	(341)
W.Bengal	1301	0	1285	574	0	567	914	0	903	605	0	598
	(4094)	(0)	(4072)	(1759)	(0)	(1750)	(3164)	(0)	(3147)	(1815)	(0)	(1805)
	(166)	(2)	(168)	(166)	(2)	(168)	(166)	(2)	(168)	(166)	(2)	(168)
Maharashtra	12217***	25943	19283	5166***	3605	4362	8018***	12911	10537	5339***	3860	4578
	(7988)	(26542)	(20946)	(3289)	(2323)	(2931)	(7875)	(13551)	(11398)	(3543)	(2705)	(3217)
	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)
All-India	4020***	9914	6960	1598***	1149	1374	2584***	4763	3671	1667**	1278	1473
	(7435)	(18376)	(14304)	(2925)	(1916)	(2482)	(5546)	(9715)	(7975)	(3031)	(2423)	(2750)
	(419)	(417)	(836)	(419)	(417)	(836)	(419)	(417)	(836)	(419)	(417)	(836)

Note: MF means marginal farmers, values within the parenthesis indicates SD and frequency
(Top to bottom respectively), ***, ** and * indicates significant at the 1%, 5% and 10% level, respectively.

Marginal farmers in all India and selected states (excluding West Bengal) incur significantly higher expenditures per acre on irrigation than other farmers (Table 3.8). The marginal farmers report a 30% higher than the expenditure reported by other farmers for cultivating vegetables. This higher expenditure is likely to benefit in terms of higher yields and profits if used to provide judicious irrigation at crucial crop growth stages.

Table 3.9. Information on water purchased cost across farm size holdings (in ₹)

	All-crops						Vegetables					
	Total expenditure			Per acre expenditure			Total expenditure			Per acre expenditure		
State	MF	Others	Overall	MF	Others	Overall	MF	Others	Overall	MF	Others	Overall
Delhi-NCR	171	412	354	122	39	59	158	274	246	197	38	76
	(1054)	(2124)	(1921)	(753)	(206)	(409)	(973)	(1620)	(1489)	(1217)	(212)	(623)
	(38)	(120)	(158)	(38)	(120)	(158)	(38)	(120)	(158)	(38)	(120)	(158)
Telangana	79	76	77	69	13	35	56	15	31	51	15	29
	(593)	(742)	(687)	(562)	(142)	(368)	(535)	(208)	(372)	(524)	(208)	(365)
	(133)	(208)	(341)	(133)	(208)	(341)	(133)	(208)	(341)	(133)	(208)	(341)
W.Bengal	4193***	26950	4464	3973	5193	3987	3240***	26950	3523	4600	5193	4607
	(3668)	(6435)	(4435)	(3376)	(1009)	(3359)	(3070)	(6435)	(4026)	(4261)	(1009)	(4236)
	(166)	(2)	(168)	(166)	(2)	(168)	(166)	(2)	(168)	(166)	(2)	(168)
Maharashtra	106	149	128	32	19	25	45	121	84	16	26	21
	(485)	(720)	(616)	(134)	(88)	(112)	(256)	(600)	(466)	(90)	(130)	(112)
	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)
All-India	1723***	317	1021	1613***	47	832	1325***	241	784	1860***	49	956
	(3095)	(2284)	(2809)	(2883)	(393)	(2203)	(2514)	(2099)	(2378)	(3511)	(410)	(2660)
	(419)	(417)	(836)	(419)	(417)	(836)	(419)	(417)	(836)	(419)	(417)	(836)

Note: MF means marginal farmers, values within the parenthesis indicates SD and frequency
(Top to bottom respectively), ***, ** and * indicates significant at the 1%, 5% and 10% level, respectively.

Also, marginal farmers invest more in purchasing irrigation water relative to farmers belonging to other categories for the cultivation of both all crops and vegetables in the sample as a whole (Table 3.9). What necessitates this higher spending on water purchase? It can be argued that their lack of irrigation sources leads to this distress-driven spending. Alternatively, we can assume that the marginal farmers resort to buying water pulled by the lure of higher profits in vegetable cultivation. This is an empirical question which we examine towards the end.

Table 3.10. Information on repair and maintenance expenditure across farm size holdings (in ₹)

	All-crops						Vegetables					
	Total expenditure			Per acre expenditure			Total expenditure			Per acre expenditure		
State	MF	Others	Overall	MF	Others	Overall	MF	Others	Overall	MF	Others	Overall
Delhi-NCR	7073**	11762	10634	1963***	971	1209	3984	4630	4475	1953***	985	1218
	(11483)	(12514)	(12402)	(2968)	(1245)	(1853)	(5477)	(6658)	(6383)	(2972)	(1244)	(1851)
	(38)	(120)	(158)	(38)	(120)	(158)	(38)	(120)	(158)	(38)	(120)	(158)
Telangana	6051*	7410	6880	2561***	1118	1681	3385	3619	3528	2808***	1280	1876
	(5866)	(7449)	(6898)	(2372)	(1314)	(1932)	(3718)	(4184)	(4005)	(2630)	(1580)	(2182)
	(133)	(208)	(341)	(133)	(208)	(341)	(133)	(208)	(341)	(133)	(208)	(341)
W.Bengal	2061	2750	2070	1874	525	1858	1493	2750	1508	1889	525	1873
	(2094)	(1768)	(2087)	(1522)	(318)	(1520)	(1796)	(1768)	(1796)	(1525)	(318)	(1523)
	(166)	(2)	(168)	(166)	(2)	(168)	(166)	(2)	(168)	(166)	(2)	(168)
Maharashtra	5229***	8809	7072	2169***	1302	1722	3035*	4828	3958	2158***	1309	1721
	(4614)	(10877)	(8605)	(1859)	(1329)	(1661)	(2943)	(8121)	(6225)	(1825)	(1327)	(1640)
	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)
All-India	4402***	8932	6662	2158***	1111	1636	2621***	4158	3388	2239***	1197	1720
	(5676)	(10026)	(8447)	(2056)	(1297)	(1797)	(3297)	(5945)	(4862)	(2166)	(1439)	(1911)
	(419)	(417)	(836)	(419)	(417)	(836)	(419)	(417)	(836)	(419)	(417)	(836)

Note: MF means marginal farmers, values within the parenthesis indicates SD and frequency
(Top to bottom respectively), ***, ** and * indicates significant at the 1%, 5% and 10% level, respectively.

We observe that marginal farmers in all-India and selected states, except for West Bengal state, incur significantly higher expenditures per acre on repair and maintenance than farmers in other categories (Table 3.10). The average spending per acre on repair and maintenance for all crops and vegetables is nearly 50% above that of the other category farmers.

Table 3.11. Expenditure on crop support, net, fence *etc*. across farm size holdings (in ₹)

State	All-crops						Vegetables					
	Total expenditure			Per acre expenditure			Total expenditure			Per acre expenditure		
	MF	Others	Overall	MF	Others	Overall	MF	Others	Overall	MF	Others	Overall
Delhi-NCR	158	1036	825	105	126	121	158	1036	825	184	203	199
	(718)	(4479)	(3933)	(509)	(632)	(603)	(718)	(4479)	(3933)	(982)	(904)	(921)
	(38)	(120)	(158)	(38)	(120)	(158)	(38)	(120)	(158)	(38)	(120)	(158)
Telangana	951	948	949	314	144	210	921	939	932	500	234	338
	(5425)	(3976)	(4588)	(1338)	(655)	(981)	(5402)	(3975)	(4577)	(1767)	(1008)	(1359)
	(133)	(208)	(341)	(133)	(208)	(341)	(133)	(208)	(341)	(133)	(208)	(341)
W.Bengal	3896	7250	3936	3826	1359	3797	3896	7250	3936	4856	1359	4814
	(3834)	(10253)	(3910)	(4371)	(1922)	(4356)	(3834)	(10253)	(3910)	(4914)	(1922)	(4902)
	(166)	(2)	(168)	(166)	(2)	(168)	(166)	(2)	(168)	(166)	(2)	(168)
Maharashtra	2165	2249	2208	687	311	494	1732	1588	1658	899	495	691
	(7102)	(8072)	(7594)	(2269)	(1060)	(1759)	(6483)	(4452)	(5515)	(3341)	(1434)	(2544)
	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)
All-India	2283***	1275	1780	1759***	180	971	2189***	1133	1662	2275***	285	1282
	(5189)	(5270)	(5251)	(3459)	(762)	(2627)	(5029)	(4266)	(4691)	(4145)	(1092)	(3192)
	(419)	(417)	(836)	(419)	(417)	(836)	(419)	(417)	(836)	(419)	(417)	(836)

Note: MF means marginal farmers, values within the parenthesis indicate SD and frequency
(Top to bottom respectively), ***, ** and * indicate significant at the 1%, 5% and 10% level, respectively.

It was observed that marginal farmers incurred significantly higher expenditures per acre on crop support, compared to other categories of farmers, for cultivating vegetables at the all-India level (Table 3.11). A state-wise analysis of the data showed that farmers in West Bengal reported 2.8 times higher expenditure per acre on crop support.

3.2. Expenditure on Manure and Fertilisers: This section focuses on farmers' expenditure on manures and fertilisers. Manure and fertiliser use is a crucial aspect of modern agriculture as it helps to improve soil fertility and increase crop yields. However, the cost of these inputs can be substantial, and farmers must weigh the benefits against the costs when deciding how much to invest in them. An effort is made here to shed light on the economic decisions made by farmers regarding the use of manure and fertilizers and to determine if there is a difference in expenditure between all crops and vegetable production. By understanding the expenditure patterns on manure and fertilizers, we can gain valuable insights into the costs of cultivation and the challenges farmers face in enhancing soil fertility and increasing crop yields.

Table 3.12. Expenditure on chemical fertilisers across marketing channels (in ₹)

State	All-crops						Vegetables					
	Total expenditure			Per acre expenditure			Total expenditure			Per acre expenditure		
	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall
Delhi-NCR	31212	33829	32686	2784	3009	2911	17310	15295	16175	3452	3544	3504
	(29496)	(28591)	(28926)	(2216)	(2631)	(2454)	(19569)	(13382)	(16348)	(2462)	(3166)	(2871)
	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)
Telangana	33488***	24173	27506	6056	5203	5508	21365***	13486	16305	6861	5947	6274
	(40207)	(20819)	(29551)	(6537)	(3311)	(4733)	(38491)	(16547)	(26779)	(7442)	(4313)	(5642)
	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)
W.Bengal	13457	10807	11974	9247	8865	9033	12471*	9155	10616	10360	12045	11303
	(13721)	(10043)	(11841)	(4647)	(5981)	(5422)	(13755)	(9497)	(11647)	(5334)	(7831)	(6877)
	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)
Maharashtra	39097***	26459	32591	7263	7015	7135	21547***	13844	17582	7631	7423	7524
	(34127)	(17470)	(27530)	(4179)	(3732)	(3945)	(20591)	(12191)	(17188)	(4971)	(3936)	(4456)
	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)
All-India	30089***	23768	26392	6371	5830	6055	18705***	13046	15395	7111	6945	7014
	(33637)	(21592)	(27405)	(5396)	(4367)	(4825)	(27307)	(14214)	(20853)	(6112)	(5670)	(5854)
	(347)	(489)	(836)	(347)	(489)	(836)	(347)	(489)	(836)	(347)	(489)	(836)

Note: SF means supermarket farmers, TF means traditional farmers, values within the parenthesis indicates SD and frequency
(Top to bottom respectively), ***, ** and * indicate significant at the 1%, 5% and 10% level respectively.

The results revealed no significant difference in the expenditure per acre on chemical fertilizers between supermarket farmers and traditional farmers for all crops and vegetable cultivation in all India (Table 3.12). However, farmers in all India had an average expenditure of 16% more per acre on chemical fertilizers for vegetable cultivation compared to all crops. This study's findings contradict the conclusions drawn by Rao *et al.* (2012), who stated that supermarket

suppliers utilized significantly fewer chemical fertilizers but purchased significantly more farmyard manure. Chaboud and Moustier (2021) emphasized that both supermarket and traditional farmers expressed concerns regarding the rejection of tomatoes resulting from the utilization of intensive levels of pesticides and chemical fertilizers. A probable reason in this case might be that farmers cultivate more vegetable crops per year on the same land compared to other crops.

Table 3.13. Expenditure on bio-fertilisers across marketing channels (in ₹)

	All-crops						Vegetables					
	Total expenditure			Per acre expenditure			Total expenditure			Per acre expenditure		
State	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall
Delhi-NCR	249	48	136	16	6	11	227	48	126	29	23	26
	(1665)	(325)	(1127)	(82)	(54)	(68)	(1645)	(325)	(1113)	(163)	(212)	(192)
	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)
Telangana	2	7	5	1	3	2	2	6	5	3	4	4
	(24)	(77)	(63)	(9)	(34)	(28)	(24)	(62)	(52)	(31)	(53)	(46)
	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)
W.Bengal	666	307	465	467*	224	331	666	307	465	559*	262	392
	(1694)	(1476)	(1581)	(957)	(832)	(895)	(1694)	(1476)	(1581)	(1144)	(867)	(1007)
	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)
Maharashtra	378*	1419	914	46**	484	272	180	796	497	38	397	223
	(1927)	(5413)	(4131)	(193)	(1872)	(1364)	(755)	(4265)	(3112)	(148)	(2193)	(1583)
	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)
All-India	282	324	306	114	131	124	230	212	220	135	127	130
	(1443)	(2424)	(2073)	(487)	(886)	(746)	(1154)	(1931)	(1652)	(579)	(1013)	(859)
	(347)	(489)	(836)	(347)	(489)	(836)	(347)	(489)	(836)	(347)	(489)	(836)

Note: SF means supermarket farmers, TF means traditional farmers, values within the parenthesis indicates SD and frequency (Top to bottom respectively), ***, ** and * indicates significant at the 1%, 5% and 10% level respectively.

The vegetable growers in the study areas spend very little on biofertilisers for vegetables and all crops, with minor differences across states and marketing channels (Table 3.13). For both vegetables and all crops, supermarket farmers' average expenditure per acre on biofertilisers is not significantly different. However, in West Bengal state, supermarket farmers reported a significantly higher expenditure on biofertilisers per acre than traditional farmers.

Table 3.14. Expenditure on FYM across marketing channels(in ₹)

	All-crops						Vegetables					
	Total expenditure			Per acre expenditure			Total expenditure			Per acre expenditure		
	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall
Delhi-NCR	6878	4892	5759	678	515	586	4254	2899	3491	811	629	709
	(9730)	(10788)	(10355)	(1004)	(1312)	(1187)	(7393)	(6514)	(6922)	(1172)	(1422)	(1318)
	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)
Telangana	6642	5448	5875	1559	1456	1493	4449	3351	3744	1692	1970	1871
	(15902)	(11186)	(13060)	(3478)	(2908)	(3119)	(14543)	(8143)	(10866)	(4089)	(4332)	(4243)
	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)
W.Bengal	550	194	351	261	214	235	550	156	330	270	281	276
	(2867)	(794)	(1994)	(1141)	(878)	(1000)	(2867)	(579)	(1954)	(1147)	(1112)	(1124)
	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)
Maharashtra	18910	17355	18109	3892	4945	4434	11260	8396	9786	3970	4717	4354
	(16237)	(18349)	(17322)	(3314)	(5024)	(4300)	(13454)	(11458)	(12512)	(4082)	(5080)	(4624)
	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)
All-India	8289**	6455	7216	1658	1667	1663	5188**	3552	4231	1752	1890	1833
	(14539)	(12883)	(13616)	(3011)	(3357)	(3216)	(11938)	(8184)	(9942)	(3480)	(3968)	(3772)
	(347)	(489)	(836)	(347)	(489)	(836)	(347)	(489)	(836)	(347)	(489)	(836)

Note: SF means supermarket farmers, TF means traditional farmers, values within the parenthesis indicates SD and frequency (Top to bottom respectively), ***, ** and * indicates significant at the 1%, 5% and 10% level respectively.

A comparison of expenditure per acre on FYM across India shows that the spending for vegetable cultivation was 10% higher than that for all crops (Table 3.14). The expenditure on FYM forms 26% of the spending on chemical fertilisers. Regarding expenditure per acre on Farmyard Manure (FYM), the value reported by supermarket farmers for all crops is the same statistically as that of traditional farmers. Similarly, for vegetable cultivation, the value reported by supermarket farmers was also not significantly different from that reported by traditional farmers.

Table 3.15. Total expenditure on manures and fertilisers across marketing channels(in ₹)

State	All-crops						Vegetables					
	Total expenditure			Per acre expenditure			Total expenditure			Per acre expenditure		
	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall
Delhi-NCR	39770	40261	40047	3565	3725	3655	22750	18865	20562	4420	4493	4461
	(37361)	(32080)	(34373)	(2551)	(3233)	(2947)	(26155)	(16217)	(21153)	(2881)	(3695)	(3354)
	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)
Telangana	44124***	33329	37191	8545	7396	7807	28419**	19328	22581	9525	8922	9138
	(50879)	(29738)	(38925)	(9553)	(5359)	(7155)	(49308)	(23917)	(35370)	(10474)	(7253)	(8536)
	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)
W.Bengal	14913*	11332	12909	10102	9335	9673	13927**	9641	11529	11387	12638	12087
	(15900)	(11054)	(13481)	(4892)	(6621)	(5918)	(15974)	(10600)	(13366)	(5580)	(8424)	(7315)
	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)
Maharashtra	59657**	46124	52690	11448	12709	12097	33803**	23374	28434	12011	12689	12360
	(46681)	(32247)	(40361)	(6508)	(7640)	(7120)	(32786)	(22705)	(28451)	(8573)	(7276)	(7915)
	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)
All-India	40699***	32638	35984	8573	8046	8265	25473***	18102	21162	9494	9501	9498
	(44439)	(30296)	(37021)	(7458)	(6415)	(6867)	(36601)	(20850)	(28677)	(8436)	(7566)	(7934)
	(347)	(489)	(836)	(347)	(489)	(836)	(347)	(489)	(836)	(347)	(489)	(836)

Note: SF means supermarket farmers, TF means traditional farmers, values within the parenthesis indicates SD and frequency (Top to bottom respectively), ***, ** and * indicates significant at the 1%, 5% and 10% level respectively.

The results indicate that, on an all-India level, there is no statistically significant difference in the expenditure per acre on both manure and fertilizers by supermarket farmers compared to traditional farmers for all crops and vegetables (Table 3.15). However, the data reveals that on an all-India level, there is a 15% higher expenditure per acre on manure and fertilizers for vegetable cultivation than all-crops cultivation. Singh *et al.,* (2021) emphasised that fertilisers, irrigation, and mechanisation were critical factors in determining foodgrains productivity in Uttar Pradesh state. Therefore, this higher fertiliser use in vegetables is bound to have yield impacts for likely higher profits.

Table 3.16. Total expenditure on both manure and fertilisers across farm size holdings(in ₹)

State	All-crops						Vegetables					
	Total expenditure			Per acre expenditure			Total expenditure			Per acre expenditure		
	MF	Others	Overall	MF	Others	Overall	MF	Others	Overall	MF	Others	Overall
Delhi-NCR	18778***	46782	40047	5739***	2995	3655	14141**	22595	20562	6410***	3844	4461
	(13276)	(36246)	(34373)	(4926)	(1444)	(2947)	(13600)	(22704)	(21153)	(4900)	(2404)	(3354)
	(38)	(120)	(158)	(38)	(120)	(158)	(38)	(120)	(158)	(38)	(120)	(158)
Telanga-na	21843***	47005	37191	9516***	6715	7807	13806***	28192	22581	10689***	8146	9138
	(17930)	(45117)	(38925)	(7424)	(6773)	(7155)	(15012)	(42779)	(35370)	(9173)	(7967)	(8536)
	(133)	(208)	(341)	(133)	(208)	(341)	(133)	(208)	(341)	(133)	(208)	(341)
W. Bengal	12079***	81825	12909	9601	15640	9673	10682***	81825	11529	12044	15640	12087
	(10560)	(48331)	(13481)	(5878)	(8641)	(5918)	(10298)	(48331)	(13366)	(7318)	(8641)	(7315)
	(166)	(2)	(168)	(166)	(2)	(168)	(166)	(2)	(168)	(166)	(2)	(168)
Maha-rashtra	31618***	72551	52690	13659***	10625	12097	18892***	37428	28434	14024***	10791	12360
	(17608)	(45473)	(40361)	(8428)	(5255)	(7120)	(13469)	(35239)	(28451)	(9191)	(6139)	(7915)
	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)
All-India	19610***	52437	35984	10018***	6503	8265	13594***	28766	21162	11491***	7496	9498
	(16543)	(43983)	(37021)	(7167)	(6070)	(6867)	(13171)	(36889)	(28677)	(8375)	(6918)	(7934)
	(419)	(417)	(836)	(419)	(417)	(836)	(419)	(417)	(836)	(419)	(417)	(836)

Note:MF means marginal farmers, values within the parenthesis indicates SD and frequency (Top to bottom respectively), ***, ** and * indicates significant at the 1%, 5% and 10% level respectively.

The marginal farmers spend a substantial amount of money per acre on both manure and fertilizers in India and selected states (excluding West Bengal) for all crops (Table 3.16). The marginal farmers invest nearly 54% more manures and fertilisers than farmers with relatively bigger parcels of land. Several other studies showed a declining trend in fertilizer use with land ownership areas. For example, Dutta and Dhar (2023) reported that fertilizers and manure usage per acre of land showed a decline with an increase in land area.

Table 3.17. Total expenditure on both manures and fertilisers across social categories (in ₹)

State	All-crops						Vegetables					
	Total expenditure			Per acre expenditure			Total expenditure			Per acre expenditure		
	SCST	Others	Overall	SCST	Others	Overall	SCST	Others	Overall	SCST	Others	Overall
Delhi NCR	18900	40882	40047	3171	3674	3655	12051	20898	20562	3738	4490	4461
	(9090)	(34745)	(34373)	(904)	(2999)	(2947)	(7497)	(21456)	(21153)	(1581)	(3405)	(3354)
	(6)	(152)	(158)	(6)	(152)	(158)	(6)	(152)	(158)	(6)	(152)	(158)
Telanga-na	29329	38638	37191	10163***	7374	7807	17220	23567	22581	12512***	8517	9138
	(30777)	(40122)	(38925)	(9169)	(6649)	(7155)	(26169)	(36765)	(35370)	(12226)	(7533)	(8536)
	(53)	(288)	(341)	(53)	(288)	(341)	(53)	(288)	(341)	(53)	(288)	(341)
W. Bengal	8810	12934	12909	7342	9687	9673	8810	11545	11529	7342	12115	12087
	(0)	(13518)	(13481)	(0)	(5933)	(5918)	(0)	(13405)	(13366)	(0)	(7328)	(7315)
	(1)	(167)	(168)	(1)	(167)	(168)	(1)	(167)	(168)	(1)	(167)	(168)
Maha-rashtra	25398*	53695	52690	11797	12108	12097	16560	28871	28434	12591	12351	12360
	(9807)	(40716)	(40361)	(6383)	(7164)	(7120)	(5983)	(28861)	(28451)	(6431)	(7981)	(7915)
	(6)	(163)	(169)	(6)	(163)	(169)	(6)	(163)	(169)	(6)	(163)	(169)
All-India	27713*	36693	35984	9633*	8147	8265	16563	21556	21162	11643**	9314	9498
	(28050)	(37620)	(37021)	(8663)	(6685)	(6867)	(23624)	(29049)	(28677)	(11389)	(7547)	(7934)
	(66)	(770)	(836)	(66)	(770)	(836)	(66)	(770)	(836)	(66)	(770)	(836)

Note:SCST means farmers belongs to SC or ST category, values within the parenthesis indicates SD and frequency (top to bottom respectively), ***, ** and * indicates significant at the 1%, 5% and 10% level respectively.

The socially disadvantaged SCST farmers in all-India and Telangana state recorded significantly higher per-acre expenditures on manure and fertilizers for all-crop and vegetable cultivation (Table 3.17). A similar trend is observed for the vegetable farmers in the Telangana state, too, while there are no statistically significant differences in other states.

3.3. Pesticides and Herbicides Expenditure: Plant protection from insects, diseases, and weeds constitutes one of the major crop production activities in the field and is crucial in maintaining crop yields. In this section, we examine the expenditure on these biotic stressors in the case of all crops and vegetables across states and marketing channels, leveraging field data collected.

Table 3.18. Expenditure on pesticides for all-crops and vegetables across marketing channels (₹)

State	All-crops						Vegetables					
	Total expenditure			Per acre expenditure			Total expenditure			Per acre expenditure		
	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall
Delhi NCR	13820	17836	16082	1384	1424	1407	9053	9912	9537	2034	4201	3255
	(11166)	(35709)	(27798)	(958)	(1600)	(1354)	(7916)	(20375)	(16125)	(1382)	(19773)	(14870)
	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)
Telanga-na	19944	27710	24932	4172	6110	5416	15629	13510	14268	6262	10697	9111
	(20123)	(109251)	(88380)	(4412)	(20024)	(16275)	(19550)	(27163)	(24701)	(5879)	(62725)	(50393)
	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)
W. Bengal	6070	8464	7410	4542	6287	5519	5780***	3737	4637	5360	5577	5482
	(5438)	(41308)	(31058)	(2466)	(20678)	(15541)	(5460)	(4217)	(4896)	(2933)	(5244)	(4369)
	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)
Mahara-shtra	10557	8957	9733	1946	2412	2186	7939**	4863	6356	2669	2540	2603
	(10933)	(11619)	(11286)	(1369)	(2872)	(2276)	(10201)	(6592)	(8648)	(2304)	(2242)	(2266)
	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)
All-India	13549	18877	16665	3171*	4633	4026	10404	9438	9839	4380	7080	5959
	(15128)	(77360)	(59994)	(3234)	(16334)	(12680)	(13879)	(20808)	(18251)	(4332)	(42961)	(32988)
	(347)	(489)	(836)	(347)	(489)	(836)	(347)	(489)	(836)	(347)	(489)	(836)

Note: SF means supermarket farmers, TF means traditional farmers, values within the parenthesis indicates SD and frequency (top to bottom respectively), ***, ** and * indicates significance at the 1%, 5% and 10% level respectively.

The expenditure incurred on pesticides for vegetable crops at Rs.5959/- is 48% higher relative to the amount spent for the same in the case of all crops (Table 3.18). It is expected since the pest intensity on vegetables is higher and that a greater number of crops are cultivated on the same land in the case of vegetables that have shorter crop periods. Across the marketing channels, the comparison shows that farmers selling to modern markets spend less on plant protection in the case of all crops. However, there was no statistically significant difference for vegetable crops.

Table 3.19. Expenditure on herbicides for all crops and vegetables across marketing channels (₹)

State	All-crops						Vegetables					
	Total expenditure			Per acre expenditure			Total expenditure			Per acre expenditure		
	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall
Delhi NCR	1751	2058	1924	157	189	175	828	867	850	121	144	134
	(4297)	(4140)	(4199)	(305)	(421)	(374)	(3996)	(2885)	(3403)	(378)	(360)	(367)
	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)
Telangana	907	678	760	167	175	172	516	380	429	153	190	177
	(1567)	(1398)	(1463)	(290)	(352)	(331)	(1063)	(1070)	(1068)	(292)	(469)	(415)
	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)
W.Bengal	521	690	616	445	533	495	436	475	458	468	590	536
	(787)	(1086)	(967)	(736)	(834)	(791)	(718)	(898)	(822)	(792)	(1192)	(1034)
	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)
Maharashtra	3178*	2032	2588	528	953	747	952***	581	761	322	352	338
	(5683)	(3023)	(4537)	(667)	(4619)	(3344)	(1042)	(621)	(869)	(252)	(415)	(345)
	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)
All-India	1529*	1173	1321	310	385	354	664	523	581	254	287	274
	(3632)	(2496)	(3023)	(542)	(2017)	(1581)	(1985)	(1505)	(1721)	(472)	(670)	(596)
	(347)	(489)	(836)	(347)	(489)	(836)	(347)	(489)	(836)	(347)	(489)	(836)

Note: SF means supermarket farmers, TF means traditional farmers, values within the parenthesis indicates SD and frequency (top to bottom respectively), ***, ** and * indicates significance at the 1%, 5% and 10% level respectively.

A review of the herbicide expenditure data indicates 23% lower spending for vegetables vis-a-vis all crops (Table 3.19). Overall, the herbicide spending constitutes only 5% of the expenditure on pesticides. Furthermore, the results show that supermarket farmers report similar spending per acre on herbicides for vegetables and all crops. Only in Maharashtra state do supermarket-selling vegetable growers spend more on herbicide applications. Given the small expenditures on herbicides, one must assume that much of the weeding happens manually. This also raises questions about the efficiency of weed management of both vegetables and all crops for the sample vegetable growers.

Table 3.20. Expenditure on both pesticides and herbicides for all-crops and vegetables across marketing channels (in ₹)

State	All-crops						Vegetables					
	Total expenditure			Per acre expenditure			Total expenditure			Per acre expenditure		
	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall
Delhi NCR	15571	19893	18006	1541	1613	1581	9881	10780	10387	2154	4346	3389
	(12333)	(35814)	(28097)	(989)	(1630)	(1384)	(9768)	(20569)	(16693)	(1507)	(19754)	(14863)
	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)
Telanga-na	20836	28388	25686	4338	6285	5588	16129	13891	14692	6413	10888	9287
	(20575)	(109434)	(88558)	(4521)	(20054)	(16309)	(19984)	(27294)	(24918)	(5909)	(62718)	(50390)
	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)
W. Bengal	6591	9155	8025	4987	6820	6013	6216***	4212	5095	5828	6167	6018
	(5461)	(41448)	(31166)	(2567)	(20735)	(15593)	(5492)	(4378)	(4985)	(3115)	(5370)	(4508)
	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)
Maharash-tra	13735	10989	12321	2474	3365	2933	8891***	5445	7117	2992	2892	2940
	(13611)	(12864)	(13264)	(1661)	(5527)	(4144)	(10700)	(6778)	(9039)	(2346)	(2373)	(2354)
	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)
All-India	15073	20049	17984	3480*	5018	4379	11062	9961	10418	4633	7367	6232
	(15974)	(77501)	(60184)	(3334)	(16474)	(12798)	(14389)	(20926)	(18493)	(4391)	(42955)	(32987)
	(347)	(489)	(836)	(347)	(489)	(836)	(347)	(489)	(836)	(347)	(489)	(836)

Note: SF meanssupermarket farmers, TF means traditional farmers, values within the parenthesis indicates SD and frequency (top to bottom respectively), ***, ** and * indicates significance at the 1%, 5% and 10% level respectively.

Our analysis shows that the cost of pesticides and herbicides for vegetable crops is 42% higher vis-à-vis all crops (Table 3.20). As can be seen from the table, supermarket farmers reported significantly lower expenditure per acre on plant protection chemicals for all crops. However, when examining the expenditure on chemicals for pest and weed control in the case of vegetables, no significant difference was observed between the expenditure of supermarket and traditional market farmers. The exceptions are Maharashtra and West Bengal states, where supermarket farmers spend significantly more on pesticides and herbicides for vegetables.

Table 3.21. Expenditure on herbicides for all-crops and vegetables across farm size holdings (₹)

	All-crops						Vegetables					
	Total expenditure			Per acre expenditure			Total expenditure			Per acre expenditure		
State	MF	Others	Overall	MF	Others	Overall	MF	Others	Overall	MF	Others	Overall
Delhi-NCR	702**	2311	1924	158	180	175	345	1010	850	127	136	134
	(1599)	(4673)	(4199)	(297)	(397)	(374)	(1189)	(3838)	(3403)	(350)	(374)	(367)
	(38)	(120)	(158)	(38)	(120)	(158)	(38)	(120)	(158)	(38)	(120)	(158)
Telang-ana	521**	913	760	244***	126	172	299*	512	429	240**	137	177
	(921)	(1707)	(1463)	(426)	(242)	(331)	(655)	(1257)	(1068)	(536)	(308)	(415)
	(133)	(208)	(341)	(133)	(208)	(341)	(133)	(208)	(341)	(133)	(208)	(341)
W Bengal	619	340	616	500	64	495	459	340	458	542	64	536
	(971)	(481)	(967)	(794)	(90)	(791)	(826)	(481)	(822)	(1039)	(90)	(1034)
	(166)	(2)	(168)	(166)	(2)	(168)	(166)	(2)	(168)	(166)	(2)	(168)
Mahara-shtra	1373***	3734	2588	1032	478	747	496***	1010	761	361	315	338
	(1936)	(5825)	(4537)	(4761)	(584)	(3344)	(496)	(1055)	(869)	(405)	(276)	(345)
	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)
All-India	743***	1901	1321	492***	215	354	405***	759	581	373***	174	274
	(1301)	(3995)	(3023)	(2189)	(404)	(1581)	(764)	(2301)	(1721)	(763)	(329)	(596)
	(419)	(417)	(836)	(419)	(417)	(836)	(419)	(417)	(836)	(419)	(417)	(836)

Note:MF means marginal farmers, values within the parenthesis indicates SD and frequency (top to bottom respectively), ***, ** and * indicates significance at the 1%, 5% and 10% level respectively.

It is noteworthy that supermarket-selling marginal farmers spend significantly more on herbicides for vegetables and all crops than traditional market farmers (Table 3.21). Our analysis shows that marginal farmers reported a 24% lower expenditure on herbicides for vegetable crops than for all crops (Table 3.21). These farmers reported significantly higher expenditure per acre on herbicides for all crops and vegetables compared to other category farmers in the sample as a whole and in the state of Telangana.

Table 3.22. Expenditure on both pesticides and herbicides for all-crops and vegetables across farm size holdings (in ₹)

	All-crops						Vegetables					
	Total expenditure			Per acre expenditure			Total expenditure			Per acre expenditure		
State	MF	Others	Overall	MF	Others	Overall	MF	Others	Overall	MF	Others	Overall
Delhi NCR	8166***	21122	18006	2261***	1366	1581	6661	11567	10387	3142	3467	3389
	(6407)	(31433)	(28097)	(1489)	(1281)	(1384)	(5984)	(18727)	(16693)	(2560)	(17011)	(14863)
	(38)	(120)	(158)	(38)	(120)	(158)	(38)	(120)	(158)	(38)	(120)	(158)
Telangana	12249**	34278	25686	5584	5591	5588	8943***	18367	14692	8362	9878	9287
	(10415)	(112347)	(88558)	(4687)	(20564)	(16309)	(8773)	(30594)	(24918)	(10076)	(64070)	(50390)
	(133)	(208)	(341)	(133)	(208)	(341)	(133)	(208)	(341)	(133)	(208)	(341)
W.Bengal	7792	27375	8025	6021	5386	6013	4826***	27375	5095	6025	5386	6018
	(31248)	(18661)	(31166)	(15684)	(3857)	(15593)	(4117)	(18661)	(4985)	(4525)	(3857)	(4508)
	(166)	(2)	(168)	(166)	(2)	(168)	(166)	(2)	(168)	(166)	(2)	(168)
Maharashtra	7021***	17318	12321	3297	2589	2933	4709***	9387	7117	3215	2681	2940
	(6951)	(15688)	(13264)	(5254)	(2701)	(4144)	(6449)	(10473)	(9039)	(2710)	(1941)	(2354)
	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)
All-India	9090***	26921	17984	5008	3748	4379	6276***	14580	10418	5956	6510	6232
	(20915)	(81676)	(60184)	(10553)	(14699)	(12798)	(6769)	(24613)	(18493)	(6796)	(46234)	(32987)
	(419)	(417)	(836)	(419)	(417)	(836)	(419)	(417)	(836)	(419)	(417)	(836)

Note:MF means marginal farmers, values within the parenthesis indicates SD and frequency (top to bottom respectively), ***, ** and * indicates significance at the 1%, 5% and 10% level respectively.

There is no significant difference between marginal and other-category farmers in their per-acre expenditure on pesticides and herbicides (Table 3.22). However, the two categories have a significantly lower average total expenditure on pesticides and herbicides for all crops and vegetables. The marginal farmers reported a 19 percent higher expenditure on pesticides and herbicides in vegetables than in all crops. For all of India, marginal farmers in Delhi-NCR reported significantly higher expenditures for all crops. In all India and selected states (except for West Bengal), marginal farmers reported significantly lower values for average total expenditure on pesticides and herbicides than other category farmers for all crops. For all-India

and selected states, there is no significant difference between marginal and other category farmers regarding per-acre expenditure on pesticides and herbicides for vegetables.

Table 3.23. Expenditure on both pesticides and herbicides for all-crops and vegetables across social categories (in ₹)

	All-crops						Vegetables					
	Total expenditure			Per acre expenditure			Total expenditure			Per acre expenditure		
State	SCST	Other	Overall	SCST	Other	Overall	SCST	Other	Overall	SCST	Other	Overall
Delhi NCR	13974 (13111) (6)	18165 (28538) (152)	18006 (28097) (158)	2137 (1675) (6)	1559 (1373) (152)	1581 (1384) (158)	7279 (6276) (6)	10510 (16972) (152)	10387 (16693) (158)	2118 (1255) (6)	3439 (15151) (152)	3389 (14863) (158)
Telanga -na	11987 (13760) (53)	28207 (95997) (288)	25686 (88558) (341)	4586 (4219) (53)	5773 (17654) (288)	5588 (16309) (341)	8391** (13031) (53)	15851 (26385) (288)	14692 (24918) (341)	6296 (4980) (53)	9837 (54787) (288)	9287 (50390) (341)
W Bengal	18100 (0) (1)	7965 (31250) (167)	8025 (31166) (168)	15083 (0) (1)	5959 (15624) (167)	6013 (15593) (168)	18100 (0) (1)	5017 (4896) (167)	5095 (4985) (168)	15083 (0) (1)	5963 (4467) (167)	6018 (4508) (168)
Mahara-shtra	6012 (2594) (6)	12554 (13443) (163)	12321 (13264) (169)	3245 (2751) (6)	2921 (4191) (163)	2933 (4144) (169)	4175 (2207) (6)	7225 (9178) (163)	7117 (9039) (169)	3400 (2629) (6)	2923 (2350) (163)	2940 (2354) (169)
All-India	11717 (13014) (66)	18521 (62570) (770)	17984 (60184) (836)	4400 (4174) (66)	4378 (13281) (770)	4379 (12798) (836)	8054 (11930) (66)	10621 (18942) (770)	10418 (18493) (836)	5786 (4879) (66)	6270 (34344) (770)	6232 (32987) (836)

Note: SCST means farmers belongs to SC or ST category, values within the parenthesis indicates SD and frequency (top to bottom respectively), ***, ** and * indicates significance at the 1%, 5% and 10% level respectively.

SCST vegetable growers spend 32% less on plant protection chemicals in vegetables than all crops on average (Table 3.23). However, analysis of data from all-India and selected states indicates no significant difference in per acre expenditure on chemicals used for pest and weed control between SCST farmers and other category farmers for both all crops and vegetables.

3.4. Machinery Use and Monetary Value: Over the last few years, agriculture mechanization has made considerable progress. Many farmers in the country have already started moving from using animal power to mechanical equipment to power their farming activities. In this section, we analyse and present the monetary value of machinery used in raising different crops (especially vegetable crops) and the information across the sampled states.

The information presented in Table 3.24 indicates that the mean value of expenditure on total machinery for vegetables and all crops was not significantly different between supermarket farmers and traditional farmers. However, in the case of vegetables, the modern market sellers spend relatively higher amounts on leveraging machinery for vegetable production per farm. As seen from the table, farmers selling to supermarkets spend more on machinery usage than traditional market farmers for all crops and vegetables in Telangana state on a per-farm basis. Also, significant in the case of vegetables in West Bengal state on both per farm and per acre basis, and modern market sellers outspend traditional market farmers. Further, the results were significant between supermarket and traditional market farmers for all crops grown in Maharashtra. However, the mean differences in per-acre expenditure are not significant for the rest of the sampled states.

Table 3.24: Mean expenditure on total machinery for all crops and vegetables across sampled states and marketing channels during 2020-2021(in ₹)

State	All crops						Vegetables					
	Total per farm expenditure			Per acre expenditure			Total per farm expenditure			Per acre expenditure		
	SF Mean (SD)	TF Mean (SD)	Total Mean (SD)	SF Mean (SD)	TF Mean (SD)	Total Mean (SD)	SF Mean (SD)	TF Mean (SD)	Total Mean (SD)	SF Mean (SD)	TF Mean (SD)	Total Mean (SD)
Delhi-NCR	35646 (33834)	36170 (37236)	35941 (35680)	3014 (1197)	2933 (1466)	2968 (1351)	14747 (17026)	13165 (14277)	13856 (15506)	1504 (1140)	1276 (1081)	1376 (1110)
Telangana	30627*** (20266)	24139 (16915)	26460 (18420)	5845 (3422)	5476 (2785)	5608 (3028)	14452*** (11575)	11189 (10166)	12356 (10789)	2695 (2475)	2651 (2062)	2763 (2220)
W.Bengal	4926 (3144)	4243 (2351)	4544 (2741)	3695 (1556)	3905 (1658)	3812 (1613)	3945*** (2811)	2638 (1692)	3214 (2339)	2965* (1466)	2556 (1651)	1736 (1581)
Maharashtra	19235 (14159)	18659 (12138)	18938 (13121)	4086** (2439)	5129 (3034)	4623 (2802)	10437 (6946)	8990 (7061)	9692 (7022)	2384 (1715)	2624 (2032)	2508 (1883)
Total	23452 (23303)	21529 (22495)	22327 (22840)	4407 (2743)	4650 (2644)	4549 (2687)	11321** (11593)	9513 (10252)	10264 (10859)	2537 (1965)	2378 (1905)	2444 (1931)

Source: Field survey conducted in four states, 2021-22.
*** sig at 1% and ** sig at 5%

Table 3.25: Per acre expenditure on total machinery for all crops and vegetables across sampled states and caste categories during 2020-2021(in ₹)

State	All crops		Vegetables	
	SC/ST Mean (SD)	Others Mean (SD)	SC/ST Mean (SD)	Others Mean (SD)
Delhi-NCR	2724 (935)	2978 (1367)	1384 (659)	1375 (1125)
Telangana	6070 (3137)	5523 (3006)	2852 (2429)	2747 (2184)
W Bengal	2500 (0)	3280 (1614)	2500 (0)	2738 (1585)
Maharashtra	5285 (3061)	4598 (2800)	3554 (3244)	2469 (1820)
Total	5640*** (3124)	4455 (2627)	2778 (2409)	2415 (1883)

Source: Field survey conducted in four states, 2021-22. Note: Others include general & other backward caste; *** sig at 1%

Table 3.25 presents the per-acre expenditure on total machinery for social categories (SC/ST and others). There is a positive and significant difference between SC/ST and other categories of farmers in terms of per-acre expenditure on total machinery for all crops in the overall sample. Nevertheless, the mean differences in per-acre expenditure on total machinery across social categories are insignificant for all crops and vegetable crops across the sampled states. Also, it is not significant for vegetables in the sample as a whole.

Table 3.26: Per acre expenditure on total machinery for all crops and vegetables across sampled states and marginal land-size categories during 2020-2021(in ₹)

State	All crops				Vegetables			
	Marginal farmers vs. Others		Market channels under marginal farmers		Marginal farmers vs. Others		Market channels under marginal farmers	
	Marginal Mean (SD)	Others Mean (SD)	SF Mean (SD)	TF Mean (SD)	Marginal Mean (SD)	Others Mean (SD)	SF Mean (SD)	TF Mean (SD)
Delhi-NCR	3548*** (1456)	2785 (1268)	3619 (1088)	3511 (1635)	2097*** (1407)	1147 (889)	2050 (1301)	2121 (1484)
Telangana	7077*** (3420)	4668 (2309)	7664 (4366)	6807 (2870)	3655*** (2597)	2193 (1720)	3771 (3107)	3601 (2342)
W.Bengal	3831 (1613)	2241 (225)	3735 (1558)	3905 (1658)	2742 (1589)	2241 (225)	2985* (1481)	2556 (1651)
Maharashtra	5836*** (2975)	3479 (2068)	5565 (2504)	6048 (3309)	3365*** (2159)	1700 (1084)	3426 (1829)	3316 (2406)
Total	5228*** (2969)	3866 (2168)	5142 (3176)	5283 (2835)	3095*** (2112)	1790 (1466)	3210 (2116)	3022 (2110)

Source: Field survey conducted in four states, 2021-22. Note: *** sig at 1%; marginal farmer category= <2.499 acres

The marginal farmers harness machinery more than other farmers in the case of all crops and vegetables on a per-acre basis (Table 3.26). In West Bengal, the supermarket farmers spend more than the traditional marketing farmers, though marginal farmers do not spend significantly more as a group. Note that, in the case of all crops, higher and more significant differences between the two groups in terms of per acre machinery expenditure are seen in Telangana state (as indicated by the higher value of SD) followed by Maharashtra and Delhi-NCR. A similar observation is true concerning vegetable crops. Furthermore, in the overall situation, the farmers having marginal land size have incurred more expenditure per acre compared to other categories, as indicated by significant per acre differences in expenditure.

Table 3.27: Per acre expenditure on total machinery for all crops and vegetables across sampled states and small land-size categories during 2020-2021(in ₹)

State	All crops				Vegetables			
	Small farmers vs. Others		Market channels		Small farmers vs. Others		Market channels	
	Small Mean (SD)	Others Mean (SD)	SF Mean (SD)	TF Mean (SD)	Small Mean (SD)	Others Mean (SD)	SF Mean (SD)	TF Mean (SD)
Delhi-NCR	3149** (1373)	2666 (1269)	2939 (1093)	3309 (1544)	2949 (1258)	2851 (2290)	2836 (1247)	3035 (1270)
Telangana	6216*** (3122)	4010 (2048)	6455 (3541)	6086 (2871)	6286*** (3698)	4276 (2351)	6473 (3897)	6185 (3594)
W.Bengal	3800 (1632)	3865 (1553)	3740 (1539)	3847 (1710)	3916 (1811)	3559 (1667)	3842 (1659)	3974 (1932)
Maharashtra	5168*** (2903)	2922 (1520)	4595** (2476)	5689 (3172)	5299*** (3242)	3023 (1697)	4790* (3094)	5762 (3327)
Total	4959*** (2841)	3441 (1805)	4752 (2893)	5105 (2798)	5009*** (3215)	3575 (2220)	4812 (3208)	5146 (3217)

Source: Field survey conducted in four states, 2021-22. Note: * sig at 10% and **sig at 5%;
Small category= ≤5.00 acres

Coming to farmers having small sizes of land (≤ 5.00 acres), the results presented in Table 3.27 indicate significant difference between small farmers vis-a-vis in case of per acre expenditure on total machinery for all crops and vegetables, except in Maharashtra state. As can be seen from the table, they spend more on the machinery utilisation for their vegetable cultivation.
Regarding vegetables, a higher and more significant difference between the two groups in terms of per acre machinery expenditure is seen in Telangana and Maharashtra (as indicated by a higher value of SD) than in Delhi-NCR.

Chapter 4
Marketing of Vegetables

This chapter discusses the marketing of vegetables across different channels concerning both quantity and income. "Supermarket" refers to modern marketing channels encompassing supermarket collection centers, processing firms, startups, e-commerce companies, farmer producer organizations (FPOs), and exclusive collection agents. On the other hand, "Traditional markets" include collectors in villages (outside mandi), transporters, mandi traders, wholesalers, commission agents in mandis, cold storages, non-government organizations (NGOs), co-operative societies, shandi markets, Rytu bazaars, consumers, hotels/restaurants, Mother Dairy, haats, retailers, products that were not marketed due to COVID-19, those who are unaware, and establishments such as colleges/schools and apartments/gated communities.

We analyse the quantity, time, and cost of vegetable growers' transactions across marketing channels in the first section followed by quality and rejection issues in the second section. The third section examines prices received in different markets for the sample as a whole and at disaggregated levels. Finally, the gross revenue received in vegetable sales across marketing channels and at disaggregated levels are analyzed in the fourth section.

4.1. Quantity, time, and cost of vegetable growers' transactions across markets

The supermarket farmers sell both in the supermarket and the traditional market, making a significantly large number of transactions on the whole relative to traditional markets (Table 4.1). The average number of transactions done by vegetable growers is 34, with 29% of transactions occurring at supermarkets and the remaining 71% at traditional markets.

Table 4.1. Average number of transactions at various markets across marketing channels (in numbers)

	Supermarket Channels	Traditional Market Channels		Combined Marketing Channels		
State	Supermarket Farmers	Supermarket Farmers	Traditional Farmers	SF	TF	Overall
Delhi-NCR	29	18	17	47***	17	31
	(41)	(22)	(17)	(49)	(17)	(38)
	(72)	(72)	(86)	(72)	(86)	(158)
Telangana	27	15***	24	42***	24	30
	(27)	(23)	(21)	(40)	(21)	(30)
	(118)	(118)	(223)	(118)	(223)	(341)
W.Bengal	24	55*	47	79***	47	59
	(23)	(34)	(30)	(42)	(30)	(38)
	(62)	(62)	(106)	(62)	(106)	(168)
Maharashtra	21	10	11	31***	11	21
	(22)	(9)	(9)	(24)	(9)	(21)
	(87)	(87)	(82)	(87)	(82)	(169)
All-India	25	22**	25	47***	25	34
	(29)	(28)	(25)	(42)	(25)	(35)
	(339)	(339)	(497)	(339)	(497)	(836)

Note: SF means supermarket farmers, TF means traditional farmers, values within the parenthesis indicates SD and frequency (top to bottom respectively), ***, ** and * indicates significant at the 1%, 5% and 10% level respectively.

As seen from Table 4.1, Telangana state farmers who sell to supermarkets reported a significantly lower number of transactions at traditional markets than traditional farmers. Conversely, West Bengal farmers who sell to supermarkets reported a significantly higher number of transactions at traditional markets than traditional market farmers. This is because in West Bengal

state, *haats* are conveniently located within a distance of 2 to 3km, and they operate throughout the week. Additionally, the *haats* are open in a different village daily, allowing farmers to sell their produce regularly and conveniently.

Table 4.2. Total quantity sold at various markets across marketing channels (in kg)

State	Supermarket channel	Traditional market channels		Combined Marketing Channels		
		Supermarket Farmers	Traditional Farmers	SF	TF	Overall
Delhi-NCR	6600	11950	17656	18549	17656	18063
	(12604)	(29817)	(22476)	(40696)	(22476)	(31979)
	(72)	(72)	(86)	(72)	(86)	(158)
Telangana	8082	1239***	4521	9321**	4521	6182
	(28324)	(2434)	(6955)	(28710)	(6955)	(17901)
	(118)	(118)	(223)	(118)	(223)	(341)
W.Bengal	718	3599	2660	4317	2660	3271
	(1418)	(11251)	(2290)	(11252)	(2290)	(7084)
	(62)	(62)	(106)	(62)	(106)	(168)
Maharashtra	2037	11806	46655	13843	46655	29763
	(4120)	(12442)	(284425)	(12700)	(284425)	(198387)
	(87)	(87)	(82)	(87)	(82)	(169)
All-India	4869	6657	13349	11526	13349	12610
	(18034)	(16607)	(116475)	(26837)	(116475)	(91384)
	(339)	(339)	(497)	(339)	(497)	(836)

Note: SF means supermarket farmers, TF means traditional farmers, values within the parenthesis indicates SD and frequency (top to bottom respectively), ***, ** and * indicates significant at the 1%, 5% and 10% level respectively.

Vegetable farmers sell 12610 kilograms of vegetables on average in both markets, with 16% in supermarkets and 84% in traditional markets across India (Table 4.2). The total quantity sold by farmers across marketing channels does not vary much. There is no significant difference even though supermarket farmers sell in both markets as collection centers of the supermarkets procure only a part of the produce brought by the farmers. These collection centres want to include many smallholders instead of taking from a few large farmers, which to encourage small farmers. In Telangana state, supermarket farmers sell significantly higher quantities in both markets. They sold 93.2 quintals of their produce in combined marketing channels, with 82% (76.31 quintals) of sales taking place in supermarkets and the remaining 18% (12.39 quintals) in traditional markets.

Table 4.3. Total quantity sold per transaction at various markets across marketing channels (in kgs)

State	Supermarket Channels	Traditional Market Channels		Combined Marketing Channels		
	Supermarket Farmers	Supermarket Farmers	Traditional Farmers	SF	TF	Overall
Delhi-NCR	713	1161***	2294	951***	2294	1682
	(1123)	(2037)	(3274)	(1505)	(3274)	(2698)
	(72)	(72)	(86)	(72)	(86)	(158)
Telangana	449	116***	267	385	267	308
	(1938)	(331)	(591)	(1397)	(591)	(950)
	(118)	(118)	(223)	(118)	(223)	(341)
W.Bengal	44	85	99	73	99	89
	(86)	(312)	(149)	(255)	(149)	(194)
	(62)	(62)	(106)	(62)	(106)	(168)
Maharashtra	180	1797	5225	633	5225	2861
	(323)	(2664)	(31460)	(690)	(31460)	(21971)
	(87)	(87)	(82)	(87)	(82)	(169)
All-India	362	764	1400	512	1400	1040
	(1284)	(1809)	(12928)	(1171)	(12928)	(10001)
	(339)	(339)	(497)	(339)	(497)	(836)

Note: SF means supermarket farmers, TF means traditional farmers, values within the parenthesis indicates SD and frequency (top to bottom respectively), ***, ** and * indicates significant at the 1%, 5% and 10% level respectively.

The average quantity of vegetables sold per transaction in supermarkets and traditional markets by farmers in all-India does not vary statistically (Table 4.3). On average, farmers in all-India sell 3.62 quintals of vegetables per transaction in supermarkets and 14.00 quintals per transaction in traditional markets. This relatively smaller quantity purchased by the supermarket collection center is an issue for vegetable growers. It does not help plan their production to sell exclusively to the supermarkets.

In Delhi-NCR state, our analysis shows that farmers selling in both marketing channels have significantly smaller quantities of vegetables per transaction, with supermarket farmers selling an average of 5.12 quintals and traditional farmers selling an average of 14.00 quintals. Supermarket farmers in Delhi-NCR sold the highest quantity of vegetables on average per transaction, at 9.51 quintals, followed by farmers in Telangana, who sold an average of 3.85 quintals per transaction. Traditional farmers in Maharashtra sold the highest quantity of vegetables in traditional marketing channels, with an average of 52.25 quintals per transaction, followed by farmers in Delhi-NCR, who had 22.94 quintals per transaction (Table 4.4).

Table 4.4. Total amount received per transaction at various markets across marketing channels (in ₹)

State	Supermarket Channels	Traditional Market Channels		Combined Marketing Channels		
	Supermarket Farmers	Supermarket Farmers	Traditional Farmers	SF	TF	Overall
Delhi-NCR	18238	19855**	31308	19947**	31308	26131
	(34421)	(34748)	(32694)	(32722)	(32694)	(33093)
	(72)	(72)	(86)	(72)	(86)	(158)
Telangana	9328	4338***	8973	8970	8973	8972
	(13365)	(8349)	(13043)	(11890)	(13043)	(12638)
	(118)	(118)	(223)	(118)	(223)	(341)
W.Bengal	2334	2094*	3277	2177*	3277	2871
	(2150)	(2006)	(4782)	(1936)	(4782)	(4004)
	(62)	(62)	(106)	(62)	(106)	(168)
Maharashtra	8792	39748	27649	17092**	27649	22214
	(25459)	(64279)	(28750)	(29992)	(28750)	(29782)
	(87)	(87)	(82)	(87)	(82)	(169)
All-India	9804	16311	14704	12144	14704	13666
	(22410)	(39509)	(22745)	(23333)	(22745)	(23005)
	(339)	(339)	(497)	(339)	(497)	(836)

Note: SF means supermarket farmers, TF means traditional farmers, values within the parenthesis indicates SD and frequency (top to bottom respectively), ***, ** and * indicates significant at the 1%, 5% and 10% level respectively.

We find a marked disparity in the gross income received per transaction from vegetable sales between supermarket and traditional market farmers in combined marketing channels throughout India and most states, except Telangana (Table 4.4). Specifically, supermarket farmers received a lower gross income per transaction, 17% less than traditional farmers. It is noteworthy that, despite this disparity, supermarket farmers still recorded a significantly higher overall income from vegetable marketing in combined channels, with a 77% increase in revenue compared to traditional farmers in all-India level.

Table 4.5. Total amount received per transaction at various markets across farm-size holdings (in ₹)

State	Supermarkets			Traditional markets			Combined		
	MF	Others	Overall	MF	Others	Overall	MF	Others	Overall
Delhi-NCR	4442	9536	8311	16663**	29074	26089	17500*	28864	26131
	(8959)	(28021)	(24876)	(19363)	(37056)	(34022)	(19124)	(36053)	(33093)
	(38)	(120)	(158)	(38)	(120)	(158)	(38)	(120)	(158)
Telangana	1491***	4338	3228	3955***	9552	7369	4995***	11515	8972
	(3345)	(11094)	(9012)	(5568)	(14065)	(11830)	(5665)	(15008)	(12638)
	(133)	(208)	(341)	(133)	(208)	(341)	(133)	(208)	(341)
W.Bengal	825***	3862	861	2817	4784	2840	2834	5942	2871
	(1646)	(5462)	(1722)	(4036)	(2317)	(4022)	(4013)	(680)	(4004)
	(166)	(2)	(168)	(166)	(2)	(168)	(166)	(2)	(168)
Maharashtra	2516	6421	4526	23088***	44047	33877	16807**	27311	22214
	(5119)	(25573)	(18741)	(30467)	(62388)	(50501)	(22944)	(34391)	(29782)
	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)
All-India	1695***	6266	3975	8401***	22344	15356	7585***	19776	13666
	(4233)	(20642)	(15049)	(17218)	(38611)	(30656)	(13697)	(28269)	(23005)
	(419)	(417)	(836)	(419)	(417)	(836)	(419)	(417)	(836)

Note: MF means marginal farmers, values within the parenthesis indicates SD and frequency (top to bottom respectively), ***, ** and * indicates significant at the 1%, 5% and 10% level respectively.

The results reveal that marginal farmers in the all-India, Telangana, and West Bengal states observed a significantly lower total amount received per transaction in the supermarket channel (Table 4.5). Similarly, in traditional markets and combined marketing channels, marginal farmers across all sampled states except West Bengal reported significantly less gross income per transaction when compared to other category farmers. Specifically, marginal farmers reported

62% less gross income, receiving only ₹7585 per transaction as opposed to the ₹19776 received by other category farmers in the combined marketing channel at the all-India level.

Table 4.6. Transaction time (in minutes per kg) and cost (in Rupees per kg) across marketing channels

State	Transaction time in minutes per kg		Transaction cost rupees per kg	
	Supermarkets	Traditional markets	Supermarkets	Traditional markets
Delhi-NCR	0.54 (0.79) (68)	0.8 (1.78) (139)	0.94*** (2.13) (68)	2.45 (2.97) (139)
Telangana	0.99* (1.35) (122)	2.46 (8.72) (341)	1.27** (1.1) (122)	3.56 (12.63) (341)
W.Bengal	0.94** (1) (74)	12.88 (44.82) (167)	0.62*** (1.13) (74)	2.12 (2.5) (167)
Maharashtra	0.8 (1.4) (82)	3.04 (16.6) (159)	1.29 (3.12) (82)	1.65 (3.01) (159)
All-India	0.84*** (1.21) (346)	4.45 (22.8) (806)	1.07*** (1.98) (346)	2.69 (8.52) (806)

Note: Values in parenthesis indicates SD and frequency (top to bottom respectively),
***, ** and * indicates significant at the 1%, 5% and 10% level respectively.

Vegetable growers save significant time and transaction costs by selling to supermarkets, as shown in Table 4.6. The time it takes to transact goes down by 81%, while transaction costs are lower by 60% in selling to supermarkets. The average transaction cost per kilogram in supermarkets is ₹1.07, significantly lower than the cost of ₹2.69 per kilogram in traditional markets. This is a massive gain for farmers as the vegetable growers are hard-pressed for time. They have to juggle various production-related field issues and simultaneously market the produce by going to markets multiple times with staggered vegetable harvesting.

Table 4.7. Item wise transaction cost per kg across marketing channels (in ₹)

Particulars	Supermarkets					Traditional markets				
	Delhi-NCR	Telangana	W.B	Maharashtra	All-India	Delhi-NCR	Telangana	W.B	Maharashtra	All-India
Bagging (stitching) or boxing	0.22 (0.63)	0.15 (0.27)	0.17 (0.39)	0.18 (0.60)	0.17* (0.47)	0.30 (0.42)	0.28 (0.98)	0.34 (1.13)	0.10 (0.27)	0.26 (0.85)
Transportation	0.35 (0.73)	0.60 (0.54)	0.16 (0.36)	0.84 (1.75)	0.51** (1.01)	0.92 (1.95)	1.33 (6.43)	0.64 (0.97)	1.16 (2.78)	1.08 (4.46)
Loading	0.01 (0.08)	0.00 (0.00)	0.07 (0.15)	0.04 (0.31)	0.03*** (0.17)	0.05 (0.21)	0.03 (0.37)	0.19 (0.38)	0.08 (0.30)	0.08 (0.34)
Off-loading	0.05 (0.31)	0.05 (0.14)	0.05 (0.15)	0.04 (0.16)	0.05** (0.19)	0.19 (0.36)	0.05 (0.55)	0.21 (0.37)	0.06 (0.16)	0.11 (0.43)
Payments at check point or road block	0.00 (0.00)	0.00 (0.00)	0.00 (0.01)	0.00 (0.00)	0.00* (0.01)	0.00 (0.00)	0.00 (0.00)	0.02 (0.10)	0.00 (0.02)	0.00 (0.04)
Personal transport to wholesale market and or back	0.09 (0.29)	0.34 (0.50)	0.06 (0.16)	0.16 (1.38)	0.19** (0.75)	0.10 (0.50)	0.60 (3.06)	0.37 (0.50)	0.03 (0.22)	0.35 (2.03)
Entry license fees	0.00 (0.00)	0.00 (0.00)	0.01 (0.06)	0.01 (0.07)	0.00*** (0.05)	0.00 (0.04)	0.17 (3.01)	0.12 (0.28)	0.05 (0.21)	0.10 (1.96)
Packaging cost	0.04 (0.16)	0.00 (0.00)	0.00 (0.04)	0.00 (0.00)	0.01*** (0.07)	0.01 (0.06)	0.00 (0.06)	0.05 (0.21)	0.00 (0.00)	0.01 (0.11)
Commission rate	0.00 (0.00)	0.02 (0.12)	0.07 (0.48)	0.01 (0.08)	0.02*** (0.24)	0.65 (0.72)	0.96 (1.04)	0.06 (0.18)	0.17 (0.28)	0.56 (0.84)
Storage charges	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Additional costs due to COVID-19	0.19 (1.35)	0.12 (0.48)	0.03 (0.10)	0.00 (0.00)	0.09 (0.66)	0.22 (1.66)	0.14 (0.58)	0.10 (0.30)	0.00 (0.00)	0.12 (0.80)
Any other fees	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.03 (0.17)	0.00 (0.00)	0.01 (0.08)
Total transaction cost	0.94	1.27	0.62	1.29	1.07***	2.45	3.56	2.12	1.65	2.69
Observations	68	122	74	82	346	139	341	167	159	806

Note: Values in parenthesis indicates standard deviation.***, ** and * indicates significant at the 1%, 5% and 10% level respectively.

We look at the item-wise transaction costs in supermarkets vis-à-vis traditional markets and present in Table 4.7. Farmers in all India reported that total transaction costs in supermarkets are

60% lower than in traditional markets and significantly lower transaction costs on transportation, personal transport to the wholesale market or back, and bagging or boxing in supermarkets. These transaction costs comprised 48%, 17%, and 16% of the total transaction cost, respectively. We also notice from the table that transaction costs in all the states nosedived with the marketing of vegetable produce to supermarket collection centres. Nuthalapati *et al*. (2020) found that transaction costs in the supermarket channel are 70% lower than in traditional markets, with farmers who sell to supermarkets benefiting from lower commission charges and transportation costs. Transportation is the highest contributor to total transaction cost for Delhi-NCR farmers selling in supermarkets and traditional markets.

4.2. Quality of produce and rejection of vegetable produce across markets

Most vegetable growers sell (84.68%) grade-A quality vegetables to supermarkets, while traditional markets get only 20.35%A grade produce (Table 4.8). In supermarkets, 72.25% of farmers sold big-size vegetables, 99.42% sold good-shaped vegetables, and 85.61% sold good-shaped vegetables. Additionally, 97.98% of farmers reported good quality in terms of colour, taste, and freshness for supermarket produce, while 82.51% of farmers reported good quality in traditional markets. Chaboud and Moustier (2021) found that in the Cali tomato supply chain in Colombia, supermarkets had stricter requirements for product attributes and categories compared to non-supermarket channels, with farmers who sold to supermarkets prioritizing five attributes - size, health, colour, physical appearance, and presentation - while those selling to traders prioritized only two attributes - size and colour.

