AGRICULTURAL MARKET IMPERFECTIONS AND FARM PROFITABILITY

(Final Report)

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PREFACE

Economic viability of farming and farmers welfare are critical concerns and the current policy priorities are focussed on ensuring a minimum level of income to farmers. To that end, assessing the extent and degree of imperfections in the product and factor markets is extremely important. The present study is a step in that direction.

The study is based on primary data collected from 1800 households spread over 45 villages in 21 districts across four states – Bihar, Gujarat, MP and Punjab. We would like to thank the Ministry of Agriculture & Farmers Welfare (MoA&FW) for giving us this opportunity and for funding and supporting the study. Our special thanks to Shri. P.C. Bodh for initiating the study and Dr. Shrabani Guha for facilitating the study in the later stages. We would also like to thank Dr. P.G. Babu, Mr. Ramesh Yadav and other officials of the Directorate of Economics & Statistics for their continuous cooperation and support.

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AGRICULTURAL MARKET IMPERFECTIONS AND FARM PROFITABILITY
EXECUTIVE SUMMARY

Institute of Economic Growth

Economic viability of farming and farmers well-being continues to be a major concern in the country. The gap between the annual income of an agricultural and non-agricultural worker increased from Rs 25,398 in 1993–94 to Rs 54,377 by 1999–2000. In the next ten years, this gap increased further to Rs 1.42 lakh (Niti Ayog 2020). As per the *Agricultural Census 2015-16*, 86% of the total number of operational holdings in the country were marginal (less than one hectare) and small (1-2 hectares). The current policy priority is focused on ensuring a minimum level of income to farmers, particularly the small & marginal farmers. This requires that the output, factor and input markets in agriculture to be free from any major imperfection. Also, since marginal and small farmers supplement their income through wage labour and dairying, imperfections in these markets also assume vital importance. The present study is an attempt towards examining the imperfections in product, input and factor markets that can have a crucial bearing farm income.

Objectives

The specific objectives of the study are the following

i) to analyze the product markets (output) including price(s) received (market as well as MSP if any), marketing channels, market structure and bottlenecks.

ii) to analyze the input markets including seeds, fertilizer, labour etc with particular attention to costs (of the inputs), market structure and problems in accessing the same

iii) to analyze the government support structure including access to credit.

iv) to analyze the coping strategies of farmers during economic hardships and their social capital.

Methodology

The study has been conducted in four states – Bihar, Gujarat, Madhya Pradesh and Punjab. Multi-stage sampling methodology has been adopted for the study. The first stage unit (FSU) is the district and one district has been selected from each agro-climatic region in the state. The districts are chosen with sufficient consideration of the cropping pattern, such that the cropping pattern varies across the districts. From each district, two villages have been selected with sufficient geographic spread and which are not contiguous. A complete household listing has been carried in the selected villages. From each village a sample of 50 farmers has been selected with representation from each land size category. The households from the land size categories i.e. marginal (<1 hectare), small (1-2 hectares), medium (2.1-4 hectares), large (4.1-10

hectares) and very large (>10 hectares) have been selected using stratified random sampling with PPS method (probability proportional to size), with a minimum of two households from each category. In all 1800 households have been surveyed across four states, 21 districts and 45 villages.

The study explored imperfections in the output, input, factor and credit markets and their possible effect on the erosion of farm profitability. The study also takes into account the asset base, skill endowments, coping strategies of farmers in the face of economic hardships and their social capital. Some of the important government programs have also been analyzed.

A preliminary tabular analysis has been followed with a systematic econometric analysis (Chapter 9) to identify the market imperfections and their plausible determinants, after controlling for state and village level heterogeneity.

Results

The key manifestation of imperfect markets is through an inverse relationship (IR) between farm size and land productivity. This is hypothesized to result from factors like intensive use of family labour on small farms (Sen 1962 and 1966, Rudra 1968, Srinivasan 1972, Bardhan 1973); supervision constraints on large farms (Bardhan 1973, Feder 1985, Eswaran and Kotwal 1986 and Bhalla 1986) and rigidities in land markets (Braverman and Stiglitz 1982, Basu 1983, Feder 1985) and distress sales by small farmers (Bhagawati-Chakravarthy 1969). Given the better access to credit of the larger farmers and the resulting farm investment and mechanization, the output per capita (or income per capita) is expected to increase with farm size (Heltberg, 1998). However, there is some evidence of weakening of IR in India in recent times, due to the effect of technology (Deininger et al. 2018, Barrett et al. 2010) and when total factor productivity measures are used (Rada and Fuglie 2019)

We have tested some of these hypotheses and evidence for IR using the household data.

Our results from the preliminary tabular analysis did not reveal a systematic pattern between farm size and land productivity. However, when we control for all the important factors and the state and village level heterogeneity, a strong IR emerges. This IR appears to be almost entirely driven by an intensive use of family labour on smaller farms. There is little or no evidence of such intensive use in case of any other factor or input. There is also evidence of a binding supervision constraint for larger farms. The *value added per capita* or the *per capita income* increases with the farm size, underlining the possible effect of better access of larger farmers to technology and credit.

In the credit market, the small & marginal farmers are more dependent on the co-operative societies whereas the larger farmers reported better access to banks. Small & marginal farmers reported seasonal unemployment (particularly in Punjab) and financial difficulties as the main reason for non-repayment of loans while larger farmers reported expected loan waivers as the reason for non-repayment. Small & marginal farmers resorted to more drastic measures like reducing consumption expenditure and taking children out of school to cope with economic

risks. They borrow mostly from non-institutional sources, often at very high interest rates. Most of these farmers have a very modest social capital. Awareness about MSP and insurance programs is very low. Claim settlement under crop insurance does not appear satisfactory. In their feedback, farmers stressed the need for government intervention through direct participation in the markets and also regulation of the markets to ensure remunerative prices for their output and affordable prices of inputs.

Policy implications

The following important policy implications emerge from the study

1. Labour market imperfections need to be addressed through expanding rural employment opportunities and land market reforms need to be initiated through easier leasing of land. *The Model Land Leasing Act 2016* (GoI, 2016) may be a good starting point.

2. There is a greater need for improving the functioning of MNREGS and to increase the availability of employment under MNREGS.

3. Strengthening of primary agricultural cooperative societies is necessary for better access to credit of the marginal & small farmers.

4. The moral hazard problem among large farmers in the credit market needs to be addressed.

5. Given the drastic measures by small & marginal farmers in the face of economic hardships, improving their access to consumption credit is extremely important.

6. Awareness about insurance needs to be increased and claim settlement needs to be improved. The inter-state variations in functioning of PM-KISAN have to be addressed. Performance of public extension system, particularly in veterinary services, needs to be improved.

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CHAPTER 1: INTRODUCTION

Policy concerns in Indian agriculture have been changing every decade or so in the last five decades. During the mid-1960s, self-sufficiency in food production was the overarching policy concern in Indian agriculture, which was instrumental in promoting the green revolution. Due to the regional inequalities that emerged in the wake of the green revolution, balanced agricultural growth became the focus of policy in the 1980s. The fiscal burden and the resource degradation due to increasing subsidies; severe stagnation in growth of agriculture and food production for nearly 10 years starting from the mid-199s, led to launch of focused initiatives such as RKVY (Rashtriya Krishi Vikas Yojana) and NFSM (National Food Security Mission) in 2007. NFSA (National Food Security Act) was enacted in 2012 to provide economic access to food respectively. All these measures helped in improving growth and increasing the food production. However, viability of farming continued to be a major concern. The gap between the annual income of an agricultural and non-agricultural worker increased from Rs 25,398 in 1993–94 to Rs 54,377 by 1999–2000. In the next ten years, this gap increased further to Rs 1.42 lakh (Niti Ayog 2020). As per the *Agricultural Census 2015-16*, 68% of the total number of operational holdings in the country were marginal (less than one hectare) and 18% were small landholdings (1-2 hectares). Thus, it is reasonable to expect that this erosion of relative position vis-a-vis non-agricultural workers was more pronounced for the small and marginal farmers.

As per the latest available NSSO estimates, nearly 58% of the rural households in India (about 90.2 million) are agricultural households[1] (*Key Indicators of Situation of Agricultural Households in India*, NSSO, 2014, hereafter referred to as NSSO 2014). Agricultural activity (which includes cultivation, livestock and other agricultural activities) formed the principal source of income for majority of the agricultural households in all the states, except Kerala. However, declining landholding size and the resulting diseconomies of scale pose a serious problem. Wage/salary employment is principal source of income for 56% and livestock for another 23% of the farm households at the lowest rung, owning less than 0.01 hectares (NSSO, 2014). The average monthly income of an agricultural household in 2012-13 was about Rs 6426/-. Of this, nearly 60% accrued from cultivation and livestock while nearly 32 percent came from wage/ salary employment. This is much higher, nearly 62% for smaller landholdings. These statistics show that wage labour and livestock, in addition to cultivation, are critical in maintaining the sustenance of these households.

Thus, to improve the economic condition of farmers, problems related to cultivation, livestock and wage employment need to be addressed. Several initiatives for agriculture have been launched in the country since the mid-1960s which led to self-sufficiency in production. Programs such as PDS and NFSA (National Food Security Act) have made foodgrains available to large sections at affordable prices. However, viability of farming continued to remain a major concern. The current policy priority is focused on ensuring a minimum level

[1]Earning more than Rs. 3,500/- from agriculture and having at least one member employed in agricultural activity during the last 365 days.

of income to farmers. The present government, while assuming office in 2014, had announced doubling farmers' income as one of its major objectives. Important pathways to increase farmers' income are increasing productivity, reducing cost of production and ensuring higher output prices. This requires the output, factor and input markets to be free from any major imperfection. Also, since marginal and small farmers supplement their income through wage labour, labour market imperfections assume vital importance. The present study is an attempt to answer these important questions through an in-depth analysis of the imperfections in the product, input and factor markets.

In the output markets, prices received by farmers vary by the region, season and the marketing channel and have a crucial bearing on a farmer's income. Also, the support received from the government through support prices, procurement, input provision, subsidies and credit can go a long way in mitigating the economic hardship of the farmers.

In the input markets, an estimated 24% is spent on fertilizer and manure; 21% on human labour and nearly 11% on seeds. In the livestock sector, 77% of the expenditure is incurred on account of animal feed. Hence, a careful analysis of these input markets and reduction of costs in these markets is important to improving the viability of crop production and livestock rearing.

Credit is a very vital component of the rural economy. Nearly half of the estimated 90.2 million agricultural households are reported to have been indebted and about a quarter of these households have reported to have borrowed from moneylenders. What is the access to credit sources of different farmer categories – small, marginal etc? What are the bottlenecks in the credit market? These are important issues that need careful examination.

1.2 Objectives of the study

The present study attempts to study some of these important output, input, factor and credit markets and their possible effect on the erosion of farm profitability. The specific objectives of the study are the following

v) to analyze the product markets (output) including price(s) received (market as well as MSP if any), marketing channels, market structure and bottlenecks

vi) to analyze the input markets including seeds, fertilizer, labour etc with particular attention to costs (of the inputs), market structure and problems in accessing the same

vii) to analyze the government support structure including access to credit

viii) to analyze the coping strategies of farmers during economic hardships and their social capital

The rest of the study is organized as follows. In the following sections of this chapter (Chapter 1), we undertake a brief review of the relevant literature, followed by a discussion of the sampling methodology. An overview of the study region including the social-economic characteristics, resource endowments is presented in Chapter 2. This is followed by a detailed discussion of the crop and livestock sectors in terms of the output and input markets in Chapters 3 and 4. Chapters 5 and 6 focus on the factor markets. The functioning of labour and credit markets and the related constraints are discussed in these chapters. A discussion of the insurance market is undertaken in Chapter 7. Chapter 8 focuses on the major problems and specific economic hardships faced by farmers; their social capital base; coping strategies and the government support programs. In Chapter 9, we undertake a systematic econometric analysis to assess the effect of various explanatory variables on important outcomes of interest, namely, land productivity, intensity of labour, intensity of input use, credit etc. Chapter 10 provides a summary of the main results, conclusions and policy implications.

1.3 Literature Review

Markets perform multiple roles. These include distribution of inputs and outputs spatially and temporally, transformation of raw commodities into value-added products and transmission of information and managing of risk (Barret and Mutambatsere 2008). According to the first welfare theorem of neo-classical economics, competitive market equilibria ensure an efficient allocation of resources and hence maximise aggregate welfare. However, in reality agricultural markets in developing countries function far less effectively than what the abstract textbook models assume (Barret and Mutambatsere 2008; Harris-White 1999). The inefficiencies are the result of incomplete or unclear property rights, imperfect contract monitoring and enforcement, high transaction costs and binding liquidity constraints which were not accounted for by the neo-classical theory. Market imperfections defined in terms of deviation from perfect market conditions are a common phenomenon in rural markets of developing countries (De Janvry, Fafchamps and Sadoulet 1991; Holden, Shiferaw and Pender 2001).

Recognising the limitations of the neoclassical economic theory, New Institutional Economics (NIE) has incorporated the ideas of incomplete markets, uncertainty and transaction costs. NIE conceptualised market institutions as a means of minimising costs associated with issues of organising information, transactions and property rights under uncertainty (Bardhan 1989; Williamson 1993 as cited in Ali Jan and Harriss-White 2012).It is important to recognise that agricultural markets in the real world are diverse and complex. Besides acting as price channels, markets are also conduits for inter-sectoral transfer of resources through the distribution of savings and reinvestment of profits and also arenas of exploitation of labour and petty producers (Ali Jan and Harriss-White 2012).

It is well understood that the major goal for agriculture is to improve economic, environmental and social sustainability. Particularly for farm households, economic sustainability is the main concern since like any other activity, the ability to continue in agriculture too depends on the capacity to remain financially viable over time. Farm profitability has critical implications for

farm survival, food security and farmers' welfare (Tey and Brindal 2015). In the context of increasing cost of cultivation and inadequate output price realisation, among others, improving the functioning of factors as well as product market in rural areas is a key concern for the welfare of farm households. Presence of market imperfections would pose constraints on the production and consumption decisions of farm households. In case of imperfections in factor markets, the factor price ratios implicitly faced by the farm households will differ (Brandt 1987). This implies that under the assumption of profit maximisation, optimal factor combinations will differ among farm households along with the output-input ratios (ibid). For instance, if factor markets in rural areas operate effectively, households with small landholdings and unable to absorb the supply of family labour should be able to hire out some of their labour or rent additional land to overcome the constraint (Brandt 1987). However, when land and labour markets function imperfectly, these same households must use their land more intensively by applying more labour and other inputs per unit of land (ibid). Market imperfections are also more likely to adversely affect small and poor farmers than large and rich farmers (Holden and Binswanger 1998). For instance, poor farmers are more probable to be rationed out of credit markets and thus will have less ability to solve their problem through consumption smoothing (coping strategies). Further, poverty is transmitted across generations through imperfect markets (Singh and Binswanger 1988).

To address the inefficiencies created by rural market imperfections, government interventions - in the form of support prices, procurement, input provision, subsidies–also assumes importance. Along with it since market imperfections and constraints are so pervasive for the farm households; they devise strategies to reduce the welfare costs of these market failures with meagre resources at their disposal (De Janvry and Sadoulet2006). Thus, it is important to identify the coping strategies undertaken by the farm households in such an adverse context.
Recognising the existence of rural market imperfections in the product and factor markets, the study tries to understand the functioning of product and factor markets. The extent of government support structures available to the farm households will also be analysed. Furthermore, it is important to understand whether farm households adopt any kind of strategies to cope with the constraints associated with market imperfections and hence maintain steady consumption overtime and maximise their profits. The coping strategies undertaken by the farm households in the face of economic risks will also be identified.
Keeping these objectives in view, the existing studies on rural market imperfections is reviewed.

1.3.1 Rural market imperfections

Rural market imperfections can be viewed in terms of factors such as land, labour and credit; and output markets. Drawing from existing studies on market imperfections, imperfections related to each of the factors, causes for the existence of these imperfections and constraints posed by them on farm households are discussed in brief.

a) Labour market imperfections

To carry out farming activity, while small farms mainly rely on family labour, large farms have to depend on hired labour either on a permanent or a seasonal basis. Family labour being the residual claimant as well as bearer of residual risks is considered to be well-motivated. Hired labour, on the other hand, is considered to require continuous supervision as they do not put in much effort and judgement as family labour (Heltberg 1998). Unlike in case of family labour, supervisory costs are incurred while using hired labour. Along with supervisory costs, there are search and hiring costs incurred for outside workers. Labour market imperfections arise due to moral hazard problems related to hired workers. Further, labour markets may not exist for some or all types of labourer may exist only in certain seasons (Heltberg 1998).

b) ***Land market imperfections***

Land market imperfections are associated with the assumption of sticky operational holding due to imperfect land rental markets and inflexible owned holding due to sales market imperfections. The imperfections in land rental markets arise due to the uncertainty created by ambiguous and inexpedient land reform legislation, by Marshallian inefficiency and by transaction costs (Skoufias 1995 as cited in Heltberg 1998).

There exist certain land reform legislations (for instance 'land to the tiller' legislation) which can make long-term lease contracts in land a risky venture for the landowner. Since the land owners fear that if laws are enforced, the land could be allotted to the tenants. Thus, renting out land is associated with cost associated with the probability of property loss. Such real or perceived risk from land reform can impede the smooth functioning of the land rental markets. Further, Marshallian inefficiency would also cause lower input use and lower profit on plots that involve share tenancy (Cheung 1969; Stiglitz 1974 as cited in Holden, Shiferaw and Pender 2001). Share tenancy, one form of land rental agreement, involves paying of rent as a fixed proportion of the harvest. Under such an arrangement, tenants lack the incentive to invest as compared to an owner-cultivator because the tenant's marginal returns to effort and input are much less than the relevant marginal products (Unal 2012). Thus, fixed rent tenancy and owner cultivation were viewed to be more efficient than sharecropping.

There are studies which had analysed the relative efficiency of different tenurial contracts. Johnson (1950) posited that sharecropping is efficient as it served a functional role of disciplining the tenants. Knight (1957)'s agricultural ladder hypothesis stated that tenancies have a hierarchy based on productivity – the landowners are at the top followed by fixed-rent tenants, sharecroppers and finally the landless labourers are in the bottom rung. According to Cheung (1969), transaction costs differ among tenancies with sharecropping having relatively higher transaction cost (both bargaining and enforcement costs) compared to fixed rent tenancy (bargaining cost) and wage contracts (enforcement costs). However, different levels of risks are related to different forms of tenancy. For instance, in fixed rent tenancy, all the risks are borne by the tenants; in wage contracts, all the risks are borne by the landlord; and risks are equally shared in share tenancy. Despite differing transaction costs, due to the benefits in risks sharing, all forms of tenancy are efficient. Stiglitz (1974) pointed out that where enforcement

cost is high, fixed-rent tenancy is preferred and when the tenant is risk averse, sharecropping is preferred. With an improvement in credit or insurance markets, farmers can manage risks by diversifying their portfolios. Thus share cropping can be expected to disappear. Other explanations for the existence of varied forms of tenancies are related to uncertainty and factor market imperfections in rural areas (Rao 1971; Bardhan 1977). It is argued that in the real world, markets are imperfect, many inputs are indivisible, managerial skills vary across individuals and uncertainty prevails – all these factors either separately or through their interaction may result in the existence of various forms of tenancies (Nabi 1985).

Land sales markets are also subjected to several imperfections. Land sales markets may be thin or non-existent. Land sales markets are distorted for various reasons. For instance, selling of land to outsiders may be restricted in some parts of the world. Crop failure is also a major reason. Although crop failure is a covariate risk (all the households in a geographic region face a similar risk), the richer farmers owning larger landholdings, are able to cope relatively better due to their better access to credit markets and asset position. At the same time, absence of insurance markets and poor access to credit markets necessitate exploring other means of consumption smoothing by the poor households, which leads to distress sales of land, often to the richer farmers of the region. This further distorts the already skewed land distribution in favour of large farmers. Even in times of better harvest, land prices are often much higher than the expected average returns from farming because of the insurance, inflation-hedge, savings, prestige and collateral values of land. This implies that even if credit for land purchases was available, non-farm income would still be needed to service the debt (Binswanger and Deininger, 1997). Thus, because of all these factors, the actual distribution of land is likely to deviate substantially from the optimal distribution that would maximize output or efficiency.

The land rental markets are usually more active than that of land sales market. Imperfections and interventions in land rental and sales markets restrict the farmers from efficiently matching owned and operated farm size to their endowment of family labour and other fixed assets (Heltberg 1998). Access to land is crucial for the well-being of the socially vulnerable groups in terms of sustaining their livelihood as well as cultural and social identity. Hence, a proper functioning of land market (both rental and sales) is important to achieve efficiency and equity and thus, improve the livelihoods of the rural population.

c) Credit market imperfections

Since risks and asymmetric information is inherent in agriculture, the amount of credit supplied to the farm sector is rationed by the formal financial institutions (Heltberg 1998). For the purpose of getting loans, farmers need to submit collateral in the form of land or other fixed assets to the financial institutions. Thus the farm households face liquidity or credit constraint. The lack of access to credit can limit the ability of farmers to rent or purchase the required inputs such as land, labour, fertilisers and so on.

Several theoretical and empirical work have established that the credit market in developing countries work inefficiently due to a number of market imperfections. There are issues of moral

hazard, adverse selection and asymmetric information. To avoid the problem of moral hazard, collateral can be used. However, either due to lack of assets or assets that are hard to collaterize, the lenders will deem the farmers to be less creditworthy (Holden and Binswanger 1998).

d) Product market imperfections

It can be understood that market imperfections include missing markets (an extreme case of market imperfection), partly missing markets (rationing, seasonality), thin markets (imperfect competition) and interlinked markets (Holden and Binswanger 1998; Holden, Shiferaw and Pender 2001). The causes of pervasive market imperfections are covariate risk, asymmetric information, moral hazard and transaction costs.

To overcome the problem of non-existence of a complete set of markets different transactions are undertaken by the same participants in an interlocking system of exchange. As such rural transactions are characterised by interlinkage. The widely observed phenomenon in Indian agricultural markets was that of interlocked factor markets – it is a situation where two markets are locked together in an inter-temporal contract by binding two distinct transactions in one contract (Ali Jan and Harriss-White 2012). The private insurance markets are poorly equipped to address these issues in countries like India, mainly because of the insurer's vulnerability & ruin (Cramer-Lundeberg, 1903, 1930) associated with the large systemic & covariate risk inherent in agriculture and the large transaction costs associated with dealing with millions of small farmers.

Market failures eventually give rise to alternative institutional arrangements for what markets could not provide (Binswanger and Mcintire 1987 as cited in De Janvry et al. 1991). These arrangements could be in the form of extended family system, labour exchange, and share contracts and so on. However, due to lack of clear property rights and imperfect information these arrangements are said to suffer from high efficiency costs. Thus to achieve greater efficiency and welfare, De Janvry et al. (1991) emphasise the need for carefully balancing the relative merits of improved market performance and of improved institutions' performance.

Datta-Chaudhuri (1990) too points out that market failures creates serious obstacles to process of growth in backward economies. The study argues that the focus of the development economists in the 1940s and 1950s was on a limited class of market failures related to investment decisions. Hence, this translated into development policies by the government giving strong emphasis to investment planning. It was believed that once physical capital was put in place, the subsequent problems of production and productivity will be automatically resolved. However, subsequent development experiences and research showed that market failures were associated with the operation of installed capacities, where learning process is of crucial importance. The state can play an important role in building the learning capacity of the economy, by recognising the following two points. One is that though the markets operate inadequately in certain conditions, it does play an important role in disciplining producers against wasteful use of resources. The other is that in a changing environment, the required institutional changes do not always happen automatically. In this regard, the state can promote

and support the right kind of market institutions. In instances where market signals are not effective, appropriate non-market institutions needs to be created. For developing societies, it is important to develop a mutually supportive structure of market and non-market institutions. The state can correct market failures through a mix of market-excluding and market-complementing interventions, in case of commissions and omissions respectively (Dreze and Sen 1995, Sekhar 2005)[2].

Thus there exists a vast literature that has established the presence of imperfections in factor and output markets in rural areas of developing countries and the causes for their existence particularly in terms of high transaction costs and imperfect information. The role of the state has also been rightly emphasised in overcoming market failures. However, most of the studies have dealt with factor market imperfections and product market imperfections disparately. Moreover, the studies focusing on factor markets have emphasised particularly on individual factor markets such as credit, labour or land separately as per the context of their study. Thus, in our study, along with inputs such as land, labour, capital, we would also consider market for indivisible assets such as draft animals/livestock that exist in terms of farm households buying and selling the animals as well as taking it on rent, which was not considered by the existing studies.

1.3.2 Farm household behaviour in the context of rural market imperfections

It is important to understand farm household behaviour in the context of market imperfections. Farm household behaviour can be decomposed into production and consumption decisions (De Janvry, Fafchamps and Sadoulet 1991). The household as a producer chooses the level of inputs and output that maximises their profit. The household as a consumer chooses the levels of consumption (food, leisure and manufactured goods) that maximises their utility. De Janvry, Fafchamps and Sadoulet (1991) argue that market failure, a subcategory of market imperfection, is a feature of the household and not commodity specific. Market fails when transaction cost incurred through market exchange creates disutility greater than the utility gain that it produces. This results in market not being used for transactions. For transaction to occur either an alternative institutional arrangement will emerge as a complete or a partial substitute for what market do not provide or the transaction does not happen at all. Non-existence of market is an extreme case of market failure. Generally, the market exists but the gains for a particular household may be below or above the cost. Thus, some households will use the market while some will not. ‘In general, markets exist, but they selectively fail for particular households, making the corresponding commodity a non-tradable for the household’ (De Janvry, Fafchamps and Sadoulet1991: 1401).

Rural economies are characterised by complex behavioural interactions (Singh, Squire and Strauss 1986). Most of the agricultural households produce partly for sale and partly for self-

[2] Market failure can result from either a commission or omission by the market The error of commission involves doing something detrimental to society’s interests. On the other hand, the error of omission involves omitting to do something that is beneficial to society.

consumption. They also purchase some of their inputs such as labour and fertiliser while some inputs such as family labour are supplied by themselves. Singh, Squire and Strauss (1986) argue for the use of agricultural household models to capture these complex interactions theoretically and empirically rather than traditional approach in which production and consumption decisions are examined separately.

Studies have shown that market imperfections cause the production and consumption decisions of farm households to be non-separable (Holden and Binswanger 1998; De Janvry 2006). Non-separability implies that consumption needs and asset distribution may have significant effect on production decisions. For instance, at the beginning of the production period, farm households are faced with the decision of allocating their resources between current period consumption and purchase of inputs for production and investment. The households who are unconstrained in the capital market can separate their consumption decisions from farm decisions - they can choose production inputs optimally for the production process they face.

In such a situation, the levels of inputs in production and investment will not be affected by the level of credit they receive. However, in case of credit constrained household, they have to choose between the investments they make and inputs they buy depending on the level of credit they receive. This will have an adverse effect on production for the constrained households (Foltz 2004).

Based on the insights from aforementioned studies, the behaviour of farm households under market imperfections can be characterised in terms of their production and consumption decisions being non-separable -- households' decisions regarding production (use of inputs, choice of activities, desired production levels) are affected by its consumer characteristics (consumption preferences, demographic composition and so on) (De Janvry and Sadoulet 2006).

1.3.3 Implications of rural market imperfections for agricultural productivity

Market imperfections have a significant effect on the production and consumption decisions of the farm households. Studies have mainly examined the implications of rural market imperfections on relationship between farm-size and productivity (Heltberg 1998, Holden,Shiferaw and Pender 2001), profitability (Foltz 2004; Foster and Rosenzweig 2010), efficiency (Udry 1996) and sustainability (Holden and Binswanger 1998).

Chayanov (1926) first documented that small farms produced more output per unit of land in Russia, in India by Sen (1962), Bardhan (1973), and Rosenzweig and Binswanger (1993); and in Brazil, Pakistan, and Malaysia by Berry and Cline (1979). Holden and Binswanger (1998) provides an extensive survey of research findings on decision making by small farmers, in the context of market imperfections particularly related to intertemporal markets such as credit and insurance; and risks faced by them. They examine the implications for efficiency and sustainability of natural resource management. They point out that market imperfections are

more likely to adversely affect small and poor farmers than large and rich farmers. They further argue that new policies to stimulate sustainable rural development are required. Such policies can be made effective by building it on an understanding of the decision making environment and behavioural responses of small farmers.

A study by Foster and Rosenzweig (2010) on barriers to farm profitability in India tries to explore the relationship among scale (size of land ownership holdings), credit market, labour use and profitability. Using panel data, their analysis shows that farms with larger owned landholdings are more mechanised, use less labour per acre and have higher profitability per acre and also face lower credit cost.

Heltberg (1998) uses the framework of land, labour, credit and risk market imperfections to explain the size-output and size-profit relationship of farm households in Pakistan. The study has used three different output variables: farm value-added (crop and livestock output less all cash inputs), return to owned land (farm value-added plus rental payment received for land rented out) and crops profits (the value of crop production less cash inputs and family labour). Their study shows the presence of an inverse size-output relationship.

The study by Udry (1996) on efficiency and market structure in the context of African countries found evidence of imperfections in land and labour markets in Kenya and of imperfections in capital and insurance markets in Burkina Faso. As illustrations, the study focuses on labour and land market imperfections and its effect on efficiency.

Foltz (2004) explores the effect of access to capital on agricultural profits and investment with respect to Tunisian agriculture. The study uses net revenue (pseudo-profit) function in order to account for possible imperfections in capital, land and labour markets. Credit market constraints did have a negative effect on farm profitability. It was found that better access to credit market will improve the profitability of larger number of farmers, though not necessarily the poorest. An improvement in access to credit would have a significant effect on the land market as well in terms of increased demand for buying or renting of land.

Holden, Shiferaw and Pender (2001) analyses how market imperfections affect land productivity in a degraded low-potential cereal-livestock economy in the Ethiopian highlands. They use three different selection models and two least squares models with HCCME (HC3) correction of standard errors to test whether there are significant market imperfections affecting land productivity at the farm plot level. Empirically, they test whether land productivity at the plot level is a function of owned farm size, household (male and female) labour force per unit of land and owned oxen per unit of land. If any of the variables are significant, it indicates the presence of factor market imperfections and significant transaction costs. However, if the factor endowments are insignificant, it would indicate that the factor markets function reasonably well or the factors are in abundant supply for all. Their analysis shows that there are significant market imperfections in labour and land markets and these imperfections affect plot level land profitability. They found that land productivity increased with household labour force but they did not find a significant inverse farm size- land productivity relationship.

Due to the effect of market imperfections on production and consumption decisions, on the one hand, it would affect the profitability of the farm households in terms of the factor mix that they use and on the other hand, it would affect the ability to undertake consumption smoothing (coping strategies) by the households.

1.3.4 Studies on India

There is a vast amount of literature on rural market imperfections in India. The patterns observed in other parts of the world were witnessed in India as well. The inverse relationship between land size and land productivity on one hand and the direct relationship between land size and labour productivity on the other (Khusro 1964, Sen 1962 and 1966, Rudra 1968, Bhagawati-Chakravarthy 1969, Srinivasan 1972, Bardhan 1973, Heltberg 1998) are now well-established in literature and have become the *stylized facts*.