Table 4.8. Information on quality of vegetables across marketing channels (%)

		Supermarkets	Traditional markets
Was the quality assessment of the lot fair?	Yes	83.82 (290)	78.04 (629)
	No	16.18 (56)	21.96 (177)
Quality of the produce	Grade A	84.68 (293)	20.35 (164)
	Grade B	2.02 (7)	9.93 (80)
	Grade C	13.29 (46)	0.5 (4)
	Not Graded	0.00 (0)	69.23 (558)
Size	Big	72.25 (250)	43.8 (353)
	Average	27.75 (96)	55.46 (447)
	Small	0.00 (0)	0.74 (6)
Shape	Good	99.42 (344)	85.61 (690)
	5-10 % deformed	0.58 (2)	13.28 (107)
	11-24 % deformed	0.00 (0)	1.12 (9)
Scratches	Yes	0.29 (1)	2.36 (19)
	No	99.71 (345)	97.64 (787)
Colour, taste, freshness etc.	Good	97.98 (339)	82.51 (665)
	Average	2.02 (7)	17.37 (140)
	Bad	0.00 (0)	0.12 (1)
Observations		346	806

Note: Values in parenthesis indicates frequency.

The rejection rates in supermarkets and traditional markets at the All-India level are 11% and 8%, respectively (Table 4.9). Delayed payments and unpredictable product rejection rates are the

most challenging contract attributes in supermarket procurement channels, leading to increased economic risks for farmers, as Ochieng et al. (2017) noted.

Table 4.9. Information on average rate of rejection and time between harvest and sale

Item		Delhi-NCR	Telangana	W.B	Maharashtra	All-India
Rejection rate (in %)	Supermarkets	7 (3) (33)	34 (15) (11)	5 (4) (5)	7 (5) (30)	11 (11) (79)
	Traditional markets	8 (9) (7)	17 (0) (1)	0 0 (0)	7 (5) (29)	8 (6) (37)
Rejection (in kg)	Supermarkets	61 (100) (33)	195 (274) (11)	7 (8) (5)	51 (112) (30)	73 (145) (79)
	Traditional markets	29 (34) (7)	50 (0) (1)	0 0 (0)	387 (493) (29)	310 (460) (37)
How much lower Percentage	Supermarkets	16 (17) (16)	35 (15) (7)	25 (21) (2)	28 (19) (6)	23 (18) (31)
	Traditional markets	55 (7) (2)	33 (0) (1)	0 0 (0)	20 (14) (2)	37 (19) (5)
How much quantity was wasted because of sampling and transacting in kg (for whole transaction)	Supermarkets	18 (48) (68)	0 (0) (122)	1 (1) (74)	7 (25) (82)	5 (26) (346)
	Traditional markets	12 (127) (139)	0 (0) (341)	0 (1) (167)	7 (41) (159)	4 (56) (806)
Time it took between harvest and sale (in hr)	Supermarkets	4 (2) (68)	5 (3) (122)	5 (3) (74)	5 (12) (82)	5 (6) (346)
	Traditional markets	6 (6) (139)	8 (5) (341)	26 (123) (167)	256 (685) (159)	60 (324) (806)

Note: Values in parenthesis indicates standard deviation and frequency (top to bottom respectively)

As can be seen in Table 4.9, the farmers in Telangana state have the highest rejection rates in supermarkets and traditional markets at 34% and 17%, respectively. On the All-India level, supermarket and traditional farmers sold their rejected produce at 23% and 37% lower prices across different marketing channels.

4.3. Average price received for vegetable produce across markets

We computed and presented average prices for the vegetable growers across marketing channels (Table 4.10), duly considering all the transactions done by both farmers in supermarkets and traditional markets. It is worth reiterating here that the modern market farmers only a part of their production to collection centres and the remaining to the traditional markets. The findings reveal that the modern market sellers receive significantly higher prices by 43% compared to those using traditional channels in all of India. Supermarket farmers received the highest prices in the supermarket channel, with significant values observed for all states.

Table 4.10. Average price received per kilogram at various markets across the marking channels (in ₹)

State	Supermarket channels	Traditional Market Channels		Combined Marketing Channels		
		Supermarket Farmers	Traditional Farmers	SF	TF	Overall
Delhi-NCR	78.86	37.32	35.21	58.65***	35.21	45.90
	(69)	(44)	(37)	(53)	(37)	(46)
	(72)	(72)	(86)	(72)	(86)	(158)
Telangana	104.63	64.99	65.48	103.53***	65.48	78.64
	(133)	(127)	(91)	(127)	(91)	(106)
	(118)	(118)	(223)	(118)	(223)	(341)
W.Bengal	92.69	56.82**	46.56	62.57***	46.56	52.47
	(75)	(35)	(27)	(38)	(27)	(32)
	(62)	(62)	(106)	(62)	(106)	(168)
Maharashtra	71.43	26.35*	20.95	38.89***	20.95	30.19
	(65)	(26)	(16)	(32)	(16)	(27)
	(87)	(87)	(82)	(87)	(82)	(169)
All-India	88.45	47.70	48.86	69.92***	48.86	57.40
	(97)	(82)	(67)	(86)	(67)	(76)
	(339)	(339)	(497)	(339)	(497)	(836)

Note: SF means supermarket farmers, TF means traditional farmers, values within the parenthesis indicates SD and frequency (top to bottom respectively), ***, ** and * indicates significant at the 1%, 5% and 10% level respectively.

Several studies across developing countries reported similar higher prices for farmers selling to modern markets (Neven et al., 2009; Pritchard et al., 2010; Nuthalapati et al., 2020). After controlling for quality differences, prices are considerably higher in the supermarket channels, as per the findings of Nuthalapati *et al*. (2020). According to a study by Neven *et al.* (2009), supermarkets offer the highest prices, which are approximately 10-20% higher than those traditional retailers offer. Furthermore, 34% of farmers selling to supermarkets consider higher prices the primary reason for choosing the supermarket distribution channel.

Table 4.11. Average price received per kilogram at various markets across social categories (in ₹)

State	Supermarkets			Traditional markets			Combined		
	SCST	Others	Overall	SCST	Others	Overall	SCST	Others	Overall
Delhi-NCR	0.00	37.35	35.94	51.36	35.58	36.18	51.36	45.68	45.90
	(0)	(62)	(61)	(44)	(40)	(40)	(43.98)	(46.43)	(46.21)
	(6)	(152)	(158)	(6)	(152)	(158)	(6)	(152)	(158)
Telangana	10.99**	40.85	36.21	72.62	63.96	65.31	78.15	78.73	78.64
	(32)	(99)	(93)	(139)	(98)	(105)	(133.10)	(100.89)	(106.31)
	(53)	(288)	(341)	(53)	(288)	(341)	(53)	(288)	(341)
W.Bengal	0.00	34.41	34.21	97.43	50.06	50.35	97.43	52.20	52.47
	(0)	(64)	(64)	(0)	(30)	(31)	(0.00)	(32.01)	(32.10)
	(1)	(167)	(168)	(1)	(167)	(168)	(1)	(167)	(168)
Maharashtra	19.58	37.40	36.77	48.59***	22.82	23.73	38.60	29.88	30.19
	(31)	(59)	(58)	(61)	(18)	(21)	(34.13)	(26.94)	(27.15)
	(6)	(163)	(169)	(6)	(163)	(169)	(6)	(163)	(169)
All-India	10.61***	38.03	35.87	68.88**	46.63	48.39	72.41*	56.11	57.40
	(30)	(78)	(76)	(126)	(66)	(73)	(120.81)	(70.42)	(75.65)
	(66)	(770)	(836)	(66)	(770)	(836)	(66)	(770)	(836)

Note: SCST means SC or ST category farmers, values within the parenthesis indicates SDand frequency (top to bottom respectively), ***, ** and * indicates significant at the 1%, 5% and 10% level respectively.

SCST farmers in all-India and Telangana state receive lower prices per kilogram through supermarket channels than farmers in other categories (Table 4.11). Conversely, SCST farmers have received significantly higher prices of ₹68.88 per kilogram in traditional markets and ₹72.41 per kilogram through combined marketing channels compared to farmers in other categories at the all-India level.

4.4. Gross revenue from vegetable sales across markets

The vegetable growers in the study areas received significantly more money from sales of their produce to supermarkets and traditional markets (Table 4.12). In Telangana, there was a significant difference between supermarket farmers and traditional market farmers who continue to use traditional markets. Traditional farmers in Telangana received significantly higher values for total revenue from marketing vegetables in traditional markets than in supermarkets.

Table 4.12. Total amount earned from selling of vegetables at various markets across marketing channels (in ₹)

State	Supermarket Farmers	Traditional Market Channels		Combined Marketing Channels		
		Supermarket Farmers	Traditional Farmers	SF	TF	Overall
Delhi NCR	330850	409972	366664	740822*	366664	537167
	(694332)	(1400965)	(478190)	(2048173)	(478190)	(1433825)
	(72)	(72)	(86)	(72)	(86)	(158)
Telangana	206599	96473***	192412	303072***	192412	230705
	(262722)	(215261)	(265480)	(336180)	(265480)	(296124)
	(118)	(118)	(223)	(118)	(223)	(341)
W. Bengal	58188	114947	116848	173135**	116848	137620
	(105607)	(141868)	(126888)	(197750)	(126888)	(158585)
	(62)	(62)	(106)	(62)	(106)	(168)
Maharashtra	140577	291277	238786	431854***	238786	338176
	(301161)	(377405)	(253058)	(584725)	(253058)	(463965)
	(87)	(87)	(82)	(87)	(82)	(169)
All-India	188902	216430	214099	405332***	214099	291644
	(397980)	(696083)	(301608)	(1025705)	(301608)	(699093)
	(339)	(339)	(497)	(339)	(497)	(836)

Note: SF means supermarket farmers, TF means traditional farmers, values within the parenthesis indicates SD and frequency (top to bottom respectively), ***, ** and * indicates significant at the 1%, 5% and 10% level respectively.

At the all-India level, the average gross revenue for supermarket farmers was ₹ 405332, with 43% of the revenue coming from the supermarket channel and the remaining 57% from traditional markets. In contrast, traditional farmers received gross revenue of ₹214099, with 95% of revenue coming from traditional markets and only 5% from the supermarket channel. Notably, supermarket farmers reported a gross income received from combined marketing channels that were 102% higher in Delhi-NCR, 39% higher in Telangana state, 57% higher in West Bengal, 90% higher in Maharashtra, and 77% higher at the all-India level than that of traditional farmers.

According to Ochieng and Ogutu (2022), supermarket participation resulted in a 61% increased overall household income. Similarly, Rao and Qaim (2011) reported that participation in supermarket channels was associated with a 48% gain in average household income in Kenya. Furthermore, a study conducted with vegetable producers in Kiambu County, Kenya, found that supermarket procurement contracts contributed to significant income gains. The results indicated that having a supermarket contract increased household income by approximately 40% on average (Ogutu *et al*., 2020).

Table 4.13. Total amount earned from selling of vegetables at various markets across farm-size holdings (in ₹)

State	Supermarkets			Traditional markets			Combined		
	MF	Others	Overall	MF	Others	Overall	MF	Others	Overall
Delhi-NCR	61310	179095	150767	149580*	461392	386399	210890	640488	537167
	(154431)	(559380)	(495320)	(131250)	(1142821)	(1005913)	(225628)	(1628421)	(1433825)
	(38)	(120)	(158)	(38)	(120)	(158)	(38)	(120)	(158)
Telangana	28499***	98982	71492	87699***	204941	159213	116198***	303924	230705
	(70114)	(223255)	(182864)	(127624)	(299057)	(253088)	(133151)	(344839)	(296124)
	(133)	(208)	(341)	(133)	(208)	(341)	(133)	(208)	(341)
W.Bengal	17685***	336000	21474	111873***	470860	116146	129557***	806860	137620
	(48414)	(475176)	(69763)	(125068)	(287807)	(132195)	(140524)	(187369)	(158585)
	(166)	(2)	(168)	(166)	(2)	(168)	(166)	(2)	(168)
Maharashtra	39539*	103310	72368	140346***	384060	265808	179885***	487370	338176
	(120925)	(290911)	(226703)	(129943)	(398803)	(323235)	(166791)	(589835)	(463965)
	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)
All-India	29351***	124076	76600	113191***	317386	215044	142542***	441462	291644
	(87119)	(365846)	(269679)	(128792)	(681565)	(500171)	(155810)	(954830)	(699093)
	(419)	(417)	(836)	(419)	(417)	(836)	(419)	(417)	(836)

Note: MF means marginal farmers, values within the parenthesis indicates SDand frequency (top to bottom respectively),
***, ** and * indicates significant at the 1%, 5% and 10% level respectively.

In all selected states of India except Delhi-NCR, marginal farmers reported a significant reduction in gross income obtained from selling vegetables through supermarkets and combined marketing channels compared to other category farmers (Table 4.13). Similarly, marginal farmers in all states across India also reported a significant decrease in gross income from selling vegetables in traditional markets compared to other categories of farmers. According to Table 4.7, the gross income obtained by marginal farmers for marketing vegetables through combined marketing channels in India was 68% less, amounting to ₹142542, compared to other category farmers who earned ₹441462.

Table 4.14. Total amount earned from selling of vegetables at various markets across social categories (in ₹)

State	Supermarket			Traditional markets			Combined		
	SCST	Others	Overall	SCST	Others	Overall	SCST	Others	Overall
Delhi-NCR	0	156719	150767	445575	384064	386399	445575	540782	537167
	(0)	(504135)	(495320)	(347737)	(1023679)	(1005913)	(347737)	(1460545)	(1433825)
	(6)	(152)	(158)	(6)	(152)	(158)	(6)	(152)	(158)
Telangana	15155***	81859	71492	128398	164884	159213	143553**	246744	230705
	(49077)	(196174)	(182864)	(187733)	(263228)	(253088)	(185163)	(309855)	(296124)
	(53)	(288)	(341)	(53)	(288)	(341)	(53)	(288)	(341)
W.Bengal	0	21603	21474	500120	113847	116146	500120	135450	137620
	(0)	(69953)	(69763)	(0)	(129180)	(132195)	(0)	(156539)	(158585)
	(1)	(167)	(168)	(1)	(167)	(168)	(1)	(167)	(168)
Maharashtra	12717	74564	72368	145829	270225	265808	158545	344788	338176
	(19747)	(230541)	(226703)	(137095)	(327441)	(323235)	(130407)	(470609)	(463965)
	(6)	(163)	(169)	(6)	(163)	(169)	(6)	(163)	(169)
All-India	13326**	82024	76600	164449	219381	215044	177775	301405	291644
	(44482)	(280050)	(269679)	(221501)	(516968)	(500171)	(217360)	(724896)	(699093)
	(66)	(770)	(836)	(66)	(770)	(836)	(66)	(770)	(836)

Note: SCST means SC or ST category farmers, values within the parenthesis indicates SD and frequency (top to bottom respectively),
***, ** and * indicates significant at the 1%, 5% and 10% level respectively.

SCST farmers in Telangana state and all India reported significantly lower incomes from selling vegetables through supermarket channels. Specifically, SCST farmers in Telangana reported a 42% lower income (₹143553) from the combined marketing channel for vegetable sales than other category farmers (₹246744), as presented in Table 4.14.

Chapter 5
Costs and Returns for Sample Vegetable Growers

We bring all the costs and returns together in this chapter to examine the profitability of cultivation in general and vegetable cultivation in particular. It is crucial because monetary gains after covering all costs matter to the farmers. We present for all crops and vegetables and all states and groups of farmers at a disaggregated level. We start with the examination of costs and returns at the aggregate level for the sample as a whole in the first section followed by analysis for all the four sampled states. Finally, we discern itemwise shares of spending for both vegetables and all crops to understand the relative importance and changing significance of different items of expenditure across markets, size and social categories of farmers and states.

The first section presents the costs and returns for all crops and vegetables at the aggregate level for all the sampled states, while the next four sections analyse the same for all the four sampled states viz., Delhi-NCR, Telangana, West Bengal and Maharashtra. The final section examines the disparate shares of expenditure groups across markets, size and social categories of farmers in the four states.

5.1. Costs and returns for all crops and vegetables at all India

In all-India, supermarket farmers reported higher expenditure per acre on seeds and lower expenditure on pesticides and herbicides for all-crops cultivation when compared to traditional farmers. Furthermore, marginal farmers received a significantly higher net income of 47% from cultivating all-crops than other category farmers. It is worth noting that there is a significant difference between SCST farmers and other category farmers in terms of expenditure on manure and fertilisers, and machine labour. The average net income received by all-India farmers from all-crops cultivation is ₹54052 per acre, as shown in Table 5.1.

Table 5.1. Costs, gross value of output and net income per acre of all-crops in all-India (2020-21) (in ₹)

S.No.	Particulars	Marketing channels		Farm-size holdings		Social categories		Overall
		SF	TF	Marginal farmers	Others	SCST	Others	
1	Seed	6116**	5417	6485***	4925	5251	5746	5707
	a) Chemical fertilisers	6371	5830	7502***	4600	6240	6039	6055
	b) Bio-fertilisers	114	131	188***	60	28	132	124
	c) FYM	1658	1667	1932**	1393	2833***	1563	1663
	d) Poultry manure	386	385	346	425	485	377	385
	e) Others	43	33	50	25	48	37	38
2	Manure and fertilisers	8572	8046	10018***	6503	9634*	8148	8265
	a) Pesticides	3171*	4633	4516	3533	4123	4018	4026
	b) Herbicides	310	385	492***	215	277	360	354
3	Pesticides and herbicides	3481*	5018	5008	3748	4400	4378	4380
	a) Irrigation cost	1595**	1217	1598***	1149	990	1407	1374
	b) Water purchase	775	872	1613***	47	104***	894	832
4	Irrigation charges	2370	2089	3211***	1196	1094***	2301	2206
5	Hired human labour	13788	12338	14080***	11795	10943	13111	12940
6	Machine labour	4407	4650	5228***	3866	5640***	4455	4549
	a) Repair and maintenance	1626	1642	2158***	1111	1880	1615	1636
	b) Cost of plastic ground	192*	109	129	159	110	147	144
	c) Cost of green-house plastic tunnel	22	5	3	21	18	12	12
	d) Expenditure on crop support	1295***	742	1759***	180	174***	1040	971
	e) Other costs	12	32	15	33	0	26	24
7	Miscellaneous cost	3147***	2530	4064***	1504	2182	2840	2787
A	Total Operational Cost (TOC)	41882	40088	48094***	33537	39143	40978	40834
B	Gross value of output (GVO)	100995	90549	112330***	77356	76865	96429	94885
Net income (B-A)		59113	50461	64237**	43819	37722	55452	54052
Observations		347	489	419	417	66	770	836

Note: SF means supermarket farmers, TF means traditional farmers, SCST means SC or ST category,
***, **, * indicates significant at the 1%, 5% and 10% respectively.

Table 5.2. Costs, gross value of output and net income per acre of vegetables in all-India (2020-21) (in ₹)

S.No.	Particulars	Marketing channels		Farm-size holdings		Social categories		Overall
		SF	TF	Marginal farmers	Others	SCST	Others	
1	Seed	8187*	7467	8539***	6989	7300	7806	7766
2	a) Chemical fertilisers	7111	6945	8813***	5206	7272	6992	7014
	b) Bio-fertilisers	135	127	192**	69	24	140	130
	c) FYM	1752	1890	2051*	1614	3525***	1688	1833
	d) Poultry manure	428	501	369*	572	771	445	470
	e) Others	68	38	66	35	51	51	51
	Manure and fertilisers	9494	9501	11491***	7496	11643**	9316	9498
3	a) Pesticide	4380	7080	5583	6337	5518	5997	5959
	b) Herbicides	254	287	373***	174	268	274	274
	Pesticides and herbicides	4634	7367	5956	6511	5786	6271	6233
4	a) Irrigation cost	1679*	1326	1667**	1278	1077	1507	1473
	b) Water purchase	892	1002	1860***	49	154***	1025	956
	Irrigation charges	2571	2328	3527***	1327	1231***	2532	2429
5	Hired human labour	17934	16200	16205	17638	14631	17116	16920
6	Machine labour	4421	4763	5178***	4062	5597***	4538	4621
7	a) Repair and maintenance	1706	1729	2239***	1197	1987	1697	1720
	b) Cost of plastic ground	315*	184	203	274	199	242	238
	c) Cost of green-house plastic tunnel	24	10	4	27	28	15	16
	d) Expenditure on crop support	1657***	1017	2275***	285	280***	1368	1282
	e) Other costs	4	3	4	4	0	4	4
	Miscellaneous	3706***	2943	4725***	1787	2494	3326	3260
A	Total Operational Cost (TOC)	50947	50569	55621***	45810	48682	50903	50727
B	Gross value of output (GVO)	124472***	106720	123501***	104631	103239	115019	114089
Net income (B-A)		73525***	56152	67881	58822	54557	64117	63363
Observations		347	489	419	417	66	770	836

Note: SF means supermarket farmers, TF means traditional farmers, SCST means SC or ST category,
values within the parenthesis indicates SD and frequency (Top to bottom respectively),
***, **, * indicates significant at the 1%, 5% and 10% respectively.

According to Table 5.2, farmers in all-India earned an average net income of ₹63363 per acre from vegetable cultivation, which is 17% higher than the net income from all-crops cultivation. The study also found that farmers selling to supermarkets had significantly higher expenditure per acre on seeds and crop support for vegetable cultivation, resulting in a 31% higher net income per acre than traditional farmers. Marginal farmers, on the other hand, have significantly higher expenditure on seeds, manure and fertilizers, machine labour, and crop support for vegetable cultivation compared to other category farmers. However, SCST farmers spend significantly lower expenditures on crop support activities in vegetable cultivation, with 80% lower spending than other categories of farmers, likely due to a lack of awareness.

Table 5.3. Costs, gross value of output and net income per acre of all-crops in Delhi-NCR (2020-21) (in ₹)

S.No.	Particulars	Marketing channels		Farm-size holdings		Social categories		Overall
		SF	TF	Marginal farmers	Others	SCST	Others	
1	Seed	4608**	3571	4725*	3802	6424**	3929	4024
	a) Chemical fertilisers	2784	3009	4576***	2383	3061	2905	2911
	b) Bio-fertilisers	16	6	14	10	0	11	11
	c) FYM	678	515	916**	481	110	605	586
	d) Poultry manure	56	137	105	101	0	106	102
	e) Others	31	58	128**	21	0	48	46
2	Manure and fertilisers	3565	3725	5739***	2995	3171	3674	3655
	a) Pesticides	1384	1424	2103***	1186	1203	1415	1407
	b) Herbicides	157	189	158	180	935***	145	175
3	Pesticides and herbicides	1541	1613	2261***	1366	2137	1559	1581
	a) Irrigation cost	2052	1543	3344***	1266	2576	1734	1766
	b) Water purchase	78	45	122	39	0	62	59
4	Irrigation charges	2130	1588	3466***	1305	2576	1795	1825
5	Hired human labour	14631***	7690	13064	9979	7370	10853	10721
6	Machine labour	3014	2933	3548***	2785	2724	2978	2968
	a) Repair and maintenance	1618***	893	1963***	971	890	1222	1209
	b) Cost of plastic ground	85	15	118	22	0	47	45
	c) Cost of green-house plastic tunnel	0	13	0	10	0	8	7
	d) Expenditure on crop support	101	137	105	126	0	126	121
	e) Other costs	23	0	0	13	0	10	10
7	Miscellaneous cost	1827**	1057	2187***	1142	890	1413	1393
A	Total Operational Cost (TOC)	31315***	22178	34989***	23375	25292	26203	26168
B	Gross value of output (GVO)	84250	70739	111233**	65684	65069	77096	76639
Net income (B-A)		52935	48561	76243*	42310	39777	50893	50471
Observations		69	89	38	120	6	152	158

Note: SF means supermarket farmers, TF means traditional farmers, SCST means SC or ST category,
values within the parenthesis indicates SD and frequency (Top to bottom respectively),
***, **, * indicates significant at the 1%, 5% and 10% respectively.

5.2. **Costs and returns for all crops and vegetables in Delhi-NCR**

According to Table 5.3, farmers selling to supermarkets in Delhi-NCR reported significantly higher expenditure per acre on seeds and hired human labour for all-crops cultivation than traditional farmers. The marginal farmers received a significantly higher net income per acre from all-crop cultivations while incurring significantly higher expenditures on seeds, manure and fertilizers, pesticides & herbicides, irrigation charges, and machine labor than other category farmers. SCST farmers reported significantly higher expenditures on seeds than other category farmers. The average net income per acre for all-crops cultivation in Delhi-NCR is ₹50,471.

Table 5.4. Costs, gross value of output and net income per acre of vegetables in Delhi-NCR (2020-21) (in ₹)

S.No.	Particulars	Marketing channels		Farm-size holdings		Social categories		Overall
		SF	TF	Marginal farmers	Others	SCST	Others	
1	Seed	8369**	5939	7480	6848	9963	6883	7000
2	a) Chemical fertilisers	3452	3544	5111***	2995	3638	3499	3504
	b) Bio-fertilisers	29	23	14	30	0	27	26
	c) FYM	811	629	931	638	100	733	709
	d) Poultry manure	53	179	101	131	0	129	124
	e) Others	74	118	253**	50	0	103	99
	Manure and fertilisers	4420	4493	6410***	3844	3738	4490	4461
3	a) Pesticide	2034	4201	3015	3331	1577	3321	3255
	b) Herbicides	121	144	127	136	542***	118	134
	Pesticides and herbicides	2154	4346	3142	3467	2118	3439	3389
4	a) Irrigation cost	2241	1665	3358***	1460	2922	1877	1917
	b) Water purchase	120	42	197	38	0	79	76
	Irrigation charges	2361	1707	3556***	1498	2922	1956	1993
5	Hired human labour	28284***	13917	19304	20472	10706	20565	20191
6	Machine labour	2925	2903	3234	2811	2493	2929	2912
7	a) Repair and maintenance	1619**	907	1953***	985	891	1231	1218
	b) Cost of plastic ground	100	5	118	24	0	48	46
	c) Cost of green-house plastic tunnel	0	21	0	15	0	12	12
	d) Expenditure on crop support	137	247	184	203	0	207	199
	e) Other costs	23	0	0	13	0	10	10
	Miscellaneous	1878**	1180	2255***	1241	891	1508	1485
A	Total Operational Cost (TOC)	50391***	34484	45381	40180	32831	41770	41431
B	Gross value of output (GVO)	117457**	87270	112153	96748	90729	100837	100453
Net income (B-A)		67067	52786	66772	56568	57898	59067	59022
Observations		69	89	38	120	6	152	158

Note: SF means supermarket farmers, TF means traditional farmers, SCST means SC or ST category,
values within the parenthesis indicates SD and frequency (Top to bottom respectively),
***, **, * indicates significant at the 1%, 5% and 10% respectively.

The findings reveal that farmers who supply vegetables to supermarkets incur significantly higher expenditures per acre on seeds and hired human labour than traditional farmers I Delhi-NCR (Table 5.4). The marginal farmers, on the other hand, report significantly higher expenditures on manure and fertilisers, as well as irrigation charges for vegetable cultivation, than other category farmers. Additionally, farmers in Delhi-NCR report an average net income of ₹59022 per acre from vegetable cultivation, which is 17% higher than the net income from all-crops cultivation.

Table 5.5. Costs, gross value of output and net income per acre of all-crops in Telangana (2020-21) (in ₹)

S.No.	Particulars	Marketing channels		Farm-size holdings		Social categories		Overall
		SF	TF	Marginal farmers	Others	SCST	Others	
1	Seed	4818	4372	5201***	4103	4622	4515	4531
	a) Chemical fertilisers	6056	5203	6336***	4979	6631*	5302	5508
	b) Bio-fertilisers	1	3	5	0	0	2	2
	c) FYM	1559	1456	2278***	990	2870***	1239	1493
	d) Poultry manure	926	720	893	730	604	828	794
	e) Others	4	15	4	15	59**	2	11
2	Manure and fertilisers	8545	7396	9516***	6715	10163***	7374	7807
	a) Pesticides	4172	6110	5340	5465	4462	5592	5416
	b) Herbicides	167	175	244***	126	123	181	172
3	Pesticides and herbicides	4338	6285	5584	5591	4586	5773	5588
	a) Irrigation cost	104	111	176***	65	155***	100	108
	b) Water purchase	3	53	69	13	51	32	35
4	Irrigation charges	106	164	245***	78	206	132	143
5	Hired human labour	13076	11956	12869	12029	11108	12586	12356
6	Machine labour	5844	5476	7077***	4668	6070	5523	5608
	a) Repair and maintenance	1649	1698	2561***	1118	1981	1625	1681
	b) Cost of plastic ground	431**	197	344	240	136	307	281
	c) Cost of green-house plastic tunnel	0	7	9	1	22**	1	4
	d) Expenditure on crop support	322	148	314	144	138	224	210
	e) Other costs	0	0	0	0	0	0	0
7	Miscellaneous cost	2402	2050	3227***	1504	2277	2157	2176
A	Total Operational Cost (TOC)	39129	37699	43719***	34688	39032	38060	38211
B	Gross value of output (GVO)	68489	59929	68425	59517	68124	62047	62991
Net income (B-A)		29359	22230	24706	24828	29092	23987	24781
Observations		122	219	133	208	53	288	341

Note: SF means supermarket farmers, TF means traditional farmers, SCST means SC or ST category, values within the parenthesis indicates SD and frequency (Top to bottom respectively), ***, **, * indicates significant at the 1%, 5% and 10% respectively.

5.3. **Costs and returns for all crops and vegetables in Telangana**

The study found no statistically significant difference in net income per acre between farmers selling in supermarkets and traditional markets for all-crop cultivation in Telangana (Table 5.5). However, marginal farmers in Telangana state reported significantly higher expenditure on seeds, manure and fertilizers, irrigation charges, and machine labour than other category farmers. Additionally, SCST farmers reported significantly higher spending on manure and fertilizers than other category farmers. Notably, farmers in the Telangana reported a 54% lower net income per acre from all-crop cultivation compared to the all-India average net income per acre value.

Table 5.6. Costs, gross value of output and net income per acre of vegetables in Telangana (2020-21) (in ₹)

S.No.	Particulars	Marketing channels		Farm-size holdings		Social categories		Overall
		SF	TF	Marginal farmers	Others	SCST	Others	
1	Seed	7092**	6094	7150***	6005	6708	6404	6451
2	a) Chemical fertilisers	6861	5947	7058**	5773	7845**	5985	6274
	b) Bio-fertilisers	3	4	8	1	0	5	4
	c) FYM	1692	1970	2661***	1366	3644***	1545	1871
	d) Poultry manure	969	985	962	990	960	983	979
	e) Others	0	15	0	16	63**	0	10
	Manure and fertilisers	9525	8922	10689***	8146	12512***	8517	9138
3	a) Pesticide	6262	10697	8123	9742	6131	9659	9111
	b) Herbicides	153	190	240**	137	165	179	177
	Pesticides and herbicides	6413	10888	8362	9878	6296	9837	9287
4	a) Irrigation cost	158	160	245***	104	225**	147	159
	b) Water purchase	0	45	51	15	114*	13	29
	Irrigation charges	158	205	296***	119	338***	161	188
5	Hired human labour	16347	16321	15043	17154	15264	16527	16330
6	Machine labour	5798	5695	6939***	4960	6066	5670	5732
7	a) Repair and maintenance	1859**	1885	2808***	1280	2114	1832	1876
	b) Cost of plastic ground	643*	341	573	370	248	486	449
	c) Cost of green-house plastic tunnel	0	13	14	5	34*	4	8
	d) Expenditure on crop support	450	275	500	234	269	350	338
	e) Other costs	0	0	0	0	0	0	0
	Miscellaneous	2953	2514	3895***	1889	2666	2672	2671
A	Total Operational Cost (TOC)	48289	50640	52374	48152	49850	49789	49799
B	Gross value of output (GVO)	92884	89882	92063	90248	98395	89587	90956
Net income (B-A)		44596	39242	39689	42097	48545	39798	41157
Observations		122	219	133	208	53	288	341

Note: SF means supermarket farmers, TF means traditional farmers, SCST means SC or ST category,
values within the parenthesis indicates SD and frequency (Top to bottom respectively),
***, **, * indicates significant at the 1%, 5% and 10% respectively.

Table 5.6 shows that Telangana state farmers received a 66% higher net income per acre from vegetable cultivation than from all-crops cultivation. However, this value is 35% lower than all India's average net income per acre. Supermarket farmers have significantly higher expenditures per acre on seeds than traditional farmers, whereas marginal farmers have higher expenditures on seeds, manure, fertilizers, and machine labour than other category farmers. Lastly, SCST farmers have significantly higher expenditure per acre on manure and fertilizers than other category farmers for vegetable cultivation.

Table 5.7. Costs, gross value of output and net income per acre of all-crops in West Bengal (2020-21) (in ₹)

S.No.	Particulars	Marketing channels		Farm-size holdings		Social categories		Overall
		SF	TF	Marginal farmers	Others	SCST	Others	
1	Seed	7466*	6186	6782	4041	5333	6758	6750
	a) Chemical fertilisers	9247	8865	8982	13271	5742	9053	9033
	b) Bio-fertilisers	467*	224	320	1219	1600	323	331
	c) FYM	261	214	238	0	0	236	235
	d) Poultry manure	0	0	0	0	0	0	0
	e) Others	127**	33	61***	1150	0	75	74
2	Manure and fertilisers	10102	9335	9601	15640	7342	9687	9673
	a) Pesticides	4542	6287	5521	5323	13417	5471	5519
	b) Herbicides	445	533	500	64	1667	487	495
3	Pesticides and herbicides	4987	6820	6021	5386	15083	5959	6013
	a) Irrigation cost	504	617	574	0	0	571	567
	b) Water purchase	3510*	4363	3973	5193	4168	3986	3987
4	Irrigation charges	4014**	4980	4547	5193	4168	4557	4554
5	Hired human labour	15740	16165	15770	33258	15333	15982	15978
6	Machine labour	3695	3905	3831	2241	2500	3820	3812
	a) Repair and maintenance	1710	1974	1874	525	668	1865	1858
	b) Cost of plastic ground	6	0	3	0	0	3	3
	c) Cost of green-house plastic tunnel	0	0	0	0	0	0	0
	d) Expenditure on crop support	4705**	3081	3826	1359	4167	3794	3797
	e) Other costs	0	13	7	0	0	7	7
7	Miscellaneous cost	6421*	5068	5709	1884	4834	5669	5664
A	Total Operational Cost (TOC)	52426	52458	52260	67643	54593	52431	52444
B	Gross value of output (GVO)	134387	150780	143274	167227	515417	141333	143559
Net income (B-A)		81962	98322	91014	99584	460823	88902	91116
Observations		74	94	166	2	1	167	168

Note: SF means supermarket farmers, TF means traditional farmers, SCST means SC or ST category,
values within the parenthesis indicates SD and frequency (Top to bottom respectively),
***, **, * indicates significant at the 1%, 5% and 10% respectively.

5.4. **Costs and returns for all crops and vegetables in West Bengal**

Supermarket farmers in West Bengal state reported significantly higher expenditure per acre on seeds and crop support for all-crops cultivation but lower expenditure on irrigation charges than traditional farmers. The results also revealed that farmers in West Bengal state generated an average net income of ₹91116 per acre, 69% higher than the average net income per acre from all-crops cultivation in all-India (Table 5.7).

Table 5.8. Costs, gross value of output and net income per acre of vegetables in West Bengal (2020-21) (in ₹)

S.No.	Particulars	Marketing channels		Farm-size holdings		Social categories		Overall
		SF	TF	Marginal farmers	Others	SCST	Others	
1	Seed	8948	9418	9273	4041	5333	9234	9211
2	a) Chemical fertilisers	10360	12045	11279	13271	5742	11336	11303
	b) Bio-fertilisers	559*	262	382	1219	1600	385	392
	c) FYM	270	281	279	0	0	278	276
	d) Poultry manure	0	0	0	0	0	0	0
	e) Others	198**	51	103***	1150	0	116	116
	Manure and fertilisers	11387	12638	12044	15640	7342	12115	12087
3	a) Pesticide	5360	5577	5484	5323	13417	5434	5482
	b) Herbicides	468	590	542	64	1667	529	536
	Pesticides and herbicides	5828	6167	6025	5386	15083	5963	6018
4	a) Irrigation cost	527	653	605	0	0	601	598
	b) Water purchase	4026	5064	4600	5193	4168	4610	4607
	Irrigation charges	4553*	5717	5205	5193	4168	5211	5205
5	Hired human labour	16206	18398	17242	33258	15333	17445	17432
6	Machine labour	3702	3962	3867	2241	2500	3856	3848
7	a) Repair and maintenance	1713	1999	1889	525	668	1880	1873
	b) Cost of plastic ground	6	0	3	0	0	3	3
	c) Cost of green-house plastic tunnel	0	0	0	0	0	0	0
	d) Expenditure on crop support	5557*	4229	4856	1359	4167	4818	4814
	e) Other costs	0	16	9	0	0	9	9
	Miscellaneous	7275	6244	6756	1884	4834	6710	6698
A	Total Operational Cost (TOC)	57899	62545	60412	67643	54593	60534	60499
B	Gross value of output (GVO)	153686	150898	151944	167227	515417	149951	152126
Net income (B-A)		95788	88352	91532	99584	460823	89417	91627
Observations		74	94	166	2	1	167	168

Note: SF means supermarket farmers, TF means traditional farmers, SCST means SC or ST category,
values within the parenthesis indicates SD and frequency (Top to bottom respectively),
***, **, * indicates significant at the 1%, 5% and 10% respectively.

Supermarket farmers in West Bengal reported significantly higher expenditures on crop support and lower spending on irrigation charges for vegetable cultivation than traditional farmers. There is no significant difference between marginal and other category farmers regarding the net income received per acre from vegetable cultivation. On average, farmers in West Bengal received a net income per acre of ₹91627 from vegetable cultivation, which is one percent higher than the net income per acre received from all-crops cultivation and 45% higher than the all-India average net income per acre from vegetable cultivation, as shown in Table 5.8.

Table 5.9. Costs, gross value of output and net income per acre of all-crops in Maharashtra (2020-21) (in ₹)

S.No.	Particulars	Marketing channels		Farm-size holdings		Social categories		Overall
		SF	TF	Marginal farmers	Others	SCST	Others	
1	Seed	8100	9103	8782	8461	9626	8579	8617
	a) Chemical fertilisers	7263	7015	7754**	6553	6052	7175	7135
	b) Bio-fertilisers	46**	484	299	246	39	280	272
	c) FYM	3892	4945	5272***	3644	5706	4387	4434
	d) Poultry manure	209	210	270	152	0	217	209
	e) Others	37	55	64	30	0	48	46
2	Manure and fertilisers	11448	12709	13659***	10625	11797	12108	12097
	a) Pesticides	1946	2412	2265	2111	2502	2174	2186
	b) Herbicides	528	953	1032	478	743	747	747
3	Pesticides and herbicides	2474	3365	3297	2589	3245	2921	2933
	a) Irrigation cost	4415	4313	5166***	3605	6944**	4267	4362
	b) Water purchase	42*	10	32	19	0	26	25
4	Irrigation charges	4456	4323	5198***	3624	6944**	4293	4388
5	Hired human labour	12377	13922	13093	13248	12328	13204	13173
6	Machine labour	4086**	5129	5836***	3479	5285	4598	4623
	a) Repair and maintenance	1524	1909	2169***	1302	2179	1706	1722
	b) Cost of plastic ground	96	102	41*	154	0	103	99
	c) Cost of green-house plastic tunnel	91	0	0	86	0	46	44
	d) Expenditure on crop support	670	328	687	311	0	512	494
	e) Other costs	31	167	61	139	0	105	101
7	Miscellaneous cost	2413	2506	2958**	1993	2179	2471	2461
A	Total Operational Cost (TOC)	45354	51058	52822**	44018	51404	48175	48290
B	Gross value of output (GVO)	133314	122815	121405	134039	92786	129202	127909
Net income (B-A)		87961	71757	68583	90021	41382	81027	79619
Observations		82	87	82	87	6	163	169

Note: SF means supermarket farmers, TF means traditional farmers, SCST means SC or ST category,
values within the parenthesis indicates SD and frequency (Top to bottom respectively),
***, **, * indicates significant at the 1%, 5% and 10% respectively.

5.5. **Costs and returns for all crops and vegetables in Maharashtra**

Supermarket farmers in Maharashtra state spent significantly less on machine labour for all-crop cultivation than traditional farmers. In contrast, marginal farmers spent significantly more on manure and fertilizers, irrigation charges, and machine labour for all-crops cultivation than other category farmers. Additionally, SCST farmers have considerably higher expenditures on irrigation charges for all-crop cultivation than other farmers. On average, farmers in Maharashtra received a net income of ₹79619 per acre from all-crops cultivation. (Table 5.9).

Table 5.10. Costs, gross value of output and net income per acre of vegetables in Maharashtra (2020-21) (in ₹)

S.No.	Particulars	Marketing channels		Farm-size holdings		Social categories		Overall
		SF	TF	Marginal farmers	Others	SCST	Others	
1	Seed	8975	10378	9795	9605	10197	9679	9697
2	a) Chemical fertilisers	7631	7423	8382***	6715	6108	7576	7524
	b) Bio-fertilisers	38	397	186	258	0	232	223
	c) FYM	3970	4717	5166**	3590	6483	4276	4354
	d) Poultry manure	323	152	280	192	0	244	235
	e) Others	47**	0	10	35	0	24	23
	Manure and fertilisers	12011	12689	14024***	10791	12591	12351	12360
3	a) Pesticide	2669	2540	2854	2366	2727	2598	2603
	b) Herbicides	322	352	361	315	673**	325	338
	Pesticides and herbicides	2992	2892	3215	2681	3400	2923	2940
4	a) Irrigation cost	4510	4641	5339***	3860	6944*	4490	4578
	b) Water purchase	39**	4	16	26	0	22	21
	Irrigation charges	4549	4645	5356***	3885	6944*	4512	4599
5	Hired human labour	13147	15856	14557	14527	12843	14604	14542
6	Machine labour	4279*	5187	5876***	3682	5071	4735	4747
7	a) Repair and maintenance	1544	1887	2158***	1309	2179	1704	1721
	b) Cost of plastic ground	288	170	49*	396	0	236	227
	c) Cost of green-house plastic tunnel	102	0	0	96	0	51	49
	d) Expenditure on crop support	1213***	199	899	495	0	717	691
	e) Other costs	0	0	0	0	0	0	0
	Miscellaneous	3146	2257	3106	2295	2179	2707	2688
A	Total Operational Cost (TOC)	49099	53904	55928**	47468	53226	51512	51573
B	Gross value of output (GVO)	151009*	121273	122174	148450	89844	137389	135701
Net income (B-A)		101909**	67368	66245**	100983	36618	85877	84128
Observations		82	87	82	87	6	163	169

Note: SF means supermarket farmers, TF means traditional farmers, SCST means SC or ST category,
values within the parenthesis indicates SD and frequency (Top to bottom respectively),
***, **, * indicates significant at the 1%, 5% and 10% respectively.

According to Table 5.10, farmers in Maharashtra state received an average net income of ₹84,128 per acre from vegetable cultivation, which is 6% higher than the net income per acre from all-crops and 33% higher than the all-India average. The study also revealed that farmers selling to supermarkets earn a significantly higher net income per acre (51%) from vegetable cultivation than those selling to traditional markets. In comparison, marginal farmers earn 34% lower net income per acre than other-category farmers. Additionally, SCST farmers have higher expenditure per acre on irrigation charges for vegetable cultivation than other category farmers.

Table 5.11. Item wise percentage share to total operational costs across marketing channels, farm-size holdings, and social categories for all-crops (2020-21) (%)

States	Particulars	Marketing channels		Farm-size holdings		Social categories		Overall
		SF	TF	Marginal farmers	Others	SCST	Others	
Delhi-NCR	Seeds	14.71	16.10	13.50	16.27	25.40	14.99	15.38
	Manure and fertilisers	11.38	16.80	16.40	12.81	12.54	14.02	13.97
	Pesticides and herbicides	4.92	7.27	6.46	5.84	8.45	5.95	6.04
	Irrigation charges	6.80	7.16	9.91	5.58	10.18	6.85	6.97
	Hired human labour	46.72	34.67	37.34	42.69	29.14	41.42	40.97
	Machine labour	9.62	13.23	10.14	11.91	10.77	11.37	11.34
	Miscellaneous cost	5.83	4.77	6.25	4.89	3.52	5.39	5.32
Telangana	Seeds	12.31	11.60	11.90	11.83	11.84	11.86	11.86
	Manure and fertilisers	21.84	19.62	21.77	19.36	26.04	19.37	20.43
	Pesticides and herbicides	11.09	16.67	12.77	16.12	11.75	15.17	14.62
	Irrigation charges	0.27	0.43	0.56	0.22	0.53	0.35	0.37
	Hired human labour	33.42	31.71	29.44	34.68	28.46	33.07	32.34
	Machine labour	14.93	14.53	16.19	13.46	15.55	14.51	14.68
	Miscellaneous cost	6.14	5.44	7.38	4.34	5.83	5.67	5.70
W.Bengal	Seeds	14.24	11.79	12.98	5.97	9.77	12.89	12.87
	Manure and fertilisers	19.27	17.80	18.37	23.12	13.45	18.48	18.44
	Pesticides and herbicides	9.51	13.00	11.52	7.96	27.63	11.37	11.47
	Irrigation charges	7.66	9.49	8.70	7.68	7.63	8.69	8.68
	Hired human labour	30.02	30.82	30.18	49.17	28.09	30.48	30.47
	Machine labour	7.05	7.44	7.33	3.31	4.58	7.29	7.27
	Miscellaneous cost	12.25	9.66	10.92	2.79	8.85	10.81	10.80
Maharashtra	Seeds	17.86	17.83	16.63	19.22	18.73	17.81	17.84
	Manure and fertilisers	25.24	24.89	25.86	24.14	22.95	25.13	25.05
	Pesticides and herbicides	5.45	6.59	6.24	5.88	6.31	6.06	6.07
	Irrigation charges	9.83	8.47	9.84	8.23	13.51	8.91	9.09
	Hired human labour	27.29	27.27	24.79	30.10	23.98	27.41	27.28
	Machine labour	9.01	10.05	11.05	7.90	10.28	9.55	9.57
	Miscellaneous cost	5.32	4.91	5.60	4.53	4.24	5.13	5.10
All-India	Seeds	14.60	13.51	13.48	14.69	13.41	14.02	13.98
	Manure and fertilisers	20.47	20.07	20.83	19.39	24.61	19.88	20.24
	Pesticides and herbicides	8.31	12.52	10.41	11.18	11.24	10.68	10.73
	Irrigation charges	5.66	5.21	6.68	3.57	2.79	5.62	5.40
	Hired human labour	32.92	30.78	29.28	35.17	27.96	32.00	31.69
	Machine labour	10.52	11.60	10.87	11.53	14.41	10.87	11.14
	Miscellaneous cost	7.51	6.31	8.45	4.48	5.57	6.93	6.83

Table 5.12. Item wise percentage share to total operational costs across marketing channels, farm-size holdings and social categories for vegetables (2020-21) (%)

Vegetables								
States	Particulars	Marketing channels		Farm-size holdings		Social categories		Overall
		SF	TF	Marginal farmers	Others	SCST	Others	
Delhi-NCR	Seeds	16.61	17.22	16.48	17.04	30.35	16.48	16.90
	Manure and fertilisers	8.77	13.03	14.12	9.57	11.39	10.75	10.77
	Pesticides and herbicides	4.27	12.60	6.92	8.63	6.45	8.23	8.18
	Irrigation charges	4.69	4.95	7.84	3.73	8.90	4.68	4.81
	Hired human labour	56.13	40.36	42.54	50.95	32.61	49.23	48.73
	Machine labour	5.80	8.42	7.13	7.00	7.59	7.01	7.03
	Miscellaneous cost	3.73	3.42	4.97	3.09	2.71	3.61	3.58
Telangana	Seeds	14.69	12.03	13.65	12.47	13.46	12.86	12.95
	Manure and fertilisers	19.73	17.62	20.41	16.92	25.10	17.11	18.35
	Pesticides and herbicides	13.28	21.50	15.97	20.51	12.63	19.76	18.65
	Irrigation charges	0.33	0.41	0.57	0.25	0.68	0.32	0.38
	Hired human labour	33.85	32.23	28.72	35.62	30.62	33.19	32.79
	Machine labour	12.01	11.25	13.25	10.30	12.17	11.39	11.51
	Miscellaneous cost	6.12	4.96	7.44	3.92	5.35	5.37	5.36
W.Bengal	Seeds	15.45	15.06	15.35	5.97	9.77	15.25	15.23
	Manure and fertilisers	19.67	20.21	19.94	23.12	13.45	20.01	19.98
	Pesticides and herbicides	10.07	9.86	9.97	7.96	27.63	9.85	9.95
	Irrigation charges	7.86	9.14	8.62	7.68	7.63	8.61	8.60
	Hired human labour	27.99	29.42	28.54	49.17	28.09	28.82	28.81
	Machine labour	6.39	6.34	6.40	3.31	4.58	6.37	6.36
	Miscellaneous cost	12.57	9.98	11.18	2.79	8.85	11.08	11.07
Maharashtra	Seeds	18.28	19.25	17.51	20.23	19.16	18.79	18.80
	Manure and fertilisers	24.46	23.54	25.08	22.73	23.66	23.98	23.97
	Pesticides and herbicides	6.09	5.37	5.75	5.65	6.39	5.67	5.70
	Irrigation charges	9.27	8.62	9.58	8.19	13.05	8.76	8.92
	Hired human labour	26.78	29.42	26.03	30.60	24.13	28.35	28.20
	Machine labour	8.72	9.62	10.51	7.76	9.53	9.19	9.20
	Miscellaneous cost	6.41	4.19	5.55	4.84	4.09	5.26	5.21
All-India	Seeds	16.07	14.77	15.35	15.26	15.00	15.34	15.31
	Manure and fertilisers	18.64	18.79	20.66	16.36	23.92	18.30	18.72
	Pesticides and herbicides	9.10	14.57	10.71	14.21	11.89	12.32	12.29
	Irrigation charges	5.05	4.60	6.34	2.90	2.53	4.97	4.79
	Hired human labour	35.20	32.04	29.13	38.50	30.05	33.62	33.36
	Machine labour	8.68	9.42	9.31	8.87	11.50	8.91	9.11
	Miscellaneous cost	7.27	5.82	8.49	3.90	5.12	6.53	6.43

5.6. Item-wise share of expenditures for all crops and vegetables

The share of expenditure on hired labour for vegetables is 28% of the total operational cost in all states. Notably, farmers in Telangana reported a higher share of spending on pesticides and herbicides at 18.65% and a lower share of expenditure on seeds at 12.95%, whereas in other sampled states, the expenditure share ranges between 5-10% on pesticides and herbicides and 15-19% on seeds for vegetable cultivation. The results suggest that farmers in Telangana tend to apply more pesticides and herbicides for vegetable cultivation than in other states. Further intensive research is needed to understand why farmers in Telangana state reported a higher expenditure on pesticides and herbicides and less on seeds than other states (Tables 5.11 and 5.12).

Chapter 6
Livestock and Non-Farm Incomes including Transfer Payments

We analyse income data from livestock and other non-farm income sources in this chapter. Our survey administered detailed questions on the ownership pattern, expenditure, income on products, and self-consumption from livestock. It also included questions on the other incomes from various non-farm sources, including non-agricultural labour, petty business, unskilled and low-skilled jobs, and transfer payments from the federal and provincial governments.

The possession of livestock has the twin benefits of increasing incomes and spurring the consumption of nutritious products that improve protein and mineral intake (Ruel et al., 2013). The diversification of agricultural production by including livestock has proven to be an effective means of accelerating agricultural growth and reducing rural poverty. According to Pingali (2007), the livestock sector has experienced rapidly increasing scales of production in response to the growing demand for meat, milk, and eggs. According to Narayanamoorthy et al. (2022), there has been a notable rise in the proportion of income generated from animal farming in India, even in advanced agricultural states. On the other hand, income generated from non-farm sources form significant share of farmers' income in recent years, as revealed by analysis of Situation Assessment Survey data of 2018-19 (Narayanamoorthy and Nuthalapati, 2023). We present analysis of data from vegetable growers in the four states on possession, expenditure, and income from livestock in the first section. The second section provides non-farm incomes received on various sources that include rural business and governmental transfer payments like PM-Kisan, Rythu Bandhu and others.

6.1. Possession, expenditure, and income from livestock

Field data indicate that nearly half (48%) of all vegetable growers have some livestock, including small ruminants (Figure 6.1). The proportion is the highest in Delhi-NCR, which includes Haryana (72%), followed by Maharashtra (65%), Telangana (38%), and West Bengal (30%). The predominantly smallholder vegetable growers in Telangana and West Bengal are deprived of this crucial insurance against crop failures. While the small pieces of land give those meagre incomes, crop failures make their lives miserable, leading to distress-driven cuts in consumption and reduced harnessing services like health and education. Across marketing channels, there is not much difference in the sample growers overall. However, traditional farmers own relatively more livestock than supermarket farmers in all the states except Maharashtra (Figure 6.2).

Figure 6.1: Percentage of Vegetable Growers Owning Livestock

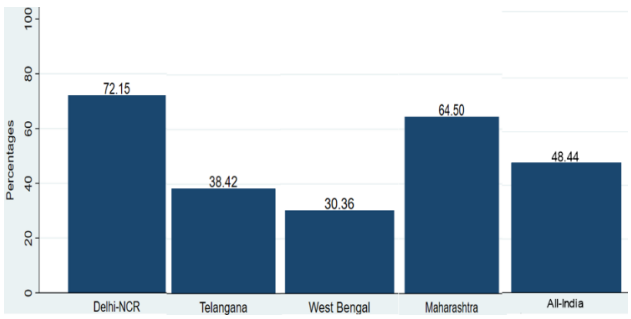


Figure 6.2. Percentage of respondents adopted animal husbandry across marketing channels

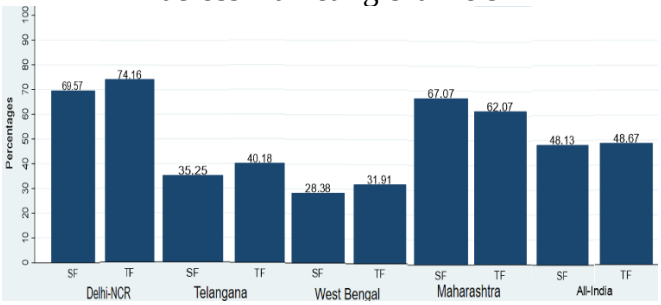


Table 6.1. Gross income received from milk during 2020-21 (in ₹)

State	Marketing Channel		Farm size holding		Social category		Overall
	SF	TF	Marginal farmers	Others	SCST	Others	
Delhi-NCR	85503	99625	70884	100606	43760	95419	93458
	(91826)	(106574)	(85749)	(103838)	(40617)	(101544)	(100338)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)
Telangana	13128*	7050	8934	9410	6362	9751	9224
	(36260)	(25097)	(25444)	(32139)	(19960)	(31126)	(29669)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)
W.Bengal	943	684	808	0	0	803	798
	(5054)	(4541)	(4789)	(0)	(0)	(4775)	(4761)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)
Maharashtra	30228	28266	23000*	35079	20393	29543	29218
	(54691)	(39382)	(33581)	(56888)	(20123)	(48004)	(47297)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)
All-India	28962	26450	14086***	40964	10941**	28911	27493
	(60965)	(62296)	(38343)	(76201)	(24564)	(63719)	(61723)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)

Note: SF means supermarket farmers, TF means traditional farmers,
SCST means farmers belongs to SC or ST category, values within the parenthesis indicates SD and frequency (top to bottom respectively),
***, ** and * indicates significant the 1%, 5% and 10% level respectively.

The vegetable farmers earn Rs. 27493/- on average from milk production, with wide variations across different states (Table 6.1). The farmers from Delhi-NCR earn only 3% of this. At the all-India level, there was no significant difference between the income of supermarkets and traditional market farmers. However, in Telangana state, supermarket farmers reported an86% higher income from milk than traditional market farmers. The marginal farmers in Maharashtra state and at the all-India level reported significantly lower income from milk compared to other categories of farmers. Similarly, SCST farmers earn a significantly lower income of 62% from milk than other category farmers. According to Kumar *et al*. (2018), smallholders are increasingly dominating milk production in India, and dairying is becoming a viable livelihood option for them, especially in states like Maharashtra.

Table 6.2. Income received from dung during 2020-21 (in ₹)

	Marketing Channel		Farm size holding		Social category		
State	SF	TF	Marginal farmers	Others	SCST	Others	Overall
Delhi-NCR	3229	3413	2618	3559	2117	3381	3333
	(4260)	(3448)	(3122)	(3991)	(2862)	(3844)	(3812)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)
Telangana	2273	1515	1801	1776	1123	1908	1786
	(8501)	(7518)	(8207)	(7684)	(3991)	(8401)	(7880)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)
W.Bengal	103	116	111	0	0	111	110
	(445)	(472)	(462)	(0)	(0)	(460)	(459)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)
Maharashtra	4469	4334	3482**	5264	2917	4454	4399
	(4969)	(5352)	(4726)	(5415)	(4674)	(5177)	(5155)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)
All-India	2519	2093	1535***	3008	1359	2348	2270
	(6077)	(5882)	(5312)	(6477)	(3925)	(6103)	(5964)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)

Note: SF means supermarket farmers, TF means traditional farmers,
SCST means farmers belongs to SC or ST category, values within the parenthesis indicates SD and frequency (top to bottom respectively),
***, ** and * indicates significant the 1%, 5% and 10% level respectively.

The production of dung translates to an annual income of Rs.2270/- for these growers, which constitutes nearly 10% of the income from milk (Table 6.2). The marginal and SCST farmers earn 32% and 40% less from dung than the all-India average. In this regard, there is no significant difference between farmers selling to modern and traditional markets.

Table 6.3. Income received from meat during 2020-21 (in ₹)

	Marketing Channel		Farm size holding		Social category		
State	SF	TF	Marginal farmers	Others	SCST	Others	Overall
Delhi-NCR	4	126	0	96	0	76	73
	(36)	(675)	(0)	(584)	(0)	(520)	(510)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)
Telangana	1500	860	1598	764	1101	1087	1089
	(7226)	(3953)	(7408)	(3444)	(4335)	(5531)	(5357)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)
W.Bengal	434	928	719	0	0	715	710
	(1949)	(6332)	(4933)	(0)	(0)	(4919)	(4904)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)
Maharashtra	195	2163	232	2129	0	1253	1208
	(1036)	(13458)	(1709)	(13398)	(0)	(9881)	(9706)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)
All-India	667	971	837	853	884	842	845
	(4440)	(6857)	(5275)	(6605)	(3903)	(6119)	(5972)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)

Note: SF means supermarket farmers, TF means traditional farmers,
SCST means farmers belongs to SC or ST category, values within the parenthesis indicates SD and frequency(top to bottom respectively),
***, ** and * indicates significant the 1%, 5% and 10% level respectively.

According to Table 6.3, the average income from meat received by farmers at the all-India level was ₹845. Supermarket and marginal farmers received lower incomes of 21% and 1%, respectively, compared to the all-India average. However, SCST farmers received a higher income of 5% compared to the all-India average.

Table 6.4. Gross income received from livestock during 2020-21 (in ₹)

State	Marketing Channel		Farm size holding		Social category		Overall
	SF	TF	Marginal farmers	Others	SCST	Others	
Delhi-NCR	88736	103165	73502	104261	45877	98876	96864
	(94853)	(109027)	(88228)	(106535)	(41219)	(104255)	(103010)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)
Telangana	16900*	9424	12332	11950	8586	12745	12099
	(43388)	(31082)	(34312)	(37258)	(26172)	(37629)	(36087)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)
W.Bengal	1480	1728	1638	0	0	1629	1619
	(5782)	(7957)	(7104)	(0)	(0)	(7083)	(7063)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)
Maharashtra	34892	34763	26714*	42471	23310	35250	34826
	(58686)	(50569)	(37320)	(66086)	(23060)	(55300)	(54494)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)
All-India	32148	29514	16458***	44825	13185**	32101	30607
	(64524)	(66045)	(41949)	(80066)	(29113)	(67403)	(65392)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)

Note: SF means supermarket farmers, TF means traditional farmers,
SCST means farmers belongs to SC or ST category, values within the parenthesis indicates SD and frequency(top to bottom respectively),
***, ** and * indicates significant the 1%, 5% and 10% level respectively.

The total gross income from livestock activities fetched an annual income of Rs.30607, with wide statewise variations observed in the case of milk (Table 6.4). The average gross income received by farmers in India from livestock activity comprised 90% from milk, 7% from dung, and 3% from meat. There is no difference in gross income across marketing channels, farm size, and social categories. As can be seen from the table, supermarket farmers in Telangana state reported a significantly higher gross income (79%) from livestock activity. It is important to note that gross income includes the imputed value of owned consumption of milk and dung. During our field survey, we observed that farmers in West Bengal primarily depend on fishery and duck-rearing activities rather than livestock activity. This is the primary reason West Bengal reported a 95% lower gross income from livestock activity compared to the all-India average gross income values. The total income received from fishery and duck-rearing activity is highlighted in the chapter on non-farm income activities.

Table 6.5. Total expenditure on livestock (both fodder and veterinary charges) during 2020-21 (in ₹)

State	Marketing Channel		Farm size holding		Social category		Overall
	SF	TF	Marginal farmers	Others	SCST	Others	
Delhi-NCR	17631	19715	14877	20048	23184	18632	18805
	(28681)	(29519)	(31336)	(28356)	(22543)	(29356)	(29082)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)
Telangana	4995	4050	4139	4547	2719	4695	4388
	(13065)	(10815)	(11359)	(11873)	(6261)	(12383)	(11660)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)
W.Bengal	1174	1250	1231	0	200	1223	1217
	(3844)	(6617)	(5586)	(0)	(0)	(5570)	(5554)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)
Maharashtra	6187	6046	5550	6646	2722	6239	6114
	(12204)	(16403)	(15979)	(12972)	(3664)	(14713)	(14476)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)
All-India	6975	6718	4237***	9424	4541	7020	6824
	(17050)	(17464)	(14272)	(19530)	(10338)	(17744)	(17284)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)

Note: SF means supermarket farmers, TF means traditional farmers,
SCST means farmers belongs to SC or ST category, values within the parenthesis indicates SD and frequency(top to bottom respectively),
***, ** and * indicates significant the 1%, 5% and 10% level respectively.

On average, farmers spend ₹6824 on livestock activity, which constitutes 22% of their gross income (Table 6.5). There are no significant differences in total expenditure on fodder and veterinary charges between supermarket and traditional market farmers in all-India and across the sampled states. The marginal farmers incurred significantly lower (55%) expenditures on fodder and veterinary charges compared to other categories of farmers. Farmers in Delhi-NCR

have an expenditure that is 1.76 times higher than the all-India average expenditure value, representing 19% of their gross income from livestock activity. Farmers in Telangana and West Bengal have the highest expenditure on livestock activity, equal to 36% and 75% of their gross income, respectively. Srivastava *et al*. (2020) highlighted the direct impact of feed intake amount and composition on dairy animal productivity, and the study found that green fodder and mixed feed had a positive and significant correlation with milk yield.

Table 6.6. Information on net income received from livestock during 2020-21 (in ₹)

	Marketing Channel		Farm size holding		Social category		
State	SF	TF	Marginal farmers	Others	SCST	Others	Overall
Delhi-NCR	71105	83450	58625	84213	22693	80244	78059
	(81943)	(99190)	(78727)	(95271)	(32338)	(92928)	(91982)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)
Telangana	11905**	5375	8193	7403	5867	8050	7711
	(35452)	(25676)	(26127)	(31773)	(22294)	(30846)	(29661)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)
W.Bengal	306	478	407	0	-200	406	402
	(6112)	(7736)	(7090)	(0)	(0)	(7069)	(7048)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)
Maharashtra	28705	28717	21164**	35825	20588	29010	28711
	(54022)	(43607)	(30206)	(60708)	(20622)	(49528)	(48791)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)
All-India	25173	22796	12221***	35401	8643**	25081	23783
	(55392)	(57659)	(35112)	(70328)	(23444)	(58514)	(56708)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)

Note: SF means supermarket farmers, TF means traditional farmers,
SCST means farmers belongs to SC or ST category, values within the parenthesis indicates SD and frequency (top to bottom respectively),
***, ** and * indicates significant the 1%, 5% and 10% level respectively.

The sampled vegetable growers across sampled states earn a net annual income of Rs.23783/- from livestock activities after covering the expenditure on fodder, feed, medicines, and insurance premiums (Table 6.6). Supermarket farmers in Telangana state reported a 1.21 times higher net income than traditional market farmers. However, their net income is 68% lower than the all-India average. Delhi-NCR farmers earn 2.28 times higher income than the all-India average net income. In comparison, the marginal and SCST farmers reported significantly lower incomes than other categories of farmers. Chandrasekhar and Mehrotra's (2016) findings suggest that relying only on cultivation income to double household income is inadequate, and policy interventions focused on enhancing household net income through animal farming would be the primary driver of income growth in agricultural households.

The survey findings of Rs.23783/- annual net income from livestock activities compare favorably with the Situation Assessment Survey Report 2018-19 data. Narayanamoorthy and Nuthalapati's (2023) analysis of SAS data shows that farmers accrue an amount of Rs.20000 from farming animals. As our survey happened in 2020-21, the income will be approximately the same as the SAS survey's if we correct for annual inflation of around 6%. In that sense, we can say that our sample and findings are broadly representative of all-India farmers' scenario.

6.2. Non-farm family income from various sources

To know the overall well-being of the farmers, it is of utmost importance to study the level and contribution of non-farm income among the sample agricultural households across the country. Non-farm family income comprises various sources, including salary income, non-agricultural wages, agriculture-related schemes, business/enterprises, selling of house/apartment, land & durable consumable goods, agricultural wages, MGNREGA wages, fishery, remittances, rent from leased-out land, farm machinery, animals, autos/jeeps and houses, pension schemes, interest from deposits & lending, land and durable consumable goods, women related schemes, other un-specified schemes, and other income sources.

According to the Situation Assessment Survey of agricultural households in the 77th Round of the National Sample Survey Organization (NSSO), non-farm activities accounted for 47% of the monthly income of farming households, with 37% from crop cultivation and 15% from animal husbandry. Rao and Qaim (2011) emphasized that farmers participating in supermarket channels are more likely to have off-farm employment, possibly due to the capital investments required. Off-farm earnings facilitate these capital investments in the presence of credit constraints and ensure short-term liquidity in the face of delayed supermarket payments. The retained earnings of rural households from non-farm employment represent potential sources of liquidity that farmers in Sub-Saharan Africa can utilize to purchase inputs (Haggblade *et al.* (2010) and Adjognon *et al*. (2017).

Table 6.7. Income earned from different non-farm activities (in ₹) (2020-21)

State	Marketing channels		Farm size holdings		Social categories		Overall
	SF	TF	Marginal farmers	Others	SCST	Others	
Delhi-NCR	203501	217484	149679	230916	97750	215863	211378
	(316920)	(376436)	(236316)	(378527)	(124173)	(356117)	(350681)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)
Telangana	158524	140466	181906	124561	132872	149513	146927
	(244985)	(462094)	(616931)	(126852)	(179702)	(426254)	(397926)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)
W.Bengal	106200	118809	112577	169550	110000	113275	113255
	(115479)	(132276)	(125222)	(116602)	(0)	(125326)	(124950)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)
Maharashtra	109640	103246	151387	63898	33667	109024	106348
	(489620)	(173034)	(500696)	(125985)	(24712)	(368167)	(361829)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)
All-India	144757	143699	145544	142726	120314	146180	144138
	(317849)	(361886)	(425163)	(236685)	(167145)	(355174)	(344095)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)

Note: SF means supermarket farmers, TF means traditional farmers, SCST means SC or ST category,
values within the parenthesis indicates SD and frequency (Top to bottom respectively),
***, **, * indicates significant at the 1%, 5% and 10% respectively.

Farmers in all-India earned an average income of ₹144,138 from various non-farm activities (Table 6.7). It includes salary income (30%), non-agricultural wages (12%), agriculture-related schemes (12%), business/enterprises (11%), selling of house/apartments, land and durable consumable goods (11%), agricultural wages, MGNREGA wages, fishery, remittances, rent from leased-out land, farm machinery, animals, autos/jeeps and houses, pension schemes, interest from deposits and lending, land and durable consumable goods, women related schemes, other un-specified schemes, and other income sources.

The vegetable growers from Delhi-NCR reported the highest non-farm income, which was 47% higher than the all-India average value. In contrast, farmers in Maharashtra had the lowest income from non-farm activities, which was 26% lower than the all-India average value. Ochieng and Ogutu (2020) reported that consistent supply to supermarkets has a positive and significant impact on non-farm business (NFB) incomes and increases farm incomes without compromising other sources of income. Pandey and Reddy (2012) concluded that implementing region-specific development strategies to generate non-farm activities is necessary for reducing rural poverty in Uttar Pradesh.

Table 6.8. Income earned from business/enterprises across marketing channels (in ₹) (2020-21)

State	Marketing channels		Farm size holdings		Social categories		Overall
	SF	TF	Marginal farmers	Others	SCST	Others	
Delhi-NCR	33246	24791	17774	31875	0	29608	28484
	(108635)	(69602)	(46060)	(98192)	(0)	(90126)	(88570)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)
Telangana	9812**	1654	4731	4471	2302	4990	4573
	(45822)	(18878)	(18638)	(37500)	(10709)	(33944)	(31481)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)
W.Bengal	27189	21652	22842***	127750	110000	23577	24091
	(66915)	(49412)	(55244)	(172888)	(0)	(57444)	(57659)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)
Maharashtra	8110	24782	23610	10172	1667	17245	16692
	(40648)	(85345)	(81870)	(50741)	(4082)	(68964)	(67787)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)
All-India	17776	13824	16784	14138	3667*	16475	15464
	(67055)	(53882)	(53582)	(65305)	(16435)	(61918)	(59697)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)

Note: SF means supermarket farmers, TF means traditional farmers, SCST means SC or ST category,
values within the parenthesis indicates SD and frequency (Top to bottom respectively),
***, **, * indicates significant at the 1%, 5% and 10% respectively.

The average income farmers earn in all-India from business/enterprises is ₹15464, accounting for 11% of the total income received from non-farm income activities (Table 6.8). The Delhi-NCR reported an 84% higher income, while Telangana state accrued a 70% lower income than the all-India average. Supermarket farmers in Telangana earned significantly higher incomes from businesses/enterprises than traditional farmers. The marginal farmers in West Bengal received the lowest income from businesses/ enterprises compared to other categories of farmers. SCST farmers in all India received the lowest income from businesses/enterprises with significant values compared to other categories of farmers.

Table 6.9. Income earned from agricultural wages (in ₹) (2020-21)

State	Marketing channels		Farm size holdings		Social categories		Overall
	SF	TF	Marginal farmers	Others	SCST	Others	
Delhi-NCR	2746	4831	9066**	2292	3750	3928	3921
	(11336)	(17875)	(23889)	(11070)	(7027)	(15606)	(15356)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)
Telangana	4411**	7647	10421***	3975	17920***	4386	6489
	(10598)	(13695)	(15543)	(9838)	(21009)	(9172)	(12753)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)
W.Bengal	21799	18640	20273	0	0	20151	20032
	(38053)	(39597)	(39012)	(0)	(0)	(38926)	(38840)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)
Maharashtra	1213	2574	3460***	455	10000***	1616	1913
	(4100)	(8627)	(9351)	(2090)	(15492)	(6203)	(6831)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)
All-India	7032	8345	12839***	2737	15640***	7128	7800
	(20850)	(21958)	(28051)	(9277)	(19984)	(21506)	(21502)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)

Note: SF means supermarket farmers, TF means traditional farmers, SCST means SC or ST category,
values within the parenthesis indicates SD and frequency (Top to bottom respectively),
***, **, * indicates significant at the 1%, 5% and 10% respectively.

The average income farmers earn in all-India from agricultural wages is ₹7800, contributing 5% to the total income received from non-farm activities (Table 6.9). Notably, farmers in West Bengal earned 157% more income from agricultural wages than the all-India average. Supermarket farmers in Telangana state earned a significantly lower income of 42% of farm wages than traditional farmers. The marginal farmers in sampled states (excluding West Bengal) received a substantially higher income from agricultural wages compared to other categories of farmers. SCST farmers in all-India received the highest income of 119% of farm wages compared to farmers in other categories.

Table 6.10. Income earned from non-agricultural wages (in ₹) (2020-21)

State	Marketing channels		Farm size holdings		Social categories		Overall
	SF	TF	Marginal farmers	Others	SCST	Others	
Delhi-NCR	8319	7551	4316	9017	18333	7474	7886
	(39314)	(30607)	(21352)	(37803)	(40208)	(34411)	(34564)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)
Telangana	25158	19947	28157	17754	16425	22803	21811
	(79576)	(98156)	(111256)	(76961)	(70230)	(95370)	(91855)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)
W.Bengal	21143**	43768	34210	0	0	34005	33802
	(39995)	(75357)	(63426)	(0)	(0)	(63290)	(63155)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)
Maharashtra	4573	2701	4695	2586	0	3742	3609
	(25021)	(17165)	(24461)	(17896)	(0)	(21676)	(21297)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)
All-India	16089	19202	23801***	11990	14856	18171	17910
	(55500)	(76137)	(76212)	(58827)	(64008)	(68702)	(68312)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)

Note: SF means supermarket farmers, TF means traditional farmers, SCST means SC or ST category,
values within the parenthesis indicates SD and frequency (Top to bottom respectively),
***, **, * indicates significant at the 1%, 5% and 10% respectively.

The average income earned by farmers in all-India from non-agricultural wages was ₹17910, which accounted for 12% of their total income from non-farm activities (Table 6.10). In West Bengal, supermarket farmers earned a significantly lower income from non-agricultural wages (₹21143) than traditional farmers (₹43768). The marginal farmers in all-India received a substantially higher income from non-agricultural wages, 99% more than other categories of farmers.

Table 6.11. Income earned from MGNREGA wages (in ₹) (2020-21)

State	Marketing channels		Farm size holdings		Social categories		Overall
	SF	TF	Marginal farmers	Others	SCST	Others	
Delhi-NCR	17	169	132	93	0	107	103
	(144)	(1180)	(811)	(919)	(0)	(909)	(891)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)
Telangana	2204***	4244	3385	3597	4770	3283	3514
	(6935)	(6752)	(4587)	(8016)	(5641)	(7066)	(6878)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)
W.Bengal	5807***	2739	4118	1800	0	4115	4091
	(8405)	(6405)	(7525)	(2546)	(0)	(7503)	(7487)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)
Maharashtra	0	186	110	83	0	99	96
	(0)	(1229)	(994)	(772)	(0)	(900)	(884)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)
All-India	2017	2491	2739**	1847	3830**	2162	2294
	(6048)	(5659)	(5667)	(5952)	(5396)	(5844)	(5824)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)

Note: SF means supermarket farmers, TF means traditional farmers, SCST means SC or ST category,
values within the parenthesis indicates SD and frequency (Top to bottom respectively),
***, **, * indicates significant at the 1%, 5% and 10% respectively.

According to Table 6.11, supermarket farmers in West Bengal earned the highest income from MGNREGA wages, while those in Telangana received the lowest income compared to traditional farmers. The marginal farmers in all-India received 48% higher income compared to other category farmers, and SCST farmers received 77% higher income compared to other category farmers from MGNREGA wages. On average, farmers in all-India earned ₹2294 from MGNREGA wages, constituting a 2% share of their total income from non-farm income activities.

The farmers in West Bengal earn 52% of their non-farm income wage activities, including 30% from non-agricultural wages, 18% from agricultural wages, and 4% from MGNREGA wages. This was mainly because agriculture labour was engaged in agricultural activities from 6:00 AM to 12:00 PM (6 hours per day) and then involved in non-farm activities such as e-rickshaw driving, labouring in haats, construction labouring, pond cleaning, *etc*. Narayanamoorthy *et al*.

(2022) revealed that between 2002-03 and 2018-19, the proportion of wage income increased in 12 out of 18 selected states, with the states earning higher wage income also generating more significant income from non-farm business sources.

Table 6.12. Income earned from salary activities (in ₹) (2020-21)

State	Marketing channels		Farm size holdings		Social categories		Overall
	SF	TF	Marginal farmers	Others	SCST	Others	
Delhi-NCR	86464	117191	59632	117750	62667	105395	103772
	(207757)	(293626)	(165208)	(281822)	(99170)	(263686)	(259333)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)
Telangana	37934	23580	35150	24601	46302	25479	28716
	(103477)	(78050)	(89859)	(86947)	(126458)	(78948)	(88114)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)
W.Bengal	20919	17319	18699	36000	0	19018	18905
	(72677)	(87775)	(81629)	(50912)	(0)	(81487)	(81256)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)
Maharashtra	24390*	52805	46707	31770	6000	40233	39018
	(80478)	(121969)	(112348)	(96826)	(14697)	(106290)	(104599)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)
All-India	40755	44613	33115**	52957	43424	42977	43012
	(124198)	(153861)	(101124)	(173592)	(117327)	(144234)	(142235)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)

Note: SF means supermarket farmers, TF means traditional farmers, SCST means SC or ST category,
values within the parenthesis indicates SD and frequency (Top to bottom respectively),
***, **, * indicates significant at the 1%, 5% and 10% respectively.

The average income farmers earn in all-India from salary activities is ₹43012, representing a 30% share of the total income received from non-farm income activities (Table 6.12). Supermarket farmers in Maharashtra earned 54% lower income from salary activities than traditional farmers. The marginal farmers in all-India received 37% lower income from salary activities than other category farmers, as shown in Table 6.

Table 6.13. Income received as rent of machinery, vehicles and buildings (in ₹) (2020-21)

State	Marketing channels		Farm size holdings		Social categories		Overall
	SF	TF	Marginal farmers	Others	SCST	Others	
Delhi-NCR	23768	18045	4526	25617	0	21355	20544
	(97614)	(61263)	(20757)	(89382)	(0)	(80431)	(78986)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)
Telangana	9225	5350	4877	7925	6792	6726	6736
	(43177)	(27261)	(27557)	(37286)	(36573)	(33350)	(33815)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)
W.Bengal	3180	6179	4917	0	0	4887	4858
	(12620)	(33259)	(26380)	(0)	(0)	(26303)	(26227)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)
Maharashtra	1427	4103	5024*	713	9167	2571	2805
	(6613)	(21522)	(22745)	(3393)	(14972)	(16160)	(16124)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)
All-India	8985	7598	4890**	11473	6288	8335	8174
	(51311)	(36414)	(25552)	(55393)	(33054)	(43976)	(43201)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)

Note: SF means supermarket farmers, TF means traditional farmers, SCST means SC or ST category,
values within the parenthesis indicates SD and frequency (Top to bottom respectively),
***, **, * indicates significant at the 1%, 5% and 10% respectively.

The marginal farmers in all-India reported a significantly lower income from leasing land, farm machinery, animals, autos/jeeps, houses, *etc*., by 57% compared to other categories of farmers (Table 6.13). However, farmers in Delhi-NCR received 151% higher income, and farmers in Maharashtra received 66% lower income from leasing-out activities compared to the all-India average value.

Table 6.14. Income received from pension schemes (in ₹) (2020-21)

State	Marketing channels		Farm size holdings		Social categories		Overall
	SF	TF	Marginal farmers	Others	SCST	Others	
Delhi-NCR	14543	14997	17013	14098	10000	14988	14799
	(39691)	(42664)	(52271)	(37346)	(15492)	(41969)	(41263)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)
Telangana	9373	8530	8151	9267	8222	8944	8831
	(12336)	(12164)	(11816)	(12470)	(12423)	(12194)	(12214)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)
W.Bengal	2757	3032	2946	0	0	2928	2911
	(6451)	(5852)	(6134)	(0)	(0)	(6120)	(6106)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)
Maharashtra	4037	3230	73	6966	0	3755	3621
	(33208)	(25905)	(663)	(41065)	(0)	(30122)	(29587)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)
All-India	7729	7707	5312***	10132	7511	7734	7716
	(25466)	(23171)	(17986)	(28852)	(12206)	(24898)	(24135)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)

Note: SF means supermarket farmers, TF means traditional farmers, SCST means SC or ST category,
values within the parenthesis indicates SD and frequency (Top to bottom respectively),
***, **, * indicates significant at the 1%, 5% and 10% respectively.

Table 8 indicates that marginal farmers (₹5312) had significantly lower income from pension schemes than farmers in other categories (₹10132) for all-India (Table 6.14). On average, farmers in all-India received ₹7716 from pension schemes, which constituted 5% of their total income from non-farm activities. The farmers in Delhi-NCR reported higher incomes, while farmers in West Bengal reported lower incomes from pension schemes.

Table 6.15. Income received from agricultural schemes (in ₹) (2020-21)

State	Marketing channels		Farm size holdings		Social categories		Overall
	SF	TF	Marginal farmers	Others	SCST	Others	
Delhi-NCR	2174	2539	3105	2150	3000	2355	2380
	(2905)	(4500)	(4549)	(3631)	(3286)	(3907)	(3878)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)
Telangana	40816	38080	19836***	51350	26345***	41399	39059
	(27523)	(28639)	(9728)	(29323)	(23214)	(28486)	(28235)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)
W.Bengal	54	64	60	0	0	60	60
	(465)	(619)	(558)	(0)	(0)	(556)	(555)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)
Maharashtra	5268	5517	5634*	5172	6000	5374	5396
	(1975)	(1641)	(1445)	(2081)	(0)	(1840)	(1810)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)
All-India	16039	18510	7705***	27311	21974	17100	17485
	(24586)	(26165)	(10249)	(31783)	(22622)	(25747)	(25536)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)

Note: Average income received from Rythu Bandu and PM-Kisan schemes.
SF means supermarket farmers, TF means traditional farmers, SCST means SC or ST category,
values within the parenthesis indicates SD and frequency (Top to bottom respectively),
***, **, * indicates significant at the 1%, 5% and 10% respectively.

According to Table 6.15, marginal farmers in Telangana state received a significantly lower income of 61% from agricultural schemes than other category farmers. It is important to note that the Rythu Bandu scheme in Telangana state has a significant drawback: farmers receive scheme benefits based on total owned land without supervision on whether the land is under cultivation or not. This has disadvantaged marginal and tenant farmers, while large farmers with larger landholdings receive more benefits. Similarly, SCST farmers in Telangana state received a significantly lower income of 36% from agricultural schemes than other category farmers. The average income received by farmers in all of India from state income transfers is ₹17485, representing a 12% share of total income from non-farm activities. These transfers are relatively high in Telangana and low in West Bengal.

Chapter 7
Employment in Vegetable Cultivation across Marketing Channels

Vegetable growers spend a significant amount of money for labour force towards crop cultivation, with an even greater emphasis on vegetable crops due to their labour-intensive nature and need for close supervision. Evidence shows that high value agriculture involving cultivation of crops like vegetables, flowers etc., enlarge employment opportunities for farm labour. Several studies also documented higher labour needs with the rise of modern marketing channels especially where that involved supermarkets and exported oriented market channels (Neven et al., 2009; Rao and Qaim, 2013; Moustier et al., 2015).

We have detailed information from field surveys on the labour employed for different operations, wages, family labour involvement, and total payments made. Man-day equivalent (MDE) is calculated as per the standard farm household survey methodologies. Family labour participation hours are converted to days and expenditure calculated using the local wages on the day. This chapter leverages the data to analyse labour employed across marketing channels, states, and categories of farmers. The first section (7.1) presents hired labour utilisation across marketing channels and size as well as social categories of farmers. The next section examines family labour utilisation patterns among the same disaggregated groups, while the final section provides analysis of number of days of employment for men, women in all crops and vegetable crops as well for all the four sampled states.

7.1. Hired labour utilisation across marketing channels and size categories

Vegetable cultivation requires 31% higher spending on hired labour per acre relative to all crop average (Table 7.1). On a per-farm basis, supermarket farmers incur 28% and 40% higher expenditures on hired labour for all crops and vegetables. However, we do not observe any significant difference in per acre expenditure, though the spending is high for modern market farmers, except in Delhi-NCR. In Delhi-NCR, supermarket farmers had significantly higher expenditures on hired labour per acre than traditional farmers for both all-crops and vegetables.

Table 7.1. Hired labour expenditure across marketing channels (in ₹)

	All-crops						Vegetables					
	Total expenditure			Per acre expenditure			Total expenditure			Per acre expenditure		
State	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall
Delhi-NCR	144779***	91396	114708	14631***	7690	10721	118413***	59554	85258	28284***	13917	20191
	(145274)	(96286)	(122649)	(14161)	(7179)	(11299)	(134594)	(64076)	(104906)	(30064)	(14519)	(23679)
	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)
Telangana	70842	63439	66088	13076	11956	12356	47499	42771	44463	16347	16321	16330
	(71889)	(140192)	(120223)	(14115)	(13954)	(14001)	(55186)	(130593)	(109654)	(18164)	(21873)	(20595)
	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)
W.Bengal	25001	21551	23070	15740	16165	15978	21787	16548	18856	16206	18398	17432
	(38965)	(33623)	(36003)	(13244)	(16851)	(15325)	(38640)	(31876)	(35004)	(14600)	(21414)	(18701)
	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)
Maharashtra	72970	57620	65068	12377	13922	13173	38615	31929	35173	13147	15856	14542
	(92661)	(64193)	(79425)	(7926)	(12714)	(10660)	(46718)	(44903)	(45778)	(10034)	(17290)	(14262)
	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)
All-India	76271**	59440	66426	13788	12338	12940	54017**	38856	45149	17934	16200	16920
	(98977)	(108921)	(105175)	(12744)	(13644)	(13289)	(81066)	(95380)	(89976)	(19745)	(19842)	(19809)
	(347)	(489)	(836)	(347)	(489)	(836)	(347)	(489)	(836)	(347)	(489)	(836)

Note: SF means supermarket farmers, TF means traditional farmers. Values within the parenthesis indicates SD and frequency (top to bottom respectively),
***, ** and * indicates significant at the 1%, 5% and 10% level respectively

Table 7.2. Hired labour expenditure across farm size holdings (in ₹)

State	All-crops						Vegetables					
	Total expenditure			Per acre expenditure			Total expenditure			Per acre expenditure		
	MF	Others	Overall	MF	Others	Overall	MF	Others	Overall	MF	Others	Overall
Delhi-NCR	44784***	136851	114708	13064	9979	10721	36719***	100629	85258	19304	20472	20191
	(46865)	(130796)	(122649)	(16518)	(9016)	(11299)	(44219)	(113670)	(104906)	(32058)	(20491)	(23679)
	(38)	(120)	(158)	(38)	(120)	(158)	(38)	(120)	(158)	(38)	(120)	(158)
Telangana	30234***	89013	66088	12869	12029	12356	20338***	59888	44463	15043	17154	16330
	(33509)	(147207)	(120223)	(14479)	(13713)	(14001)	(27334)	(136602)	(109654)	(15768)	(23160)	(20595)
	(133)	(208)	(341)	(133)	(208)	(341)	(133)	(208)	(341)	(133)	(208)	(341)
W.Bengal	21231***	175735	23070	15770	33258	15978	16966***	175735	18856	17242	33258	17432
	(28841)	(179018)	(36003)	(15079)	(33131)	(15325)	(27276)	(179018)	(35004)	(18554)	(33131)	(18701)
	(166)	(2)	(168)	(166)	(2)	(168)	(166)	(2)	(168)	(166)	(2)	(168)
Maharashtra	33301***	95009	65068	13093	13248	13173	20854***	48669	35173	14557	14527	14542
	(30054)	(97997)	(79425)	(11764)	(9572)	(10660)	(21671)	(57199)	(45778)	(16903)	(11326)	(14262)
	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)
All-India	28587***	104447	66426	14080***	11795	12940	20588***	69827	45149	16205	17638	16920
	(33210)	(134922)	(105175)	(14450)	(11918)	(13289)	(28681)	(119186)	(89976)	(19053)	(20538)	(19809)
	(419)	(417)	(836)	(419)	(417)	(836)	(419)	(417)	(836)	(419)	(417)	(836)

Note: MF means marginal farmers, values within the parenthesis indicates SD and frequency (top to bottom respectively),
***, ** and * indicates significant at the 1%, 5% and 10% level respectively

The marginal farmers have significantly higher expenditures on hired labour per-acre basis for all crops than traditional farmers (Table 7.2). They spend 31% more on hired labor per acre for vegetable cultivation than all crops. The modern market farmers' spending on hired labor for vegetable cultivation per acre is not significantly different.

Table 7.3. Hired labour utilisation across marketing channels (in man-day equivalent)

State	All-crops						Vegetables					
	Total labour employed			Per acre labour employed			Total labour employed			Per acre labour employed		
	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall
Delhi-NCR	390***	261	317	41***	22	30	317***	182	241	77***	43	58
	(385)	(276)	(333)	(43)	(23)	(34)	(345)	(205)	(282)	(81)	(50)	(68)
	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)
Telangana	144	148	147	27	27	27	101	105	104	34	37	36
	(147)	(382)	(318)	(29)	(35)	(33)	(117)	(357)	(295)	(37)	(61)	(53)
	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)
W.Bengal	84	74	79	53	57	55	73	57	64	54	65	60
	(124)	(103)	(112)	(42)	(66)	(57)	(122)	(98)	(109)	(47)	(76)	(65)
	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)
Maharashtra	236	183	209	39	44	41	124	103	113	41	49	45
	(327)	(214)	(275)	(27)	(40)	(34)	(171)	(155)	(163)	(34)	(56)	(47)
	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)
All-India	202**	161	178	38	35	36	143**	110	124	49	46	47
	(276)	(304)	(293)	(36)	(44)	(41)	(214)	(269)	(248)	(53)	(62)	(58)
	(347)	(489)	(836)	(347)	(489)	(836)	(347)	(489)	(836)	(347)	(489)	(836)

Note: SF means supermarket farmers, TF means traditional farmers. Values within the parenthesis indicates SD and frequency (top to bottom respectively),
***, ** and * indicates significant at the 1%, 5% and 10% level respectively

The farmers employed 47 man-day equivalents (MDE) of labor to cultivate one acre of vegetable crops on average, compared to only 36 days for all crops (Table 7.3). At the all-India level, there is a 31% increase in the number of days of hired labour required per acre for vegetable cultivation compared to all crops. In Delhi-NCR, supermarket farmers utilized significantly more days of hired labour per acre for both vegetables and all-crops than traditional farmers. In West Bengal, farmers reported 28% higher utilization of hired labour for vegetable cultivation per acre (60 MDE) than the all-India average (47 MDE).

Table 7.4. Family labour expenditure across marketing channels (in ₹)

	All-crops						Vegetables					
	Total expenditure			Per acre expenditure			Total expenditure			Per acre expenditure		
State	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall
Delhi-NCR	2711	2245	2449	307	257	279	1827	1245	1499	440	374	403
	(3709)	(2903)	(3277)	(519)	(360)	(436)	(2773)	(1737)	(2260)	(595)	(513)	(550)
	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)
Telangana	16171***	11776	13348	3241	2816	2968	11979***	7799	9294	4615	4108	4289
	(13082)	(8753)	(10700)	(2875)	(2772)	(2813)	(11725)	(7210)	(9289)	(4985)	(3802)	(4263)
	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)
W.Bengal	6968*	5663	6238	4994	5800	5445	5928***	3879	4781	4972**	6426	5786
	(5940)	(3404)	(4722)	(2791)	(4507)	(3857)	(6068)	(2796)	(4636)	(3130)	(5241)	(4484)
	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)
Maharash-tra	8420	7526	7960	1825	2181	2008	5422	4383	4887	2261	2587	2429
	(7118)	(5607)	(6382)	(1427)	(1759)	(1611)	(4919)	(3810)	(4401)	(2305)	(1926)	(2118)
	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)
All-India	9700***	8110	8770	2697	2811	2764	7120***	5245	6023	3305	3603	3479
	(10409)	(7551)	(8879)	(2760)	(3295)	(3083)	(8827)	(5844)	(7287)	(3894)	(4016)	(3967)
	(347)	(489)	(836)	(347)	(489)	(836)	(347)	(489)	(836)	(347)	(489)	(836)

Note: SF means supermarket farmers, TF means traditional farmers. Values within the parenthesis indicates SD and frequency (top to bottom respectively), ***, ** and * indicates significant at the 1%, 5% and 10% level respectively

7.2. Family labour utilisation across marketing channels and size categories

Similar to hired labour spending, the expenditure on family labour per acre is 26% higher for vegetable cultivation than all-crop cultivation (Table 7.4). Supermarket farmers leveraged family labor more than traditional marketing farmers in the case of all crops and vegetable crops in the study areas. The farmers in Delhi-NCR reported a considerably lower expenditure on family labour per acre for vegetable cultivation compared to the all-India average spending. This is mainly because of the cultural settings in the study areas around Haryana and Delhi, where women family members do not participate in agricultural activities much. Additionally, supermarket farmers in West Bengal reported a significantly lower expenditure on family labour per acre than traditional farmers. This may be because family members of the vegetable cultivating households go to Haats to sell directly in the absence of a supermarket collection agent buying at the village itself.

Table 7.5. Family labour expenditure across farm size holdings (in ₹)

	All-crops						Vegetables					
	Total expenditure			Per acre expenditure			Total expenditure			Per acre expenditure		
State	MF	Others	Overall	MF	Others	Overall	MF	Others	Overall	MF	Others	Overall
Delhi-NCR	1972	2599	2449	544***	195	279	1515	1494	1499	600***	340	403
	(2539)	(3473)	(3277)	(724)	(241)	(436)	(2198)	(2288)	(2260)	(794)	(432)	(550)
	(38)	(120)	(158)	(38)	(120)	(158)	(38)	(120)	(158)	(38)	(120)	(158)
Telangana	8720***	16308	13348	3901***	2371	2968	6590***	11024	9294	5320***	3630	4289
	(7446)	(11407)	(10700)	(3821)	(1663)	(2813)	(6776)	(10234)	(9289)	(5769)	(2741)	(4263)
	(133)	(208)	(341)	(133)	(208)	(341)	(133)	(208)	(341)	(133)	(208)	(341)
W.Bengal	6075***	19791	6238	5464	3868	5445	4601***	19791	4781	5809	3868	5786
	(4469)	(7505)	(4722)	(3875)	(1629)	(3857)	(4318)	(7505)	(4636)	(4504)	(1629)	(4484)
	(166)	(2)	(168)	(166)	(2)	(168)	(166)	(2)	(168)	(166)	(2)	(168)
Maharash-tra	6207***	9611	7960	2509***	1537	2008	3793***	5918	4887	2821**	2060	2429
	(4607)	(7340)	(6382)	(1820)	(1220)	(1611)	(3045)	(5185)	(4401)	(2290)	(1882)	(2118)
	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)
All-India	6568***	10983	8770	3943***	1578	2764	4794***	7258	6023	4596***	2357	3479
	(5796)	(10709)	(8879)	(3688)	(1612)	(3083)	(5128)	(8781)	(7287)	(4734)	(2558)	(3967)
	(419)	(417)	(836)	(419)	(417)	(836)	(419)	(417)	(836)	(419)	(417)	(836)

Note: MF means marginal farmers, values within the parenthesis indicates SD and frequency (top to bottom respectively), ***, ** and * indicates significant at the 1%, 5% and 10% level respectively

The marginal farmers in all India and across sampled states (except West Bengal) harness family labor more, which amounts to significantly higher expenditure per acre for all crops and vegetables (Table 7.5). This higher spending translates to 150% higher in the case of all crops and 118% in vegetable crops. The marginal farmers reported a 17% higher expenditure on family labour per acre for vegetable cultivation than all-crop cultivation. The Delhi-NCR marginal

farmers reported a significantly lower expenditure on family labour per acre for vegetable cultivation than the all-India average.

Table 7.6. Family labour utilisation across marketing channels (in man-day equivalent)

	All-crops						Vegetables					
	Total labour employed			Per acre labour employed			Total labour employed			Per acre labour employed		
State	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall
Delhi-NCR	42***	62	53	5***	9	7	28*	38	33	6***	12	9
	(34)	(49)	(44)	(4)	(13)	(10)	(26)	(39)	(34)	(4)	(15)	(12)
	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)	(69)	(89)	(158)
Telangana	159***	124	137	34	35	34	115***	80	93	54	53	54
	(85)	(70)	(77)	(23)	(28)	(26)	(78)	(53)	(65)	(41)	(48)	(46)
	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)	(122)	(219)	(341)
W.Bengal	115***	89	100	102	102	102	103***	70	84	115	127	122
	(60)	(43)	(53)	(65)	(79)	(73)	(61)	(41)	(53)	(73)	(95)	(86)
	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)	(74)	(94)	(168)
Maharash-tra	104**	87	95	24	27	26	67***	50	59	29	33	31
	(62)	(44)	(54)	(16)	(19)	(17)	(46)	(33)	(41)	(22)	(27)	(25)
	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)
All-India	113***	99	105	40	41	41	84***	65	73	52	56	54
	(78)	(63)	(70)	(48)	(51)	(50)	(68)	(48)	(58)	(57)	(66)	(62)
	(347)	(489)	(836)	(347)	(489)	(836)	(347)	(489)	(836)	(347)	(489)	(836)

Note: SF means supermarket farmers, TF means traditional farmers. Values within the parenthesis indicates SD and frequency (top to bottom respectively), ***, ** and * indicates significant at the 1%, 5% and 10% level respectively

The family labour utilisation went up among the supermarket farmers relative to their traditional marketing counterparts in the case of vegetables and all crop averages, though not on a per-acre basis (Table 7.6). Supermarket farmers in Delhi-NCR recorded a significantly lower number of days of family labour used per acre than traditional farmers for all-crop and vegetable cultivation. Vegetable cultivation employs family labour for 54 man-days equivalent and 32% more than the average requirement for all crops.

Table 7.7. Family labour utilisation across farm size holdings (in man-day equivalent)

	All-crops						Vegetables					
	Total labour employed			Per acre labour employed			Total labour employed			Per acre labour employed		
State	MF	Others	Overall	MF	Others	Overall	MF	Others	Overall	MF	Others	Overall
Delhi-NCR	44	56	53	15***	4	7	31	34	33	17***	7	9
	(45)	(44)	(44)	(18)	(3)	(10)	(40)	(32)	(34)	(20)	(7)	(12)
	(38)	(120)	(158)	(38)	(120)	(158)	(38)	(120)	(158)	(38)	(120)	(158)
Telangana	114***	151	137	53***	23	34	79***	101	93	77***	38	54
	(60)	(83)	(77)	(31)	(14)	(26)	(52)	(71)	(65)	(57)	(28)	(46)
	(133)	(208)	(341)	(133)	(208)	(341)	(133)	(208)	(341)	(133)	(208)	(341)
W.Bengal	100*	163	100	103	32	102	84**	163	84	123	32	122
	(52)	(100)	(53)	(73)	(21)	(73)	(52)	(100)	(53)	(86)	(21)	(86)
	(166)	(2)	(168)	(166)	(2)	(168)	(166)	(2)	(168)	(166)	(2)	(168)
Maharash-tra	79***	110	95	34***	17	26	50***	67	59	40***	22	31
	(37)	(62)	(54)	(19)	(10)	(17)	(27)	(49)	(41)	(30)	(14)	(25)
	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)	(82)	(87)	(169)
All-India	95***	115	105	65***	16	41	71	75	73	83***	26	54
	(56)	(81)	(70)	(59)	(14)	(50)	(50)	(65)	(58)	(75)	(25)	(62)
	(419)	(417)	(836)	(419)	(417)	(836)	(419)	(417)	(836)	(419)	(417)	(836)

Note: MF means marginal farmers, values within the parenthesis indicates SD and frequency (top to bottom respectively), ***, ** and * indicates significant at the 1%, 5% and 10% level respectively

Interestingly, marginal farmers in all-India and sampled states (except West Bengal) recorded a significant increase in the utilization of family labour per acre for both all crops and vegetable cultivation (Table 7.7). In all-India, marginal farmers employed 28% more family labour per acre for vegetable cultivation (83 MDE) than all crops (65 MDE). Furthermore, marginal farmers in Delhi-NCR employed 80% less family labour per acre (17 MDE) for vegetable cultivation than the all-India average (83 MDE).

Table 7.8. Information on labour utilisation for all crops

State	In days						In Man Day Equivalent (MDE)					
	Male hired labour											
	Total labour employed			Per acre labour employed			Total labour employed			Per acre labour employed		
	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall
Delhi-NCR	216*	155	181	25***	13	18	216*	155	181	25***	13	18
Telangana	19	34	29	3	4	4	19	34	29	3	4	4
W.Bengal	70	55	62	45*	43	44	70	55	62	45	43	44
Maharashtra	115	100	107	19	23	21	115	100	107	19	23	21
All-India	**92**	**72**	**80**	**20***	**17**	**18**	**92**	**72**	**80**	**20***	**17**	**18**
	Female hired labour											
Delhi-NCR	262**	158	204	24***	15	19	175**	106	136	16***	10	13
Telangana	188	171	177	36	34	34	126	114	118	24	22	23
W.Bengal	21	28	25	11	21	17	14	19	17	8	14	11
Maharashtra	181*	126	153	30	31	31	121*	84	102	20	21	20
All-India	**166***	**133**	**147**	**27**	**27**	**27**	**110***	**89**	**98**	**18**	**18**	**18**
	Combined hired labour											
Delhi-NCR	477***	313	385	49**	27	37	390***	261	317	41***	22	30
Telangana	207	205	206	39	38	38	144	148	147	27	27	27
W.Bengal	91	84	87	56	65	61	84	74	79	53	57	55
Maharashtra	297	225	260	49	54	51	236	183	209	39	44	41
All-India	**257****	**205**	**227**	**47**	**44**	**45**	**202****	**161**	**178**	**38**	**35**	**36**
	Male family labour											
Delhi-NCR	38***	56	48	4***	7	6	38***	56	48	4***	7	6
Telangana	112***	85	95	24	24	24	112***	85	95	24	24	24
W.Bengal	104***	78	90	92	90	90	104***	78	90	92	90	90
Maharashtra	79**	65	72	18	20	19	79**	65	72	18	20	19
All-India	**88*****	**75**	**80**	**33**	**33**	**33**	**88*****	**75**	**80**	**33**	**33**	**33**
	Female family labour											
Delhi-NCR	7	9	8	1**	2	2	4	6	5	1**	1	1
Telangana	70***	58	63	15	16	16	47***	39	42	10	11	11
W.Bengal	16	16	16	15	18	17	11	10	11	10	12	11
Maharashtra	37	33	35	9	10	9	24	22	23	6	6	6
All-India	**38**	**37**	**37**	**11****	**13**	**12**	**25**	**24**	**25**	**7****	**9**	**8**
	Combined family labour											
Delhi-NCR	45***	65	56	5**	9	7	42***	62	53	5***	9	7
Telangana	182***	144	158	39	40	40	159***	124	137	34	35	34
W.Bengal	121***	94	106	107	108	107	115***	89	100	102	102	102
Maharashtra	116**	98	107	27	30	29	104**	87	95	24	27	26
All-India	**126*****	**112**	**118**	**44**	**46**	**45**	**113*****	**99**	**105**	**40**	**41**	**41**

Note: SF means supermarket farmers, TF means traditional farmers. ***, ** and * indicates significant at the 1%, 5% and 10% level respectively

7.3. Number of days of hired and family labour utilisation

As per Table 7.8, the utilisation of family labour per acre in all-India for all-crop cultivation is 14% higher than hired labour per acre. On a per-farm basis, the total labour requirement increases in vegetable cultivation. However, there is a difference in the components of growth in hired and family labour utilisation. While hired labour growth comprised more female labourers, the obverse holds in the case of family labour. Notably, an equal amount of hired male and female labour per acre is employed. However, the number of male family labour per acre employed is higher than that of female family labour per acre for all-crop cultivation.

In Delhi-NCR, supermarket farmers have reported a significantly higher utilization of hired labour per acre than traditional market farmers, but a significantly lower utilization of family labour per acre for all-crop cultivation. Compared to the all-India averages, Delhi-NCR farmers have reported 17% lower utilization of hired labour per acre and 83% lower utilization of family labour per acre for all-crop cultivation. Conversely, West Bengal state farmers have reported 53% higher utilization of hired labour per acre and 149% higher utilization of family labour per acre than the all-India averages.

Table 7.9. Information on labour utilisation for vegetables

State	In days						In Man Day Equivalent (MDE)					
	Male hired labour											
	Total labour employed			Per acre labour employed			Total labour employed			Per acre labour employed		
	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall	SF	TF	Overall
Delhi-NCR	156***	96	122	41***	22	30	156***	96	122	41***	22	30
Telangana	13	30	24	3	7	6	13	30	24	3	7	6
W.Bengal	60*	39	48	47	47	47	60*	39	48	47	47	47
Maharashtra	47	50	49	16	21	19	47	50	49	16	21	19
All-India	**59**	**47**	**52**	**23**	**20**	**21**	**59**	**47**	**52**	**23**	**20**	**21**
	Female hired labour											
Delhi-NCR	242***	128	178	55***	32	42	161***	85	118	36***	21	28
Telangana	132	114	120	47	45	46	88	76	80	31	30	30
W.Bengal	20	27	24	12**	26	20	13	18	16	8**	17	13
Maharashtra	116*	79	97	38	43	40	77*	53	65	25	29	27
All-India	**126****	**94**	**107**	**39**	**39**	**39**	**84****	**62**	**71**	**26**	**26**	**26**
	Combined hired labour											
Delhi-NCR	398***	224	300	96**	54	72	317***	182	241	77***	43	58
Telangana	145	143	144	50	52	51	101	105	104	34	37	36
W.Bengal	80	66	72	58	73	67	73	57	64	54	65	60
Maharashtra	163	129	146	54	64	59	124	103	113	41	49	45
All-India	**185****	**141**	**159**	**62**	**59**	**60**	**143****	**110**	**124**	**49**	**46**	**47**
	Male family labour											
Delhi-NCR	25*	33	29	5***	10	8	25*	33	29	5***	10	8
Telangana	79***	54	63	38	37	37	79***	54	63	38	37	37
W.Bengal	93***	61	75	103	112	108	93***	61	75	103	112	108
Maharashtra	51***	38	44	22	25	23	51***	38	44	22	25	23
All-India	**65*****	**49**	**55**	**41**	**44**	**43**	**65*****	**49**	**55**	**41**	**44**	**43**
	Female family labour											
Delhi-NCR	5	7	6	1**	3	2	3	5	4	1**	2	1
Telangana	54***	39	44	24	25	25	36***	26	30	16	17	17
W.Bengal	15	13	14	19	23	21	10	9	9	13	15	14
Maharashtra	25**	19	22	11	12	11	16**	13	15	7	8	8
All-India	**29***	**25**	**26**	**15****	**18**	**17**	**19***	**17**	**18**	**10****	**12**	**11**
	Combined family labour											
Delhi-NCR	29*	40	35	6***	13	10	28*	38	33	6***	12	9
Telangana	133***	93	107	62	62	62	115***	80	93	54	53	54
W.Bengal	108***	74	89	122	135	129	103***	70	84	115	127	122
Maharashtra	76***	57	66	33	37	35	67***	50	59	29	33	31
All-India	**93*****	**73**	**82**	**57**	**62**	**60**	**84*****	**65**	**73**	**52**	**56**	**54**

Note: SF means supermarket farmers, TF means traditional farmers. ***, ** and * indicates significant at the 1%, 5% and 10% level respectively

There is a 15% higher utilization of family labour per acre than hired labour per acre for vegetable cultivation (Table 7.9). A higher number of days of hired female labour are utilized compared to hired male labour per acre. However, there was a higher utilization of male family labour per acre than female family labour per acre for vegetable cultivation in all-India.

The data indicate that supermarket farmers in Delhi-NCR employed a significantly higher number of days of hired labour per acre than traditional farmers, but a considerably lower number of days of family labour per acre for vegetable cultivation. Delhi-NCR farmers showed a 23% higher utilization of hired labour per acre and 83% lower utilization of family labour per acre compared to the all-India averages for vegetable cultivation. Meanwhile, the farmers from West Bengal reported a 28% higher utilization of hired labour per acre and 126% higher utilization of family labour per acre compared to the all-India averages for vegetable cultivation.

Chapter 8
Household Consumption Expenditure and Dietary Diversity

We examine the poverty and inequality in different states and marketing channels in India, using monthly per capita consumption expenditure to understand the standard of living. We collected data on monthly and yearly consumption expenditures from vegetable growers. We analysed it to examine the disparity in the standard of living of vegetable growers across the states and marketing channels in India. Tables 8.1 to 8.21 present detailed information for each category of food and non-food items, broken down by state and marketing channel. The chapter is presented as follows. The first section (8.1) examines the food expenditure across markets and categories of farmers in all the four states and at the aggregate level, while the next section presents non-food expenditures analysis. Section 8.3 elucidates shares of food and non-food expenditures across all the groups of farmers, while the final section brings out dietary diversity analysis.

8.1. Itemwise food expenditure across markets, size, and social categories

In all-India, the MPCE for cereals is ₹324 on average. However, marginal farmers have a notably higher MPCE for cereals at ₹345 compared to other categories of farmers at ₹302. There is no substantial difference in the MPCE for cereals between supermarket farmers, at ₹322, and traditional farmers, at ₹325 (Table 8.1).

Table 8.1. Information on monthly per capita expenditure on cereals & cereal substitutes (in ₹)

	Marketing channel		Farm size holding		Social category			Marginal farmers		Small farmers		
State	SF	TF	MF	Others	SCST	Others	Overall	SF	TF	SF	TF	Overall
Delhi-NCR	206	221	205	218	238	214	215	182	217	196	229	211
	(95)	(82)	(77)	(91)	(92)	(88)	(88)	(65)	(81)	(87)	(58)	(76)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)	(13)	(25)	(20)	(17)	(37)
Telanga-na	371	363	373	361	332	372	365	391	365	366	338	350
	(162)	(168)	(159)	(170)	(130)	(171)	(166)	(160)	(159)	(159)	(156)	(158)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)	(42)	(91)	(48)	(62)	(110)
W.Bengal	381	369	374	443	300	375	374	379	369	443	.	443
	(118)	(106)	(112)	(33)	(0)	(111)	(111)	(119)	(106)	(33)	.	(33)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)	(72)	(94)	(2)	(0)	(2)
Maharash-tra	293	288	307*	275	249	292	290	296	315	305	274	290
	(129)	(121)	(129)	(119)	(98)	(125)	(125)	(124)	(133)	(135)	(105)	(121)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)	(36)	(46)	(26)	(25)	(51)
All-India	322	325	345***	302	315	324	324	348	343	316	305	310
	(149)	(148)	(139)	(154)	(127)	(150)	(148)	(141)	(138)	(153)	(139)	(146)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)	(163)	(256)	(96)	(104)	(200)

Notes: SF means supermarket farmers, TF means traditional farmers, MF means marginal farmers, SCST means farmers belongs to SC or ST category, values within the parenthesis indicates SD and frequency (top to bottom respectively), *** indicates significant at the 1% level, ** indicates significant at the 5% level and * indicates significant at the 10% level.

Table 8.2. Information on monthly per capita expenditure on pulses and pulse products (in ₹)

	Marketing channel		Farm size holding		Social category			Marginal farmers		Small farmers		
State	SF	TF	MF	Others	SCST	Others	Overall	SF	TF	SF	TF	Overall
Delhi	117	108	97**	117	106	112	112	105	92	117	109	113
NCR	(61)	(50)	(47)	(57)	(51)	(56)	(55)	(54)	(43)	(63)	(36)	(52)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)	(13)	(25)	(20)	(17)	(37)
Telangana	108	111	103	115	95	113	110	100	104	116	106	110
	(75)	(76)	(63)	(82)	(56)	(78)	(76)	(65)	(63)	(91)	(67)	(78)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)	(42)	(91)	(48)	(62)	(110)
W.Bengal	87	91	89	132	109	89	89	86	91	132	.	132
	(44)	(50)	(48)	(12)	(0)	(48)	(48)	(44)	(50)	(12)	.	(12)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)	(72)	(94)	(2)	(0)	(2)
Maharash	111**	88	95	102	86	100	99	112**	83	120	107	114
-tra	(72)	(65)	(63)	(75)	(43)	(70)	(69)	(57)	(65)	(100)	(74)	(88)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)	(36)	(46)	(26)	(25)	(51)
All-India	106	102	95***	113	95	105	104	97	94	118	107	112
	(67)	(66)	(56)	(74)	(54)	(67)	(66)	(54)	(57)	(86)	(65)	(76)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)	(163)	(256)	(96)	(104)	(200)

Notes: SF means supermarket farmers, TF means traditional farmers, MF means marginal farmers, SCST means farmers belongs to SC or ST category, values within the parenthesis indicates SD and frequency (top to bottom respectively), *** indicates significant at the 1% level, ** indicates significant at the 5% level and * indicates significant at the 10% level.

There is no significant difference in the MPCE on pulses between supermarket farmers (₹106) and traditional farmers (₹102) across the marketing channels. However, there is a significantly lower consumption of pulses between marginal farmers (₹95) and other category farmers (₹113). The average MPCE for pulses in all-India is ₹104 (Table 8.2).

Table 8.3. Information on monthly per capita expenditure on meat (include fish and eggs also) (in ₹)

	Marketing channel		Farm size holding		Social category			Marginal farmers		Small farmers		
State	SF	TF	MF	Others	SCST	Others	Overall	SF	TF	SF	TF	Overall
Delhi	34	40	43	35	16	38	37	30	50	14	29	21
NCR	(112)	(110)	(74)	(121)	(26)	(113)	(111)	(55)	(82)	(60)	(80)	(69)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)	(13)	(25)	(20)	(17)	(37)
Telanga	433	415	450*	403	415	422	421	466	443	406	402	404
-na	(220)	(268)	(283)	(228)	(236)	(255)	(252)	(214)	(311)	(172)	(208)	(192)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)	(42)	(91)	(48)	(62)	(110)
W Bengal	490	446	460***	930	665	464	466	478	446	930	.	930
	(256)	(183)	(209)	(582)	(0)	(218)	(218)	(239)	(183)	(582)	.	(582)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)	(72)	(94)	(2)	(0)	(2)
Maharash	103	88	111	81	96	96	96	127	98	88	80	84
-tra	(121)	(123)	(133)	(109)	(83)	(123)	(122)	(135)	(132)	(111)	(129)	(119)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)	(36)	(46)	(26)	(25)	(51)
All-India	288	294	351***	232	354**	286	292	362	344	249	264	257
	(272)	(271)	(272)	(257)	(257)	(272)	(271)	(266)	(277)	(251)	(243)	(247)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)	(163)	(256)	(96)	(104)	(200)

Notes: SF means supermarket farmers, TF means traditional farmers, MF means marginal farmers, SCST means farmers belongs to SC or ST category, values within the parenthesis indicates SD and frequency (top to bottom respectively), *** indicates significant at the 1% level, ** indicates significant at the 5% level and * indicates significant at the 10% level.

The average MPCE for meat is ₹292 in all India. The marginal farmers (₹351) and SCST farmers (₹354) have a significantly higher MPCE on meat than other categories of farmers. However, there is no significant difference in MPCE on meat between supermarket farmers (₹288) and traditional farmers (₹294) (Table 8.3).

Table 8.4. Information on monthly per capita expenditure on milk and milk products (in ₹)

	Marketing channel		Farm size holding		Social category			Marginal farmers		Small farmers		
State	SF	TF	MF	Others	SCST	Others	Overall	SF	TF	SF	TF	Overall
Delhi	676	701	716	682	498	698	690	889	625	522	807	653
NCR	(684)	(739)	(796)	(688)	(512)	(720)	(713)	(647)	(863)	(535)	(687)	(618)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)	(13)	(25)	(20)	(17)	(37)
Telanga	165	167	177	159	144	170	166	175	178	136	165	153
-na	(163)	(151)	(161)	(151)	(126)	(160)	(155)	(135)	(172)	(118)	(133)	(127)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)	(42)	(91)	(48)	(62)	(110)
W Bengal	75	74	74	116	185	74	74	74	74	116	.	116
	(75)	(75)	(75)	(79)	(0)	(75)	(75)	(75)	(75)	(79)	.	(79)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)	(72)	(94)	(2)	(0)	(2)
Maharash	245***	150	163*	227	141	198	196	223***	116	249	190	220
-tra	(236)	(213)	(180)	(264)	(188)	(230)	(229)	(220)	(126)	(224)	(317)	(272)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)	(36)	(46)	(26)	(25)	(51)
All-India	266	243	182***	324	176	259	253	198	172	247	276	262
	(401)	(407)	(322)	(463)	(215)	(416)	(404)	(307)	(331)	(316)	(404)	(364)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)	(163)	(256)	(96)	(104)	(200)

Notes: SF means supermarket farmers, TF means traditional farmers, MF means marginal farmers, SCST means farmers belongs to SC or ST category, values within the parenthesis indicates SD and frequency (top to bottom respectively), *** indicates significant at the 1% level, ** indicates significant at the 5% level and * indicates significant at the 10% level.

The MPCE on milk and milk products is recorded as ₹253 in all-India. The marginal farmers (₹182) have a significantly lower MPCE on milk and milk products when compared to other category farmers (₹324). However, there is no significant difference in MPCE on milk and milk products between supermarket farmers (₹266) and traditional farmers (₹243) (Table 8.4).

Table 8.5. Information on monthly per capita expenditure on fruits (in ₹)

	Marketing channel		Farm size holding		Social category			Marginal farmers		Small farmers		
State	SF	TF	MF	Others	SCST	Others	Overall	SF	TF	SF	TF	Overall
Delhi	70	69	53**	74	56	70	69	51	54	61	76	68
NCR	(59)	(54)	(42)	(59)	(42)	(57)	(56)	(40)	(44)	(57)	(55)	(56)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)	(13)	(25)	(20)	(17)	(37)
Telanga	75*	99	90	91	66	95	91	69	100	88	82	85
-na	(73)	(149)	(106)	(139)	(72)	(135)	(127)	(65)	(119)	(76)	(132)	(111)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)	(42)	(91)	(48)	(62)	(110)
W.Bengal	107	85	93***	249	155	94	95	103	85	249	.	249
	(98)	(73)	(84)	(63)	(0)	(86)	(85)	(96)	(73)	(63)	.	(63)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)	(72)	(94)	(2)	(0)	(2)
Maharash	46***	31	39	39	36	39	39	46	33	48**	27	38
-tra	(38)	(38)	(45)	(33)	(27)	(39)	(39)	(41)	(47)	(39)	(23)	(33)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)	(36)	(46)	(26)	(25)	(51)
All-India	74	79	78	76	63	78	77	78	78	75	68	71
	(73)	(111)	(86)	(107)	(68)	(99)	(97)	(79)	(90)	(70)	(107)	(91)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)	(163)	(256)	(96)	(104)	(200)

Notes: SF means supermarket farmers, TF means traditional farmers, MF means marginal farmers, SCST means farmers belongs to SC or ST category, values within the parenthesis indicates SD and frequency (top to bottom respectively), *** indicates significant at the 1% level, ** indicates significant at the 5% level and * indicates significant at the 10% level.

The results of MPCE on fruits throughout India have shown no significant difference in MPCE on fruits among different marketing channels, farm size holdings, and social categories. The average MPCE for fruits in all India is ₹77 (Table 8.5).

Table 8.6. Information on monthly per capita expenditure on vegetables (in ₹)

	Marketing channel		Farm size holding		Social category			Marginal farmers		Small farmers		
State	SF	TF	MF	Others	SCST	Others	Overall	SF	TF	SF	TF	Overall
Delhi	109	106	93*	112	82	109	108	93	93	106	120	112
NCR	(54)	(61)	(49)	(60)	(45)	(58)	(58)	(47)	(51)	(57)	(63)	(59)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)	(13)	(25)	(20)	(17)	(37)
Telanga	129	138	156***	121	143	133	135	141	163	139	120	128
-na	(89)	(90)	(92)	(86)	(97)	(88)	(90)	(84)	(95)	(88)	(80)	(84)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)	(42)	(91)	(48)	(62)	(110)
W.Bengal	286	271	277	341	433	276	277	284	271	341	.	341
	(142)	(112)	(126)	(150)	(0)	(126)	(126)	(142)	(112)	(150)	.	(150)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)	(72)	(94)	(2)	(0)	(2)
Maharash	96*	81	88	89	56	89	88	91	85	102	79	91
-tra	(59)	(52)	(53)	(59)	(27)	(56)	(56)	(49)	(56)	(74)	(47)	(63)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)	(36)	(46)	(26)	(25)	(51)
All-India	151	148	185***	113	134	150	149	189	182	126	110	118
	(116)	(106)	(126)	(77)	(100)	(111)	(110)	(137)	(119)	(86)	(72)	(80)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)	(163)	(256)	(96)	(104)	(200)

Notes: SF means supermarket farmers, TF means traditional farmers, MF means marginal farmers, SCST means farmers belongs to SC or ST category, values within the parenthesis indicates SD and frequency (top to bottom respectively), *** indicates significant at the 1% level, ** indicates significant at the 5% level and * indicates significant at the 10% level.

The MPCE on vegetables in all-India is ₹149. The Maharashtra state farmers observed a significant difference in MPCE on vegetables between supermarket (₹96) and traditional (₹81) farmers. However, for all-India, marginal farmers (₹185) have reported a significantly higher MPCE on vegetables compared to other category farmers (₹113) (Table 8.6).

Table 8.7. Information on monthly per capita expenditure on edible oils (in ₹)

	Marketing channel		Farm size holding		Social category			Marginal farmers		Small farmers		
State	SF	TF	MF	Others	SCST	Others	Overall	SF	TF	SF	TF	Overall
Delhi-	157*	131	128	147	159	142	143	116	135	186	161	175
NCR	(94)	(93)	(94)	(94)	(153)	(92)	(94)	(65)	(107)	(98)	(102)	(99)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)	(13)	(25)	(20)	(17)	(37)
Telanga	149	148	148	149	135	151	149	147	148	146	150	148
-na	(80)	(88)	(84)	(87)	(88)	(85)	(85)	(80)	(86)	(74)	(92)	(85)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)	(42)	(91)	(48)	(62)	(110)
W.	177	177	176	196	200	176	177	176	177	196	.	196
Bengal	(59)	(66)	(63)	(63)	(0)	(63)	(63)	(59)	(66)	(63)	.	(63)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)	(72)	(94)	(2)	(0)	(2)
Mahara	179	176	208***	149	137	179	178	219	200	156	161	158
-shtra	(113)	(155)	(136)	(130)	(42)	(138)	(136)	(132)	(140)	(102)	(208)	(161)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)	(36)	(46)	(26)	(25)	(51)
All-India	164	156	169***	149	139*	161	159	173	166	158	154	156
	(89)	(102)	(94)	(99)	(91)	(97)	(97)	(90)	(96)	(88)	(130)	(111)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)	(163)	(256)	(96)	(104)	(200)

Notes: SF means supermarket farmers, TF means traditional farmers, MF means marginal farmers, SCST means farmers belongs to SC or ST category, values within the parenthesis indicates SD and frequency (top to bottom respectively), *** indicates significant at the 1% level, ** indicates significant at the 5% level and * indicates significant at the 10% level.

The marginal farmers (₹169) have reported a significantly higher MPCE on edible oils compared to other category farmers (₹149), and SCST farmers (₹139) have reported a substantially lower MPCE on edible oils compared to other category farmers (₹161) in all-India. The MPCE on edible oils in all-India is ₹159 (Table 8.7).

Table 8.8. Information on monthly per capita expenditure on sugar and jaggary (in ₹)

	Marketing channel		Farm size holding		Social category			Marginal farmers		Small farmers		
State	SF	TF	MF	Others	SCST	Others	Overall	SF	TF	SF	TF	Overall
Delhi-NCR	61	63	66	61	56	62	62	48	75	65	63	64
	(27)	(45)	(57)	(30)	(42)	(38)	(38)	(29)	(65)	(22)	(26)	(24)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)	(13)	(25)	(20)	(17)	(37)
Telangana	28	31	32	29	25**	31	30	31	32	26*	33	30
	(18)	(20)	(20)	(20)	(14)	(20)	(20)	(15)	(22)	(18)	(24)	(22)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)	(42)	(91)	(48)	(62)	(110)
W.Bengal	27	27	27	38	11	27	27	27	27	38	.	38
	(13)	(13)	(13)	(25)	(0)	(13)	(13)	(13)	(13)	(25)	.	(25)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)	(72)	(94)	(2)	(0)	(2)
Maharash-tra	59	55	64**	50	50	57	57	65	63	54	50	52
	(28)	(48)	(47)	(31)	(21)	(40)	(40)	(29)	(57)	(27)	(40)	(34)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)	(36)	(46)	(26)	(25)	(51)
All-India	42	40	39	43	30***	42	41	38	40	42	42	42
	(27)	(34)	(34)	(29)	(21)	(32)	(32)	(25)	(39)	(27)	(31)	(29)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)	(163)	(256)	(96)	(104)	(200)

Notes: SF means supermarket farmers, TF means traditional farmers, MF means marginal farmers, SCST means farmers belongs to SC or ST category, values within the parenthesis indicates SD and frequency (top to bottom respectively), *** indicates significant at the 1% level, ** indicates significant at the 5% level and * indicates significant at the 10% level.

Table 8.8 illustrates no significant difference in MPCE between supermarket farmers (₹42) and traditional farmers (₹40). However, SCST farmers (₹30) have a significantly lower MPCE for sugar and jaggery than other category farmers (₹42). The average MPCE for sugar and jaggery across India is ₹41.

Table 8.9. Information on monthly per capita expenditure on salt and spices (in ₹)

	Marketing channel		Farm size holding		Social category			Marginal farmers		Small farmers		
State	SF	TF	MF	Others	SCST	Others	Overall	SF	TF	SF	TF	Overall
Delhi-NCR	39	38	30*	41	24	39	38	23	33	35	50	42
	(33)	(36)	(26)	(36)	(16)	(35)	(34)	(20)	(29)	(24)	(54)	(41)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)	(13)	(25)	(20)	(17)	(37)
Telangana	48	55	49	55	46	54	53	41	53	46	65	57
	(62)	(62)	(44)	(71)	(48)	(64)	(62)	(41)	(45)	(54)	(92)	(78)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)	(42)	(91)	(48)	(62)	(110)
W Bengal	75	64	68**	172	50	69	69	72	64	172	.	172
	(73)	(70)	(71)	(8)	(0)	(72)	(72)	(72)	(70)	(8)	.	(8)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)	(72)	(94)	(2)	(0)	(2)
Maharashtra	46	40	39	46	42	43	43	38	40	55	42	49
	(32)	(34)	(33)	(34)	(49)	(33)	(33)	(34)	(31)	(27)	(42)	(35)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)	(36)	(46)	(26)	(25)	(51)
All-India	52	51	53	50	44	52	51	53	53	49	57	53
	(56)	(57)	(55)	(57)	(46)	(57)	(56)	(57)	(54)	(46)	(77)	(64)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)	(163)	(256)	(96)	(104)	(200)

Notes: SF means supermarket farmers, TF means traditional farmers, MF means marginal farmers, SCST means farmers belongs to SC or ST category, values within the parenthesis indicates SD and frequency (top to bottom respectively), *** indicates significant at the 1% level, ** indicates significant at the 5% level and * indicates significant at the 10% level.

The results in Table 8.9 show no significant difference in MPCE for salt and spices across marketing channels, farm size holdings, and social categories. The average MPCE for salt and spices across India is ₹51.

Table 8.10. Information on monthly per capita expenditure on beverages and processed foods (in ₹)

State	Marketing channel		Farm size holding		Social category			Marginal farmers		Small farmers		
	SF	TF	MF	Others	SCST	Others	Overall	SF	TF	SF	TF	Overall
Delhi-NCR	50	41	40	46	40	45	45	36	43	49	48	48
	(43)	(41)	(30)	(45)	(39)	(42)	(42)	(22)	(34)	(43)	(62)	(52)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)	(13)	(25)	(20)	(17)	(37)
Telangana	30	31	25**	35	24	32	31	21	27	32	35	34
	(40)	(38)	(26)	(45)	(26)	(41)	(39)	(25)	(26)	(31)	(55)	(46)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)	(42)	(91)	(48)	(62)	(110)
W.Bengal	51	54	53	17	75	53	53	52	54	17	.	17
	(33)	(42)	(38)	(24)	(0)	(38)	(38)	(33)	(42)	(24)	.	(24)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)	(72)	(94)	(2)	(0)	(2)
Maharash-tra	45*	33	32**	45	38	39	39	43**	23	48	49	48
	(42)	(40)	(39)	(42)	(49)	(41)	(41)	(46)	(31)	(41)	(52)	(46)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)	(36)	(46)	(26)	(25)	(51)
All-India	42	38	39	40	28***	41	40	41	38	39	40	40
	(41)	(40)	(36)	(45)	(30)	(41)	(41)	(36)	(36)	(37)	(55)	(47)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)	(163)	(256)	(96)	(104)	(200)

Notes: SF means supermarket farmers, TF means traditional farmers, MF means marginal farmers, SCST means farmers belongs to SC or ST category, values within the parenthesis indicates SD and frequency (top to bottom respectively), *** indicates significant at the 1% level, ** indicates significant at the 5% level and * indicates significant at the 10% level.