The result that small farms produced more output per unit of land was first noted in India by Sen (1962), Bardhan (1973), and Rosenzweig and Binswanger (1993); and in Brazil, Pakistan, and Malaysia by Berry and Cline (1979). This inverse relationship (IR) was puzzling as there was considerable evidence at the time that found constant returns to scale for agricultural production in different countries (e.g., Hayami and Ruttan 1970; Bardhan 1973; Berry and Cline 1979; Fulginiti and Perrin 1993). Also, if IR existed and markets functioned perfectly then farmers would subdivide their lands and increase productivity, thereby eventually eliminating IR. Thus understanding this phenomenon has important policy implications for addressing market imperfections (Assuncao and Braido 2007). Thus, the first strand of literature focussed mainly on this aspect. Initially the focus was on single market failures. Chayanov (1926), Sen (1962), Carter (1984), and Carter and Wiebe (1990) found that peasant households applied family labour more intensively because the opportunity cost of their time is low. Sen (1962) proposed 'labour dualism' based on a Malthusian explanation to understand this. The missing labour markets for women and children, non-clearing labour markets due to low wage rates (below the reservation wage) and lower skill endowments of rural labour (that prevent them from moving to urban occupations) are some of the factors considered responsible for this intensive application of family labour on small farms. This, *ceteris paribus,* leads to *higher land productivity,* because of the better quality and commitment of family labour (in comparison to hired labour). However, given that there are limits to increasing land productivity beyond a certain threshold and due to better access to credit of large farmers which results in higher farm investment and mechanization, the *output/income per capita* is expected to be higher on large farms. *Thus, the output per unit land is inversely proportional and output per capita is directly proportional to the land size.*

Now the natural question that arises is the following. Why can't the small farmers augment their landholdings through land leasing or purchase, so that they can realize higher per capita incomes? This led to hypothesis of multiple market failures in the factor and product markets as the reason for IR and the resulting inter-linkages among these markets (Braverman and

Stiglitz 1982, Basu 1983, Feder 1985). Feder (1985) noted that a single market failure is insufficient to generate the inverse relationship. Under constant returns to scale, there need to be multiple market failures simultaneously to prevent land subdivision and distort the shadow price of labour and some other factors. If imperfections in the labour market cause the peasant's shadow price of time to differ from the market wages, and if failures in the land or/and rental markets prevent them from augmenting their landholdings, then an inverse relationship is a very likely possibility. Thus, imperfection (failure) of land markets has come to be considered as the additional factor for IR. Labour supervision costs (Bardhan 1973, Feder 1985, Eswaran and Kotwal 1986, and Bhalla 1986) and distress sales by small farmers (Bhagwati and Chakravarty 1969) were further added to the list of possible factors for IR.

The multiple markets failures are also hypothesized to result in inter-linkages among markets. In the Indian context, it was initially confined to sharecropping contracts but was later extended to relations between traders and moneylenders to explain a range of contracts they make with farmers and labour. These interlocked markets existed as a response to reducing risks and uncertainties inherent in agrarian production and minimising transaction costs in the context of incomplete or non-existent markets (Bardhan 1980; Bardhan 1983; Bardhan 1989).

Basu (1983) looks into the reasons for the emergence of isolation and interlinkage in rural markets in underdeveloped economies. He analyses the relationship between landlord and labour in rural market. The presence of potential risk in credit markets (referred to the risk of default if a loan is given to a carelessly chosen borrower) is argued to give rise to interlinkage in the rural markets. Lender’s risk hypothesis cannot explain the presence of usurious interest rates in the rural areas. Studies have challenged this hypothesis based on the empirical evidence that rural landlord faces very little risk while giving loan to the borrower as loans are repaid in terms of confiscated land or bonded labour, even if not in cash (Bhaduri 1977; Roth 1979 as cited in Basu 1983). The landlord ensures that the debtor is one over whom he has control, thus there is no risk of default when the landlord gives a loan. Further, the presence of potential risk also results in isolation. A labourer who is charged exorbitant interest rate by his landlord cannot go to another peasant’s landlord for his loan. Another landlord will not give him a loan because there is a chance of default by the peasant over which this landlord has no control. In such as case, government intervention could ensure that the peasants always had to repay their debts along with interest rates. This could result in breaking down of isolation and the lowering of interest rates. However, since such government intervention does not exist, the only option left to the peasant to avoid paying high rate of interest is to persuade another landlord to employ him and thus make a switch to this landlord. The worth of the switch would depend jointly on the interest charged by the landlord as well as the wages that the landlord is willing to offer.

Land quality and not market imperfections, was proposed as a major factor for the existence of IR by Khusro (1964). He showed in an important study, how adjustments for land quality diminish and even eliminate IR. Khusro's study was based on highly aggregate land productivity and land tax revenue (i.e. land quality) data. Since adjustments to land taxes are conducted only at long intervals, often spanning more than a decade, it is very difficult to verify Khusro's results with farm level data. Study by Carter (1984) is on similar lines and finds that

the inverse relationship weakens when intra-village soil quality differentials are included but inter-village differences do not change IR. Carter's findings, however, remain unconvincing mainly because direct data on soil quality is absent in his study. Bhalla and Roy (1986) and more recently Assuncao and Braido (2007) find that market failures and household level heterogeneity are not adequate to explain IR and unobserved factors such as soil quality are the more likely determinants.

According to several studies, concerns related to risk could generate the inverse relationship (Srinivasan 1972, Rosenzweig and Binswanger 1993, and Barrett 1996). Srinivasan (1972) has theoretically shown that under considerations of uncertainty, and no imperfections in input markets it would be optimal for a small farmer to apply more labour and achieve a higher land productivity than a larger farmer.

There is some evidence of weakening of these inter-linkages, particularly of the IR in India in recent times, due to the effect of technology (Deininger et al. 2018, Barrett et al. 2010) and when total factor productivity measures are used instead of partial measures of productivity (Rada and Fuglie 2019). Based on the foregoing analysis, the effects of different types of market failures on small and marginal farmers are summarized in *Table 1.1*

1.4 Sampling methodology

The study has been conducted in four states – Bihar, Gujarat, Madhya Pradesh and Punjab. Given the study objectives, it is important to study the functioning of the markets and their imperfections in different agro-climatic and socio-economic settings. Thus, a multi-stage sampling methodology has been adopted for the study. The first stage unit (FSU) is the district. One district has been selected from each agro-climatic region in the state. The districts are chosen with sufficient consideration of the cropping pattern, such that the cropping pattern varies across the districts. From each district, two villages are selected with sufficient geographic spread and which are not contiguous. A complete household listing has been carried in the selected villages. If a village is very large (>500 household s), listing of at least 300 households, from all the locations in the village, has been carried out. The village listing thus carried out formed the sampling frame for the study. From each village a sample of 50 farmers has been selected with representation from each land size category. The households from the land size categories i.e. marginal (<1 hectare), small (1-2 hectares), medium (2.1-4 hectares), large (4.1-10 hectares) and very large (>10 hectares) have been selected using stratified random sampling with PPS method (probability proportional to size), with a minimum of two households from each category. Details of the villages and the number of households in each village are presented in *Table 1.2.*

Table 1.1: Effect of market imperfection on small and marginal farmers

Market imperfection	Production / Consumption	Effects on small and marginal farmers
Land	Production	Lack of ability to reap of economies of scale in production, marketing lack of access to credit (collateral) and insurance markets; absence of an inflation hedge Lower per capita output
	Consumption	Lack of access to credit (collateral) from institutional and non-institutional sources (mortgage); large transaction costs due to adverse selection and asymmetries of information etc.
Labour	Production	Intensive use of labour per unit of land which leads to *higher output per unit of land but lower profitability at market wages*; no supervision costs since family labour is motivated.
	Consumption	Leads to *lower output per person* and *lower profitability at market wages*; leads to outmigration of male members and increases workload and drudgery for women.
Credit	Consumption smoothing	Leads to distress sales of land and livestock. Distress land sales lead to further skewing of land distribution in favour of large farmers. Distress sales of livestock exacerbate poverty. Increases drudgery for women as they need to undertake wage labour to supplement income
	Production	Cannot reap scale economies by augmenting land through lease or purchase cannot attain higher productivity through intensive use of inputs
Insurance	Production	Makes subsistence a priority. Inhibits high return but risky crops, thus making production and consumption non-separable (DeJanvry and Sadoulet 2006).
	Consumption	Increase vulnerability of poor households to idiosyncratic shocks, such as crop failure, illness or death

Source: Author's compilation

Table 1.2: List of Villages in the study

	State	District	Village	Number of sample households
	Bihar	Begusarai	Kesabe	50
			Korai	50
		Bhagalpur	Kurpat	50
			Rangra	50
		Katihar	Nabaganj	50
			Narayanpur	50
	Gujarat	Ahmedabad	Sahij	50
			Vanch	50
		Banas Kantha	Moti Pavad	50
			Vasana	25
			Vasana-Vatam	25
		Bharuch	Umalla	50
		Bhavnagar	Otha	50
		Botad	Shirvaniya	50
		Jamnagar	Haripar	50
			Theba	50
		Kheda	Heranj	50
			Savali	50
		Mahisagar	Janod	50
			Limbadiya	50
		Navsari	Vad	50
		Surat	Kumbhari	50
		Tapi	Kikakui	50
	MP	Balaghat	Butte Hajari	50
			Merigaon	50
		Hoshangabad	Gadariya	50
			Rampura	50
		Ujjain	Badgama	50
			Palduna	50
		Vidisha	Badkhera Gambheer	53
			Badkhera Kachwa	47
	Punjab	Bathinda	Ghuman Kalan	50
			Kararwala	50
		Hoshiarpur	Asalpur	2
			Khun Khun Khurd	7
			Khusrpur	2
			Lachowal	16
			Madiala	3
			Nainowal Vaid	36
			Pathial	7
			Rampur	10
			Sherpur	13
			Sikri	4
		Moga	Bhinder Khurd	50
			Chuhar Chak	50
Total	**4**	**21**	**45**	1800

Details of the methodology adopted in each of the four states are given below.

Bihar

In Bihar, there are three agro-climatic zones, viz., zone I, zone II, and zone III (comprising IIIA & IIIB). Districts in zone I are Siwan, Gopalganj, Saran, Bettiah, Motihari, Vaishali, Muzaffarpur, Sheohar, Sitamarhi, Madhubani, Darbhanga, Samastipur and Begusarai (13 in number). Zone II consists of eight districts, namely Purnia, Katihar, Madhepura, Kishanganj, Saharsa, Supaul, Khagaria and Araria. Zone III covers districts namely Bhagalpur, Banka, Munger, Jamui, Lakhisarai and Sheikhpura (falling under III – A), Patna, Jehanabad, Nalanda, Aurangabad, Kaimur, Buxar, Gaya, Nawada, Ara, Sasaram and Arwal under III – B, i.e., total 17 districts formed part of Zone – III. Thus, total number of districts in Bihar is 38.

Three districts, one each from the three agro-climatic regions, i.e.; Zone I, II and III have been chosen such that the cropping pattern varied across the districts. The three selected districts are Begusarai, Katihar and Bhagalpur from Zone – I, II and III respectively. At the second stage of sampling, from each district, two villages have been selected with sufficient geographic spread. From each village, sample of 50 farmers has been taken with representation from each land size category (LSC). In this way, the total sample size in Bihar
is 300
Table ***1.3***.

Table 1.3: Details on sample districts, villages and sample households in Bihar

Slno.	Agro-climatic zone	Districts	Villages	Sample hhs
1	I. North-West Alluvial Plain	Begusarai	Keshavai (Kesabe) & Korai	100
2	II. North-East Alluvial Plain	Katihar	Nawabganj & Narayanpur	100
3	III. South-Bihar Alluvial Plain	Bhagalpur	Rangara & Kurpat Baizalpur	100
	Total	03	---	300

Gujarat

In Gujarat the villages that were selected for the block year 2017-2020 under the Government of India's scheme for the data collection on cost of cultivation (Comprehensive Scheme for Studying the Cost of Cultivation of Principal Crops in Gujarat)[3] of major crops in Gujarat have

[3] Under the Comprehensive Scheme for Studying the Cost of Cultivation of Principal Crops (CCS) in Gujarat, from eight Agro-climatic zones, total sixty village clusters have been selected from selected 60 talukas of 33 districts of the state (on the basis of area under selected crops) for collection of primary data on cost of cultivation of 16 principal crops in the state. This data is collected for all three agriculture seasons (Kharif, Rabi and Summer) every year through the field staff appointed at each cluster. The selection of number of clusters from different Agro-Climatic Zones is based on the share of area under selected crops together to gross cropped area in the state, i.e., higher the share in GCA of particular zone, higher the number of clusters selected from the corresponding zone. The selection of talukas and subsequent village/s from that talukas are based on the data related to area under study crops, area sown more than once, irrigation availability, livestock and mechanization,

been covered. The selection procedure suggested by the Ministry of Agriculture, Government of India in Cost of Cultivation Scheme is adopted as given below:

The State is divided into 8 homogeneous agro-climatic zones based on cropping pattern, soil type rainfall pattern etc. At the first stage, all 246 taluka/tehsils in the State were arranged in 8 Agro-climatic zones (as one district may fall under more than one ACZ). The districts, villages and households have been selected as per the broad methodology outlined at the beginning of this section. In all 800 households were selected from the state (Table 1.4). The selected farmers were surveyed with a pre-tested schedule. Households in the category of large (4.1-10 hectares) and very large (>10 hectares) were not available in some selected districts (in South Gujarat region such Bharuch, Navsari and Tapi district), while in other district, share of very large famer households was very small or nil). In such cases, households from the nearby category were included.

Table 1.4: Details on sample districts, villages and sample households in Gujarat

Slno.	Agro-Climatic Zones		Districts	Talukas	Villages	Sample hhs
1	I	South Gujarat (Heavy Rain Area)	Navsari & Tapi	Khergam & Songadh	Vad & Kikakui	100
2	II	South Gujarat	Surat & Bharuch	Olpad & Jagadia	Khumbhari & Umalla	100
3	III	Middle Gujarat	Mahisagar	Khanpur & Balasinor	Limbadiya & Janod	100
4	IV	North Gujarat	Kheda	Mahudha & Kapadvanj	Heranj & Savali	100
5	V	North West Gujarat	Banaskantha	Tharad & Lakhani	Vasana-Vatam & Moti Pavad	100
6	VI	North Saurashtra	Bhavnagar & Botad	Mahuva & Botad	Otha & Shirvaniya	100
7	VII	South Saurashtra	Jamnagar	Dhrol & Jamnagar	Haripar & Theba	100
8	VIII	Bhal & Coastal Area	Ahmedabad	Dholka & Daskroi	Sahij & Vanch	100

Madhya Pradesh

The methodology outlined at the beginning of this section has been followed. The details of the district, blocks, villages and the number of households are given in Table 1.5. In all, 400 households were included in the study and the number of households from the marginal, small, medium, large and very large land size categories were 87, 117, 124, 51 and 27 respectively.

village accessibility and other parameters. Village-wise approximate area under crop is collected from Taluka Agriculture Officer of respective tehsil.

Table 1.5: Details on sample districts, villages and sample households in Madhya Pradesh

Slno	Districts	Blocks	Crops Selected	Villages	Sample hhs
1	Hoshangabad	Hoshangabad and Seonimalwa	Wheat	Rampura, Gadaria	100
2	Balaghat	Balaghat	Rice	Bhuttehazari, Merigaon	100
3	Ujjain,	Ujjain and Badnagar	Soybean	Paldhuna, Badganwa	100
4	Vidisha	Vidisha andGulabganj	Chick Pea	Badkhera Kachwa, Badkhera Gambheer	100
Total					**400**

Punjab

Punjab comprises of three broad agro-climatic regions (Table 1.6). Following the broad methodology outlined at the beginning of this section, a sample of 300 households has been selected. In the first stage, three districts - Moga, Bathinda and Hoshairpur, representing each agro-climatic region of the state were selected randomly. Moga district represents the central plain zone, while Bathinda and Hoshairpur represent southwestern plain zone and the sub-mountain undulating zone of the state respectively. The districts were chosen with sufficient variation in the cropping pattern. In the second stage two villages were selected with sufficient geographic spread from each district. Finally, from each of the selected village /or cluster, 50 households were selected using PPS method. Thus, a total sample of 300 farmer households comprising 103 marginal, 102 small, 52 medium, 35 large and 8 very large farmers formed the basis for the present study.

Table 1.6: Details on sample districts, villages and sample households in Punjab

Agro-climatic regions	District	Village/Cluster	Size	Sample hhs
Central plain zone	Moga	**Chuhar chak**	Marginal	14
			Small	15
			Medium	13
			Large	6
			Very large	2
			Total	50
		Bhinder Khurd	Marginal	12
			Small	15
			Medium	8
			Large	13
			Very large	2
			Total	50
	Bathinda	**Kararwala**	Marginal	17
			Small	14
			Medium	10
			Large	8

South-western plain zone			Very large	1
			Total	50
		Ghuman kalan	Marginal	20
			Small	18
			Medium	7
			Large	4
			Very large	1
			Total	50
Sub-mountain undulating zone	Hoshiarpur	**Cluster-I (Lachowal,Pathial,Sherpur, Khun khun khurd,Madiala,Asalpur and Khusrpur)**	Marginal	20
			Small	18
			Medium	9
			Large	2
			Very large	1
			Total	50
		Cluster-II (Nainowal vaid,Rampur and Sikri	Marginal	20
			Small	22
			Medium	5
			Large	2
			Very large	1
			Total	50
	Total Sample size		Marginal	103
			Small	102
			Medium	52
			Large	35
			Very large	8
			Total	300

CHAPTER 2: OVERVIEW OF THE STUDY REGION

The study was conducted in the four states of Bihar, Gujarat, Madhya Pradesh (MP henceforth) and Punjab. Data was collected from 300 households each in Bihar and Punjab and 800 and 400 households in Gujarat and MP respectively.

The analysis was done with respect to various socio-economic characteristics as well as input and output markets across the different landholding categories. The landholding categories considered are marginal (less than 1 ha), small (1 to 2 ha), medium (2 to 4 ha), large (4 to 10 ha) and very large (above 10 ha).

Relevant patterns evident from the analysis are presented for the overall sample (i.e., all the states taken together) and each of the sample states.

2.1 Socio-economic characteristics

Distribution of households across the landholding categories (Table 2.1)- The overall sample showed that majority of the households belonged to the marginal landholding category (34 percent). This was followed by households with small (30 percent), medium (22 percent), large (11 percent) and very large (3 percent) landholdings. While Bihar and Gujarat had the same pattern as the overall sample with majority of households being in the marginal landholding category (43 percent-Bihar and 39 percent- Gujarat), it was different in case of MP and Punjab. In MP, 30 percent of the households belonged to medium category and in Punjab, 31 percent belonged to small landholding category.

Operational landholding (Table 2.2)- The average landholding size was highest in MP (3.34 ha) followed by Punjab (3.22 ha), Gujarat (2.10 ha) and Bihar (1.84 ha). Across the landholding categories, the average size of landholding in marginal category was lowest in Gujarat (0.61 ha) and highest in Punjab (0.70 ha). In Bihar and MP, the average landholding size in the marginal category was 0.64 ha and 0.65 ha respectively. For the small category, average landholding size was highest in Bihar (1.52 ha) followed by Gujarat (1.49 ha) and lowest in Punjab (1.38 ha) and MP (1.40 ha). In case of medium category, the average size of landholding was lowest in Punjab (2.52 ha) followed by Bihar (2.62 ha), MP (2.69 ha) and Gujarat (2.90 ha). In the 'large' category, Bihar had the lowest average landholding size (5.52 ha) followed by MP (5.62 ha), Punjab (5.82 ha) and Gujarat (5.96 ha). In the 'very large' category, the average landholding size was lowest in Bihar (11.10 ha) while it was highest in MP (17.15 ha) and it was 16.08 ha and 12.75 ha in Gujarat and Punjab respectively.

While all the operational land in Punjab was irrigated, average unirrigated land was highest in Bihar (0.3 ha) followed by Gujarat (0.14 ha) and MP (0.12 ha).

Social group (Table 2.3) – In the overall sample, 47 percent of the households belonged to OBC category followed by general (37 percent), SC (8 percent) and ST (7 percent). The trend was the same across all the landholding categories exception being medium landholding category wherein there was almost same percentage of households in the general (47 percent) and OBC (46 percent) group. Turning to individual states, Bihar too had majority of households in the OBC category (73 percent) followed by general (24 percent) and a small percentage of SC (3

percent) and ST (1 percent). Within each of the landholding categories, majority of households belonged to the OBC group. Exception was the 'very large' category wherein 80 percent of the households belonged to general group. Further, it is important to note that the small percentage of SC and ST households in the sample were mostly concentrated in the marginal (SC- 4 percent; ST – 1 percent) and small landholding (SC- 2 percent; ST – 1 percent) category. These trends indicate that the distribution of large farms was skewed in favour of general category.

In Gujarat, an almost equal percentage of households were in the general (38 percent) and OBC (37 percent) groups, followed by ST (14 percent) and SC (11 percent). Majority of households in the 'very large' (71 percent), 'large' (55 percent) and 'medium' (50 percent) landholding categories belonged to the general group. The marginal landholding category mostly belonged to OBC group (40 percent) and an almost same percent of households within the small landholding category belonged to general (38 percent) and OBC (39 percent) group. While none of the households in the 'very large' landholding category were from SC or ST group, it was households in the marginal (SC- 17 percent; ST – 16 percent) and small landholding categories (SC- 8 percent; ST – 15 percent) that had majority of SC and ST groups.

In MP, majority of the households belonged to OBC (78 percent) followed by SC (9 percent), general (8 percent) and ST (4 percent). The trend was the same across the landholding categories too. The meagre percentage of SC and ST households in the sample were mostly concentrated in the marginal (SC- 12 percent; ST- 6 percent) and small landholding (SC- 12 percent; ST- 9 percent) category.

From the foregoing analysis of the landholdings in the sample region, the marginal and small farmers mostly were from the SC and ST category while the large farmers mostly consisted of general category households.

Principal occupation *(*Table 2.4*)*- In the overall sample, the principal occupation of majority of the households was cultivation (97 percent). Within each of the landholding categories too, over 90 percent of the households were mainly engaged in cultivation as their primary occupation. At the state level, the entire sample households (100 percent) in Bihar and MP were engaged in cultivation. This was so for the total sample as well as across the landholding categories in each of these states. In Gujarat, 94 percent of the households were engaged in cultivation as their primary occupation. The pattern was similar across the landholding categories. Exception was the marginal landholding category wherein 90 percent of the households were engaged in cultivation, whereas the remaining was engaged in self-employment, salaried employment, dairy and agricultural labour. In Punjab too, 94 percent of the households had cultivation as their primary occupation followed by salaried employment (4 percent) and non-agricultural wage labour (2 percent). Across the landholding categories, all the households (100 percent) in the 'very large', 'large' and 'medium' landholding category were engaged in cultivation as their primary occupation. In the marginal category, 83 percent of the households had cultivation as their primary occupation followed by salaried employment (10 percent), non-agricultural wage labour (6 percent) and remittance (1 percent). The households in the small landholding category were engaged in cultivation (96 percent) and salaried employment (4 percent).

Thus, cultivation is the predominant occupation for medium, large and very large categories in our sample regions while marginal and small farmers seem to supplement cultivation with wage labour and other sources of income.

Livestock owned *(*Table *2.5)*– In the overall sample, an equal percentage of households (38) owned milch cows and milch buffaloes followed by bullocks (13 percent), pigs (9 percent) and goats (2 percent). The pattern was similar across the landholding categories, except that none of the households in the 'very large' and 'large' categories owned goats while those in the 'marginal', 'small' and 'medium' category owned goats (3 percent, 2 percent and 1 percent respectively).

Turning to individual states, 80 percent of the households in Bihar owned milch cows followed by milch buffaloes (11 percent), goats (7 percent) and bullocks (2 percent). The pattern of livestock possession across the landholding categories was varied. All the 5 households (100 percent) in the 'very large' category owned only milch cows and none of the other livestock such as milch buffaloes, bullocks and goats. The households in the 'medium' and 'large' category had milch cows (91 and 87 percent respectively) and milch buffaloes (9 and 13 percent respectively). Households in the marginal and small category also owned bullocks (3 and 2 percent respectively) and goats (10 and 9 percent respectively) along with milch cows (76 and 77 percent respectively) and milch buffaloes (11 and 13 precent respectively).

In Gujarat, majority of the households had milch buffaloes (49 percent) followed by milch cows (35 percent) and bullocks (16 percent). Across the landholding categories too, the pattern of livestock possession was the same. Exception was the 'very large' category wherein households owned higher percentage of milch cows (50 percent) compared to milch buffaloes (36).

In MP, majority of the households owned milch cows (47 percent) followed by milch buffaloes (35 percent), bullocks (12 percent) and goat (6 percent). Within the landholding categories, while milch cows, milch buffaloes and bullocks were owned by the households in all the landholding categories, goats were mostly owned by those in the marginal, small and medium category.

In Punjab, 34 percent of the households owned milch buffaloes followed by milch cows (24 percent), bullocks (12 percent) and pigs (30 percent). The pattern was the same across the landholding categories, except that possession of bullocks was much higher in case of 'very large' (24 percent) and 'large' (23 percent) unlike those in the marginal (4 percent), small (6 percent) and medium (9 percent) categories.

Thus, milch animals appear to be predominant livestock asset in our sample regions in the higher land categories while small ruminants are owned mostly by the small and marginal farmers. Punjab appears to be an exception though where large farmers seem to own relatively more number of bullocks.

Farm machinery/equipment possessed (purchased/shared/taken on rent) *(*Table *2.6)*: In the overall sample, 27 percent of the households possessed electric pumps followed by

borewell (20 percent), tube well (18 percent), tractor/tractor trolley/tiller (14 percent), diesel pump (12 percent), bullock cart (5 percent) and thresher (4 percent). Across the landholding categories, majority of households in the 'very large' and 'large' category possessed tractor/tractor trolley/tiller (23 percent respectively), which is on the expected lines. Households in the marginal category mostly possessed tubewell (31 percent) while those in the small and medium category mostly had electric pump (29 percent respectively).

In Bihar, majority of the households possessed tubewell (42 percent) and an equal percentage of households had borewell and diesel pump (24 percent each). Irrespective of the landholding categories considered, an almost equal percent of households possessed tubewell, borewell and diesel pump. Exception was the marginal category where tubewell was possessed by 87 percent of the households. Farm equipment such as tractor/tractor trolley/tiller (18 and 19 percent respectively), thresher (19 percent each) and combine harvester (1 and 4 percent respectively) was possessed mostly by households in the 'large' and 'very large' category.

In Gujarat, majority of the households possessed borewell (31 percent) followed by electric pump (29 percent) and an equal percentage of households had tubewells and tractor/tractor trolley/tiller (13 percent each). Tactor/tractor trolley/tiller (25 and 24 percent respectively), borewell (21 and 24 percent respectively) and electric pump (21 and 24 percent respectively) were the main equipment possessed by majority of the households in the 'very large' category and 'large' category. For the households in the 'marginal', 'small' and 'medium' category, it was borewell (36, 35 and 28 percent respectively) and electric pump (29, 32 and 28 percent respectively) that was mostly possessed by them.

In MP, electric pump was the main equipment possessed by majority of the households (34 percent). The pattern was the same for households across the landholding categories. Bullock cart was mostly possessed by households in the 'marginal' (6 percent), 'small' (10 percent) and 'medium' (5 percent) category while equipment such as tractor/tractor trolley/tiller and thresher was possessed by all the landholding categories, proportion was higher in case of 'large' (18 and 20 percent respectively) and 'very large' (12 and 16 percent respectively) categories.

Unlike other states, households in Punjab reported possession of mainly three types of farm equipment, namely, electric pump (50 percent), tractor/tractor trolley/tiller (36 percent) and bullock cart (13 percent). The pattern was the same across the landholding categories too. Except that a higher proportion of households in the 'large' (24 percent) and 'very large' (26 percent) category were possessing bullock cart as compared to those in the 'marginal' (6 percent), 'small' (7 percent) and 'medium' (10 percent) category. This is consistent with our observation that a relatively larger proportion of 'large' and 'very large' farmers possessed bullocks. Further, unlike in other states, possession of tractor/tractor trolley/tiller was highest in medium category (40 percent) compared to 'large' (38 percent) and 'very large' (35 percent). Even 29 percent of the households in the 'marginal' and 34 percent of the households in 'small' category reported possession of tractor/tractor trolley/tiller.

SUMMARY OF THE CHAPTER

Household characteristics and endowments

1. The overall sample showed that majority of the households belonged to the marginal landholding category (34 percent). This was followed by households with small (30 percent), medium (22 percent), large (11 percent) and very large (3 percent) landholdings.

2. The average landholding size was highest in MP (3.34 ha) followed by Punjab (3.22 ha), Gujarat (2.10 ha) and Bihar (1.84 ha).

3. 47 percent of the households belonged to OBC category followed by general (37 percent), SC (8 percent) and ST (7 percent). The marginal and small farmers mostly were from the SC and ST category while the large farmers mostly consisted of general category households

4. The principal occupation of majority of the households was cultivation (97 percent). Within each of the landholding categories too, over 90 percent of the households were mainly engaged in cultivation as their primary occupation. In Bihar and MP all the sample households (100 percent) were engaged in cultivation.

5. However, cultivation is the predominant occupation for medium, large and very large categories while marginal and small farmers seem to supplement cultivation with wage labour and other sources of income.

6. Milch animals is the predominant livestock asset in our sample regions in the higher land categories while small ruminants are owned mostly by the small and marginal farmers. Punjab appears to be an exception though where large farmers seem to own relatively more number of bullocks.

7. In the overall sample, 27 percent of the households possessed electric pumps followed by borewell (20 percent), tube well (18 percent), tractor/tractor trolley/tiller (14 percent), diesel pump (12 percent), bullock cart (5 percent) and thresher (4 percent). Across the landholding categories, majority of households in the ‘very large’ and ‘large’ category possessed tractor/tractor trolley/tiller (23 percent respectively), which is on the expected lines.

Tables

Table 2.1: Distribution of households across the landholding categories

Landholding Categories	Bihar		Gujarat		MP		Punjab		overall	
	No. of Households	Percent	No. of Households	Percent	No. of Households	Percent	No. of Households	Percent	No. of Households	Percent
Marginal	130	43	315	39	81	20	80	27	606	34
Small	87	29	239	30	113	28	94	31	533	30
Medium	51	17	156	20	121	30	70	23	398	22
Large	27	9	76	10	57	14	44	15	204	11
Very Large	5	2	14	2	28	7	12	4	59	3
Total	300	100	800	100	400	100	300	100	1800	100

Table 2.2: Average size of landholding (in hectares)

Categories	**Bihar**						**Gujarat**						**MP**						**Punjab**					
	OA	OL	LiL	LoL	IL	UL	OA	OL	LiL	LoL	IL	UL	OA	OL	LiL	L o L	IL	UL	OA	OL	LiL	LoL	IL	U L
Marginal	0.64	0.55	0.36		0.62	0.15	0.61	0.62	0.00	0.01	0.56	0.05	0.65	0.65			0.63	0.02	0.70	0.69	0.01		0.70	
Small	1.52	1.47	0.61	0.45	1.50	0.17	1.49	1.49	0.02	0.02	1.43	0.06	1.40	1.35	0.05		1.34	0.07	1.38	1.29	0.10	0.01	1.38	
Medium	2.62	2.59	0.57	0.67	2.58	0.32	2.90	2.71	0.19	0.00	2.80	0.10	2.69	2.65	0.05		2.63	0.06	2.52	2.23	0.29		2.52	
Large	5.52	5.80		1.07	5.36	0.64	5.96	5.39	0.59	0.03	5.75	0.21	5.62	5.03	0.59		5.37	0.24	5.82	3.12	2.69		5.81	
Very Large	11.1	11.1			10.86	0.61	16.08	7.93	8.15	0.00	12.45	3.62	17.15	16.82	0.33		16.54	0.61	12.75	5.56	7.18		12.75	
Total	1.84	1.82	0.45	0.75	1.81	0.31	2.10	1.87	0.24	0.01	1.96	0.14	3.34	3.21	0.14		3.22	0.12	2.57	1.79	0.79	0.01	2.57	

Please note: OA-operated area, OL-owned land, LiL- leased-in-land, LoL-leased-out land, IL-irrigated land, UL-unirrigated land.