SCST farmers (₹28) have a significantly lower MPCE on beverages and processed foods than other category farmers (₹41). The average MPCE on beverages and processed foods across India is ₹40 (Table 8.10).

Table 8.11. Information on monthly per capita expenditure on pan, tobacco and intoxicants (in ₹)

State	Marketing channel		Farm size holding		Social category			Marginal farmers		Small farmers		
	SF	TF	MF	Others	SCST	Others	Overall	SF	TF	SF	TF	Overall
Delhi NCR	10	11	8	12	23	10	11	8	8	3	9	6
	(30)	(31)	(21)	(33)	(40)	(30)	(30)	(21)	(22)	(13)	(25)	(19)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)	(13)	(25)	(20)	(17)	(37)
Telangana	21	32	69***	2	54	23	28	59	74	2	4	3
	(183)	(218)	(326)	(13)	(331)	(174)	(206)	(311)	(334)	(14)	(18)	(17)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)	(42)	(91)	(48)	(62)	(110)
W.Bengal	10	7	9	0	0	9	9	10	7	0	.	0
	(26)	(22)	(24)	(0)	(0)	(24)	(24)	(26)	(22)	(0)	.	(0)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)	(72)	(94)	(2)	(0)	(2)
Maharash-tra	14	9	11	12	21	11	11	10	12	23*	7	15
	(31)	(45)	(48)	(28)	(51)	(38)	(39)	(26)	(60)	(40)	(17)	(32)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)	(36)	(46)	(26)	(25)	(51)
All-India	15	19	28**	7	48*	15	18	23	32	8	6	7
	(111)	(148)	(187)	(24)	(297)	(109)	(134)	(160)	(203)	(25)	(19)	(22)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)	(163)	(256)	(96)	(104)	(200)

Notes: SF means supermarket farmers, TF means traditional farmers, MF means marginal farmers, SCST means farmers belongs to SC or ST category, values within the parenthesis indicates SD and frequency (top to bottom respectively), *** indicates significant at the 1% level, ** indicates significant at the 5% level and * indicates significant at the 10% level.

According to Table 8.11, marginal farmers (₹28) and SCST farmers (₹48) have significantly higher MPCE on pan, tobacco, and intoxicants compared to other category farmers, such as ₹7 and ₹15, respectively. The average MPCE on pan, tobacco, and intoxicants across India is ₹18.

Table 8.12. Information on monthly per capita expenditure on dry fruits (in ₹)

	Marketing channel		Farm size holding		Social category			Marginal farmers		Small farmers		
State	SF	TF	MF	Others	SCST	Others	Overall	SF	TF	SF	TF	Overall
Delhi	32*	15	7**	27	0	23	22	8	7	47	28	38
NCR	(69)	(43)	(25)	(63)	(0)	(57)	(56)	(28)	(24)	(79)	(68)	(74)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)	(13)	(25)	(20)	(17)	(37)
Telangana	14	11	9	15	3*	14	12	12	7	17	10	13
	(33)	(46)	(29)	(48)	(9)	(45)	(42)	(30)	(29)	(33)	(36)	(35)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)	(42)	(91)	(48)	(62)	(110)
W Bengal	9	5	6	22	38	6	7	8	5	22	.	22
	(30)	(15)	(23)	(31)	(0)	(23)	(23)	(30)	(15)	(31)	.	(31)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)	(72)	(94)	(2)	(0)	(2)
Maharash	21	18	14	25	28	19	20	13	15	23	25	24
-tra	(55)	(47)	(43)	(57)	(68)	(50)	(51)	(39)	(46)	(47)	(54)	(50)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)	(36)	(46)	(26)	(25)	(51)
All-India	18*	12	9***	20	6*	15	15	10	8	25	17	21
	(48)	(42)	(30)	(55)	(22)	(46)	(44)	(32)	(28)	(50)	(47)	(49)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)	(163)	(256)	(96)	(104)	(200)

Notes: SF means supermarket farmers, TF means traditional farmers, MF means marginal farmers, SCST means farmers belongs to SC or ST category, values within the parenthesis indicates SD and frequency (top to bottom respectively), *** indicates significant at the 1% level, ** indicates significant at the 5% level and * indicates significant at the 10% level.

Supermarket farmers reported significantly higher MPCE on dry fruits (₹18) than traditional farmers (₹12). However, marginal farmers (₹9) and SCST farmers (₹6) have significantly lower MPCE on dry fruits. The average MPCE on dry fruits is ₹15 in all-India (Table 8.12).

Table 8.13. Information on monthly per capita expenditure on light and fuels (in ₹)

	Marketing channel		Farm size holding		Social category			Marginal farmers		Small farmers		
State	SF	TF	MF	Other	SCST	Others	Overall	SF	TF	SF	TF	Overall
Delhi-	365*	360	263***	394	315	364	362	251	269	350	455	398
NCR	(267)	(269)	(165)	(286)	(147)	(271)	(267)	(129)	(183)	(143)	(283)	(222)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)	(13)	(25)	(20)	(17)	(37)
Telanga												
-na	158	162	177*	150	130*	166	161	188	172	140	163	153
	(99)	(145)	(177)	(86)	(85)	(136)	(130)	(138)	(193)	(62)	(116)	(96)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)	(42)	(91)	(48)	(62)	(110)
W.Bengal	252	225	234***	471	88	238	237	246	225	471	.	471
	(124)	(138)	(129)	(273)	(0)	(132)	(132)	(116)	(138)	(273)	.	(273)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)	(72)	(94)	(2)	(0)	(2)
Maharash	286*	248	266	266	249	267	266	278	256	310*	247	279
-tra	(144)	(141)	(161)	(125)	(119)	(144)	(143)	(153)	(168)	(151)	(108)	(134)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)	(36)	(46)	(26)	(25)	(51)
All-India	249*	226	225*	246	157***	242	235	239	216	237	231	234
	(177)	(186)	(159)	(204)	(111)	(186)	(183)	(134)	(172)	(151)	(185)	(169)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)	(163)	(256)	(96)	(104)	(200)

Notes: SF means supermarket farmers, TF means traditional farmers, MF means marginal farmers, SCST means farmers belongs to SC or ST category, values within the parenthesis indicates SD and frequency (top to bottom respectively), *** indicates significant at the 1% level, ** indicates significant at the 5% level and * indicates significant at the 10% level.

8.2. Itemwise non-food expenditure across markets, size, and social categories

Supermarket farmers reported significantly higher MPCE on light and fuel (₹249) than traditional farmers (₹226). However, marginal farmers (₹225) and SCST farmers (₹157) have significantly lower MPCE on light & fuel. The average MPCE on light and fuel was ₹235 in all India (Table 8.13).

Table 8.14. Information on monthly per capita expenditure on health (in ₹)

State	Marketing channel		Farm size holding		Social category			Marginal farmers		Small farmers		
	SF	TF	MF	Others	SCST	Others	Overall	SF	TF	SF	TF	Overall
Delhi-NCR	367	423	96	495	415	398	399	138	74	789	987	880
	(1748)	(1335)	(142)	(1738)	(333)	(1553)	(1524)	(200)	(98)	(3151)	(2282)	(2750)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)	(13)	(25)	(20)	(17)	(37)
Telanga-na	686	537	514	639	352	634	590	644	454	646	427	523
	(1797)	(1654)	(1159)	(1978)	(624)	(1834)	(1705)	(1328)	(1075)	(1760)	(965)	(1367)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)	(42)	(91)	(48)	(62)	(110)
W.Bengal	243	186	211	213	65	212	211	244	186	213	.	213
	(278)	(212)	(245)	(92)	(0)	(245)	(244)	(281)	(212)	(92)	.	(92)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)	(72)	(94)	(2)	(0)	(2)
Maharash-tra	816*	425	526	698	130	633	615	561*	498	573	461	518
	(1611)	(1080)	(1159)	(1551)	(153)	(1395)	(1374)	(901)	(1336)	(895)	(864)	(873)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)	(36)	(46)	(26)	(25)	(51)
All-India	559	429	358***	608	333	496	483	409	326	647	527	585
	(1550)	(1332)	(859)	(1821)	(573)	(1477)	(1427)	(835)	(875)	(1933)	(1256)	(1614)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)	(163)	(256)	(96)	(104)	(200)

Notes: SF means supermarket farmers, TF means traditional farmers, MF means marginal farmers, SCST means farmers belongs to SC or ST category, values within the parenthesis indicates SD and frequency (top to bottom respectively), *** indicates significant at the 1% level, ** indicates significant at the 5% level and * indicates significant at the 10% level.

The marginal farmers have significantly lower MPCE on health (₹358) than other category farmers (₹608). However, there is no significant difference in MPCE on health across marketing channels and social categories. The average MPCE on health across India is ₹483 (Table 8.14).

Table 8.15. Information on monthly per capita expenditure on education (in ₹)

State	Marketing channel		Farm size holding		Social category			Marginal farmers		Small farmers		
	SF	TF	MF	Others	SCST	Others	Overall	SF	TF	SF	TF	Overall
Delhi-NCR	494*	243	177	408	93	363	353	245	142	248	230	240
	(1123)	(437)	(359)	(911)	(135)	(832)	(818)	(475)	(286)	(279)	(568)	(429)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)	(13)	(25)	(20)	(17)	(37)
Telanga-na	291*	169	126**	268	129	228	213	146	117	376**	137	241
	(690)	(602)	(325)	(768)	(294)	(680)	(636)	(423)	(270)	(734)	(491)	(618)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)	(42)	(91)	(48)	(62)	(110)
W. Bengal	118	95	105	116	313	104	105	118	95	116	.	116
	(167)	(129)	(147)	(164)	(0)	(147)	(147)	(169)	(129)	(164)	.	(164)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)	(72)	(94)	(2)	(0)	(2)
Maharash-tra	134	106	96	142	81	121	120	107	87	130	153	142
	(185)	(227)	(157)	(245)	(111)	(210)	(207)	(159)	(157)	(188)	(340)	(271)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)	(36)	(46)	(26)	(25)	(51)
All-India	257***	157	116***	282	124	205	199	133	106	277*	156	214
	(669)	(459)	(242)	(743)	(269)	(576)	(558)	(285)	(210)	(551)	(470)	(513)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)	(163)	(256)	(96)	(104)	(200)

Notes: SF means supermarket farmers, TF means traditional farmers, MF means marginal famers, SCST means farmers belongs to SC or ST category, values within the parenthesis indicates SD and frequency (top to bottom respectively), *** indicates significant at the 1% level, ** indicates significant at the 5% level and * indicates significant at the 10% level.

Supermarket farmers have significantly higher Monthly Per Capita Consumption Expenditure (MPCE) on education (₹257), and marginal farmers have significantly lower MPCE on education (₹116) in all-India. The average MPCE in education across India is ₹199 (Table 8.15).

Table 8.16. Information on monthly per capita expenditure on clothing (in ₹)

	Marketing channel		Farm size holding		Social category			Marginal farmers		Small farmers		
State	SF	TF	MF	Others	SCST	Others	Overall	SF	TF	SF	TF	Overall
Delhi	105**	138	110	128	106	124	124	89	121	94**	155	122
NCR	(76)	(118)	(75)	(110)	(62)	(104)	(103)	(43)	(86)	(57)	(110)	(90)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)	(13)	(25)	(20)	(17)	(37)
Telangana	358***	283	304	314	302	311	310	350*	282	319	315	317
	(236)	(253)	(217)	(268)	(351)	(227)	(249)	(257)	(194)	(190)	(389)	(316)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)	(42)	(91)	(48)	(62)	(110)
W.Bengal	190*	162	174	231	167	175	175	189*	162	231	.	231
	(108)	(85)	(96)	(92)	(0)	(97)	(96)	(108)	(85)	(92)	.	(92)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)	(72)	(94)	(2)	(0)	(2)
Maharash	225***	145	158*	208	131	186	184	184	138	212	170	192
-tra	(232)	(134)	(137)	(230)	(68)	(194)	(191)	(97)	(159)	(307)	(114)	(232)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)	(36)	(46)	(26)	(25)	(51)
All-India	241**	209	206**	238	266*	218	222	222	196	241	254	248
	(211)	(201)	(166)	(238)	(323)	(192)	(206)	(175)	(159)	(226)	(316)	(276)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)	(163)	(256)	(96)	(104)	(200)

Notes: SF means supermarket farmers, TF means traditional farmers, MF means marginal farmers, SCST means farmers belongs to SC or ST category, values within the parenthesis indicates SD and frequency (top to bottom respectively), *** indicates significant at the 1% level, ** indicates significant at the 5% level and * indicates significant at the 10% level.

Supermarket farmers (₹241) and SCST farmers (₹266) report significantly higher MPCE on clothing than other category farmers. However, marginal farmers have been reported to have a lower MPCE on clothing than the other categories, with an MPCE of ₹206. The overall average MPCE on clothing for all farmers in India is ₹222 (Table 8.16).

Table 8.17. Information on monthly per capita expenditure on footwear (in ₹)

	Marketing channel		Farm size holding		Social category			Marginal farmers		Small farmers		
State	SF	TF	MF	Others	SCST	Others	Overall	SF	TF	SF	TF	Overall
Delhi	17	19	16	19	8	19	18	12	18	21**	12	17
NCR	(17)	(21)	(15)	(20)	(10)	(20)	(19)	(16)	(15)	(13)	(14)	(14)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)	(13)	(25)	(20)	(17)	(37)
Telanga	32	38	39	34	42	35	36	34	41	31	36	34
-na	(27)	(37)	(38)	(31)	(48)	(30)	(33)	(32)	(40)	(26)	(39)	(34)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)	(42)	(91)	(48)	(62)	(110)
W. Bengal	32**	25	28	23	17	28	28	33**	25	23	.	23
	(27)	(21)	(24)	(33)	(0)	(24)	(24)	(27)	(21)	(33)	.	(33)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)	(72)	(94)	(2)	(0)	(2)
Maharash	40***	23	26**	37	20	32	32	29	23	38**	20	29
-tra	(44)	(30)	(29)	(45)	(14)	(39)	(38)	(27)	(31)	(33)	(28)	(31)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)	(36)	(46)	(26)	(25)	(51)
All-India	31	29	30	30	36*	29	30	30	29	31	28	30
	(31)	(31)	(30)	(32)	(45)	(30)	(31)	(28)	(31)	(27)	(35)	(31)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)	(163)	(256)	(96)	(104)	(200)

Notes: SF means supermarket farmers, TF means traditional farmers, MF means marginal farmers, SCST means farmers belongs to SC or ST category, values within the parenthesis indicates SD and frequency (top to bottom respectively), *** indicates significant at the 1% level, ** indicates significant at the 5% level and * indicates significant at the 10% level.

The average MPCE on footwear is ₹30 in all-India. However, farmers who belong to Scheduled Castes and Scheduled Tribes (SCST) have a significantly higher MPCE on footwear, with an MPCE of ₹36, compared to other categories of farmers with an MPCE of ₹29. This is higher than the all-India average MPCE on footwear (Table 8.17).

Table 8.18. Information on monthly per capita expenditure on vacation and social functions (in ₹)

	Marketing channel		Farm size holding		Social category			Marginal farmers		Small farmers		
State	SF	TF	MF	Others	SCST	Others	Overall	SF	TF	SF	TF	Overall
Delhi NCR	37	188	82	135	17	126	122	45	102	22	89	53
	(71)	(1056)	(338)	(894)	(39)	(811)	(796)	(92)	(414)	(31)	(200)	(139)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)	(13)	(25)	(20)	(17)	(37)
Telanga -na	407	641	1015	265	393	588	558	715	1154	272	325	302
	(1028)	(4818)	(6133)	(937)	(775)	(4240)	(3908)	(1611)	(7343)	(522)	(1580)	(1231)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)	(42)	(91)	(48)	(62)	(110)
W.Bengal	88	66	74	167	42	76	75	86	66	167	.	167
	(186)	(111)	(149)	(0)	(0)	(149)	(149)	(188)	(111)	(0)	.	(0)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)	(72)	(94)	(2)	(0)	(2)
Maharasth -tra	459	117	168*	392	57	291	283	149	182	1065	59	572
	(2033)	(673)	(738)	(1966)	(50)	(1528)	(1501)	(410)	(922)	(3468)	(113)	(2505)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)	(36)	(46)	(26)	(25)	(51)
All-India	278	355	392	253	323	323	323	259	477	433	223	323
	(1174)	(3274)	(3491)	(1213)	(708)	(2717)	(2615)	(885)	(4411)	(1860)	(1226)	(1562)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)	(163)	(256)	(96)	(104)	(200)

Notes: SF means supermarket farmers, TF means traditional farmers, MF means marginal farmers, SCST means farmers belongs to SC or ST category, values within the parenthesis indicates SD and frequency (top to bottom respectively), *** indicates significant at the 1% level, ** indicates significant at the 5% level and * indicates significant at the 10% level.

The MPCE on vacation and social function results in Table 8.18 reveal no significant difference across marketing channels, farm size holding, and social category. The average MPCE on vacation and social function is ₹323 in all-India.

Table 8.19. Monthly per capita expenditure on other expenses (in ₹)

	Marketing channel		Farm size holding		Social category			Marginal farmers		Small farmers		
State	SF	TF	MF	Others	SCST	Others	Overall	SF	TF	SF	TF	Overall
Delhi NCR	783	762	535**	846	472	783	771	410	600	784	641	718
	(742)	(797)	(627)	(799)	(374)	(781)	(771)	(320)	(736)	(826)	(222)	(622)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)	(13)	(25)	(20)	(17)	(37)
Telangana	773***	619	646	692	540**	699	674	712	616	811	669	731
	(505)	(470)	(449)	(511)	(348)	(506)	(488)	(446)	(449)	(575)	(601)	(591)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)	(42)	(91)	(48)	(62)	(110)
W Bengal	710**	546	612	1126	462	619	618	698**	546	1126	.	1126
	(589)	(347)	(474)	(253)	(0)	(476)	(475)	(593)	(347)	(253)	.	(253)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)	(72)	(94)	(2)	(0)	(2)
Maharash -tra	1279***	754	912	1100	1215	1001	1009	1105	760	1132	735	937
	(1579)	(866)	(1188)	(1373)	(2195)	(1251)	(1287)	(1450)	(923)	(1008)	(891)	(964)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)	(36)	(46)	(26)	(25)	(51)
All-India	881***	655	674***	824	594*	762	749	769**	614	899**	680	785
	(951)	(613)	(689)	(853)	(720)	(782)	(779)	(839)	(568)	(769)	(638)	(710)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)	(163)	(256)	(96)	(104)	(200)

Notes: SF means supermarket farmers, TF means traditional farmers, MF means marginal farmers, SCST means farmers belongs to SC or ST category, values within the parenthesis indicates SD and frequency (top to bottom respectively), *** indicates significant at the 1% level, ** indicates significant at the 5% level and * indicates significant at the 10% level.

According to the results presented in Table 8.19, supermarket farmers have a significantly higher MPCE on other expenses when compared to traditional market farmers, with an MPCE of ₹881. Conversely, farmers who fall under the classification of marginal farmers and those belonging to Scheduled Castes and Scheduled Tribes have a significantly lower MPCE on other expenses, with MPCEs of ₹674 and ₹594, respectively. The overall average MPCE on other expenses for all farmers in India is ₹749.

Table 8.20. Monthly per capita expenditure among vegetable growers (include both food and non-food items) (in ₹)

	Marketing channel		Farm size holding		Social category			Marginal farmers		Small farmers		
State	SF	TF	MF	Others	SCST	Others	Overall	SF	TF	SF	TF	Overall
Delhi NCR	3728	3680	2765***	3998	2724	3740	3701	2779	2758	3709	4302	3981
	(2790)	(2286)	(1679)	(2659)	(1398)	(2539)	(2510)	(1374)	(1844)	(3764)	(2657)	(3272)
	(69)	(89)	(38)	(120)	(6)	(152)	(158)	(13)	(25)	(20)	(17)	(37)
Telangana	4277	4051	4501	3896	3371	4272	4132	4442	4527	4116	3582	3815
	(2600)	(5396)	(6476)	(2784)	(1942)	(4916)	(4592)	(2383)	(7676)	(2799)	(2128)	(2446)
	(122)	(219)	(133)	(208)	(53)	(288)	(341)	(42)	(91)	(48)	(62)	(110)
W.Bengal	3409**	2975	3144**	5001	3372	3165	3166	3365**	2975	5001	.	5001
	(1362)	(926)	(1144)	(543)	(0)	(1159)	(1156)	(1353)	(926)	(543)	.	(543)
	(74)	(94)	(166)	(2)	(1)	(167)	(168)	(72)	(94)	(2)	(0)	(2)
Maharashtra	4497***	2876	3320	3985	2861	3692	3662	3696	3026	4733*	2938	3853
	(3868)	(2342)	(2447)	(3874)	(2829)	(3287)	(3268)	(2052)	(2703)	(4504)	(2261)	(3663)
	(82)	(87)	(82)	(87)	(6)	(163)	(169)	(36)	(46)	(26)	(25)	(51)
All-India	4035*	3568	3575	3949	3266	3804	3762	3669	3515	4217	3545	3868
	(2822)	(3916)	(3948)	(2998)	(1958)	(3609)	(3509)	(1884)	(4826)	(3493)	(2270)	(2933)
	(347)	(489)	(419)	(417)	(66)	(770)	(836)	(163)	(256)	(96)	(104)	(200)

Notes: SF means supermarket farmers, TF means traditional farmers, MF means marginal farmers, SCST means farmers belongs to SC or ST category, values within the parenthesis indicates SD and frequency (top to bottom respectively), *** indicates significant at the 1% level, ** indicates significant at the 5% level and * indicates significant at the 10% level.

The overall MPCE on consumption for all farmers in India during 2020-21 at current prices was ₹3868. In 2013-14, the MPCE on consumption for the sampled farmers in all-India was ₹3287 at current prices (Table 8.20). Supermarket farmers across all states of India have a significantly higher MPCE on consumption than traditional farmers. Specifically, supermarket farmers in all-India have an MPCE of ₹4035, those in West Bengal have an MPCE of ₹3409 and those in Maharashtra have an MPCE of ₹4497, in contrast to traditional farmers who have MPCEs of ₹3568, ₹2975, and ₹2876 respectively. On the other hand, marginal farmers in Delhi-NCR and West Bengal states have a significantly lower MPCE on consumption than other category farmers, with MPCEs of ₹2765 and ₹3144, respectively, compared to other category farmers with MPCEs of ₹3998 and ₹5001. SCST farmers have been reported to have a 14% lower MPCE on consumption than other category farmers, with an MPCE of ₹3266 compared to ₹3804, respectively.

Table 8.21. Item wise monthly per capita consumption expenditure for all-India (in ₹)

	Marketing channel		Farm size holding		Social category		**Overall**	Marginal farmers		Small farmers		
Items	SF	TF	MF	Others	SCST	Others		SF	TF	SF	TF	Overall
Health	559 (13.85)	429 (12.02)	358*** (10.01)	608 (15.40)	333 (10.20)	496 (13.04)	**483 (12.84)**	409 (11.15)	326 (9.27)	647 (15.34)	527 (14.87)	585 (15.12)
Cereal and cereal substitutes	322 (7.98)	325 (9.11)	345*** (9.65)	302 (7.65)	315 (9.64)	324 (8.52)	**324 (8.61)**	348 (9.48)	343 (9.76)	316 (7.49)	305 (8.60)	310 (8.01)
Vacation and social function	278 (6.89)	355 (9.95)	392 (10.97)	253 (6.41)	323 (9.89)	323 (8.49)	**323 (8.59)**	259 (7.06)	477 (13.57)	433 (10.27)	223 (6.29)	323 (8.35)
Egg, fish & meat	288 (7.14)	294 (8.24)	351*** (9.82)	232 (5.87)	354** (10.84)	286 (7.52)	**292 (7.76)**	362 (9.87)	344 (9.79)	249 (5.90)	264 (7.45)	257 (6.64)
Milk & milk products	266 (6.59)	243 (6.81)	182*** (5.09)	324 (8.20)	176 (5.39)	259 (6.81)	**253 (6.73)**	198 (5.40)	172 (4.89)	247 (5.86)	276 (7.79)	262 (6.77)
Light and fuel	249* (6.17)	226 (6.33)	225* (6.29)	246 (6.23)	157*** (4.81)	242 (6.36)	**235 (6.25)**	239 (6.51)	216 (6.15)	237 (5.62)	231 (6.52)	234 (6.05)
Clothing	241** (5.97)	209 (5.86)	206** (5.76)	238 (6.03)	266* (8.14)	218 (5.73)	**222 (5.90)**	222 (6.05)	196 (5.58)	241 (5.71)	254 (7.17)	248 (6.41)
Education	257*** (6.37)	157 (4.40)	116*** (3.24)	282 (7.14)	124 (3.80)	205 (5.39)	**199 (5.29)**	133 (3.62)	106 (3.02)	277* (6.57)	156 (4.40)	214 (5.53)
Edible oil	164 (4.06)	156 (4.37)	169*** (4.73)	149 (3.77)	139* (4.26)	161 (4.23)	**159 (4.23)**	173 (4.72)	166 (4.72)	158 (3.75)	154 (4.34)	156 (4.03)
Vegetables	151 (3.74)	148 (4.15)	185*** (5.17)	113 (2.86)	134 (4.10)	150 (3.94)	**149 (3.96)**	189 (5.15)	182 (5.18)	126 (2.99)	110 (3.10)	118 (3.05)
Pulses & pulse products	106 (2.63)	102 (2.86)	95*** (2.66)	113 (2.86)	95 (2.91)	105 (2.76)	**104 (2.76)**	97 (2.64)	94 (2.67)	118 (2.80)	107 (3.02)	112 (2.90)
Fruits (fresh)	74 (1.83)	79 (2.21)	78 (2.18)	76 (1.92)	63 (1.93)	78 (2.05)	**77 (2.05)**	78 (2.13)	78 (2.22)	75 (1.78)	68 (1.92)	71 (1.84)
Salt and spices	52 (1.29)	51 (1.43)	53 (1.48)	50 (1.27)	44 (1.35)	52 (1.37)	**51 (1.36)**	53 (1.44)	53 (1.51)	49 (1.16)	57 (1.61)	53 (1.37)
Sugar and jaggary	42 (1.04)	40 (1.12)	39 (1.09)	43 (1.09)	30*** (0.92)	42 (1.10)	**41 (1.09)**	38 (1.04)	40 (1.14)	42 (1.00)	42 (1.18)	42 (1.09)
Beverages, etc.	42 (1.04)	38 (1.07)	39 (1.09)	40 (1.01)	28*** (0.86)	41 (1.08)	**40 (1.06)**	41 (1.12)	38 (1.08)	39 (0.92)	40 (1.13)	40 (1.03)
Footwear	31 (0.77)	29 (0.81)	30 (0.84)	30 (0.76)	36* (1.10)	29 (0.76)	**30 (0.80)**	30 (0.82)	29 (0.83)	31 (0.74)	28 (0.79)	30 (0.78)
Pan, tobacco and intoxicants	15 (0.37)	19 (0.53)	28 (0.78)	7 (0.18)	48 (1.47)	15 (0.39)	**18 (0.48)**	23 (0.63)	32 (0.91)	8 (0.19)	6 (0.17)	7 (0.18)
Fruits (dry)	18* (0.45)	12 (0.34)	9*** (0.25)	20 (0.51)	6* (0.18)	15 (0.39)	**15 (0.40)**	10 (0.27)	8 (0.23)	25 (0.59)	17 (0.48)	21 (0.54)
Other expenses	881*** (21.83)	655 (18.36)	674*** (18.85)	824 (20.87)	594* (18.19)	762 (20.03)	**749 (19.91)**	769** (20.96)	614 (17.47)	899** (21.32)	680 (19.18)	785 (20.29)
Total expenditure	4035* (100.00)	3568 (100.00)	3575 (100.00)	3949 (100.00)	3266 (100.00)	3804 (100.00)	**3762 (100.00)**	3669 (100.00)	3515 (100.00)	4217 (100.00)	3545 (100.00)	3868 (100.00)

Note: Values in parenthesis indicates percentage share to total expenditure, MF indicates marginal farmers. ***, ** and * indicates significant at the 1%, 5% and10% level, respectively

8.3. Item-wise proportion of MPCE across markets, size, and social categories

For all-India, the sampled farmers have the highest percentage of the amount spent on miscellaneous expenses, at 19.91%. This is followed by health expenses at 12.84%, cereal and cereal substitutes at 8.61%, vacation and social functions at 8.59%, egg, fish, and meat at 7.76%, and so on. (Table 8.21).

MPCE across marketing channels: According to the results presented in Table 8.21, supermarket farmers have a significantly higher MPCE on consumption compared to traditional farmers, with an MPCE of ₹4035 for supermarket farmers and ₹3568 for traditional market farmers. The observed values for both supermarket and traditional market farmers are higher than the MPCE on consumption in the previous quinquennial survey in 2013-14, with MPCEs of ₹3467 for supermarket farmers and ₹3053 for traditional farmers. Supermarket farmers spend a significantly higher amount on other expenses (21.83%) compared to traditional farmers; this is

followed by education (6.37%), light and fuel (6.17%), clothing (5.97%), and dry fruits (0.45%) compared to traditional farmers.

While Supermarket farmers spend a higher amount on (means top four items) 1. other expenses (21.83%), 2. health (13.85%), 3. cereal & cereal substitutes (7.98%), and 4. egg, fish & meat (7.14%), traditional market farmers spend a higher amount on (means top four items) 1. other expenses (18.36%), 2. health (12.02%), 3. vacation & social function (9.95%), and 4. cereal & cereal substitutes (9.11%).

MPCE across farm size holding: Marginal farmers spend significantly lower amounts on other expenses (18.85%), health (10.01%), milk and milk products (5.09%), light and fuel (6.29%), clothing (5.76%), education (3.24%), pulses and pulse products (2.66%), and dry fruits (0.25%) compared to other categories of farmers. However, marginal farmers spend significantly higher amounts on cereal and cereal substitutes (9.65%), egg, fish, and meat (9.82%), edible oil (4.73%), and vegetables (5.17%) than other categories of farmers. The average Monthly Per Capita Expenditure (MPCE) on consumption for marginal farmers is ₹3575 (Table 8.21).

MPCE across social categories: SCST farmers (₹3266) reported non-significantly lower MPCE on consumption than other category farmers (₹3804). When compared to other categories of farmers, SCST farmers spend significantly lower amounts on other expenses (18.19%), light and fuel (4.81%), edible oil (4.26%), sugar and jaggery (0.92%), beverages (0.86%), and dry fruits (0.18%). However, they spend significantly higher amounts on egg, fish, and meat (10.84%), clothing (8.14%), and footwear (1.10%) (Table 8.21)

Table 8.22. Share of food and non-food expenditure in MPCE (in ₹ and %)

State	Food	Food share %	Non-food	Non-food share %	Total
Delhi NCR	1552	42	2149	58	3701
Telangana	1591	39	2542	61	4132
W.Bengal	1717	54	1449	46	3166
Maharashtra	1156	32	2509	68	3662
All-India	1523	40	2241	60	3762

Finally, we look at the share of food and non-food in the monthly per capita consumption expenditure (Table 8.22). The vegetable growers in study areas consume food with 40% of their total MPCE with some statewise variations. Farmers from Telangana spend 54% of their consumption expenditure on food, while those from Maharashtra utilise only 32%. The lowest spending on food is observed in Maharashtra, while West Bengal farmers spend a relatively higher amount.

8.4. Dietary diversity among vegetable growers

Dietary diversity is also a crucial metric to understand the likely nutritional outcomes. This is especially important in rural contexts of developing countries like India. Therefore, we asked questions related to the food consumed on the previous day by the head of the household's wife. We took special care to see that the information does not pertain to a special day like a festival, fasting, etc. The following four tables present the results (Tables 8.23 to 8.26).

At an overall level, apart from maximum cereals consumption, about 80 % of the sampled farmers had consumed white tubers and roots or other starchy foods, 44% consumed dark green leafy vegetables, and very small proportions of them had consumed vitamin A-rich fruits (13%) (Table 8.23). Coming to non-vegetarian items, about 82 % of them consumed meat, eggs, and fish, whereas 72 % of vegetable growers consumed milk and milk products in the overall sample.

As expected, 59% of farmers consumed fish in Maharashtra as compared to meagre proportion in West Bengal (14%). Vitamin-A-rich fruit consumption among farmers is higher in West Bengal (21%) than in Maharashtra (just 4%). A substantial percentage of farmers consumed spices and condiments, oils and fats, and sweet and sugar beverages across both the categories in the sampled states. There is not much difference between supermarkets and traditional farmers in the proportion of consumption of items across states and for the whole sample.

Table 8.23: Distribution of farmers according to different items of consumption across market channels (%)

Items	Maharashtra			W.Bengal			Total		
	SF (n=82)	TF (n=87)	Total (n=169)	SF (n=74)	TF (n=94)	Total (n=168)	SF (n=156)	TF (n=181)	Total (n=337)
Cereals	95.12	100.00	97.63	100.00	98.94	99.40	97.44	99.45	98.52
Vitamin A rich vegetables and	35.37	39.08	37.28	33.78	47.87	41.67	34.62	43.65	39.47
White tubers and roots or other starchy foods	65.85	64.37	65.09	95.95	95.74	95.83	80.13	80.66	80.42
Dark green leafy vegetables	48.78	47.13	47.93	37.84	40.43	39.29	43.59	43.65	43.62
Other vegetables	74.39	77.01	75.74	94.59	95.74	95.24	83.97	86.74	85.46
Vitamin A rich fruits	23.17	19.54	21.30	2.70	4.26	3.57	13.46	11.60	12.46
Other fruits	58.54	52.87	55.62	45.95	52.13	49.40	52.56	52.49	52.52
Meat	23.17	18.39	20.71	10.81	19.15	15.48	17.31	18.78	18.10
Eggs	28.05	17.24	22.49	28.38	36.17	32.74	28.21	27.07	27.60
Fish	17.07	10.34	13.61	58.11	59.57	58.93	36.54	35.91	36.20
Pulses	78.05	63.22	70.41	72.97	78.72	76.19	75.64	71.27	73.29
Nuts and seeds	24.39	18.39	21.30	10.81	9.57	10.12	17.95	13.81	15.73
Milk and milk products	91.46	87.36	89.35	51.35	57.45	54.76	72.44	71.82	72.11
Oils and fats	95.12	94.25	94.67	100.00	95.74	97.62	97.44	95.03	96.14
Sweets and sugary beverages	89.02	91.95	90.53	95.95	98.94	97.62	92.31	95.58	94.07
Spices & condiments	93.90	93.10	93.49	100.00	100.00	100.00	96.15	96.69	96.44

Source: Field survey conducted in two states, 2021-22. Note: SF= Supermarket farmers and TF= Traditional farmers

The proportion of cereals consumption is maximum in both the sampled states across SC/ST and other category of vegetable growers (Table 8.24). A higher proportion of SC/ST farmers consumed different items in Maharashtra state than in West Bengal due to the smaller sample size in Maharashtra.

Table 8.24: Distribution of farmers according to different items of consumption across marketing channels (%)

Items	Maharashtra			W.Bengal			Total		
	SC/ST (n=6)	Other (n=163)	Total (n=169)	SC/ST (n=1)	Other (n=167)	Total (n=168)	SC/ST (n=7)	Other (n=330)	Total (n=337)
Cereals	100.00	97.55	97.63	100.00	99.40	99.40	100.00	98.48	98.52
Vitamin A rich vegetables and	33.33	37.42	37.28	100.00	41.32	41.67	42.86	39.39	39.47
White tubers and roots or other	50.00	65.64	65.09	100.00	95.81	95.83	57.14	80.91	80.42
Dark green leafy vegetables	16.67	49.08	47.93	100.00	38.92	39.29	28.57	43.94	43.62
Other vegetables	100.00	74.85	75.74	100.00	95.21	95.24	100.00	85.15	85.46
Vitamin A rich fruits	33.33	20.86	21.30	0.00	3.59	3.57	28.57	12.12	12.46
Other fruits	50.00	55.83	55.62	100.00	49.10	49.40	57.14	52.42	52.52
Meat	33.33	20.25	20.71	0.00	15.57	15.48	28.57	17.88	18.10
Eggs	16.67	22.70	22.49	0.00	32.93	32.74	14.29	27.88	27.60
Fish	16.67	13.50	13.61	100.00	58.68	58.93	28.57	36.36	36.20
Pulses	83.33	69.94	70.41	100.00	76.05	76.19	85.71	73.03	73.29
Nuts and seeds	0.00	22.09	21.30	0.00	10.18	10.12	0.00	16.06	15.73
Milk and milk	83.33	89.57	89.35	100.00	54.49	54.76	85.71	71.82	72.11
Oils and fats	83.33	95.09	94.67	100.00	97.60	97.62	85.71	96.36	96.14
Sweets and sugary	100.00	49.08	86.98	100.00	97.60	97.02	100.00	93.94	94.07
Spices &	100.00	93.25	93.49	100.00	99.40	99.40	100.00	96.36	96.44

Source: Field survey conducted in two states, 2021-22. Note: Other category include general & other backward caste

In the overall sample, the percentage of marginal farmers who reported consuming cereals, oils and fats, sweet and sugar beverages, and spices and condiments remained above 94%. For white tubers and roots or other starchy foods, fish, and eggs, it remained at 83%, 45%, and 30%, respectively (Table 8.25). However, percentages are higher for other category farmers for milk and milk products (91%), pulses (81%), dark green leafy vegetables (54%), and Vitamin A-rich fruits (19%) in the overall situation.

State-wise analysis in Table 8.25 suggests that, across land categories, apart from maximum consumption of cereals, spices and condiments, oils and fats, and sweet and sugar beverages, the proportion of marginal farmers who consumed white tubers and roots or other starchy foods are higher in West Bengal (96 %) than in Maharashtra (59%). The reverse is true in the case of vitamin A-rich fruits, which is higher in Maharashtra (23%) than in West Bengal (4%). About 88 % of marginal vegetable growers consumed milk and milk products in Maharashtra compared to West Bengal (54%). However, fish consumption is higher in West Bengal (58%) than in Maharashtra (18%). Not many differences are observed in the proportion of consumption of marginal vegetable growers across the two states for the rest of the items.

Table 8.25: Distribution of farmers according to different items of consumption across land categories (%)

Items	W.Bengal			Maharashtra			Total		
	Marginal (n=166)	other (n=2)	Total (n=168)	Marginal (n=82)	other (n=87)	Total (n=169)	Marginal (n=248)	other (n=89)	Total (n=337)
Cereals	99.40	100.00	99.40	97.56	97.70	97.63	98.79	97.75	98.52
Vitamin A rich vegetables and tubers	40.96	100.00	41.67	41.46	33.33	37.28	41.13	34.83	39.47
White tubers and roots or other starchy foods	95.78	100.00	95.83	58.54	71.26	65.09	83.47	71.91	80.42
Dark green leafy vegetables	38.55	100.00	39.29	42.68	52.87	47.93	39.92	53.93	43.62
Other vegetables	95.18	100.00	95.24	65.85	85.06	75.74	85.48	85.39	85.46
Vitamin A rich fruits	3.61	0.00	3.57	23.17	19.54	21.30	10.08	19.10	12.46
Other fruits	49.40	50.00	49.40	60.98	50.57	55.62	53.23	50.56	52.52
Meat	15.66	0.00	15.48	25.61	16.09	20.71	18.95	15.73	18.10
Eggs	33.13	0.00	32.74	24.39	20.69	22.49	30.24	20.22	27.60
Fish	58.43	100.00	58.93	18.29	9.20	13.61	45.16	11.24	36.20
Pulses	75.90	100.00	76.19	59.76	80.46	70.41	70.56	80.90	73.29
Nuts and seeds	10.24	0.00	10.12	17.07	25.29	21.30	12.50	24.72	15.73
Milk and milk products	54.22	100.00	54.76	87.80	90.80	89.35	65.32	91.01	72.11
Oils and fats	97.59	100.00	97.62	93.90	95.40	94.67	96.37	95.51	96.14
Sweets and sugary beverages	97.59	100.00	97.62	87.80	93.10	90.53	94.35	93.26	94.07
Spices & condiments	99.40	100.00	99.40	89.02	97.70	93.49	95.97	97.75	96.44

Source: Field survey conducted in two states, 2021-22
Note: Other vegetables- eggplant, green papaya, cauliflower, cabbage, onion, radish, sheem/boboti/beans
Other fruits- banana, apples, guava, oranges, other citrus fruits, pineapple, watermelon, olives, grapes, jambura berries, kamranga, tamarind, plum

Among small farmers, the consumption of cereals, oils and fats, sweet and sugar beverages, spices and condiments, and milk and milk products remained high, as reported by more than 90% in each of the item groups (Table 8.26).

Table 8.26: Distribution of farmers according to different items of consumption for small farmers vs. other farmers (%)

Items	W.Bengal			Maharashtra			Total		
	Small (n=2)	Others (n=165)	Total (n=168)	Small (n=51)	Others (n=118)	Total (n=169)	Small (n=53)	Others (n=284)	Total (n=337)
Cereals	100.00	100.00	99.40	98.04	97.46	97.63	98.11	98.59	98.52
Vitamin A rich vegetables and tubers	100.00	41.21	41.67	37.25	37.29	37.28	39.62	39.44	39.47
White tubers and roots or other starchy foods	100.00	96.36	95.83	70.59	62.71	65.09	71.70	82.04	80.42
Dark green leafy vegetables	100.00	38.79	39.29	58.82	43.22	47.93	60.38	40.49	43.62
Other vegetables	100.00	95.76	95.24	84.31	72.03	75.74	84.91	85.56	85.46
Vitamin A rich fruits	0.00	3.64	3.57	21.57	21.19	21.30	20.75	10.92	12.46
Other fruits	50.00	49.70	49.40	54.90	55.93	55.62	54.72	52.11	52.52
Meat	0.00	15.76	15.48	19.61	21.19	20.71	18.87	17.96	18.10
Eggs	0.00	33.33	32.74	23.53	22.03	22.49	22.64	28.52	27.60
Fish	100.00	58.79	58.93	13.73	13.56	13.61	16.98	39.79	36.20
Pulses	100.00	76.36	76.19	82.35	65.25	70.41	83.02	71.48	73.29
Nuts and seeds	0.00	10.30	10.12	23.53	20.34	21.30	22.64	14.44	15.73
Milk and milk products	100.00	54.55	54.76	90.20	88.98	89.35	90.57	68.66	72.11
Oils and fats	100.00	98.18	97.62	98.04	93.22	94.67	98.11	95.77	96.14
Sweets and sugary beverages	100.00	98.18	97.62	94.12	88.98	90.53	94.34	94.01	94.07
Spices & condiments	100.00	100.00	99.40	100.00	90.68	93.49	100.00	95.77	96.44

Source: Field survey conducted in two states, 2021-22
Note: Other vegetables- eggplant, green papaya, cauliflower, cabbage, onion, radish, sheem/boboti/beans
Other fruits- banana, apples, guava, oranges, other citrus fruits, pineapple, watermelon, olives, grapes, jambura berries, kamranga, tamarind, plum

As can be seen from Table 8.26, it remained 83%, 60%, and 21%, respectively, in the case of pulses, dark green leafy vegetables, and vitamin A-rich fruits. However, percentages are higher for those other than the small category for white tubers and roots or other starchy foods (82%), fish (40%), and eggs (29%) in the overall situation.

The state-wise analysis suggests that the proportion of farmers who consumed white tubers and roots or other starchy foods is higher in West Bengal (96%) than in Maharashtra (65%). The reverse is true in the case of dark green leafy vegetables and vitamin A-rich fruits. Milk and milk product consumption is higher in Maharashtra (89%) than in West Bengal (55%). However, fish consumption was just 14% in Maharashtra compared to 59% in West Bengal. Further, egg consumption is low in Maharashtra (22% compared to 33% in West Bengal). The consumption of other vegetables is substantial in West Bengal (95%) than in Maharashtra (76%).

Chapter 9
Agricultural Services

The present chapter provides an analysis of the demand and supply of various agricultural services, including agricultural extension, credit, and insurance, as well as the participation of farmer households in community-based organizations (CBOs). Specifically, the chapter examines the participation of farmer households in self-help groups, primary agricultural credit societies, and producer organizations. Additionally, the chapter explores why farmer households' access or do not access extension services, credit, and insurance. The data presented in this chapter is from a sample of 836 farmer households across different states and social categories in India. The plan of presentation is as follows. The first section (9.1) examines the vegetable growers' participation in community-based organisations (CBOs) like self-help groups, farmer producer organisations and so on. The next section analyses extension services harnessed by the vegetable growers for various requirements and associated issues. The final section (9.3) investigates credit requirements, providers, rates of interest and associated issues, while the final section discerns insurance requirements and providers.

9.1. Participation in Community Based Organisations and Services

The respondents from Telangana state had the highest representation in Self-Help Groups (SHGs) (Table 9.1). In particular, 84% of respondents from Telangana reported membership in SHGs, while 20% of respondents from West Bengal reported membership, 11% from Maharashtra, and 2% from Delhi-NCR reported membership. With respect to Primary Agricultural Credit Societies (PACS), the membership was notably high in Maharashtra (41%) and Telangana (20%). On the other hand, membership in multipurpose cooperative societies was highest among respondents from Maharashtra state at 22%. The respondents reported that membership in other community-based organizations, such as producer groups and farmer-producer organizations, had minimal representation.

Table 9.1. Information on membership in various community-based Organisations (%)

	SHG	PACS	MPCS	PG	FPO	RMG	MIG	Others
Delhi-NCR (n=158)	1.90	0.63	2.53	0.00	3.80	0.00	0.00	3.80
Telangana (n=341)	83.58	20.23	0.00	0.29	1.47	0.29	0.00	0.00
W.Bengal (n=168)	19.64	0.60	0.00	0.00	1.19	0.00	2.38	0.60
Maharashtra (n=169)	11.24	41.42	22.49	0.59	1.78	0.00	0.00	0.59
Supermarket (n=347)	40.35	18.44	5.76	0.29	2.02	0.00	1.15	0.58
Traditional (n=489)	40.90	15.75	4.50	0.20	1.84	0.20	0.00	1.23
Marginal farmers (n=419)	36.04	13.37	4.53	0.24	0.48	0.00	0.95	0.72
Other category(n=417)	45.32	20.38	5.52	0.24	3.36	0.24	0.00	1.20
SC/ST (n=66)	72.73	13.64	1.52	0.00	0.00	0.00	0.00	1.52
Other category (n=770)	37.92	17.14	5.32	0.26	2.08	0.13	0.52	0.91
All-India (n=836)	40.67	16.87	5.02	0.24	1.91	0.12	0.48	0.96
	(340)	(141)	(42)	(2)	(16)	(1)	(4)	(8)

Note: SHG means elf help groups, PACS means primary agricultural co-operative societies, MPCS means multi-purpose co-operative societies, PG means producer group, FPO means farmer producer organisation, RMG means Rytu Mitra group and MIG means micro-irrigation group

When examining the membership of farmers in different marketing categories, 40% of supermarket farmers reported membership in SHGs. For farm size and social categories, this percentage is 36% for marginal farmers and 73% for SC/ST farmers. Regarding PACS, 18% of supermarket farmers reported membership, 13% of marginal farmers, and 14% of SC/ST farmers reported membership. Compared to other categories of farmers, SC/ST farmers had a lower percentage of membership in multipurpose cooperative societies, with only 1.52% of respondents

reporting membership. In contrast, the proportion of supermarket farmers with membership in this type of society is 5.76%, and that of marginal farmers is 4.53%.

Table 9.2. Nature of self-help group (SHG) reported by respondents (%)

States/categories	Government	Private	Donor agencies	Total
Delhi-NCR	1 (33.33)	2 (66.67)	0 (0.00)	3 (100)
Telangana	285 (100)	0 (0.00)	0 (0.00)	285 (100)
W.Bengal	31 (93.94)	2 (6.06)	0 (0.00)	33 (100)
Maharashtra	5 (26.32)	13 (68.42)	1 (5.26)	19 (100)
Supermarket farmers	128 (91.43)	11 (7.86)	1 (0.71)	140 (100)
Traditional farmers	194 (97)	6 (3)	0 (0.00)	200 (100)
Marginal farmers	141 (93.38)	9 (5.96)	1 (0.66)	151 (100)
SC/ST	48 (100)	0 (0.00)	0 (0.00)	48 (100)
All-India	322 (94.71)	17 (5)	1 (0.29)	340 (100)

Note: Values within the parenthesis indicates percentage

According to the respondents, 94.71% of Self-Help Groups (SHGs) in the overall sample are government-controlled (Table 9.2). In contrast, donor agencies control just 0.29% of SHGs. When examining the control of SHGs by sampled states, Telangana had the highest proportion of government controlled SHGs at 100%, followed by West Bengal at 93.94%. In contrast, Maharashtra and Delhi-NCR had a higher proportion of privately controlled SHGs, with 68.42% and 66.67% of respondents reporting this. Regarding the marketing categories, 91.43% of supermarket farmers reported that SHGs are government-controlled, and 93.38% of marginal farmers and 100% of SC/ST farmers reported the same.

Table 9.3. Nature of primary agricultural credit societies (PACS) reported by respondents (%)

	Government	Private	Total
Delhi-NCR	1 (100)	0 (0)	1 (100)
Telangana	69 (100)	0 (0)	69 (100)
W Bengal	1 (100)	0 (0)	1 (100)
Maharashtra	67 (97.1)	2 (2.9)	69 (100)
Supermarket farmers	61 (96.83)	2 (3.17)	63 (100)
Traditional farmers	77 (100)	0 (0)	77 (100)
Marginal farmers	53 (96.36)	2 (3.64)	55 (100)
SC/ST	9 (100)	0 (0)	9 (100)
All-India	138 (98.57)	2 (1.43)	140 (100)

Note: Values within the parenthesis indicates percentage

As reported by the respondents, 98.57% of Primary Agricultural Credit Societies (PACS) in the overall sample are government-controlled (Table 9.3). When examining the control of PACS by state, out of 138 PACS, Telangana state had the highest number of government controlled PACS at 69, closely followed by Maharashtra at 67. In contrast, West Bengal and Delhi-NCR had only

one government-controlled PACS each. There is slight variation in the proportion of government controlled PACS among different categories of farmers, such as farm size, social, and marketing.

Table 9.4. Type of services provided by various co-operative societies (%)

	Loan	Seeds	Fertilizer	Pesticide	Extension	Crop sales	Bargain prices with supermarket	Storage	Overall
SHG	337 (99.12)	25 (7.35)	23 (6.76)	23 (6.76)	2 (0.59)	3 (0.88)	0 (0.00)	0 (0.00)	340 (100.00)
PACS	128 (90.78)	24 (17.02)	26 (18.44)	6 (4.26)	1 (0.71)	5 (3.55)	0 (0.00)	0 (0.00)	141 (100.00)
Co-operative	41 (97.62)	0 (0.00)	11 (26.19)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	42 (100.00)
Producer Group	2 (100.00)	1 (50.00)	1 (50.00)	1 (50.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	2 (100.00)
FPO	3 (18.75)	11 (68.75)	10 (62.50)	7 (43.75)	10 (62.50)	2 (12.50)	2 (12.50)	0 (0.00)	16 (100.00)
RMG	1 (100.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	1 (100.00)
MIG	0 (0.00)	3 (75.00)	2 (50.00)	1 (25.00)	3 (75.00)	0 (0.00)	1 (25.00)	0 (0.00)	4 (100.00)
others Group	3 (37.50)	3 (37.50)	3 (37.50)	3 (37.50)	1 (12.50	0 (0.00)	0 (0.00)	0 (0.00)	8 (100.00)

Note: Values within the parenthesis indicates percentage

The membership in the new age CBOs like the farmer producer organisations enable a multitude of services including bargaining with the supermarkets in selling their agricultural products, apart from hep in procuring inputs like seeds, fertilisers and pesticides and technical advice (Table 9.4). On the other hand, SHGs, PACS and other cooperatives confine mainly to input provision. It is this aspect of FPOs that enhance their significance in the agri-food system transformation by forging links between the small farmers and modern market channels.

Table 9.5. Information on membership (in years) for self-help group reported by respondents

	Traditional market farmers	Supermarket farmers	Other category	SC/ST	All-India
Delhi NCR	9 (10) (3)	0 (0) (0)	9 (10) (3)	0 (0) (0)	9 (10) (3)
Telangana	12 (5) (180)	11 (5) (105)	12 (5) (237)	11 (5) (48)	12 (5) (285)
W.Bengal	7 (5) (13)	6 (4) (20)	7 (4) (33)	0 (0) (0)	7 (4) (33)
Maharashtra	4 (1) (4)	6 (5) (15)	5 (5) (19)	0 (0) (0)	5 (5) (19)
All-India	12 (6) (200)	9 (5) (140)	11 (6) (292)	11 (5) (48)	11 (6) (340)

Note: Values within the cell indicates mean, SD and frequency (top to bottom respectively)

Table 9.5 presents information on the duration of membership in self-help groups (SHGs) in years among the sampled farmer households. The data revealed that, on an all-India level, the average number of years of membership in SHGs was nine years, as reported by 41% of respondents with memberships. The highest average number of years of membership was found in Telangana (11 years), followed by six years each in Maharashtra and West Bengal. When considering social categories, the SC/ST category farmers reported an average of 11 years of membership in SHGs in Telangana.

Table 9.6. Information on membership (in years) for PACS reported by respondents

	Traditional market farmers	Supermarket farmers	SC/ST	All
Delhi-NCR	20 (0) (1)	0 (0) (0)	0 (0) (0)	20 (0) (1)
Telangana	19 (9) (45)	18 (8) (24)	17 (9) (8)	19 (9) (69)
W Bengal	0 (0) (0)	3 (0) (1)	0 (0) (0)	3 (0) (1)
Maharashtra	18 (8) (31)	14 (7) (39)	20 (0) (1)	16 (8) (70)
All-India	19 (8) (77)	16 (8) (64)	18 (9) (9)	17 (8) (141)

Note: Values within the cell indicates mean, SD and frequency (top to bottom respectively)

Table 9.6 presents data on membership duration in Primary Agricultural Credit Societies (PACS) for the sample of farmer households. On a national level, the average number of years of membership in PACS is 17 years. The traditional market farmers have been members of PACS for a relatively longer period, 19 years, compared to 16 years for the supermarket farmers. Telangana had the highest average membership duration among the sampled states at 19 years, followed by Maharashtra at 16 years and West Bengal at three years. When examining the data by social category, SC/ST farmers reported an average of 18 years of membership in PACS across all of India, 20 years in Maharashtra, and 17 years in Telangana.

Table 9.7 presents farmers' satisfaction levels regarding the quality of services provided by different types of community-based organizations. Overall, 97% of respondents reported satisfaction with the services offered by self-help groups (SHGs), 92% with primary agricultural credit societies (PACS), and 100% with multipurpose co-operative and producer groups. The satisfaction levels vary slightly across different categories of farmers, with supermarket farmers reporting the highest satisfaction levels with SHGs (98%), while marginal farmers reporting the lowest satisfaction levels with PACS (89%). When considering the sampled states, the maximum number of respondents reported satisfaction with the services provided by Farmer Producer Organisations (FPOs) across all states and categories of farmers.

Table 9.7. Information on quality of service provided by different CBOs (%)

	SHG	PACS	MPCS	Producer group	FPO	RMG	MIG
Delhi-NCR	2	1	4	0	2	0	0
	(66.67)	(100)	(100)	(0.00)	(66.67)	(0.00)	(0.00)
	277	60	0	1	6	0	0
Telangana	(97.19)	(86.96)	(0.00)	(100)	(100)	(0.00)	(0.00)
	32	1	0	0	5	1	0
	(96.97)	(100)	(0.00)	(0.00)	(100)	(100)	(0.00)
W.Bengal	18	68	38	1	2	0	4
	(94.74)	(97.14)	(100)	(100)	(100)	(0.00)	(100)
	193	67	22	1	8	1	0
Maharashtra	(96.5)	(87.01)	(100)	(100)	(88.89)	(100)	(0.00)
Supermarket farmers	136	63	20	1	7	0	4
	(97.14)	(98.44)	(100)	(100)	(100)	(0.00)	(100)
Marginal farmers	148	53	19	1	2	0	4
	(98.01)	(94.64)	(100)	(100)	(100)	(0.00)	(100)
Large farmers	86	33	10	1	9	0	0
	(95.56)	(89.19)	(100)	(100)	(90)	(0.00)	(0.00)
SC/ST	46	8	1	0		0	0
	(95.83)	(88.89)	(100)	(0.00)	(0.00)	(0.00)	(0.00)
All-India	329	130	42	2	15	1	4
	(96.76)	(92.2)	(100)	(100)	(93.75)	(100)	(100)

Note: Values within the parenthesis indicates percentage

9.2. Agricultural extension services availed by vegetable growers

The data presented in Table 9.8 pertains to the extension services utilized by the surveyed farmers and the reasons for not utilizing such services. Of the 836 sampled farmer households, 52% reported accessing extension services.

Table 9.8. Information on extension services across states, marketing channel and social categories (in %)

	Extension services accessed			Reasons for not availing extension services				
	No	Yes	Total	Costly	Not accessible	Not needed	Quality of services is poor	Stopped
Delhi-NCR	54.43	45.57	100.00	0.00	23.26	53.49	19.77	0.00
	(86)	(72)	(158)	(0)	(20)	(46)	(17)	(0)
Telangana	61.29	38.71	100.00	0.96	33.97	38.28	24.88	12.44
	(209)	(132)	(341)	(2)	(71)	(80)	(52)	(26)
W Bengal	7.74	92.26	100.00	0.00	7.69	69.23	7.69	0.00
	(13)	(155)	(168)	(0)	(1)	(9)	(1)	(0)
Maharashtra	56.21	43.79	100.00	8.42	31.58	27.37	53.68	11.58
	(95)	(74)	(169)	(8)	(30)	(26)	(51)	(11)
Supermarket farmers	40.92	59.08	100.00	3.52	27.46	38.03	36.62	9.86
	(142)	(205)	(347)	(5)	(39)	(54)	(52)	(14)
Traditional market farmers	53.37	46.63	100.00	1.92	31.80	41.00	26.44	8.81
	(261)	(228)	(489)	(5)	(83)	(107)	(69)	(23)
SC/ST	56.06	43.94	100.00	0.00	45.95	32.43	21.62	8.11
	(37)	(29)	(66)	(0)	(17)	(12)	(8)	(3)
Other category	47.53	52.47	100.00	2.73	28.69	40.71	30.87	9.29
	(366)	(404)	(770)	(10)	(105)	(149)	(113)	(34)
All-India	48.21	51.79	100.00	2.48	30.27	39.95	30.02	9.18
	(403)	(433)	(836)	(10)	(122)	(161)	(121)	(37)

Note: Values in parenthesis indicates frequency

The highest proportion of such households accessing extension services are from West Bengal (92%), followed by the Delhi-NCR (46%), Maharashtra (44%), and Telangana (39%) (Table 9.8). Additionally, 59% of supermarket and 44% of SC/ST farmers reported utilizing extension services. When asked about reasons for not utilizing extension services, 40% of farmers reported not needing such services, 30% reported that services were not accessible, and an equal percentage (30%) reported poor quality services. These patterns can be observed from Table 8 across states and different categories of farmers. However, in Maharashtra, 54% of respondents reported poor quality services, 32% reported services were inaccessible, 27% reported services were not needed, and only 8% reported services were costly. It should be noted that cost was not

a significant factor for not utilizing extension services in the study area, with only 2% of respondents overall and 4% of supermarket farmers citing cost as a reason.

Table 9.9. Information on sources of extension services for vegetable growers (%)

Information Sources	States				Marketing categories		Social categories		All India
	Delhi-NCR	Telangana	WB	Maharashtra	TF	SF	Others	SC/ST	
Friends and co-farmers	51.39 (37)	46.97 (62)	39.19 (29)	79.35 (123)	62.72 (143)	52.68 (108)	58.42 (236)	51.72 (15)	57.97 (251)
Agriculture dept officers	18.06 (13)	21.21 (28)	5.41 (4)	6.45 (10)	10.96 (25)	14.63 (30)	12.13 (49)	20.69 (6)	12.70 (55)
Other private company extension provider	16.67 (12)	0.76 (1)	6.76 (5)	0.65 (1)	3.07 (7)	5.85 (12)	4.21 (17)	6.90 (2)	4.39 (19)
Extension AGENT from the fertilizer companies	5.56 (4)	24.24 (32)	17.57 (13)	10.97 (17)	14.04 (32)	16.59 (34)	15.59 (63)	10.34 (3)	15.24 (66)
Private company that promote own products	4.17 (3)	8.33 (11)	28.38 (21)	4.52 (7)	7.46 (17)	12.20 (25)	10.15 (41)	3.45 (1)	9.70 (42)
Supermarket	2.78 (2)	1.52 (2)	4.05 (3)	1.29 (2)	0.00 (0)	4.39 (9)	1.98 (8)	3.45 (1)	2.08 (9)
Extension agent processing company	2.78 (2)	0.00 (0)	1.35 (1)	0.65 (1)	0.44 (1)	1.46 (3)	0.99 (4)	0.00 (0)	0.92 (4)
KVK	1.39 (1)	9.85 (13)	6.76 (5)	0.00 (0)	3.51 (8)	5.37 (11)	4.21 (17)	6.90 (2)	4.39 (19)
Private consultancies	4.17 (3)	0.00 (0)	1.35 (1)	0.65 (1)	1.75 (4)	0.49 (1)	1.24 (5)	0.00 (0)	1.15 (5)
Other public extension provider	1.39 (1)	0.00 (0)	0.00 (0)	0.00 (0)	0.44 (1)	0.00 (0)	0.25 (1)	0.00 (0)	0.23 (1)
University/Directorate of extension services	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
NGO	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
ATMA	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
Extension Agent plant protection Unit	0.00 (0)	0.00 (0)	0.00 (0)	0.65 (1)	0.00 (0)	0.49 (1)	0.25 (1)	0.00 (0)	0.23 (1)
Adarsa Rytu	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
Model farmer	0.00 (0)	0.00 (0)	1.35 (1)	1.29 (2)	0.88 (2)	0.49 (1)	0.74 (3)	0.00 (0)	0.69 (3)
Extension services availing	100.00 (72)	100.00 (132)	100.00 (74)	100.00 (155)	100.00 (228)	100.00 (205)	100.00 (404)	100.00 (29)	100.00 (433)

Note: Values in parenthesis indicates frequency

Table 9.9 presents the sources of extension services harnessed by the vegetable growers. Friends and co-farmers were the major sources of extension services amongst the sampled farmers, as reported by 58% of respondents at All-India. A similar pattern can be observed across the sampled states: West Bengal (79%), Delhi-NCR (51%), Telangana (47%) and Maharashtra (39%). 53% of supermarket farmers and 52% of SC/ST farmers also reported that friends and co-farmers were one of the major sources of extension services in the study area. The other important sources of extension services in the study area are the fertilizer companies, agricultural department officers, and private companies that promote their own products, among others.

Table 9.10. Type of information received from extension service providers (%)

Type of information	States				Marketing categories		Social Categories		All-India
	Delhi-NCR	Telangana	WB	Maha shtra	TF	SF	Other	SC/ST	
Use of fertilizer	55.56	64.39	47.74	66.22	58.33	56.10	57.18	58.62	57.27
Disease Problems	56.94	37.88	30.97	14.86	37.28	31.71	33.91	44.83	34.64
Irrigation	16.67	25.00	24.52	33.78	24.56	25.37	24.75	27.59	24.94
They test my crops for problems	30.56	21.21	17.42	10.81	21.05	18.05	19.55	20.69	19.63
Weather problem	9.72	20.45	13.55	14.86	15.79	14.63	15.10	17.24	15.24
Soil Problems	13.89	11.36	19.35	12.16	12.72	17.07	14.85	13.79	14.78
New Seed varieties	2.78	6.82	16.13	36.49	12.28	17.07	15.10	6.90	14.55
Help getting credit	15.28	14.39	13.55	16.22	13.60	15.61	14.11	20.69	14.55
Marketing advice	9.72	13.64	10.32	4.05	10.96	9.27	10.40	6.90	10.16
General advice	8.33	5.30	15.48	9.46	10.96	9.27	10.64	3.45	10.16
Information about technology	4.17	5.30	7.74	16.22	9.65	5.85	8.42	0.00	7.85
Extension services availing	100.00	100.00	100.0	100.00	100.00	100.00	100.00	100.00	100.00

Note: SF-Supermarket farmers, TF-Traditional farmers

Regarding the type of information received from the extension service providers, 57% of the farmer households received information about using fertilisers at the All-India level (Table 9.10). About 1/3rd had received information about the problem of the disease, and 1/4th had received information about irrigation at the All-India level. A similar pattern emerges across states, except for Delhi-NCR. For instance, a maximum proportion (57%) of farmer households reported receiving information regarding disease problems. As noted by the respondents, we notice a similar pattern in the case of marketing and social categories.