Table 2.3: Distribution of households by social group across the landholding categories

	Bihar					Gujarat					MP					Punjab				Overall				
Landholding Categories	Gen	OBC	SC	ST	Total	Gen	OBC	SC	ST	Total	Gen	OBC	SC	ST	Total	Gen	OBC	SC	Total	Gen	OBC	SC	ST	Total
Marginal	25	99	5	1	130	83	127	54	51	315	8	58	10	5	81	61	13	6	80	177	297	75	57	606
%	19	76	4	1	100	26	40	17	16	100	10	72	12	6	100	76	16	8	100	29	49	12	9	100
Small	20	64	2	1	87	90	94	20	35	239	3	86	14	10	113	86	8	0	94	199	252	36	46	533
%	23	74	2	1	100	38	39	8	15	100	3	76	12	9	100	91	9	0	100	37	47	7	9	100
Medium	17	33	1	0	51	78	49	10	19	156	13	96	10	2	121	68	2	0	70	176	180	21	21	398
%	33	65	2	0	100	50	31	6	12	100	11	79	8	2	100	97	3	0	100	44	45	5	5	100
Large	5	21	1	0	27	42	21	5	8	76	7	48	2	0	57	41	3	0	44	95	93	8	8	204
%	19	78	4	0	100	55	28	7	11	100	12	84	4	0	100	93	7	0	100	47	46	4	4	100
Very Large	4	1	0	0	5	10	4	0	0	14	2	25	1	0	28	11	1	0	12	27	31	1	0	59
%	80	20	0	0	100	71	29	0	0	100	7	89	4	0	100	92	8	0	100	46	53	2	0	100
Total	71	218	9	2	300	303	295	89	113	800	33	313	37	17	400	267	27	6	300	674	853	141	132	1800
%	24	73	3	1	100	38	37	11	14	100	8	78	9	4	100	89	9	2	100	37	47	8	7	100

Table 2.4: Distribution of households by principal occupation across the landholding categories

Categories	Bihar		Gujarat								MP		Punjab					Overall							
	C	Total	C	AL	D	NAL	SLE	SE	P	Total	C	Total	C	NAL	SE	R	Total	C	AL	D	NAL	SLE	SE	P	R	Total
Marginal	130	130	285	1	4	0	14	11	0	315	81	81	66	5	8	1	80	562	1	4	5	14	19	0	1	606
%	100	100	90	0	1	0	4	3	0	100	100	100	83	6	10	1	100	93	0	1	1	2	3	0	0	100
Small	87	87	227	0	3	1	6	1	1	239	113	113	90	0	4	0	94	517	0	3	1	6	5	1	0	533
%	100	100	95	0	1	0	3	0	0	100	100	100	96	0	4	0	100	97	0	1	0	1	1	0	0	100
Medium	51	51	154	0	1	0	0	1	0	156	121	121	70	0	0	0	70	396	0	1	0	0	1	0	0	398
%	100	100	99	0	1	0	0	1	0	100	100	100	100	0	0	0	100	99	0	0	0	0	0	0	0	100
Large	27	27	76	0	0	0	0	0	0	76	57	57	44	0	0	0	44	204	0	0	0	0	0	0	0	204
%	100	100	100	0	0	0	0	0	0	100	100	100	100	0	0	0	100	100	0	0	0	0	0	0	0	100
Very Large	5	5	13	0	1	0	0	0	0	14	28	28	12	0	0	0	12	58	0	1	0	0	0	0	0	59
%	100	100	93	0	7	0	0	0	0	100	100	100	100	0	0	0	100	98	0	2	0	0	0	0	0	100
Total	300	300	755	1	9	1	20	13	1	800	400	400	282	5	12	1	300	1737	1	9	6	20	25	1	1	1800
%	100	100	94	0	1	0	3	2	0	100	100	100	94	2	4	0	100	97	0	1	0	1	1	0	0	100

Please note: C- cultivation; AL- Agricultural labour; D- Dairy; NAL-Non-agricultural wage labour; SLE- Self-employed; SE- Salaried employed; R-Remittances; P-Pension.

Table 2.5: Distribution of households by livestock possession across landholding categories

categories	Bihar					Gujarat					MP						Punjab					overall							
	MC	MB	B	G	Total	MC	MB	B	S	Total	MC	MB	B	G	P	Total	MC	MB	B	Pi	Total	MC	MB	B	G	S	P	Pi	Total
Marginal	47	7	2	6	62	68	101	21	1	191	35	17	10	6	0	68	25	40	4	26	95	175	165	37	12	1	0	26	416
%	76	11	3	10	100	36	53	11	1	100	51	25	15	9	0	100	26	42	4	27	100	42	40	9	3	0	0	6	100
Small	36	6	1	4	47	82	115	36	0	233	61	36	18	9	1	125	41	45	8	37	131	220	202	63	13	0	1	37	536
%	77	13	2	9	100	35	49	15	0	100	49	29	14	7	1	100	31	34	6	28	100	41	38	12	2	0	0	7	100
Medium	20	2	0	0	22	64	75	36	0	175	50	41	17	7	0	115	37	55	14	53	159	171	173	67	7	0	0	53	471
%	91	9	0	0	100	37	43	21	0	100	43	36	15	6	0	100	23	35	9	33	100	36	37	14	1	0	0	11	100
Large	13	2	0	0	15	29	48	17	0	94	26	24	3	0	0	53	22	35	28	38	123	90	109	48	0	0	0	38	285
%	87	13	0	0	100	31	51	18	0	100	49	45	6	0	0	100	18	28	23	31	100	32	38	17	0	0	0	13	100
Very Large	5	0	0	0	5	7	5	2	0	14	14	19	1	0	0	34	8	10	9	11	38	34	34	12	0	0	0	11	91
%	100	0	0	0	100	50	36	14	0	100	41	56	3	0	0	100	21	26	24	29	100	37	37	13	0	0	0	12	100
Total	121	17	3	10	151	250	344	112	1	707	186	137	49	22	1	395	133	185	63	165	546	690	683	227	32	1	1	165	1799
%	80	11	2	7	100	35	49	16	0	100	47	35	12	6	0	100	24	34	12	30	100	38	38	13	2	0	0	9	100

Please note: MC- milch cows; MB- milch buffaloes; B- Bullocks, G- Goats; S-Sheep; P- Poultry, Pi- Pigs

Table 2.6: Distribution of households by farm machinery/equipment possession (purchased/shared/taken on rent) across landholding categories

Landholding categories	Bihar								Gujarat								
	TB	BW	DP	BC	TT	T	CH	Tot	TW	BW	EP	DP	BC	TT	T	CH	Tot
Marginal	130	9	9	2	0	0	0	150	67	136	110	31	6	23	3	0	376
%	87	6	6	1	0	0	0	100	18	36	29	8	2	6	1	0	100
Small	87	82	82	1	0	0	0	252	47	160	149	30	23	46	5	0	460
%	35	33	33	0	0	0	0	100	10	35	32	7	5	10	1	0	100
Medium	51	50	50	0	2	2	0	155	52	114	114	23	27	65	18	0	413
%	33	32	32	0	1	1	0	100	13	28	28	6	7	16	4	0	100
Large	27	27	27	0	23	24	1	129	22	52	52	10	14	52	10	1	213
%	21	21	21	0	18	19	1	100	10	24	24	5	7	24	5	0	100
Very large	5	5	5	0	5	5	1	26	5	10	10	2	2	12	7	0	48
%	19	19	19	0	19	19	4	100	10	21	21	4	4	25	15	0	100
Total	300	173	173	3	30	31	2	712	193	472	435	96	72	198	43	1	1510
%	42	24	24	0	4	4	0	100	13	31	29	6	5	13	3	0	100

Please note: TW- Tubewells; BW- Borewells; EP- Electric pump; DP- Diesel pumps; BC- Bullock cart; TT- Tractor/tractor trolley/tiller; T- Thresher; CH- Combine harvester.

Table 2.6 contd…

Landholding categories	MP									Punjab					Overall								
	TW	BW	EP	DP	BC	TT	T	CH	Total	EP	BC	TT	CH	Total	TW	BW	EP	DP	BC	TT	T	CH	Total
Marginal	26	8	59	34	8	3	3	0	141	40	4	18	0	62	223	153	209	74	20	44	6	0	729
%	18	6	42	24	6	2	2	0	100	65	6	29	0	100	31	21	29	10	3	6	1	0	100
Small	37	26	88	35	23	12	7	1	229	73	8	41	0	122	171	268	310	147	55	99	12	1	1063
%	16	11	38	15	10	5	3	0	100	60	7	34	0	100	16	25	29	14	5	9	1	0	100
Medium	51	21	93	49	13	21	14	0	262	70	14	56	0	140	154	185	277	122	54	144	34	0	970
%	19	8	35	19	5	8	5	0	100	50	10	40	0	100	16	19	29	13	6	15	4	0	100
Large	28	21	57	25	4	34	24	1	194	44	28	44	0	116	77	100	153	62	46	153	58	3	652
%	14	11	29	13	2	18	12	1	100	38	24	38	0	100	12	15	23	9	7	23	9	0	100
Very large	24	11	28	14	0	25	20	1	123	12	9	12	1	34	34	26	50	21	11	54	32	3	231
%	20	9	23	11	0	20	16	1	100	35	26	35	3	100	15	11	22	9	5	23	14	1	100
Total	166	87	325	157	48	95	68	3	949	239	63	171	1	474	659	732	999	426	186	494	142	7	3645
%	17	9	34	17	5	10	7	0	100	50	13	36	0	100	18	20	27	12	5	14	4	0	100

Please note: TW- Tubewells; BW- Borewells; EP- Electric pump; DP- Diesel pumps; BC- Bullock cart; TT- Tractor/tractor trolley/tiller; T- Thresher; CH- Combine harvester.

CHAPTER 3: CROP OUTPUT, INPUT USE AND FACTOR MARKETS

3.1 Gross Cropped Area (GCA) under different crops

In the overall sample, in terms of area under cultivation, crops predominantly grown by the households were soybean (33 percent), wheat (22 percent), paddy (16 percent), gram (5 percent), cotton (5 percent) and maize (4 percent) (**Table *3.1***). Across the landholding categories, there was a slight variation in the pattern of area under the crops. In the marginal and small category, wheat (24 and 21 percent respectively) and paddy (24 and 18 percent respectively) were the main crops grown by the households while wheat and soybean were the major crops grown by the households in the 'medium' (20 and 29 percent respectively), 'large' (23 and 31 percent respectively) and 'very large' category (22 and 51 percent respectively).

In Bihar, the proportion of area under maize was the highest (33 percent). Besides maize being the main crop, other crops grown by the sample households were mainly paddy (23 percent), wheat (22 percent), masur (13 percent), gram (6 percent), potato (2 percent) and onion (1 percent). The pattern was similar across the landholding categories.

Unlike other states, the sample households in Gujarat were growing varied crops/fruits/vegetables such as paddy, bajra, jowar, maize, wheat, gram, tur, sugarcane, cumin, other spices, mangoes, other fruits, onion, other vegetables, groundnut, castor seed, sesamum, rapeseed, cotton, tobacco, guar and other fodder crops. Among all these crops, the proportion of area in GCA was highest under cotton (22 percent) followed by paddy (19 percent), wheat (10 percent), groundnut (9 percent) and tobacco (8 percent) indicating that these were the major crops grown by majority of the sample households. Considering the landholding categories, the pattern was quite different. Paddy (31 percent) and wheat (17 percent) emerged to be the major crops grown by households in the 'marginal' category. With an equal proportion of area under paddy (17 percent) and cotton (17 percent), the said crops were the major crops grown by households in the 'small' category along with wheat (10 percent) and groundnut (9 percent). The pattern in medium and large category was more or less the same as that in the small category. Compared to other categories, in the 'very large' category, proportion of area was higher in case of riskier crops such as cotton (35 percent) and groundnut (12 percent). Along with these crops, paddy (16 percent) too was another major crop grown by the 'very large' category**.**

In MP, soybean was the major crop occupying 43 percent of the GCA followed by wheat (32 percent), gram (15 percent) and paddy (7 percent). The pattern was similar across the landholding categories. In Punjab, wheat (44 percent) and paddy (41 percent) was predominantly grown by the households. Besides wheat and paddy, other crops grown by the households were maize (6 percent), potato (3 percent), fodder crops (3 percent).

The broad pattern that emerges is that the marginal and small farmers are mainly engaged in paddy and wheat cultivation, possibly owing to lower yield risk, while large and 'very large' categories are relatively more likely to opt for riskier crops. There is growing evidence that the preference for paddy and wheat by marginal and farmers is mainly due to the lower yield risk of these crops (Mekala et al. 2021). The exception though is Punjab, where all categories of

farmers grow mainly paddy and wheat because of extensive irrigation and assured price support.

3.2 Yield (kg/ha) of major crops

Considering the major crops identified for the overall sample and each of the sample states in the earlier discussion on GCA under the crops, the pattern in yield of these major crops are discussed here.

In the overall sample, the yield of crops such as maize varied directly with land size. In case of paddy and wheat too, the yield increased with increasing land size, except that the yield of 'very large' landholding category (6365 kg/ha and 4041 kg/ha respectively) were relatively lower than that of the 'large' category (7277 kg/ha and 4135 kg/ha) (**Table *3.2***). In case of cotton, yield was inversely related to the land size, however, the yield of medium category (1892 kg/ha) was relatively higher than the small category (1397 kg/ha).

In Bihar, except for masur, the yield of which varied directly with land size, a clear pattern was not visible with respect to yield of major crops such as paddy, maize and wheat. There were relatively marginal differences in the yield of these crops across the landholding categories. Similar was the case for other crops such as gram, potato and onion. In Gujarat, the yield of paddy was inversely related to the land size, except that the yield of 'very large' (3416 kg/ha) category was the lowest compared to that of the 'large' (9739 kg/ha), medium (4957 kg/ha), small (4901 kg/ha) and marginal (4115 kg/ha) category. No clear pattern could be discerned between the yield of crops such as wheat, groundnut and land size. In case of cotton, an inverse relationship was evident between yield and land size; except that the yield of cotton in the medium category (1881 kg/ha) was relatively higher than that in the small category (1373 kg/ha). In MP, a clear pattern was not evident between yield of major crops such as soybean, wheat, paddy, gram and land size. In Punjab, with increasing land size, the yield of wheat showed an increasing trend indicating a direct relationship between land size and yield of wheat. No clear pattern was evident in case of paddy. As expected, the average yield of paddy (7221 kg/ha) was the highest in Punjab compared to other states such as Bihar (4200 kg/ha), Gujarat (5922 kg/ha), MP (1390 kg/ha). The yield of other crops such as maize and potato varied directly with land size. However, the yield of maize in marginal category (3420 kg/ha) was relatively higher than that in the small category (3002 kg/ha).

3.3 Value of output, sale and profitability

As could be seen from the analysis of yield of the output, there is no clearly discernible link with land size or any evidence of scale economies. However, it is possible that the price received is different for different categories of farmers due to factors like quality differences, marketing channel etc and this in turn could lead to differences in value of output. Also, there could be scale economies (or diseconomies) in input use and other factors such as machinery and credit, which in turn could lead to increasing (or decreasing) profitability with size of the holding. To explore these issues further we analyze the value of output and value added (per hectare and per capita). Value added is defined here as the value of output net of input costs. Two measures of 'value added' have been used – VA1 and VA2. The difference is in the way

family labour is treated. For the calculation of VA1, the cost of family labour is not included in the total input cost whereas for VA2 the cost of family labour is imputed on the basis of the market wage rate. Thus, the value of VA1 is always *higher* than VA2.

3.4 Value of output (Rs/ha)

In the overall sample, for all the crops taken together, no clear pattern was evident in case of value of output (Rs/ha) and landholding size (**Table *3.3***). The value of major crops such as paddy and wheat varied directly with land size except that the highest value per ha was reported by the large instead of very large category in both the crops. *Turning to the states*, in Bihar, there is no clear pattern with respect to value of aggregate output per ha and land size. Considering the crop-wise trends, the value of paddy varied directly with land-size. No clear pattern was evident in case of maize and wheat. For masur too, value of output varied directly with land size except that the value of output for small category was relatively higher (Rs 57249 per ha) than that for the marginal category (Rs 56868 per ha). In Gujarat, no clear pattern was evident between value of output and land size in case of major crops such as paddy, wheat, groundnut as well as for the overall crops. The value of cotton per ha was observed to be inversely related to the land size. In MP, for the overall crops, the value of output varied directly with land size except that the value of output for the 'very large' category (Rs 55929 per ha) was relatively lower than the large category (Rs 56373 per ha). In case of major crops such as soybean, paddy, wheat and gram, no clear pattern was evident regarding value of output and land size. In Punjab, the value of overall crops varied directly with land size. Crop-wise trends showed that the value of wheat too varied directly with land size while no clear pattern was evident in case of paddy.

3.5 Value added1 (VA1) per hectare (Rs/ha) and VA1 per person (Rs/capita)

In Bihar, contrary to *a priori* expectations, value of output net of paid out costs (VA1) per ha increased with increasing land size (**Table *3.4***). Exception was the 'very large' category (Rs 23055 per ha) wherein VA1 per ha was lower than small (Rs 24631 per ha), medium (Rs 25069 per ha) and large category (Rs 26483 per ha). However, the VA1 per person varied directly with the land size. In Gujarat, no definite pattern could be discerned with respect to VA1 per ha and land size. However, VA1 per ha for 'very large' category (Rs 28768 per ha) was relatively lower than the medium (Rs 45018 per ha) and large category (Rs 60886 per ha). VA1 per person increased with an increase in the land size, like in Bihar, except that the VA1 per person was relatively lower for the 'very large' category (Rs 73165 per capita) than the large category (Rs 76083 per capita). In MP, VA1 per hectare and VA1 per person varied directly with the land size. In Punjab, no clear pattern was evident with respect to VA1 per ha and land size while VA1 per person increased with increasing land size.

Relation between VA1 (Per ha and Per person) and landholding size

State	VA1 (no imputation of family labour costs)		VA2 (imputed family labour cost at market wages)	
	Per ha	**Per capita**	**Per ha**	**Per capita**
Bihar	Direct	Direct	Direct	Direct
Gujarat	No definite pattern	Direct	Direct	Direct
MP	Direct	Direct	Direct	Direct
Punjab	No definite pattern	Direct	Direct	Direct

3.6 Value-added per hectare and Value-added per capita

In Bihar, VA2 (VA1 net of imputed cost of family labour) per hectare, increases with an increase in land size (**Table *3.5***). In fact, when the cost of family labour is incorporated then the value added per ha for small category is very negligible (Rs 511 per ha) and even negative for marginal category. VA2 per person varied directly with land size. In Gujarat, VA2 per ha and VA2 per person also showed a direct relationship with land size. However, VA2 per hectare was relatively lower for the 'very large' (Rs 22967 per ha) than the large category (Rs 48458 per ha). Similarly, VA2 per person was also relatively lower for 'very large' (Rs 58410 per capita) as compared to large category (Rs 60552 per capita). In MP, with an increase in land size, VA2 per hectare also showed an increasing trend, except that it was relatively lower for large category (Rs 45643 per ha) compared to medium category (Rs 47945 per ha). VA2 per person too increased with an increase in land size. In Punjab, both VA2 per ha and VA2 per person varied directly with the land size.

Thus, once the cost of family labour is accounted by imputing market wage rates, the advantage that the small farms seem to possess vanishes. VA2 even in *per capita* terms increases with increase in land size. This seems to lend support to the 'labour dualism' hypothesis (Sen, 1962, 1966). However, it needs to be noted that the imputation of market wage to family labour may not be totally appropriate because of missing or incomplete markets for women and some members of the household. Use of an appropriate shadow price, instead of market wage, may be more informative.

Value added (per unit land or per unit output) or profitability depends mainly upon three factors – physical yield of the crop, output price and input costs. Output price, in turn, depends upon factors like quantum sold/marketed surplus, marketing channel etc. Input costs are determined by the quantum and intensity of usage of inputs. Thus, we will examine each of these aspects in some detail here. Our main focus is whether these variables vary systematically with the landholding size.

3.7 Marketing

3.7.1 Marketed surplus (kg/ha) of major crops

In the overall sample, the marketed surplus of major crops such as paddy, wheat varied directly with the land size *(***Table *3.6***)*.

In Bihar, no clear pattern was observed regarding the marketed surplus of paddy and land size. In case of maize, marketed surplus decreased with increasing land size except that it was relatively higher for the 'very large' category (3351 kg/ha) than the large (3296 kg/ha) and medium category (3294 kg/ha). The marketed surplus of wheat varied directly with land size. In case of masur, the marketed surplus was exceptionally high for marginal category (6321 kg/ha) compared to the other landholding categories. In Gujarat, for crops such as paddy and wheat, no clear pattern was observed between marketed surplus and land size. In case of groundnut and cotton too, though no clear pattern was visible, the marketed surplus was observed to be the highest for marginal category (1641 kg/ha and 2406 kg/ha respectively). In MP, the marketed surplus of soybean decreased with an increase in land size while the marketed surplus of paddy increased with land size. In case of wheat, no clear pattern was observed regarding marketed surplus and land size, however, the highest marketed surplus was reported by marginal category. The marketed surplus for gram showed a decreasing trend with land size, exception being the 'very large' category (1007 kg/ha) with a higher marketed surplus than the large (750 kg/ha) and medium category (784 kg/ha). In Punjab, the marketed surplus for wheat varied directly with land size while no clear pattern was evident for paddy.

3.7.2 Price received (Rs/kg)

In the overall sample, the price received per kg of paddy was the same across the landholding categories exception being the 'very large' category (Rs 18 per kg) which received marginally higher price than other categories (Rs 17 per kg) (**Table *3.7***). The price received for wheat was also the same across all the landholding categories (Rs 18 per kg). In case of gram, price received was relatively higher for the medium (Rs 41 per kg), large (Rs 41 per kg) and 'very large category' (Rs 42 per kg) compared to the marginal and small category (Rs 40 per kg).

In Bihar, price received for crops such as paddy (Rs 13 per kg), maize (Rs 13 per kg) and wheat (Rs 16 per kg) was the same across the landholding categories, except that in case of wheat, the price received by 'very large' category (Rs 15 per kg) was marginally lower than the other categories (Rs 16 per kg). In Gujarat, price received for paddy by medium and large category (Rs 18 per kg) was relatively higher than that received by marginal, small and 'very large' category (Rs 17 per kg). In case of wheat, the lowest price was received by 'very large' category (Rs 16 per kg) compared to the marginal and small category (which received Rs 17 per kg) and medium and large category (which received Rs 18 per kg). The price received for groundnut (Rs 49 per kg) and cotton (Rs 52 per kg) was the highest for the 'very large' category unlike the other categories. In MP, for crops such as soybean and paddy, price received was the same for all the landholding categories except the 'very large' category which received marginally higher price per kg (Rs 33 per kg and Rs 18 per kg respectively). For wheat, price received was the same across the landholding categories (Rs 18 per ha). In case of gram, highest price was received by 'very large' category (Rs 42 per ha). In Punjab, the price received for paddy (Rs 18 per kg) and wheat (Rs 18 per kg) was the same across all the landholding categories.

3.7.3. Value of sale (Rs/ha)

In the overall sample, the sale value of total crops did not show any clear pattern with land size. The crop-wise trend showed that for crops such as paddy and wheat, the sale value increased with land size (**Table *3.8***).

In Bihar, the aggregate sale value per hectare of all crops showed a more or less inverse relationship with land size with highest sale value for marginal category (Rs 75201 per ha) and lowest for the large category (Rs 47126 per ha). Considering the crop-wise trend, the sale value of paddy varied directly with land size. The sale value of maize and wheat did not show any clear pattern with land size. In Gujarat, no clear pattern was observed with respect to aggregate sale value and land size. Similarly, for crops such as paddy, wheat and groundnut no clear pattern was evident. For cotton too, no clear pattern was visible, however, the highest sale value was observed for marginal category (Rs 106946 per ha) and lowest for the 'very large' category (Rs 52540 per ha). In MP too, the aggregate sale value did not show any clear pattern with land size. The sale value of soybean decreased with land size. The sale value of paddy increased with land size except that the sale value of large category (Rs 51195 per ha) was relatively lower than the medium category (Rs 53350 per ha). For wheat, the sale value did not show any clear pattern with land size. In case of gram, the sale value decreased with land size with the highest value reported by marginal category (Rs 45586 per ha) and lowest by the large category (Rs 42394 per ha). In Punjab, the aggregate sale value showed an increasing trend with an increase in land size. The sale value of paddy did not show any clear pattern with land size while the sale value of wheat increased with land size.

3.7.4. Marketing channel (% of households)

In Bihar, the paddy growing households were mostly dependent on local private dealer (98 percent) for disposing their crop while the remaining 2 percent were dependent on cooperative & government agency. The pattern was similar across the landholding categories and it was the small (3 percent) and medium (4 percent) category households that were selling paddy to cooperative & government agency. In case of maize and wheat, all the households had sold their crop to local private dealer (100 percent). In Gujarat, households sold paddy mainly through local private dealers (67 percent) followed by mandi (18 percent), input dealers (8 percent), and processors (1 percent). The pattern was the same across the landholding category except that the 'very large' landholding category was dependent only on local private dealers (100 percent) for disposing paddy. In case of wheat, local private dealer was the main agency to whom the crop was sold (92 percent). This was followed by mandi (5 percent) and input dealers (2 percent). The pattern was more or less the same across the landholding categories with variation in the dependence on mandi and input dealers. The dependence on mandi was mostly by marginal (6 percent), small (3 percent) and large category (19 percent) and that on input dealers was by small (5 percent) and medium category (5 percent). In case of groundnut, mandi (39 percent) was the main agency through which the crop was disposed thereafter it was local private dealers (37 percent), processors (14 percent) and cooperative & government agency (9 percent). Across the landholding categories, there were slight variations in the dependence on these agencies. The dependence on cooperative & government agency was the least across all the landholding categories. Local private dealers were the main agency for sale

of groundnut in case of small (45 percent) and 'very large' (43 percent) category. In case of cotton, the households sold their crop through local private dealers (39 percent) followed by mandi (38 percent), processor (18 percent) and cooperative & government agency (5 percent). There was slight variations in the patterns across the landholding categories – while marginal (50 percent) and large category (47 percent) was dependent mainly on local private dealers for disposing cotton, small (42 percent), medium (40 percent) and very large category (56 percent) were dependent mostly on mandi.

In MP, soybean was mainly sold through mandi (96 percent) and the remaining was sold through local private dealers (2 percent) and input dealers (2 percent). The pattern was the same across the landholding categories. The paddy growing households disposed their crops through cooperative & government agency (69 percent), input dealers (25 percent) and mandi (7 percent). Across the landholding categories, the pattern was the same with slight variation in dependence on mandi and input dealers. The marginal (2 hhs), medium (2 hhs) and large category (3 hhs) were dependent on mandi while none from small and 'very large' category was dependent on them. In case of input dealers, meagre households from all the categories expect large and 'very large' sold their crop through them. For wheat, majority of the households sold their crop through cooperative & government agency (81 percent) while 17 percent sold it to input dealers and 2 percent sold it to mandis. The pattern was the same across the landholding categories, except that none from large and 'very large' category sold wheat through mandis. In case of gram, mandi was the main agency through which the crop was sold (67 percent), followed by local private dealers (26 percent), input dealers (4 percent) and cooperative & government agency (3 percent). The pattern was the same across the landholding categories except that none of the households from large and 'very large' category were selling gram through input dealers and cooperative & government agency. Further, marginal category was also not selling gram through cooperative & government agency.

In Punjab, all the households growing paddy were disposing their crops through cooperative & government agency. Similar was the case for wheat with 98 percent of the households selling their crop through cooperative & government agency while 2 percent which mostly belonged to the marginal category sold it to other agencies.

3.8 INPUT COSTS (Rs/ha)

In the overall sample, total input costs varied inversely with land size (**Table *3.10***). In Bihar, a clear pattern was not visible between input costs and land size. The total input costs was the highest for marginal farmers (Rs 80966 per ha) and lowest for medium category (Rs 76152 per ha). In Gujarat and MP, the total input costs varied inversely with land size while in Punjab, it varied directly with land size.

Seeds

Considering the input cost on seeds, in the overall sample, the total expenses on paddy seeds and maize seeds showed an inverse relationship with land size (

Table *3.11*). Expenses on wheat seeds too had an inverse relationship with land size except that the expenses incurred on wheat seeds by large category (Rs 1035 per ha) was relatively higher than that by medium category (Rs 903 per ha). No clear pattern was evident with respect

to expenses on cotton seeds and land size. The lowest expense on cotton seeds was reported by marginal category (Rs 544 per ha) while the highest expense was for the small category (Rs 855 per ha).

In Bihar, there were only marginal differences in the total expenses incurred on the purchase of seeds such as for paddy, maize across the landholding categories. Hence, no discernible trend was evident between the total expenses on purchase of seeds such as paddy, maize and land size. The cost of wheat seeds varied directly with land size, except that the cost incurred by large category (Rs 2043 per ha) was lower than that by medium (Rs 2117 per ha) and large (Rs 2268 per ha) category. A clear pattern was also not evident in case of cost of masur seeds and land size– the lowest cost was for 'very large' category (Rs 477 per ha) and highest was for 'large' category (Rs 693 per ha).

In Gujarat, the cost incurred on paddy seeds varied inversely with land size. Exception was the large category (Rs 355 per ha) which reported expense on paddy seeds to be relatively higher than medium category (Rs 289 per ha). In case of maize and wheat seeds too, inverse relationship was seen between expenses and land size. No clear pattern was discernible between cost incurred on cotton seeds, groundnut seeds and land size. In MP, the expense on soybean seeds varied directly with land size. Expenses on paddy seeds, wheat seeds and gram seeds exhibited inverse relationship with land size. Except that in case of gram seeds, expenses incurred by small category (Rs 2396 per ha) was relatively higher than that by marginal category (Rs 1921 per ha). In Punjab, the expense on paddy seeds was directly related to land size- exception being the 'very large' category (Rs 730 per ha). A clear pattern was not evident in case of expenses on wheat seeds and land size. An inverse relationship was observed in case of expenses on maize seeds. Expenses on potato varied directly with land size

Fertilisers and manures

In the overall sample, expenses on fertilisers and manures (Rs per ha), did not show any clear pattern with respect to land size (

Table *3.12*). Expenses on manures varied inversely with farm size. In Bihar, only expenses on fertilisers were reported. No clear pattern was evident with respect to expenses of fertilisers and land size. The per hectare expenses incurred on fertilisers was the highest for Bihar (Rs 12500 per ha) than the other states (Gujarat – Rs 7004 per ha; MP- Rs 8101 per ha; Punjab – Rs 8364 per ha). In Gujarat, expenses on fertilisers exhibited an inverse relationship with land size, exception being the medium category (Rs 7880 per ha). In case of manures, expenses varied inversely with land size. In MP, expenses on fertilisers varied directly with land size, except that the marginal category (Rs 8313 per ha). Expenses on manures varied inversely with land size. In Punjab, no clear pattern was visible regarding fertilisers and manures expenses and land size.

Irrigation

In the overall sample, an inverse relation was found between expenses on irrigation and land size (

Table *3.13*). Exception was the medium category (Rs 1988 per ha). In Bihar, irrigation expenses and land size did not show any clear pattern- the lowest expense was reported by medium category (Rs 12144 per ha) It is important to note that the per hectare irrigation expenses reported for Bihar (Rs 12393 per ha) are exceptionally higher than the other states (Gujarat- Rs 1344 per ha; MP- Rs 265 per ha; Punjab- Rs 716). In Gujarat, expenses on irrigation varied inversely with land size- except that the expense reported by 'very large' (Rs 604 per ha) was relatively higher than the large category (Rs 506 per ha). In MP, no clear pattern was evident – the highest expense was reported by small category (Rs 303 per ha) and lowest by large category (Rs 221 per ha). In Punjab, no irrigation expenses have been reported for the 'very large' landholding category and for only one household in the 'medium' category. Considering the other landholding categories for which expenses are reported, an inverse relationship is observed between irrigation expenses and land size.

Plant protection materials

In the overall sample, expenses on plant protection chemicals varied directly with land size (

Table *3.14*), exception being the 'very large' category (Rs 4885 per ha) having expenses relatively lower than the large category (Rs 5655 per ha). In Bihar, no clear pattern was visible with respect to the expenses on plant protection chemicals and land size. In Gujarat, expenses on plant protection showed a direct relationship with land size- except that the 'very large' category (Rs 3487 per ha) reported relatively lower expense than large category (Rs 4158 per ha). In MP, expenses on plant protection chemicals did not show any clear relationship with land size. In Punjab, expenses on plant protection chemicals varied directly with land size.

Diesel and electricity

In the overall sample, expenses on diesel varied directly with land size (**Table *3.15***), except that the expense was relatively lower for 'very large' category (Rs 3019 per ha) than the large category (Rs 3450 per ha). In case of electricity, expenses per ha varied inversely with land size. No expenses were reported for diesel and electricity in case of Bihar. Among all the states, Gujarat reported the highest expense on diesel per hectare (Rs 8614 per ha) and MP reported the lowest expense (Rs 396 per ha). It was Rs 5546 per ha for Punjab. In Gujarat, as the size of the farm increased, per hectare expense on diesel showed an increasing trend. The expense reported by the 'very large' category (Rs 23934 per ha) was 9 times higher than that of the marginal category (Rs 2716 per ha). In case of electricity, expenses varied inversely with land size. In MP, no clear pattern was visible between expenses on diesel and farm size. Electricity expense varied inversely with land size. In Punjab, no expenses were reported for electricity. Expenses on diesel were observed to be inversely related to farm size- except that the expense

incurred by 'very large' category (Rs 7048 per ha) was relatively lower than that by large category Rs 7140 per ha).

Other items (include human labour, animal labour, minor repair, interest, cost of hiring machinery, lease rent for land, other expenses)

In the overall sample, expenses on human labour varied inversely with land size- except that the 'very large' category (Rs 14474 per ha) incurred relatively higher expense than the large category (Rs 14066 per ha) (**Table *3.16***). Expenses on animal labour too varied inversely with land size – except that the marginal category (Rs 921 per ha) incurred relatively lower expense than the small (Rs 1549 per ha) and medium category (Rs 1131 per ha). Expenses on minor repair varied directly with land size with the exception of the 'very large' category (Rs 1047 per ha)

In the overall sample, none of the households in the 'very large' category reported expenses on interest. The landholding categories who have reported the expenses on interest exhibited an inverse relationship with land size- exception being the large category (Rs 83 per ha). The cost of hiring machinery as well as other expenses was inversely related to the land size, except that the cost of hiring machinery was relatively higher for the 'very large' category (Rs 5131 per ha) as opposed to the large category (Rs 4502 per ha). The lease rent for land was observed to be directly related to land size.

In Bihar, expenses on animal labour, cost of hiring of machinery and other expenses were not reported by the sample households. Expenses on human labour showed an inverse relationship with farm size – exception being the large category which incurred the highest expense on human labour (Rs 12738 per ha). With regard to minor repair, no expenses were reported by marginal and large category. Considering the landholding categories who have reported the expenses on minor repair, it was found to vary directly with land size. Excluding the 'very large' category which had not reported the expenses on interest rate, it varied inversely with land size- except for the slightly higher expenses reported by large category (Rs 235 per ha). The lease rent for land was not reported by the 'very large' and large category. Thus taking the other three landholding categories, lease rent for land showed an inverse relationship with land size.

In Gujarat, expenses such as on human labour, cost of hiring machinery showed an inverse relationship with land size. No clear pattern was evident with respect to expenses on animal labour and land size. Expenses on minor repair varied directly with land size. Among the landholding categories, expenses on interest were reported only by marginal and large category and it showed direct relationship with farm size. The lease rent for land and other expenses too varied directly with land size.

In MP, expense on interest was not reported by the sample households. Expenses on animal labour and other expenses varied inversely with land size. A clear pattern was not evident with respect to expenses such as on human labour, minor repair and land size. The cost of hiring machinery was inversely related to land size. No clear pattern was evident between lease rent for land and land size across the landholding categories.

In Punjab, no expenses were reported for animal labour and interest by the sample households. No clear pattern was visible for expenses on human labour, minor repair, other expenses and land size. The cost of hiring machinery varied inversely with land size and the lease rent for land varied directly with land size.

3.9 Perceptions of Farmers

In the foregoing analysis we tried to uncover the effect of imperfections in output and input markets through their link with landholding size. In this section we will try to explore farmers' perceptions about the markets they operate in. The data in this section is mostly qualitative in nature and should be read in conjunction with the 'hard' data presented.

3.9.1 Reasons for dissatisfaction regarding sale of crops (% of households)

In the overall sample, a large majority of farmers in MP, Gujarat and Bihar are dissatisfied with sale while farmers in Punjab are fine. 'Lower than market price', 'delayed payments', 'deductions for loans', 'faulty weighing' are the major reasons for the dissatisfaction (**Table *3.17***).

In Bihar, the main reason for dissatisfaction regarding sale of paddy was reported to be 'both getting lower than market price and faulty weighing and grading of the crop' (93 percent) while only 7 percent were satisfied with the disposal of the crop. The pattern was the same across the landholding categories. In case of maize too, 'both receiving lower than market price and faulty weighing and grading of the crop' was reported as the major source of dissatisfaction for the sale of the crop (93 percent) and the remaining 7 percent reported to be satisfied with the sale of maize. Across the landholding categories, the pattern was the same except that none of the households from the marginal and 'very large' category reported satisfaction from the sale of maize. Unlike other major crops, for wheat, around 82 percent of the households reported to be satisfied with the sale of wheat while 18 percent were dissatisfied due to 'getting lower than market price and faulty weighing and grading of the crop'. The pattern was the same across the landholding categories.

In Gujarat, around 16 percent of the households were satisfied with the sale of paddy while 76 percent were dissatisfied due to 'receiving lower than market price' and 7 percent due to 'delayed payments'. The pattern was the same across the landholding categories except that none of the households from 'very large' category reported 'delayed payments' as a reason for dissatisfaction. In case of wheat, while 15 percent were satisfied with the sale of the crop, 80 percent were dissatisfied due to 'receiving lower than market price' and 2 percent each due to 'delayed payments', 'deductions for loan borrowed' and 'faulty weighing and grading'. Across the landholding categories too, the main reason for dissatisfaction was due to 'receiving lower than market price' for wheat. In case of groundnut, around 17 percent of the households were satisfied with the sale of groundnut. Majority of the households reported 'receiving lower than market price' for groundnut as the main reason for dissatisfaction (81 percent) while 1 percent were dissatisfied because of 'deductions for loans'. The pattern was the same across the landholding categories except that none of the households from the marginal, large and 'very large' category reported 'deductions from loan' as a reason for dissatisfaction with the sale of groundnut. For cotton too, while 14 percent were satisfied with the sale of cotton, 82 percent

cited ‘receiving lower than market price’ as the main reason for dissatisfaction followed by ‘deductions for loans’ (2 percent). Across the landholding categories too, similar pattern was evident, however, none from other categories but only medium category reported ‘deductions for loans’ as a reason for dissatisfaction with the sale of cotton.

In MP, while 21 percent were satisfied with the sale of soybean, 79 percent cited ‘receiving lower than market price’ as the main reason for dissatisfaction. Similar pattern was observed across the landholding categories as well. In case of paddy, a very high percentage of households were satisfied with the sale of paddy (86 percent). Regarding reasons for dissatisfaction with the sale of paddy, 10 percent reported ‘delayed payments’ and 4 percent reported ‘receiving of lower than market price’. Across the landholding categories too, majority of the households (over 75 percent) reported to be satisfied with the sale of paddy. None of the households from medium, large and very large category reported ‘receiving of lower than market price’ as a reason for dissatisfaction. In case of wheat too, around 88 percent were satisfied with the sale of the crop while 12 percent were dissatisfied due to ‘receiving lower than market price’. The pattern was the same across the landholding categories, except that all the households (100 percent) in the ‘very large’ category were satisfied with the sale of wheat. For gram, around 26 percent of the households were satisfied with the sale of the crop. Households who were dissatisfied with the sale of gram reported ‘receiving lower than market price’ (67 percent), ‘delayed payments’ (4 percent) and ‘deductions for loans’ (3 percent) as the reasons for it. For all the landholding categories too, ‘receiving lower than market price’ was cited as the main reason for dissatisfaction (over 57 percent). ‘Delayed payments’ was not reported as a reason for dissatisfaction by households in the large and ‘very large’ category. ‘Deductions for loan borrowed’ was not a reason for dissatisfaction for marginal, large and ‘very large’ category.

In Punjab, all the farmers in the sample (100 percent) were satisfied with the first/second/third major disposal of crops such as paddy and wheat.

3.9.2 Reasons for receiving lower price for crops (% of households)

In the overall sample, a large majority cited ‘lack of government purchase’, ‘no minimum price’, ‘few buyers’ and ‘collusion of buyers’ as major reasons (**Table *3.18***).

In Bihar, all the sample households (100 percent) reported both ‘no government purchase and private buyers collude’ as the main reason for receiving lower price for paddy. There are no responses reported for other crops such as maize, wheat, masur, gram, potato, onion in case of Bihar.

In Gujarat, the main reason for receiving lower price for paddy was reported to be having ‘no minimum price fixed’ for the crop (58 percent). Along with it, both ‘no government purchase and no minimum price fixed’ (14 percent) and ‘private buyers collude’ (14 percent) were cited as reasons for getting lower price for paddy. Across the landholding categories too, ‘no minimum price fixed’ was reported as the main reason for receiving lower price for paddy. For wheat too, the main reason cited for receiving of lower prices for the crop was ‘no minimum price fixed’ (65 percent). Other reasons cited were ‘private buyers collude’ (21 percent) and

'no government purchase' (10 percent). The trend was the same across the landholding categories as well with majority of the households in all the categories reporting 'no minimum price fixed' as the main reason for receiving lower price for wheat. In case of groundnut, around 76 percent of the households reported 'all the reasons' which included very few buyers, no government purchase, private buyers collude, no minimum price fixed to be responsible for receiving lower price for groundnut. Around 21 percent reported 'no minimum price fixed' as one of the reasons for receiving lower price for groundnut. The trend was the same across the landholding categories with over 71 percent of the households reporting 'all the reasons'. For cotton too, 'all the reasons' (64 percent) and 'no minimum price fixed' (30 percent) were reported as reasons for receiving lower price. 'All the reasons' emerged to be significant for receiving lower price for paddy across all the landholding categories. Besides 'all the reasons', singular reason such as 'no minimum price' was reported mainly by a higher percentage of households in the marginal (36 percent) and medium category (39 percent).

In MP, 'no government purchase' (59 percent) and 'private buyers collude' (41 percent) were the reasons reported for receiving lower price for soybean. While 'no government purchase' was cited by a majority of the households in all the landholding categories (over 50 percent), exception was the 'very large' category wherein a higher percentage of households (63 percent) reported 'private buyers collude' as the main reason for receiving lower price for soybean. However, the number of households is rather small (only 8). In case of paddy, out of the 31 households who considered price received for paddy to be not reasonable, the main reasons cited for it were 'no government purchase' (39 percent), others (35 percent) and 'private buyers collude' (26 percent). Since the spread of the households was very negligible across the landholding category, no clear pattern could be discerned with respect to reasons for receiving lower price and land size. Out of 23 households who reported price for wheat to be not reasonable, 'other' (78 percent), 'very few buyers' (17 percent) and 'private buyers collude' (4 percent) were the reasons cited for it. No clear pattern was observed across the landholding categories for reason as stated in case of paddy. For gram, around 266 households reported the price received for gram to be not reasonable. The reasons cited for receiving lower price for gram were 'no government purchase' (67 percent) and 'private players collude' (75 percent). Across the land holding categories too similar pattern was visible with majority of households citing 'no government purchase' as the main reason for receiving lower price for gram.

3.9.3 Whether price of inputs is reasonable? (% of households)

In Bihar, all the sample households (100 percent each) growing crops such as paddy, wheat and maize as well as other crops reported price for the seeds of the respective crops to be reasonable (Table 3.19). Similarly for inputs such as fertilizers, plant protection chemicals, human labour and irrigation facility, price of these inputs were also reported to be reasonable by all the sample households (100 percent). Thus, in Bihar, prices of all the inputs have been reported to be reasonable for all the crops.

In Gujarat, while 19 percent of the households reported price of paddy seeds to be reasonable, 80 percent found it to be 'high' and 1 percent as 'very high' (Table 3.20). Similar pattern was observed across the landholding categories. Around 14 percent of the households found the price of wheat seeds to be reasonable whereas 79 percent and 7 percent found it to be high and

'very high' respectively. Across the landholding categories, majority of the households (over 77 percent) reported price of wheat seeds to be high. Exception were the large category wherein only 59 percent of the households reported price of wheat seeds to be high and 36 percent found it to be reasonable. In case of groundnut seeds, only 4 percent of the households found it to be reasonable whereas 72 percent found the price to be 'very high' and 23 percent found it to be high. Across the landholding categories too, majority of the households (over 70 percent) reported the price of groundnut seeds to be 'very high'. However, a relatively higher percentage of households in the marginal category reported price to be reasonable (14 percent) compared to other categories. In case of cotton seeds, merely 6 percent of the households reported price of the seeds to be reasonable while 34 percent and 61 percent found the price to be high and 'very high' respectively. The trend was similar across the landholding categories too, except the marginal category. For fertilizers, only 3 percent of the households reported the price to be reasonable while 67 percent found it to be high and 30 percent reported it to be 'very high'. Across the landholding categories too, majority of the households reported the price of fertilizers to be high. In case of manures, a high percentage of households found the price to be reasonable (52 percent) while 20 percent and 28 percent found it to be high and 'very high' respectively. Across the landholding categories too, similar pattern was observed with majority of the households reporting the price of manure to be reasonable, except the 'very large; category. In case of plant protection chemicals, around 9 percent reported the price of plant protection chemicals to be reasonable. Around 46 percent and 45 percent reported price of plant protection chemicals to be high and 'very high' respectively. Across the landholding categories, none of the households in the 'very large' category reported the price of plant protection chemicals to be reasonable. In case of diesel, majority of the households reported the price to be 'very high' (43 percent) followed by those reporting price to be high (34 percent) and reasonable (24 percent). In case of marginal category, majority of the households reported the price of diesel to be reasonable (68 percent) while there was none in the 'very large' category. In case of electricity, a higher percentage of households reported price of electricity to be high (44 percent), this was followed by those reporting it to be 'very high' (31 percent) and reasonable (25 percent). Across the landholding categories too, majority of households reported the price of electricity to be high. In case of human labour, around 53 percent of the households reported the price of human labour to be 'very high' followed by high (27 percent) and reasonable (20 percent). The pattern was the same across the landholding categories too, except that in case of marginal category, a relatively higher percentage of households reported the price of human labour to be reasonable (31 percent). In case of animal labour, majority of the households reported the price of animal labour to be 'very high' (72 percent) while 17 percent and 11 percent reported it to high and reasonable respectively. The pattern was the same across the landholding categories too. For irrigation facility, around 44 percent reported the price to be high while it was 'very high' and reasonable for 33 percent and 23 percent respectively. Similar pattern was evident across the landholding categories as well. For minor repair & maintenance of machinery/equipment, majority of households reported the price to be 'very high' (41 percent) followed by high (28 percent) and reasonable (31 percent). The pattern was slightly different across the landholding categories particularly in case of marginal category. In case of hiring of machinery, around 48 percent of the households reported the price to be 'high' followed by 'very high' and 'reasonable' (21 percent). Similar pattern was

observed across the landholding categories except that in the marginal category, households reporting the price of hiring machinery to be reasonable (27 percent) was relatively higher than those reporting it to be 'very high' (24 percent). The lease rent paid for land was reported to be reasonable by majority of the households (60 percent) while 29 percent and 12 percent reported it to be high and 'very high' respectively. The pattern was the same across the landholding categories except that majority of the households in the 'very large' category reported the lease rent paid for land to be high (56 percent).

In MP, while 51 percent of the households reported the price of soybean seeds to be reasonable, 47 percent found it to be high and 1 percent as 'very high' (Table 3.21). The pattern was slightly different for the small and 'very large' category. In the case of small and 'very large' category, a relatively higher percentage of households found the price of soybean to be high (55 percent and 61 percent respectively) rather than reasonable (42 percent and 36 percent respectively). In case of paddy seeds, around 89 percent of the households reported the price to be reasonable and 11 percent as high while none of the households reported the price to be 'very high'. The pattern was the same across the landholding categories. In case of both wheat seeds and gram seeds, a very percentage of households found the price of the respective seeds to be reasonable (93 percent and 81 percent respectively). Similar pattern was observed across the landholding categories as well. For manures, while 100 percent of the sample households reported the price to reasonable, a very high percentage of households (91 percent) also reported the price of fertilizers to be reasonable. For fertilizers, the pattern was the same across the landholding categories. In case of plant protection chemicals, majority of the households (65 percent) reported the price to be high followed by those who reported it to be reasonable (29 percent) and 'very high' (6 percent). The pattern with respect to plant protection chemicals was the same across the landholding categories. In case of diesel, only 1 percent reported the price to be reasonable while 92 percent reported it to be high and 6 percent found the price to be 'very high'. The pattern was the same across the landholding categories. In case of electricity, 96 percent of the households reported the price to be reasonable and same pattern was evident across the landholding categories as well. Majority of the households reported prices of inputs such as animal labour (88 percent), irrigation facility (96 percent), minor repair and maintenance of machinery/equipment (84 percent), lease rent paid for land (79 percent) to be reasonable and the pattern was the same across the landholding categories for these inputs. In case of human labour too majority of the households reported price to be reasonable (63 percent) followed by high (33 percent) and 'very high' (5 percent). However, there were slight variations in the patterns across the landholding categories. Though majority of households in all the landholding categories reported the price of human labour to be reasonable, those in the large category mainly reported it to be high (56 percent).

In Punjab, majority of households reported the price of paddy seeds to be reasonable (69 percent) followed by high (31 percent) (Table 3.22). Across the landholding categories too, majority of the households (over 71 percent) of the households reported price of paddy seeds to be reasonable exception was the medium category. For wheat seeds, around 64 percent of the households reported the price of wheat seeds to be high while 36 percent found it to be reasonable. The pattern was different in case of marginal and 'very large' category wherein

majority of the households reported the price seeds to be reasonable. In case of inputs such as fertilizers (71 percent), plant protection chemicals (65 percent), human labour (96 percent), irrigation (73 percent), minor repair and maintenance of machinery/ equipment (87 percent), hiring of machinery (79 percent), majority of the households reported the price of these inputs to be reasonable and the pattern was also the same across the landholding categories for all these inputs. In case of diesel, none of the households reported the price of diesel to be reasonable while majority of them reported it to be 'high' (78 percent) and 'very high' (22 percent). The pattern was the same across the landholding categories. The lease rent paid for land was reported to be 'very high' by 41 percent of the households followed by high (29 percent) and reasonable (29 percent). In the marginal category, lease rent paid for land was mostly reported to be reasonable (67 percent) while it was reported to be high in case of 'very large' category (56 percent).

3.9.4 Reasons for unreasonable price of inputs (% of households)

A majority of farmers cited 'no government sale', 'no minimum price', 'not subsidized' and 'collusion of sellers' as major reasons for unreasonable price of inputs

In Bihar all the sample households have reported that the prices of all the inputs are reasonable. In Gujarat, majority of the households cited 'all the reasons' for unreasonable price for wheat seeds (64 percent), groundnut seeds (86 percent) and cotton seeds (83 percent). 'All the reasons' include 'not subsidized', 'very few sellers', 'no government sellers', 'private sellers collude', 'no price control'. Similar pattern was observed across the landholding categories as well. In case of paddy seeds, the main reason for its unreasonable price was stated as 'not subsidized and no price control' (47 percent) (Table 3.23). For inputs such as fertilizers (56 percent), manures (84 percent), plant protection chemicals (61 percent), diesel (75 percent), electricity (65 percent), human labour (57 percent), animal labour (99 percent), irrigation facility (59 percent), minor repair and maintenance of machinery/equipment (84 percent), hiring machinery (65 percent), lease rent paid for land (62 percent), reason for their unreasonable price was stated as 'all the reasons'. Across the landholding categories too, 'all the reasons' was cited for unreasonable price for these inputs. However, in case of inputs such as diesel ('not subsidized and no price control'), human labour ('very few sellers') and hiring of machinery ('private sellers collude'), pattern was slightly different for the marginal category and large category.

In MP, for inputs such as soybean seeds (61 percent), paddy seeds (83 percent), gram seeds (72 percent), the main reason for its unreasonable price was stated as 'private sellers collude' (Table 3.24). This is largely consistent across the landholding categories too. For wheat seeds, 'presence of no government sellers' was cited as the main reason for unreasonable price for the seeds (31 percent). Along with it, other reasons cited were 'private sellers collude' (28 percent), 'very few sellers' (24 percent), 'not subsidized' (17 percent). In case of fertilizers, 'private sellers collude' was stated to be the main reason for its unreasonable price by majority of the households (56 percent) and the pattern was the same across the landholding categories too. In case of inputs such as plant protection chemicals (68 percent), diesel (100 percent), human labour (99 percent), hiring of machinery (91 percent), 'no price control' was the main reason stated for its unreasonable price and similar pattern was observed across the landholding

categories too. There were very few households reporting unreasonable price for inputs such as electricity (13), animal labour (6), irrigation facility (8), minor repair and maintenance of machinery/equipment (15), lease rent for land (5). So no particular pattern could be discerned across the landholding categories.

In Punjab, the reason for unreasonable price of paddy seeds was stated as 'not subsidized' by majority of households (53 percent) followed by 'no price control' (41 percent) (Table 3.25). Across the landholding categories too, majority of the households cited paddy seeds being not subsidized to be the main reason for its unreasonable price exception was the medium category. In case of wheat seeds, very few households (18) reported the price to be unreasonable. For inputs such as plant protection chemicals (51 percent), diesel (100 percent), lease rent paid for land (100 percent), 'no price control' was the main reason for their unreasonable price and similar pattern was observed across the landholding categories. In case of hiring of machinery, around 57 percent of the households stated 'not subsidized' to be the main reason for its unreasonable price and the pattern was the same across the landholding categories as well. A very small number of households reported price as unreasonable for inputs such as manures (6), human labour (13, irrigation facility (20), minor repair and maintenance of machinery/equipment (22) and no particular pattern could be discerned across the landholding categories.

SUMMARY OF THE CHAPTER

Cropping pattern

1. In the marginal and small category, wheat (24 and 21 percent of the GCA respectively) and paddy (24 and 18 percent respectively) were the main crops grown by the households while wheat and soybean were the major crops grown by the households in the 'medium' (20 and 29 percent), 'large' (23 and 31 percent respectively) and 'very large' category (22 and 51 percent respectively).

2. In Bihar, maize is the main crop (33 percent followed by paddy (23 percent), wheat (22 percent). In Gujarat, the cropping pattern is more varied but proportion of area under riskier crops such as cotton (35 percent) and groundnut (12 percent) was higher in the 'very large' category. In MP, soybean was the major crop occupying 43 percent of the GCA followed by wheat (32 percent), gram (15 percent) and paddy (7 percent). The pattern was similar across the landholding categories. In Punjab, wheat (44 percent) and paddy (41 percent) were predominant crops

3. The broad pattern that emerges is that the marginal and small farmers are mainly engaged in paddy and wheat cultivation, possibly owing to lower yield risk, while large and 'very large' categories are relatively more likely to opt for riskier crops. There is growing evidence that the preference for paddy and wheat by marginal and farmers is mainly due to the lower yield risk of these crops (Mekala et al. 2021). The exception though is Punjab, where all categories of farmers grow mainly paddy and wheat because of extensive irrigation and assured price support.

4. **Yield:** Yield of crops such as maize varied directly with land size. In case of paddy and wheat too, the yield increased with increasing land size

Value of output

5. In the overall sample, for all the crops taken together, no clear pattern was evident in case of value of output (Rs/ha) and landholding size. The value of major crops such as paddy and wheat varied directly with land size

6. In Bihar, there is no clear pattern with respect to value of aggregate output per ha and land size. Considering the crop-wise trends, the value of paddy varied directly with land-size.

7. In Gujarat, no clear pattern was evident between value of output and land size in case of major crops such as paddy, wheat, groundnut as well as for the overall crops. The value of cotton per ha was observed to inversely related to the land size. In MP, for the overall crops, the value of output varied directly with land size

8. In MP, there is no clear pattern for major crops such as soybean, paddy, wheat and gram value of output and land size. In Punjab, the value of overall crops varied directly with land size. Crop-wise trends showed that the value of wheat too varied directly with land size while no clear pattern was evident in case of paddy.

Value added per hectare (Rs/ha) and Value added per capita ((Rs/person)

9. In Bihar, contrary to *a priori* expectations, value of output net of paid out costs (VA1) per hectare increased with increasing land size. VA1 per person also varied directly with the land size. In Gujarat, no definite pattern could be discerned with respect to VA1 per ha and land size. VA1 per person increased with an increase in the land size, like in Bihar. In MP, VA1 per hectare and VA1 per person varied directly with the land size. In Punjab, no clear pattern was evident with respect to VA1 per ha and land size while VA1 per person increased with increasing land size. **Thus, there is no discernible link between variation in value added per unit area and size of the landholding but value added per capita (farm income per capita) has increased with land size in all the states.**

10. Value added per hectare increases with land size *when family labour is imputed market wage rates*. However, it needs to be noted that imputation of market wage to family labour may not be totally appropriate because of missing or incomplete markets for women and some members of the household. Use of an appropriate shadow price, instead of market wage, may be more informative.

Marketed surplus (kg/ha) and its value of major crops

11. In the overall sample, quantum of marketed surplus for major crops such as paddy, wheat varied directly with the land size. There was no clear pattern for other crops. Price was almost similar for all the land categories of farmers. Thus, the value of marketed for paddy and wheat increased with land size but there was no such pattern for other crops.

Marketing channel

12. In Bihar, the paddy growing households were mostly dependent on local private dealer (98 percent) for disposing their crop. In Gujarat, households sold paddy and wheat mainly through local private dealers (67 and 92 percent), and groundnut through mandi (39 percent) and local private dealers (37 percent). In MP, soybean was mainly sold through mandi (96 percent) and paddy & wheat through cooperative & government agency (69 percent, 81 percent). In Punjab, almost all the households sold paddy and wheat through cooperative & government agency (100% and 98%)

Input costs

13. In the overall sample, total input costs varied inversely with land size (table 2). In Bihar, no clear pattern was visible. In Gujarat and MP, the total input costs varied inversely with land size while in Punjab, it varied directly with land size.

14. In the overall sample, the total expenses on paddy seeds and maize seeds showed an inverse relation with land size. Expenses on wheat seeds too had an inverse relation with land size. No clear pattern was evident with respect to expenses on cotton seeds and land size.

Fertilisers and manures

15. In the overall sample, expenses on fertilisers and manures (Rs per ha), did not show any clear pattern with respect to land size (table 4). Expenses on manures varied inversely with farm size.

16. In Bihar, only expenses on fertilisers was reported. No clear pattern was evident with respect to expenses of fertilisers and land size. In Gujarat, expenses on fertilisers exhibited an inverse relationship with land size. In MP, expenses on fertilisers varied directly with land size. In Punjab, no clear pattern was visible regarding fertilisers and manures expenses and land size.

Irrigation

17. In the overall sample, an inverse relation was found between expenses on irrigation and land size. In Bihar and MP, irrigation expenses and land size did not show any clear pattern. In Gujarat and Punjab, expenses on irrigation varied inversely with land size.

Plant Protection material

18. In the overall sample, expenses on plant protection chemicals varied directly with land size. In Bihar and MP, no clear pattern was visible. In Gujarat and Punjab, a direct relationship was observed.

Other expenses

19. In the overall sample, expenses on diesel and minor repairs varied directly with land size while expenses on human labour, animal labour, interest, cost of hiring machinery and other expenses varied inversely with land size

Farmers' feedback on constraints faced

20. In the overall sample, a large majority of farmers in MP, Gujarat and Bihar are dissatisfied with sale of crop. 'Lower than market price', 'delayed payments', 'deductions for loans', 'faulty weighing' are the major reasons for the dissatisfaction with sale of the crop. In Punjab, all the farmers in the sample (100 percent) were satisfied with the first/second/third major disposal of crops such as paddy and wheat.

21. A large majority cited 'lack of government purchase', 'no minimum price', 'few buyers' and 'collusion of buyers' as major reasons for receiving lower prices.

22. In Bihar, prices of all the inputs have been reported to be reasonable for all the crops. In Gujarat, except land lease rent, prices of all other inputs have been reported to be high by a majority of farmers. In MP, except plant protection material and diesel, prices of all other inputs have been reported to be reasonable by a majority of farmers. In Punjab, except wheat seeds, land rent and diesel, prices of all other inputs have been reported to be reasonable by a majority of farmers.