About 31 % of respondents in Delhi-NCR have reported that the extension service providers have tested crops to detect problems/diseases. This percentage of respondents varies from 11-21% in the other three states (Maharashtra, Telangana, and West Bengal) who have reported the same.

Around 16 % of sampled respondents of Maharashtra reported receiving information about new technology from the extension service providers. Meanwhile, 5.85% of supermarket framers, compared to traditional farmers (9.65%), had reported the same. A very small proportion of respondents reported receiving information about marketing and general advice across sampled states and different categories, as evident from Table 9.10.

Table 9.11. Proportion of farmers paying for extension services (%)

	No	Yes	Total
Delhi-NCR (n=72)	97.22	2.78	100.00
Telangana (n=132)	95.45	0.00	95.45
W.Bengal (n=155)	97.42	2.58	100.00
Maharashtra (n=74)	93.24	5.41	98.65
All-India (n=433)	96.07	2.31	98.38
TF (n=228)	95.61	2.63	98.25
SF (n=205)	96.59	1.95	98.54
SC/ST (n=29)	93.10	3.45	96.55
Total (n=433)	96.07	2.31	98.38

Most of the sampled respondents (96%) did not pay for the extension services (Table 9.11). The same is true for all the sampled states and different categories of sampled farmers. 5.41 % of respondents paid for the extension services in Maharashtra, and no one paid for the same in Telangana. At the same time, around 3% of each in Delhi-NCR and West Bengal had paid for the extension services. Further, 3.45 % of SC/ST farmers reported paying for the extension services compared to supermarket farmers (1.95%).

Table 9.12. Information on satisfaction with extension services (%)

	No	Yes	Total
Delhi-NCR (n=72)	1	71	72
%	1.39	98.61	100.00
Telangana (n=132)	6	120	126
%	4.55	90.91	95.45
W.Bengal (n=155)	0	155	155
%	0.00	100.00	100.00
Maharashtra (n=74)	1	72	73
%	1.35	97.30	98.65
All-India (n=433)	8	418	426
%	1.85	96.54	98.38
TF (n=228)	4	220	224
%	1.75	96.49	98.25
SF (n=205)	4	198	202
%	1.95	96.59	98.54
Others (n=404)	6	392	398
%	1.49	97.03	98.51
SC/ST (n=29)	2	26	28
%	6.90	89.66	96.55

Table 9.12 indicated that 97% of the respondents are satisfied with the extension services in the overall situation. Across the sampled states, 100% of respondents are happy with the extension services in West Bengal compared to Telangana (91%). Across categories of farmers, 97% of supermarket farmers were satisfied with the extension services compared to SC/ST farmers (90%).

9.3. Credit required, availed and sources by vegetable growers

It is clear from Table 9.13 that 56 % of the respondents did not require any credit in the whole study area. Across sampled states, the credit requirements are higher in Maharashtra (56% of them reported), followed by Telangana (52%). Nearly 1/3rd of Delhi-NCR and West Bengal respondents reported the need for credit. About 50% of the SC/ST farmers required credit compared to supermarket farmers (43%).

Table 9.13. Information on requirement of any credit (%)

	No	Yes	Total
Delhi-NCR	108 (68.35)	50 (31.65)	158 (100)
Telangana	165 (48.39)	176 (51.61)	341 (100)
W.Bengal	113 (67.26)	55 (32.74)	168 (100)
Maharashtra	75 (44.38)	94 (55.62)	169 (100)
All-India	461 (55.14)	375 (44.86)	836 (100)
TF	264 (53.99)	225 (46.01)	489 (100)
SF	197 (56.77)	150 (43.23)	347 (100)
Others	428 (55.58)	342 (44.42)	770 (100)
SC/ST	33 (50)	33 (50)	66 (100)

Note: Values within the parenthesis indicates percentage

Table 9.14 showed that a very small proportion of respondents (14%) owned a Kisan Credit Card (KCC) in the study area. Across the sampled states, the maximum proportion of respondents who owned KCC were from Delhi-NCR (25%), followed by Maharashtra (21%) and West Bengal (17%). However, only 3 % of sampled respondents reported owning KCC in Telangana. More supermarket farmers (18%) owned a KCC compared to traditional market farmers (10%).

Table 9.14. Information on ownership of Kisan Credit Card (%)

	No	Yes	Total
Delhi-NCR	119	39	158
	(75.32)	(24.68)	(100)
Telangana	330	11	341
	(96.77)	(3.23)	(100)
W.Bengal	139	29	168
	(82.74)	(17.26)	(100)
Maharashtra	133	36	169
	(78.7)	(21.30)	(100)
All-India	721	115	836
	(86.24)	(13.76)	(100)
TF	438	51	489
	(89.57)	(10.43)	(100)
SF	283	64	347
	(81.56)	(18.44)	(100)
Others	658	112	770
	(85.45)	(14.55)	(100)
SC/ST	63	3	66
	(95.45)	(4.55)	(100)

Note: Values within the parenthesis indicates percentage

Table 9.15 showed that out of the total who owned KCC, 44% of them received credit for the overall situation. Across the sampled states, the maximum proportion of respondents who received credit was from Delhi-NCR (72%), followed by West Bengal (45%), Maharashtra (22%), and Telangana (9%). None of the SC/ST respondents who owned KCC had received credit. On the other hand, 42% of the supermarket farmers received the same in the study area, compared to a higher 45% of traditional market farmers getting credit with KCC.

Table 9.15. Information credit received through Kisan Credit Card in the last twelve months (%)

	No	Yes	Total
Delhi-NCR	11	28	39
	(28.21)	(71.79)	(100)
Telangana	10	1	11
	(90.91)	(9.09)	(100)
W.Bengal	16	13	29
	(55.17)	(44.83)	(100)
Maharashtra	28	8	36
	(77.78)	(22.22)	(100)
All-India	65	50	115
	(56.52)	(43.48)	(100)
TF	28	23	51
	(54.9)	(45.1)	(100)
SF	37	27	64
	(57.81)	(42.19)	(100)
Others	62	50	112
	(55.36)	(44.64)	(100)
SC/ST	3	0	3
	(100)	(0)	(100)

Note: Values within the parenthesis indicates percentage

Table 9.16 indicates that 40% of the respondents have received credit from other sources for the sample as a whole. Across sampled states, the maximum proportion of respondents who received credit from any other sources was from Telangana (61%), followed by Maharashtra (37%), Delhi-NCR (21%), and West Bengal (15%). Only two-fifths of supermarket farmers (40%) received credit from other sources in the study area.

Table 9.16. Information on credit received during the last 12 months from any other sources (%)

	No	Yes	Total
Delhi-NCR	125 (79.11)	33 (20.89)	158 (100)
Telangana	134 (39.3)	207 (60.70)	341 (100)
W.Bengal	142 (84.52)	26 (15.48)	168 (100)
Maharashtra	107 (63.31)	62 (36.69)	169 (100)
TF	301 (61.55)	188 (38.45)	489 (100)
SF	207 (59.65)	140 (40.35)	347 (100)
SC/ST	37 (56.06)	29 (43.94)	66 (100)
Total	508 (60.77)	328 (39.23)	836 (100)

Note: Values within the parenthesis indicates percentage

Table 9.17 indicated that 53% of the respondents reported receiving sufficient credit when required for All-India. Across the sampled states, the maximum proportion of respondents who reported that they did not receive credit in adequate amounts were from West Bengal (78%) as compared to Delhi-NCR (47%), Telangana (38%), and Maharashtra (33%). A lesser proportion of supermarket farmers (45%) reported that they did not receive credit in sufficient amounts when required than the traditional market farmers (49%) in the study area.

Table 9.17. Information on sufficiency of credit received (%)

State/ market channel/ social categories	Yes	No	Total
Delhi-NCR	84 (53.16)	74 (46.84)	158 (100)
Telangana	210 (61.58)	131 (38.42)	341 (100)
W.Bengal	37 (22.02)	131 (77.98)	168 (100)
Maharashtra	114 (67.46)	55 (32.54)	169 (100)
TF	253 (51.74)	236 (48.26)	489 (100)
SF .	192 (55.33)	155 (44.67)	347 (100)
SC/ST	33 (50)	33 (50)	66 (100)
Total	445 (53.23)	391 (46.77)	836 (100)

Note: Values within the parenthesis indicates percentage

Table 9.18 presents the reasons for not receiving credit in the study area. There is no need for credit in the study area, as reported by 55% of the respondents for the whole situation. The remaining 45% reported other reasons: inability to find a lender, interest rates too high, and not having collateral. Across states and categories, we can observe a similar pattern except for Maharashtra, where 62 % of the respondents cannot find the lender, and 20% reported no need for credit. Across the sampled states, little more than 1/4th of the respondents in West Bengal reported that interest rates were too high to avail of credit facilities. Even 24% of the supermarket farmers reported the same in the study area.

Table 9.18. Reasons for not received any credit (%)

	No need	Unable to find lender	Interest rate too high	Did not have collateral	Total
Delhi-NCR	60	3	9	2	74
	(81.08)	(4.05)	(12.16)	(2.7)	(100)
Telangana	72	14	17	28	131
	(54.96)	(10.69)	(12.98)	(21.37)	(100)
W.Bengal	73	23	35	0	131
	(55.73)	(17.56)	(26.72)	(0)	(100)
Maharashtra	11	34	5	5	55
	(20)	(61.82)	(9.09)	(9.09)	(100)
TF	133	49	29	25	236
	(56.36)	(20.76)	(12.29)	(10.59)	(100)
SF	83	25	37	10	155
	(53.55)	(16.13)	(23.87)	(6.45)	(100)
SC/ST	14	3	8	8	33
	(42.42)	(9.09)	(24.24)	(24.24)	(100)
Total	216	74	66	35	391
	(55.24)	(18.93)	(16.88)	(8.95)	(100)

Note: Values within the parenthesis indicates percentage

Table 9.19. Information on yearly limit on KCC (in ₹)

	Traditional farmers	Supermarket farmers	Others	SC/ST	Total
Delhi-NCR	341263	229400	288737	100000	283897
	(286595)	(146459)	(230934)	(0)	(229870)
	(19)	(20)	(38)	(1)	(39)
Telangana	88143	289000	175800	15000	161182
	(121130)	(206923)	(181253)	(0)	(178656)
	(7)	(4)	(10)	(1)	(11)
W.Bengal	72000	46913	52103	.	52103
	(113349)	(22919)	(53047)	.	(53047)
	(6)	(23)	(29)	(0)	(29)
Maharashtra	167368	180588	172857	200000	173611
	(110156)	(130598)	(120314)	(0)	(118669)
	(19)	(17)	(35)	(1)	(36)
All-India	210059	154578	181170	105000	179183
	(220421)	(142696)	(184179)	(92601)	(182561)
	(51)	(64)	(112)	(3)	(115)

Note: Values within the cell indicates mean, SD and frequency (top to bottom respectively)

The average annual credit limits among KCC owners in the study area have been presented in Table 9.19. The average yearly limit in the sample was Rs. 1.79 lakhs. The limit was the highest in Delhi-NCR (Rs. 2.84 lakhs), followed by Maharashtra (Rs. 1.74 lakhs) and Telangana (Rs. 1.61 lakhs). On the other hand, West Bengal had the lowest limit (Rs. 0.52 lakhs). In Telangana and Maharashtra, the average annual KCC limit was higher among supermarket farmers than their counterparts, *i.e.*, Rs. 2.89 lakhs and Rs. 1.81 lakhs, respectively. On the other side, the reverse is true. Delhi-NCR and West Bengal farmers reported that the KCC limit was higher among traditional farmers than supermarket farmers.

Table 9.20. Information on credit amount received by respondents (in ₹)

State	Traditional farmers	Supermarket farmers	Other than SC/ST	Total
Delhi-NCR	327917 (358101) (12)	185000 (78230) (16)	246250 (246641) (28)	246250 (246641) (28)
Telangana	10000 (0) (1)	0 (0) (0)	10000 (0) (1)	10000 (0) (1)
W.Bengal	19750 (20172) (4)	33111 (21774) (9)	29000 (21424) (13)	29000 (21424) (13)
Maharashtra	123333 (68313) (6)	250000 (70711) (2)	155000 (86520) (8)	155000 (86520) (8)
All-India	207130 (288544) (23)	139185 (100000) (27)	170440 (209421) (50)	170440 (209421) (50)

Note: Values within the cell indicates mean, SD and frequency (top to bottom respectively)

Against the limit, the average annual credit obtained by the respondents overall was Rs. 1.70 lakhs (Table 9.20). The Delhi-NCR respondents obtained the maximum credit (Rs. 2.46 lakhs) and the lowest in Telangana (Rs. 0.10 lakhs). Supermarket farmers of Maharashtra and West Bengal had obtained more credit than the traditional farmers. At the same time, traditional farmers obtained more credit than the supermarket farmers in Delhi-NCR.

Table 9.21. Information on credit received during the last 12 months from different sources (%)

Credit sources	State wise				Market channel		Social categories		All-India
	Delhi-NCr	Telangana	W.Bengal	Maharashtra	SF	TF	SCST	OTHER	
Nationalized bank	6.06 (2)	58.94 (122)	23.08 (6)	35.48 (22)	50.00 (70)	43.62 (82)	31.03 (9)	47.83 (143)	46.34 (152)
Cooperative society(PACS) or District Cooperative Bank	0.00 (0)	10.14 (21)	0.00 (0)	46.77 (29)	14.29 (20)	15.96 (30)	13.79 (4)	15.38 (46)	15.24 (50)
SHG	0.00 (0)	16.43 (34)	23.08 (6)	0.00 (0)	15.71 (22)	9.57 (18)	10.34 (3)	12.37 (37)	12.20 (40)
Regional rural bank	3.03 (1)	4.83 (10)	0.00 (0)	8.06 (5)	2.14 (3)	6.91 (13)	6.90 (2)	4.68 (14)	4.88 (16)
Sub-total	**9.09**	**90.34**	**46.16**	**90.31**	**82.14**	**76.06**	**62.06**	**80.26**	**78.66**
Friend/Relatives	21.21 (7)	24.15 (50)	57.69 (15)	4.84 (3)	23.57 (33)	22.34 (42)	20.69 (6)	23.08 (69)	22.87 (75)
Private money lender	15.15 (5)	12.56 (26)	0.00 (0)	1.61 (1)	8.57 (12)	10.64 (20)	24.14 (7)	8.36 (25)	9.76 (32)
Wholesaler/commission agent	42.42 (14)	0.00 (0)	0.00 (0)	0.00 (0)	2.86 (4)	5.32 (10)	3.45 (1)	4.35 (13)	4.27 (14)
Private bank (e.g - ICICI)	3.03 (1)	0.48 (1)	3.85 (1)	6.45 (4)	2.86 (4)	1.60 (3)	0.00 (0)	2.34 (7)	2.13 (7)
Micro-finance	3.03 (1)	0.00 (0)	7.69 (2)	0.00 (0)	0.71 (1)	1.06 (2)	0.00 (0)	1.00 (3)	0.91 (3)
NGO	0.00 (0)	0.00 (0)	0.00 (0)	1.61 (1)	0.00 (0)	0.53 (1)	0.00 (0)	0.33 (1)	0.30 (1)
Supermarket Agent	0.00 (0)	0.48 (1)	0.00 (0)	0.00 (0)	0.71 (1)	0.00 (0)	0.00 (0)	0.33 (1)	0.30 (1)
Input retailer	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
Private processing company store	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
RBH	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
Startups	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
Credit received last 12 months	**33**	**207**	**26**	**62**	**140**	**188**	**29**	**299**	**328**

Note: Values within the parenthesis indicate frequency, SF means supermarket farmers, TF means traditional farmers, SC/ST means SC and SC category farmers and others means OBC and OC category farmers.

The field data from vegetable growers from all India reveal that institutional sources provide credit to more than three-fourths 979%) of the farmers (Table 9.21). The maximum proportion of respondents (46.34%) in the overall sample has taken credit from nationalised banks. The

other important source of credit was friends/relatives (as reported by 22.87%), PACS (15.24%) and SHGs (12.20%). The dominant source of credit varied across the sampled states. For example, PACS was the predominant source of credit in Maharashtra (as reported by 44.62% of respondents), it was a wholesaler/commission agent in Delhi-NCR (42.42%), friends/relatives in West Bengal (57.69%), and Nationalized bank in Telangana (58.94%). In Telangana, 12.56% of respondents reported receiving credit from private money lenders compared to Delhi-NCR (15.15%). Meanwhile, West Bengal farmers do not depend on private money lenders for credit.

The nationalised bank was the dominant source of credit among farmers' marketing and social categories (Table 9.21). It is essential to mention that SC/ST farmers depended on private money lenders for credit, as reported by 24.14% of respondents in the study area. Overall, none of the sampled farmers depended on the input dealers, private processing company stores, RBH, or start-ups for credit in the study area.

Table 9.22. Average distance to lender (in km), amount borrowed (in Rs. lakhs) and annual interest rate (%)- 2020-21

State	Indicator(s)	Marketing channels		Social categories		Total
		Traditional	Supermarket	Others	SC/ST	
Delhi-NCR	Distance to lender (km)	12.90	12.40	11.80	40.00	12.70
	Amount borrowed (Rs. Lakhs)	1.51	1.82	1.65	0.20	1.61
	Interest rate (% per annum)	19	17	18	24	18
Telangana	Distance to lender (km)	5.13	4.43	4.73	6.05	4.77
	Amount borrowed (Rs. Lakhs)	1.30	1.08	1.16	0.69	1.13
	Interest rate (% per annum)	7	6	6	11	6
W.Bengal	Distance to lender (km)	3.40	1.20	2.25	***	2.25
	Amount borrowed (Rs. Lakhs)	0.76	0.35	0.55	***	0.55
	Interest rate (% per annum)	10	9	10	***	10
Maharashtra	Distance to lender (km)	4.10	13.45	7.10	***	7.10
	Amount borrowed (Rs. Lakhs)	2.01	1.93	2.02	***	2.02
	Interest rate (% per annum)	4	4	4	***	4
All-India	Distance to lender (km)	5.17	4.50	4.80	6.65	4.83
	Amount borrowed (Rs. Lakhs)	1.40	1.16	1.25	0.68	1.22
	Interest rate (% per annum)	6	5	6	7	6

Note: Simple average values of different credit sources; *** indicates N.A

The average distance to the source of credit for all the respondents who received credit was 4.83 km (Table 9.22). The distance was greater in Delhi-NCR (12.70 km) and less in West Bengal (2.25 km). Conversely, the amount borrowed was more in Maharashtra (Rs. 2.02 lakhs) and less in West Bengal (Rs. 0.55 lakhs). Further, the interest rate is less in Maharashtra (4 % per annum) and more in Delhi-NCR (18% per annum). It is important to note that the Delhi-NCR farmers have borrowed substantial amounts from different sources despite the high rate of interest. However, the SC/ST farmers have borrowed less (Rs. 0.20 lakhs) because of the longer distance to lenders and the very high-interest rate (24% per annum) in Delhi-NCR. This is true in the case of Telangana as well. The farmers other than SC/ST have not obtained credit in Maharashtra and West Bengal (Table 22). Except for Delhi-NCR, traditional farmers borrowed more credit than supermarket farmers, where traditional farmers (Rs. 1.51 lakhs) borrowed less than supermarket farmers (Rs. 1.82 lakhs), as shown in Table 9.22.

9.4. Insurance services availed by vegetable growers

It is essential to mention that none of the respondents have taken weather insurance in the study area. Life insurance was more important among the SC/ST farmers than other insurances, as 30% of them reported (Table 9.23). Across different groups of farmers, crop insurance was the least important.

Table 9.23. Information pertaining to different insurances across sampled respondents (%)

Particulars	States				Marketing Channels		Social Categories		All-India (n=836)
	Delhi-NCR (n=158)	Telangana (n=341)	W.Bengal (n=169)	Maharashtra (n=168)	Traditional (n=489)	Super-market (n=347)	Others (n=770)	SC/ST (n=66)	
General insurance	4 2.53	24 7.04	45 26.63	2 1.19	36 7.36	39 11.24	73 9.48	2 3.03	75 8.97
Life insurance	43 27.22	101 29.62	37 21.89	21 12.50	114 23.31	88 25.36	182 23.64	20 30.30	202 24.16
Weather insurance	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00
Crop insurance	2 1.27	1 0.29	4 2.37	2 1.19	5 1.02	4 1.15	9 1.17	0 0	9 1.08
Total	49 31.01	126 36.95	86 50.89	25 14.88	155 31.70	131 37.75	264 34.29	22 33.33	286 34.21

Note: Values within the cell indicates frequency and percentage (top to bottom respectively)

Table 9.24. Average distance (in km) and premium payment from insurance service provider

State	Traditional farmers		Supermarket farmers		Others		SC/ST		Total	
	Distance (Km)	Premium paid (Rs.)	Distance (Km)	Premium paid (Rs.)	Distance (Km)	Premium paid (Rs.)	Distance (Km)	Premium paid (Rs.)	Distance (Km)	Premium paid (Rs.)
Delhi-NCR	30	17440	61	12626	54	14126	N.A	N.A	54	14126
Telangana	27	10808	24	16324	26	13419	7	8341	25	13304
W.Bengal	3	6883	3	4634	3	4212	1	9000	3	4235
Maharashtra	15	44500	12	46500	17	48334	N.A	N.A	17	48334
All-India	27	13870	50	14200	48	13638	6	8354	48	13510

Note: Simple average values of different insurance providers

Table 9.24 presents the average distance from the insurance service provider and the average premium paid. At all India levels, the average distance was 48 km. It was 54 km in Delhi-NCR, 25 Km in Telangana, 17 km in Maharashtra, and just 3 km in West Bengal. Regarding yearly premiums, Maharashtra respondents paid the maximum premium (Rs. 48,334) and the least in West Bengal (Rs. 4235). Among marketing categories of farmers, supermarket farmers have paid more premiums in Maharashtra and Telangana. It was more among traditional farmers in Delhi-NCR and West Bengal.

Table 9.25. Reasons for not having insurance for vegetable growers (%)

States/categories	Not aware	No need	Unable to find reliable insurer	Cost too high	Rewards are too small	Not available	Total
Delhi-NCR	22 (21.15)	57 (54.81)	10 (9.62)	12 (11.54)	1 (0.96)	2 (1.92)	104 (100)
Telangana	99 (45.21)	56 (25.57)	23 (10.5)	13 (5.94)	25 (11.42)	3 (1.37)	219 (100)
W.Bengal	8 (5.56)	72 (50.00)	16 (11.11)	47 (32.64)	1 (0.69)	0 (0)	144 (100)
Maharashtra	30 (31.58)	23 (24.21)	16 (16.84)	10 (10.53)	15 (15.79)	1 (1.05)	95 (100)
TF	104 (30.23)	121 (35.17)	41 (11.92)	53 (15.41)	19 (5.52)	6 (1.74)	344 (100)
SF	55 (25.23)	87 (39.91)	24 (11.01)	29 (13.3)	23 (10.55)	0 (0)	218 (100)
Others	138 (26.64)	202 (39)	60 (11.58)	75 (14.48)	37 (7.14)	6 (1.16)	518 (100)
SC/ST	21 (47.73)	6 (13.64)	5 (11.36)	7 (15.91)	5 (11.36)	0 (0)	44 (100)
All-India	159 (28.29)	208 (37.01)	65 (11.57)	82 (14.59)	42 (7.47)	6 (1.07)	562 (100)

Note: Values within the parenthesis indicates percentage

We analyze the analysis of reasons for 'not having availed' of various insurance and present them in Table 9.25. It is clear from the perceptions that many farmers (37%) did not perceive a need for insurance, and a significant proportion (28%) were unaware of insurance. The other important reasons were costs that were too high (15%), the inability to find a reliable insurer (12%), and rewards that were too small (7%). Across states, lack of awareness among respondents of Telangana and Maharashtra was the dominant reason (as reported by 45% and 32%, respectively) for not having insurance. Not needing insurance was the predominant reason in Delhi-NCR (55%) and West Bengal (50%). The maximum proportion of farmers in West Bengal felt that insurance costs were too high (as reported by 33%), while it was more in Maharashtra who perceived that rewards were too small (as reported by 16%). Across different categories of farmers, a proportion of SC/ST farmers are unaware of insurance (48%), and a higher proportion of supermarket farmers do not need insurance (40%) compared to their respective counterparts in the study area. Another important finding is that very few sampled households felt insurance was unavailable.

Chapter 10
Perceptions of Vegetable Growers

This chapter discusses vegetable growers' perceptions concerning selling their produce to different marketing channels. An attempt has been made in this chapter to integrate the perceptions of the sampled vegetable growers into the quantitative analysis of vegetable selling, thereby generating essential insights into marketing opportunities and constraints in the study area. The responses to the set questions are presented as follows. The first section (10.1) expounds the perceptions of vegetable growers on merits and demerits of selling to modern and traditional markets in the four sampled states. The next four sections examine farmers' perceptions of selling to Rythu Bazaar in Telangana, Haats in West Bengal, Mother Dairy collection centres in Delhi-NCR, and weekly markets in Maharashtra. The final section (10.6) presents distances to key input providers, market agents and other key stakeholders for the vegetable growers in the selected states.

10.1. Perceptions of vegetable growers on selling to modern and traditional markets

The respondents were also asked questions on the importance of selling their vegetables to supermarket collection centres, and the results are presented in Table 10.1. Most of the sampled respondents in the overall situation have reported that the supermarket collection center was transparent in weighing (72%), got better prices (70%), saved a lot on transport and transaction costs (62%), flexible timings that allowed them to work in the field after selling the produce (39%). Fewer respondents have reported that they got payment whenever they asked for it (6%), and price variations are minimized by participating in the supermarkets (9%).

Table 10.1: Perceptions on the importance of selling to supermarkets (%)

Particular(s)	Delhi-NCR (n=69)	Telangana (n=122)	W.Bengal (n=74)	Maharashtra (n=82)	Total (n=347)
Supermarket collection centre is transparent in weighing	42.03	90.16	52.70	87.80	72.05
I get the payment whenever I ask for it	7.25	6.56	2.70	7.32	6.05
I can save a lot on transport and transaction costs	60.87	45.90	77.03	70.73	61.38
It has flexible timing which allows me to work in the field	17.39	59.84	16.22	46.34	38.90
I get better prices for the better-quality products	59.42	81.15	70.27	63.41	70.32
I don't have to go through the hassles of going to mandi	28.99	6.56	10.81	60.98	24.78
I know the prices and quality to be delivered before	7.25	17.21	6.76	46.34	19.88
Price variations are minimized	4.35	6.56	1.35	24.39	9.22
The quality of vegetable production is improved	7.25	14.75	12.16	26.83	15.56

Source: Field survey conducted in four states, 2021-22

State-wise analysis shows that, in Telangana state, the majority of them reported supermarket collection centre was transparent in weighing (90%), received better prices for better quality products (81%), had flexible timings to sell their products (60%) and saved a lot on transport and transaction costs (46%), among others. In Delhi-NCR and West Bengal states, most of the respondents reported that they had saved a lot on transport and transaction costs amongst other perceptions, i.e., 61% and 77%, respectively, whereas, in Maharashtra state, the majority have reported transparency in weighing at the supermarket collection center (88%). Further, the majority of vegetable growers who have reported a reduction in price variations because they participated in supermarkets are from Maharashtra (24%), followed by Telangana (7%), Delhi-NCR (4%), and West Bengal (1%) states. Several vegetable growers reported improvement in

the quality of vegetable production due to participation in selling to supermarkets. These farmers are higher in Maharashtra (27%) followed by Telangana (15%), West Bengal (12%) and Delhi-NCR (7%) states.

The information in Table 10.2 shows that, in the overall sample, 28% of the vegetable farmers could only sell part of the product to the supermarkets because supermarket collection centers procured less from farmers than they produce. A similar percentage of farmers (28%) reported that modern channels take top-grade produce only.

Table10.2: Reasons reported by sampled farmers for preferring to sell to traditional markets (%)

Respondent's response	Maharashtra (n=169)	Delhi-NCR (n=158)	Telangana (n=341)	W.Bengal (n=168)	Total (n=836)
Reasons for selling to traditional market besides selling to supermarket collection centre (%)					
Produce more than supermarket demand	44.97	22.78	23.17	23.81	27.63
Buy only top-grade produce	31.36	20.25	31.96	23.81	27.99
Doesn't procure every day	42.60	18.35	7.04	25.00	19.98
Doesn't not provide input advance & credit	5.33	46.84	2.93	2.98	2.87
Reasons for not selling to supermarket collection centre (%)					
Not aware of supermarket procurement	11.83	14.56	13.78	5.95	11.96
Do not want to sell supermarket	35.50	30.38	32.26	41.07	34.33
Reasons for selling their produce earlier to supermarket collection centre but dropped out later (%)					
Rejection at supermarket is too high	7.10	3.16	3.81	3.57	4.31
Delayed in the settlement of payment	6.51	4.43	2.05	4.17	3.83
Does not procure regularly	0.59	1.90	1.76	2.98	1.79
Reasons for not wanting to sell to supermarket collection centre (%)					
Farm is too far from the collection centre	2.96	1.90	4.69	1.19	3.11
Cannot meet supermarket quality standard	13.02	8.23	10.85	9.52	10.53
Doesn't procure regularly& enough	38.46	25.32	9.09	27.38	21.77
Prices are not attractive given the quality standard demanded	13.61	5.06	8.21	5.95	8.25
Need credit & input advances which I get from only mandi	5.92	1.90	0.59	44.05	1.79
Anyway, I have to go to mandi to sell other produce	24.85	8.23	7.33	6.55	10.89
Non- accessibility of vehicle to go to collection centre	1.18	0.63	0.29	0.00	0.48

Source: Field survey conducted in four states, 2021-22

Most of the vegetable growers in NCR Delhi have reported problems in providing input advance and credit, i.e., 47%. However, a very small proportion of vegetable growers had reported the non-provision of input advance and credit in the rest of the sampled states. In Maharashtra, about 43 % of vegetable growers reported that they could not sell all their produce in supermarkets because they did not procure it daily. However, 41% of vegetable growers are not willing to sell their produce in supermarket collection centers in West Bengal. This percentage of non-willingness was 36 in Maharashtra, followed by 32 in Telangana and 30 in Delhi-NCR.

Table 10.2 further shows that higher proportions of farmers in Maharashtra have reported high rejection rates and delays in settlement of payments as the reasons for dropping out of selling their produce to supermarkets. About 38% of the farmers in Maharashtra reported irregular procurement and lesser quantity as the reasons for not wanting to sell their produce in the supermarkets. In contrast, only 9% of them reported similar reasons in the study area of Telangana. The percentages in Maharashtra and NCR Delhi are 27 and 25, respectively.

A maximum percentage of farmers in Maharashtra (25%) have mentioned that they must go to mandi to sell other crops, so they do not want to market their produce in the supermarket collection center. However, only 7 to 8 % of vegetable growers have reported the same reason in the other three states. Moreover, 44% of them in West Bengal reported that they needed credit and advances, which they got only from the *mandis*, as one of the reasons for not wanting to sell their produce to the supermarkets. There are other reasons in the rest of the sampled states. Other reasons for not wanting to sell their produce to the supermarkets in the study are- the farm is too far from the collection center, non-accessibility of the vehicles to go to the collection center, prices are not attractive given the quality standard demanded, and not being able to meet supermarket quality standard (Table 10.2).

Table 10.3: Perceptions of marketing of vegetable produce in Telangana (%)

Respondent's response	Rythu Bazaar (Telangana) n=341		
	SF (n=20)	TF (n=45)	Total (n=65)
Selling to Rythu bazaar (%)	5.87	13.20	19.06
Selling to Rythu bazaar (Average years)	11.7 [5.00]	13.1 [4.98]	12.7 [4.99]
How often do you sell to Rythu bazaar (%)			
Always	20.00	48.89	40.00
Regularly	45.00	42.22	43.08
Rarely	35.00	8.89	16.92
Having space at Rythu Bazaar	40.00	37.78	38.46
Average amount paid for membership (Rs/ year)	150 [212]	176 [166]	171 [163]
Having a stall in Rythu bazaar	30.00	15.56	20.00
if yes, selling directly to consumers	30.00	8.89	15.38
If no, who do you sell to (%)			
Informal agent	55.00	53.33	53.85
My neighbour farmer	0.00	4.44	3.08
Others	0.00	2.22	1.54
Reasons reported by farmers for not selling their produce themselves in Rythu bazaar (%)			
There is not enough stalls	0.00	2.22	1.54
It is very time consuming	55.00	60.00	58.46
Informal traders don't allow us to sell on our own	5.00	6.67	6.15
I have to work in the field	45.00	28.89	33.85
Membership fee is high	0.00	0.00	0.00
I cannot sell the entire product in this market	0.00	0.00	0.00
Others	5.00	13.33	10.77
Average quantity sold (in Kgs)	26 [41]	97 [260]	76 [219]
Sources of information about the prices at Rythu bazaar (%)			
Set my own prices	5.00	15.56	12.31
Through auctions	0.00	2.22	1.54
Speaking with other farmers in the bazaar	20.00	33.33	29.23
Rytu committee/ association set daily prices	65.00	42.22	49.23
Speaking with the retailers	10.00	4.44	6.15
The informal agent sets his own prices	0.00	2.22	1.54
Farmers reported quality of product sold to Rythu bazaar (%)			
Top quality	10.00	31.11	24.62
Average quality (Grade-B)	35.00	15.56	21.54
Low quality	0.00	0.00	0.00
No grading/mixed	55.00	53.33	53.85
During the last 3 years, consumers attached the highest value on the basis of quality attributes as reported by farmers (%)			
Freshness	100.00	97.78	98.46
Pesticide residue	0.00	2.22	1.54
Firmness	5.00	11.11	9.24
Shape	10.00	24.44	20.00
Smell	10.00	17.78	15.38
Colour	30.00	40.00	36.92
Size	5.00	28.89	21.54
Any other	0.00	0.00	0.00
Farmers reported different advantages of working with Rythu bazaar than with mandi (%)			
Don't have to pay the commission fees	65.00	42.22	49.23
Get better prices	55.00	37.78	43.08
Grade myself and sell accordingly	5.00	20.00	15.38
There is less wastages	5.00	22.22	16.92
There is no rounding off in favour of buyers	0.00	13.33	9.23

Source: Field survey conducted in four states, 2021-22. Note: [ ] shows standard deviation;
SF= Supermarket farmers and TF= Traditional farmers

10.2. Perceptions of vegetable growers on selling to Rytu Bazaar in Telangana

Table 10.3 indicated that, among the sampled households (n=341), 19% sold to Rythu Bazaar in Telangana. Of these, 6% are supermarket farmers, and 13% are traditional farmers. Farmers reported selling in Rythu Bazaar for the past 13 years on average. About 45 % of the supermarket farmers were selling regularly to Rythu Bazaar compared to 42% of traditional farmers. However, approximately 49% of traditional market farmers always sold to Rythu Bazaar. Though 38 % of farmers have space at Rythu Bazaar, only 20% possess a stall. While 38 % of traditional farmers paid a membership fee of Rs 176 per year (as compared to Rs 150 per year for supermarket farmers) to have a space at Rytu Bazaar, only 16% of them (as compared to 30% of supermarket farmers) were able to have space at Rythu Bazaar.

Furthermore, only 9% of traditional farmers who had stalls (16%) at Rythu Bazaar could sell directly to consumers compared to 30% of supermarket farmers. For those who do not have any space at Rythu Bazaar among both categories, the majority of them were selling their produce to informal agents. However, traditional farmers also sold their produce to neighbouring farmers and other buyers. The major reasons reported by farmers for not selling their produce themselves in Rythu Bazaar were very time-consuming (58%) and must work in their fields (34%). Only 6% reported that informal traders crowd them out of selling their produce at Rythu Bazaar.

Moreover, about 49% of the farmers have reported that the Rythu Committee/association fixed the price daily. The next important source of price information was speaking to other farmers in the bazaar (29%). Own price setting was done for nearly 12% of farmers. Most farmers (54%) sold without grading/mixed quality of their vegetable produce in the Rythu Bazaar. The maximum proportion of farmers reported that consumers attached the highest value to freshness during the past three years based on quality attributes followed by color, size, shape, and smell in the Telangana markets. Most farmers have cited that they do not have to pay the commission fees and get better prices while working with the Rythu Bazaar than with *mandi*. Moreover, a higher proportion of traditional farmers than supermarket farmers have reported they have the advantage of grading and the reduction of wastages in Rythu Bazaar as compared to mandi (Table 10.3).

Table 10.4: Perceptions of marketing of vegetable produce in W. Bengal (%)

Respondent's response	Haats n=168		
	SF (n=73)	TF (n=92)	Total (n=165)
Selling to Haats (%)	43.45	54.76	98.21
Selling to Haats (Average years)	20.91	21.16	21.05
How often do you sell to Haats (%)			
Always	17.81	23.91	21.21
Regularly	80.82	71.74	75.76
Rarely	1.37	4.35	3.03
Having stall/space in Haats	15.07	7.61	10.91
Average amount paid for space (Rs/ day)	20.45	13.57	17.78
Selling produce directly to retailers	63.01	82.61	73.94
If not selling directly, who do you sell to (%)			
Informal agent	31.51	36.96	34.55
My neighbour farmer	39.73	33.70	36.36
Others	0.00	0.00	0.00
Average quantity sold (in Kgs)	63	67	65
Sources of information about the prices at Haats (%)			
Set my own prices	21.92	16.30	18.79
Through auctions	17.81	7.61	12.12
Speaking with other farmers in the bazaar	86.30	93.48	90.30
Haat committee/association set daily prices	6.85	16.30	12.12
Speaking with the retailers	41.10	54.35	48.48
The informal agent sets his own prices	0.00	1.09	0.61
Farmers reported quality of product sold to Haats (%)			
Top quality	2.74	18.48	11.52
Average quality (Grade-B)	8.22	9.78	9.09
Low quality	0.00	3.26	1.82
No grading/mixed	90.41	88.04	89.09
During the last 3 years, consumers attached the highest value on the basis of quality attributes as reported by farmers			
Freshness	27.40	47.83	38.79
Pesticide residue	0.00	1.09	0.61
Firmness	1.37	5.43	3.64
Shape	2.74	11.96	7.88
Smell	2.74	8.70	6.06
Colour	8.22	19.57	14.55
Size	1.37	14.13	8.48
Any other	0.00	0.00	0.00
Farmers reported different advantages of working with Haats than with mandi (%)			
Don’t have to pay the commission fees	23.29	35.87	30.30
Get better prices	23.29	44.57	35.15
Grade myself and sell accordingly	16.44	22.83	20.00
There is less wastages	34.25	52.17	44.24
There is no rounding off in favour of buyers	1.37	2.17	1.82

Source: Field survey conducted in four states, 2021-22. SF= Supermarket farmers and TF= Traditional farmers

10. 3. Perceptions of vegetable growers on selling to Haats in West Bengal

We have also collected information from the growers of vegetables who sold their produce to the Haats in West Bengal, and perceptions are presented in Table 10.4. Among the sampled households (n=168), 98 % sold to Haats. Of these, 43 % are supermarket farmers, and 55 % are traditional farmers. Farmers reported selling for the past 21 years on average in the Haats. Most supermarket farmers (80%) regularly sell to Haats compared to 72% of traditional farmers. It is also reported by the supermarket farmers (15%) that they must pay Rs. 20 per day for space at Haats as compared to Rs 14 per day by traditional farmers (8%). At the same time, 63 % of supermarket farmers at Haats could sell directly to retailers compared to 83 % of traditional market farmers.

The information presented in Table 10.4 further showed that for those without space at Haats, most were selling their produce to neighbouring farmers (36%) and informal agents (35%). However, fewer supermarket farmers (32%) sold their produce to informal agents than their

counterparts (37%). About 90 % of the farmers have reported that the price was fixed by speaking with other farmers in Haats. The next important source of price fixation was speaking with the retailers (48%), followed by their own price setting (19%), auctions (12%), and the Haats committee (12%). Most supermarket (90%) and traditional (88%) farmers sold their vegetable produce without grading/mixing in the Haats. Surprisingly, only 3 % of the supermarket farmers sold top-quality produce in the Haats compared to traditional farmers (18%).

Furthermore, the maximum proportion of farmers reported that, during the past three years, consumers attached the highest value to freshness based on quality attributes followed by colour, size, shape, and smell in the Haats. The majority of the farmers have cited that there is a reduction in wastage at Haats (44%), they got better prices (35%), do not have to pay the commission fees (30%), and grade the produce on their own & sell accordingly (20%) while working with Haats than with mandi. However, very few have cited no rounding off in favour of buyers (2%).

Table 10.5. Perceptions of marketing of vegetable produce at Mother Dairy in Delhi-NCR (%)

Respondent's response	Mother Dairy (Delhi NCR) n=158		
	SF (n=27)	TF (n=13)	Total (n=40)
Selling to mother dairy (%)	17.09	8.23	25.32
Selling to mother dairy (Average years)	11.08	5.51	9.27
How often do you sell to mother dairy (%)			
Always	33.33	30.77	32.50
Regularly	44.44	23.08	37.50
Rarely	22.22	46.15	30.00
Selling produce directly to mother dairy collection centre	96.30	100.00	97.50
Farmers get paid by Mother Dairy (%)			
Whenever I demand	1.64	3.65	2.93
I get paid within a day	4.92	8.22	7.04
I get paid after a week	0.82	5.94	4.11
Farmers grade their produce before selling to Mother dairy	0.00	0.00	0.00
Farmers reported rejection at the Mother Dairy collection	22.97	35.11	29.76
Average rejection (in per cent)	10.92	14.29	12.10
Farmers reported second rejection at Mother dairy collection	7.41	0.00	5.00
Average rejection (in per cent)	7.5	Nil	7.5
Farmers knew the prices of the vegetables that they sell to Mother dairy (%)			
Same day	81.48	53.85	72.50
Next day	14.81	30.77	20.00
After more than two days	3.70	15.38	7.50
Farmers being contacted by Mother Dairy in the beginning of the season for procurement of vegetables (%)	51.85	53.85	52.50

Source: Field survey conducted in four states, 2021-22.
SF= Supermarket farmers and TF= Traditional farmers

10.4. Perceptions of vegetable growers on selling to Mother Dairy in Delhi-NCR

One-fourth of the vegetable growers in Delhi-NCR sold to Mother Dairy collection centres, as seen in Table 10.5. Of these, 17% are supermarket farmers, and 8% are traditional farmers. Farmers reported, on average, selling from the past nine years to the Mother Dairy collection centres. A maximum proportion of supermarket farmers (44%) were regularly selling to the Mother Dairy collection centre compared to 23% of traditional farmers. 96% of supermarket farmers could market directly to the Mother Dairy collection centre compared to 100% of traditional market farmers.

Furthermore, 23% of supermarket farmers have reported the rejection of produce at the Mother Dairy collection centre compared to traditional farmers (35%). Note that the average rejection of produce was 11% as reported by supermarket farmers, which was a little lesser as reported by traditional farmers (14%). Moreover, 7% of supermarket farmers have reported that their produce had been rejected a second time at the Mother Dairy collection centre, with a 7.5% average

rejection rate. Even 8% of traditional farmers reported receiving payments within a day compared to supermarket farmers (5%). However, farmers belonging to both groups have not graded their produce before selling it to the Mother Dairy collection center.

Most farmers reported that they knew the prices of the vegetables they sold to the Mother Dairy collection center on the same day (73%). Across marketing categories, a larger proportion of supermarket farmers (81%) knew the prices on the same day as compared to traditional farmers (54%) farmers. At the same time, 31% of the traditional market farmers knew the prices the next day against their counterparts (15%). About 53% of the farmers reported being contacted by the Mother Dairy collection centre officials at the beginning of the season to procure vegetables (Table 5).

10.5. Perceptions of vegetable growers on weekly markets in Maharashtra

The information presented in Table 10.6 shows that, among the sampled households (n=169), only 8% sold to Weekly markets in Maharashtra. Of these, 3% are supermarket farmers, and 5% are traditional farmers. Farmers reported, on average, selling to the weekly markets for the past 15 years. The maximum proportion of farmers (93%) rarely sold to the Weekly markets. Only 20% of supermarket farmers were selling regularly to Weekly markets. Also, 60% of supermarket farmers could sell directly to Weekly markets compared to 56% of traditional farmers.

Four-fifths of supermarket farmers have reported that the price was fixed by speaking with other farmers in Weekly markets, against 56% of traditional farmers. Own price setting was the next important source of price fixation, as reported by 60 % of supermarket farmers and 67 % of traditional market farmers. The other important sources of price fixation at Weekly markets were auctions and speaking with the retailers. Most farmers sold their vegetable produce without grading/mixing in the Weekly markets. Of those reported, 67 % were traditional farmers, and 20% were supermarket farmers. Also, 40 % of supermarket farmers reported selling top-quality produce in the Weekly markets, and about 60% reported selling average-quality (Grade-B) produce (Table 10.6).

The maximum proportion of farmers reported that, during the past three years, consumers attached the highest value to freshness (86%) based on quality attributes followed by shape (7%) and size (7%) in the Weekly markets. Concerning the advantages of working with Weekly markets than mandi, the majority of sampled farmers (50%) reported that they do not have to pay commission fees, get better prices (43%), do grading and sell accordingly (36%), reduction in wastages (21%) and no rounding-off in favour of buyers (21%).

Table 10.6: Perceptions of marketing of vegetable produce at weekly markets in Maharashtra (%)

Respondent's response	Weekly Markets (Maharashtra) n=169		
	SF (n=5)	TF (n=9)	Total (n=14)
Selling to weekly market (%)	2.96	5.33	8.28
Selling to weekly market (Average years)	15.00	15.33	15.21
How often do you sell to weekly market (%)			
Always	0.00	0.00	0.00
Regularly	20.00	0.00	7.14
Rarely	80.00	100.00	92.86
Selling produce directly to weekly market	60.00	55.56	57.14
Average quantity sold (in Kgs)	48.00	28.33	35.36
Sources of information about the prices at weekly market (%)			
Set my own prices	60.00	66.67	64.29
Through auctions	60.00	22.22	35.71
Speaking with other farmers in the bazaar	80.00	55.56	64.29
Seller's association set daily prices	0.00	0.00	0.00
Speaking with the retailers	40.00	22.22	28.57
The informal agent sets his own prices	0.00	0.00	0.00
Farmers reported quality of product sold to weekly markets (%)			
Top quality	40.00	22.22	28.57
Average quality (Grade-B)	60.00	11.11	28.57
Low quality	20.00	11.11	14.29
No grading/mixed	20.00	66.67	50.00
During the last 3 years, consumers attached the highest value on the basis of quality attributes as reported by farmers (%)			
Freshness	100.00	77.78	85.71
Shape	0.00	11.11	7.14
Size	0.00	11.11	7.14
Any other	0.00	0.00	0.00
Farmers reported different advantages of working with weekly market than with mandi (%)			
Don’t have to pay the commission fees	60.00	44.44	50.00
Get better prices	60.00	33.33	42.86
Grade myself and sell accordingly	60.00	22.22	35.71
There is less wastages	0.00	33.33	21.43
There is no rounding off in favour of	20.00	22.22	21.43

Source: Field survey conducted in four states, 2021-22.
SF= Supermarket farmers and TF= Traditional farmers

10.6. Distance to input providers, markets, and agents for vegetable growers

Regarding the average distance of different marketing locations from the farm household, the supermarket collection centre (7.80 km) and supermarket collection agent (6.32 km) were closer as compared to the nearest wholesale market (17.51 km) and nearest town center (13.03 km) for the whole sample (Table 10.7).

Table 10.7: State-wise average distance from marketing and other important locations (in Kms)

Marketing /other locations (in Kms)	Maharashtra (n=169)	Delhi-NCR (n=158)	Telangana (n=341)	W.Bengal (n=168)	Total (n=836)
Nearest supermarket collection centre	3.76	5.17	13.09	3.59	7.80
Nearest supermarket collection agent	3.06	6.16	10.00	2.26	6.32
Nearest wholesale market	13.98	21.96	24.60	2.45	17.51
Nearest fertilizer shop	3.38	2.66	5.66	0.89	3.67
Nearest pesticide shop	3.33	2.67	5.65	0.89	3.66
Nearest seed shop	3.56	2.66	5.72	0.99	3.75
Nearest town centre	15.08	13.00	14.70	7.62	13.03
Nearest Rythu Bazar	-	-	29.25	-	-
Nearest mother dairy collection centre	-	4.51	-	-	-
Nearest Haat	-	-	-	1.87	-
Nearest weekly market	6.59	-	-	-	-
Nearest tar road	1.69	0.67	1.17	0.48	1.04
Village Sarpanch	1.37	5.67	0.48	3.03	2.15

Source: Field survey conducted in four states, 2021-22.

Across sampled states, the location of the supermarket collection center and supermarket collection agent was nearer to the farm household in Maharashtra, followed by West Bengal, Delhi-NCR, and Telangana. The average distance to the nearest wholesale market from the farm household was greater in Telangana (24.60 km) and Delhi-NCR (21.96 km) than in West Bengal (13.98 km) and Maharashtra states (2.45 km). However, the nearest town center was farther in West Bengal (15.08 km), followed by Telangana (14.70 km), Delhi-NCR (13.00 km), and Maharashtra states (7.62 km).

On average, Rythu bazaar in Telangana (29.25 km) was located farther from the farm household as compared to the Weekly market in Maharashtra (6.59 km), Mother dairy collection centre in Delhi-NCR (4.51 km), and Haats in West Bengal (1.87 km). Fertilizer, pesticide, and seed shops were farthest in Telangana compared to the other three sampled states in the study area (Table 10.7).

Between supermarket and traditional farmers, the analysis presented in Table 8 shows that the traditional market farmers were significantly located farther in terms of the average distance of different marketing locations from their farms as compared to the supermarket farmers. For instance, for the whole sample, the average distance to the nearest supermarket collection centre was significantly greater among traditional farmers (10.12 km) than the supermarket farmers (4.52 km). This is true for all the sampled states. Likewise, in the distance from the supermarket collection centre, the traditional farmers were significantly distant from their counterparts from other marketing locations, such as supermarket collection agents, wholesale markets, fertilizer shops, pesticide shops, seed shops, and town centers, for the overall study area. The same is true across the sampled states, but the distance was insignificant in all the marketing locations except for Maharashtra. Notably, the traditional farmers were significantly distant from their counterparts from supermarket collection centres and supermarket collection agents in all four sampled states.

The traditional farmers were significantly distant compared to their counterparts from the Rythu Bazaar in Telangana, the Mother Dairy Collection Centre in NCR Delhi, and Haats in West Bengal. The results were not significant in the case of the Weekly market in Maharashtra. It is also inferred from the analysis that the supermarket farmers were closer than the traditional farmers in terms of the average distance from the tar road and sarpanch (village head) for the whole sample and across the sampled states. The only exception in this regard was that supermarket farmers (3.19 km) were a little farthest as compared to their counterparts (2.90 km) from sarpanch in West Bengal (Table 10.8).

Table 10.8: State-wise average distance from marketing and other important locations(in Kms)

Marketing /other locations (in Kms)	Maharashtra (n=169)		Delhi-NCR (n=158)	
	SF (n=82)	TF (n=87)	SF (n=69)	TF (n=89)
Nearest supermarket collection centre	2.64***	4.80	3.01***	6.84
Nearest supermarket collection agent	2.07***	3.99	4.07*	7.78
Nearest wholesale market	13.88	14.08	20.93	22.75
Nearest fertilizer shop	3.04	3.71	2.07	3.11
Nearest pesticide shop	3.05	3.59	2.07*	3.13
Nearest seed shop	3.44	3.68	2.09	3.11
Nearest town centre	14.06	16.05	13.01	12.99
Nearest Rythu Bazar	-	-	-	-
Nearest mother dairy collection centre	-	-	3.48***	5.30
Nearest Haat	-	-	-	-
Nearest weekly market	6.83	6.36	-	-
Nearest tar road	1.60	1.78	0.52***	0.78
Village Sarpanch	1.22	1.52	2.33	8.27
Marketing /other locations (in Kms)	**Telangana (n=341)**		**W.Bengal (n=168)**	
	SF (n=122)	**TF (n=219)**	**SF (n=74)**	**TF (n=94)**
Nearest supermarket collection centre	8.58***	15.60	1.33***	5.36
Nearest supermarket collection agent	7.50***	11.39	0.80***	3.40
Nearest wholesale market	20.70**	26.78	2.19*	2.66
Nearest fertilizer shop	5.23	5.87	0.81**	0.95
Nearest pesticide shop	5.28	5.85	0.81**	0.95
Nearest seed shop	5.28	5.96	1.01 ***	0.97
Nearest town centre	14.10	15.03	6.78***	8.28
Nearest Rythu Bazar	31.16*	28.19	-	-
Nearest mother dairy collection centre	-	-	-	-
Nearest Haat	-	-	1.55***	2.13
Nearest weekly market	-	-	-	-
Nearest tar road	0.90*	1.32	0.43	0.53
Village Sarpanch	0.12	0.68	3.19	2.90
Marketing /other locations (in Kms)	**Total (n=836)**			
	SF (n=347)	**TF (n=489)**		
Nearest supermarket collection centre	4.52***	10.12		
Nearest supermarket collection agent	4.11***	7.88		
Nearest wholesale market	15.19***	19.15		
Nearest fertilizer shop	3.16***	4.04		
Nearest pesticide shop	3.16***	4.01		
Nearest seed shop	3.30***	4.08		
Nearest town centre	12.31	13.54		
Nearest Rythu Bazar	-	-		
Nearest mother dairy collection centre	-	-		
Nearest Haat	-	-		
Nearest weekly market	-	-		
Nearest tar road	0.89**	1.15		
Village Sarpanch	1.47	2.63		

Source: Field survey conducted in four states, 2021-22.
*** sig at 1%, ** sig at 5% and * sig at 10%

Between social categories of farmers, the analysis shows that the SCST farmers were significantly located farther in terms of average distance of different marketing locations from their farms as compared to other category of farmers. For instance, for whole sample, the average distance to the nearest supermarket collection centre was significantly more among SC/ST farmers (13.62 kms) than the supermarket farmers (7.30 kms). This is true for all the sampled states, except Maharashtra due to negligible sample in SC/ST category and the results are not significant in all the sampled states (Table 10.8).

The SC/ST farmers were found to be located at the farthest place against their counterparts from other marketing locations, such as supermarket collection agent, wholesale market, fertiliser shop, pesticide shop, seed shop, and town centre, for overall study area. However, in case of fertiliser shop, pesticide shop and seed shop, the distance among SC/ST farmers was more as compared to other category of farmers in Telangana. Not much difference has been observed in

both the social categories in terms of average distance from the Rythu Bazaar in Telangana, from Mother dairy collection centre in Delhi-NCR, from Weekly market in Maharashtra and Haats in West Bengal. It is also inferred from the analysis presented in Table 9that the SC/ST farmers were closer than the other category of farmers in terms of average distance from the sarpanch (village head) for whole sample and across the sampled states. Whereas reverse is true in case of average distance from the tar road in the study area.

Chapter 11
Analysis on Farmers' Income and Consumption

We endeavour to compare the incomes during 2020-21 with those in 2013-14 by bringing in panel data evidence in this chapter. It analyses impacts of modern market participation on income as well as food and non-food expenditure, harnessing panel data models and the Heckman selection model to correct self-selection bias and unobserved heterogeneity. Achieving the objectives of understanding the true impact of direct procurement systems on farm households poses twin challenges of controlling for unobserved heterogeneity arising due to latent characteristics of the farm households that lead participants to perform differently than the traditional market sellers. Moreover, it is challenging to attribute the resilience of the farm households to overcome widespread fears of Coronavirus infection and health consequences, apart from various bottlenecks in procuring inputs and organizing labour while at the same time balancing family welfare in the pandemic.

We take recourse to econometric models that control for self-selection bias and panel data models to control for time-invariant farmer-related characteristics. The plan of presentation is as follows. The first section (11.1) explains the econometric methodology especially the strategy to control for self-selection bias. The second section presents incomes from vegetable and other sources for the sampled household by means of means and Kolmogorov-Smirnov statistics. The econometric results on income are presented in the third section, followed by the section on panel data model results on household consumption. The final section provides conclusions.

11.1. Econometric methodology

The participation in the direct procurement system is not randomly distributed, and farmer households self-select into selling to this modern marketing channel, making participation endogenous to the outcome process (Rao and Qaim, 2011). Ignoring such selection bias might result in overestimating the impact of supermarket participation on the intake of nutrients. Conversely, resource-poor smallholders participating in these markets might need to pay more attention to the impacts constrained by resources, including social networking (Bellemare, 2012). Therefore, the Heckman selection correction model is employed to control the effect of self-selection bias. This model combines selection and outcome equations using a maximum likelihood estimation procedure. The core equation to be estimated is:

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 d_i + U_i \dots\dots\dots (4)$$

where the unit of observation is household. *Yi* is consumption of nutrient, *di* is a variable denoting the supermarket participation.$U_i$is an error term which is identically andindependently distributed with mean zero. X_1indicates a vector of household characteristics variables that may influence consumption of the nutrient reported by the farmer households.

The purpose of this exercise is to estimate β_2 which represents the impact of participation in the direct procurement system on income. Participation is likely driven by unobserved characteristics such as the farmer's attitude towards risk, innovation, and enterprising ability. Ignoring these variables may bias the estimate of the impact of direct procurement systems on the outcome variable. In a sense, identifying a causal effect is difficult in such a context. There are two methods to deal with such problems. We can add a variable to the model as a proxy for these missing variables on farmer's inherent characteristics or replace the treatment indicator –direct procurement system participation with an instrument that purifies it from the effects of the same

variables on which we don't have enough information (Angrist and Krueger, 2001). However, the survey data on farmer's inherent characteristics are not readily available.

We, therefore, adopt the latter approach and instrument the supermarket participation dummy. We instrument the treatment variable- *di*, a dummy indicating whether a household participates in the supermarket channel with the distance to collection centre of the procurement. The selection of an instrument assumes that such a variable affects participation decision but not the outcome variable.

Panel data models: The present study examines the panel data collected to determine net income impacts, duly controlling for time-invariant farmer-related characteristics that lead to unobserved heterogeneity.

The basic model is specified as follows for the panel data set in the study location:

$$\log Y_{it} = \theta_t + x_{it}\beta + \delta_{it} + \gamma_t + c_i + u_{it}$$

Where Y_{it} is net income of farm household *i* in period *t*. $\theta_t$denotes time varying intercept and x_{it} is a (1xk) set of observable characteristics that impact household income.

What distinguishes this model is the unique separation of the disturbance term into ($c_i + u_{it}$), where c_i is the impact of socioeconomic and farm level characteristics that change across farmers and not across time and so subscripted only with *'i'*. It is variously called unobserved component, unobserved heterogeneity, and fixed effect. As *'i'* in the present study refers to the individual farmers, we can also call it the individual effect or farmer effect or farmer heterogeneity. The u_{it} represents the disturbance term that varies over time and also across farmers viz., both over *'i'* and *'t'* and affects Y_{it} and are also called idiosyncratic errors or idiosyncratic disturbance. Theγ_t refers to season specific production shocks that are a result of weather influences.

Data: Field surveys are conducted physically for the 2020-21 agricultural year, leveraging the 795-household survey done for 2013-14 in four states representing all states of India. Lockdown-related difficulties persisted long after the three-month lockdown from March to July 2020, and economic activity took a long time to reach near-normal levels. Moreover, the deadly delta wave of coronavirus struck in March 2021, forcing governments to impose severe restrictions on people and vehicle movements. This study uses data from 618 farm households for whom information on production, marketing, consumption, non-farm income, and asset base are available for both survey periods.

11.2. Household and vegetable income during 2013-14 and 2020-21

As seen from Table 11.1, supermarket-selling farmers spend more on critical intermediary inputs in farming. Several of these advantageous endowments of the modern market farmers confound the actual effects of market participation, posing severe challenges for the researchers in finding out the exact impacts, as vividly explained by Barrett et al. (2012).

Table 11.1. Agricultural household income across marketing channels during 2013-14 and 2020-21 (n=618) (in ₹)

Income earning activities	2013-14 (Nominal prices INR)			2020-21 (Nominal prices INR)		
	SF (n=305)	TF (n=313)	Overall (n=618)	SF (n=178)	TF (n=440)	All farmers (n=618)
All-crops	293073*** (892179)	145281 (522556)	218221 (731940)	372422*** (1006216)	214300 (478418)	259844 (677080)
Vegetables	128944*** (341501)	55996 (206784)	91998 (283576)	273516*** (955223)	109364 (241217)	156644 (555599)
Livestock	42751 (126669)	32420 (68718)	37519*** (101588)	26419 (56552)	22838 (59359)	23869 (58541)
Business and enterprises	18198 (63127)	16852 (77835)	17517** (70904)	14855 (52907)	15063 (56235)	15003 (55255)
Wages	17342 (49980)	17430 (33910)	17386 (42570)	18514** (58451)	28113 (64926)	25348 (63232)
Transfer payments	1654 (15562)	774 (5241)	1208*** (11550)	25649 (30710)	27302 (37484)	26826 (35648)
Other sources	37588 (95893)	30668 (76679)	34083** (86694)	99671 (378812)	61556 (195647)	72534 (262105)
Household income	410536*** (928572)	243426 (555554)	325900 (766744)	557530*** (1060826)	369172 (558625)	423424 (743071)

Note: SF means supermarket farmer and TF mean traditional market farmer. Values within parenthesis indicate standard deviation.
***, **, * indicates significance at the 1%, 5% and 10%.

Table 11.1 presents the household incomes of farmers selling to traditional and modern marketing channels in both the 2013-14 and 2020-21 study periods. Though vegetable income is shown separately in the table, keeping in view the specific purpose of the study, it forms part of the all-crops income. The farmers selling to supermarket collection centers earn higher household incomes of 69% and 51% over their traditional market counterparts in the first and second periods. The pandemic-led crisis does not dampen the income gains for the farmers selling to the new collection centers.

The traditional market-selling farmers resorted to wage earning significantly in the pandemic-affected 2020-21 agricultural year. To abstract from the limiting assumption of normal distribution, we harness the Kolmogorov-Smirnov test to examine whether the farmers selling to both markets' cumulative income distribution functions (CDFs) are significantly different. The graphs are presented in Figure 11.1 relating to the sample farmers for 2013-14 and 2020-21, and Figure 11.2 for both periods combined. They reveal that the CDF of the modern market farmers is to the right of the traditional market farmers, showing that they earn relatively higher income. It is also significantly different as the KS statistic becomes significant in all the graphs at the 1% level.