23. A majority of farmers cited 'no government sale', 'no minimum price', 'not subsidized' and 'collusion of sellers' as major reasons for unreasonable price of inputs

Tables

Table 3.1: Gross cropped area under different crops across the landholding categories (in ha)

Landholding categories	Bihar							
	Paddy	Maize	Wheat	Masur	Gram	Potato	Onion	GCA
Marginal	23	33	21	13	7	2	1	100
%	23	33	21	13	7	2	1	100
Small	36	53	34	20	10	4	2	158
%	23	33	21	12	6	3	1	100
Medium	37	53	35	23	8	2	1	159
%	23	34	22	14	5	1	1	100
Large	43	62	42	28	11	1	1	188
%	23	33	23	15	6	1	1	100
Very Large	16	22	14	7	3	2		64
%	24	35	23	11	5	3	0	100
Total	153	224	146	90	40	11	5	670
%	23	33	22	13	6	2	1	100

Table 3.1 contd…

Landholding categories	Gujarat																						
	Paddy	Bajra	Jowar	Maize	Wheat	Gram	Tur	Sugarcane	Cumin	Other Spices	Mangoes	Other Fruits	Onion	Other Vegetables	Groundnut	Castorseed	Sesamum	Rapeseed & Mustard	Cotton	Tobacco	Guar	Other Fodder Crop	GCA
Marginal	77	13	0	8	42	1	6	7		1	3	2		1	12	14	1	9	25	15	1	10	247
%	31	5	0	3	17	0	3	3	0	0	1	1	0	0	5	6	0	4	10	6	0	4	100
Small	79	41	2	3	46		6	14	4	1	2	6	8	2	40	16	9	36	76	31	6	30	459
%	17	9	0	1	10	0	1	3	1	0	0	1	2	0	9	3	2	8	17	7	1	7	100
Medium	80	24	6	5	45	3	6	23	10	5	5	5	0	2	54	19	14	27	137	31	3	18	523
%	15	5	1	1	9	1	1	4	2	1	1	1	0	0	10	4	3	5	26	6	1	3	100
Large	104	30		1	60	2	7	29	14	2	3	8	6	1	44	12	7	18	110	38		16	512
%	20	6	0	0	12	0	1	6	3	0	1	2	1	0	9	2	1	4	21	7	0	3	100
Very Large	40	14			7			4	2	6		3	0		29		6	4	85	39		6	245
%	16	6	0	0	3	0	0	2	1	2	0	1	0	0	12	0	2	2	35	16	0	2	100
Total	380	123	8	17	200	6	26	77	31	14	13	23	10	6	178	62	37	95	433	154	11	79	1980
%	19	6	0	1	10	0	1	4	2	1	1	1	1	0	9	3	2	5	22	8	1	4	100

Table 3.1 contd…

	MP										**Punjab**								
Land holding Categories	Soybean	Paddy	Urad	Wheat	Gram	Peas (Pulses)	Garlic	Onion	Masur/Other Pulses	GCA	Paddy	Wheat	Fodder Crops	Maize	Cotton	Sugar cane	Potato	Moong	GCA
Marginal	35	17	1	33	18		0.20			104	28	50	6	20	2	0	0	0	106
%	33	16	1	32	18	0	0	0	0	100	26	47	6	19	2	0	0	0	100
Small	98	53	8	79	67	0	1	0	1	307	74	118	12	41	3	0	2	0	249
%	32	17	3	26	22	0.13	0	0.13	0	100	30	47	5	16	1	0	1	0	100
Medium	237	73	15	178	134	2	7	2	1	649	146	158	15	12	3	3	6	0	343
%	37	11	2	27	21	0	1	0	0	100	43	46	4	4	1	1	2	0	100
Large	283	29	6	208	94	1	7	2	4	634	234	214	13	11	1	4	28	18	522
%	45	5	1	33	15	0	1	0	1	100	45	41	2	2	0	1	5	3	100
Very Large	474	1	5	358	92	5	8	4	8	955	138	130	4	2	0	10	8	6	300
%	50	0	1	37	10	1	1	0	1	100	46	43	1	1	0	3	3	2	100
Total	1127	173	35	856	406	8	23	8	14	2649	620	670	50	86	9	17	44	24	1520
%	43	7	1	32	15	0	1	0	1	100	41	44	3	6	1	1	3	2	100

Table 3.1 contd

Land holding Catg	overall																													
	Paddy	Maize	Wheat	Masur	Gram	Potato	Onion	Bajra	Jowar	Tur	Sugarcane	Cumin	Other Spices	Mangoes	Other Fruits	Other Veg	Groundnut	Castorseed	Sesamum	Rapeseed &Mustard	Cotton	Tobacco	Guar	Other Fodder Crop	Soybean	Urad	Peas(Pulses)	Garlic	Moong	GCA
Marginal	144	61	146	13	27	2	1	13	0	6	7		1	3	2	1	12	14	1	9	27	15	1	16	85	2		1	0	609
%	24	10	24	2	4	0	0	2	0	1	1	0	0	0	0	0	2	2	0	2	5	2	0	3	14	0	0	0	0	100
Small	242	97	277	21	77	6	10	41	2	6	14	4	1	2	6	2	40	16	9	36	79	31	6	42	241	20	1	2	0	1332
%	18	7	21	2	6	0	1	3	0	0	1	0	0	0	0	0	3	1	1	3	6	2	0	3	18	2	0	0	0	100
Medium	336	70	416	24	145	8	3	24	6	6	23	10	5	5	5	2	54	19	14	27	140	31	3	33	586	38	4	17	0	2054
%	16	3	20	1	7	0	0	1	0	0	1	0	0	0	0	0	3	1	1	1	7	2	0	2	29	2	0	1	0	100
Large	410	74	524	32	107	29	9	30		7	29	14	2	3	8	1	44	12	7	18	111	38		29	700	14	2	18	18	2290
%	18	3	23	1	5	1	0	1	0	0	1	1	0	0	0	0	2	1	0	1	5	2	0	1	31	1	0	1	1	100
Very Large	195	24	509	15	95	10	4	14			4	2	6		3		29		6	4	85	39		10	1170	14	12	21	6	2276
%	9	1	22	1	4	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	4	2	0	0	51	1	1	1	0	100
Total	1327	327	1872	103	451	55	23	123	8	26	77	31	14	13	23	6	178	62	37	95	442	154	11	129	2784	87	19	58	24	8557
%	16	4	22	1	5	1	0	1	0	0	1	0	0	0	0	0	2	1	0	1	5	2	0	2	33	1	0	1	0	100

Table 3.2: Yield (kg/ha) of major crops

Paddy					
Landholding Categories	Bihar	Gujarat	MP	Punjab	Overall
Marginal	4200	4115	3381	7175	4637
Small	4188	4901	3506	7257	5208
Medium	4183	4957	3430	6941	5403
Large	4210	9739	3326	7235	7277
Very Large	4238	3416	3459	7484	6365
Total	4200	5922	3431	7221	6004
Wheat					
marginal	4445	2622	3460	4270	3638
small	4483	2748	3144	4493	3815
medium	4414	2553	3411	4636	3869
large	4438	2329	3971	4740	4135
very large	4533	2780	3741	4881	4041
Total	4453	2554	3662	4664	3964
Maize					
marginal	3898	1375		3420	3419
small	3886	2081		3002	3456
medium	3912	827		3554	3634
large	3850	1001		5855	4101
very large	3908			7500	4205
Total	3886	1314		3646	3689
Masur					
marginal	1598				1598
small	1596		1186		1575
medium	1610		741		1580
large	1620		673		1511
very large	1710		988		1316
Total	1616		904		1522
Gram					
marginal	1508	488	954		1095
small	1458		998		1057
medium	1528	8468	952		1145
large	1504	518	987		1033
very large	1441		1109		1120
Total	1493	4943	1003		1095
Potato					
marginal	12174				12174
small	12060			9625	11280
medium	12250			16333	15349
large	12132			29839	28952
very large	12355			38000	33684
Total	12164			28562	25201
Cotton					
marginal		15706			15706
small		28646			28646
medium		35429		60167	38255
large		35893		72500	40375
very large		13982		80000	60881
Total		31491		74735	39316

Onion					
marginal	12507				12507
small	12596	7348	44478		9714
medium	12849	15333	24129		19027
large	12553	10811	42007		16923
very large		10938	41617		39260
Total	12624	13191	37889		21289
Soyabean					
marginal			1034		
small			1043		
medium			1085		
large			1039		
very large			1047		
Total			1052		
Groundnut					
marginal		1714			
small		1465			
medium		1094			
large		1584			
very large		1285			
Total		1370			

Table 3.3: Value of output of major crops (Rs per ha)

Overall crops					
Landholding Categories	**Bihar**	**Gujarat**	**MP**	**Punjab**	**Overall**
Marginal	59865	68421	48850	85879	65609
Small	60203	63111	46878	89405	63161
Medium	58971	82373	53106	102465	71992
Large	58023	90807	56373	109688	80324
Very Large	60175	62276	55929	116916	68445
Total	59243	76061	185661	104643	122580
Paddy					
Marginal	54477	70611	57665	129690	77713
Small	54411	84934	60355	128085	88343
Medium	54512	87143	58755	123157	92845
Large	54537	186856	57346	128126	130413
Very Large	56815	59845	61250	131990	111040
Total	54723	107750	58916	127886	104647
Wheat					
Marginal	69716	46023	64147	79074	64762
Small	69952	47840	57705	82667	68137
Medium	68843	44888	62829	85310	69938
Large	68856	41042	73195	87209	74916
Very Large	69892	46857	68882	89801	73919
Total	69328	44720	67457	85860	71746
Maize					
Marginal	52051	22345		40805	36063
Small	52093	32394		36009	35741
Medium	52583	13597		45120	36280
Large	51209	17014		87217	79793
Very Large	51316			111195	112500

Total	51881	21200		46658	42627
Masur					
Marginal	56868				56868
Small	57249		38400		56336
Medium	56690		27000		55446
Large	57339		24426		53230
Very Large	62319		33745		46805
Total	57461		30934		53887
Gram					
Marginal	55498	31050	39696		43933
Small	52285		41493		42878
Medium	55735	396086	38799		47414
Large	53493	25662	40895		41492
Very Large	53363		46137		46394
Total	53127	232777	41336		44719
Potato					
Marginal	105685				105685
Small	111970			122314	103858
Medium	99340			111344	113717
Large	122307			148502	143747
Very Large	132819			169628	172226
Total	113007			146337	138461
Cotton					
Marginal		107394		112134	107620
Small		69155		112734	70569
Medium		93692		115793	94447
Large		66108		142412	67071
Very Large		52540			52540
Total		75127		117549	76085
Onion					
Marginal	188966				188966
Small	191517	38664	1470185		85218
Medium	197721	52950	509183		350894
Large	192406	36571	517586		172829
Very Large		71094	614263		574028
Total	192498	56688	587715		269296
Soyabean					
Marginal			32579		
Small			32708		
Medium			35329		
Large			33720		
Very Large			34779		
Total			343808		
Groundnut					
Marginal		71383			
Small		63419			
Medium		48098			
Large		67000			
Very Large		63251			
Total		60522			

Table 3.4: Value added1 (VA1) per ha and per person

VA1 per ha (Rs per ha)				
Landholding Categories	Bihar	Gujarat	MP	Punjab
Marginal	22819	27046	48156	106211
Small	24631	25795	50790	108784
Medium	25069	45018	67566	132891
Large	26483	60886	74640	117102
Very Large	23055	28768	75167	122893
Total	24807	40980	69237	119677
VA1 per person (Rs per capita)				
Marginal	2551	4192	7202	20733
Small	6872	8308	14348	36874
Medium	12099	24659	36272	82258
Large	27331	76083	82566	136817
Very Large	46549	73165	205156	266767
Total	8251	18976	46658	74152

Please note VA1 is value of output minus paid-out costs; VA1 per person is computed by dividing VA1 by number of adults in a family. Two children are considered to be equivalent to one adult in a family. Children are considered as those below 18 years of age (National Policy for Children, 2013).

Table 3.5: Value added2 (VA2) per ha and per person

VA2 per ha (Rs per ha)				
Landholding Categories	Bihar	Gujarat	MP	Punjab
Marginal	-36339	-44604	13250	-115939
Small	511	-11763	26604	-18266
Medium	11360	20398	47945	58700
Large	19930	48458	45643	84393
Very Large	20150	22967	60883	103626
Total	4822	14027	48148	50493
VA2 per person (Rs per capita)				
Marginal	-4063	-6913	1982	-22632
Small	142	-3788	7516	-6192
Medium	5483	11173	25739	36335
Large	20569	60552	50490	98602
Very Large	40682	58410	166170	224945
Total	1604	6495	32446	31286

Please note that VA2 is VA1 minus imputed value of family labour at market wage rate.

Table 3.6: Marketed surplus of major crops (kg/ha)

Paddy					
Landholding Categories	**Bihar**	**Gujarat**	**MP**	**Punjab**	**Overall**
Marginal	3142	3088	1979	7168	3758
Small	3146	2929	2705	7226	4226
Medium	3141	4399	3111	6916	5076
Large	3164	2223	3010	7223	5234
Very Large	3137	3416	3400	7482	6275
Total	3148	3130	2860	7206	5002
Wheat					

Marginal	3486	1534	4277	2670	2825
Small	3451	1451	3302	3528	3107
Medium	3454	2071	2967	4276	3409
Large	3476	1448	3392	4225	3517
Very Large	3689	1946	3270	4648	3615
Total	3487	1624	3279	4080	3405
Maize					
Marginal	3354	997		3208	2401
Small	3346	1325		2862	3078
Medium	3294	827		3442	3146
Large	3296	0		5818	3616
Very Large	3351			7450	3690
Total	3321	935		3508	3247
Masur					
Marginal	6321				6582
Small	1373		2200		1413
Medium	1395		0		1336
Large	1393		275		1253
Very Large	1431		513		932
Total	2084		764		1906
Gram					
marginal	2345	488	1122		1451
small	3133		1025		1296
medium	1222	8468	784		973
large	1198	518	750		782
very large	1153		1007		1012
Total	1877	4943	880		1017
Cotton					
Marginal		2406		2100	2384
Small		1364		2000	1388
Medium		1878		2400	1889
Large		1298		3300	1316
Very Large		1010			1010
Total		1501		2300	1518
Soyabean					
Marginal			1557		
Small			1243		
Medium			971		
Large			878		
Very Large			856		
Total			941		
Groundnut					
Marginal		1641			
Small		1445			
Medium		1062			
Large		1571			
Very Large		1285			
Total		1348			

Table 3.7: Price received from the sale of major crops (Rs/kg)

Paddy					
Landholding Categories	**Bihar**	**Gujarat**	**MP**	**Punjab**	**Overall**
Marginal	13	17	17	18	17
Small	13	17	17	18	17
Medium	13	18	17	18	17
Large	13	18	17	18	17
Very Large	13	17	18	18	18
Total	13	18	17	18	17
Wheat					
Marginal	16	17	18	18	18
Small	16	17	18	18	18
Medium	16	18	18	18	18
Large	16	18	18	18	18
Very Large	15	16	18	18	18
Total	16	17	18	18	18
Maize					
Marginal	13	16		12	16
Small	13	16		12	13
Medium	13	16		13	13
Large	13			15	14
Very Large	13			15	13
Total	13	16		13	13
Gram					
marginal	39	64	41		40
small	36		41		40
medium	36	47	40		41
large	36	50	42		41
very large	37		42		42
Total	37	47	41		41
Cotton					
Marginal		44		53	51
Small		50		53	52
Medium		50		54	55
Large		51		52	58
Very Large		52			60
Total		50		53	56
Soyabean					
Marginal			32		
Small			32		
Medium			32		
Large			32		
Very Large			33		
Total			33		
Groundnut					
Marginal		42			
Small		43			
Medium		44			
Large		42			
Very Large		49			
Total		44			

Table 3.8: Value of sale of major crops (Rs/ha)

Paddy					
Landholding Categories	**Bihar**	**Gujarat**	**MP**	**Punjab**	**Overall**
Marginal	40745	53838	34219	126869	63638
Small	40861	49542	46408	127901	71519
Medium	40942	77698	53350	122405	87838
Large	41029	39981	51195	128114	91246
Very Large	42052	59595	59500	132720	110028
Total	41030	54810	49018	127713	86538
Wheat					
Marginal	54663	26701	78661	49127	50175
Small	53837	24946	60605	64918	55662
Medium	53853	36639	54683	78622	61758
Large	53937	25369	62585	77746	63829
Very Large	56907	31623	60309	85532	66242
Total	54289	28301	60427	75068	61756
Maize					
Marginal	44795	16184		38948	39216
Small	44851	20876		34944	39911
Medium	44330	13597		44125	42132
Large	43838	0		86118	49392
Very Large	44144			111750	49729
Total	44367	15119		45488	43143
Gram					
marginal	92254	31050	45586		58425
small	112624		42310		51332
medium	44557	396086	31553		40104
large	42790	25662	31230		31965
very large	42690		42394		42405
Total	69156	232777	36254		41554
Cotton					
Marginal		106946		110500	107205
Small		68703		106453	70134
Medium		93521		128867	94279
Large		66108		172900	67071
Very Large		52540			52540
Total		74967		122207	75928
Soyabean					
Marginal			50294		
Small			40058		
Medium			31540		
Large			28527		
Very Large			28373		
Total			30774		
Groundnut					
Marginal		68140			
Small		62534			
Medium		47014			
Large		66549			
Very Large		63602			
Total		59402			

Table 3.9: Marketing channels (% of households)

	Bihar						
landholding categories	Paddy			Maize		Wheat	
	local private	cooperative & govt. agency	Total	local private	Total	local private	Total
marginal	130	0	130	130	130	110	110
%	100	0	100	100	100	100	100
small	84	3	87	87	87	79	79
%	97	3	100	100	100	100	100
medium	49	2	51	51	51	51	51
%	96	4	100	100	100	100	100
large	27	0	27	27	27	27	27
%	100	0	100	100	100	100	100
very large	5	0	5	5	5	5	5
%	100	0	100	100	100	100	100
Total	295	5	300	300	300	272	272
%	98	2	100	100	100	100	100

Table 3.9 contd…

	Gujarat																		
landholding categories	Paddy					Wheat				Groundnut					Cotton				
	local private	mandi	input dealer	processor	Total	local private	mandi	input dealer	Total	local private	mandi	cooperative & govt. agency	processor	Total	local private	mandi	cooperative & govt. agency	processor	Total
marginal	76	24	8	1	121	50	3	0	53	6	7	2	4	19	21	12	1	8	42
%	63	20	7	1	100	94	6	0	100	32	37	11	21	100	50	29	2	19	100
small	48	14	6	1	73	34	1	2	37	26	18	6	8	58	22	30	3	16	71
%	66	19	8	1	100	92	3	5	100	45	31	10	14	100	31	42	4	23	100
medium	32	7	7	0	46	21	0	1	22	16	22	5	5	48	30	31	3	13	77
%	70	15	15	0	100	95	0	5	100	33	46	10	10	100	39	40	4	17	100
large	23	5	2	0	30	13	3	0	16	7	12	0	4	23	14	9	3	4	30
%	77	17	7	0	100	81	19	0	100	30	52	0	17	100	47	30	10	13	100
very large	6	0	0	0	6	1	0	0	1	3	2	1	1	7	3	5	1	0	9
%	100	0	0	0	100	100	0	0	100	43	29	14	14	100	33	56	11	0	100
Total	185	50	23	2	276	119	7	3	129	58	61	14	22	155	90	87	11	41	229
%	67	18	8	1	100	92	5	2	100	37	39	9	14	100	39	38	5	18	100

Table 3.9 contd…

	MP																	**Punjab**			
landholding categories	Soybean				Paddy				Wheat				Gram					Paddy	Wheat		
	local private	Mandi	input dealers	Total	mandi	input dealers	cooperative& govt agency	Total	mandi	input dealers	cooperative& govt. agency	Total	local private	Mandi	input dealers	cooperative& govt agency	Total	cooperative& govt. agency	cooperative& govt. agency	others	Total
marginal	3	48	1	52	2	4	20	26	2	4	50	56	10	20	5	0	35	46	75	5	80
%	6	92	2	100	8	15	77	100	4	7	89	100	29	57	14	0	100	20	94	6	100
small	0	66	2	68	0	14	26	40	1	13	56	70	23	48	2	1	74	61	94	0	94
%	0	97	3	100	0	35	65	100	1	19	80	100	31	65	3	1	100	27	100	0	100
medium	2	88	2	92	2	8	20	30	2	22	66	90	16	59	4	7	86	65	70	0	70
%	2	96	2	100	7	27	67	100	2	24	73	100	19	69	5	8	100	29	100	0	100
large	1	49	0	50	3	0	5	8	0	9	43	52	12	28	0	0	40	43	44	0	44
%	2	98	0	100	38	0	63	100	0	17	83	100	30	70	0	0	100	19	100	0	100
very large	0	24	1	25	0	0	1	1	0	3	23	26	5	17	0	0	22	12	12	0	12
%	0	96	4	100	0	0	100	100	0	12	88	100	23	77	0	0	100	5	100	0	100
Total	6	275	6	287	7	26	72	105	5	51	238	294	66	172	11	8	257	227	295	5	300
%	2	96	2	100	7	25	69	100	2	17	81	100	26	67	4	3	100	100	98	2	100

Table 3.10: Input usage (Rs/ha) - total expenditure on all inputs

Landholding Categories	Bihar	Gujarat	MP	Punjab	Overall
Marginal	80966	71538	57505	54113	61229
Small	78808	63320	47375	62978	52112
Medium	76152	55955	45706	64628	46303
Large	80607	47877	45000	107579	40832
Very Large	80144	44551	43750	108950	38832
Total	79109	55600	45550	69379	45625

Table 3.11: Input usage (Rs/ha) – expenses on seeds

Paddy seeds					
Landholding Categories	Bihar	Gujarat	MP	Punjab	Overall
Marginal	1342	1006	1267	478	1037
Small	1345	426	1030	538	725
Medium	1342	289	666	846	621
Large	1396	355	296	897	589
Very Large	1361	245		730	265
Total	1359	412	405	762	593
Wheat seeds					
Marginal	2004	722	1333	2115	1285
Small	2039	377	1084	2206	1109
Medium	2117	310	571	2121	903
Large	2268	350	674	1980	1035
Very Large	2043	89	63	2174	543
Total	2115	353	504	2099	934
Maize seeds					
Marginal	3726	86		1775	1281
Small	3726	15		1553	1129
Medium	3722	9		378	745
Large	3878	3		325	772
Very Large	3721			118	518
Total	3765	16		608	858
Masur seeds					
Marginal	573		0		352
Small	549		125		317
Medium	634		16		196
Large	693		47		252
Very Large	477		113		150
Total	605		70		227
Gram seeds					
Marginal	802	8	1921		512
Small	667		2396		725
Medium	544	7	2159		854
Large	694	12	1410		607
Very Large	499		1014		676
Total	648	6	1587		698
Cotton seeds					
Marginal		662		139	544
Small		1131		97	855
Medium		1080		79	799

Large		948		19	612
Very Large		1134		0	675
Total		1014		51	711
Soybean seeds					
Marginal			3611		
Small			3739		
Medium			4082		
Large			4936		
Very Large			6125		
Total			4961		
Groundnut seeds					
Marginal		861			
Small		1657			
Medium		1476			
Large		1256			
Very Large		1033			
Total		1325			

Table 3.12: Input usage (Rs/ha) – expenses on fertilizers and manures

Fertilizers					
Landholding Categories	Bihar	Gujarat	MP	Punjab	Overall
Marginal	12612	7439	8313	7417	8663
Small	12623	6541	7656	7973	8040
Medium	12227	7880	7688	7780	8340
Large	12757	6590	8126	8954	8303
Very Large	12005	6432	8489	8716	8230
Total	12500	7004	8101	8364	8284
Manures					
Marginal		7812	1450	0	5254
Small		7095	1343	77	4267
Medium		6391	766	578	3400
Large		4195	705	318	2145
Very Large		4112	757	593	1608
Total		5806	844	369	2948

Table 3.13: Input usage (Rs/ha) – expenses on irrigation

Landholding Categories	**Bihar**	**Gujarat**	**MP**	**Punjab**	**overall**
Marginal	12210	4107	281	1654	4975
Small	12345	1814	303	1194	3187
Medium	12144	1004	241	-	1988
Large	12762	506	221	1155	2121
Very Large	12383	604	297	-	1057
Total	12393	1344	265	716	2308

Table 3.14: Input usage (Rs/ha) – expenses on plant protection chemicals

Landholding Categories	Bihar	Gujarat	MP	Punjab	overall
Marginal	3984	2809	3822	7917	3942
Small	4042	3129	3660	8602	4306
Medium	3902	3787	4345	9741	4933
Large	4196	4158	4550	10532	5655
Very Large	4047	3487	4000	10034	4885
Total	4041	3595	4168	9740	4920

Table 3.15: Input usage (Rs/ha) – expenses on diesel and electricity

Diesel					
Landholding Categories	**Bihar**	**Gujarat**	**MP**	**Punjab**	**overall**
Marginal		2716	534	1408	1102
Small		4410	379	2795	1557
Medium		7544	482	5262	2192
Large		10863	317	7140	3450
Very Large		23934	381	7048	3019
Total		8614	396	5546	2526
Electricity					
Marginal		4045	7134		4697
Small		4328	2985		3916
Medium		3167	2044		2697
Large		2377	1636		2070
Very Large		1827	1152		1368
Total		3121	1936		2596

Table 3.16: Input usage (Rs/ha) – expenses on other items

Human labour					
Landholding Categories	**Bihar**	**Gujarat**	**MP**	**Punjab**	**overall**
Marginal	12662	28221	21805	11734	21565
Small	12577	21750	18859	11526	17893
Medium	12130	16807	19075	10044	15817
Large	12738	12514	18616	11887	14066
Very Large	11644	5355	19945	11792	14474
Total	12431	16474	19358	11378	15943
Animal labour					
Marginal		920	929		921
Small		1992	554		1549
Medium		1918	39		1131
Large		910	93		572
Very Large		1038	0		331
Total		1429	222		894
Minor repair					
Marginal	0	806	1173	1509	783
Small	143	1223	1182	1772	1123
Medium	156	1828	1021	2177	1438
Large	0	1943	1819	1349	1535
Very Large	429	1737	921	657	1047

Total	115	1601	1201	1484	1268
Interest					
Marginal	349	26			123
Small	212	0			57
Medium	79	0			18
Large	235	33			83
Very Large	0	0			
Total	185	12			55
Cost of hiring machinery					
Marginal		8213	10011	15858	9941
Small		6289	7985	15092	8478
Medium		3866	8318	10791	6666
Large		2473	3877	8870	4502
Very Large		511	6550	7475	5131
Total		4054	6646	10590	6299
Lease rent for land					
Marginal	3084	145	0	1701	986
Small	1199	422	1000	9116	2124
Medium	497	1512	544	13580	3053
Large	0	2266	4669	52323	13514
Very Large	0	8862	1021	59235	12634
Total	868	2312	1736	33898	7561

Table 3.17: Reasons for dissatisfaction regarding sale of first major disposal of crops (% of households)

	Bihar									**Gujarat**																	
	Paddy			Maize			Wheat			Paddy				Wheat						Groundnut				Cotton			
Landholding Categories	satisfactory	lower than market price & faulty weighing and grading	Total	satisfactory	lower than market price & faulty weighing and grading	Total	satisfactory	lower than market price & faulty weighing and grading	Total	satisfactory	lower than market price	delayed payments	Total	satisfactory	lower than market price	delayed payments	deductions for loans borrowed	faulty weighing and grading	Total	satisfactory	lower than market price	deduction for loan borrowed	Total	satisfactory	lower than market price	deductions for loans borrowed	Total
Marginal	0	130	130	0	130	130	97	33	130	24	90	4	121	8	42	0	1	2	53	3	16	0	19	5	36	0	42
%	0	100	100	0	100	100	75	25	100	20	74	3	100	15	79	0	2	4	100	16	84	0	100	12	86	0	100
Small	9	78	87	9	78	87	74	13	87	12	56	4	73	7	29	0	1	0	37	12	45	1	58	12	57	0	71
%	10	90	100	10	90	100	85	15	100	16	77	5	100	19	78	0	3	0	100	21	78	2	100	17	80	0	100
Medium	7	44	51	7	44	51	47	4	51	2	38	6	46	1	19	1	0	1	22	9	38	1	48	8	63	5	77
%	14	86	100	14	86	100	92	8	100	4	83	13	100	5	86	5	0	5	100	19	79	2	100	10	82	6	100
Large	4	23	27	4	23	27	24	3	27	5	21	4	30	3	12	1	0	0	16	2	21	0	23	5	25	0	30
%	15	85	100	15	85	100	89	11	100	17	70	13	100	19	75	6	0	0	100	9	91	0	100	17	83	0	100
Very Large	0	5	5	0	5	5	4	1	5	1	5	0	6	0	1	0	0	0	1	1	6	0	7	2	7	0	9
%	0	100	100	0	100	100	80	20	100	17	83	0	100	0	100	0	0	0	100	14	86	0	100	22	78	0	100
Total	20	280	300	20	280	300	246	54	300	44	210	18	276	19	103	2	2	3	129	27	126	2	155	32	188	5	229
%	7	93	100	7	93	100	82	18	100	16	76	7	100	15	80	2	2	2	100	17	81	1	100	14	82	2	100

Table 3.17 contd…

	MP																**Punjab**	
	Soyabean				Paddy				Wheat			Gram					Paddy	Wheat
landholding categories	satisfactory	lower than market price	faulty weighing & grading	Total	satisfactory	lower than market price	delayed payments	Total	satisfactory	lower than market price	Total	satisfactory	lower than market price	delayed payments	deductions for loans borrowed	Total	satisfactory	satisfactory
marginal	7	45	0	52	20	3	3	26	48	8	56	10	20	5	0	35	46	80
%	13	87	0	100	77	12	12	100	86	14	100	29	57	14	0	100	100	100
small	15	52	1	68	35	1	4	40	59	11	70	23	48	2	1	74	61	94
%	22	76	1	100	88	3	10	100	84	16	100	31	65	3	1	100	100	100
medium	26	66	0	92	28	0	2	30	76	14	90	16	59	4	7	86	65	70
%	28	72	0	100	93	0	7	100	84	16	100	19	69	5	8	100	100	100
large	10	40	0	50	6	0	2	8	50	2	52	12	28	0	0	40	43	44
%	20	80	0	100	75	0	25	100	96	4	100	30	70	0	0	100	100	100
very large	1	24	0	25	1	0	0	1	26	0	26	5	17	0	0	22	12	12
%	4	96	0	100	100	0	0	100	100	0	100	23	77	0	0	100	100	100
Total	59	227	1	287	90	4	11	105	259	35	294	66	172	11	8	257	227	300
%	21	79	0	100	86	4	10	100	88	12	100	26	67	4	3	100	100	100

Table 3.18: Reasons for receiving lower price for crops (% of households)

	Bihar	**Gujarat**																									
	Paddy	Paddy								Wheat							Groundnut					cotton						
Land holding Categories	no government purchase & private buyers collude	very few buyers	very few buyers & private buyers collude	no government purchase	no government purchase & no minimum price fixed	private buyers collude	no minimum price fixed	all of the reasons	Total	very few buyers	very few buyers & private buyers collude	no government purchase	private buyers collude	no minimum price fixed	all of the reasons	Total	very few buyers	no government purchase & no minimum price fixed	no minimum price fixed	all of the reasons	Total	very few buyers	very few buyers & private buyers collude	no government purchase	private buyers collude	no minimum price fixed	all of the above	Total for cotton
Marginal	130	1	1	13	10	8	62	2	97	1	0	9	7	31	1	49	1	0	2	10	13	0	1	4	0	13	18	36
%	100	1	1	13	10	8	64	2	100	2	0	18	14	63	2	100	8	0	15	77	100	0	3	11	0	36	50	100
Small	87	1	0	2	11	16	22	0	52	0	0	0	13	18	0	31	1	1	7	31	40	1	1	0	0	14	44	60
%	100	2	0	4	21	31	42	0	100	0	0	0	42	58	0	100	3	3	18	78	100	2	2	0	0	23	73	100
Medium	51	1	3	1	8	4	21	0	38	0	1	1	2	13	0	17	0	1	11	29	41	0	3	1	1	27	38	70
%	100	3	8	3	21	11	55	0	100	0	6	6	12	76	0	100	0	2	27	71	100	0	4	1	1	39	54	100
Large	27	1	3	1	0	0	14	0	19	1	0	1	0	8	0	10	0	0	3	16	19	0	0	0	0	3	22	25
%	100	5	16	5	0	0	74	0	100	10	0	10	0	80	0	100	0	0	16	84	100	0	0	0	0	12	88	100
Very Large	5	0	0	0	0	0	1	0	1								0	0	1	3	4	0	0	0	0	1	4	5
%	100	0	0	0	0	0	100	0	100								0	0	25	75	100	0	0	0	0	20	80	100
Total	300	4	7	17	29	28	120	2	207	2	1	11	22	70	1	107	2	2	24	89	117	1	5	5	1	58	126	196
%	100	2	3	8	14	14	58	1	100	2	1	10	21	65	1	100	2	2	21	76	100	1	3	3	1	30	64	100

Table 3.18 contd…

	MP															**Punjab**		**Overall**								
	Soyabean			Paddy				Wheat				Gram				**Paddy**	Wheat									
landholding categories	no government purchase	private buyers collude	Total	no government purchase	private buyers collude	others	Total	very few buyers	private buyers collude	others	Total	no government purchase	private buyers collude	Total	others for paddy	others for wheat	no government purchase & no minimum price fixed	no government purchase & private buyers collude	no government purchase	no minimum price fixed	private buyers collude	very few buyers and private buyers collude	others	all of the reasons	Total
marginal	13	10	23	4	0	4	8	2	0	3	5	23	11	34	5	5	6	130	82	180	51	23	13	41	538
%	57	43	100	50	0	50	100	40	0	60	100	68	32	100	100	100	1	24	15	33	9	4	2	8	100
small	11	4	15	2	5	4	11	2	1	6	9	48	20	68	17	17	9	87	77	125	72	36	33	115	569
%	73	27	100	18	45	36	100	22	11	67	100	71	29	100	100	100	2	15	14	22	13	6	6	20	100
medium	16	10	26	5	2	2	9	0	0	9	9	45	28	73	18	18	17	51	81	127	50	24	34	90	493
%	62	38	100	56	22	22	100	0	0	100	100	62	38	100	100	100	3	10	16	26	10	5	7	18	100
large	5	5	10	1	1	1	3					21	10	31	16	16	6	27	42	44	19	8	27	62	246
%	50	50	100	33	33	33	100					68	32	100	100	100	2	11	17	18	8	3	11	25	100
very large	3	5	8									14	6	20	5	5	0	5	18	8	13	0	10	13	70
%	38	63	100									70	30	100	100	100	0	7	26	11	19	0	14	19	100
Total	48	34	82	12	8	11	31	4	1	18	23	151	75	226	61	61	38	300	299	484	205	91	117	321	1916
%	59	41	100	39	26	35	100	17	4	78	100	67	33	100	100	100	2	16	16	25	11	5	6	17	100

Please note that there are no responses reported for other crops such as maize, wheat, masur, gram, potato, onion in case of Bihar.

All of the reasons includes very few buyers, no govt purchase, private buyers collude, no minimum price fixed. The figures for overall sample are for all the crops taken together and not just the ones given in the table.

Table 3.19: Price for inputs reasonable or not (% of households)- Bihar

	Bihar													
	paddy		maize		wheat		fertilizers		plant protection chemicals		human labour		irrigation facility	
Landholding Categories	Reasonable	Total	Reasonable	Total	Reasonable	Total	Reasonable	Total	Reasonable	Total	Reasonable	Total	Reasonable	Total
Marginal	130	130	130	130	130	130	130	130	130	130	130	130	130	130
%	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Small	87	87	87	87	87	87	87	87	87	87	87	87	87	87
%	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Medium	51	51	51	51	51	51	51	51	51	51	51	51	51	51
%	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Large	27	27	27	27	27	27	27	27	27	27	27	27	27	27
%	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Very Large	5	5	5	5	5	5	5	5	5	5	5	5	5	5
%	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Total	300	300	300	300	300	300	300	300	300	300	300	300	300	300
%	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Please note that there were no responses on 'whether price was reasonable' for 'minor repair and maintenance of machinery and equipment', 'interest', 'cost of hiring of machinery', 'lease rent for land', 'other expenses' in Bihar

Table 3.20: Price for inputs reasonable or not (% of households)- Gujarat

	Gujarat																			
	paddy seed				wheat seeds				groundnut seeds				cotton seed				fertilizer			
Landholding Categories	reasonable	high	very high	Total	reasonable	high	very high	Total	reasonable	high	very high	Total	reasonable	high	very high	Total	reasonable	high	very high	Total
Marginal	31	129	2	162	9	74	4	87	3	8	10	21	3	23	20	46	9	260	43	312
%	19	80	1	100	10	85	5	100	14	38	48	100	7	50	43	100	3	83	14	100
Small	18	67	1	86	7	41	5	53	3	14	40	57	6	16	49	71	10	144	85	239
%	21	78	1	100	13	77	9	100	5	25	70	100	8	23	69	100	4	60	36	100
Medium	7	43	1	51	3	24	4	31	0	12	36	48	3	29	45	77	3	82	71	156
%	14	84	2	100	10	77	13	100	0	25	75	100	4	38	58	100	2	53	46	100
Large	6	25	0	31	8	13	1	22	1	2	20	23	1	10	20	31	0	46	30	76
%	19	81	0	100	36	59	5	100	4	9	87	100	3	32	65	100	0	61	39	100
Very Large	1	4	0	5	0	2	0	2	0	0	7	7	0	1	8	9	0	5	9	14
%	20	80	0	100	0	100	0	100	0	0	100	100	0	11	89	100	0	36	64	100
Total	63	268	4	335	27	154	14	195	7	36	113	156	13	79	142	234	22	537	238	797
%	19	80	1	100	14	79	7	100	4	23	72	100	6	34	61	100	3	67	30	100

Table 3.20 contd…

	Gujarat																			
	manure				plant protection chemicals				diesel				electricity				human labour			
Landholding Categories	reasonable	high	very high	Total	reasonable	high	very high	Total	reasonable	high	very high	Total	reasonable	high	very high	Total	reasonable	high	very high	Total
Marginal	128	43	24	195	27	107	64	198	23	9	2	34	28	60	23	111	98	56	161	315
%	66	22	12	100	14	54	32	100	68	26	6	100	25	54	21	100	31	18	51	100
Small	85	36	54	175	19	72	97	188	9	15	28	52	32	61	48	141	32	76	131	239
%	49	21	31	100	10	38	52	100	17	29	54	100	23	43	34	100	13	32	55	100
Medium	53	17	49	119	8	58	74	140	10	23	28	61	32	38	39	109	19	56	81	156
%	45	14	41	100	6	41	53	100	16	38	46	100	29	35	36	100	12	36	52	100
Large	25	14	26	65	1	37	34	72	7	19	21	47	9	21	20	50	10	26	40	76
%	38	22	40	100	1	51	47	100	15	40	45	100	18	42	40	100	13	34	53	100
Very Large	3	0	7	10	0	5	9	14	0	4	10	14	3	6	2	11	1	4	9	14
%	30	0	70	100	0	36	64	100	0	29	71	100	27	55	18	100	7	29	64	100
Total	294	110	160	564	55	279	278	612	49	70	89	208	104	186	132	422	160	218	422	800
%	52	20	28	100	9	46	45	100	24	34	43	100	25	44	31	100	20	27	53	100

Table 3.20 contd..

	Gujarat																			
Landholding Categories	animal labour				irrigation facility				minor repair & maintenance of mach, equipment				hiring machinery				lease rent paid for land			
	reasonable	high	very high	Total	reasonable	high	very high	Total	reasonable	high	very high	Total	reasonable	high	very high	Total	reasonable	high	very high	Total
Marginal	7	11	21	39	40	88	48	176	8	10	5	23	77	138	67	282	1	1	0	2
%	18	28	54	100	23	50	27	100	35	43	22	100	27	49	24	100	50	50	0	100
Small	7	7	50	64	19	42	34	95	16	15	25	56	29	88	78	195	4	1	0	5
%	11	11	78	100	20	44	36	100	29	27	45	100	15	45	40	100	80	20	0	100
Medium	4	5	44	53	10	12	19	41	23	21	27	71	17	42	43	102	11	4	4	19
%	8	9	83	100	24	29	46	100	32	30	38	100	17	41	42	100	58	21	21	100
Large	0	5	9	14	6	4	7	17	17	14	22	53	3	22	7	32	11	4	2	17
%	0	36	64	100	35	24	41	100	32	26	42	100	9	69	22	100	65	24	12	100
Very Large	2	2	2	6	0	1	2	3	4	1	9	14	0	2	1	3	4	5	0	9
%	33	33	33	100	0	33	67	100	29	7	64	100	0	67	33	100	44	56	0	100
Total	20	30	126	176	75	147	110	332	68	61	88	217	126	292	196	614	31	15	6	52
%	11	17	72	100	23	44	33	100	31	28	41	100	21	48	32	100	60	29	12	100

Table 3.21: Price for inputs reasonable or not (% of households)- MP

	MP																											
	soybean seeds				paddy seeds			wheat seeds				gram seeds				fertilisers				manures		plant protection chemicals				diesel			
Landholding Categories	reasonable	high	very high	Total	reasonable	high	Total	reasonable	high	very high	Total	reasonable	high	very high	Total	reasonable	high	very high	Total	reasonable	Total	reasonable	high	very high	Total	reasonable	high	very high	Total
Marginal	37	18	0	55	22	4	26	54	3	2	59	26	7	2	35	73	8	0	81	26	26	25	48	6	79	0	33	1	34
%	67	33	0	100	85	15	100	92	5	3	100	74	20	6	100	90	10	0	100	100	100	32	61	8	100	0	97	3	100
Small	31	40	2	73	38	2	40	71	7	2	80	58	16	0	74	102	9	2	113	51	51	44	63	4	111	1	35	0	36
%	42	55	3	100	95	5	100	89	9	3	100	78	22	0	100	90	8	2	100	100	100	40	57	4	100	3	97	0	100
Medium	48	41	1	90	25	4	29	93	3	4	100	67	15	4	86	110	10	1	121	43	43	30	83	8	121	1	47	1	49
%	53	46	1	100	86	14	100	93	3	4	100	78	17	5	100	91	8	1	100	100	100	25	69	7	100	2	96	2	100
Large	26	25	0	51	7	2	9	54	1	0	55	37	3	0	40	52	5	0	57	25	25	9	43	5	57	0	18	6	24
%	51	49	0	100	78	22	100	98	2	0	100	93	8	0	100	91	9	0	100	100	100	16	75	9	100	0	75	25	100
Very Large	10	17	1	28	1	0	1	26	1	1	28	19	1	2	22	27	1	0	28	21	21	7	20	1	28	0	12	2	14
%	36	61	4	100	100	0	100	93	4	4	100	86	5	9	100	96	4	0	100	100	100	25	71	4	100	0	86	14	100

Total	152	141	4	297	93	12	105	298	15	9	322	207	42	8	257	364	33	3	400	166	166	115	257	24	396	2	145	10	157
%	51	47	1	100	89	11	100	93	5	3	100	81	16	3	100	91	8	1	100	100	100	29	65	6	100	1	92	6	100

Table 3.21 contd…

	MP																											
	electricity				human labour				animal labour				irrigation facility			minor repair and maintenance of machinery & equipment			hiring of machinery				lease rent paid for land			
Landholding Categories	reasonable	high	very high	Total	reasonable	high	very high	Total	reasonable	high	very high	Total	reasonable	high	Total	reasonable	high	Total	reasonable	high	very high	Total	reasonable	high	very high	Total
Marginal	58	1	0	59	59	18	4	81	9	1	0	10	42	0	42	2	1	3	58	17	3	78				
%	98	2	0	100	73	22	5	100	90	10	0	100	100	0	100	67	33	100	74	22	4	100				
Small	87	0	0	87	83	23	7	113	16	2	0	18	65	1	66	10	2	12	72	21	10	103	6	0	0	6
%	100	0	0	100	73	20	6	100	89	11	0	100	98	2	100	83	17	100	70	20	10	100	100	0	0	100
Medium	91	1	1	93	72	46	3	121	14	2	1	17	56	1	57	20	1	21	64	35	8	107	5	0	0	5
%	98	1	1	100	60	38	2	100	82	12	6	100	98	2	100	95	5	100	60	33	7	100	100	0	0	100
Large	53	3	1	57	22	32	3	57	3	0	0	3	24	0	24	27	7	34	27	16	1	44	7	3	1	11
%	93	5	2	100	39	56	5	100	100	0	0	100	100	0	100	79	21	100	61	36	2	100	64	27	9	100
Very Large	22	3	3	28	14	13	1	28					5	6	11	21	4	25	10	18	0	28	1	1	0	2
%	79	11	11	100	50	46	4	100					45	55	100	84	16	100	36	64	0	100	50	50	0	100
Total	311	8	5	324	250	132	18	400	42	5	1	48	192	8	200	80	15	95	231	107	22	360	19	4	1	24
%	96	2	2	100	63	33	5	100	88	10	2	100	96	4	100	84	16	100	64	30	6	100	79	17	4	100

Table 3.22: Price for inputs reasonable or not (% of households)- Punjab

	Punjab																	
	paddy seeds			wheat seeds			fertilizers			manures			plant protection chemicals			diesel		
Landholding Categories	reasonable	high	Total	reasonable	high	Total	reasonable	high	Total	reasonable	high	Total	reasonable	high	Total	high	very high	Total
Marginal	37	7	44	4	3	7	63	17	80				60	20	80	18	0	18
%	84	16	100	57	43	100	79	21	100				75	25	100	100	0	100
Small	40	12	52	2	6	8	66	28	94	1	0	1	68	26	94	34	7	41
%	77	23	100	25	75	100	70	30	100	100	0	100	72	28	100	83	17	100
Medium	23	29	52	1	5	6	49	21	70	1	3	4	36	34	70	42	14	56
%	44	56	100	17	83	100	70	30	100	25	75	100	51	49	100	75	25	100

Large	24	10	34	1	3	4	27	17	44	2	2	4	23	21	44	32	12	44
%	71	29	100	25	75	100	61	39	100	50	50	100	52	48	100	73	27	100
Very Large	9	1	10	2	1	3	7	5	12	2	1	3	7	5	12	8	4	12
%	90	10	100	67	33	100	58	42	100	67	33	100	58	42	100	67	33	100
Total	133	59	192	10	18	28	212	88	300	6	6	12	194	106	300	134	37	171
%	69	31	100	36	64	100	71	29	100	50	50	100	65	35	100	78	22	100

Table 3.22 contd…

Landholding Categories	**Punjab**																		
	human labour			irrigation				minor repair & maintenance of machinery/equip				hiring of machinery				lease rent paid for land			
	reasonable	high	Total	reasonable	high	very high	Total	reasonable	high	very high	Total	reasonable	high	very high	Total	reasonable	high	very high	Total
Marginal	74	6	80	37	5	0	42	15	3	0	18	63	17	0	80	2	0	1	3
%	93	8	100	88	12	0	100	83	17	0	100	79	21	0	100	67	0	33	100
Small	91	3	94	17	6	0	23	38	2	0	40	61	29	4	94	1	2	6	9
%	97	3	100	74	26	0	100	95	5	0	100	65	31	4	100	11	22	67	100
Medium	67	3	70	1	0	0	1	52	4	0	56	59	8	3	70	4	3	8	15
%	96	4	100	100	0	0	100	93	7	0	100	84	11	4	100	27	20	53	100
Large	43	1	44	0	7	2	9	34	9	1	44	44	0	0	44	11	10	11	32
%	98	2	100	0	78	22	100	77	20	2	100	100	0	0	100	34	31	34	100
Very Large	12	0	12					9	3	0	12	10	2	0	12	2	5	2	9
%	100	0	100					75	25	0	100	83	17	0	100	22	56	22	100
Total	287	13	300	55	18	2	75	148	21	1	170	237	56	7	300	20	20	28	68
%	96	4	100	73	24	3	100	87	12	1	100	79	19	2	100	29	29	41	100

Table 3.23: Reasons for unreasonable price of inputs (% of households)- Gujarat

	Gujarat																												
	paddy seed								wheat seeds								groundnut seeds							cotton seed					
Landholding Categories	not subsidized	not subsidized & no price control	very few sellers	no government seller	private sellers collude	no price control	all of the reasons	Total	not subsidized	not subsidized & no price control	very few sellers	no government sellers	private sellers colludle	no price control	all of the reasons	Total	not subsidized	& no government sellers	not subsidized, no government sellers, no price control	not subsidized & no price control	no price control	all of the reasons	Total	not subsidized	not subsidized & no price control	no government sellers	private sellers colludle	all of the reasons	Total
Marginal	0	66	4	2	15	7	37	131	1	5	1	4	12	6	49	78	0	4	0	0	2	12	18	0	13	1	0	29	43

%	0	50	3	2	11	5	28	100	1	6	1	5	15	8	63	100	0	22	0	0	11	67	100	0	30	2	0	67	100
Small	1	32	0	2	7	5	21	68	1	3	1	4	6	4	27	46	0	5	1	0	0	48	54	0	7	0	0	58	65
%	1	47	0	3	10	7	31	100	2	7	2	9	13	9	59	100	0	9	2	0	0	89	100	0	11	0	0	89	100
Medium	0	18	0	1	5	1	19	44	0	3	0	1	3	2	19	28	2	5	0	1	0	40	48	2	9	0	1	62	74
%	0	41	0	2	11	2	43	100	0	11	0	4	11	7	68	100	4	10	0	2	0	83	100	3	12	0	1	84	100
Large	0	12	0	0	3	0	10	25	0	1	0	0	2	0	11	14	0	1	0	0	0	21	22	1	3	0	0	26	30
%	0	48	0	0	12	0	40	100	0	7	0	0	14	0	79	100	0	5	0	0	0	95	100	3	10	0	0	87	100
Very Large	0	1	0	0	1	0	2	4	0	0	0	0	0	0	2	2	0	0	0	0	0	7	7	0	0	0	0	9	9
%	0	25	0	0	25	0	50	100	0	0	0	0	0	0	100	100	0	0	0	0	0	100	100	0	0	0	0	100	100
Total	1	129	4	5	31	13	89	272	2	12	2	9	23	12	108	168	2	15	1	1	2	128	149	3	32	1	1	184	221
%	0	47	1	2	11	5	33	100	1	7	1	5	14	7	64	100	1	10	1	1	1	86	100	1	14	0	0	83	100

Table 3.23 contd…

Landholding categories	Gujarat																			
	fertilizer												manure							
	not subsidized	not subsidized, very few sellers, no price control	not subsidized & no government sellers	not subsidized, no government sellers, no price control	not subsidized & no price control	not subsidized & all of the reasons	very few sellers	no government sellers	private sellers collude	no price control	all of the reasons	Total	not subsidized	not subsidized & no price control	very few sellers	private sellers collude	no price control	all of the reasons	any other	Total
Marginal	0	0	13	0	95	0	13	9	22	9	142	303	4	1	3	6	4	48	1	67
%	0	0	4	0	31	0	4	3	7	3	47	100	6	1	4	9	6	72	1	100
Small	2	1	16	1	44	0	6	4	14	8	133	229	1	0	5	6	0	78	0	90
%	1	0	7	0	19	0	3	2	6	3	58	100	1	0	6	7	0	87	0	100
Medium	0	0	11	0	31	1	4	2	4	5	95	153	0	0	4	1	0	61	0	66
%	0	0	7	0	20	1	3	1	3	3	62	100	0	0	6	2	0	92	0	100
Large	2	0	4	0	18	0	1	0	1	1	49	76	0	0	4	2	0	34	0	40
%	3	0	5	0	24	0	1	0	1	1	64	100	0	0	10	5	0	85	0	100
Very Large	0	0	0	0	1	0	0	0	0	0	13	14	0	0	0	0	0	7	0	7
%	0	0	0	0	7	0	0	0	0	0	93	100	0	0	0	0	0	100	0	100
Total	4	1	44	1	189	1	24	15	41	23	432	775	5	1	16	15	4	228	1	270
%	1	0	6	0	24	0	3	2	5	3	56	100	2	0	6	6	1	84	0	100

Table 3.23 contd…

	Gujarat																				
	Plant protection chemicals										human labour								animal labour		
landholding ding categories	not subsidized	not subsidized & no government sellers	not subsidized, no government sellers, no price control	not subsidized & no price control	very few sellers	no government sellers	private sellers collude	no price control	all of the reasons	Total	not subsidized	not subsidized & no price control	very few sellers	no govtsellers	private sellers collude	no price control	all of the reasons	Total	not subsidized	all of the reasons	Total
Marginal	6	14	0	46	2	3	11	9	80	171	0	22	117	0	0	1	77	217	0	32	32
%	4	8	0	27	1	2	6	5	47	100	0	10	54	0	0	0	35	100	0	100	100
Small	3	16	1	21	1	6	8	4	109	169	1	40	40	1	1	0	124	207	1	56	57
%	2	9	1	12	1	4	5	2	64	100	0	19	19	0	0	0	60	100	2	98	100
Medium	3	11	0	20	0	3	6	3	86	132	1	24	11	1	0	3	97	137	0	49	49
%	2	8	0	15	0	2	5	2	65	100	1	18	8	1	0	2	71	100	0	100	100
Large	1	5	0	13	0	0	2	1	49	71	0	12	2	0	0	1	51	66	0	14	14
%	1	7	0	18	0	0	3	1	69	100	0	18	3	0	0	2	77	100	0	100	100
Very Large	0	0	0	1	0	0	0	0	13	14	0	0	0	0	0	0	13	13	0	4	4
%	0	0	0	7	0	0	0	0	93	100	0	0	0	0	0	0	100	100	0	100	100
Total	13	46	1	101	3	12	27	17	337	557	2	98	170	2	1	5	362	640	1	155	156
%	2	8	0	18	1	2	5	3	61	100	0	15	27	0	0	1	57	100	1	99	100

Table 3.24: Reasons for unreasonable price of inputs (% of households)- MP

	MP																									
	soybean seeds							paddy seeds				wheat seeds					gram seeds			fertilisers				plant protection chemicals			
Landholding Categories	not subsidized	very few seller	no govt sellers	private sellers collude	no price control	all of the above	Total	very few sellers	private sellers collude	no price control	Total	not subsidized	very few sellers	no govt sellers	private sellers collude	Total	private sellers collude	no price control	Total	very few sellers	private sellers collude	no price control	Total	not subsidized	private sellers collude	no price control	Total
Marginal	0	1	0	8	9	0	18	0	4	0	4	3	0	2	1	6	7	2	9	1	4	3	8	0	16	38	54
%	0	6	0	44	50	0	100	0	100	0	100	50	0	33	17	100	78	22	100	13	50	38	100	0	30	70	100
Small	0	7	3	27	5	0	42	0	2	0	2	1	4	4	3	12	11	5	16	2	5	4	11	0	27	40	67
%	0	17	7	64	12	0	100	0	100	0	100	8	33	33	25	100	69	31	100	18	45	36	100	0	40	60	100
Medium	2	2	0	26	11	1	42	1	2	1	4	1	3	1	2	7	14	5	19	2	6	3	11	1	26	64	91
%	5	5	0	62	26	2	100	25	50	25	100	14	43	14	29	100	74	26	100	18	55	27	100	1	29	70	100
Large	0	1	0	17	7	0	25	0	2	0	2	0	0	1	1	2	1	2	3	1	4	0	5	0	14	34	48
%	0	4	0	68	28	0	100	0	100	0	100	0	0	50	50	100	33	67	100	20	80	0	100	0	29	71	100
Very Large	0	1	0	10	7	0	18					0	0	1	1	2	3	0	3	0	1	0	1	0	5	16	21
%	0	6	0	56	39	0	100					0	0	50	50	100	100	0	100	0	100	0	100	0	24	76	100
Total	2	12	3	88	39	1	145	1	10	1	12	5	7	9	8	29	36	14	50	6	20	10	36	1	88	192	281
%	1	8	2	61	27	1	100	8	83	8	100	17	24	31	28	100	72	28	100	17	56	28	100	0	31	68	100

Table 3.24 contd…

	MP																							
	Diesel		Electricity					Human labour			Animal labour				Irrigation facility and minor repair and maintenance of mach/equip		Hiring of machinery				Lease rent paid for land			
Landholding categories	no price control	Total	no govt support	private sellers collude	no price control	all of the reasons	Total	no price control	others	Total	not subsidized	very few sellers	all of the reasons	Total	others for irrigation facility	others for minor repair and maintenance of mach/equip	not subsidized	no price control	others	Total	very few sellers	no price control	all of the reasons	Total
Marginal	34	34	0	1	0	0	1	22	0	22	1	0	0	1		1	0	20	0	20				
%	100	100	0	100	0	0	100	100	0	100	100	0	0	100		100	0	100	0	100				
Small	35	35						29	1	30	1	1	0	2	1	2	4	25	2	31				
%	100	100						97	3	100	50	50	0	100	100	100	13	81	6	100				
Medium	48	48	1	0	1	0	2	49	0	49	1	0	2	3	1	1	4	38	1	43				
%	100	100	50	0	50	0	100	100	0	100	33	0	67	100	100	100	9	88	2	100				
Large	24	24	2	0	0	2	4	35	0	35						7	7	7	3	17	1	2	1	4
%	100	100	50	0	0	50	100	100	0	100						100	41	41	18	100	25	50	25	100
Very large	14	14	5	1	0	0	6	13	1	14					6	4	17	1	0	18	0	1	0	1
%	100	100	83	17	0	0	100	93	7	100					100	100	94	6	0	100	0	100	0	100
Total	155	155	8	2	1	2	13	148	2	150	3	1	2	6	8	15	32	91	6	129	1	3	1	5
%	100	100	62	15	8	15	100	99	1	100	50	17	33	100	100	100	25	71	5	100	20	60	20	100

Table 3.25: Reasons for unreasonable price of inputs (% of households)- Punjab

	Punjab																			
	paddy seeds				wheat seeds				fertilizers			manures		plant protection chemicals					diesel	
Landholding Categories	not subsidized	no price control	all the reasons	Total	not subsidized	no price control	all the reasons	Total	not subsidized	any other	Total	very few sellers	Total	not subsidized	private sellers collude	no price control	all the reasons	Total	no price control	Total
Marginal	6	1	0	7	1	1	1	3	0	17	17			2	6	10	2	20	18	18
%	86	14	0	100	33	33	33	100	0	100	100			10	30	50	10	100	100	100
Small	7	4	1	12	4	1	1	6	1	27	28			9	2	11	4	26	41	41
%	58	33	8	100	67	17	17	100	4	96	100			35	8	42	15	100	100	100
Medium	12	14	3	29	3	2	0	5	5	16	21	3	3	8	3	20	3	34	56	56
%	41	48	10	100	60	40	0	100	24	76	100	100	100	24	9	59	9	100	100	100
Large	5	5	0	10	2	1	0	3	7	10	17	2	2	3	5	11	2	21	44	44

%	50	50	0	100	67	33	0	100	41	59	100	100	100	14	24	52	10	100	100	100
Very Large	1	0	0	1	0	1	0	1	1	4	5	1	1	2	0	2	1	5	12	12
%	100	0	0	100	0	100	0	100	20	80	100	100	100	40	0	40	20	100	100	100
Total	31	24	4	59	10	6	2	18	14	74	88	6	6	24	16	54	12	106	171	171
%	53	41	7	100	56	33	11	100	16	84	100	100	100	23	15	51	11	100	100	100

Table 3.25 contd…

	Punjab																		
landholding categories	human labour			irrigation facility				minor repair and maintenance of machinery/equipment				hiring of machinery					lease rent for land	
	very few sellers	no price control	Total	not subsidized	very few sellers	no price control	Total	very few sellers	no govt sellers	no price control	Total	not subsidized	very few sellers	no price control	all the reasons	Total	no price control	Total
Marginal	2	4	6	0	4	1	5	0	0	3	3	11	2	3	1	17	1	1
%	33	67	100	0	80	20	100	0	0	100	100	65	12	18	6	100	100	100
Small	2	1	3	0	6	0	6	1	0	1	2	20	9	3	1	33	8	8
%	67	33	100	0	100	0	100	50	0	50	100	61	27	9	3	100	100	100
Medium	1	2	3	2	0	7	9	1	3	0	4	4	1	5	1	11	11	11
%	33	67	100	22	0	78	100	25	75	0	100	36	9	45	9	100	100	100
Large	0	1	1					3	7	0	10	1	0	1	0	2	21	21
%	0	100	100					30	70	0	100	50	0	50	0	100	100	100
Very Large								2	1	0	3						7	7
%								67	33	0	100						100	100
Total	5	8	13	2	10	8	20	7	11	4	22	36	12	12	3	63	48	48
%	38	62	100	10	50	40	100	32	50	18	100	57	19	19	5	100	100	100

CHAPTER 4: LIVESTOCK OUTPUT AND INPUT USE

Though dairy was not the principal occupation of the households in all the four states as observed in Table 2.4 in chapter 2, it was an important secondary source of income for majority of the households in three states- Bihar (55 percent), Gujarat (53 percent), and Punjab (73 percent) except MP (4 percent) (**Table *4.1***). Given the high dependence of households on livestock for their livelihood, this chapter examines the pattern of sale and marketing channels for livestock products and input usage across the landholding categories.

4.1. Sale value of livestock products (Rs/hh and Rs/capita)

In the overall sample, the sale value of livestock products both in terms of Rs/household and Rs/capita was the lowest for the marginal category and highest for the 'very large' category (**Table *4.2***). Thus, contrary to expectation, households with larger landholding were earning more from livestock product sales than those with smaller landholdings.

The sale value of livestock products, which was basically milk for all the states except MP, both in Rs/household and Rs/capita too followed the same trend as the overall sample. Exception was Punjab, wherein the sale value of milk (Rs/household) was the highest for the medium (Rs 18253) rather than the 'very large' category (Rs 11782). Similarly, the sale value of milk in Rs/capita too was highest for the medium category (Rs 2453) rather than the 'very large' category (Rs 1705).

4.2 Marketing channels for livestock products (% of households)

In Bihar, milk was sold entirely to cooperative & government agency (100 percent). In Gujarat, majority of the households sold milk through cooperative & government agency (83 percent) (**Table *4.3***). Selling directly to households (6 percent), to processors (6 percent) and to local trader (5 percent) was minimal. The pattern was the same across the landholding categories. In MP, milk was mainly sold directly to households (55 percent) followed by local trader (39 percent) and commission agents (6 percent). The pattern was the same across the landholding categories except that the in case of 'very large' category. In Punjab, main marketing channel was local trader (80 percent) followed by cooperative & government agency (17 percent). Selling directly to households was very little (3 percent). The pattern was the same across the landholding categories except that none of the households in the small, large and 'very large' category were selling milk directly to the households.

4.3 Expenses incurred for the purchase of inputs (Rs/hh)

In the overall sample, costs on inputs related to animal husbandry increased with increasing land size (**Table *4.4***). Costs incurred on individual inputs such as animal seeds (cattle/buffalo) and green fodder too increased with increasing landholding size. In case of inputs such as dry fodder, concentrates, veterinary charges, labour charges and other expenses, no clear pattern was evident.

The highest inputs costs on animal husbandry was reported for Punjab (Rs 125227/hh) (this was so because of very high cost of animal seeds reported for Punjab unlike other states) followed by MP (Rs 22332/hh), Gujarat (Rs 15481/hh) and Bihar (Rs 8600/hh). In all the states,

highest input costs were observed for the 'very large' category and lowest for the marginal category.

No clear pattern was evident in Bihar for inputs such as animal seeds (cattle/buffalo), green fodder, dry fodder, concentrates, veterinary charges, labour charges and other expenses. In Gujarat, input costs on animal seeds (cattle/buffalo), green fodder, dry fodder and other animal feed increased with the size of the holding. No such clear pattern was visible for inputs such as concentrates, veterinary charges, labour charges and other expenses. In MP, labour charges increased with increasing landholding size. For inputs such as animal seeds (cattle/buffalo and sheep/goats/piggery), green fodder, dry fodder, concentrates, veterinary charges and other expenses, no clear pattern was visible. In Punjab, inputs such as animal seeds (cattle/buffalo), green fodder, dry fodder, concentrates, veterinary charges increased with increasing landholding size. No clear pattern was evident in case of labour charges.

4.4 Perceptions of Farmers

4.4.1 Reasons for dissatisfaction regarding sale of livestock products *(% of households)*

In Bihar, all the sample households reported satisfaction regarding its sale (100 percent). In Gujarat, while 41 percent households were satisfied with the sale of milk, 57 percent were dissatisfied due to receiving of lower than market price for milk (**Table *4.5***). Across the landholding categories too, 'lower than market price' was stated to be the main reason by majority of the households for their dissatisfaction, except the marginal category. In MP, all the sample households reported 'lower than market price' to be the main reason for dissatisfaction with the sale of milk (100 percent). In Punjab too, majority of the households reported to be dissatisfied with the sale of milk because of receiving lower than market price (62 percent) while 38 percent reported satisfaction. Similar pattern was observed across the landholding categories as well.