Figure 11.1. Cumulative distribution of income earned by agricultural households across marketing channel

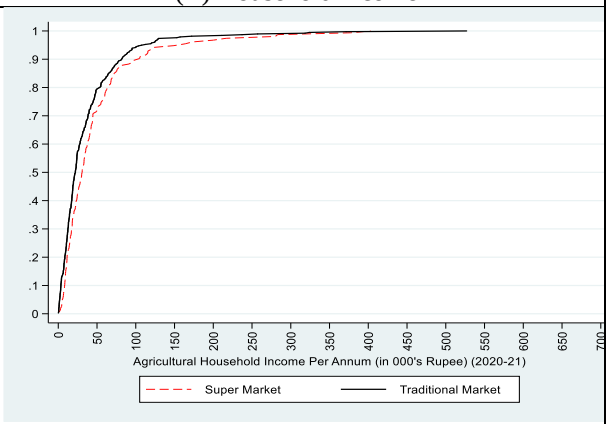
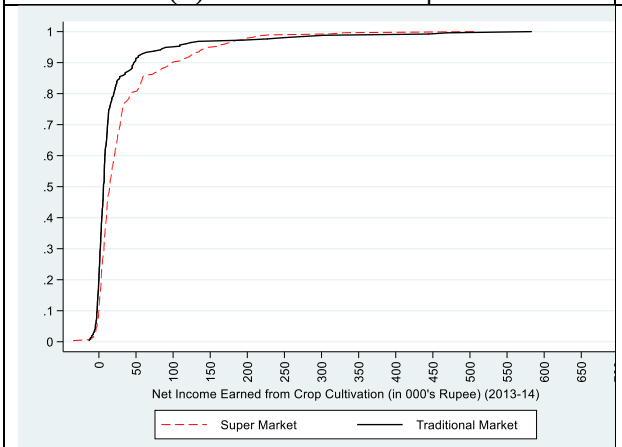
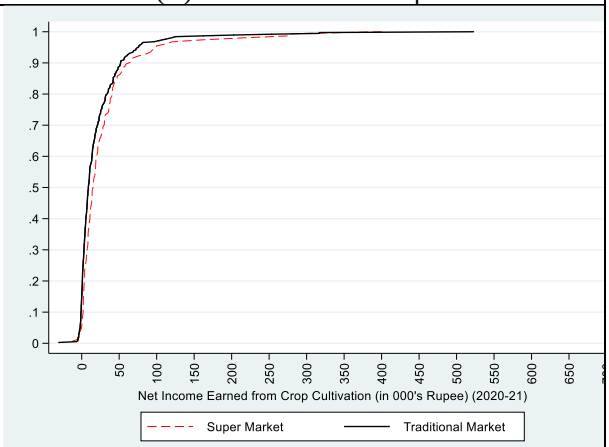
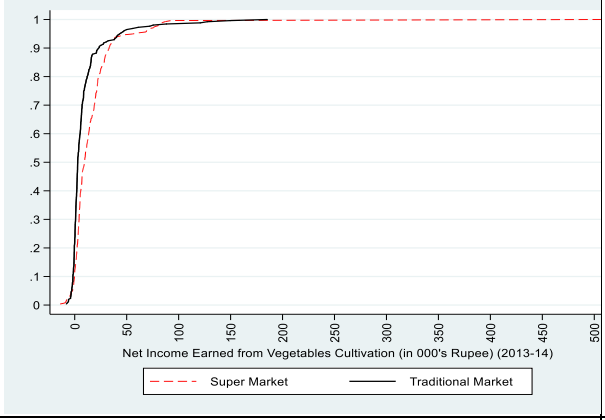
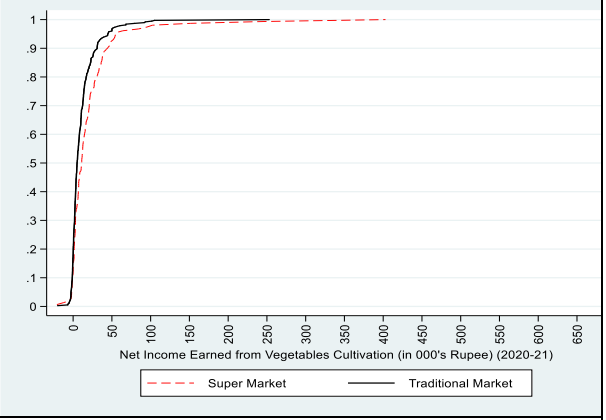
2013-14 (n=531)	2020-21 (n=531)
(A) Household income	(B) Household income
	
Combined K-S: 0.1936 0.000 0.000	Combined K-S: 0.1574 0.009 0.008
(C) Income from all-crops	(D) Income from all-crops
	
Combined K-S: 0.2708 0.000 0.000	Combined K-S: 0.1701 0.004 0.003
(E) Income from vegetables	(F) Income from vegetables
	
Combined K-S: 0.2894 0.000 0.000	Combined K-S: 0.1973 0.000 0.000

Figure 11.2. Cumulative distribution of income and consumption earned by agricultural households across marketing channel in both the study periods

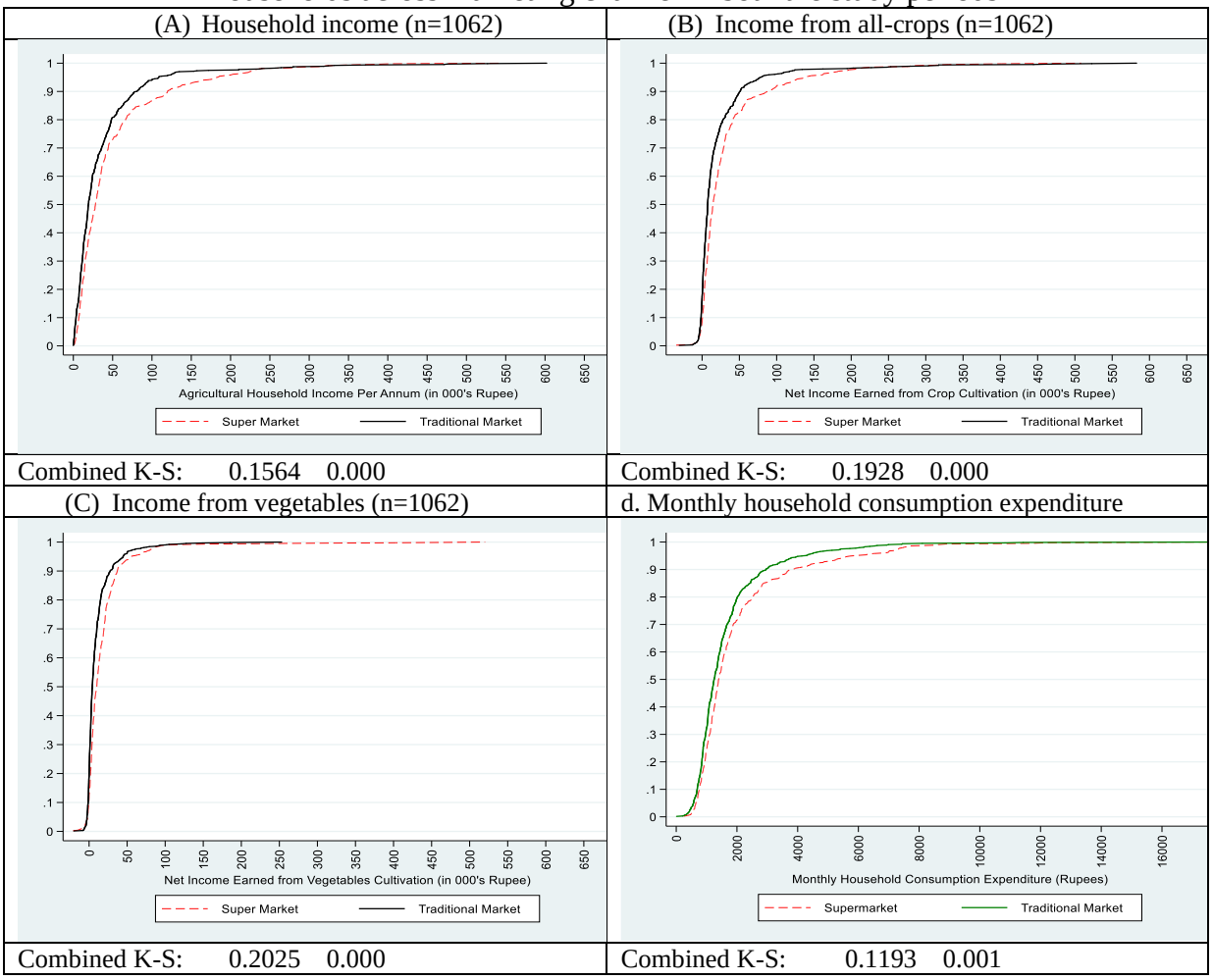


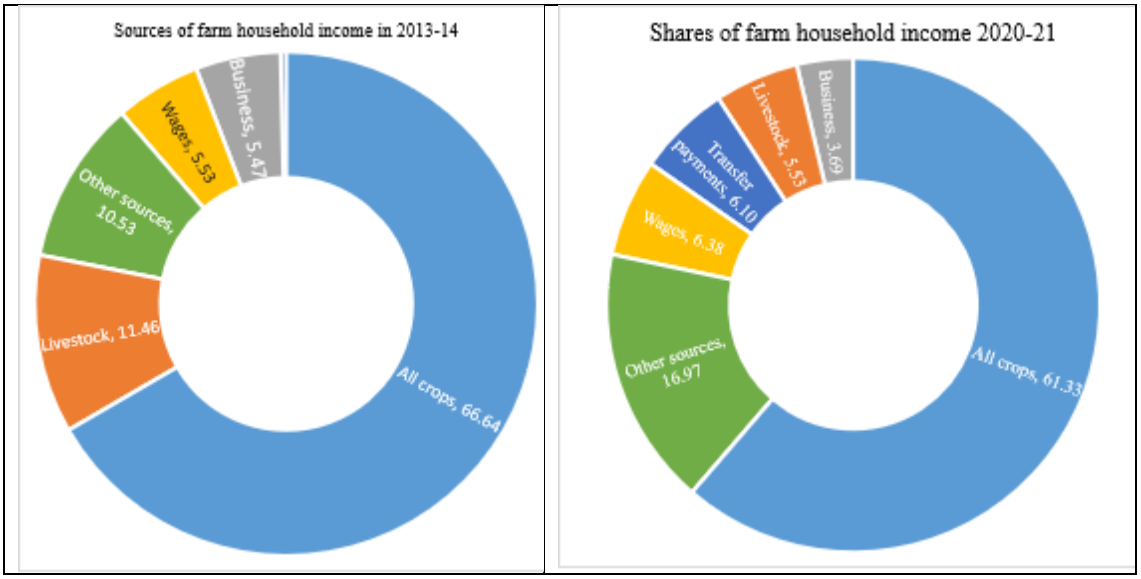
Table11.2. Changes in household income across marketing channels in 202021 over 2013-14 (In constant prices INR)

Income activities	Supermarket farmers		Traditional market farmers		All farmers	
	2013-14 (n=305)	2020-21 (n=178)	2013-14 (n=313)	2020-21 (n=440)	2013-14 (n=618)	2020-21 (n=618)
All-crops	35845 (107064)	32325 (88372)	17751 (63888)	19302 (45080)	26681 (88282)	23053 (61001)
Vegetables	15982 (41774)	23791 (84156)	6884* (25109)	9734 (20830)	11374 (34632)	13783 (48796)
Livestock	5237** (15705)	2283 (4910)	3958*** (8377)	1994 (5224)	4589*** (12547)	2078 (5134)
Business and enterprises	2277 (7846)	1330 (4625)	2105 (9535)	1409 (5111)	2190** (8736)	1386 (4972)
Wages	2211 (6250)	1624 (5050)	2214 (4346)	2713 (6294)	2212 (5367)	2400 (5979)
Transfer payments	197*** (1853)	2179 (2593)	97*** (692)	2340 (3196)	147*** (1391)	2294 (3033)
Other sources	4650** (11762)	8596 (32329)	3793 (9454)	5481 (17438)	4216** (10655)	6378 (22763)
Household income	50417 (111667)	48337 (92857)	29918 (67885)	33240 (51757)	40035 (92625)	37588 (66531)

Note: ***, **, * indicates significance at the 1%, 5% and 10%.

The household income in Table 11.2 reveals that farmers' income in 2020-21 remained unchanged from 2013-14 after covering for the effects of inflation. However, the pandemic-led crisis might have triggered some changes in the composition of household consumption. Sample farmers' incomes from livestock and businesses declined by 55% and 38% over the 2013-14 levels. This may be due to the prolonged lockdowns and closure of hotels, restaurants, and other eateries using milk in case of livestock and the closure of all shops for a long time due to a lack of people movement. On the other hand, transfer payments increased by 14 times as central and state governments started money transfers with schemes like *PM-Kisan*, *RythuBandhu*, COVID-19 ex-gratia, and other such payments. There was a 50% spike in income from other sources, like remittances and salary from non-farm jobs, including security, *hamaali* etc. These two sources compensated for the loss of incomes from livestock and business and enterprises. Examining across marketing channels, supermarket farmers' income from other sources went up, while traditional market farmers managed to get higher incomes from vegetable cultivation. Notably, the traditional market farmers, even after this hike, earn 31% lower than what the supermarket farmers get.

Figure 11.3: Farm household income sources in 2013-14 and 2020-21(in %)



Source: Field data

While the total household income did not change in the pandemic-affected 2020-21 agricultural year, the contributions of different earning activities changed (Figure 11.3). While the contribution of livestock and crops plummeted by nearly 5% and 6%, respectively, earnings from transfer payments (6%) and other sources (6%) were compensated. Wage earning covered incomes lost from businesses and enterprises.

Table 11.3. Per acre net vegetable income during 2013-14 and 2020-21 across marketing channels (n=618) (in ₹)

State	2013-14 (Nominal prices INR)			2020-21 (Nominal prices INR)		
	SF (n=305)	TF (n=313)	Overall (n=618)	SF (n=178)	TF (n=440)	Overall (n=618)
Delhi-NCR	48275 (73975)	69144 (120808)	56431 (94942)	58029* (85013)	41352 (67088)	45377 (71652)
Telangana	19781 (138745)	15090 (148467)	16887 (144589)	46392 (90533)	33933 (70570)	37512 (76876)
W.Bengal	59281*** (53095)	30242 48514)	45729 (52811)	78545 (75119)	83146 (99175)	82533 (96018)
Maharashtra	56409 (82988)	44027 (46363)	51594 (71088)	88832*** (144865)	60264 (72155)	72565 (110011)
All-India	42553* (102419)	28511 (121783)	35441 (112771)	65076*** (112007)	50131 (79304)	54436 (90109)

Note: SF means supermarket farmer and TF mean traditional market farmer. Values within parenthesis indicate standard deviation.
***, **, * indicates significance at the 1%, 5% and 10% level.

Vegetable cultivation enables the lion's share of the sample farmers' household income, and this has increased during the 2020-21 study period to constitute 60% of household income compared to 43% in 2013-14 (Table 11.3). Therefore, we examine net income from vegetable cultivation closely in Table 11.4. In both years, the farmers selling to supermarkets get significantly higher net income per acre from vegetables. However, the variations among supermarket farmers are higher than those of traditional market farmers, as seen by the standard deviation in 2020-21. This is even though the overall variations came down relatively during this study period.

Table11.4. Net income from vegetable cultivation per acre in 2013-14 and 2020-21 in constant prices (INR)

State	Supermarket farmers		Traditional market farmers		All farmers	
	SF in 2013-14 (n=305)	SF in 2020-21 (n=178)	TF in 2013-14 (n=313)	TF in 2020-21 (n=440)	All farmers in 2013-14 (n=618)	All farmers in 2020-21 (n=618)
Delhi-NCR	5747 (8807)	5144 (7537)	8231** 14382	3666 (5948)	6718** (11303)	4023 (6352)
Telangana	2412 (16920)	3912 (7633)	1840 (18106)	2861 (5950)	2059 (17633)	3163 (6482)
W.Bengal	8121 (7273)	8679 (8300)	4143*** (6646)	9187 (10959)	6264** (7234)	9120 (10610)
Maharashtra	7016 (10322)	7573 (12350)	5476 (5767)	5138 (6151)	6417 (8842)	6186 (9379)
All-India	5368 (12626)	5707 (9686)	3545 (14868)	4715 (7674)	4445 (13826)	5000 (8307)

Note: Values within parenthesis indicate standard deviation. ***, **, * indicates significance at the 1%, 5% and 10% level.

In real terms (after controlling for inflation), the income from vegetable cultivation per acre remained mostly the same in 2020-21 over the level in 2013-14 for the sample farmers as a whole and farmers selling to traditional markets and supermarkets (Table 11.3). In other words, there has been no growth in income from the cultivation of vegetables for the sample farmers over the last seven years. There, however, is the difficulty in considering the latest study period, 2020-21, as the representative period given the unusual difficulties for agriculturists due to the crisis driven by COVID-19. There are a few exceptions: traditional market farmers getting lower incomes in 2020-21 in Delhi-NCR and higher incomes in West Bengal in 2020-21 over 2013-14. As a result, vegetable growers in West Bengal got higher net incomes per acre from vegetables in contrast to lower incomes in Delhi-NCR. The per acre net income from vegetables remained the same for supermarket farmers because the collection centers are located close to the villages, enabling them to sell regardless of the logistic problems of COVID-19.

Table 11.5. Heckman selection model results for supermarket participation and net income from vegetable cultivation

Variable	Vegetable income		All crops income		Household income	
	Outcome equation	Selection equation	Outcome equation	Selection equation	Outcome equation	Selection equation
Supermarket participation dummy	11300.23** (5597.23)	-	54067.97*** (5710.72)		47623.07*** (9631.81)	-
Age of head of HH in years	0.3027 (100.60)	-0.0092 (0.0064)	97.07 (189.86)	-0.0080 (0.0059)	92.76 (202.61)	-0.0073 (0.0063)
Adult share	75.26 (61.03)	0.0072** (0.0037)	-	-	-	-
Adult size	-	-	-812.91 (1495.59)	0.0473 (0.4726)	1961.46 (1590.34)	0.0331 (0.0489)
Education in years	-407.411 (280.62)	0.0491*** (0.0171)	-770.14 (517.34)	0.0386** (0.0161	-338.97 (556.95)	0.0440*** (0.0167)
Number of non-farm family members	-109.75 (1457.28)	-0.2111** (0.093)	-2426.25 (2805.84)	-0.1701* (0.0868)	6680.83** (3003.46)	-0.2003** (0.0915)
Vegetable experiences in years	6.41 (12.57)	-0.0072 (0.0078)	11.98 (23.53)	-0.0053 (0.0062)	9.58 (25.06)	-0.0060 (0.0070)
Owned land in acres	647.95 (399.85)	0.0251 (0.0248)	1124.99 (752.23)	0.2782 (0.2108)	2019.54*** (800.81)	0.0178 (0.023)
Share of vegetables in gross cultivated area (%)	113.64** (48.93)	0.0059** (0.0030)	-237.95*** (91.48)	0.0059** (0.0028)	-230.29** (97.91)	0.0061** (0.0029)
Share of irrigation in vegetable area (%)	29.01 (64.34)	0.012** (0.0056)	-26.89 (120.36)	0.0102** (0.0052)	-15.60 (128.59)	0.0107** (0.0053)
Total paid out costs in constant prices INR	0.3443** (0.1629)	0.0000*** (0.0000)	0.5324* (0.2912)	0.0000*** (0.0000)	0.4754 (0.3191)	0.0000*** (0.0000)
Value of farm assets in constant prices INR	0.2072*** (0.0263)	0.0000 (0.0000)	0.2309*** (0.0511)	0.0000 (0.0000)	0.2646*** (0.0543)	0.0000 (0.0000)
Value of livestock assets in constant prices INR	-	-	-0.1025 (0.1455)	-0.0000 (0.0000)	-0.2162 (0.1546)	0.0000 (0.0000)
Distance to wholesale market in kilometers	214.89*** (79.93)	-0.260*** (0.0061)	499.03*** (135.89)	-0.0212*** (0.0054)	334.61** (154.56)	-0.0238*** (0.0058)
Membership in community-based organisations dummy (1=Yes)	6700.78** (2887.27)	0.3653** (0.1659)	862.62 (5372.91)	0.3127** (0.1560)	2866.61 (5747.95)	0.3681** (0.1619)
Number of family members infected with COVID-19 dummy	2643.68 (3555.04)	-0.0571 (0.2123)	-2442.85 (6681.28)	0.0033 (0.1961)	-1532.55 (7102.52)	-0.0730 (0.2047)
Telangana dummy	309.52 (3711.03)	0.7784*** (0.2425)	-25367.67** (6905.60)	0.9103*** (0.2301)	-35492.06*** (7453.49)	0.8600*** (0.2368)
W.Bengal dummy	10604.66** (4435.19)	-0.3055 (0.2927)	12262.39 (8420.28)	-0.0697 (0.2761)	-2015.97 (8974.98)	-0.2374 (0.2856)
Maharashtra dummy	3865.99 (3985.54)	0.2670 (0.2426)	-8278.25 (7383.50)	0.4957** (0.2260)	-24424.17*** (7924.30)	0.3890* (0.2372)
Distance to collection centre in kilometers	-	-0.0627*** (0.0132)	-	-0.0462*** (0.0116)	-	-0.0590*** (0.0132)
Constant	-22434.62 (10510.1)	-2.4753*** (0.7910)	14236.33 (18463.23)	-2.10 (0.7041)	21277.48 (19627.31)	-2.0260*** (0.7152)
Number of observations	*531*	*531*	*531*	*531*		
Wald $\chi 2$		*207.12***		*218.18***		*206.17***
Arthrho		*-0.2183*** (0.1312)*		*-0.9987*** (0.961)*		*-0.6337*** (0.1357)*
LR test $\chi 2$		*1.77*		*29.85***		*4.77***

Note: ***, **, * indicates significance at the 1%, 5% and 10% level.

11.3. Results from econometric analysis of determinants of income

Our analysis starts with the current year's (2020-21) data for the resurveyed vegetable growers and identifies the factors responsible for or leading to supermarket participation. Also, jointly studied through the Heckman selection model are the associated impacts on their net income from vegetable cultivation as the intervention is through buying their produce mediated by collection centers. We hypothesise that any impact on vegetable income will have contagion effects on crop income as a whole and, consequently, the household income. The analysis employs distance to the collection centre of the supermarket as the instrumental variable here. While locating closer to the farmers might enable farmers to sell to the supermarkets, it does not impact the farmer's net income in any way. We have also checked correlations separately for the validity of the instrumental variable. The results are presented in Table 11.5. The negative sign of the *arthro* shows that this is a case of positive selection bias as better-off farmers self-selected into selling to modern markets. The significance of *arthro* indicates that self-selection happened,

and that self-selection bias would have overestimated the magnitude and direction of impact without using this model.

As seen from Table 11.5, participation is driven by the membership in community based organisations like FPOs and SHGs, irrigation facilities, education, the share of vegetables in a total cultivated area of the farmer, working capital, and the share of adults in the family. The vegetable growers in the Telangana also tend to sell to supermarket collection centers. On the other hand, having more family members in non-farm activities dissuades the farmer from selling to supermarkets because the non-farm work leaves little disposable time for grading and selling in two separate markets. As the distance to the collection center of the supermarket is greater, farmers' inclination to market goes down naturally. An unexpected finding is that distance to the wholesale market reduces participation in the supermarkets instead of catalyzing it, and this needs an explanation.

It is worth highlighting that the finding that land ownership does not facilitate modern market participation in the study area,as found in other studies (Rao and Qaim, 2011). It is the availability of resources like irrigation, as found in other studies (Hernandez et al., 2007), and CBOs membership (Michelson et al., 2012). Other studies in India also found small farmer participation in contract farming schemes (Dev and Nuthalapati, 2005; Narayanan, 2014). The primary variable of interest, viz., supermarket participation dummy, becomes significant in all the outcome equations for vegetables, all crops, and household incomes (Columns 2,4 and 6 of Table 5). This is expected, as the share of vegetable income is high in the sample farm households. Enhanced vegetable income with modern market participation pulls up crop income and, consequently, the household income that can benefit smallholder participants' well-being.

Panel data models for net income: The analysis now moves on to use the panel data of the two periods and focuses on vegetable income (Table 11.6). As explained earlier, we employ panel data models to determine the supermarket participation impact on net income, and Table 11.6 presents the results. The Hausman Test chi-square values of 10.11 and 9.67 do not become significant below the 10% level, and therefore, we consider random effects model results for this econometric exercise. The variables are collectively significant, as the Wald chi-square value is significant. As seen from the table, the supermarket participation coefficient is positively significant in both the model specifications, indicating monetary gains. Higher land ownership is associated with enhanced net income, as expected. Another interesting finding is that farmers with a higher share of vegetables in their total cultivated area reap more gains in terms of net income. Comparing the magnitude of coefficients for land and share of vegetables in the total area reveals that the latter forms just one-tenth of the former, viz., land ownership. Higher paid-out costs and farm asset ownership catapult net incomes for the vegetable growers in the study area. Coefficients of state dummies show that vegetable cultivation from Maharashtra state is remunerative, probably because of the clustering of markets, both supermarket collection centers and traditional regulated markets. These results are consistent across both model specifications.

Table 11.6. Panel data model results on determinants of net income from vegetable cultivation

Variable	Model 1			Model 2		
	Coefficient	S.E	*p* values	Coefficient	S.E	*p* values
Supermarket participation dummy	3815.68**	1814.09	0.04	3069.93*	1853.20	0.10
Age of head of HH in years	27.80	74.07	0.71	32.18	74.03	0.66
Adult family members	810.88	556.84	0.15	786.09	556.74	0.16
Education in years	-16.41	202.26	0.94	-17.35	202.26	0.93
Vegetable experiences in years	5.19	13.24	0.70	5.09	13.24	0.70
Number of family members in non-farm work	-387.25	1023.33	0.71	-407.48	1019.77	0.69
Owned land in acres	1144.33***	249.29	0.00	1144.27***	249.29	0.00
Share of vegetables in gross cultivated area (%)	127.56***	37.52	0.00	128.08***	37.52	0.00
Share of irrigation in vegetable area (%)	55.46	41.93	0.19	54.67	41.92	0.19
Total paid out costs in constant prices INR	0.34***	0.10	0.00	0.33***	0.10	0.00
Value of farm assets in constant prices INR	0.15***	0.02	0.00	0.15***	0.02	0.00
Value of livestock assets in constant prices INR	-0.08	0.06	0.19	-0.08	0.06	0.19
Distance to wholesale market in kilometres	48.63	57.23	0.40	53.15	57.06	0.35
Membership in community-based organisations dummy (1=Yes)	1984.03	2233.55	0.37	1961.67	2233.36	0.38
Friends and relatives in supermarkets	-	-	-	381.36	562.92	0.50
Friends and relatives in supermarkets five years ago	-514.45	826.62	0.53	-	-	-
Friends and relatives in traditional markets	-	-	-	4.01	73.56	0.96
Friends and relatives in traditional markets five years ago	54.49	121.27	0.65	-	-	-
Telangana dummy	-2088.09	2740.50	0.45	-2370.10	2731.85	0.39
W.Bengal dummy	2605.78	3403.96	0.44	2734.98	3404.03	0.42
Maharashtra dummy	4861.34*	2934.60	0.10	4989.79*	2935.14	0.09
Constant	-16106.10**	6867.42	0.02	-16042.33**	6866.68	0.02
Number of observations	*1062*			*1062*		
Wald $\chi 2$	*265.70***		*0.00*	*265.70***		*0.00*
Hausman test $\chi 2$	*10.11*		*0.69*	*9.67*		*0.72*

Note: ***, **, * indicates significance at the 1%, 5% and 10% level.

11.4. Panel data model results on household consumption

Further analysis of modern market participation impacts on monthly household consumption expenditure using panel data models is shown in Table 11.7. We employ panel fixed effects models for food expenditure and random effects models for both non-food and total household consumption expenditure, based on the Hausman test chi-square values that are presented at the end of the table. The significance of the F test for fixed effects models and Wald chi-square for the random effects model allows us to accept the findings as collectively significant.

Table 11.7. Panel data model results on impact of market participation on household consumption and market participation

Variable	Combined (Random effect)		Food (Fixed effect)		Non-food (Random effect)	
	Coefficient (S.E)	Coefficient (S.E)	Coefficient (S.E)	Coefficient (S.E)	Coefficient (S.E)	Coefficient (S.E)
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Supermarket participation dummy	255.34*** (98.77)	-	147.11*** (42.32)	-	168.24* (88.61)	-
Share of produce sold to supermarket	-	2.86* (1.60)	-	3.51*** (0.71)		1.34 (1.44)
Age of head of HH	0.12 (3.97)	-0.02 (3.98)	3.24 (2.40)	3.09 (2.37)	-2.28 (3.56)	-2.45 (3.57)
Education in years	17.56 (10.86)	19.00* (10.85)	-5.19 (7.72)	-5.02 (7.63)	12.34 (9.74)	13.51 (9.73)
Adult family members	149.71*** (29.77)	147.48*** (29.90)	59.33*** (13.63)	54.40*** (13.51)	71.00*** (26.71)	70.27*** (26.81)
Number of family members in non-farm work	104.69* (55.16)	106.39* (55.39)	-0.08 (24.53)	5.09 (24.25)	80.40 (49.48)	79.90 (49.67)
Owned land in acres	79.08*** (12.95)	80.35*** (12.95)	27.38*** (6.35)	27.96*** (6.28)	55.12*** (11.61)	56.13*** (11.61)
Share of vegetables in gross cultivated area (%)	-0.38 (1.89)	-0.19 (1.89)	1.23 (0.87)	1.23 (0.86)	-0.35 (1.70)	-0.20 (1.70)
Share of irrigation in vegetable area (%)	0.09 (2.24)	-0.01 (2.25)	-0.47 (1.04)	-0.51 (1.03)	-0.45 (2.01)	-0.49 (2.02)
Share of vegetable income to household income	0.00 (0.01)	0.00 (0.01)	0.00 (0.00)	0.01 (0.00)	0.00 (0.01)	0.00 (0.01)
Share of business, wages and other income to total household income	0.06 (0.20)	0.04 (0.20)	0.08 (0.08)	0.06 (0.08)	0.02 (0.18)	0.01 (0.18)
Farm assets in constant prices	0.00 (0.00)	0.00 (0.00)	0.00*** (0.00)	0.00*** (0.00)	0.00* (0.00)	0.00* (0.00)
Livestock assets in constant prices	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Distance to supermarket collection center in kilometres	-8.99** (4.54)	-9.76** (4.55)	3.28 (2.30)	2.93 (2.25)	-9.62** (4.07)	-10.45** (4.08)
Membership in community based organisations dummy (1=Yes)	204.71* (114.11)	231.95** (113.79)	101.31** (49.48)	123.16*** (48.83)	131.32 (102.37)	149.41 (102.04)
Vegetable experiences in years	-0.21 (0.71)	-0.25 (0.71)	-0.38 (0.29)	-0.41 (0.29)	-0.24 (0.64)	-0.27 (0.64)
Friends and relatives in supermarkets (five years ago)	-72.10 (44.10)	-59.18 (43.74)	-4.88 (18.07)	-6.41 (17.78)	-67.31* (39.56)	-55.02 (39.23)
Friends and relatives in traditional markets (five years ago)	4.68 (6.50)	5.24 (6.54)	-1.87 (2.57)	-0.58 (2.55)	4.77 (5.83)	4.95 (5.86)
Telangana dummy	-1344.11*** (167.54)	-1390.41*** (168.65)	-	-	-736.93*** (150.30)	-761.43*** (151.23)
W.Bengal dummy	-1275.46*** (175.36)	-1259.90*** (175.94)	-	-	-947.51*** (157.31)	-940.70*** (157.77)
Maharashtra dummy	-1482.04*** (155.52)	-1462.40*** (155.71)	-	-	-864.15*** (139.51)	-852.23*** (139.63)
Constant	1700.67*** (362.00)	1752.66*** (361.60)	174.27 (194.95)	189.45 (191.02)	1199.99*** (324.74)	1240.07*** (324.27)
Number of observations	1062	1062	1062	1062	1062	1062
F	-	-	5.85 (0.00)	6.71 (0.00)	-	-
Adjusted R^2	-	-	-0.73	-0.69	-	-
Wald $\chi 2$	348.52 (0.00)	343.88 (0.00)	-	-	191.94 (0.00)	188.71 (0.00)
Hausman test $\chi 2$	12.18 (0.59)	13.93 (0.45)	23.00 (0.06)	32.77 (0.00)	8.74 (0.85)	9.05 (0.83)

Note: ***, **, * indicates significance at the 1%, 5% and 10% level.

The positive and significant coefficient results indicate that participation enhances household consumption after controlling for several household-related, farm-related, and other variables. However, our second model using the share of produce sold to supermarkets as a dependent variable shows a non-significant impact on non-food consumption expenditure. However, supermarket participation in both models positively impacts food and total spending. Across the models and items of household expenditure, an increase in the area of land owned and the number

of adults in the family leads to higher spending. As the number of family members working in non-farm activities increases, the total household consumption expenditure increases in tandem with non-food spending. Families that are more connected socially do well regarding food expenditure, as borne by the positively significant coefficients for social capital in both models. Social capital for the study comprises membership in both primary and multi-purpose cooperative societies, self-help group (SHG) membership, farmer producer organizations (FPOs), farmers' organizations, and others. Household and farm asset ownership increase has opposing effects on food (negative) and non-food expenditures (positive) while having no impact on total household consumption expenditure. Another interesting finding is that distance to the supermarket collection centre reduces household non-food and total consumption expenditure.

11.5. Conclusions

The sampled farmers are smallholders with low education and asset base levels. Nevertheless, the preceding analysis noted relatively favorable endowments for those selling to modern markets, exacerbating the challenges to researchers endeavoring to separate participation impacts. Household income and income from vegetable cultivation of sellers to collection centers of supermarkets are relatively the same in both study periods. At the same time, we find no difference in the incomes of the sample farmers, those selling to modern and traditional markets, after taking care of inflation. This overall picture masks certain adjustments in terms of sources of income. A substantial dip was noticed during 2020-21 from livestock and businesses, incomes from transfer payments from federal and state governments, distress-driven non-farm activities, and wage employment. As revealed by all four states, farm household incomes could have been much worse if not for various social safety net measures and transfer payments.

Observable COVID-19 infection does not need to occur in any family to affect farm households' production and marketing decisions, as widespread fear of death, logistical troubles, market closures, lack of demand, and other problems. Controlling for unobserved heterogeneity becomes crucial in this context. The analysis in this chapter, duly controlling for this, finds that the smallholder cultivators gain significantly by participating in supermarket procurement systems. The participant vegetable growers' household incomes went up during the pandemic. Another interesting finding of the study is that selling to these markets is not conditioned by land ownership and is accessible to smallholders, subject to possession of education, availability of irrigation, and membership in CBOs. Longitudinal data analysis using panel data models reveals that incomes and food, non-food, and household consumption expenditures are spurred due to household market choices in favour of supermarkets. Investigating this issue among vegetable growers assumes significance since the food policy of the Indian government does not support them in any way.

Chapter 12
Conclusions and Policy Implications

There have been concerns about the distribution of gains from the global food system transformation across the value chain and, most notably, to the producers. Scholars raised questions about the sustainability of smallholder farming, given the rise of transnational corporations with huge market power and the resultant asymmetry with small farmers. The Indian agri-food systems have been undergoing modernisation in various nodes, from production to marketing, impacting the farming community involved in food production in myriad ways. This study examined the impacts of innovations at the marketing stage on the primary producer, viz., the vegetable farmers, by undertaking field studies in four states, viz., Delhi-National Capital Region (Delhi and Haryana), Telangana, West Bengal, and Maharashtra, and collected data for the agricultural year 2020-21. We collected detailed information on farmer livelihoods, assets, inputs and outputs in crop and livestock production, non-farm income, vegetable marketing, and consumption of food and non-food items of households, apart from perceptions of growers on related issues.

The study analyses the production, marketing, and consumption aspects of vegetable growers selling to traditional markets and supermarket collection centres to find various impacts on farm households' profitability, employment, and related issues. It is worth mentioning here that the study builds on a survey conducted earlier in 2013-14 and resurveyed the same farmers. A total of 836 farmers from four states, ten districts, and 62 villages are studied. The selected farmers sell to both traditional markets and supermarkets in nearly equal proportions. SCSTs and Muslim communities are represented by up to 6% and 8%, respectively. The sampled vegetable growers possess an average of 3.17 acres of land with significant statewise variation and a much smaller holding size in West Bengal. In that sense, these farmers are representative of the small farmer-dominated agriculture of the country.

The analysis indicates significant statewise variations in asset position and input use patterns. The vegetable growers in the Delhi-NCR and Maharashtra have significantly higher assets relative to the four-state average, while West Bengal farmers are asset-poor. Across the marketing channels, farmers selling to supermarkets own significantly higher valued farm and non-farm assets, including machinery like tractors, than their traditional marketing counterparts. On average, they also spend more on new technologies like seeds, mulching, and crop support, apart from investing more in repairing and maintaining farm assets. Relative to the all-crop average, the investment of farmers on intermediate inputs like seeds, fertilizers, pesticides, herbicides, irrigation, and repair maintenance is more for vegetable crops. The field data indicate that marginal farmers show a risk-taking attitude and apply higher quantities of these inputs in their aspiration to earn more and uplift their welfare through cultivation. The vegetable growers in West Bengal spend around ₹4500 per acre to purchase irrigation water, while those from Maharashtra and Telangana leverage modern techniques like plastic mulching to reduce evapotranspiration. The expenditures on fertilisers and pesticides on average are ₹7014 and ₹5959 per acre and higher by 16% and 48% over the average spending in the case of all crops.

The field studies show that vegetable cultivation exerts pressure on human resources in terms of the time taken to market the produce in a staggered manner. On average, a vegetable grower in the four sampled states goes 34 times to market their produce. On the one hand, selling to supermarkets creates an additional burden in selling smaller quantities in many transactions. However, they are rewarded with higher prices and lower transaction time and transaction costs. The average price per kilogram received in the modern markets was 43% higher. The most

significant gains in the modern channels are the driving down of both the time and transaction costs. The transaction time is lower by 81%, while the transaction costs are lower by 60%. Specifically, marketing costs due to intermediaries' commissions and license fees are eliminated in modern chains. At the same time, personal transport costs plummeted as the collection centers of supermarkets were closer to the villages than the *mandis*. Evidence shows that socially disadvantaged groups of farmers also get higher prices and reduce transaction time and costs. The rejection rates in collection centers and traditional markets are approximately the same, as the vegetable growers acquired skills in grading and sorting to take the right quality of product to the modern markets. However, it must be remembered that these farmers take better quality produce to the modern markets. It therefore raises the question on whether any welfare implications are a result of selling to the modern markets or because of the better resource endowments.

Supermarkets had stricter requirements for product attributes and categories compared to non-supermarket channels, with farmers who sold to supermarkets prioritising five attributes- size, shape, freshness, colour, and physical appearance, while those selling to traditional markets focused on only two attributes: size and colour. One-third of the vegetable growers harnessed online and app-based extension services during the pandemic.

The share of expenditure on hire labor for vegetables was over 28% of the total operational cost in all states. Notably, farmers in Telangana reported a higher share of spending on pesticides and herbicides at 18.65% and a lower share of expenditure on seeds at 12.95%, whereas in other sampled states, the expenditure share ranges between 5-10% on pesticides and herbicides and 15-19% on seeds for vegetable cultivation. The results suggest that farmers in Telangana tend to apply more pesticides and herbicides for vegetable cultivation than in other states. Further intensive research is needed to understand why farmers in Telangana had higher expenditures on pesticides and herbicides and less on seeds compared to other states.

The vegetable growers earned an average net income of ₹63363 per acre from vegetable cultivation among the sampled farm households, 17% higher than the net income from all-crops cultivation. The study also found that farmers selling to supermarkets had significantly higher expenditure per acre on seeds and crop support for vegetable cultivation, resulting in a 31% higher net income per acre than traditional farmers. Marginal farmers, on the other hand, have significantly higher expenditure on seeds, manure and fertilizers, machine labour, and crop support for vegetable cultivation compared to other category farmers. However, SCST farmers are observed to have significantly lower expenditures on crop support activities in vegetable cultivation, with 80% lower spending than other categories of farmers, likely due to a lack of awareness. On a per-farm basis, the sample farmers get an annual income of Rs.285751 from crop cultivation with wide statewise variations. The farmers in West Bengal and Telangana earn only 52% and 53% of the all-India crop average, while those in Delhi-NCR and Maharashtra get 194% and 155% of this, respectively. Hired human labour constitutes the major expenditure, with one-third of crop cultivation for both groups of farmers. On the other hand, supermarket farmers spend slightly more on seeds and less on machinery use.

Two-fifths of the sampled farmers are organised into self-help groups, followed by cooperatives and FPOs, with pronounced statewise variations. Huge participation in SHGs (80%) is noticed in Telangana, while cooperatives' membership predominate (40%) vegetable growers in Maharashtra. In Delhi-NCR and West Bengal, involvement in community-based organisations is low. The state plays a significant role in improving the social capital of the farmers. These CBOs' role is mainly in providing loan facilities except for providing inputs like fertilisers and

seeds in a small number of cases with a minor role in marketing farmers' produce. The extension services reach 52% of the farmers, and the government contributes 35%. Institutional sources cater to 79% of the total credit received by vegetable growers during the agricultural year, with wide statewise variations. Those in Delhi-NCR received less than 10% of their credit from government sources and 42% from commission agents. Disadvantaged social category farmers could source only half of the all-farmer average credit. The major institutional credit providers are nationalized banks (46%), followed by cooperatives (15%), self-help groups (12%), and regional rural banks (5%).

The study collected qualitative data on vegetable growers' perceptions of various marketing issues to supplement quantitative data. The majority (72%) of the farmers opined that supermarkets are transparent in their weighing, followed by those (70%) who perceive higher prices for better quality produce, lower transaction costs (61%), ease of transaction (25%) and perfect information (20%). Some farmers (16%) opined that the quality of vegetable produce improved after starting to sell to supermarkets as they learned how to sort and grade the produce before marketing. However, farmers could only sell part of the produce to the modern markets as they procure less and only top-quality produce. Alternative markets like the state-sponsored Rythu Bazaars in Telangana and farmer-driven Haats in West Bengal act as alternative marketing sources.

The possession of livestock has the twin benefits of increasing incomes and spurring the consumption of nutritious products that improve protein and mineral intake. Our field data analysis indicates that nearly half of the vegetable growers have some kind of livestock, including small ruminants like goats and sheep. The proportion is the highest in Delhi-NCR (72%) followed by Maharashtra (65%), Telangana (38%) and West Bengal (30%). The lack of livestock possession deprives the predominantly smallholder vegetable growers in Telangana and West Bengal of this most crucial insurance against crop failures. While the small pieces of land in those states give meagre incomes, crop failures make their lives miserable, leading to distress-driven cuts in consumption and reduced harnessing of services like health and education. Across marketing channels, there is no significant difference in the sample farmers' livestock position.

The cultivation of vegetable crops resulted in 31% higher expenditure on hired labour relative to the all-crop average and created 101 man-day equivalents of employment. On a per-farm basis, supermarket farmers spend 28% and 40% higher expenditures on hired labour in the case of all crops and vegetables. We do not observe any significant difference in per acre expenditure, though the spending is higher in the modern markets. In Delhi-NCR, supermarket farmers had significantly higher expenditures on hired labour per acre than traditional market farmers for all crops and vegetables. However, supermarket-selling farmers employ a greater number of both hired and family labour, especially female hired labour and both male and female family labour. The marginal farmers made more intensive use of family labour for vegetable cultivation.

The overall monthly per capita consumption expenditure (MPCE) for all farmers at current prices during 2020-21 was ₹3868 and grew at 3% per annum since our study in 2013-14. This falls short of the average annual inflation growth rate of 5% per annum during the same period. The supermarket farmers, across all sampled states, have a significantly higher (13%) MPCE on consumption than traditional marketing farmers. Specifically, supermarket farmers in the entire sample have an MPCE of ₹4035 comp to ₹3568 by traditional market farmers with significant statewise variations. For example, supermarket farmers in Maharashtra consume at a monthly rate of ₹4497, while those from West Bengal had a 24% lower value at ₹3409. On the other hand, marginal farmers in Delhi-NCR and West Bengal states have a significantly lower MPCE viz.,

₹2765 and ₹3144, respectively. Also, SCST farmers reported 14% lower consumption expenditure. Of the total MPCE, 40% is spent on food, with some statewise variations. Farmers from Telangana spend 54% of the MPCE on food, while only 32% is on food in Maharashtra. Modern market farmers spend more on education and other expenses like conveyance, entertainment, and eating out. They consume more fruits, vegetables, livestock, and dairy products to improve immunity and protect from the highly contagious Coronavirus.

The non-farm income sources provide significant income to the sampled vegetable growers. The sampled vegetable growers earn on average₹144138 of non-farm income. These non-farm sources include wages and salaries, business ventures, and central and state government transfer payments. The share of non-farm sources is higher in Telangana (48%) and West Bengal (43%), with relatively small land-holding sizes. The nature of non-farm employment in these states is distress-driven rather than 'pull' factors. The net income from livestock farming is ₹23783, with wide statewise variations. Those in Delhi-NCR accrue ₹78059, while sampled farm households in West Bengal and Telangana could earn only ₹451 and ₹7711, respectively.

Combining all the sources, the farm household, on average, earns ₹453672. The total household income mainly accrues from crop cultivation (63%), followed by non-farm sources (32%) and livestock (5%). The income from vegetable cultivation per acre, after controlling for inflation, did not change significantly in 2020-21 over the level in 2013-14 for the sample farmers and farmers across marketing channels. In other words, there has been no growth in income from the cultivation of vegetables for the sample farmers over the last seven years. There, however, is the difficulty in considering the latest study period, 2020-21, as the representative period given the unusual difficulties for agriculturists due to the crisis driven by COVID-19. The household income in 2020-21 remained unchanged from 2013-14, after covering for the effects of inflation. This stagnation in income is mainly due to the pandemic-led crisis. In both years, the farmers selling to supermarkets get significantly higher net income per acre from vegetables than their counterparts selling to traditional marketing channels. However, the variations among supermarket farmers are higher than those of traditional market farmers, as seen by the standard deviation in 2020-21. This is even though the overall variations came down relatively during this study period.

However, the pandemic-led crisis has triggered some changes in the composition of household income. Sample farmers' incomes from livestock and businesses declined by 55% and 38% over the 2013-14 levels. This may be due to the prolonged lockdowns and closure of hotels, restaurants, and other eateries using milk in case of livestock and the closure of all shops for a long time due to a lack of people movement. On the other hand, transfer payments increased by 14 times as central and state governments started money transfers with schemes like *PM-Kisan*, *Rythu Bandhu,* COVID-19 ex-gratia, and other such payments. There was a 50% spike in incomes from other sources, like remittances and salary from low-quality non-farm jobs, including security, *hamaali* etc. These two sources compensated for the loss of incomes from livestock and business and enterprises. Examining across marketing channels, supermarket farmers' income from other sources went up, while traditional market farmers managed to get higher incomes from vegetable cultivation. Even after this hike, traditional market farmers earn 40% of what the supermarket farmers get.

Econometric analysis used models to control for several confounding factors and unobserved heterogeneity arising from the self-selection of relatively better-off farmers to sell to the modern market channels. Also, we used panel data models leveraging the data from earlier survey to understand the true impact of participation and inclusivity. The analysis finds that the smallholder

cultivators gain significantly by participating in supermarket procurement systems regarding income and consumption. The participant vegetable growers' household incomes increased relative to traditional marketing farmers during the pandemic due to the opportunity to sell to modern markets.

An important finding of the study is that selling to these markets is not conditioned by land ownership and is accessible to smallholders, subject to possession of education, availability of irrigation, and membership in CBOs. Longitudinal data analysis using panel data models reveals that incomes and food, non-food, and household consumption expenditures spurred due to household market choices favoring supermarkets. Investigating this issue among vegetable growers assumes significance since the food policy of the Indian government does not support them in any way. In other words, markets, especially modern food markets, can improve the social welfare of participating farm households if the smallholders can sell to the supermarket collection centers with enabling conditions like being members of community-based organisations and having education and irrigation facilities.

The farm households, on average, are better off with vegetable cultivation and emerging innovative direct procurement systems of modern markets. The total farm household income from all sources comes to ₹453672 in 2020-21 among the sampled vegetable growers. Vegetable cultivation contributes to 40% of the total farm income on average and is much higher in West Bengal and Telangana and among small farmers. The household food and non-food consumption come to Rs. 225720/. The total loans taken during the year, along with interest, will be Rs.140 000/- Therefore, the vegetable farmers will cover all the expenses comfortably. However, the marginal farmers, disadvantaged social categories, and farmers from West Bengal and Telangana will not cover all costs and face difficulties in making both ends meet.

Moreover, farmers' income stagnated at the 2013-14 level with lower earnings from livestock and business. State transfers under various schemes and wage earnings enabled even to maintain incomes at that level. The newer marketing opportunities with the rise of demand-driven value chains and their innovative direct procurement systems can enhance resilience against shocks like COVID-19.

Policy Implications

The findings of the present longitudinal study have important implications for the rapidly progressing agri-food system transformation in India as part of the ongoing process across developing countries. The rise of organized retailing in the marketing of agricultural produce brings several significant changes in the farm-level organization of marketing and production, along with farmers' welfare, and thereby has crucial policy relevance. The present study examined the process with longitudinal field studies on the inclusivity and welfare implications from the perspective of small farmers in Indian agriculture.

- The analysis conclusively shows that modern markets enhance market efficiency with low transaction costs and prices and thereby higher incomes. It also reveals that small farmers can sell to supermarket collection centres notwithstanding their small land holding size and associated scale disadvantages. On the other hand, their inclusion is necessary for the successful functioning of organized retailers for the seamless supply of high-quality vegetables to cater to quality-conscious urban consumers. Reardon et al. (2009) hypothesized that inclusion is a conditional pre-requisite in small farmer-dominated agrarian settings.

- The present study shows that small farmer inclusion in modern market channels is conditioned by resources like irrigation, membership in community-based organisations like farmer producers and cooperatives, and possession of education. The availability of irrigation facilities and improving efficiency through drip and sprinkler methods catapult farmers to selling modern markets with investments in upgrading production technologies and processes and quality maintenance. The state and financial institutions must continue prioritizing support and lending for this. The NABARD, in particular, may continue its deep engagement with the federal and provincial governments to support irrigation.
- Field data analysis indicates that new-age institutions like the FPOs support the farmers across all food value chain nodes. The crucial distinction of these institutions lies in their initiatives in linking with markets in general and modern markets in particular. We noticed, for example, in Haryana, that an FPO developed solar-powered cold storage to avoid a glut in the market by short-period storage. In fact, the FPO started a collection centre on its own with linkages to organized retailers and startups. We noticed that the FPO-led collection centre functioned differently from supermarket collection centres in that they prioritized the interests of farmers, especially by taking all that is offered for sale and accessibility.
- Further, field observations show that FPOs initiated efforts across all the states at varying levels to build backend infrastructure like cold storage acquisition, generating and updating critical market information relating to buyer heterogeneity and preferences, and price data across marketing channels. On the other hand, rigorous econometric analysis of the longitudinal data of vegetable growers also proves that membership in new-age institutions enables vegetable growers to participate in selling to supermarkets. Evidence from the study concludes that FPOs can improve equity by enabling small farmers to participate in modern markets and, at the same time, improve the efficiency of markets by reducing transaction costs and better price discovery.
- The state and its various agencies, therefore, need to tailor interventions to support the creation and strengthening of FPOs across the country, primarily to support crops outside the ambit of government procurement operations and livestock. In the case of the vegetable growers in our study, they bear the brunt of demand-supply variations, infrastructural deficiencies, and lack of credit facilities.
- The variations in member size, age, financial leverage, commodity focus, geographical location, and related issues bring heterogeneity among FPOs across states. The asymmetry emanates from various sources, including supporting organizations from state, private, and civil society. Also, the international literature identified wide variations among FPOs and argued for interventions aimed at support (Abraham et al., 2022; Sellare et al., 2023; Surendran-Padmaja and Ojha, 2023). The FPOs got early patronage in the country with the initiatives and continued prioritization of the National Bank for Agriculture and Rural Development (NABARD), an apex agricultural lending organization unique to India among developing countries.
- The creation of FPOs got a fillip in recent years with the stepping in of the central government with some incentives. Nevertheless, field observations reveal that the newly created FPOs lack infrastructure and effective functioning. The continued creation of new FPOs and strengthening of existing ones to make them vibrant and viable remains crucial for making agricultural markets equitable and efficient in the background of the present

study findings. The capacity building of FPOs necessitates the creation of support organizations, as witnessed during the early stages of the development of SHGs and innovative credit systems for working capital requirements. By taking another leaf out of SHG development experience, policymakers may consider putting in place appropriate financial architecture through RBI guidelines stipulating FPO credit norms to banks and NBFCs.

- The elevated proportion of vegetable crops grown by farm households drives integration with modern value chains and enables reaping associated benefits. Development agencies might, therefore, consider interventions to support high-value crop cultivation.
- The next crucial condition for enabling small farmer inclusion in modern value chains is the education level of the farmers, as revealed by econometric results. The farmers need higher skill sets to understand the unfolding opportunities in newer marketing channels, digital approaches, and so on. The study shows that the average number of years of education for vegetable growers is only around six years. While increasing the level of formal education in the farming community might take a long time, targeted vocational training approaches through extension agencies and skill development agencies will empower them to link with modern markets.
- At a broader level, the study findings indicate the positive developmental significance of the agri-food system modernization for income, employment, and consumption. The government and regulatory agencies may rethink the food system incentives and financial architecture to make the agri-food transformation seamless and equitable.
- Apex financial development institutions like NABARD need to take initiatives in this regard to promote the modernization of the agri-food system through the promotion of direct procurement systems of companies and individuals, community-based organizations, irrigation, and short-term credit to strengthen resilience against shocks through modernization.
- Policymakers may consider providing incentives to direct procurement systems of supermarkets as it enhances income and consumption. Also, to FPOs, SHGs, and unemployed youths who have started acting as a direct link between farmers and disparate modern and online sellers like startups and quality-conscious urban consumers.
- Finally, various forms of social safety nets and money transfers must continue in the medium term for farmers' welfare, as this study conclusively proved that household incomes of small and disadvantaged social category farmers do not cover the consumption expenditure if not for the state transfer payments.

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Appendix 1

Production and Marketing of Vegetables: A Multi-state Study Household Questionnaire

1. Basic Details

I.D No _____ State _____

District_____ Mandal/ Block_____

Village _____

Name of the farmer_____ Father's/ husband's name_____

Sex (*1=M, 2=F)*_____ Religion_____*(1=Hindu,2=Muslim,3=Christian,4=Others)*

Community _____ Sub-caste_____

(*1=SC, 2=ST, 3=BC, 4=OC)*

Telephone number (optional)_____ E-mail:_____

To be read by the enumerator:

"This survey is conducted by IEG, Delhi. The survey is to study vegetable production and marketing in AP in order to make recommendations to policymakers, communities and farmers, and to agri food businesses. The information will not be reported as individual, and thus will be fully anonymous, without identity revealed. Do you wish to continue with the interview?" 1. Yes 2. No

Crops code: **Vegetables:** Tomato-1; Bottle gourd-2; Bitter gourd-3; Ridge gourd-4; Cabbage-5; Chillies-6; Carrot-7;Cauliflower-8; Radish-9;Coccinia-10; Coriander-11;Potato-12; Sweet potato-13; Cucumber- 14;Ginger-15; Pea-16; Brinjal-17;Celery-18; Green pepper (Capsicum)-19; White gourd-20;Guar Seed-21; Onions- 22; Garlic-23; Dry ginger-24; Turmeric-25; Arecanut-26; Mint-27; Menthi (phenugreek)-28; Spinach-29; Other leafy vegetables-30; Curry leaf-31; Drumstick-32; Pumpkin-33; Bhendi-34; Snake gourd-35; ; Beet root-36; Turnip-37; Bruccoli-38; Baby corn-39; Gherkin-40; Loban-41; Chikudu-42; Beans-43; Sweet corn-44; Lettuce- 45; tinda- 46; Kakri- 47; Lobia- 48; French beans- 49; Red/Yellow capsicum- 50; Yam- 51; Sponge gourd- 52; Dolichos beans- 53; Knol kohl- 54; Spring onion- 55; Bitter melon- 56; Jejube- 57; Other vegetables-58.

Fruits: Mango-59;Apple-60; Sweet orange-61; Lemon-62; Mandarin-63; Pears-64; Peach-65; Plum- 66; Sapota-67; Banana-68; Papaya-69; Guava-70; Pomegranate-71; Coconut-72; Grapes-73;Cashewnut-74; Strawberry-75; Pineapple-76; Custard apple-77; Water melon-78; Musc melon-79; Other fruits-80.

Flowers: Marigold-81;Jasmine-82; Chrysanthemum-83; Rose-84; Cut flowers-85; Other flowers-86

Cereals and pulses: Paddy-87; Wheat-88; Maize-89; Jowar-90; Bajra-91; Ragi-92; Barley-93; Tapioca-94;Gram-95; Arhar/Tur-96; Moong-97; Urad-98; Masoor-99; Horse gram-100; Other pulses-101; Other cereals-102

Oilseeds and Commercial crops: Soyabean-103; Linseed-104; Sesamum-105; Groundnut-106;1Rapeseed/Mustard-107; Castor-108; Niger-109; Safflower-110; Sunflower-111; Sugarcane-112; -Cotton-113; Mesta-114; Jute-115; Tobacco-116; Pepper-117; Rubber-118; Shallot-119; Medicinal crops-120;Agave-121; No crop- 122; others (Specify)-123.`

Season codes: Kharif-1; Rabi-2; Summer-3; Annual-4; Perennial-5

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A. **Demographic particulars**

Q. How many members are there in your family now? (in the year 2020-21) _____(number)

1. Members of the household, starting with the head of household

Sl.no.	Relation with HH head	Gender	Age	Number of years of Education	Technical /vocative education	Works at least some time onHH farm?	2020-21			2015-16		
							Local Farm wage-labor work in 2020-21	Non-farm Work in 2020-21	MGNREGA 2020-21	Farm wage-labor work in 2015-16	Non-farm Work in 2015-16	MGNREGA 2015-16
	Code 1	*1. Male 2. Female*	Years	Years	Code 2	*1.yes 2. no*	*1=yes 2=no*	*Code 3*	*1=yes, 2=no*	*1=yes, 2=no*	*Code 3*	*1=yes, 2=no*
	01	*02*	*03*	*04*	*05*	*06*	*07*	*08*	*09*	*10*	*11*	*12*
1.1.In the household in 2020-21												
1	HH Head											
2												
3												
4												
5												
1.2 Any change in the household since 2015-16												
1												
2												
3												

Code for question 01 on relation with household head*: Household head-1; Spouse-2; Son/ Daughter-3; Grandchildren-4; Parent-5; Brother/Sister-6; Son/Daughter/Brother-in-law-7; Father/Mother- in- law-8; Grandparents-9; Other relatives_____-10.*

Code 2: *Nil-1; ITI-2; Diploma (Polytechnic)-3;B.Tech-4; Agri B.Sc-5; M.B.B.S-6; Others-7_____(Specify)*

Code 3- Occupations*- Non-agrl.labour-1; Factory worker-2; Transport worker-3; Earth work labour-4; Construction labour-5; Sweeper- 6; Scavenger-7; Tea garden worker- 8; Apprentice- 9; Other wage labor- 10.*

Salaried worker: *Government -11; Private enterprise (e.g. sales person, manager)-12; House maid-13; Teacher (Primary school)-14; Teacher (High school)-15; Teacher (College/university)-16; NGO worker-17; Other salaried worker-18*

Self-employment: *Milk collector-19; Feed supplier-20; Animal Breeder- 21; veterinary doctor-22; Para veterinary doctor-23; Rickshaw/van pulling-24; Driver of motor vehicle-25; Tailor/seamstress-26; Potter-27; Blacksmith-28; Goldsmith-29; Hair cutter-30; Cobbler-31; Clothes washer-32; Repairman (appliances)-33; Carpenter-34; Mason-35; Contractor-36; Doctor/Engineer-37; Herbal doctor-38; Lawyer/deed writer-39; House tutor-40; Religious leader-41; Plumber-42; Electrician-43; Mechanic (vehicles)-44; Midwife-45; Beggar-46.*

Production: *Food Processing-47; Small industry-48; Handicrafts-49*

Trader: *Small trader (<25000 Rs monthly sales.)- 50; Medium trader (25000-75000Rs)-51; Large trader (>75000 Rs)- 52; Fish Trader-53; commercial feed producer-54; Vet medicine seller-55*

Non-earning occupation: *Student-56; Housewife-57; Jobless-58; Retired-59; Child (age <12 no study no work)-60; Physically handicapped/Mentally handicapped-61; Dependant-62; No non-farm activity- 63; Any others-64_____ (Specify)*

Note: Children with less than five or less than years of age, the entire row may be mentioned as NA
Children with less than one year will be mentioned as '00' in age and all other columns will be NA

2. Any member of the family infected with COVID-19_____(1-yes, 2- no, 3-don not know)
   If yes, how many members are infected in 2020? _____ (number)
   If yes, how many members are infected in 2021? _____(number)
3. What type of ration card do you have? _____*BPL card -1; APL card -2; Antyodaya card -3; Annapoorna -4; Yellow card- 5; Red card- 6; white card-7; RKSY-I-8; RKSY-II-9; PHH-10; SPHH-11; Do not have a ration card-8; other-9;*
4. Is your house_____*Katcha -1; Semi pucca - 2; Pucca – 3*
5. Is it_____*1.rented 2.owned*
6. Do you have separate individual toilet in your home*?*_____*(Yes-1; No-2)*
   4a. Do you use the toilet _____ (Yes-1; No-2)

Module B. Land

a. In which land unit do you want to answer the following questions?

1-Acres; 2-Gunta; 3-Cents; 4-Katch Bigha; 5-Pacca Bigha; 6-Kila; 7-Bigha(WB); 8-Katha

b. How much _____units = 1_____unit in your village?

c. Do you or your family own any agriculture land in the year 2020-21? (1-yes; 2-no)

d. Do you or your family own any agriculture land in the year 2015-16? (1-yes; 2-no)

B.1. How much land do you possess and cultivate?

Type of field	Operational land								
	a. Land owned and cultivated			Q: Have you leased-in land? (yes/no) b. If yes, land leased in or taken for free			Q: Have you leased-out land? (yes/no) c. If yes, land leased out or kept fallow		
Years	Total area inlocal units		Area unit codes	Total areain local units		Area unit codes	Total area inlocal units		*Area unit codes*
Total land									
2020-21									
2015-16									
Area cultivated more than once									
2020-21									
2015-16									
Area irrigated more than once									
2020-21									
2015-16									

Area unit codes: 1-Acres; 2-Gunta; 3-Cents; 4-Katch Bigha; 5-Pacca Bigha; 6-Kila; 7-Bigha(WB); 8-Katha

Note: Area cultivated more than once and area irrigated more than once do not apply for the land leased out.

B.2. Make a list of all the crops that you owned and leased in or leased out in 2020-21

(from biggest to smallest, includingvegetables, rice, and other crops such as maize or orchards (fruit), and non-crop)

Q. How many crops have you cultivated in the year 2020-21?

Name of the crop Crop code	Total area (numbers)	Area codes	Source of Irrigation Code 3	Soil type Code 4	Operational status Code 5	Since how many years? (numbers)	Season (Kharif/Rabi/ Summer/annual/ perennial)
1	*3*	*4*	*5*	*6*	*7*	*8*	

Area codes: 1-Acres; 2-Gunta; 3-Cents; 4-Katch Bigha; 5-Pacca Bigha; 6-Kila; 7-Bigha(WB); 8-Katha

Code 3: 1-rainfed; 2-pond-irrigation; 3-tube well/canal water; 4-river/canal water; 5-open well; 6-shallow pump; other

Code 4: 1-clay; 2-black cotton; 3-loam; 4-sand; 5-rocky; 6-other

Code 5: Owned and operated-1; Fallow-2; Leased out-3; Leased in-4; Any others (Specify)-5

B.3. Transaction of land in the last five years

1. Did you sell land between 2015-16 and now?_____ 1.Yes 2. No
   If yes, how many plots have you sold in total between 2015-16 and now? _____(numbers)
2. Did you purchase land between 2015-16 and now?___*1.Yes 2.No*
   If yes, how many plots have you purchased in total between 2015-16 and now? _____(numbers)
3. If yes, please give details:

Sl. No.	Year of sales/ purchase	Area of the plot No.	Unit code **Code 1**	Crops grown at the time of sale/purchase **(Code)**	Irrigation source at the time of sale/purchase **Code 2**	Sales value of the plot in Rs/acre
1	2	3		4	5	6
Sales						
1						
2						
Purchase						
1						
2						

Code 1 : Unit of land : 1-Acres; 2-Gunta; 3-Cents; 4-Katch Bigha; 5-Pacca Bigha; 6-Kila; 7-Bigha(WB); 8-Katha
Code 2- Irrigation source: Rainfed-1; Pond-irrigation-2; Tube well / Borewell-3 ; River/canal water-4; Open well-5 ;Others-6.