4.4.2 Reasons for receiving lower price (% of households)

In Gujarat, 'all the reasons' was reported for receiving lower price for milk by majority of the households (53 percent) (**Table *4.6***). All the reasons include 'very few buyers', 'no government purchase', 'private buyers collude' and 'no minimum price'. Around 39 percent cited 'very few buyers and private buyers collude' as the reason for receiving lower price for milk. Across the landholding categories too, majority of the households cited 'all the reasons' for receiving lower price for milk. In MP, all the sample households stated 'no government purchase' as the main reason for receiving lower price for milk (100 percent). In Punjab, 'no minimum price' (54 percent) and 'no government purchase' (45 percent) were stated to be the reasons for receiving lower price for milk. Across the landholding categories, except for the small category, majority of the households in all the categories reported 'no minimum price' as the main reason for receiving lower price for milk.

4.4.3 Whether price of inputs for livestock reasonable? *(% of households)*

In Bihar, majority of the households reported the price to be reasonable for inputs such as animal seeds (cattle/buffalo) (90 percent), green fodder (97 percent), dry fodder (97 percent), concentrates (100 percent), veterinary charges (98 percent) (Table 4.7). Similar pattern was evident across the landholding categories as well. In Gujarat, around 55 percent of the

households reported the price of animal seeds (cattle/buffalo) to be reasonable while 20 percent and 25 percent respectively reported it to be high and 'very high' (Table 4.8). Across the landholding categories too, majority of the households stated the price of animal seeds (cattle/buffalo) to be reasonable. For green fodder too, price was reported to be reasonable by 55 percent of the households followed by 30 percent reporting it to be high and 15 percent as 'very high'. Across the landholding categories, except for the 'very large' category reporting the price to be too high (67 percent), majority of the households in all the categories stated the price of green fodder to be reasonable. In case of dry fodder, around 48 percent reported the price to be reasonable followed by 'very high' (33 percent) and high (19 percent). Compared to the other landholding categories, a higher percentage of households in the marginal category reported the price of dry fodder to be reasonable (65 percent). In case of concentrates, percentage of households reporting the price to be not reasonable (high- 52 percent; very high- 35 percent) was relatively higher than those reporting it to be reasonable (13 percent). Majority of households in all the categories reported the price of concentrates to be high exception was the 'very large' category reporting the price to be 'very high'. For animal feed (others) too, households reporting the price to be not reasonable (high- 33 percent; very high- 44 percent) was higher than those reporting it to be reasonable (23 percent). However, unlike other landholding categories, majority of households in the marginal category reported the price of animal feed (others) to be reasonable (45 percent). In case of veterinary charges, a higher percentage of households reported the price to be reasonable (56 percent) compared to those who considered it to be high (17 percent) and very high (27 percent). The pattern was the same across the landholding categories too, except that a higher percentage of households in the 'very large' category reported veterinary charges to be high (44 percent) rather than reasonable (22 percent). In case of labour charges, out of 20 households, 15 of them (75 percent) reported the labour charges to be 'very high'.

In MP, majority of the households reported the price to be reasonable for inputs such as animal seeds (cattle/buffalo) (93 percent), animal seeds (sheep/goat/pig) (91 percent), green fodder (100 percent), dry fodder (100 percent), veterinary charges (97 percent), labour charges (100 percent), other expenses (100 percent) (Table 4.9). Similar pattern was observed across the landholding categories as well. In case of concentrates, around 44 percent and 13 percent reported its price to be high and 'very high' respectively while 43 percent reported it to be reasonable. The percentage of households reporting the price of concentrates to be reasonable was higher for marginal (51 percent), small (49 percent) and medium category (47 percent) as compared to large (27 percent) and 'very large' category (19 percent).

In Punjab, majority of households reported price to be reasonable for inputs such as animal feed (concentrates) (94 percent), veterinary charges (100 percent), labour charges (100 percent) and the pattern was the same across the landholding categories as well (Table 4.10).

4.4.4 Reasons for unreasonable price of inputs for livestock (% of households)

In Bihar, out of the households who reported price of animal seeds (cattle/buffalo) to be unreasonable, reasons were reported to be 'no government sellers' (6), 'private sellers collude' (5) and 'very few sellers' (4) (Table 4.11). These reasons were mostly reported by marginal and small category. In case of veterinary charges, out of the 4 households who reported the charge

to be unreasonable, 2 households each reported 'no government sellers' and 'private sellers collude' to be the reasons for it. In Gujarat, majority of households reported 'all the reasons' for unreasonable price of inputs such as animal seeds (cattle/buffalo) (94 percent), green fodder (99 percent), dry fodder (92 percent), concentrates (63 percent), animal feed (others) (92 percent), veterinary charges (97 percent), labour charges (100 percent) and the pattern was the same across the landholding categories (Table 4.12). All the reasons include 'not subsidized', 'very few sellers', 'no government sellers', 'private sellers collude', 'no price control'. In MP, out of 19 households who reported the price of animal seeds (cattle/buffalo) to be unreasonable, 53 percent reported collusion among private sellers to be the reason for it (Table 4.13). In case of animal seeds (sheep/goat/piggery), 2 households who stated the price of the seeds to be unreasonable reported it to be due to 'no price control'. For animal feed (concentrates), around 64 percent of the households reported 'no price control' to be the reason for the unreasonable price of the input and similar pattern was observed across the landholding categories. For veterinary charges, 2 households who reported the charge to be unreasonable stated it to be due to presence of 'no government sellers'. In Punjab, majority of the households stated 'no price control' to be the reason for unreasonable price of inputs such as animal seeds (cattle/buffalo) (90 percent), animal feed (concentrates) (57 percent) (Table 4.14).

SUMMARY OF THE CHAPTER

1. In the overall sample, the sale value of livestock products both in terms of Rs/household and Rs/capita was the lowest for the marginal category and highest for the 'very large' category, except in Punjab

2. In Bihar and Gujarat, majority of the households (more than 80%) sold milk through cooperative & government agency. In MP, households and local trader are the major channels while in Punjab local trader is the predominant marketing channel.

3. In the overall sample, costs on inputs related to animal husbandry increased with increasing land size. Costs incurred on individual inputs such as animal seeds (cattle/buffalo) and green fodder too increased with increasing landholding size. In case of inputs such as dry fodder, concentrates, veterinary charges, labour charges and other expenses, no clear pattern was evident.

4. The highest inputs costs on animal husbandry was reported for Punjab (Rs 125227/hh) followed by MP (Rs 22332/hh), Gujarat (Rs 15481/hh) and Bihar (Rs 8600/hh). In all the states, highest input costs were reported by the 'very large' category and lowest by the marginal category.

5. Except Bihar, in all the states majority of the farmers expressed dissatisfaction with the sale of milk and 'receiving lower than market price' has been reported to be the reason for the same.

6. 'No government purchase' and 'no minimum price' have been reported to be the major reasons for receiving lower than market price for livestock products.

7. Majority of the households reported the price to be reasonable for inputs such as animal seeds (cattle/buffalo), animal seeds (sheep/goat/pig), green fodder, dry fodder, veterinary charges, labour charges and other expenses. Price of concentrates has been reported to be high in Gujarat and MP.

Tables

Table 4.1: Percentage of households dependent on dairy as secondary income source

	Bihar		**Gujarat**		**MP**		**Punjab**	
categories	dairy	Total hhs reporting secondary occupation	dairy	Total hhs reporting secondary occupation	dairy	Total hhs reporting secondary occupation	dairy	Total hhs reporting secondary occupation
marginal	36	106	105	279	0	34	36	59
%	34	100	38	100	0	100	61	100
small	31	39	123	214	2	47	56	70
%	79	100	57	100	4	100	80	100
medium	17	20	90	137	2	37	55	66
%	85	100	66	100	5	100	83	100
large	11	13	52	68	1	5	27	41
%	85	100	76	100	20	100	66	100
very large	5	5	6	11	0	3	7	11
%	100	100	55	100	0	100	64	100
Total	100	183	376	709	5	126	181	247
%	55	100	53	100	4	100	73	100

Table 4.2: Sale value of livestock products (mean values)

	Bihar	**Gujarat**	**MP**	**Punjab**	**Overall**	
(Rs per household)						
Landholding Categories	total sale value of milk	total sale value of milk	total sale value of livestock products	total sale value of milk	total sale value of milk	total sale value of livestock products
Marginal	18232	11632	715	7745	10986	2413
Small	18121	15114	1062	10733	12629	2666
Medium	17985	16467	993	18253	13869	2731
Large	19366	16630	1257	15303	13242	2471
Very Large	37986	106942	3376	11782	29326	4501
Total	19268	16396	1160	12842	13437	2848
Rs per capita						
Marginal	794	1132	102	1023	1545	890
Small	1042	1796	126	1083	1993	1188
Medium	983	1777	128	2453	1999	1282
Large	1315	2352	166	2115	2379	1547
Very Large	6331	9722	338	1705	6173	3416
Total	1031	1813	147	1603	2079	1255

Table 4.3: Marketing channels for livestock products (% of households)

	Bihar		Gujarat						MP				Punjab			
landholding categories	cooperative & govt. agency	Total	directly to other household	local trader	cooperative & govt. agency	processor	others	Total	directly to other household	local trader	commission agent	Total	directly to other household	local trader	cooperative & govt agency	Total
marginal	36	36	4	12	108	5	0	129	12	11	0	23	2	33	7	42
%	100	100	3	9	84	4	0	100	52	48	0	100	5	79	17	100
small	31	31	9	4	109	9	1	132	25	16	2	43	0	41	2	43
%	100	100	7	3	83	7	1	100	58	37	5	100	0	95	5	100
medium	0	0	8	2	71	7	0	88	27	14	3	44	4	32	7	43
%	100	100	9	2	81	8	0	100	61	32	7	100	9	74	16	100
large	11	11	3	1	42	4	1	51	18	11	0	29	0	24	10	34
%	100	100	6	2	82	8	2	100	62	38	0	100	0	71	29	100
very large	5	5	1	0	6	0	0	7	6	11	4	21	0	8	3	11
%	100	100	14	0	86	0	0	100	29	52	19	100	0	73	27	100
Total	83	83	25	19	336	25	2	407	88	63	9	160	6	138	29	173
%	100	100	6	5	83	6	0	100	55	39	6	100	3	80	17	100

Table 4.4: Average expenses incurred for the purchase of inputs related to animal husbandry (Rs/hh)

All inputs					
landholding categories	Bihar	Gujarat	MP	Punjab	Overall
marginal	7480	13617	19716	74853	25079
small	8628	15761	19773	97722	31990
medium	8479	16986	22927	131950	46232
large	8217	15109	22028	190478	62054
very large	20420	24300	34417	256585	79178
Total	8600	15481	22332	125227	15837
Animal seeds (cattle/buffalo)					
Marginal	259	401	11170	70094	15547
Small	258	544	9839	92091	21151
Medium	248	680	14500	123516	34165
Large	265	581	13307	181250	51117
Very Large	360	939	21788	245000	64152
Total	262	547	13011	118133	29150
Green fodder					
marginal	2220	2354	704	1489	1894
small	2331	3387	787	1646	2269
medium	2249	3608	718	2096	2303
large	2207	3388	780	2817	2395
very large	4860	4867	1208	3329	2669
Total	2365	3158	792	2013	2216
Dry fodder					
marginal	2427	3059	1077	567	2148
small	3138	4310	959	712	2625
medium	3020	4254	773	917	2334
large	2934	4305	1000	1094	2386
very large	3960	5700	825	1605	2161
Total	2854	3953	923	843	2376
Concentrates					
marginal	851	6334	1578	2319	3969
small	849	5280	1432	2829	3359
medium	806	5532	1621	4918	3931
large	776	5112	1775	4533	3661
very large	1500	6961	2585	5636	3909
Total	867	5664	1669	3708	3723
Veterinary charges					
marginal	656	756	177	266	572
small	711	842	143	297	624
medium	703	1065	178	312	689
large	646	880	143	454	623
very large	700	1044	188	537	615
Total	681	883	162	332	625
Labour charges					
marginal	6611	26250	4372		5474
small	6563	7400	4477	700	4775
medium	6300	12886	4504	1200	5190
large	6750	1067	5086	671	4378
very large	7500	2350	7881	697	6922

Total	6707	9750	4880	761	5164
Other expenses					
marginal		4000	114		503
small		850	90		159
medium			107		107
large	1525		140		536
very large	1540	2500	211		807
Total	1533	2050	123		391

Table 4.5: Reasons for dissatisfaction regarding sale of livestock products (% of households)

	Bihar		**Gujarat**					**MP**		**Punjab**		
	Milk		Milk					Milk		Milk		
Landholding Categories	satisfactory	Total	satisfactory	lower than market price	delayed payments	other cause of dissatisfaction	Total	lower than market price	Total	satisfactory	lower than market price	Total
Marginal	30	30	66	63	0	0	129	23	23	17	25	42
%	100	100	51	49	0	0	100	100	100	40	60	100
Small	26	26	47	81	4	0	132	43	43	19	24	43
%	100	100	36	61	3	0	100	100	100	44	56	100
Medium	17	17	27	59	1	1	88	44	44	11	32	43
%	100	100	31	67	1	1	100	100	100	26	74	100
Large	9	9	24	27	0	0	51	29	29	13	21	34
%	100	100	47	53	0	0	100	100	100	38	62	100
Very Large	4	4	2	4	0	1	7	21	21	5	6	11
%	100	100	29	57	0	14	100	100	100	45	55	100
Total	86	86	166	234	5	2	407	160	160	65	108	173
%	100	100	41	57	1	0	100	100	100	38	62	100

Table 4.6: Reasons for receiving lower price for livestock products (% of households)

	Gujarat							**MP**		**Punjab**			
	Milk							**Milk**		**Milk**			
Landholding Categories	very few buyers	very few buyers & private buyers collude	very few buyers & no minimum price	no government purchase & no minimum price	no minimum price	all of the reasons	Total	no government purchase	Total	no govt purchase	private buyers collude	no minimum price	Total
Marginal	2	40	2	0	1	18	63	23	23	10	1	14	25
%	3	63	3	0	2	29	100	100	100	40	4	56	100
Small	3	24	2	1	1	54	85	43	43	16	0	8	24
%	4	28	2	1	1	64	100	100	100	67	0	33	100
Medium	2	22	0	2	1	34	61	44	44	13	0	19	32
%	3	36	0	3	2	56	100	100	100	41	0	59	100
Large	2	8	0	0	0	17	27	29	29	7	0	14	21

%	7	30	0	0	0	63	100	100	100	33	0	67	100
Very Large	0	1	0	0	0	4	5	21	21	3	0	3	6
%	0	20	0	0	0	80	100	100	100	50	0	50	100
Total	9	95	4	3	3	127	241	160	160	49	1	58	108
%	4	39	2	1	1	53	100	100	100	45	1	54	100

Please note that since all the households in Bihar reported satisfaction regarding the sale of livestock products, reasons for receiving lower price is not applicable to Bihar.

Table 4.7: Price for inputs for livestock operations reasonable or not (% of households)- Bihar

	animal seeds (cattle/buffalo)			green fodder			dry fodder			concentrates		veterinary charges		
Landholding Categories	reasonable	high	Total	reasonable	high	Total	reasonable	high	Total	reasonable	Total	reasonable	high	Total
Marginal	39	8	47	128	2	130	128	2	130	36	36	108	1	109
%	83	17	100	98	2	100	98	2	100	100	100	99	1	100
Small	32	4	36	83	4	87	84	3	87	87	87	86	1	87
%	89	11	100	95	5	100	97	3	100	100	100	99	1	100
Medium	20	0	20	49	2	51	49	2	51	51	51	49	2	51
%	100	0	100	96	4	100	96	4	100	100	100	96	4	100
Large	13	0	13	24	1	25	25	0	25	25	25	24	1	25
%	100	0	100	96	4	100	100	0	100	100	100	96	4	100
Very Large	5	0	5	4	1	5	4	1	5	5	5	4	1	5
%	100	0	100	80	20	100	80	20	100	100	100	80	20	100
Total	109	12	121	288	10	298	290	8	298	204	204	271	6	277
%	90	10	100	97	3	100	97	3	100	100	100	98	2	100

Table 4.8: Price for inputs for livestock operations reasonable or not (% of households)- Gujarat

	animal seeds (cattle/buffalo)				green fodder				dry fodder				concentrates				animal feed (others)				veterinary charges				labour charges			
Landholding Categories	reasonable	high	very high	Total	reasonable	high	very high	Total	reasonable	high	very high	Total	reasonable	high	very high	Total	reasonable	high	very high	Total	reasonable	high	very high	Total	reasonable	high	very high	Total
Marginal	81	26	19	126	102	14	19	135	86	29	18	133	22	85	25	132	28	22	12	62	70	13	14	97	0	1	1	2
%	64	21	15	100	76	10	14	100	65	22	14	100	17	64	19	100	45	35	19	100	72	13	14	100	0	50	50	100
Small	78	30	36	144	70	23	57	150	59	30	61	150	12	69	66	147	18	28	50	96	72	23	41	136	1	0	5	6
%	54	21	25	100	47	15	38	100	39	20	41	100	8	47	45	100	19	29	52	100	53	17	30	100	17	0	83	100
Medium	50	20	31	101	49	18	35	102	42	18	41	101	15	45	42	102	9	18	32	59	45	16	29	90	2	0	5	7
%	50	20	31	100	48	18	34	100	42	18	41	100	15	44	41	100	15	31	54	100	50	18	32	100	29	0	71	100
Large	26	9	22	57	28	10	19	57	26	10	19	55	8	28	19	55	3	14	15	32	28	9	16	53	0	1	2	3
%	46	16	39	100	49	18	33	100	47	18	35	100	15	51	35	100	9	44	47	100	53	17	30	100	0	33	67	100
Very Large	4	4	1	9	2	1	6	9	2	0	7	9	1	3	5	9	1	2	5	8	2	4	3	9	0	0	2	2
%	44	44	11	100	22	11	67	100	22	0	78	100	11	33	56	100	13	25	63	100	22	44	33	100	0	0	100	100
Total	239	89	109	437	251	66	136	453	215	87	146	448	58	230	157	445	59	84	114	257	217	65	103	385	3	2	15	20
%	55	20	25	100	55	15	30	100	48	19	33	100	13	52	35	100	23	33	44	100	56	17	27	100	15	10	75	100

Table 4.9: Price for inputs for livestock operations reasonable or not (% of households)- MP

	animal seeds (cattle/buffalo)				animal seeds (sheep/goat/piggery)			green fodder		dry fodder		concentrates				veterinary charges			labour charges		other expenses	
Landholding Categories	reasonable	high	very high	Total	reasonable	high	Total	reasonable	Total	reasonable	Total	reasonable	high	very high	Total	reasonable	high	Total	reasonable	Total	reasonable	Total
Marginal	46	1	0	47	6	0	6	47	47	47	47	24	18	5	47	13	0	13	47	47	9	9
%	98	2	0	100	100	0	100	100	100	100	100	51	38	11	100	100	0	100	100	100	100	100
Small	79	4	1	84	7	2	9	87	87	87	87	43	40	4	87	21	0	21	87	87	20	20
%	94	5	1	100	78	22	100	100	100	100	100	49	46	5	100	100	0	100	100	100	100	100
Medium	68	4	3	75	7	0	7	75	75	75	75	35	28	12	75	18	0	18	75	75	15	15
%	91	5	4	100	100	0	100	100	100	100	100	47	37	16	100	100	0	100	100	100	100	100
Large	40	4	0	44				44	44	44	44	12	25	7	44	14	1	15	44	44	10	10
%	91	9	0	100				100	100	100	100	27	57	16	100	93	7	100	100	100	100	100
Very Large	24	2	0	26				26	26	26	26	5	13	8	26	7	1	8	26	26	9	9
%	92	8	0	100				100	100	100	100	19	50	31	100	88	13	100	100	100	100	100
Total	257	15	4	276	20	2	22	279	279	279	279	119	124	36	279	73	2	75	279	279	63	63
%	93	5	1	100	91	9	100	100	100	100	100	43	44	13	100	97	3	100	100	100	100	100

Table 4.10: Price for inputs for livestock operations reasonable or not (% of households)- Punjab

	animal seeds (cattle/buffalo)				animal feed (concentrates)				veterinary charges		labour charges		prices for the overall reported inputs			
Landholding Categories	reasonable	high	very high	Total	reasonable	high	very high	Total	reasonable	Total	reasonable	Total	reasonable	high	very high	Total
Marginal	23	5	7	35	53	0	0	53	53	53			36	9	7	52
%	66	14	20	100	100	0	0	100	100	100			69	17	13	100
Small	20	8	9	37	60	6	0	66	66	66	1	1	42	18	6	66
%	54	22	24	100	91	9	0	100	100	100	100	100	64	27	9	100
Medium	23	9	5	37	60	4	0	64	64	64	2	2	38	19	7	64
%	62	24	14	100	94	6	0	100	100	100	100	100	59	30	11	100
Large	8	5	9	22	36	3	1	40	40	40	7	7	19	14	7	40
%	36	23	41	100	90	8	3	100	100	100	100	100	48	35	18	100
Very Large	4	2	1	7	11	0	0	11	11	11	3	3	6	3	2	11
%	57	29	14	100	100	0	0	100	100	100	100	100	55	27	18	100
Total	78	29	31	138	220	13	1	234	234	234	13	13	141	63	29	233
%	57	21	22	100	94	6	0	100	100	100	100	100	61	27	12	100

Table 4.11: Reasons for unreasonable price of inputs for livestock operations (% of households)- Bihar

	animal seeds (cattle/buffalo)				veterinary charges		
Landholding Categories	very few sellers	no government sellers	private sellers collude	Total	no government sellers	private sellers collude	Total
Marginal	4	5	4	13	1	0	1
%	31	38	31	100	100	0	100
Small	0	1	1	2	0	0	0
%	0	50	50	100	0	0	
Medium	0	0	0	0	0	1	1
%					0	100	100
Large	0	0	0	0	0	1	1
%					0	100	100
Very Large					1	0	1
%					100	0	100
Total	4	6	5	15	2	2	4

%	27	40	33	100	50	50	100

Table 4.12: Reasons for unreasonable price of inputs for livestock operations (% of households)- Gujarat

	animal seeds (cattle/buffalo)							green fodder				dry fodder					
Landholding Categories	not subsidized	not subsidized & no price control	not subsidized & all of the reasons	very few sellers	no government sellers	all of the reasons	Total	not subsidized	not subsidized & no price control	all of the reasons	Total	not subsidized	not subsidized & no price control	private sellers collude	all of the reasons	any other	Total
Marginal	0	4	1	0	1	39	45	0	0	33	33	0	0	1	41	5	47
%	0	9	2	0	2	87	100	0	0	100	100	0	0	2	87	11	100
Small	2	0	0	0	0	64	66	1	0	79	80	0	0	1	85	5	91
%	3	0	0	0	0	97	100	1	0	99	100	0	0	1	93	5	100
Medium	0	1	0	0	0	50	51	0	1	52	53	0	1	0	56	2	59
%	0	2	0	0	0	98	100	0	2	98	100	0	2	0	95	3	100
Large	1	0	0	1	0	29	31	1	0	28	29	1	0	2	26	0	29
%	3	0	0	3	0	94	100	3	0	97	100	3	0	7	90	0	100
Very Large	0	0	0	0	0	5	5	0	0	7	7	0	0	0	7	0	7
%	0	0	0	0	0	100	100	0	0	100	100	0	0	0	100	0	100
Total	3	5	1	1	1	187	198	2	1	199	202	1	1	4	215	12	233
%	2	3	1	1	1	94	100	1	1	99	100	0	0	2	92	5	100

Please note 'all of the reasons' includes not subsidized, very few sellers, no govt sellers, private sellers collude, no price control

Table 4.12 contd…

landholding categories	concentrates							animal feed (others)						
	not subsidized	not subsidized & no price control	not subsidized & all of the reasons	private sellers collude	no price control	all of the reasons	Total	not subsidized	not subsidized & all of the reasons	no government sellers	private sellers collude	no price control	all of the reasons	Total
Marginal	7	28	0	10	8	57	110	2	0	0	2	1	29	34
%	6	25	0	9	7	52	100	6	0	0	6	3	85	100
Small	7	26	2	2	6	92	135	5	1	0	0	0	72	78
%	5	19	1	1	4	68	100	6	1	0	0	0	92	100
Medium	4	16	0	3	5	59	87	1	0	3	0	0	46	50
%	5	18	0	3	6	68	100	2	0	6	0	0	92	100
Large	1	10	0	6	1	29	47	0	0	0	0	1	28	29
%	2	21	0	13	2	62	100	0	0	0	0	3	97	100
Very Large	0	0	0	1	0	7	8	0	0	0	0	0	7	7
%	0	0	0	13	0	88	100	0	0	0	0	0	100	100

Total	19	80	2	22	20	244	387	8	1	3	2	2	182	198
%	5	21	1	6	5	63	100	4	1	2	1	1	92	100

Table 4.12 contd…

landholding categories	veterinary charges					labour charges	
	not subsidized	not subsidized & no price control	no govt sellers	all of the reasons	Total	all of the reasons	Total
Marginal	1	2	0	24	27	2	2
%	4	7	0	89	100	5	100
Small	0	0	1	63	64	5	5
%	0	0	2	98	100	6	100
Medium	0	1	0	44	45	5	5
%	0	2	0	98	100	10	100
Large	0	0	0	25	25	3	3
%	0	0	0	100	100	11	100
Very Large	0	0	0	7	7	2	2
%	0	0	0	100	100	25	100
Total	1	3	1	163	168	17	17
%	1	2	1	97	100	8	100

Table 4.13: Reasons for unreasonable price of inputs for livestock operations (% of households)- MP

	animal seeds (cattle/buffalo)					animal seeds (sheep/goat/piggery)		animal feed (concentrates)							veterinary charges	
Landholding Categories	very few sellers	no government sellers	private sellers collude	no price control	Total	no price control	Total	not subsidized	very few sellers	no govt sellers	private sellers collude	no price control	all of the reasons	Total	no govt sellers	Total
Marginal	0	0	0	1	1			0	0	6	1	16	0	23		
%	0	0	0	100	100			0	0	26	4	70	0	100		
Small	1	0	3	1	5	2	2	1	0	12	0	30	1	44		
%	20	0	60	20	100	100	100	2	0	27	0	68	2	100		
Medium	1	1	4	1	7			2	1	14	0	23	0	40		
%	14	14	57	14	100			5	3	35	0	58	0	100		
Large	1	0	2	1	4			0	0	10	0	21	1	32	1	1
%	25	0	50	25	100			0	0	31	0	66	3	100	100	100
Very Large	0	0	1	1	2			0	0	8	1	12	0	21	1	1
%	0	0	50	50	100			0	0	38	5	57	0	100	100	100
Total	3	1	10	5	19	2	2	3	1	50	2	102	2	160	2	2

%	16	5	53	26	100	100	100	2	1	31	1	64	1	100	100	100

Table 4.14: Reasons for unreasonable price of inputs for livestock operations (% of households)- Punjab

	animal seeds (cattle/buffalo)					animal feed (concentrates)		
Landholding Categories	not subsidized	very few sellers	no govt sellers	no price control	Total	not subsidized	no price control	Total
Marginal	0	1	0	11	12			
%	0	8	0	92	100			
Small	1	1	1	14	17	2	4	6
%	6	6	6	82	100	33	67	100
Medium	0	1	1	12	14	3	1	4
%	0	7	7	86	100	75	25	100
Large	0	0	0	14	14	1	3	4
%	0	0	0	100	100	25	75	100
Very Large	0	0	0	3	3			
%	0	0	0	100	100			
Total	1	3	2	54	60	6	8	14
%	2	5	3	90	100	43	57	100

CHAPTER 5: LABOUR MARKET

Overall needed

5.1 Average person-days per hectare

In Bihar, the average person-days per ha of family labour and farm servants show an inverse relationship with land size. This indicates that the smaller landholdings were using more family labour and farm servants than those with larger landholdings (**Table *5.1***). The same trend was evident when average person-days per ha for only farm labour was considered. In case of average person-days for hired labour, it varied directly with land size indicating that larger landholdings used more of hired labour than smaller holdings. In Gujarat too, the trend in average person-days per ha was same as in Bihar, except that the average person-days per hectare for hired labour was relatively higher in large (57) than in medium category (55). In MP too, the trend in average person-days per ha for family labour and farm servants and only for family labour was the same as in Bihar and Gujarat. Surprisingly, the average person-days per ha was the highest for the marginal category and lowest for the very large category. In Punjab too, the trend in average person-days per ha for family labour and farm servants and only for family labour was the same as in Bihar, Gujarat and MP. However, the average person-days per ha was the highest for the medium category.

5.2 Average wage rate paid to labour engaged in farming and livestock operations (in Rs)

In Bihar, no responses were recorded for female farm servants while the average wage rate of male farm servant was Rs 215 per day (**Table *5.2***). The average wage rate paid by small (Rs 225) and medium category (Rs 238) was relatively higher than that paid by large and 'very large' category (Rs 200 each). In case of casual labour, average wage rate for male and female labour was Rs 262/- and Rs 155/- respectively. The average wage rate paid by 'very large' category (Rs 250 and Rs 150 respectively) was lower than that for other landholding categories in case of both male and female casual labour!

In Gujarat, only the large category had reported the wage rate of female farm servant. the average wage rate paid per day to male and female farm servants was Rs 223/- and Rs 180/- respectively. The wage rate paid to male farm servants varied directly with land size. In case of casual labour, the average wage rate paid to male and female workers was the same (Rs 196). For both male and female casual labour, average wage rate paid increased with land size exception being the large category where average wage rate paid was lower than the medium category.

In MP, only 'very large' category reported the average wage rate per day of male and female farm servants, which were Rs 275/- and Rs 178/- respectively. In case of casual labour, average wage rate was the same for male and female worker (Rs 247 each).

In Punjab, the average wage rate per day of a male farm servant was Rs 313. In case of casual labour, no details were reported for female workers. The average daily wage rate for male casual worker was Rs 316 and the wage rate increased with land size.

5.3 Wage rate reasonable or not (% of households)

In the overall sample, 48 percent reported the wage rate to be reasonable followed by 40 percent reporting it to be high and 13 percent to be 'very high' (**Table *5.3***). Similar pattern was evident across the landholding categories. Majority of the households reported the wage rate to be reasonable in states such as Bihar (93 percent), MP (80 percent), Punjab (76 percent) and the pattern across the landholding categories in these states was also similar. In Gujarat, only 11 percent of the households reported wage rate to be reasonable while 64 percent reported it to be high and 25 percent to be 'very high'. Across the landholding categories too, majority of the households reported wage rate to be high. However, in case of marginal category, the percentage of households reporting wage rate to be reasonable was relatively higher (21 percent) than the other landholding categories.

5.4 Reasons for unreasonable wage rate (% of households)

In Bihar, all those who reported wage rate to be unreasonable cited working in MNREGA to be the reason for it (100 percent) (**Table *5.4***). In Gujarat, limited labour supply was cited as one of the main reasons for unreasonable wage rate by majority of the households (73 percent). The pattern was the same across the landholding categories. In MP, the reasons stated for unreasonable wage rate were 'working in MNREGA' (46 percent), 'labour contractors' control' (32 percent) and 'limited labour supply' (23 percent). Across the landholding categories too, working in MNREGA emerged to be the main reason for unreasonable wage rate. Exception was the marginal category where 43 percent of the households cited 'limited labour supply' to be the main reason for unreasonable wage rate. In Punjab, 58 percent cited 'limited labour supply' and 42 percent cited 'working in MNREGA' as the reasons for unreasonable wage rate.

5.5 Households engaged as wage labour in various forms (% of households)

Overall, most of the wage labour was engaged in others' farms and not MNREGS (**Table *5.5***). Also, MNREGS is employing mainly from marginal and small farm categories. Around 91 percent are engaged as wage labour in others' farm while the remaining 9 percent were engaged in MNREGS. The pattern was similar across the landholding categories with none of the households from large and 'very large' category being engaged in MNREGS.