C. Input-output information

C.1. Output in 2020-21

Crop code	Season (codes-1)	Area		Total production				Priceper unit Rs.	Self consumption in kgs.	Wastage in kgs.
		Total area	Units (codes - 2)	No ofunits	Type of units (codes - 3)	Weight of unit inKG	Total output in kgs			
1	2	3	4	5	6	7	8	9	10	11

Season (codes-1): *Kharif -1; Rabi -2; Summer -3; Annual- 4; Perennial- 5*
Area (codes – 2): 1-Acres; 2-Gunta; 3-Cents; 4-Katch Bigha; 5-Pacca Bigha; 6-Kila; 7-Bigha(WB); 8-Katha
Production unit (code - 3): 1-bag; 2-crates; 3-trolley; 4-trucks; 5-basket; 6-carton; 7-Quintal; 8-Bunches; 9-Number of pieces; 10- Packets; 11-Mon; 12-Palla; 13-kg , 14-Others;

C.2. Expenditure on seeds, irrigation and other items

S.No	Particulars	Crop 1	Crop 2	Crop 3	Crop 4	Crop 5	Crop 6
1	Crop code (refer page no.1)						
2	Season code (*Kharif -1; Rabi -2; Summer -3; Annual- 4; Pernennial- 5)*						
3	Type of seed used **(Code1)**						
4	Quantity used- Number						
	Unit code (Gram-1;Kg-2; Bundle-3; Pieces-4; quintals-5; mon-6; palla-7; bag-8; crates-9; Any others-10)						
	1 _____unit=how much Kg?						
5	Source (**Code 2**)						
6	Total seed cost incurred in Rs.						
7	Whether irrigated or not? 1-Yes; 2-No.						
8	Method of irrigation **(Code 3)**						
	Number of irrigations						
9	**Cost of irrigation in Rs.**						
9a	Electricity/Diesel in Rs.						
9b	Value of water purchase in Rs.						
10	Repair and Maintenance for all implements and buildings Rs.						
11	Cost of plastic ground use in Rs.						
12	Cost of glass green house in Rs.						
13	Cost of plastic tunnel green house in Rs.						
14	Crop support, net, fence etc						
15	Any Other cost (in Rupees)						

Code 1: *Hybrid-1; HYV-2; Local-3; Improved-4; Bt-5; Others_____(Specify)-6.*
Code 2: *Own Seeds-1; Co-Farmers-2; Local Retailer-3; Private Dealers-4; Distributors-5; Co-Operative society-6; Govt. seed agencies-7; Research institute/university-8; online startups-9; nursery-10; Others_____(Specify)-11.*
Code 3: Type of irrigation: *Surface irrigation-1; Drip-2; Sprinkler-3; Row and furrow-4; Any other_____(Specify-5.*

C3. Details of fertilizer application

Name of fertilizer	1. Crop code _____				2. Crop code _____				3. Crop code _____			
	Season code: _____				Season code:_____				Season code:_____			
	How many types of "____" have you used? (in number)				How many types of "____" have you used? (in number)				How many types of "____" have you used? (in number)			
	Quantity Applied (No)	Unit code	Price per unit	Total price In Rs.	Quantity Applied (No)	Unit code	Price per unit	Total price In Rs.	Quantity Applied (No)	Unit code	Price per unit	Total price In Rs.
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*
Chemical fertilisers												
Biofertilisers												
Organic Manure												
Have you applied FYM? (yes/no) If yes, continue table												
Have you applied poultry manure? (yes/no) If yes, continue table												
Others												

Name of fertilizer	4. Crop Code _____				5. Crop Code _____				6. Crop Code _____			
	Season code_____				Season code_____				Season code_____			
	How many types of "____" have you used? (in number)				How many types of "____" have you used? (in number)				How many types of "____" have you used? (in number)			
	Quantity Applied (No)	Unit code	Price per unit	Total price In Rs.	Quantity Applied (No)	Unit code	Price per unit	Total price In Rs.	Quantity Applied (No)	Unit code	Price per unit	Total price In Rs.
Chemical fertilisers												
Biofertilisers												
Organic Manure												
Have you applied FYM? (yes/no) If yes, continue table												
Have you applied poultry manure? (yes/no) If yes, continue table												
Others _____												

Season codes-1: *Kharif -1; Rabi -2; Summer -3; Annual- 4; Perennial- 5*
Local units: Bags-1; Kgs-2; Liters-3; Cart-4; Tractor-5 (Q. one ____unit= how much Kgs?)
Note: Growth promoters and micronutrients like Zinc, Iron *etc*. also may be mentioned in the chemical fertilisers

C4. Details of pesticides/ herbicides application

Name of pesticide/ herbicide	1. Crop code __ Season code: _____ How many types of "___" have you used? (in number)						2. Crop code ___ Season code:_ How many types of "___" have you used? (in number)					
	Type of pesticide code	Total number of sprays	Quantity applied (No)	Unit code	Price Per unit	Total amount (Rs.)	Type of pesticide code	Total number of sprays	Quantity applied (No)	Unit code	Price Per unit	Total amount (Rs.)
How many types of herbicides have you used? (numbers)												

Name of pesticide/ herbicide	3. Crop code __ Season code: _____ How many types of "___" have you used? (in number)						4. Crop code ___ Season code:_ How many types of "___" have you used? (in number)					
	Type of pesticide code	Total number of sprays	Quantity applied (No)	Unit code	Price Per unit	Total amount (Rs.)	Type of pesticide code	Total number of sprays	Quantity applied (No)	Unit code	Price Per unit	Total amount (Rs.)
How many types of herbicides have you used? (numbers)												

Season codes-1: *Kharif -1; Rabi -2; Summer -3; Annual- 4; Perennial- 5*
Type of the pesticide: Algicides-1; Bio pesticides-2; Fungicides-3; Insecticides-4
Code for units: Kilogram-1; Grams-2; Litre-3; Mille Liter - 4; Others-5 (Specify).

C.5. Details of family labour engaged and Hired labour in crop cultivation during 2020-21

Crop cultivation	**1. Crop code ___ Season code: _**								**2. Crop code ___ Season code: _**							
	Family labour		**Hired labour**						**Family labour**		**Hired labour**					
	Male	Female	Male			Female			Male	Female	Male			Female		
	Hours	Hours	Persons	Days	Wage per day	Persons	Days	Wage per day	Hours	Hours	Persons	Days	Wage per Day	Persons	Days	Wage per day
Land preparation																
Sowing and transplanting																
Application of fertilizers &manures																
Application of pesticides																
Weeding																
Irrigation																
Supervision/crop protection																
Harvesting																
Threshing																
Cleaning, washing, grading and sorting etc.																
Crop support																
Any other activity (Specify)																
Season codes-1: *Kharif -1; Rabi -2; Summer -3; Annual- 4; Perennial- 5*																

C.6. Details of Machinery/Animals used in agriculture

Q. How many machinery/animals you have used in "_____" crop cultivation?

	Ownership Code	Expenditure in Rs.	Ownership Code	Expenditure in Rs.	Ownership	Expenditure in Rs.
1	2	3	4	5	6	7
	Crop Code _____		**Crop Code _____**		**Crop Code _____**	
	Season code_____		Season code_____		Season code_____	
Tiller/Tractor						
Transplanter						
Weed remover						
Harvester						
Thresher						
Power sprayer						
Hand sprayer						
Cultivator						
Wooden plough						
Iron Plough						
Bullocks/He-buffaloes						
Cows						
Rotavator						
Others						
	Crop Code _____		**Crop Code _____**		**Crop Code _____**	
	Season code_____		Season code_____		Season code_____	
Tiller/Tractor						
Transplanter						
Weed remover						
Harvester						
Thresher						
Power sprayer						
Hand sprayer						
Cultivator						
Wooden plough						
Iron Plough						
Bullocks/He-buffaloes						
Cows						
Rotavator						
Others						

1=Owned; 2=Rented from neighboring farmers; 3= Rented from university/Institutes; 4= Rented from government service centers; 5= Rented from startups; 6. Rented from FPOs/SHG; 7= Any others

Questions for perennial crops

Q. Do you grow perennial crops? (yes/no)

If yes, how many perennial crops are you cultivating? _____ (in numbers)

1. Name of perennial crop_____ (**code**: Grape-1; Pomegranate-2; others___(specify)-3)
2. Number of acres planted_____
3. How many years since planted? ____ years
4. How many years since yield started?_____ years
5. Costs incurred at the time of planting
   a. Land preparation/pit making_____Rs.
   b. Grafts/plants/seed material cost_____Rs.
   c. Manure cost_____Rs
   d. Fertiliser cost_____Rs
   e. Pesticide cost_____Rs.
   f. Laour cost_____Rs.
   g. Machinery cost_____Rs.
   h. Fencing cost_____RS.
   i. Pendal cost_____Rs.
   j. Others_1 (specify) _____Rs.
   k. Others_2 (specify)_____Rs.
6. Costs incurred before fruiting started
   a. During first year before fruiting_____Rs.
   b. During second year before fruiting_____Rs.
   c. During third year before fruiting_____Rs.
   d. During fourth year before fruiting_____Rs.
   e. During fifth year before fruiting_____Rs.
7. Please mention any specific problems or issues with the growing of this crop

_____

_____

_____

D. Marketing Crops

Did you sell any vegetable in year 2020-21? (yes/no)

If yes, how many vegetables you have sold in the year 2020-21? (in numbers)

D1: Marketing channels for vegetables- 2020-21

S.N0.	Item	Transactions					
1	Crop code						
2	Season code						
3	How many transaction have you done for your "___" crop						
4	To whom did you sell? (Code 1)						
5	Month of transaction						
6	Major reason for the choice first buyer (Code 2)						
7	Quantity sold- (in number)						
8	Unit code (Code 3) I-----unit=how much kg?						
9	Number of transactions over which it is averaged						
10	Quality of produce						
	10a. **Size**- Big-1; Average-2; Small-3						
	10b **Shape**- Good-1; 5-10% deformed-2; 11-24% deformed- 3; 25% deformed-4; More than 25% deformed- 5; Others-6						
	10c **Colour**, **taste**, **freshness** *etc*.- good-1; average-2; Bad-3						
	10d **Scratches**- Yes-1; No-2						
	10e **Overall**- Grade A-1; Grade B-2; Grade C- 3; Not graded-4						
11 a	Time between harvest and sale- In days						
11 b	Time between harvest and sale- In hours						
12 a	Is price determined based on grading? Yes-1; No-2						
	If yes, Price per unit for grade 1						
	Percentage of produce in grade 1						
	Price per unit for grade 2						
	Percentage of produce in grade 2						
12 b	If no, price per unit						
13	Total amount received Rs.						
14	Quantity rejected due to poor quality at the time of sale in Kgs.						
15	Mode of payment (Code 4)						
16	Percentage paid in cash and immediately						
17	If credited, no. of days for payment						
18	Any input advance *1=yes 2=No* ***(If no, skip to Q 20)***						
19	If yes, how much Rs.						
20	Sale location of farmer (Code 5)						
21	How far from home to the sale location in Kms						
22	Time between departure home and arrival location sale in hours						
23	Transport means (Code 6)						
24	Transaction time on location sale in minutes						
25	In this year, price received due to COVID-19 is: *Codes; Normal-1; Lower by 10%-2; Lower by 11-25%-3; Lower by more than 25%-4; Higher upto 10%-5; Higher by 11-25%-6; Higher by more than 25%-7; Any other-8.*						

Season codes-1: *Kharif -1; Rabi -2; Summer -3; Annual- 4; Perennial- 5*

Code 1: (Buyer) *Collector in village (outside mandi)-1; .Transporter of mandi trader-2; .Wholesale on mandi-3; Commission Agent on mandi-4; Cold Storage-5; RBH-6; NGO-7; Processing firm-8; Co-operative Society-9; Farmer co-op-10; Shandimarket-11; Rytu bazaar-12; Consumer-13; Hotels/Restaurant-14; Supermarket collection centre-15; Mother Dairy- 16; Startup- 17; E-commerce companies-18; Haat- 19; Retailer- 20; Not marketed due to COVID- 21; Does not know- 22;Colleges/Schools- 23;Apartments/Gated communities- 24; Exclusive collection agent- 25; Others _____(Specify)-26.*

Code 2- reason for selecting buyer: *Gives higher prices-1; Accepts large quantities-2; Accepts small quantities-3 Gives advances when needed-4; Pays immediately-5; He is close by-6; Takes lesser time to settle transaction-7; More transparent in weighing-8;He is trustworthy- 9; He is likeable/Good behavior- 10; Urgency to sell for want of money- 11; No other option-12; Others-____-(Specify) -13.*

Code 3-Sales unit: *Kgs-1; Quintal- 2; Bag-3; Basket-4; Carton box-5; Crates-6; Loose-7; gram-8; bunches/bundle-9; number/pieces-10; mon-11; palla-12, other____(specify)-13*

Code 4-mode of payment: I*n cash-1;In kind-2; Partly in cash and partly in kind-3; Cheque-4; NEFT/RTGS/Online transfer- 5; Mobile payments like PayTm/PhonePe/GooglePay/AmazonPay/Bhim etc-6; Others_(Specify)-7*

Code 5-Sale location: *Farmer's field or own village-1; .Wholesale market 2;.Supermarket Collection Centre 3; Shandi market- 4; RBH- 5;Rytu bazaar- 6; Cold Storage-7; Haat- 8; Mother Dairy Collection Centre- 9; weekly market-10; Others_(specify)-10*

Code 6-Main transport means: *Porter/own carry-1; Handcart-2; Tractor-3; Truck-4; Car-5; Bicycle-6; Motorbike-7;Horsecart-8; Bullock cart-9; Pick up van-10; Trolley auto-11; Cycle trolley- 12; Engine van-13; E-rickshaw-14; No transportation-15; other(Specify)-16.*

D2: Give us the details of the most recent complete transaction with each marketing channel accessed by you:
(We define a complete transaction as one where the product has been procured at one place and has been completely sold by you)

D.2.1.Q. Are you selling to traditional market? (yes/no) (If no, skip to section D.2.2)

D.2.1Traditional Marketing Channel (Village market, wholesale, *mandi*, *Rytu Bazaar*/weekly market/*Haat*):

1. Which crop did you sell?_____(Crop code)

2. When did you sell the crop? Date_____Month_____year_____

3. How much did you sell?_____Number_____units
Kgs-1; Quintal- 2; Bag-3; Basket-4; Carton box-5; Crates-6; Loose-7; gram-8; bunches/bundle-9; number/pieces-10; mon-11; palla-12.
1 _____unit=how much kg?

4. Which sales channel did you use? _____
1 Collector in the village (outside mandi) 2.Transporter of mandi 3.wholesaler/commission agent on mandi 4.Shandi market 5.Rytu bazaar 6. Co-operative Society 7.Farmer Co-operative 8.Retailer 9.Consumer 10; Startup- 11; Cold storage- 12; Haat-13; weekly market-14; Others_____specify-15.

5. What is the main source of information on the price of the day? _____
1. Personal observation 2. Speaking with other farmers 3. Speaking with Commission agent 4.Speaking with other retailers 5.Observe price at auction 6.Newspaper/Radio/Internet 7.Respondent sets his/her own price 8.Screen/Board with price information 9.Internet- 10; Mobile app- 11; Any other ___(specify)-12.

6. Did you get in touch with the buyer before you go to the sales location?_____*1.Yes 2.No*

7. If yes, did you discuss prices of the product with him?_____*1.Yes 2.No*

8. Is there any rejection by the buyer on quality ground?_____*1.Yes 2.No. (* ***If no, skip to 12)***

9. If yes, how much is the rejection rate?_____% or_____kgs

10. What do you do with the rejected lot? _____
1. Sell in the mandi; 2. Sell in the local market; 3. Consume myself; 4. Use as livestock feed;5. Throw it away 6.Others_____ ***If code 4,5 and 6, skip to question 12***

11. a. Did you sell the rejected lot at lower price?_____1.Yes, 2.No.

b. If yes, by how much lower_____percentage or_____Rupees

12. How many brokers or mandi traders in vegetables among your relatives and friends.
Now_____and five years ago_____

13. How many persons working as sellers at Rytu bazaars/Mother Dairy/Haat or others among your relatives and friends.Now_____and five years ago ____

14. How many persons working at supermarket centres among your relatives and friends?
Now_____and five years ago_____

15. How many persons working at Startups/e-commerce companies among your relatives and friends?Now _____and five years ago _____

D.2.1 Details of most recent complete transaction in Traditional Market for vegetables

Sl.No	Cost items for this transaction	Did you pay?	If yes, how much?
		1. Yes. 2.No	Rs
1	a. Bagging (Sitching) or boxing		
	b. Transportation		
	c. Loading		
	d. Off-loading		
	e. Payments at check point or road block		
	f. Personal transport to wholesale market and or back		
	g. Entry license fees		
	h. Packaging cost		
	i. Commission rate		
	j. Storage charges		
	k. Additional costs due to COVID-19		
	l.. Did you pay for any other fees		
2	How much quantity was wasted because of sampling and transacting *(kgs for whole transaction)*		
3	Advance received? *1.Yes 2.No*		
4	Total amount received for the transaction (including advance) from Commission agent or trader?	Rs	
5	Amount received per unit *Unit codes: Kgs-1; Quintal- 2; Bag-3; Basket-4; Carton box-5; Crates-6; Loose-7; gram-8; bunches/bundle-9; number/pieces-10; mon-11; palla-12.*	Rs	
6	Mode of payment **Code for mode of payment:** I*n cash-1;In kind-2; Partly in cash and partly in kind-3; Cheque-4; NEFT/RTGS/Online transfer- 5; Mobile payments like PayTm/PhonePe/GooglePay/AmazonPay/Bhim etc-6; Others_(Specify)-7*		
7	Percentage paid in cash and immediately		
8	If credited, no. of days for payment		
9	Type of scale used? ***Electronic-1; Mechanical-2; No weight-3***		
10	Do you think this weighing is proper and transparent? *Yes-1; No-2; Do not know-3*		
11	Was there any rounding off? *1.Yes 2.No*		
12	If yes, in whose favour? *1.Buyers 2.Yours 3. Sometimes mines sometimes buyers*		
13	Was the quality assessment of the lot fair? *1.Yes 2.No*		
14	14a. **Quality** of the produce 1. Grade A 2. Grade B 3. Grade C; 4. Not graded; 5. other		
	14b. Size- Big-1; Average-2; Small-3		
	14c. Shape- Good-1; 5-10% deformed-2; 11-24% deformed- 3; 25% deformed-4; More than 25%- 5; Others____(Specify)-6		
	14d. Colour, **taste, freshness *etc***.- Good-1; Average-2; Bad-3		
	14e. Scratches- Yes-1; No-2		
17	Is price determined based on Grading? *Yes-1; No-2*		
	17a. If yes to (17), price per unit for Grade A		
	17b. Percentage produce for Grade A		
	17c. If yes to (17), price per unit for Grade B		
	17d. Percentage produce for Grade B		
18	If no to (17), price per unit		
19	Time it took to do the complete transaction (in hours)		
20	Time it took between harvest and sale (in hours)		
21	In this transaction, price is *Normal-1; Lower by 10%-2; Lower by 11-25%-3; More than 25%-4; Higher upto 10%-5; Higher by 11-25%-6; Higher by more than 25%-7; Any other-8.*		
22	Do you feel that the price was fair? Yes/No		
23	Do you feel that the traders colluded on that occasion? Yes/No		

D.2.2. Q. Are you selling to super market/startup/E commerce? (If no, skip to D3 section)

D.2.2.Modern Marketing (Supermarket) Channel:

1. Which crop did you sell in the last?_____(crop code)

2. When did you sell the crop? Day_____Month_____year_____

3. How much did you sell?_____Number_____units

Kgs-1; Quintal- 2; Bag-3; Basket-4; Carton box-5; Crates-6; Loose-7; gram-8; bunches/bundle-9; number/pieces-10; mon-11; palla-12. 1 _____unit=how much kg?

4. Is the quantity of this transaction same as your average transaction in 2020-21? *Yes-1; No-2*

5. If no to (5), how does this transaction compare with average 2020-21 transaction?
Normal-1; Lower by 10%-2; Lower by 11-25%-3; Lower by More than 25%-4; Higher upto 10%-5; Higher by 11-25%-6; Higher by more than 25%-7; Any other-8.

6. Which supermarket collection centre did you sell to? _____
1. Reliance Fresh; 2.ITC; 3.More; 4.Heritage Fresh; 5. Food world; 6. Big bazaar; 7. Easy day;
8. Spencer's; 9. Metro; 10. Big basket; 11. Amazon; 12. Flipkart; 13. Other_____(specify)

7. Since when are you selling through this supermarket collection centre?_____years.

8. How did you get in touch with supermarket procurement agent?_____(Code)

1. Through my neighbour; 2. The collection agent directly approached me;3. Through the village head; 4. myself approached the supermarket agent; 5.Any other_____specify

8. Are you also listed with Supermarket procurement agent?_____1.Yes 2.No

9. If yes, what type of listing?_____1.Oral 2.Written
10. Do you know of any eligibility criteria to work with the firm?_____1. Yes 2.No
11. What is the main source of information on the price of the day?_____(Code)

Personal observation-1; Speaking with other farmers-2; Speaking with Commission agent-3; Speaking with other retailers-4; Observe price at auction-5; Newspaper/Radio/Internet-6; Respondent sets his/her own price-7; Screen/Board with price information-8; Any other_____specify-9.

12. Did you get in touch with the buyer before you go to the sales location?_____*1.Yes 2.No*

13. If yes, did you discuss prices of the product with him?_____*1.Yes 2.No*

14. Is there any rejection by the buyer on quality ground?_____*1.Yes 2.No* ***(If no, skip to question 18)***

15. If yes, how much is the rejection rate?_____% or_____kgs

16. What do you do with the rejected lot? _____

Sell in the mandi-1; Sell in the local market-2; Consume myself-3; Use as livestock feed-4; Throw it away-5; Others_____- 6. ***(If code 4,5,6, skip to question 18)***

17. a. Did you sell the rejected lot at lower price? _____1.Yes, 2.No. ***(If no, skip to question 18)***

b. If yes, by how much lower_____percentage or_____Rupees

18. How many persons working at supermarket centres among your relatives and friends?
Now_____and five years ago_____

19. How many brokers or mandi traders in vegetables among your relatives and friends.

Now_____and five years ago_____

20. How many persons working as sellers at rytu bazaars or others among your relatives and friends.

Now_____and five years ago _____

D2.2. Details of most recent transaction in modern market channel for vegetables

Sl.No	Cost items for this transaction	Did you pay?	If yes, how much?
		1. Yes. 2.No	Rs
1	a. Bagging (Sitching) or boxing		
	b. Transportation		
	c. Loading		
	d. Off-loading		
	e. Payments at check point or road block		
	f. Personal transport to wholesale market and or back		
	g. Entry license fees		
	h. Packaging cost		
	i. Commission rate		
	j. Storage charges		
	k. Additional costs due to COVID-19		
	l.. Did you pay for any other fees		
2	How much quantity was wasted because of sampling and transacting *(kgs for whole transaction)*		
3	Advance received? *1.Yes 2.No*		
4	Total amount received for the transaction (including advance) from Commission agent or trader?	Rs	
5	Amount received per unit *Unit codes: Kgs-1; Quintal- 2; Bag-3; Basket-4; Carton box-5; Crates-6; Loose-7; gram-8; bunches/bundle-9; number/pieces-10; mon-11; palla-12.*	Rs	
6	Mode of payment **Code for mode of payment:** I*n cash-1;In kind-2; Partly in cash and partly in kind-3; Cheque-4; NEFT/RTGS/Online transfer- 5; Mobile payments like PayTm/PhonePe/GooglePay/AmazonPay/Bhim etc-6; Others_(Specify)-7*		
7	Percentage paid in cash and immediately		
8	If credited, no. of days for payment		
9	Type of scale used? ***Electronic-1; Mechanical-2; No weight-3***		
10	Do you think this weighing is proper and transparent? *Yes-1; No-2; Do not know-3*		
11	Was there any rounding off? *1.Yes 2.No*		
12	If yes, in whose favour? *1.Buyers 2.Yours 3. Sometimes mines sometimes buyers*		
13	Was the quality assessment of the lot fair? *1.Yes 2.No*		
14	14a. **Quality** of the produce 1. Grade A 2. Grade B 3. Grade C; 4. Not graded; 5. other		
	14b. Size- Big-1; Average-2; Small-3		
	14c. Shape- Good-1; 5-10% deformed-2; 11-24% deformed- 3; 25% deformed-4; More than 25%- 5; Others____(Specify)-6		
	14d. Colour, **taste, freshness *etc***.- Good-1; Average-2; Bad-3		
	14e. Scratches- Yes-1; No-2		
17	Is price determined based on Grading? *Yes-1; No-2*		
	17a. If yes to (17), price per unit for Grade A		
	17b. Percentage produce for Grade A		
	17c. If yes to (17), price per unit for Grade B		
	17d. Percentage produce for Grade B		
18	If no to (17), price per unit		
19	Time it took to do the complete transaction (in hours)		
20	Time it took between harvest and sale (in hours)		
21	In this transaction, price is *Normal-1; Lower by 10%-2; Lower by 11-25%-3; More than 25%-4; Higher upto 10%-5; Higher by 11-25%-6; Higher by more than 25%-7; Any other-8.*		
22	Do you feel that the price was fair? Yes/No		
23	Do you feel that the traders colluded on that occasion? Yes/No		

D3. Agricultural marketing in the year 2015-16 (Five years ago [write in order of importance])

1. Did you sell any crop in the year 2015-16? (yes/ no)

2. If yes, how many crops you have sold in the year 2015-16?

Sl. No	Crop code	Total production in qunitals	Self consumption in kgs	Wastage in Kgs	3. How many buyers have you sold your " _____" crop?									
					Buyer A		Buyer B		Buyer C		Buyer D		Buyer E	
					Buyer code	%	Buyer code 2	%	Buyer Code	%	Buyer Code	%	Buyer Code	%
1														
2														
3														
4														
5														
6														
7														
8														

Code for buyer: Collector in village (outside mandi)-1; .Transporter of mandi trader-2; .Wholesaler on mandi-3; Commission Agent on mandi-4; Cold Storage-5; RBH-6; NGO-7; Processing firm-8; Co-operative Society-9; Farmer co-op-10; Shandimarket-11; Rytu bazaar-12; Consumer-13; Hotels/Restaurant-14; Supermarket collection centre-15; Mother Dairy- 16; Startup-17; Ecommerce company-18; Haat-19; Retailer- 20; not marketed due to COVID-21; College/schools-22; Apartments/gated communities-23; Exclusive collection agent-24; Does not know-25; other__(specify)-26.

E - Services

E1.Membership in community based organisations for members of household

Sl. No	Type of co-operative	Whether member or not?	Nature of coop	Since how many years?	Type of Services received	Quality of Services	Is it linked with? Code 4
		1-Yes 2-No	Code 1	Year	Code 2	Code 3	1-Yes 2-No
1	Self Help Group						
2	Primary Agricultural Credit Society (PACS)						
3	Multipurpose Co-operative						
4	Producer Group						
5)	Farmer Producer Organization						
6	Rytu Mitra Group						
7	Any others group?						

***Code 1: Nature of coop**: Government-1; Private-2; NGO-3; Donor agencies-4; Others-5.*

***Code 2**: **Type of services received:** Loan facilities-1; Seeds-2; Fertilizer-3; Pesticide-4; Extension services-5; Crop sales-6; Bargain prices with supermarkets-7;Storage- 8; COVID-19 relief-9; Any others_____-8.*

***Code 3: Quality of services:** Satisfied-1; Not satisfied-2; Never will go-3; Any others- 4.*

Code 4: 1. Supermarket; 2- Startup; 3. Corporate companies; 4. Not linked 5. Any others

E2: Agricultural extension services

1. Have you received any agricultural extension during the last one year?_____*1-Yes; 2-No*
   (Please explain to the farmers on what is extension service).
2. If no, why did you not avail any extension service_____
   Costly-1;Not accessible-2; Not needed-3; Not availability of quality services-4; Stopped availing as the services are not useful-5; Any other_____(Specify)-6.
3. If yes to (q.no.1), fill the table below:

Table: Agricultural extension service received in 2020-21

Sl. No	Item	Service provider					
		1	2	3	4	5	6
1	Who provided the agricultural extension from the public and private sources (multiple responses can also come) **Code 1**						
3	Major reasons for the choice of extension agent **Code 2**						
5	Distance to place of extension Kms/Put 999 if came to their farm						
6	How often did you have contact with the source in last 3 seasons? Number of times						
7	Did you have to pay for extension? *1=Yes; 2=No*						
8	For what crop were consultations made? Crop code (if general, code=888)						
9	What type of information was mainly given? **Code 3**						
10	Were you satisfied with the extension services? *1=Yes; 2=No*						
11	If no, why not? **Code 4**						

Code 1 : Sources of extension: *KVK-1; Agriculture dept officers-2; University/ Directorate of extensions services-3; NGO-4; ATMA-5; .Extension Agent Plant protection Unit-6; Other Public extension provider-7; Adarsa Rytu-8; Friends and co farmer-8; Extension Agents from the fertilizer companies (eg. IFFCO)-9; Private company that promote own products-10; Supermarkets-11; Extension Agent Private Processing company-12; Other private company extension provider-13; Model farmer-14; Private consultancies-15;; Any other_____(Specify)-17.*

Code 2: Reason for choice of extension agent:: *He is close by-1; He gives the lowest price-2;.Quality is assured-3; Most relevant information-4; Timely availability-5; He contacted me on his own-6; No other option-7; Specify_____-8.*

Code 3: Type of information: *Use of fertilizer-1; Irrigation-2;New Seed varieties-3; Disease Problems-4; Soil Problems-5; Weather problem-6; Marketing advice-7; Help getting credit-8; General advice-9; They test my crops for problems-10; Information about new technology-11; Others_____-12.*

Code 4: If not satisfied, why: T*oo far-1; High cost of extension-2; Poor quality advice-3; Not relevant information-4; Already know the information-5; Long wait-6; Difficult to contact-7; No information on new technologies-8; Others_____specify-9.*

E3. Financial Services in the last 12 months

1. Do you require any credit?_____*1=Yes 2=No*
2. Do you own a Kisan Credit Card?_____*1=Yes 2=No* (***If No, skip to Question 6***).
3. If yes, what is the yearly limit on this card?_____Rs.
4. Did you receive credit through Kisan Credit Card in the last twelve months_____(1-Yes;2-No)
5. If yes, please mention the amount of credit obtained_____Rupees
6. Did you receive any credit during the last twelve months from any other sources?_____*1=Yes 2=No*
7. Did you receive credit in sufficient amount when required?_____(Yes-1; No-2)
8. If no, why did you not receive any?_____*No need-1; Unable to find lender at the right time-2; Interest rates are too high-3;Did not have the collateral-4.* ***(Skip to Question F4.)***
9. If yes, please fill out the table below for every credit transaction in 2020-21

Sl.No	Source of credit	Major reasons for the choice of credit provider	When did you obtain this credit?	Distance to lender	Amount borrowed in total?	When have you or are you planning to repay?		Annual interest rate	What was the collateral for the loan?	Use of the credit
	Code 1	Code 2	Month	Kms	Rs	Month (MM)	Year (YY)	% per annum	Code 3	Code 4
01	02	03	04	05	06	07	08	09	10	11
1										
2										

Code 1: Credit provider: Private bank (e.g. ICICI)-1; Nationalized bank-2; Cooperative society (PACS) or District CooperativeBank-3; Regional rural bank-4; Private money lender-5; NGO-6; Input retailer-7; Wholesaler/ Commission Agent-8 ; Private processing company store-9; RBH-10; Supermarket Agent-11; Startups- 12;Micro-finance-12; SHG-13; Friends/Relatives-14; Any other____(Specify)-15.

Code 2 Reasons for choice of credit provider: *He is close by-1; He gives the best conditions-2; He is reliable-3; Always available-4; No other option-5; Other_____(Specify)-6.*

Code 3: Collateral for loan: *Land-1; Equipments-2; Ornaments-3; No collateral-4; Others_____(Specify)-5.*

Code 4: Use of credit: *Seasonal agricultural inputs-1; Agricultural equipments-2; Land purchase-3; Livestock purchase-4; Purchase other assets-5; Food needs-6; Health needs-7; Education needs-8; To repay other loans-9;Social functions-10; Others____(specify)-11.*

E4. Type of insurance

1. Do you have any type of insurance? (yes/no)
2. If yes, how many insurance do you have? (in numbers)

Sl.No	Type of insurance	Did you use in the last 12 months *1=Yes 2=No* ***(if no, skip to last column)***	If yes, name provider?	If yes, how far away is the provider? Km	If yes, yearly premium ? Rs/year	If yes, is there a choice between providers? *1=Yes 2=No*	Did you make a claim insurance amount *1=Yes 2=No*	Did you use insurance in the year 2015-16 *1=Yes 2=No*	3. If do not have insurance, why not? **(Code 1)**
1	General insurance (Vehicle, livestock etc)								
2	Life insurance								
3	Weather insurance								
4	Crop Insurance								
5	Any others								

Code 1: Reason for not having insurance: *Not aware-1; No need-2; Unable to find reliable insurer-3; Cost too high-4; Rewards are too small-5; Not available-6.*

F. Assets

F1.Farm machines/tools and equipments/ Household equipment

Sl. No	Item	No.	How acquired? (Code 1)	Year of purchase (Multiple years also can come)	Value / piece when purchased.Rs.	Sl .No	Item	No.	How acquired ? (Code 1)	Year of purchase (Multiple years also can come)	Value / piece when purchased. Rs.
01	Tractor					30	Axe				
02	Trailer					31	Shovel				
03	Planter/ Transplanter					32	Sickle				
04	Combined harvester					33	Cold storage				
05	Cultivator					34	Green house				
06	Leveler					35	Warehouse				
07	Seed drill					36	Pre-cooling Unit				
08	Electric motor					37	Crates				
09	Oil engine					38	Fertigation unit				
10	Rower Pump					39	Scooter/bike/ moped				
11	Thresher					40	Bicycle				
12	Winnower					41	Fixed phone				
13	Chaff cutter					42	Mobile				
14	Gauge wheel					43	Refrigerator				
15	Power tiller					44	Television				
16	Power sprayer					45	LPG stove				
17	Knapsack sprayer (manual)					46	Laptop				
18	Duster					47	Desktop computer				
19	Drip irrigation					48	Car				
20	Sprinkler irrigation					49	Auto trolley				
21	Harrow					50	Air conditioner				
22	Weeder					51	Cooler				
23	Bullock cart					52	Washing machine				
24	Mould board plough					53	Rotar weeder				
25	Iron plough					54	Shallow pump				
26	Hoe					55	Mini pump				
27	Crowbar					56	Hydroponics				
28	Neerani					57	Poly-houses				
29	Khurpi					58	Rotavator				
						59	Any other				

Code 1: Mode of acquisition: *1- Inherited; 2- Purchased; 3- Gifted; 4-Subsidised; 5-Govt provided; 6-Self-made; Others-7.*
(Multiple codes can be mentioned. So, also years of purchase)

F2. Livestock

F2.1. Do you have any type of livestock? (yes/no) If no, skip to household spending pattern questions

Sl. No	Item	No.	Method of acquisition (Code 1)	Year of purchase (Multiple years can come)	Value / piece when purchased Rs.	Sl. No	Item	No.	Method of acquisition (Code 1)	Year of purchase (Multiple years can come)	Value / piece when purchased Rs.
1	2	3	4	5	6	7	8	9	10	11	12
1	Bullocks					6	Goat				
2	Cows					7	Sheep				
3	Calves					8	Poultry				
4	He-buffaloes					9	Fishery				
5	She-buffaloes					10	Others				

Code 1: Mode of acquisition*: Inherited-1; Purchased-2; Gifted-3; Subsidised-4; Govt provided-5; Home bred-6; Others_____-7 (Multiple codes can come be mentioned)*

F2.2. Production and sale of livestock products in June 2020 to May 2021

	1. Milk (In liters)				**2. Dung (in tractor)**			**3. Meat**		**4. Eggs (in Number)**		
	Qty produced/Day	Qty sold/Day	No. of days produced	Price per unit	Qty produced	Qty sold	Price per tractor in Rs.	Number sold	Total mount realized in Rs.	Qty produced	Qtysold	Amount realized in Rs.
She buffalo												
Cows												
Sheep												
Goat												
Pigs												
Poultry												
Total Dung												
Others (specify)												

F2.3.Use of input markets for cattle

1. In the last 12 months, did you purchase green, dry fodder, or concentrates?_____*Yes-1; No-2.*

If no, skip to question 3

2. If yes, fill out the following table

No	Type of fodder *Code 1*	Quantity Number	Unit Code 2	Price per unit Rs	Total value in Rs.
1					
2					
3					
4					
5					
6					

Code 1: Green fodder: *Berseem-1; Green jowar-2; Green bajra-3; Maize-4; Cut grasses-5; Other green fodder-6;*
Dry fodder: *Wheat straw-7; Rice straw-8; Jowar straw-9; Bajra straw-10; Maize straw-11; Other dry straw-12*
Concentrates: *Grains bran-13;Grains-14; Oilseeds-15; Oilcakes-16; Compound feed-17;Salt-18; Oils-19; Gur/jiggery-20; Mineral mixture-21; Any other- 22.*
Code 2: *Quintal-1; Kilograms-2; Grams-3; Cart load-4; Tractor-5; Others-6. (1___unit=how much kg?)*

3. Did you spend on veterinary care (vaccinations/ medicines/ inseminations) in the last 12 months?_____*1.Yes 2.No*

4. If yes, how much did you spend?_____Rs.

5. Did you spend on fish feed, medicines, steroids *etc*., in the last 12 months?_____*1.Yes 2.No*

6. If yes, how much did you spend?_____Rs.

G. Household spending pattern

G1.1 In the last 30 days, how much did your household consume the following food and fuel?

Sl. No.	Item	Whether consumed Yes-1 No-2	If purchased			If owned/gifted/received inkind/totally subsidised		
			No	Unit (Code 1)	Amount spent Rs.	No	Unit (Code 1)	Imputed value Rs.
1	Wheat (atta, maida)							
2	Rice							
3	Maize flour							
4	Bajra (Pearl millet)							
5	Jowar (Sorghum)							
6	Other cereals (Minor millets)							
7	Cereal products (bread, muri chira, maidasuji noodles)							
8	Sago/Sabudaana							
9	Rajma							
10	Gram (Chana)							
10a	Gram dal							
10b	Besan							
10c	Chattu							
11	Dal							
11a	Tur dal							
11b	Moong dal							
11c	Urad dal							
10d	Masoor dal							
10e	Pea dal							
10f	Any other dal							
11	Other pulses							
11a	Moong (Green gram)							
11b	Cowpea (Lobia)							
11c	Mothbean							
11d	Soybean							
12a	Meat							
12b	Chicken							
12c	Fish							
13	Eggs							
14	Liquid milk							
15	Milk Products (ghee, butter, curd, paneer,milk powder, icecream, sweets)							
16	Apples							
17	Mangoes							
18	Banana							
19	Orange							
20	Water melon							
21	Other fruits							
21a	Sweet orange							
21b	Guava							
21c	Papaya							
21s	Pomegranate							
21e	Any others (Specify)							
22	Potato							
23	Onion							
24	Tomato							
25	Bhendi							
26	Capsicum							
27	Radish							
28	Cucumber							
29	Peas							
30	Cauliflower							
31	Cabbage							

32	Carrot							
33	Brinjal							
34	Dolichos							
35	Bottle gourd							
36	Spinach							
37	Other leafy vegetables (Specify)							
38	Other leafy vegetables (Specify)							
39	Pumpkin							
40	Papaya							
41	Any other vegetables							
42	Edible oils and vanaspati							
42a	Ground nut oil							
42b	Mustard oil							
42c	Sunflower oil							
42d	Any others (Specify)							
43	Sugar							
44	Jaggery/Gur/ Other sweeteners							
Unit code: Kilograms-1; Grams-2; Dozen-3; Litres-4; Milli litres-5; NA-6; Others_____(Specify)-7								

G1.2. How much did your household consume the following items

Sl. No.	Item	Whether consumed Yes-1 No-2	If purchased			If owned		
			No	Unitcode1	Amount spent Rs.	No	Unit code 1	Imputed value Rs.
45	Salt and spices (includes dry chillies, curry powder, oilseeds, etc.)							
46	Other food items like tea, coffee, processed food (such as biscuits, cake, pickles, sauce)							
47	Paan, tobacco, intoxicants							
48	Nuts (coconut, ground nut dates, kishmish, monacca, other dried fruits like almond, cashew etc)							
49	Food at restaurants, eating out, etc.							
50	Light (electricity)							
51	Kerosene / woods							
52	Firewood							
53	LPG cylinder							
54	Entertainment (includes cinema, picnic, sports, club fees, DVDs, cable TV charges, TataSky charges etc)							
55	Telephone, mobile phone, internet							
56	Toilet articles (including toothpaste, hair oil, shaving blades, face creams, face wash, sanitiser, shaving cream etc)							
57	Household items (including electric bulb, tubelight, glassware, bucket, soap, detergents, agarbati, insecticides, etc.)							
58	Conveyance (including railway, bus, taxi, rickshaw, airfares, porter charges, diesel/petrol,school bus, …)							
59	House rent and other appliances							
60	Consumer taxes, cess, fees (including water charges)							
61	Non-agricultural staff (domestic servants and others)							
62	Any others							

G2. In the last one year, how much did your household spend?

Sl. No.	Item	Whether purchased? Yes-1; No-2	If yes, numberof times purchased	If yes, how much didyour household spent? Rs./year
1	Medical expenses (out-patient services)			
1a	Doctor consultancy			
1b	Diagnostic test			
1c	Medicines			
1d	Medical service at home			
1e	COVID-19 related: Consultation Diagnostic tests Medicines Hospitalisation charges			
2	Medical (In-patient)			
3	School/private tuition, school books & other educational Articles			
4	Men's wear			
5	Ladies wear			
6	Kids wear			
7	Home linen			
8	Footwear			
9	Furniture& fixtures (Bedstead, almirah, suitcase, carpet, paintings etc)			
10	Crockery and utensils (incl casseroles, thermos etc)			
11	Personal care (incl spectacles, torch, umbrella, mask, sanitizer, *etc*)			
12	Therapeutic appliances incl hearing aids, glasses, orthopaedic equipment			
13	Repair &maintenance (residential building and bathroom equipment)			
14	Insurance premiums			
15	Vacations			
16	Social functions (social functions, funerals, gifts etc)			

H. Non-farm family income (for all family members)

H1. Income from non-farm enterprise and commerce

1. In the last 12 months, did you have income from a family enterprise or commerce:__*1=Yes 2=No* ***(if no, go to H.2)***

2. How much income did you have in the last 12 months: [_____,_____,_____] Rs

3. How many variable expenses (transport, salaries) did you have for this enterprise in the last 12 months : [_____,_____,_____] Rs

*4.*Did you have the family enterprise/ business in the year 2015-16?_____*1.Yes 2.No*

H.2. Other income in the year 2020-21 and 5 years ago (in 2015-16)

Sl. No	Source	2020-21	2015-16	Sl.No	Source	2020-21	2015-16
01	Agricultural wage labour			17	Income from remittances		
02	Non-agricultural labour			18	Old age pension		
03	MNREGS labor			19	Widown pension		
04	Salary income			20	Rytu Bandhu		
05	Income from fishery			21	PM-Kisan		
06	Rental income of leased-out land			22	Kalyana Lakshmi		
07	Rental income (Houses etc)			23	Shaadi Mubaarak		
08	Rental income from farm machinery			24	Death contingency		
09	Rental income farm animals			25	Covid 19 exgratia		
10	Rental income from autos/jeeps			26	Disabled/ Divyang		
11	Pension			27	Dependent pension		
12	Interest on deposits			28	Kanyashri		
13	Interest from lending			29	Ruposhri		
14	Income from selling house/apartments			30	Swasth Sati		
15	Income from selling land			31	Total income from remaining schemes in West Bengal (include Jayshri, Jay Bangla *etc*.,)		
16	Income from selling durable consumable goods			32	Other sources (specify)		

I. Perception of farmers

1. Since when have you been a vegetable cultivator?_____years

2. How did you learn vegetable cultivation? _____
1=with parents/family, 2=with an employer/working as a laborer, 3=in school, 4=with the help of governmentextension agents, 5= by observing and discussing with farmers, 6= by experimenting on my own, 7=input supplier; 8=TV/Radio/Magazines/newspapers; 9 =other: _____

3. Do you sell to supermarket?__*1.Yes 2.No* ***(If yes, continue to questions 4,5, and 6. If no, skip to question 7)***

4. If yes, which supermarket do you sell to?

a .Reliance Fresh_____*1.Yes 2.No* if yes, since when_____year
b .ITC_____*1.Yes 2.No* if yes since when_____year
c. More_____*1.Yes 2.No* if yes, since when_____year
d. Heritage Fresh_____*1.Yes 2.No* if yes, since when_____year
e. Food World_____*1.Yes 2.No* if yes since when_____year
f. Big Bazaar_____*1.Yes 2.No* if yes since when_____year
g. Easy Day _____*1.Yes 2.No* if yes since when_____year
h. Spencer's _____*1.Yes 2.No* if yes since when_____year
i. Metro _____*1.Yes 2.No* if yes since when_____year
j. Big Basket _____*1.Yes 2.No* if yes since when_____year
k. Amazon _____*1.Yes 2.No* if yes since when_____year
l. Flipkart _____*1.Yes 2.No* if yes since when_____year
m. Mother Dairy _____*1.Yes 2.No* if yes since when_____year
n. Any other _____ (Specify) since when _____year

5. If you are selling to supermarket collection centre, what, in your opinion, are the advantages of supplying to supermarket?

a. Supermarket collection centre is transparent in weighing _____ *1.Yes 2.No*
b. I get the payment whenever I ask for it _____1.Yes 2.No
c. I can save a lot on transport and transaction costs _____1.Yes 2.No
d. It has flexible timing which allows me to work in the field _____ 1.Yes 2.No
e. I get better price for the better quality products _____ 1.Yes 2.No
f. I don't have to go through the hassles of going to mandi _____1.Yes 2.No
g. I know the prices and quantity to be delivered before _____ 1.Yes 2.No
h. I get technical and other advice from supermarket staff _____ Yes-1; No-2
i. Price variations are minimized _____Yes- 1; No-2
j. The quality of the vegetable production is improved _____ Yes-1; No-2
k. others_____specify) _____1.Yes 2.No

6. If you are also selling to the mandi besides selling to supermarket, why do you do so?

a. I produce more than what supermarket demand _____ *1.yes 2.no*
b. Supermarket collection centre buy only top grade produce _____ *1.yes 2.no*
c. Supermarket doesn't procure from me every day _____*1.yes 2.no*
d. Supermarket doesn't provide me with input advance and credit_____*1.yes 2.no*
e. Other_____specify ***(Now, move to question 10).***

7. If you are not selling to supermarket, why are you not selling it?

a. I am not aware of supermarket procurement _____Yes-1; No-2. ***If yes, skip to question.10***
b. I sold to supermarket before but dropped out later_____Yes-1; No-2. ***If yes, skip to question.8.***
c. I don't want to sell to supermarket _____Yes-1; No-2. ***If yes, skip to question.9***

8. if you sold to supermarket before but dropped out later, why did you do so?

a. The rejection of the supermarket cc is too high _____ *1.yes 2.no*
b. The supermarket delayed in the settlement of payment _____ *1.yes 2.no*
c. The supermarket does not procure regularly _____*1.yes 2.no*
d. The supermarket does not procure enough _____*1.yes 2.no*
e. The prices are not attractive given the quality standard demanded_____*1.yes 2.no*
f. Others (specify)_____

9. If you don't want to sell to supermarket, what are the reasons?

a.My farm is too far from the collection centre. _____*1.yes2.no*
b.I cannot meet the quality standard specified by the supermarket _____*1.yes 2.no*
c.The supermarket does not procure regularly and enough _____*1.yes 2.no*
d. Prices are not attractive given the quality standard demanded _____ *1.yes 2.no*
e. I need credit and input advances which I get from only mandi _____*1.yes 2.no*
f. Anyway, I have to go to mandi to sell other produce _____*1.yes 2.no*
g. I don't have access to vehicle to go to supermarket cc _____*1.yes 2.no*
h. Others (specify) _____

10. A. **Some information on Rytu bazaar**

i. Do you sell to Rytu bazaar/Haat?_____*1.Yes 2.no* ***(If no, move to question 11).***
ii. If yes, since how many years? _____
iii. If yes, how often do you sell to Rytu bazaar/Haat?__*1.Always 2.Regularly 3. Rarely*
iv. Do you have space in the Haat/Rytu Bazaar?_____ Yes-1; No-2
v. How much did you pay for the space?_____ Yes-1; No-2.
vi. Do you have membership card for Rytu bazaar?_____*1.Yes 2.no*
vii. How much did you pay for the membership card?_____Rs____ per 1.monthly. 2. Yearly. 3. 5 yearly
viii. Do you have a stall in Rytu bazaar?_____*1.Yes 2.No*
ix. if yes, do you sell your produce to the retailers yourself?_____*1.yes 2.no*
x. if no, who do you sell to? *1. informal agent 2.my neighbor farmer 3. Others (specify)*
xi. If no, why don't you sell your produce yourself?

a.there is not enough stalls _____*1.yes 2.no*
b. It is very time consuming _____*1yes 2.no*
c. Informal traders don't allow us to sell on our own _____*1.yes 2.no*
d. I have to work in the field _____*1.yes 2.no*
e. Membership fee is high_____ Yes-1; No-2
f. I cannot sell the entire produce in this market Yes-1; No-2
g. Others (specify) _____

Xii. How much do you sell on average?_____number_____*Kg-1; Qunitals-2; Numbers-3; Bunches-4; Others-5.*

Xiii. How do you get to know the prices in Rytu bazaar/Haat?

1. set my own price 2. *Through auction* ***3****. I speak to other farmers in the bazaar* ***4****. The Rytucommittee set the daily prices.* ***5****. Speaking with the retailers* ***6****. The informal agent sets his own price.*

xiv. Which quality of product do you sell to Rytu Bazaar/Haat?_____
Top quality-1; Average quality (Grade B)-2; Low quality-3; No grading/Mixed-4;
xv. Have you done grading in last 3 sales and sold it with different pries?_____ *Yes-1; No-2*
xvi. If yes to (xvi), how many grades_____(Number) and prices_____*(Rs.)*_____*(Rs.)*_____*(Rs.)*____
xvii. During the last 3 sales, did any customer complained about the product quality*?*____*Yes-1; No-2*
xviii. During the last 3 sales, did any customer asked you about pesticide application?_____*- Yes-1; No-2*
xix. During the last 3 sales, which among the quality attributes customers attach highest value?_____
Freshness-1; Pesticide residue free-2; Firmness-3; Shape-4; Smell-5; Colour-6; Size-7; Any other _____(Specify)- 8

xx. Do you see some advantages of working with Rytu bazaar compared to mandi?*1.Yes 2.No*

a. If yes, what are these?

i. I don't have to pay the commission fees _____*1.yes 2.no*
ii. I get better prices _____*1.yes 2.no*
iii. I can grade myself and sell accordingly _____*1.yes 2.no*
iv. there is less wastages _____*1.yes 2.no*
v. There is no rounding off in favour of buyer _____*1.yes 2.no*
vi. Others (Spcify)_____

b. What are your suggestions for the improvement of Rytu Bazaar?_____

i. _____

ii. _____

iii. _____

c. Do you think government or others (e.g.farmers association, sellers association etc.,) can play a role? _____Yes-1; No-2

d. If yes to (c), how?

i. _____

ii. _____

iii. _____

10. B. Do you sell to Mother Dairy?

If yes, some information on Mother Dairy

1. Since when? _____(year)
2. How often do you sell to Mother Dairy?____ *1.Always 2.Regularly 3. Rarely*
3. How do you sell to Mother Dairy? 1- I sell directly to Mother Dairy; 2-I sell to local trader/farmer who then sell to Mother Dairy; 3- I sell through farmers association; 4-others
4. Who set up this association?

codes: 1-Ordinary member, 2-Active member, 3-Executive committee member, 4-President/ Secretary/ Treasurer, 5-Any other (specify)

5. Do you also have to pay transaction fees/ commission for selling through the association? (yes/no)
   If yes, how much do you pay? (in %)
6. Do you buy any inputs (fertilizers, pesticides, seeds through Mother Dairy) through farmers association? (yes/no)
7. Do you buy them at prices lower than what you buy from market? (yes/no)
8. Is the quality of the inputs that you buy better than what you get in the market? (yes/no)
9. Do you have to pay services fees for buying inputs through this association? (yes/no)
   How much do you pay? (in %)
10. When do you get paid once you sell your produce to Mother Dairy? Codes: 1- whenever I demand; 2- I get paid within one day;3- I get paid after a week
11. Do you grade your produce when you sell to Mother Dairy? (yes/no)
12. Does your produce get rejected at the collection centre of Mother Dairy? (yes/no)
    How much is the rejection rate? (in %)
13. Does it get rejected again after you sell your produce to Mother Dairy? (yes/no)
    How much is the rejection rate? (in %)
14. When do you get to know the prices of the vegetable that you are selling to Mother Dairy? Codes: 1-Same day; 2- Next day; 3- After more than two days
15. Does Mother Dairy contact your association beginning of the season for procurement of vegetables? (yes/no)
16. Any other problems that you face while selling to Mother Dairy
    A. _____
    B. _____

10. C. Some information on weekly market

i. Do you sell to Weekly Market? Yes-1 No-2
ii. If yes, since how many years? _____ (Years)
iii. If yes, how often do you sell to Weekly Market? Always -1, Regularly-2, Rarely- 3.
iv. Do you have membership in the weekly market sellers association? 1.Yes 2.No
v. Do you have a stall/ space in Weekly Market? Yes=1 No=2
vi. If yes, how much did you pay for the space? Rs._____ Daily -1, Weekly -2, Monthly -3, Yearly -4.
vii. If yes, do you sell your produce to the consumers yourself? Yes=1 No=2
viii. If not, to whom do you sell to? Informal agent-1, My neighbor farmer-2, Retailers- 3, Others - 4 (specify)_____
ix. If no to question vii, why don't you sell your produce yourself?
a. There are not enough stalls/ spaces Yes=1 No=2
b. It is very time consuming Yes=1 No=2
c. Informal traders/ retailers don't allow us to sell on our own Yes=1 No=2
d. I have to work in the field Yes=1 No=2
e. Membership fee is high Yes=1 No=2
f. I cannot sell the entire produce in this market Yes=1 No=2
g. Others (Specify)_____
x. How much do you sell on average? _____number _____ Kg-1, Qunitals-2, Numbers-3, Bunches-4, others -5.
xi. How do you get to know the prices in Weekly Market
I set my own price -1, Through auction -2, I speak to other farmers in the bazaar- 3, The sellers association set the daily price- 4, Speaking with the regular sellers/ retailers - 5, The informal agent sets his own price – 6, any others (specify) - 7
xii. Which quality of product do you sell to Weekly Market? ___ (code): top quality (grade A) -1, average quality (grade B) -2, low quality-3, No grading/Mixed - 4.
xiii. During the last 3 sales, did any customer complaint about the product quality? Yes=1 No=2.
if yes, how many customers? _____
xiv. During the last 3 sales, did any customer asked you about pesticide application? Yes=1 No=2
if yes, how many customers?_____
xv. During the last 3 sales, which among the quality attributes customers attach highest value?____
Freshness -1, Pesticide residue -2, Firmness -3, shape - 4, Smell - 5, Colour -6, size -7, Any other (specify)_____
xvi. Do you see some advantages of working with Weekly Market compared to mandi Yes=1 No=2
xvii. If yes, what are these
a. I don't have to pay the commission fees Yes=1 No=2
b. I get better prices Yes=1 No=2
c. I can grade myself and sell accordingly. Yes=1 No=2
d. There is less wastages Yes=1 No=2
e. There is no rounding off in favor of buyer Yes=1 No=2
f. Others (Specify) _____
xviii. a. What are your suggestions for the improvement of Weekly Market?
1._____
2._____

b. Do you think government or others (e.g. farmer association, sellers association etc.) can play a role? _____ (Yes-1 No-2) if yes how?
1.
2.
3.

10. D. Some information on Haat

i. Do you sell to Haat? Yes-1 No-2

ii. If yes, since how many years?_____

iii. If yes, how often do you sell to Haat? Always -1, Regularly-2, Rarely- 3.

iv. Do you have membership in the Haat sellers association? 1.Yes 2.No

iv. a. What is your role in the Haat sellers association?

codes: 1-Ordinary member, 2-Active member, 3-Executive committee member, 4-President/ Secretary/ Treasurer, 5-Any other (specify)

v. Do you have a stall/ space in Haat? Yes=1 No=2

vi. How much did you pay for the space? Rs._____ Daily -1, Weekly -2, Monthly -3, Yearly -4.

vi. a. Did you have any difficulty in getting stall/space in Haat? Yes-1 No-2

vii. if yes, do you sell your produce to the consumers yourself? Yes=1 No=2

viii. if not, to whom do you sell to? Informal agent-1, My neighbor farmer-2, Retailers- 3, Others - 4 (specify)_____

ix. If no to question vii, why don't you sell your produce yourself?

a. There are not enough stalls/ spaces Yes=1 No=2

b. It is very time consuming Yes=1 No=2

c. Informal traders/ retailers don't allow us to sell on our own Yes=1 No=2

d. I have to work in the field Yes=1 No=2

e. Membership fee is high Yes=1 No=2

f. I cannot sell the entire produce in this market Yes=1 No=2

g. Others (Specify)_____

x. How much do you sell on average? _____number _____ Kg-1, Qunitals-2, Numbers/ Pieces-3, Bunches-4, others_____(specify) -5.

xi. How do you get to know the prices in Haat

I set my own price -1, Through auction -2, I speak to other farmers in the bazaar- 3, The sellers association set the daily price- 4, Speaking with the regular sellers/ retailers - 5, The informal agent sets his own price – 6, any others (specify) - 7

xii. Which quality of product do you sell to Haat ? ___ (code): top quality (grade A) -1, average quality (grade B) -2, low quality-3, No grading/Mixed - 4.

xii. a. Have you done any grading in last 3 sales and sold it with different prices? Yes - 1 No - 2 , If yes, how many grades _____(number) Rs._____ Rs. _____ Rs. _____

xiii. During the last 3 sales, did any customer complaint about the product quality? Yes=1 No=2.

if yes, how many customers? _____

xiv. During the last 3 sales, did any customer asked you about pesticide application? Yes=1 No=2

if yes, how many customers?_____

xv. During the last 3 sales, which among the quality attributes customers attach highest value?____

Freshness -1, Pesticide residue -2, Firmness -3, shape - 4, Smell - 5, Colour -6, size -7, Any other (specify)_____

xvi. Do you see some advantages of working with Haat compared to mandi Yes=1 No=2

xvii. If yes, what are these

a. I don't have to pay the commission fees Yes=1 No=2

b. I get better prices Yes=1 No=2

c. I can grade myself and sell accordingly. Yes=1 No=2

d. There is less wastage Yes=1 No=2

e. There is no rounding off in favor of buyer Yes=1 No=2

f. Others (Specify) _____

xviii. **a.** What are your suggestions for the improvement of Haat?

1._____

2._____

b. Do you think government or others (e.g. farmer association, sellers association etc.) can play a role?_____(Yes-1, No-2)

C. If yes, how?

1. _____
2. _____
3._____

a. Where do you store your pesticides and chemicals?___(Code)

Within the house- 1; Separate store room-2; Farm house-3; Any others-4

b. Did you receive any complaints of product quality in the last three transactions?___*(Yes-1; No-2)*

If yes, what are the complaints

1. ___
2. ___
3. ___

c. Please rank the quality attributes, as you see it:

Attribute	**Rank (from 1 to 8)**
Freshness	
Pesticide residue	
Firmness	
Colour	
Size	
Shape	
Smell	
Taste	

d. Please inform the following:

a. Distance from nearest collection center of supermarket_____kilometers
b. Distance from nearest supermarket collection agent_____ kilometers.
c. Distance from nearest wholesale market_____kilometers.
d. Distance from nearest fertilizer shop_____kilometers.
e. Distance from nearest pesticide shop_____kilometers.
f. Distance from nearest seed shop_____kilometers.
g. Distance from nearest Rytu Bazaar_____kilometers.
h. Distance from nearest town center_____kilometers.
i. Distance from nearest tar road_____kilometers.
j. Distance from village sarpanch's house_____kilometers.
k. Distance from nearest Mother Dairy collection center _____Kilometers
l. Distance from the agent (Secretary) of Mother Dairy collection center_____Kilometers
m. Distance from nearest weekly market _____Kilometers
n. Distance from nearest Haat _____Kilometers

e. Do you have pandals for better cultivation of vegetables_____*1.yes 2.no.*
If yes, year of cultivation_____
f. Area of pandal cultivation_____acres__guntas,Total Expenditure_____Rs.

We would also like to know your opinion on few more issues that may affect the cropping practices and pattern:

g. What are the problems that you face if you want to supply to supermarket collection centre?
1. _____
2. _____-
3. _____

h. Is there any changes in technology and cultivation practices in the recent times?_____*1.yes 2.no.*
if yes, what are these?
1 _____
2. _____-
3. _____

i. Is there any new crops that were cultivated since the supermarket set up collection centre in the area?
1 _____
2. _____-
3. _____

Part B (Choice Experiment)

1. Supply chain preferences:

Block number: _____

Choice card 1: Choice - A; Choice - B; Choice – C; Remarks_____

Choice card 2: Choice - A; Choice - B; Choice – C; Remarks_____

Choice card 3: Choice - A; Choice - B; Choice – C; Remarks_____

Preferences for contracts

A. BASIC QUESTIONS

1. **Which one of the following do you prefer with reference to harvest timing?**
   a. Harvest timing is decided by (code)_____

      Farmer - 1, Buyer -2, Contractual agreement –

      3; other -4

   b. Harvest timing is primarily depend on (code/s):_____

      Crop maturity -1, Market demand - 2, Buyer convenience - 3,

      Producer convenience - 4 , Any other_____(specify) -5

2. **Which type of contract do you prefer (code)_____**

      Verbal - 1, Written - 2

3. **Do you prefer the following specifications in contract?** code - Yes - 1, No - 2
   a. Quality :_____
   b. Production process: (organic/inorganic; irrigated or rainfed; pesticides *etc*.) _____
   c. Quantity _____
   d. Time of sale / harvest time _____

4. **Which contracts do you prefer** (code)_____

      Direct - 1, via producers groups or group of farmers - 2

      via intermediaries (for example: NGO, middleman *etc*.) - 3

      Any other_____(specify) - 4

2. Contract preferences:

Block number: _____

Choice card 1: Choice - A; Choice - B; Choice – C; Remarks_____

Choice card 2: Choice - A; Choice - B; Choice – C; Remarks_____

Choice card 3: Choice - A; Choice - B; Choice – C; Remarks_____

COVID-19 Questions

1. Is there any change in the area under vegetables due to COVID-19?
    a. Increased by upto 10%
    b. Increased by 11-24%
    c. Increased by 25-49%
    d. Increased by 50% and more
    e. Decreased by upto 10%
    f. Decreased by 11-24%
    g. Decreased by 25-49%
    h. Decreased by more than 50%
    i. No change
    j. Any others_____(Specify)
2. Is there any change in production and yields of vegetables due to COVID-19?
    a. Increased by upto 10%
    b. Increased by 11-24%
    c. Increased by 25-49%
    d. Increased by 50% and more
    e. Decreased by upto 10%
    f. Decreased by 11-24%
    g. Decreased by 25-49%
    h. Decreased by more than 50%
    i. No change
    j. Any others_____(Specify)

3. Which aspect of vegetable production is mainly affected due to Covid-19
    a. Production
    b. Productivity
    c. Transport
    d. Marketing
    e. Credit
    f. Input procurement
    g. Others
4. Are you unable to produce any of the vegetables due to covid-19 pandemic? (Yes/No)
    If yes, what are the reasons:
    a. Increased cost of production due to lack of agricultural workers
    b. Non-availability of inputs such as seeds, fertilizers & herbicides, etc
    c. Availability of inputs at higher cost
    d. There is under-supply of inputs in the market
    e. Not motivated to carry production due to fear of pandemic
    f. Difficulty in sourcing credit
    g. Diversify towards cereals and pulses
    h. Others_____(Specify)
5. Please answer the following for vegetable marketing during the last year:
    a. Increased by upto 10%
    b. Increased by 11-24%
    c. Increased by 25-49%
    d. Increased by 50% and more
    e. Decreased by upto 10%
    f. Decreased by 11-24%
    g. Decreased by 25-49%

h. Decreased by more than 50%
i. No change
j. Any others_____(Specify)

6. If you are able to sell during covid-19 pandemic, what is the mode of selling?
   a. Middlemen/agent at farm
   b. Village collector
   c. Village haats directly
   d. Mandis directly
   e. Direct to wholesalers
   f. Direct to retailers
   g. Direct to consumers
   h. Direct to supermarket collection centre
   i. Direct to exclusive wholesalers
   j. Sold through e-commerce
   k. Forced to sell consumers directly at lower price-8,
   l. Others_____(mention)

7. Is any part of the vegetable production could not be marketed Yes/No
   If yes, what was the reason (Multiple codes can come)

   a. Non-availability of Commission agents/Village traders.
   b. Closure of mandis
   c. Fear of not getting remunerative prices.
   d. Fear of COVID-19
   e. Fear of wastage.
   f. Any others_____(Specify)

8. What are the strategies adopted by you to cope with the effect of Covid-19 on unsold produce of vegetables?

   a. Stored in cold storage
   b. Some part kept for own consumption
   c. Distribute freely to relatives & friends
   d. Destroyed in own field due to restrictions
   e. No mitigation strategy
   f. Others_____(Specify)

9. Did you get difficulty in getting inputs (multiple codes)

   a. Seeds
   b. Fertilisers
   c. Pesticides
   d. Any other input_____(Specify)

10. If yes to above questions, how you sorted out (Multiple codes)
   a. Not sorted out
   b. Used farm saved seed
   c. Purchased from neighbouring farmers
   d. Purchased locally available seeds
   e. Online supplier/Door delivery

f. Used less quantity of fertilisers
g. Used less pesticides leading to higher pests/diseases
h. Any others_____(Specify).

11. Did you get labour problems Y/N

If yes, which operations are affected due to shortage of labour in vegetables?

a. Land preparation
b. Sowing/transplanting
c. Weeding
d. Irrigation
e. Fertilisation and plant protection
f. Harvesting
g. Transport to market
h. Any others_____(Specify).

12. Did you notice any changes in labour use pattern Yes/No

If yes, please answer the following (Multiple codes possible)

a. Used more family women
b. Used more family children
c. Used more family men
d. Used more hired female labour
e. Used more hired male labour
f. Paid higher wage rate for hired labour
g. Paid lower wage rate for hired labour
h. Any others_____(Specify).

13. Losses due to non-availability of labour as percentage

a. upto 10%
b. by 11-24%
c. By 25-49%
d. 50% and more
e. No change
f. other

14. Did you notice non-functioning of community based organisations? Y/N

If yes, which CBOs

a. SHG
b. PACS
c. Multipurpose cooperative society
d. Farmers organisation
e. Farmer producer organisation
f. Rytu Mitra
g. Others

15. Did you get needed extension advices during last one year? Y/N

If not, did you get from any new service provider?

a. Online service provider
b. Mobile app
c. Any others_____(Specify)

16. During the Covid-19 pandemic did you borrow money from non-institutional souces? (Yes/No)
If yes, for what purpose? (Multiple codes)

a. Household living (food and other consumption related)
b. Agricultural purpose (to buy seeds, fertilizers, labor wage etc.)
c. Family health & hygiene (hospital expenses)
d. Children's education
e. Others_____ (specify)

17. Did you mortgage anything to borrow money? (Yes/No)
i) What you mortgaged, if yes? (Select the appropriate)

a. Jewellery
b. Land
c. Livestock
d. Other assets_____ (Specify)
e. Any others_____(Specify)

(ii) Rate of interest (per month): _____%

18. Source of finance (Multiple codes)

a. Friends
b. Relatives
c. Money lender
d. Trader/agents
e. SHGs
f. Startups
g. Others_____(specify-7)

19. Could you sell your livestock products as usual? Yes/No

If no, which of them are affected? (Multiple codes)

a. Milk
b. Eggs
c. Poultry
d. Sheep
e. Goat
f. Fodder prices went up
g. Fodder not available
h. Fodder prices went down
i. Any others_____(Specify)

20. Was there a change in your household consumption? (Multiple codes)

a. No change
b. Consumed more cereals relative to previous year
c. Consumed less of cereals relative to previous year
d. Consumed more pulses relative to previous year
e. Consumed less pulses relative to previous year
f. Consumed more fruits relative to previous year
g. Consumed less fruits relative to previous year
h. Consumed more vegetables relative to previous year
i. Consumed less vegetables relative to previous year

j. Consumed more dairy products relative to previous year
k. Consumed less dairy products relative to previous year
l. Consumed more livestock products relative to previous year
m. Consumed less livestock products relative to previous year
n. Consumed more supplements (*viz*., vitamin D tablets, minerals etc,)
o. Any other changes_____(Specify)

21. What are you most worried about in the next six months or one year?
    a. Labour shortage
    b. Cost of cultivation increase
    c. Produce price fluctuation
    d. Difficulty in selling produce
    e. Increase in wastage due to lack of cold storage
    f. Reduction in income
    g. Prone to ill health/sickness
    h. Others_____(specify)

Dietary diversity questions

Was yesterday a special day (celebration, feast day, or fasting) where anyone in the HH ate special foods or more or less than usual? **– Yes-1 No-2**

Instructions: If the respondent said "no, yesterday was not special", ask the following question a about foods (meals/snacks) consumed yesterday during the day and night, whether at home or outside the home. If respondent said, "yes, yesterday was an unusual day", then ask about the day before yesterday or the last normal day. Also, note that foods in parentheses are merely examples and not exclusive of other similar foods available locally.

I would like to now ask you about what was eaten yesterday (or the day before if yesterday was unusual) by you.

1. CEREALS (rice, bread made of wheat, puffed rice, pressed rice, noodles, or any other rice, wheat, maize/ corn*)* **– Yes-1 No-2**
2. VITAMIN A RICH VEGETABLES AND TUBERS (pumpkin, carrots, sweet potatoes that are orange and yellow inside) **– Yes-1 No-2**
3. WHITE TUBERS AND ROOTS OR OTHER STARCHY FOODS (potatoes, white yams, white sweet potato (not orange inside), potato crisps or other root foods (not orange or yellow) **– Yes-1 No-2**
4. DARK GREEN LEAFY VEGETABLES (spinach, red/green amaranth, puishak, laushak, kumrashak, kolmishak, mustard leaves, yam leaves, koloishak, dhekishak, demisha)
5. OTHER VEGETABLES (eggplant, green papaya, cauliflower, cabbage, onion, radish, sheem/boboti (beans)) **– Yes-1 No-2**
6. VITAMIN A RICH FRUITS (ripe mangoes, ripe papaya/pawpaw, jack fruit) **– Yes-1 No-2**
7. OTHER FRUITS (banana, apples, guava, oranges, other citrus fruits, pineapple, watermelon, olives, grapes, jambura berries, kamranga, tamarind, plum) **– Yes-1 No-2**
8. MEAT (goat, lamb, chicken, duck, or other birds; liver, kidney, heart, or other organ) **– Yes-1 No-2**
9. EGGS (eggs of different birds – chicken, duck, turkey etc.; with yolk, without yolk) **– Yes-1 No-2**
10. FISH (big/small fresh or dried fish or shellfish (e.g, prawn, crab etc.)) **– Yes-1 No-2**

11. PULSES (beans, peas, lentils, other pulses, soybeans) **– Yes-1 No-2**
12. NUTS AND SEEDS **– Yes-1 No-2**
13. MILK AND MILK PRODUCTS (milk, cheese, yogurt) **– Yes-1 No-2**
14. OILS AND FATS (oil, fats or butter added to food or used for cooking including ghee) **– Yes-1 No-2**
15. SWEETS AND SUGARY BEVERAGES (sugar, molasses, honey, misti, chocolates, candies, biscuits, cold drinks, coffee, tea, etc.) **– Yes-1 No-2**
16. SPICES, CONDIMENTS, Spices (cumin, coriander, salt), condiments (pickles, chutney), etc.) **– Yes-1 No-2**

INVESTIGATORS OBSERVATION

_____

_____

_____

_____

_____

Please record the GPS

_____

_____

Appendix 2

Production and Marketing of Vegetables: A Multi-state Study
Household Questionnaire

1. Basic Details

I.D No _____ State _____

District _____ Mandal/Block_____

Village _____

Name of the farmer_____ Father's/husband's name_____

Sex (*1=M, 2=F)*_____ Religion ____ *(1=Hindu,2=Muslim,3=Christian,4=Others)*

Community _____ Sub-caste_____

(*1=SC, 2=ST, 3=BC, 4=OC)*

Telephone number (optional)_____ E-mail:_____

To be read by the enumerator:

"This survey is conducted by IEG, Delhi. The survey is to study vegetable production and marketing in AP in order to make recommendations to policymakers, communities and farmers, and to agrifood businesses. The information will not be reported as individual, and thus will be fully anonymous, without identity revealed. Do you wish to continue with the interview?___1. Yes 2. No"

Crops code: **Vegetables:** Tomato-1; Bottle gourd-2; Bitter gourd-3; Ridge gourd-4; Cabbage-5; Chillies-6; Carrot-7;Cauliflower-8; Radish-9;Coccinia-10; Coriander-11;Potato-12; Sweet potato-13; Cucumber-14;Ginger-15; Pea-16; Brinjal-17;Celery-18; Green pepper-19; White gourd-20;Guar Seed-21; Onions-22; Garlic-23; Dry ginger-24; Turmeric-25; Arecanut-26; Mint-27; Menthi (phenugreek)-28; Spinach-29; Other leafy vegetables-30; Curry leaf-31; Drumstick-32; Pumpkin-33; Bhendi-34; Snake gourd-35; Capsicum-36; Beet root-37; Turnip-38; Bruccoli-39; Baby corn-40; Gherkin-41; Other vegetables-42.
Fruits: Mango-43;Apple-44; Sweet orange-45; Lemon-46; Mandarin-47; Pears-48; Peach-49; Plum-50; Sapota-51; Banana-52; Papaya-53; Guava-54; Pomegranate-55; Coconut-56; Grapes-57;Cashewnut-58; Strawberry-59; Pineapple-60; Custard apple-61; Water melon-62; Musc melon-63; Other fruits-64.
Flowers: Marigold-65;Jasmine-66; Chrysanthemum-67; Rose-68; Cut flowers-69; Other flowers-70
Cereals and pulses: Paddy-71; Wheat-72; Maize-73; Jowar-74; Bajra-75; Ragi-76; Barley-77; Tapioca-78; Gram-79; Arhar/Tur-80; Moong-81; Urad-82; Masoor-83; Horse gram-84; Other pulses-85; Other cereals-86
Oilseeds and Commercial crops: Soyabean-87; Linseed-88; Sesamum-89; Groundnut-90;Rapeseed/Mustard-91; Castor-92; Niger-93; Safflower-94; Sunflower-95; Sugarcane-96; -Cotton-97; Mesta-98; Jute-99; Tobacco-100; Pepper-101; Rubber-102; Shallot-103; Medicinal crops-104;Agave-106; No crop- 107; others _____(Specify)-108.
Season codes: Kharif-1; Rabi-2; Summer/Zayed-3

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2014

A. Demographic particulars

1. Members of the household, starting with the head of household

Sl.no.	Relation with HH head	Gender	Age	Number of years of Education	Technical /vocative education	Works at least some time on HH farm?	2013/14			2008/9		
							Local Farm wage-labor work in 2013/14	Non-farm Work in 2013/14	MNREGS 2013/14	Farm wage-labor work in 2008/9	Non-farm Work in 2008/9	MNREGS 2008/9
	Code 1	*1. Male 2. Female*	Years	Years	Code 2	*1.yes 2. no*	*1=yes 2=no*	*Code 3*	*1=yes, 2=no*	*1=yes, 2=no*	*Code 3*	*1=yes, 2=no*
	01	*02*	*03*	*04*	*05*	*06*	*07*	*08*	*09*	*10*	*11*	*12*
1.1.In the household in 2013/14												
1	1											
2												
3												
4												
5												
6												
7												
8												
9												
10												
1.2 Any change in the household since 2008/09												
1												
2												
3												
4												

Code for question 01 on relation with household head*: Household head-1; Spouse-2; Son/ Daughter-3; Grandchildren-4; Parent-5; Brother/Sister-6; Son/Daughter/Brother-in-law-7; Father/Mother- in- law-8; Grandparents-9; Other relatives_____-10.*
Code 2: *Nil-1; ITI-2; Diploma (Polytechnic)-3;B.Tech-4; Agri B.Sc-5; M.B.B.S-6; Others-7_____ (Specify)*
Code 3- Occupations- *Non-agrl.labour-1; Factory worker-2; Transport worker-3; Earth work labour-4; Construction labour-5; Sweeper- 6; Scavenger-7; Tea garden worker- 8; Apprentice- 9; Other wage labor- 10.*
Salaried worker: *Government -11; Private enterprise (e.g. sales person, manager)-12; House maid-13; Teacher (Primary school)-14; Teacher (High school)-15; Teacher (College/university)-16; NGO worker-17; Other salaried worker-18*
Self-employment: *Milk collector-19; Feed supplier-20; Animal Breeder- 21; veterinary doctor-22; Para veterinary doctor-23; Rickshaw/van pulling-24; Driver of motor vehicle-25; Tailor/seamstress-26; Potter-27; Blacksmith-28; Goldsmith-29; Hair cutter-30; Cobbler-31; Clothes washer-32; Repairman (appliances)-33; Carpenter-34; Mason-35; Contractor-36; Doctor/Engineer-37; Herbal doctor-38; Lawyer/deed writer-39; House tutor-40; Religious leader-41; Plumber-42; Electrician-43; Mechanic (vehicles)-44; Midwife-45; Beggar-46.*
Production: *Food Processing-47; Small industry-48; Handicrafts-49*
Trader: *Small trader (<25000 Rs monthly sales.)- 50; Medium trader (25000-75000Rs)-51; Large trader (>75000 Rs)- 52; Fish Trader-53; commercial feed producer-54; Vet medicine seller-55*
Non-earning occupation: *Student-56; Housewife-57; Lodging master-58; Jobless-59; Retired-60; Child (age <12 no study no work)-61; Physically handicapped/Mentally handicapped-62; Dependant-63; No non-farm activity- 64; Any others-65_____ (Specify)*

Note: Children with less than five or less than years of age, the entire row may be mentioned as NA
Children with less than one year will be mentioned as '00' in age and all other columns will be NA

2. Are you a holder of _____ *BPL card -1; APL card -2; Antyodaya card -3; Annapoorna -4; None -5*
3. Is your house _____ *Katcha -1; Semi pucca - 2; Pucca - 3*
4. Do you have separate individual toilet in your home*?*_____*(Yes-1; No-2)*
5. Is it _____ *1.rented 2.owned*

Module B. Land

B.1. How much land do you possess and cultivate?

	Operational land						c. Land leased out or kept fallow		
Type of field	a. Land owned and cultivated			b. Land leased in or taken for free					
Years	Number of plots	Total area in local units	Unit (Code) *1-Acres 2-Gunta 3-Cents 4.Bigha*	Number of plots	Total area in local units	Unit (Code) *1-Acres 2-Gunta 3-Cents 4.Bigha*	Number of plots	Total area in local units	Unit (Code) *1-Acres 2-Gunta 3-Cents 4.Bigha*
1	2	3	4	5	6	7	8	9	10
1.Vegetable Plots									
a) 2013/14									
b)2008/9									
2.Rice plots									
a)2013/14									
b)2008/9									
3. Other crops									
a)2013/14									
b.2008/9									
4.Total									
a)2013/14									
b)2008/9									

B.2. Make a list of all the plots that you owned and leased in or leased out in 2013/14 (from biggest to smallest, including vegetables, rice, and other crops such as maize or orchards (fruit), and non-crop)

Sl.No	Plot type Code 1	Total area	Unit code Code 2	Source of Irrigation Code 3	Soil type Code 4	Operational status Code 5	Since how many years?	Crops grown in 2013-14 (Code)			Approx. land value/ac. if sold now Rs.
								Kharif	Rabi	Summer	
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
Plot 1											
Plot 2											
Plot 3											
Plot 4											
Plot 5											
Plot 6											
Plot 7											
Plot 8											

***Code** 1-**Plot type**. Cultivable land-1 ; Orchard-2; Fallow-3; Other land-4.*
Code 2: Acres-1; Gunta-2; Cents-3; Bigha-4
***Code3 - Irrigation source** : Rainfed-1; Pond-irrigation-2; Tube well/Borewell-3 ; River/canal water-4; Open well-5; Water purchase- 6; Others-7.*
***Code 4 -Soil type**:.Clay-1; Black cotton-2; Loam-3; Sand-4; Rocky-5; Any other _____(Specify)-6.*
***Code 5: Operational status:** Owned and operated-1; Fallow-2; Leased out-3; Leased in-4; Any others_____(Specify)-5.*

B.3. Transaction of land in the last five years

1. Did you sell land between 2008/09 and now: _____ *1.Yes 2. No*
2. Did you purchase land between 2008/09 and now? _____*1.Yes 2.No*
3. If yes, please give details:

Sl. No.	Year of sales/purchase	Area of the plot No.	Unit code **Code 1**	Crops grown at the time of sale/purchase **(Code)**	Irrigation source at the time of sale/purchase **Code 2**	Sales value of the plot in Rs/acre
1	2	3		4	5	6
			Sales			
1						
2						
3						
			Purchase			
1						
2						
3						

Code 1 : Unit of land : *Acres-1;Gunta-2; Cents-3; Bigha-4.*
Code 2- Irrigation source *: Rainfed-1 ; Pond-irrigation-2 ; Tube well / Borewell-3 ; River/canal water-4; Open well-5 ;Others-6.*

D. Input-output information

D1. Output in 2013/14

Crop code	Season code *Kharif -1 Rabi -2 Summer -3*	Area		Total production				Price per unit Rs.	Self consumption in kgs.	Wastage in kgs.
		Total area	Units *1=Acres 2=Gunta 3=Cents 4=Bigha*	No of units	Type of unit *1=bag 2=crates 3=trolley;4=trucks 5=basket;6=carton 7=other*	Weight of unit in KG	Total output in kgs			
1	2	3	4	5	6	7	8	9	10	11

D2: Expenditure on seeds, irrigation and other items

S.No		Crop 1	Crop 2	Crop 3	Crop 4	Crop 5	Crop 6	Crop 7	Crop 8	Crop 9
1	Crop code									
2	Season code (*Kharif-1; Rabi-2; Summer-3*)									
3	Type of seed used **(Code1)**									
4	Quantity used- Number									
	Unit code (*Gram-1;Kg -2; Bundle - 3; Number - 4*)									
5	Source (**Code 2**)									
6	Seed cost incurred in Rs **(Total)**									
7	Whether irrigated or not? 1-Yes; 2-No.									
8	Method of irrigation **(Code 3)**									
	Number of irrigations									
9	**Cost of irrigation in Rs.**									
10	Electricity/Diesel in Rs.									
11	Repair & Maintenance in Rs.									
12	Value of water purchase in Rs.									
13	Cost of plastic ground use in Rs.									
14	Cost of glass green house in Rs.									
15	Cost of plastic tunnel green house in Rs.									
16	Any Others									

Code 1: *Hybrid-1; HYV-2; Local-3; Bt-4; Others_____(Specify)-5.*
Code 2: Own Seeds-1; Co-Farmers-2; Local Retailer-3; Private Dealers-4; Distributers-5; Co-Operative society-6; Govt. seed agencies-7; Others_____(Specify)-8.
Code 3: Type of irrigation: *Surface irrigation-1; Drip-2; Sprinkler-3; Any other_____(Specify).*

D3.Details of fertilizer application

Name of fertilizer	**Crop code _____**				**Crop code _____**				**Crop code _____**			
	Season code: _____				**Season code:_____**				**Season code:_____**			
	Quantity Applied (No)	Unit code	Price per unit	Total price In Rs/	Quantity Applied (No)	Unit code	Price per unit	Total price In Rs/	Quantity Applied (No)	Unit code	Price per unit	Total price In Rs/
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*
Organic Manure												
FYM												
Poultry Manure												
Others												

Name of fertilizer	**Crop Code _____**				**Crop Code _____**				**Crop Code _____**			
	Season code_____				**Season code_____**				**Season code_____**			
Organic Manure												
FYM												
Poultry Manure												
Others _____												

Name of fertilizer	**Crop Code _____**				**Crop Code _____**				**Crop Code _____**			
	Season code_____				**Season code_____**				**Season code_____**			
Organic Manure												
FYM												
Poultry Manure												
Others												

Local units: *Bags-1; Kgs-2; Liters-3; Cart-4; Tractor-5; Any others_____(Specify)-6.*

Note: *Growth promoters and micronutrients like Zinc, Iron etc also may be mentioned in the chemical fertilisers*

D4. Details of pesticides/ herbicides application

Name of pesticide/ herbicide	**Crop Code _____** **Season code_____**				**Crop Code _____** **Season code_____**				**Crop Code _____** **Season code_____**			
	Total number of sprays	Quantity applied (No)	Unit code	Price Per unit	Total number of sprays	Quantity Applied (No)	Unit code	Price per unit	Total number of sprays	Quantity Applied (No)	Unit code	Price per unit
Herbicide												

Name of pesticide/ herbicide	**Crop Code _____** **Season code_____**				**Crop Code _____** **Season code_____**				**Crop Code _____** **Season code_____**			
Herbicide												

Name of pesticide/ herbicide	**Crop Code 1 _____** **Season code_____**				**Crop Code 2 _____** **Season code_____**				**Crop Code 3 _____** **Season code_____**			
Herbicide												

Code for units: *Kilogram-1; 500 gms-2; 250 gms-3; 100 gms- 4; Gram-5; Litre- 6; 500 ml-7; 250 ml-8; 100 ml-9; Milli liter (Ml)-10; Others_____(Specify)-11.*

D.5. Details of family labour engaged and Hired labour in crop cultivation during 2013-2014 (continued)

Crop cultivation	Family labour												Hired labour											
	Crop Code _____				Crop Code _____				Crop Code _____				Crop Code _____				Crop Code _____				Crop Code _____			
	Season code_____				Season code_____				Season code_____				Season code_____				Season code_____				Season code_____			
	Male		Female		Male		Female		Male		Female		Male		Female		Male		Female		Male		Female	
	No. hrs spent	No. days worked	No. hrs spent	No. days worked	No. hrs spent	No. days worked	No. hrs spent	No. days worked	No. hrs spent	No. days worked	No. hrs spent	No. days worked	No. days worked	Wage rate (Per day)	No. days worked	Wage rate (Per day)	No. days worked	Wage rate (Per day)	No. days worked	Wage rate (Per day)	No. days worked	Wage rate (Per day)	No. days worked	Wage rate (Per day)
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Land preparation																								
Sowing and transplanting																								
Application of fertilizers & manures																								
Application of pesticides																								
Weeding																								
Irrigation																								
Supervision/ crop protection																								
Harvesting																								
Threshing																								
Cleaning washing, grading & sorting																								

D.5. Details of family labour engaged and Hired labour in crop cultivation during 2013- 2014 (continued)

Crop cultivation	Family labour												Hired labour											
	Crop Code _____				Crop Code _____				Crop Code _____				Crop Code _____				Crop Code _____				Crop Code _____			
	Season code_____				Season code_____				Season code_____				Season code_____				Season code_____				Season code_____			
	Male		Female		Male		Female		Male		Female		Male		Female		Male		Female		Male		Female	
	No. hrs spent	No. days worked	No. hrs spent	No. days worked	No. hrs spent	No. days worked	No. hrs spent	No. days worked	No. hrs spent	No. days worked	No. hrs spent	No. days worked	No. days worked	Wage rate (Per day)	No. days worked	Wage rate (Per day)	No. days worked	Wage rate (Per day)	No. days worked	Wage rate (Per day)	No. days worked	Wage rate (Per day)	No. days worked	Wage rate (Per day)
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Land preparation																								
Sowing and transplanting																								
Application of fertilizers & manures																								
Application of pesticides																								
Weeding																								
Irrigation																								
Supervision/ crop protection																								
Harvesting																								
Threshing																								
Cleaning washing, grading & sorting																								

D.5. details of family labour engaged and Hired labour in crop cultivation during 2013- 2014.

Crop cultivation	Family labour												Hired labour											
	Crop Code _____				Crop Code _____				Crop Code _____				Crop Code _____				Crop Code _____				Crop Code _____			
	Season code_____				Season code_____				Season code_____				Season code_____				Season code_____				Season code_____			
	Male		Female		Male		Female		Male		Female		Male		Female		Male		Female		Male		Female	
	No. hrs spent	No. days worked	No. hrs spent	No. days worked	No. hrs spent	No. days worked	No. hrs spent	No. days worked	No. hrs spent	No. days worked	No. hrs spent	No. days worked	No. days worked	Wage rate (Per day)	No. days worked	Wage rate (Per day)	No. days worked	Wage rate (Per day)	No. days worked	Wage rate (Per day)	No. days worked	Wage rate (Per day)	No. days worked	Wage rate (Per day)
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Land preparation																								
Sowing and transplanting																								
Application of fertilizers & manures																								
Application of pesticides																								
Weeding																								
Irrigation																								
Supervision/ crop protection																								
Harvesting																								
Threshing																								
Cleaning washing, grading & sorting																								

D.6. Details of Machinery/Animals used in agriculture

	1=Owned 2=Rented	Expenditure in Rs/	1=Owned 2=Rented	Expenditure in Rs/	1=Owned 2=Rented	Eexpenditure in Rs/
1	2	3	4	5	6	7
	Crop Code ______		**Crop Code _______**		**Crop Code _______**	
	Season code________		Season code________		Season code________	
Tiller/Tractor						
Transplanter						
Weed remover						
Harvester						
Thresher						
Power sprayer						
Hand sprayer						
Cultivator						
Iron Plough						
Bullocks/He-buffaloes						
Cows						
Others						
	Crop Code ______		**Crop Code _______**		**Crop Code _______**	
	Season code________		Season code________		Season code________	
Tiller/Tractor						
Transplanter						
Weed remover						
Harvester						
Thresher						
Power sprayer						
Hand sprayer						
Cultivator						
Iron Plough						
Bullocks/He-buffaloes						
Cows						
Others						
	Crop Code _______		**Crop Code _______**		**Crop Code _______**	
	Season code________		Season code________		Season code________	
Tiller/Tractor						
Transplanter						
Weed remover						
Harvester						
Thresher						
Power sprayer						
Hand sprayer						
Cultivator						
Iron Plough						
Bullocks/He-buffaloes						
Cows						
Others						

E. Marketing Crops

E.1. Marketing channels for vegetables- 2013-14 (continued)

S.No.	Item	Transactions								
1	Crop code									
2	Season code									
3	First Buyer (Code 1)									
4	Second buyer (Code 1)									
5	Month of transaction									
6	Major reason for the choice first buyer (Code 2)									
7	Quantity sold- Number									
	Unit code (Kgs-1; Quintal-2)									
8. **Quality of produce** 8a. Size- Big-1; Average-2; Small-3										
8b.Shape- Good-1; 5-10% deformed-2; 25% deformed-3										
8c. Colour, taste etc- good-1; average-2; Bad-3										
8d. Scratches- Yes-1; No-2										
8e. Overall- Grade A-1; Grade B-2; Not graded-3										
8f. Time between harvest and sale- In days										
In hours										
9	Is price determined based on grading? Yes-1; No-2									
9a	If yes, Price per unit for grade 1									
	Price per unit for grade 2									
9b	If no, price per unit									
10	Total amount received Rs.									
11	Quantity rejected due to poor quality at the time of sale in Kgs.									
12	Mode of payment (Code 3)									
13	%paid in cash and immediately									
14	If credit, no. of days for payment									
15	Any input advance *1=yes 2=No* ***(If no, skip to Q 17)***									
16	If yes, how much Rs.									
17	Sale location of farmer (Code 4)									
18	How far from home to the location Kms									
19	Time between departure home and arrival location sale- Hours									
	Minutes									
20	Transport means (Code 5)									
21	Transaction time on location sale Hours									
	Minutes									

Code 1: (Buyer) *Collector in village (outside mandi)-1; .Transporter of mandi trader-2; .Wholesale on mandi-3; Commission Agent on mandi-4; Cold Storage-5; RBH-6; NGO-7; Processing firm-8; Co-operative Society-9; Farmer co-op-10; Shandimarket-11; Rytu bazaar-12; Consumer-13; Hotels/Restaurant-14; Supermarket collection centre-15; Does not know-16;Others_____(Specify)-17.*

Code 2- reason for selecting buyer: *Gives higher prices-1; Accepts large quantities-2; Accepts small quantities-3 Gives advances when needed-4; Pays immediately-5; He is close by-6; Takes lesser time to settle transaction-7; More transparent in weighing-8; No other option-9.*

Code 3-mode of payment: I*n cash-1;In kind-2; Partly in cash and partly in kind-3; Cheque-4; Others_____(Specify)-5*

Code 4-Sale location: *1.Farmer's field or own village 2.Wholesale market 3.Supermarket Collection Centre 4. Shandimarket 5.RBH 6..Rytu bazaar 7.Cold Storage 8; Others_____(specify)*

Code 5-Main transport means: *Porter/own carry-1; Handcart-2; Tractor-3; Truck-4; Car-5; Bicycle-6; Motorbike-7; Horsecart-8; Bullock cart-9; Pick up van-10; Trolley auto-11; other_____(Specify)-12.*

Code 6-Sales unit: *Bag-1; Basket-2; Carton box-3; Crates-4; Loose-5.*

E.2. Marketing channels for vegetables- 2013-14 (continued)

S.No.	Item	Transactions								
1	Crop code									
2	Season code									
3	First Buyer (Code 1)									
4	Second buyer (Code 1)									
5	Month of transaction									
6	Major reason for the choice first buyer (Code 2)									
7	Quantity sold- Number									
	Unit code (Kgs-1; Quintal-2)									
8. **Quality of produce** 8a. Size- Big-1; Average-2; Small-3										
8b.Shape- Good-1; 5-10% deformed-2; 25% deformed-3										
8c. Colour, taste etc- good-1; average-2; Bad-3										
8d. Scratches- Yes-1; No-2										
8e. Overall- Grade A-1; Grade B-2; Not graded-3										
8f. Time between harvest and sale- In days										
	In hours									
9	Is price determined based on grading? Yes-1; No-2									
9a	If yes, Price per unit for grade 1									
	Price per unit for grade 2									
9b	If no, price per unit									
10	Total amount received Rs.									
11	Quantity rejected due to poor quality at the time of sale in Kgs.									
12	Mode of payment (Code 3)									
13	%paid in cash and immediately									
14	If credit, no. of days for payment									
15	Any input advance *1=yes 2=No* ***(If no, skip to Q 17)***									
16	If yes, how much Rs.									
17	Sale location of farmer (Code 4)									
18	How far from home to the location Kms									
19	Time between departure home and arrival location sale- Hours									
	Minutes									
20	Transport means (Code 5)									
21	Transaction time on location sale Hours									
	Minutes									

Code 1: (Buyer) *Collector in village (outside mandi)-1; .Transporter of mandi trader-2; .Wholesale on mandi-3; Commission Agent on mandi-4; Cold Storage-5; RBH-6; NGO-7; Processing firm-8; Co-operative Society-9; Farmer co-op-10; Shandimarket-11; Rytu bazaar-12; Consumer-13; Hotels/Restaurant-14; Supermarket collection centre-15; Does not know-16;Others_____(Specify)-17.*

Code 2- reason for selecting buyer: *Gives higher prices-1; Accepts large quantities-2; Accepts small quantities-3 Gives advances when needed-4; Pays immediately-5; He is close by-6; Takes lesser time to settle transaction-7; More transparent in weighing-8; No other option-9.*

Code 3-mode of payment: I*n cash-1;In kind-2; Partly in cash and partly in kind-3; Cheque-4; Others_____(Specify)-5*

Code 4-Sale location: *1.Farmer's field or own village 2.Wholesale market 3.Supermarket Collection Centre 4. Shandimarket 5.RBH 6..Rytu bazaar 7.Cold Storage 8; Others_____(specify)*

Code 5-Main transport means: *Porter/own carry-1; Handcart-2; Tractor-3; Truck-4; Car-5; Bicycle-6; Motorbike-7; Horsecart-8; Bullock cart-9; Pick up van-10; Trolley auto-11; other_____(Specify)-12.*

Code 6-Sales unit: *Bag-1; Basket-2; Carton box-3; Crates-4; Loose-5.*

E.3. Marketing channels for vegetables- 2013-14

S.No.	Item	Transactions								
1	Crop code									
2	Season code									
3	First Buyer (Code 1)									
4	Second buyer (Code 1)									
5	Month of transaction									
6	Major reason for the choice first buyer (Code 2)									
7	Quantity sold- Number									
	Unit code (Kgs-1; Quintal-2)									
8. **Quality of produce** 8a. Size- Big-1; Average-2; Small-3										
8b.Shape- Good-1; 5-10% deformed-2; 25% deformed-3										
8c. Colour, taste etc- good-1; average-2; Bad-3										
8d. Scratches- Yes-1; No-2										
8e. Overall- Grade A-1; Grade B-2; Not graded-3										
8f. Time between harvest and sale- In days										
	In hours									
9	Is price determined based on grading? Yes-1; No-2									
9a	If yes, Price per unit for grade 1									
	Price per unit for grade 2									
9b	If no, price per unit									
10	Total amount received Rs.									
11	Quantity rejected due to poor quality at the time of sale in Kgs.									
12	Mode of payment (Code 3)									
13	%paid in cash and immediately									
14	If credit, no. of days for payment									
15	Any input advance *1=yes 2=No* ***(If no, skip to Q 17)***									
16	If yes, how much Rs.									
17	Sale location of farmer (Code 4)									
18	How far from home to the location Kms									
19	Time between departure home and arrival location sale- Hours									
	Minutes									
20	Transport means (Code 5)									
21	Transaction time on location sale Hours									
	Minutes									

Code 1: (Buyer) *Collector in village (outside mandi)-1; .Transporter of mandi trader-2; .Wholesale on mandi-3; Commission Agent on mandi-4; Cold Storage-5; RBH-6; NGO-7; Processing firm-8; Co-operative Society-9; Farmer co-op-10; Shandimarket-11; Rytu bazaar-12; Consumer-13; Hotels/Restaurant-14; Supermarket collection centre-15; Does not know-16;Others_____(Specify)-17.*

Code 2- reason for selecting buyer: *Gives higher prices-1; Accepts large quantities-2; Accepts small quantities-3 Gives advances when needed-4; Pays immediately-5; He is close by-6; Takes lesser time to settle transaction-7; More transparent in weighing-8; No other option-9.*

Code 3-mode of payment: I*n cash-1;In kind-2; Partly in cash and partly in kind-3; Cheque-4; Others_____(Specify)-5*

Code 4-Sale location: *1.Farmer's field or own village 2.Wholesale market 3.Supermarket Collection Centre 4. Shandimarket 5.RBH 6..Rytu bazaar 7.Cold Storage 8; Others_____(specify)*

Code 5-Main transport means: *Porter/own carry-1; Handcart-2; Tractor-3; Truck-4; Car-5; Bicycle-6; Motorbike-7; Horsecart-8; Bullock cart-9; Pick up van-10; Trolley auto-11; other_____(Specify)-12.*

Code 6-Sales unit: *Bag-1; Basket-2; Carton box-3; Crates-4; Loose-5.*

E.4. Give us the details of the most recent complete transaction with each marketing channel accessed by you: *(We define a complete transaction as one where the product has been procured at one place and has been completely sold by you)*

E.4.1. Traditional Marketing Channel (Village wholesale, mandi, Rytu Bazaar):

1. Which crop did you sell? _____(Crop code)

2. When did you sell the crop? Day _____Month_____

3. How much did you sell? _____Number_____1.Kgs 2.Quintals

4. Which sales channel did you use? _____

1 Collector in the village (outside mandi) 2.Transporter of mandi 3.wholesaler/commission agent on mandi 4.Shandi market 5.Rytu bazaar 6. Co-operative Society 7.Farmer Co-operative 8.Retailer 9.Consumer 10. Others_____specify

5. What is the main source of information on the price of the day? _____

1. Personal observation 2. Speaking with other farmers 3. Speaking with Commission agent 4.Speaking with other retailers 5.Observe price at auction 6.Newspaper/Radio/Internet 7.Respondent sets his/her own price 8.Screen/Board with price information 9.Any other _____(specify)

6. Did you get in touch with the buyer before you go to the sales location? _____*1.Yes 2.No*

7. If yes, did you discuss prices of the product with him? _____*1.Yes 2.No*

8. Is there any rejection by the buyer on quality ground? _____*1.Yes 2.No. (* ***If no, skip to 12)***

9. If yes, how much is the rejection rate? _____% or _____kgs

10. What do you do with the rejected lot? _____

1. Sell in the mandi; 2. Sell in the local market; 3. Consume myself; 4. Use as livestock feed;5. Throw it away 6.Others_____ ***If code 5, skip to question 12***

11. a. Did you sell the rejected lot at lower price? _____ 1.Yes, 2.No.

b. If yes, by how much lower _____percentage or_____Rupees

12. How many brokers or mandi traders in vegetables among your relatives and friends.

Now _____ and five years ago_____

13. How many persons working as sellers at rytu bazaars or others among your relatives and friends.

Now _____and five years ago _____

14. How many persons working at supermarket centres among your relatives and friends?
Now_____ and five years ago_____

E- 4.1.15 Details of most recent complete transaction in Traditional Market for vegetables

Sl.No	Cost items for this transaction	Did you pay?	If yes, how much?
		1. Yes. 2.No	Rs
1	a. Bagging (+itching) or boxing		
	b. Transportation		
	c. Loading		
	d. Off-loading		
	e. Payments at check point or road block		
	f. Personal transport to wholesale market and or back		
	g. Entry license fees		
	h. Packaging cost		
	i. Commission rate		
	j. Storage charges		
	k. Other fees		
2	How much quantity was wasted because of sampling and transacting *(kgs for whole transaction)*		
3	Advance received? *1.Yes 2.No*		
4	Price received for the transaction (including advance) from Commission agent or trader?	Rs	
5	Amount received per kg	Rs	
6	Type of scale used? ***Electronic-1; Mechanical-2; No weight-3***		
7	Was there any rounding off? *1.Yes 2.No*		
8	If yes, in whose favour? *1.Buyers 2.Yours 3. Sometimes mines sometimes buyers*		
9	Was the quality assessment of the lot fair? *1.Yes 2.No*		
10	Quality of the produce *1. Grade A 2. Grade B 3. Not graded; 4. Others ___ specify*		
11	Time needed to do the complete transaction (journey to market: transaction and time on the market: journey from market to home)	___Hours ____minutes	

E.4.2. Modern Marketing (Supermarket) Channel: -

1. Are you selling to supermarket? _____1. Yes 2. No ***(If No skip to E.5)***
2. Which crop did you sell in the last? _____ (crop code)
3. When did you sell the crop? Day _____Month_____
4. How much did you sell? _____Number_____1.Kgs 2.Quintals
5. Which supermarket collection centre did you sell to? _____

   1. Reliance Fresh 2.ITC 3.More 4.Heritage Fresh 5. Spencer 6. Big bazaar 7.Other Supermarket CCs._____(Specify)

6. Since when are you selling through this supermarket collection centre? _____years_____months.
7. How did you get in touch with supermarket procurement agent?_____(Code)

1. Through my neighbour; 2. The collection agent directly approached me;3. Through the village head; 4. myself approached the supermarket agent; 5.Any other _____specify

8. Are you also listed with Supermarket procurement agent? _____1.Yes 2.No
9. If yes, what type of listing? _____1.Oral 2.Written
10. Do you know of any eligibility criteria to work with the firm? _____ 1. Yes 2.No
11. What is the main source of information on the price of the day? _____(Code)

Personal observation-1; Speaking with other farmers-2; Speaking with Commission agent-3; Speaking with other retailers-4; Observe price at auction-5; Newspaper/Radio/Internet-6; Respondent sets his/her own price-7; Screen/Board with price information-8; Any other _____specify-9.

12. Did you get in touch with the buyer before you go to the sales location? _____*1.Yes 2.No*

13. If yes, did you discuss prices of the product with him? _____*1.Yes 2.No*

14. Is there any rejection by the buyer on quality ground? _____*1.Yes 2.No* ***(If no, skip to question 18)***

15. If yes, how much is the rejection rate? _____% or _____kgs

16. What do you do with the rejected lot? _____

Sell in the mandi-1; Sell in the local market-2; Consume myself-3; Use as livestock feed-4; Throw it away-5; Others_____- 6. ***(If code 5, skip to question 18)***

17. a. Did you sell the rejected lot at lower price? _____ 1.Yes, 2.No. ***(If no, skip to question 18)***

b. If yes, by how much lower _____percentage or_____Rupees

18. How many persons working at supermarket centres among your relatives and friends?
Now_____ and five years ago_____

19. How many brokers or mandi traders in vegetables among your relatives and friends.

Now _____ and five years ago_____

20. How many persons working as sellers at rytu bazaars or others among your relatives and friends.

Now _____and five years ago _____

E.4.2.19. Details of most recent transaction in modern market channel for vegetables

Sl. No	**Cost items for this transaction**	**Did you pay?**	**If yes, how much?**
		1. Yes. 2.No	Rs
1	a. Bagging (+itching) or boxing		
	b. Transportation		
	c. Loading		
	d. Off-loading		
	e. Payments at check point or road block		
	f. Personal transport to wholesale market and or back		
	g. Entry license fees		
	h. Packaging cost		
	i. Commission rate		
	j. Storage charges		
	k. Other fees		
2	How much quantity was wasted because of sampling and transacting *(kgs for whole transaction)*		
3	Advance received? *1.Yes 2.No*		
4	Total amount received for the transaction (including advance) from Commission agent or trader?	Rs	
5	Amount received per kg	Rs	
6	Type of scale used? ***Electronic-1; Mechanical-2; No weight-3***		
7	Was there any rounding off? *1.yes 2.no*		
8	If yes, in whose favour? *1.Buyers 2.Yours 3. Sometimes mines sometimes buyers*		
9	Was the quality assessment of the lot fair? *1.Yes 2.No*		
10	Quality of the produce *1. Grade A 2. Grade B 3. Not graded 4. Others _____ specify*		
11	Time needed to do the complete transaction (journey to market: transaction and time on the market: journey from market to home)	_____Hours _____minutes	

E.5.Agricultural marketing in the year 2008-09 (Five years ago [write in order of importance])

Sl. No	Crop code	Total production in qunitals	Self consumption in kgs	Wastage in Kgs	Buyer A		Buyer B		Buyer C		Buyer D		Buyer E	
					Buyer code	%	Buyer code	%	Buyer Code	%	Buyer Code	%	Buyer Code	%
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														

Code 2: (Buyer) *Collector in village (outside mandi)-1; .Transporter of mandi trader-2; .Wholesaler on mandi-3; Commission Agent on mandi-4; Cold Storage-5; RBH-6; NGO-7; Processing firm-8; Co-operative Society-9; Farmer co-op-10; Shandimarket-11; Rytu bazaar-12; Consumer-13; Hotels/Restaurant-14; Supermarket collection centre-15; Does not know-16;Others_____(Specify)-17.*

F1.Membership in Co-operative for members of household

Sl. No	Type of co-operative	Whether member or not?	Nature of coop	Since when you are member?	Type of Services received	Quality of Services	Is it linked with supermarket
		1-Yes 2-No	Code 1	Year	Code 2	Code 3	1-Yes 2-No
1	Self Help Group						
2	Primary Agricultural Credit Society (PACS)						
3	Multipurpose Co-operative						
4	Producer Group						
5)	Farmer Organization						
6	Rytu Mitra Group						
7	Any Other						

Code 1: Nature of coop*: Government-1; Private-2; NGO-3; Donor agencies-4; Others-5.*
Code 2*: **Type of services received:** Loan facilities-1; Seeds-2; Fertilizer-3; Pesticide-4; Extension services-5; Crop sales-6; Bargain prices with supermarkets-7;Any others_____ -8.*
Code 3: Quality of services: *Satisfied-1; Not satisfied-2; Never will go-3.*

F.2: Agricultural extension services

1. Have you received any agricultural extension during the last one year? _____1-Yes; 2-No
2. If no, why did you not avail any extension service_____

Costly-1;Not accessible-2; Not needed-3; Not availability of quality services-4; Stopped availing as the services are not useful-5; Any other_____(Specify)-6.

3. If yes, fill the table below:

Table: Agricultural extension service received in 2013/14

Sl. No	Item	Service provider					
		1	2	3	4	5	6
1	Who provided the agricultural extension from the public and private sources (multiple responses can also come) **Code 1**						
3	Major reasons for the choice of extension agent **Code 2**						
5	Distance to place of extension Kms/Put 999 if came to their farm						
6	How often did you have contact with the source in last 3 seasons? Number of times						
7	Did you have to pay for extension? *1=Yes; 2=No*						
8	For what crop were consul-tations made? Crop code (if general, code=88)						
9	What type of information was mainly given? **Code 3**						
10	Were you satisfied with the extension services? *1=Yes; 2=No*						
11	If no, why not? **Code 4**						

Code 1 : Sources of extension: *KVK-1; Agriculture dept officers-2; University/ Directorate of extensions services-3; NGO-4; ATMA-5; .Extension Agent Plant protection Unit-6; Other Public extension provider-7; Adarsa Rytu-8; Friends and co farmer-8; Extension Agents from the fertilizer companies (eg IFFCO)-9; Private company that promote own products-10; Supermarkets-11; Extension Agent Private Processing company-12; Other private company extension provider-13; Model farmer-14; Private consultancies-15; Any other_____(Specify)-16.*

Code 2: Reason for choice of extension agent:: *He is close by-1; He gives the lowest price-2;.Quality is assured-3; Most relevant information-4; Timely availability-5; He contacted me on his own-6; No other option-7; Specify_____ -8.*

Code 3: Type of information: *Use of fertilizer-1; Irrigation-2;New Seed varieties-3; Disease Problems-4; Soil Problems-5; Weather problem-6; Marketing advice-7; Help getting credit-8; General advice-9; They test my crops for problems-10; Information about new technology-11; Others_____-12.*

Code 4: If not satisfied, why: T*oo far-1; High cost of extension-2; Poor quality advice-3; Not relevant information-4; Already know what the information-5; Long wait-6; Difficult to contact-7; No information on new technologies-8; Others_____ specify-9.*

F3. Financial Services in the last 12 months

1. Do you require any credit? ____ *1=Yes 2=No*
2. Do you own a Kisan Credit Card? ____ *1=Yes 2=No* (***If No, skip to Question 6***).
3. If yes, what is the yearly limit on this card? _____ Rs.
4. Did you receive credit through Kisan Credit Card in the last twelve months_____ (1-Yes;2-No)
5. If yes, please mention the amount of credit obtained_____Rupees
6. Did you receive any credit during the last twelve months from any other sources? ____ *1=Yes 2=No*
7. Did you receive credit in sufficient amount when required?_____(Yes-1; No-2)
8. If no, why did you not receive any? _____ *No need-1; Unable to find lender at the right time-2; Interest rates are too high-3;Did not have the collateral-4.* ***(Skip to Question F4.)***
9. If yes, please fill out the table below for every credit transaction

Sl.No	Source of credit	Major reasons for the choice of credit provider	When did you obtain this credit?	Distance to lender	Amount borrowed in total?	When have you or are you planning to reimburse?		Annual interest rate	What was the collateral for the loan?	Use of the credit
	Code 1	Code 2	Month	Kms	Rs	Month (MM)	Year (YY)	% per annum	Code 3	Code 4
01	02	03	04	05	06	07	08	09	10	11
1										
2										
3										
4										
5										
6										

Code 1: Credit provider: *Private bank (e.g. ICICI)-1; Nationalized bank-2; Cooperative society (PACS) or District Cooperative Bank-3; Regional rural bank-4; Private money lender-5; NGO-6; Input retailer-7; Wholesaler/ Commission Agent-8 ; Private processing company store-9; RBH-10; Supermarket Agent-11; Micro-finance-12; SHG-13; Friends/Relatives-14; Any other_____(Specify)-15.*
Code 2 Reasons for choice of credit provider: *He is close by-1; He gives the best conditions-2; He is reliable-3; Always available-4; No other option-5; Other_____(Specify)-6.*
Code 3: Collateral for loan: *Land-1; Equipments-2; Ornaments-3; No collateral-4; Others_____(Specify)-5.*
Code 4: Use of credit: *Seasonal agricultural inputs-1; Agricultural equipments-2; Land purchase-3; Livestock purchase-4; Purchase other assets-5; Food needs-6; Health needs-7; Education needs-8; Others_____-9.*

F4. Type of insurance

Sl.No	Type of insurance	Did you use in the last 12 months *1=Yes 2=No* ***(if no skip 9)***	If yes, name provider?	If yes, how far away is the provider? Km	If yes, yearly premium ? Rs/year	If yes, is there a choice between providers? *1=Yes 2=No*	Did you make a claim insurance amount *1=Yes 2=No*	Did you use insurance in the year 2008/9 *1=Yes 2=No*	If do not have insurance, why not? **(Code 1)**
1	2	3	4	5	6	7	8	9	10
1	.General insurance (Vehicle, etc)								
2	Life insurance								
3	Weather								
4	Crop Insurance								
5	Any others								

Code 1: Reason for not having insurance: *Not aware-1; No need-2; Unable to find reliable insurer-3; Cost too high-4; Rewards are too small-5; Not available-6.*

G. Assets

G.1. Farm machines/tools and equipments/Household equipment

Sl. No	Item	No.	How acquired? (Code 1)	Year of purchase (Multiple years also can come)	Value / piece when purchased.Rs.	Sl .No	Item	No.	How acquired ? (Code 1)	Year of purchase (Multiple years also can come)	Value / piece when purchased. Rs.
1	2	3	4	5	6	7	8	9	10	11	12
01	Tractor					27	Axe				
02	Trailer					28	Shovel				
03	Planter/Transplanter					29	Sickle				
04	Combined harvester					30	Cold Storage				
05	Cultivator					31	Green House				
06	Leveler					32	Warehouse facilities				
07	Seed drill					33	Pre-cooling Unit				
08	Electric motor					34	Crates				
09	Oil engine					35	Fertigation unit				
10	Rower Pump					36	Scooter/bike/ moped				
11	Thresher					37	Bicycle				
12	Winnower					38	Fixed phone				
13	Chaff cutter					39	Mobile phone				
14	Gauge wheel					40	Refrigerator				
15	Power tiller					41	Television				
16	Power sprayer					42	LPG stove				
17	Knapsack sprayer (manual)					43	Laptop				
18	Duster					44	Desktop computer				
19	Drip irrigation					45	Car				
20	Sprinkler irrigation					46	Auto trolley				
21	Harrow					47	Air conditioner				
22	Weeder					48	Cooler				
23	Bullock cart					49	Washing machine				
24	Mould board plough					50	Any others				
25	Iron plough					51	Any others				
26	Hoe										

Code 1: Mode of acquisition: *1- Inherited; 2- Purchased; 3- Gifted; 4-Subsidised; 5-Govt provided; 6-Self-made; Others-7.*
(Multiple codes can be mentioned. So, also years of purchase)

G.2. Livestock

Sl. No	Item	No.	Method of acquisition (Code 1)	Year of purchase (Multiple years can come)	Value / piece when purchased Rs.	Sl. No	Item	No.	Method of acquisition (Code 1)	Year of purchase (Multiple years can come)	Value / piece when purchased Rs.
1	2	3	4	5	6	7	8	9	10	11	12
1	Bullocks					6	Goat				
2	Cows					7	Sheep				
3	Calves					8	Poultry				
4	He-buffaloes					9	Others				
5	She-buffaloe										

***Code 1: Mode of acquisition**: Inherited-1; Purchased-2; Gifted-3; Subsidised-4; Govt provided-5; Home bred-6; Others_____-7 (Multiple codes can come be mentioned)*

G.3. Production and sale of livestock products in June 2013 to May 2014

	1 Milk (In liters)				**2 Dung (Tractor)**			**3 Meat (in Kgs)**			**4. Eggs (in Number)**			
	Qty produced	Qty sold	No. of days produced	Price per unit	Qty produced	Qty sold	Price per unit	Qty produced	Qty sold	Price per unit	Qty produced	Qty sold	No. of days produced	Price per unit
	1	2	3	4	5	6	7	9	10	12	13	14	15	16
She buffalo														
Cows														
Sheep														
Goat														
Pigs														
Poultry														
Total Dung														
Others (specify)														

G.4. Use of input markets for cattle

1. In the last 12 months, did you purchase green, dry fodder, or concentrates? _____ *Yes-1; No-2.*

If no, skip to question 3

2. If yes, fill out the following table

No	Type of fodder	Quantity	Unit	Price per unit	Total value in Rs.
	Code 1	Number	Code 2	Rs	
1					
2					
3					
4					
5					
6					

***Code 1: Green fodder:** Berseem-1; Green jowar-2; Green bajra-3; Maize-4; Cut grasses-5; Other green fodder-6;*
***Dry fodder:** Wheat straw-7; Rice straw-8; Jowar straw-9; Bajra strawa-10; Maize straw-11; Other dry straw-12*
***Concentrates:** Grains bran-13;Grains-14; Oilseeds-15; Oilcakes-16; Compound feed-17;Salt-18; Oils-19; Gur/jiggery-20; Mineral mixture-21.*
***Code 2:** Quintal-1; Kilograms-2; Grams-3; Cart load-4; Tractor-5; Others-6.*

3. Did you spend on veterinary care (vaccinations/ medicines/ inseminations) in the last 12 months? ____*1.Yes 2.No*

4. If yes, how much did you spend? _____Rs

H. Household spending pattern:

H1. In the last 30 days, how much did your household consume the following food and fuel?

Sl. No.	Item	Whether consumed Yes-1 No-2	If purchased			If owned/gifted/received in kind/totally subsidised		
			No	Unit (Code 1)	Amount spent Rs.	No	Unit (Code 1)	Imputed value Rs.
1	Wheat (atta, moida)							
2	Rice							
3	Maize Flour							
4	Bajra (Pearl millet)							
5	Jowar (sorghum)							
6	Other cereals							
7	Cereal products (bread muri chira maida suji noodles)							
8	Rajma							
9	Gram							
10	Dal							
11	Other pulses							
12	Meat chicken fish							
13	Eggs							
14	Liquid milk							
15	Milk Products (ghee, dahi, curd, paneer, milk powder, icecream, sweets)							
16	Apples							
17	Mangoes							
18	Banana							
19	Orange							
20	Melon							
21	Other fruits							
22	Potato							
23	Onion							
24	Tomato							
25	Bhendi							
26	Capsicum							
27	Radish							
28	Cucumber							
29	Peas							
30	Other vegetables							
31	Edible oils and vanaspati							
32	Sugar							
33	Gur/ Other sweeteners							

Unit code: Kilograms-1; Grams-2; Dozen-3; Litres-4; Milli litres-5; NA-6; Others_____(Specify)-7

H 1. How much did your household consume the following items

Sl.No.	Item	Whether consumed Yes-1 No-2	If purchased			If owned		
			No	Unit code 1	Amount spent Rs.	No	Unit code 1	Imputed value Rs.
34	Salt and spices (includes dry chillies, curry powder, oilseeds, etc.)							
35	Other food items like tea, coffee, processed food (such as biscuits, cake, pickles, sauce)							
36	Paan, tobacco, intoxicants							
37	Nuts (coconut, dates, kishmish, monacca, other dried fruits)							
38	Food at restaurants, eating out, etc.							
39	Llight (electricity)							
40	Kerosene / woods							
41	Firewood							
42	LPG cycliner							
43	Entertainment (includes cinema, picnic, sports, club fees, DVDs)							
44	Telephone, Cellphone, internet							
45	Toilet articles (including toothpaste, hair oil, shaving blades, etc)							
46	Household items (including electric bulb, tubelight, glassware, bucket, soap, agarbati, insecticides, etc.)							
47	Conveyance (including railway, bus, taxi, rickshaw, airfares, porter charges, diesel/petrol, school bus, …)							
48	House rent and rent other appliances							
49	Consumer taxes, cess, fees (including water charges)							
50	Non-agricultural staff (domestic servants and others)							
51	Any others							

H 2. In the last one year, how much did your household spent?

Sl. No.	Item	Whether purchased? Yes-1; No-2	If yes, number of times purchased	If yes, how much did your household spent? Rs./year
1	Medical expenses (out-patient services)			
2	Medical (In-patient)			
3	School/private tuition, school books & other educational articles			
4	Men's wear			
5	Ladies wear			
6	Kids wear			
7	Home linen			
8	Footwear			
9	Furniture& fixtures (Bedstead, almirah, suitcase, carpet, paintings etc)			
10	Crockery and utensils (incl casseroles, thermos etc)			
11	Personal care (incl spectacles, torch, umbrella etc)			
12	Therapeutic appliances incl hearing aids, glasses, orthopaedic equipment			
13	Repair &maintenance (residential building and bathroom equipment)			
14	Insurance premiums			
15	Vacations			
16	Social functions (social functions, funerals, gifts etc)			

I. Non-farm family income (for all family members)

1. Income from non-farm enterprise and commerce

1. In the last 12 months, did you have income from a family enterprise or commerce:__*1=Yes 2=No* ***(if no, go to H.2)***
2. How much income did you have in the last 12 months: [_____, _____, _____] Rs
3. How many variable expenses (transport, salaries) did you have for this enterprise in the last 12 months : [_____, _____, _____] Rs
4. Did you have the family enterprise/ business in the year 2008-09? _____*1.Yes 2.No*

I.2. Other income in 2013/14 and 5 years ago

Sl. No	Source	Last 12 months	2008/09	Sl.No	Source	Last 12 months	2008/09
01	Agricultural wage labour			14	Income from selling house/apartments		
02	Non-agricultural labour			15	Income from selling land		
03	MNREGS labor			16	Income from selling durable consumable goods		
04	Salary income			17	Income from remittances		
05	Income from fishery			18			
06	Rental income of leased-out land			19			
07	Rental income (Houses etc)			20			
08	Rental income from farm machinery			21			
09	Rental income farm animals			22			
10	Rental income from autos/jeeps			23			
11	Pension			24			
12	Interest on deposits			25			
13	Interest from lending						

J. Perception of farmers

1. Since when have you been a vegetable cultivator? _____ years

2. How did you learn vegetable cultivation? _____

1=with parents/family, 2=with an employer/working as a laborer, 3=in school, 4=with the help of government extension agents, 5= by observing and discussing with farmers, 6= by experimenting on my own, 7=input supplier; 8=TV/Radio/Magazines/newspapers; 9 =other: _____

3. Do you sell to supermarket?___*1.Yes 2.No* ***(If yes, continue to questions 4,5, and 6. If no, skip to question 7)***

4. If yes, which supermarket do you sell to?

a.Reliance Fresh _____ *1.Yes 2.No* if yes, since when _____ year
b.ITC _____ *1.Yes 2.No* if yes since when _____ year
c.More _____ *1.Yes 2.No* if yes, since when _____ year
d.Heritage Fresh _____ *1.Yes 2.No* if yes, since when _____ year
e.Food World _____ *1.Yes 2.No* if yes since when _____ year
f.Big Bazaar _____ *1.Yes 2.No* if yes since when _____ year
g.Any other _____(please specify) since when _____ year

5. If you are selling to supermarket collection centre, what, in your opinion, are the advantages of supplying to supermarket?

a. Supermarket collection centre is transparent in weighing _____ 1.Yes 2.No
b. I get the payment whenever I ask for it _____ 1.Yes 2.No
c. I can save a lot on transport and transaction costs _____ 1.Yes 2.No
d. It has flexible timing which allows me to work in the field _____ 1.Yes 2.No
e. I get better price for the better quality products _____ 1.Yes 2.No
f. I don't have to go through the hassles of going to mandi _____ 1.Yes 2.No
g. I know the prices and quantity to be delivered before _____ 1.Yes 2.No
h. others _____(specify) _____1.Yes 2.No

6. If you are also selling to the mandi besides selling to supermarket, why do you do so?

a. I produce more than what supermarket demand _____ *1.yes 2.no*
b. Supermarket collection centre buy only top grade produce _____ *1.yes 2.no*
c. Supermarket doesn't procure from me every day _____*1.yes 2.no*
d. Supermarket doesn't provide me with input advance and credit _____ *1.yes 2.no*
e. Other _____specify ***(Now, move to question 10).***

7. If you are not selling to supermarket, why are you not selling it?

a. I am not aware of supermarket procurement _____Yes-1; No-2. ***If yes, skip to question.10***
b. I sold to supermarket before but dropped out later_____Yes-1; No-2. ***If yes, skip to question.8.***
c. I don't want to sell to supermarket _____Yes-1; No-2. ***If yes, skip to question.9***

8.if you sold to supermarket before but dropped out later, why did you do so?

a. The rejection of the supermarket cc is too high _____ *1.yes 2.no*
b. The supermarket delayed in the settlement of payment _____ *1.yes 2.no*
c. The supermarket does not procure regularly _____ *1.yes 2.no*
d. The supermarket does not procure enough _____ *1.yes 2.no*
e. The prices are not attractive given the quality standard demanded _____ *1.yes 2.no*
f. Others (specify)_____

9. if you don't want to sell to supermarket, what are the reasons?

a.My farm is too far from the collection centre. _____ *1.yes2.no*
b.I cannot meet the quality standard specified by the supermarket _____ *1.yes 2.no*
c.The supermarket does not procure regularly and enough _____ *1.yes 2.no*
d. Prices are not attractive given the quality standard demanded _____ *1.yes 2.no*
e. I need credit and input advances which I get from only mandi _____ *1.yes 2.no*
f. Anyway, I have to go to mandi to sell other produce _____*1.yes 2.no*
g. I don't have access to vehicle to go to supermarket cc _____*1.yes 2.no*
h. Others (specify) _____

10. Some information on Rytu bazaar

i. Do you sell to Rytu bazaar? _____*1.Yes 2.no* ***(If no, move to question 11).***
ii. If yes, since when? _____
iii. If yes, how often do you sell to Rytu bazaar? _____*1.Always 2.Regularly 3. Rarely*
iv. Do you have membership card for Rytu bazaar? _____*1.Yes 2.no*
v. How much did you pay for the membership card? _____Rs ___ per 1.monthly. 2. Yearly. 3. 5 yearly
vi. Do you have a stall in Rytu bazaar? _____*1.Yes 2.No*
vii. if yes, do you sell your produce to the retailers yourself? _____*1.yes 2.no*
viii. if no, who do you sell to? *1. informal agent 2.my neighbor farmer 3. Others (specify)*
ix. If no, why don't you sell your produce yourself?

a.there is not enough stalls _____*1.yes 2.no*
b. It is very time consuming _____*1yes 2.no*
c. Informal traders don't allow us to sell on our own _____*1.yes 2.no*
d. I have to work in the field _____*1.yes 2.no*
e. (specify) _____

x. How much do you sell on average? _____number _____*1.Kg 2.Qunitals*
xi. How do you get to know the prices in Rytu bazaar?

1*. i set my own price* 2. *Through auction* ***3****. I speak to other farmers in the bazaar* ***4****. The Rytu committee set the daily prices.* ***5****. Speaking with the retailers* ***6****. The informal agent sets his own price.*

xii. Do you see some advantages of working with Rytu bazaar compared to mandi? _____*1.Yes 2.No*
xiii. If yes, what are these?

a. I don't have to pay the commission fees _____ *1.yes 2.no*
b. I get better prices _____*1.yes 2.no*
c. I can grade myself and sell accordingly _____*1.yes 2.no*
d. there is less wastages _____*1.yes 2.no*
e. There is no rounding off in favour of buyer _____ _*1.yes 2.no*

11. Where do you store your pesticides and chemicals? _____ (Code)
Within the house- 1; Separate store room-2; Farm house-3; Any others-4
12. Did you receive any complaints of product quality in the last three transactions? _____*(Yes-1; No-2)*
13. If yes, what are the complaints

1. _____
2. _____
3. _____

14. Please rank the quality attributes, as you see it:

Attribute	Rank	Attribute	Rank
Freshness		Shape	
Pesticide residue		Smell	
Firmness		Taste	
Colour			
Size			

15. Please inform the following:

a. Distance from nearest collection centre of supermarket _____ kilometers
b. Distance from nearest supermarket collection agent_____ kilometres.
c. Distance from nearest wholesale market_____ kilometers.
d. Distance from nearest fertilizer shop_____ kilometers.
e. Distance from nearest pesticide shop_____ kilometers.
f. Distance from nearest seed shop_____ kilometres.
g. Distance from nearest *Rytu Bazaar*_____ kilometres.
h. Distance from nearest town centre_____ kilometres.
i. Distance from nearest tar road_____ kilometres.
j. Distance from village sarpanch's house_____ kilometres.

16. Do you have pandals for better cultivation of vegetables_____ *1.yes 2.no.*

17. If yes, year of cultivation_____

Area of pandal cultivation_____acres_____guntas,

Total Expenditure_____Rs.

18. Please explain the total expenditure on repairs and maintenance (other than for irrigation)_____ Rs.

19. We would also like to know your opinion on few more issues that may affect the cropping practices and pattern:

a. what are the problems that you face if you want to supply to supermarket collection centre?

1. _____
2. _____
3. _____

b. Is there any changes in technology and cultivation practices in the recent times? _____*1.yes 2.no.*
if yes, what are these?

1. _____

2. _____

3. _____

c. Is there any new crops that were cultivated since the supermarket set up collection centre in the area?

1. _____

2. _____

3. _____

PREFERENCES FOR CONTRACTS

A. BASIC QUESTIONS

1. **Which one of the following do you prefer with reference to harvest timing?**
   a. Harvest timing is decided by (code)_____
      Farmer - 1, Buyer -2, Contractual agreement - 3
   b. Harvest timing is primarily depend on (code/s):_____
      Crop maturity -1, Market demand - 2, Buyer convenience - 3,
      Producer convenience - 4 , Any other_____(specify) -5

2. **Which type of contract do you prefer (code)_____**
      Verbal - 1, Written - 2

3. **Do you prefer the following specifications in contract?** code - Yes - 1, No - 2
   a. Quality :_____
   b. Production process: (organic/inorganic; irrigated or rainfed; pesticides etc.) _____
   c. Quantity _____
   d. Time of sale / harvest time _____

4. **Which contracts do you prefer** (code)_____
      Direct - 1, via producers groups or group of farmers - 2
      via intermediaries (for example: NGO, middleman etc.) - 3
      Any other_____(specify) - 4

INVESTIGATORS OBSERVATION

_____

_____

_____

_____

_____

Investigator:_____ Date of interview:_____

Supervisor/Editor:_____

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