In Bihar, sample households were engaged as wage labour in others' farm (85 percent) and in MNREGS (13 percent). These households particularly belonged to the marginal category and none from medium, large and 'very large' category. In Gujarat, only 2 percent were engaged in MNREGS while 98 percent were engaged as wage labour in others' farm. None of the households in the medium, large and 'very large' category were engaged in MNREGS. In MP, the percentage of households working in MNREGS was relatively higher (26 percent) than in other states. Around 74 percent of the households were engaged as wage labour in others' farm. In MP too, none of the households from large and 'very large' category were working in MNREGS. In Punjab, none of the sample households were engaged as wage labour.

5.6 Constraints related to wage labour (% of households)

In the overall sample, the main constraints related to wage labour was reported to be 'work being available for a very limited period of time' (46 percent) and 'wage being very low' (54

percent) (**Table *5.6***). The pattern was the same across the landholding categories. In Bihar, equal percentage of households in the marginal category reported 'work being available for a very limited period of time' (31 percent) and 'wage being very low' (31 percent) as the constraints related to wage labour. In Gujarat, 33 different combinations of responses were reported and hence it was not possible to discern any meaningful pattern from it. In MP, only 16 households have provided responses on constraints related to wage labour. Out of 16 households, 11 reported 'wage being very low' and 5 reported 'work being available for a very limited period of time' to be the major constraints related to wage labour. In Punjab, since none of the sample households reported to be engaged in wage labour, constraints related to wage labour is not applicable.

SUMMARY OF THE CHAPTER

1. In all the four states, the average person-days per ha of family labour and farm servants show an inverse relationship with land size. This indicates that the smaller landholdings were using more family labour and farm servants than those with larger landholdings

2. In the overall sample, 48 percent reported the wage rate to be reasonable. Similar pattern was evident across the landholding categories. Majority of the households reported the wage rate to be reasonable in Bihar, MP and Punjab and the pattern across the landholding categories in these states was also similar. In Gujarat, only 11 percent of the households reported wage rate to be reasonable

3. The major reasons reported for unreasonable wage rates are 'working in MNREGA' and 'limited labour supply'.

4. Most of the wage labour was engaged in others' farms and not MNREGS. Around 91 percent are engaged as wage labour in others' farm while the remaining 9 percent were engaged in MNREGS. MNREGS is employing mainly from marginal and small farm categories and none from medium, large and very large categories.

5. In the overall sample, the main constraints related to wage labour reported were 'work being available for a very limited period of time' (46 percent) and 'wage being very low' (54 percent). The pattern was the same across the landholding categories.

Tables

Table 5.1: Average person days per hectare

Landholding Categories	Bihar	Gujarat	MP	Punjab
Overall labour				
Marginal	103	239	219	223
Small	150	130	152	542
Medium	89	116	204	325
Large	92	87	207	137
Very Large	57	49	133	68
Total	100	107	276	279
Family labour & farm servants				
Marginal	69	178	81	76
Small	72	86	56	78
Medium	39	75	45	59
Large	30	41	34	26
Very Large	15	29	26	10
Total	48	65	121	40
Family labour				
Marginal	69	147	81	76
Small	24	64	56	33
Medium	12	65	45	31
Large	8	34	34	18
Very Large	4	16	10	6
Total	16	49	31	18
Hired labour				
Marginal	52	72	537	13
Small	59	62	307	29
Medium	62	55	481	12
Large	81	57	409	7
Very Large	83	41	250	7
Total	61	53	387	15

Table 5.2: Average wage rate paid to labour engaged in farming and livestock operations (in Rs)

landholding categories	Bihar		Gujarat		MP		Punjab	
Farm Servants								
	Male	Female	Male	Female	Male	Female	Male	Female
marginal			201					
small	225		220				300	22
medium	238		231				333	25
large	200		252	180			305	22
very large	200		287		275	178	317	23
total	215		223	180	275	178	313	23
Casual labour								
marginal	262	154	169	169	250	250	300	
small	263	154	204	205	248	247	308	
medium	264	155	215	215	247	247	315	
large	261	159	211	210	245	244	322	
very large	250	150	232	232	248	248	330	
total	262	155	196	196	247	247	316	

Table 5.3: Wage rate reasonable or not (% of households)

	Bihar			**Gujarat**				**MP**			**Punjab**			**Overall**			
landholding categories	reasonable	high	Total	reasonable	high	very high	Total	reasonable	high	Total	reasonable	high	Total	reasonable	high	very high	Total
marginal	123	6	129	65	198	52	315	67	14	81	12	1	13	267	219	52	538
%	95	5	100	21	63	17	100	83	17	100	92	8	100	50	41	10	100
small	82	5	87	15	148	76	239	89	24	113	13	2	15	199	179	76	454
%	94	6	100	6	62	32	100	79	21	100	87	13	100	44	39	17	100
medium	47	4	51	4	100	52	156	99	22	121	17	7	24	167	133	52	352
%	92	8	100	3	64	33	100	82	18	100	71	29	100	47	38	15	100
large	22	5	27	5	56	15	76	43	14	57	25	12	37	95	87	15	197
%	81	19	100	7	74	20	100	75	25	100	68	32	100	48	44	8	100
very large	5	0	5	1	8	5	14	23	5	28	10	2	12	39	15	5	59
%	100	0	100	7	57	36	100	82	18	100	83	17	100	66	25	8	100
Total	279	20	299	90	510	200	800	321	79	400	77	24	101	767	633	200	1600
%	93	7	100	11	64	25	100	80	20	100	76	24	100	48	40	13	100

Table 5.4: Reasons for unreasonable wage rate (% of households)

	Bihar		**Gujarat**												**MP**				**Punjab**		
land holding categories	working in MNREGA	Total	limited labour supply	limited labour supply & working in MNREGA	limited labour supply & labour contractors' control	limited labour supply & labour contractors' control & all of the reasons	limited labour supply & labour contractors' control & others	limited labour supply & all of the reasons	limited labour supply & all of the reasons & others	working in MNREGA	working in MNREGA & labour contractors' control	labour contractors' control	all of the reasons*	Total	limited labour supply	working in MNREGA	labour contractors' control	Total	limited labour supply	working in MNREGA	Total
marginal	6	6	215	4	2	0	0	4	3	1	0	0	21	250	6	4	4	14	0	1	1
%	100	100	86	2	1	0	0	2	1	0	0	0	8	100	43	29	29	100	0	100	100
small	5	5	161	10	7	0	1	7	0	0	1	0	37	224	5	13	6	24	2	0	2
%	100	100	72	4	3	0	0	3	0	0	0	0	17	100	21	54	25	100	100	0	100
medium	4	4	97	11	5	1	0	4	0	0	0	1	33	152	2	11	9	22	6	1	7
%	100	100	64	7	3	1	0	3	0	0	0	1	22	100	9	50	41	100	86	14	100
large	5	5	42	3	9	0	0	2	0	1	0	1	13	71	3	6	5	14	4	8	12
%	100	100	59	4	13	0	0	3	0	1	0	1	18	100	21	43	36	100	33	67	100
very large			6	3	0	0	0	0	0	0	0	0	4	13	2	2	1	5	2	0	2
%			46	23	0	0	0	0	0	0	0	0	31	100	40	40	20	100	100	0	100
Total	20	20	521	31	23	1	1	17	3	2	1	2	108	710	18	36	25	79	14	10	24
%	100	100	73	4	3	0	0	2	0	0	0	0	15	100	23	46	32	100	58	42	100

Table 5.5: Households engaged as wage labour in various forms (% of households)

	Bihar			Gujarat			MP			Punjab	Overall		
landholding categories	others' farm	MNREGS	Total	others' farm	MNREGS	Total	others' farm	MNREGS	Total		others' farm	MNREGS	Total
marginal	70	13	83	130	3	133	23	10	33		223	26	249
small	1		87	55	1	56	13	5	18		69	6	75
medium	0		51	28	0	28	4	1	5		32	1	33
large	0		27	7	0	7	4	0	4		11	0	11
very large	0		5	3	0	3	1	0	1		4	0	4
Total	71	13	300	223	4	227	45	16	61		339	33	372

Please note that none of the households were engaged as wage labour (others' farm and MNREGS), hence the corresponding details on duration and wage rate is blank in case of Punjab.

Table 5.6: Constraints related to wage labour (% of households)

	Bihar			Gujarat	MP			Punjab	Overall		
landholding categories	work available for a very limited period	wage is very low	total		work available for a very limited period of time	wage is very low	Total		work available for a very limited period of time	wage is very low	Total
marginal	31	31	62		3	7	10		34	38	72
%	50	50	100		30	70	100		47	53	100
small					2	3	5		2	3	5
%					40	60	100		40	60	100
medium					0	1	1		0	1	1
%					0	100	100		0	100	100
large									0	0	0
%									0	0	0
very large									0	0	0
%									0	0	0
Total	31	31	62		5	11	16		36	42	78
%	50	50	100		31	69	100		46	54	100

Note: In case of Gujarat, there are 33 different combinations of responses, hence it was not possible to put it in tabular format. Please note that none of the households were engaged as wage labour (others' farm and MNREGS) in Punjab, hence the question on constraints related to wage labour is also not applicable to them.

CHAPTER 6: CREDIT MARKET

6.1 Percentage of households borrowing from different sources (wrt to total number of borrowings)

In the overall sample, around 44 percent and 40 percent of the total number of borrowings were from institutional sources such as cooperative society and government banks respectively (**Table *6.1***). This was followed by borrowings from non-institutional sources such as input dealers (15 percent), employer (1 percent). Across the landholding categories too, similar pattern was observed. Further, while the highest percentage of borrowings in the marginal category was from cooperative society (53 percent), in the very large category, it was from government banks (45 percent). Households particularly in the marginal category were also dependent on other institutional sources such as micro finance/community groups/NGOs (0.2 percent) and SHGs (1 percent) though the number of borrowings was very small. Input dealers were the major non-institutional source of borrowings across the landholding categories.

In Bihar, the total number of borrowings reported by the households was very low (19). Out of the total borrowings, 14 (74 percent) were from government banks, 2 from SHGs and one each from cooperative society, micro finance/community groups/NGOs and relatives. None of the households in the 'very large' households reported any borrowings from any of the sources. All the borrowings in the small (6), medium (2) and large category (3) were reported to be from only government bank. In the marginal category, borrowings were from institutional sources (government bank-3; cooperative society -1, micro finance/community groups/NGOs- 1; SHGs -2) and non-institutional sources such as relatives (1). In Gujarat, majority of the borrowings were from institutional sources such as government banks (66 percent) and cooperative society (31 percent) and a meagre percentage from employer (2 percent). Across the landholding categories too, similar pattern was evident.

In MP too, households were borrowings mainly from government banks (55 percent) and cooperative society (41 percent) followed by fellow farmers (2 percent), money lenders (2 percent) and others (1 percent). Across the landholding categories, government banks was the major source of borrowings for the 'very large' categories (81 percent) and large category (80 percent). In the medium category, government banks (61 percent) and cooperative society (39 percent) was the only two sources from which borrowings were done. In the marginal and small category, majority of the borrowings were from cooperative society (65 percent and 56 percent respectively) followed by government banks (28 percent and 38 percent respectively).

In Punjab, three sources of borrowings were reported by the households namely government banks, cooperative society and input dealers. Majority of the borrowings were from cooperative society (54 percent). This was followed by borrowings from non-institutional source such as input dealers (28 percent) and borrowings from government banks were as low as 19 percent. Though cooperative society was the major source of borrowing for the households across the landholding categories, borrowings from input dealers was higher than that from the government bank in all the categories.

6.2 Amount borrowed from different sources (Rs/ha)

In the overall sample, amount borrowed from government banks (Rs 40790 per ha) was the highest followed by cooperative society (Rs 18324 per ha), input dealers (Rs 8612 per ha) and employer (Rs 2494 per ha) (**Table *6.2***). Across landholding categories, amount borrowed from cooperative society was the highest for small (Rs 26005 per ha) and marginal category (Rs 25983 per ha) and the amount borrowed decreased with increasing land size. In case of government banks too, the amount borrowed was the highest for small category (Rs 50393 per ha) and it decreased with increasing land. However, amount borrowed by marginal category (Rs 35708 per ha) from government banks was relatively lower than other landholding categories such as small (Rs 50393 per ha), medium (Rs 44730 per ha) and large (Rs 38673 per ha). Amount borrowed from input dealers too was relatively higher for the marginal category (Rs 15844 per ha) unlike other categories.

6.3 Interest rate charged by non-institutional sources (money lenders, relatives etc)

The interest rates varied widely ranging from 7% charged by the institutional sources to 8-10% by the employers to 22-24% by the money lenders / fellow farmers.

In Bihar, no details on interest rate charged by non-institutional sources are provided. In Gujarat, the interest rate charged by input dealers/commission agents is reported for the medium category as 7 percent (**Table *6.3***). The interest rate charged by money lenders is as high as 24 percent and this is reported only for the marginal category. The interest rate charged by employers was 9.2 percent and across the landholding categories, it varied directly with land size with the highest interest rate being reported by the large category (10.2 percent).

In MP, interest rate charged by fellow farmers/neighbours was 22.8 percent and across the landholding categories, it varied inversely with land size. The interest rate charged by moneylenders too stood at 22.8 percent and across the landholding categories, it was 24 percent for marginal and 'very large' category and 21 percent for large category.

In Punjab, the interest rate charged by input dealers/commission agents was 18 percent and across the landholding categories too, it was 18 percent.

6.4 Reasons for non-repayment of the borrowed money (% of households)

In Bihar, with respect to money borrowed from government bank, only 2 households had reported to have not repaid the borrowed money (**Table *6.4***). One household belonged to the marginal category and the reason for non-repayment was stated as 'payment will be made after harvesting'. The other household belonged to the small category and the reason for non-repayment was due to postponement of debt repayment.

In Gujarat, 10 households reported non-repayment of the borrowed money. Three households each belonged to marginal and small category and two households each belonged to medium and large category. The reasons cited by the marginal category for non-repayment of borrowed money were 'debt repayment has been postponed', 'payment will be made after harvesting',

‘major medical or other expenses’. For the small category, the reasons were ‘expecting debt waiver’, ‘debt repayment has been postponed’, ‘major medical or other expenses’. ‘Debt repayment has been postponed’ and ‘payment will be made after harvesting’ were the reasons cited by medium category. For the large category, the reasons were ‘payment will be made after harvesting’ and ‘major medical or other expenses’. With respect to money borrowed from cooperative society, in Gujarat, only two households reported reasons for non-repayment of borrowed money. Each of the household was from marginal and small category. The marginal category cited ‘other’ reasons for it while small category cited ‘income being always less than expenditure’ as a reason for non-repayment.

In MP, with respect to money borrowed from employer, 2 households each belonging to medium and large category reported non-repayment of borrowed money. Both these categories cited ‘payment to be made after harvesting’ as the reason for non-repayment. Regarding money borrowed from government bank, in MP, 66 percent reported that they were expecting debt waiver, hence they have not paid their loan. Remaining 34 percent were unable to pay the loan because their income is always less than expenditure. Income being always less than expenditure was the most prominent reason cited by the marginal (73 percent) and small category (71 percent). It was mostly the households in the medium (62 percent), large (90 percent) and ‘very large’ category (100 percent) that was expecting a debt waiver and hence had not repaid the loan. With respect to money borrowed from cooperative bank, in MP, 45 percent did not pay the loan as they were expecting debt waiver while 55 percent cited income being always less than expenditure as the reason for non-repayment. A higher percentage of households in the marginal (62 percent), small (59 percent) and medium category (58 percent) cited income being always less than expenditure as the main reason for non-repayment.

SUMMARY OF THE CHAPTER

1. In the overall sample, around 44 percent and 40 percent of the total number of borrowings were from institutional sources such as cooperative society and government banks respectively. Further, while the highest percentage of borrowings in the marginal category was from cooperative society (53 percent), in the very large category, it was from government banks (45 percent). Households particularly in the marginal category were also dependent on other institutional sources such as micro finance/community groups/NGOs (0.2 percent) and SHGs (1 percent) though the number of borrowings was very small.

2. In the overall sample, amount borrowed from government banks (Rs 40790 per ha) was the highest followed by cooperative society (Rs 18324 per ha), input dealers (Rs 8612 per ha) and employer (Rs 2494 per ha). Across landholding categories, amount borrowed from cooperative society was the highest for small (Rs 26005 per ha) and marginal category (Rs 25983 per ha) and the amount borrowed decreased with increasing land size. In case of government banks too, the amount borrowed was the highest for small category (Rs 50393 per ha) and it decreased with increasing land.

3. The interest rates varied widely ranging from 7% charged by the institutional sources to 8-10% by the employers to 22-24% by the money lenders / fellow farmers.

4. There are very few households that have not repaid loan in Bihar. In Gujarat, the reasons cited by the marginal category for non-repayment of borrowed money were 'debt repayment has been postponed', 'payment will be made after harvesting', 'major medical or other expenses'. In MP, 66 percent reported that they were expecting debt waiver as reason for not repaying the money borrowed from government bank. Income being always less than expenditure was the most prominent reason cited by the marginal (73 percent) and small category (71 percent). It was mostly the households in the medium (62 percent), large (90 percent) and 'very large' category (100 percent) that were expecting a debt waiver and hence had not repaid the loan. With respect to money borrowed from cooperative bank, in MP, 45 percent did not pay the loan as they were expecting debt waiver.

Tables

Table 6.1: Percentage of households borrowing from different sources (wrt to total no of borrowings)

	Bihar						**Gujarat**							**MP**							
categories	government bank	cooperative society	micro finance/ community group/NGOs	SHG	relatives	Total no of borrowings	government bank	cooperative society	SHG	input dealers/commission agent	money lenders	employer	Total no of borrowings	govt bank	cooperative society	micro finance	Self-help	fellow farmers	money lenders	others	Total no of borrowings
marginal	3	1	1	2	1	8	80	53	1	0	1	1	136	12	28	0	1	1	1	0	43
%	38	13	13	25	13	100	59	39	1	0	1	1	100	28	65	0	2	2	2	0	100
small	6					6	147	59	0	0	0	2	208	33	49	1	0	3	0	1	87
%	100					100	71	28	0	0	0	1	100	38	56	1	0	3	0	1	100
medium	2					2	115	57	0	1	0	6	179	61	39	0	0	0	0	0	100
%	100					100	64	32	0	1	0	3	100	61	39	0	0	0	0	0	100
large	3					3	65	28	0	0	0	3	96	40	7	0	0	0	2	1	50
%	100					100	68	29	0	0	0	3	100	80	14	0	0	0	4	2	100
very large							19	5	0	0	0	0	24	21	2	0	0	1	2	0	26
%							79	21	0	0	0	0	100	81	8	0	0	4	8	0	100
Total	14	1	1	2	1	19	426	202	1	1	1	12	643	167	125	1	1	5	5	2	306
%	74	5	5	11	5	100	66	31	0	0	0	2	100	55	41	0	0	2	2	1	100

Table 6.1 contd…

	Punjab				Overall										
Landhlding categories	govt bank	cooperative society	input dealers/commission agents	Total number of borrowings	Government bank	Cooperative society	Micro finance/community group/NGOs	SHGs	Relatives	Input dealers/commission agent	Money lenders	employer	fellow farmers	others	total no of borrowings
Marginal	50	154	54	258	145	236	1	4	1	54	2	1	1	0	445
%	19	60	21	100	33	53	0.2	1	0	12	0	0	0	0	100
Small	54	182	66	302	240	290	1	0		66	0	2	3	1	603
%	18	60	22	100	40	48	0	0	0	11	0	0	0	0	100
Medium	52	134	73	259	230	230	0	0		74	0	6	0	0	540
%	20	52	28	100	43	43	0	0	0	14	0	1	0	0	100
Large	36	82	80	198	144	117	0	0		80	2	3	0	1	347
%	18	41	40	100	41	34	0	0	0	23	1	1	0	0	100
Very large	6	24	22	52	46	31	0	0		22	2	0	1	0	102
%	12	46	42	100	45	30	0	0	0	22	2	0	1	0	100
Total	198	576	295	1069	805	904	2	4	1	296	6	12	5	2	2037
%	19	54	28	100	40	44	0	0	0	15	0	1	0	0	100

Table 6.2: Amount borrowed from different sources (Rs per ha)

Landholding Categories	Bihar	Gujarat	MP	Punjab	Overall
Government bank					
Marginal	1811	42438	20577	76732	35708
Small	3034	71544	18239	79826	50393
Medium	1122	58374	30386	69252	44730
Large	3353	48124	37672	43775	38673
Very Large	0	53315	32917	14052	32782
Total	2170	55897	31212	52176	40790
Cooperative society					
Marginal	241	23024	17635	82001	25983
Small	0	18865	17318	82693	26005
Medium	0	17910	13098	77846	23979
Large	0	12544	2550	43913	15060
Very Large	0	3279	1250	27320	6040
Total	36	15293	6998	57686	18324
Micro finance/community group/NGOs					
Marginal	181		0		111
Small	0		63		34
Medium	0		0		0
Large	0		0		0
Very Large	0		0		0
Total	27		7		13
SHGs					
Marginal	543	52	1538		412
Small	0	0	0		0
Medium	0	0	0		0
Large	0	0	0		0
Very Large	0	0	0		0
Total	81	6	60		38
Input dealers/commission agent					
Marginal		0		70393	15844
Small		0		32740	8737
Medium		276		25057	7221
Large		0		28800	10401
Very Large		0		6536	2645
Total		74		27217	8612
Money lenders					
Marginal		104	3846		899
Small		0	0		0
Medium		0	0		0
Large		0	1875		776
Very Large		0	2917		1986

Total		12	1645		736
Relatives					
Marginal	302				302
Small	0				0
Medium	0				0
Large	0				0
Very Large	0				0
Total	45				45
Employer					
Marginal		1556			1556
Small		786			786
Medium		4879			4879
Large		3091			3091
Very Large		0			0
Total		2494			2494
Fellow farmers/neighbours					
Marginal			3846		3846
Small			2830		2830
Medium			0		0
Large			0		0
Very Large			208		208
Total			561		561

Table 6.3: Interest rate charged by non-institutional sources (%)

landholding categories	**Bihar**	**Gujarat**	**MP**	**Punjab**
Input dealers/commission agents				
marginal				18
small				18
medium		7		18
large				18
very large				18
total		7		18
Money lenders				
marginal		24	24	
small				
medium				
large			21	
very large			24	
total		24	22.8	
marginal		7		
small		7		
medium		9.8		
large		10.2		
very large				
total		9.2		
Fellow farmers/neighbours				
marginal			24	
small			24	
medium				
large				
very large			18	
total			22.8	

Table 6.4: Reasons for non-repayment of the borrowed money (% of households)

	Bihar			**Gujarat**									**MP**						
	money borrowed from govt bank			money borrowed from govt bank					money borrowed from cooperative bank			money borrowed from employer		money borrowed from govt bank			money borrowed from cooperative bank			
landholding categories	debt repayment has been postponed	payment will be made after harvesting	Total	expecting debt waiver	debt repayment has been postponed	payment will be made after harvesting	Major medical or other expenses	Total	income is always less than expenditure	others	Total	payment will be made after harvesting	Total	income is always less than expenditure	expecting debt waiver	Total	income is always less than expenditure	expecting debt waiver	payment will be made after harvesting	Total
marginal	0	1	1	0	1	1	1	3	0	1	1			8	3	11	13	7	1	21
%	0	100	100	0	33	33	33	100	0	100	100			73	27	100	62	33	5	100
small	1	0	1	1	1	0	1	3	1	0	1			20	8	28	23	16	0	39
%	100	0	100	33	33	0	33	100	100	0	100			71	29	100	59	41	0	100
medium				0	1	1	0	2				1	1	20	32	52	19	14	0	33
%				0	50	50	0	100				100	100	38	62	100	58	42	0	100
large				0	0	1	1	2				1	1	4	36	40	0	7	0	7
%				0	0	50	50	100				100	100	10	90	100	0	100	0	100
very large														0	21	21	0	1	0	1
%														0	100	100	0	100	0	100
Total	1	1	2	1	3	3	3	10	1	1	2	2	2	52	100	152	55	45	1	101
%	50	50	100	10	30	30	30	100	50	50	100	100	100	34	66	100	54	45	1	100

CHAPTER 7: Insurance Market

7.1 Percentage of insured, non-insured and loanee insured households in each size-group

In Bihar, only 14 households each have reported to have insured paddy and wheat. This constituted only 5 percent of the households growing these crops (**Table 7.1**). In case of both paddy and wheat, none of the households from 'very large' category had insured the crops. In Gujarat, considering the major crops such as paddy, wheat, cotton, groundnut and tobacco, the percentage of households who had insured cotton (59 percent) and groundnut (72 percent) was higher than those who had insured paddy (12 percent), wheat (17 percent) and tobacco (6 percent). In case of households growing cotton, the insured households were relatively higher than the non-insured households across all the landholding categories, except the marginal category. In case of groundnut too, across all the landholding categories, insured households were higher than the non-insured households and it was the highest in case of 'very large' households (100 percent). In MP, the percentage of households who had insured the major crops were 69 percent for paddy, 72 percent for wheat, 14 percent for soybean and 79 percent for gram. In case of paddy, the percentage of households insured was higher than the non-insured households across the landholding categories except the marginal category, where the percentage of households who had insured and not insured paddy was equal. For wheat, the percentage of insured households was higher than the non-insured households across the landholding categories, except the marginal category and it increased with increasing land size. In case of soybean, the percentage of insured households was lower than non-insured households across the landholding categories. In case of gram, over 70 percent of the households had insured the crop across all the landholding categories. In Punjab, none of the households had reported to have insured their crops.

7.2 Percentage of households that experienced crop loss

None of the households in Bihar reported to have experienced any crop loss in case of paddy and wheat during the last one year (2018-19) (**Table *7.2***). In Gujarat, around 20 percent of the households had experienced crop loss in case of paddy and the highest crop loss (43 percent) was experienced by the 'very large' category. In case of wheat, the percentage of crop loss was 10 percent and the highest crop loss was experienced by the large category (14 percent). In case of crops such as groundnut and cotton, the percentage of households that had experienced crop loss was quite high (47 percent and 53 percent respectively). The crop loss was high for the large (57 percent) and 'very large' category (71 percent). In case of cotton, in all categories, the percentage of households that experienced crop loss was higher than those that have not experienced it, except the marginal category.

In MP, all the households (100 percent) growing wheat and paddy have reported crop loss. In case of soybean, around 59 percent of the households reported crop loss. In case of soybeans, across the landholding categories, those who had experienced crop loss were relatively higher than those who did any experience any crop loss. The percentage of households that

experienced crop loss in case of gram was 77 percent. The highest crop loss was reported by households in the large category (93 percent) followed by those in the marginal (83 percent), 'very large' (82 percent), medium (78 percent) and small category (64 percent). In Punjab, none of the households reported to have experienced any crop loss during the last one year.

7.3 Percentage of households that received compensation out of those insured

In Gujarat, for paddy, out of those who were insured, majority of the households had not received any compensation for crop loss (71 percent) (**Table *7.3***). Only one household which belonged to the 'very large' category had received the compensation in time while 19 households had received it but with some delay. The latter households particularly belonged to the marginal (9), small (8) and medium (2) category.

In case of groundnut too, majority of the insured households had not received any compensation for crop loss (92 percent). Only 5 households had received the claim amount in time and these households were one each from marginal, small and large category and 2 from medium category. Only one household had received the claim amount but with delay and belonged to the large category. In case of cotton too, around 80 percent of the households had not received compensation for crop loss. While 10 percent had received the claim amount in time, 11 percent had received it but with delay. Considering the landholding categories, households receiving claim amount in time belonged to medium category (17 percent). Around 60 percent of the households in the 'very large' category reported to have received delayed compensation.

Please note that no data was available for crop compensation in case of MP even though households have reported to have insured their crop and also reported to have experienced crop loss. In case of Bihar, though households have reported to have insured their crops, none of the households have experienced any crop loss, so details on crop compensation are not applicable to them. In Punjab, since none of the households have either insured their crops or have experienced any crop loss, details on crop compensation are not applicable to them.

The broad pattern of insurance, crop loss and claim receipt is as follows

State	Whether insured	Whether suffered crop loss	% received compensation
Bihar	Yes	No	-
Gujarat	Yes	Yes	Less than 10%
MP	Yes	Yes	Not available
Punjab	No	No	-

7.4 Average premium paid, crop loss suffered and crop compensation received *(Rs/ha)*

Average premium paid (Rs/ha): In Bihar, for paddy, average premium paid was the highest for the large category (Rs 235 per ha) and least for the medium category (Rs 82 per ha) (**Table 7.4**). For wheat, the average premium paid was highest for the small category (Rs 179 per ha) and least for the medium category (Rs 64 per ha). In Gujarat, the average premium paid was

the highest for cotton (Rs 391 per ha) and groundnut (Rs 167 per ha) followed by paddy (Rs 102 per ha) and wheat (Rs 98 per ha). For crops such as paddy and wheat, the average premium paid varied inversely with land size. For groundnut and cotton, the average premium paid was the highest for the large category (Rs 295 per ha and Rs 890 per ha respectively) and lowest for the marginal category (Rs 77 per ha and Rs 60 per ha).

Crop loss suffered (Rs/ha)*:* In Gujarat, the crop loss suffered was the highest for riskier crops such as groundnut (Rs 61236 per ha) and cotton (Rs 40399 per ha) compared to paddy (Rs 6456 per ha) and wheat (Rs 3430 per ha) (**Table *7.5***). Across the landholding categories, the highest amount of crop loss suffered was reported by the 'very large' category in case of paddy (Rs 12000 per ha) and groundnut (Rs 110112). In case of cotton, it was the marginal category that suffered the highest crop loss (Rs 68412) compared to the other landholding categories. In case of wheat, the medium category suffered the highest crop loss (Rs 8822 per ha).

Crop compensation received (Rs/ha): In Gujarat, the crop compensation received was the highest for cotton (Rs 2311 per ha) followed by groundnut (Rs 905 per ha) and paddy (Rs 598 per ha) (**Table *7.6***). Across the landholding categories, in case of cotton, the highest compensation was received by the marginal category while in case of groundnut, it was the large category (Rs 1591 per ha) and small category for paddy (Rs 1772 per ha).

7.5 Reasons for not insuring crops (% of the total number of responses)

Lack of awareness about insurance in general or about existence of the facility for insurance are reported as the main reasons for not insuring crops in Bihar, Gujarat and MP. In Punjab, the main reason is 'no need for insurance'.

In Bihar, non-awareness was cited as the main reason for not insuring paddy and wheat (80 percent each). The pattern was the same across the landholding categories (**Table *7.7***). In Gujarat, around 41 percent cited being 'not aware' as the reason for not insuring paddy and 25 percent cited the reason as 'not being aware about availability of facility' while 16 percent were not interested in insuring paddy. Across the landholding categories too, 'not aware' was the main reason cited for not insuring the crops. In case of wheat, while 43 percent cited the reason as 'not aware', 33 percent cited it as 'not aware about availability of facility'. It was mostly the medium (46 percent) and large category (42 percent) that cited the reason as 'not aware about availability of facility' for not insuring wheat. The main reasons for not insuring groundnut were reported as 'not aware about availability of facility' (57 percent), 'insurance facility not available' (20 percent) and 'not aware' (14 percent). Across the landholding categories too, 'not aware about availability of facility' was cited as the reason for not insuring groundnut by majority of the households in all the categories. In case of cotton, the reasons cited for not insuring the crop were 'not aware' (41 percent), 'insurance facility not available' (24 percent) and 'not aware about availability of facility (19 percent). While 'not aware' was cited by majority of the households in the marginal category (65 percent), 'insurance facility not available' was cited by majority of households in the 'very large' category (67 percent) for not insuring cotton.

In MP, majority of the households cited 'other' reasons for not insuring crops such as soybean (100 percent), paddy (85 percent), wheat (90 percent). The pattern was the same across the landholding categories. In case of gram, reasons for not insuring the crop were 'other' reasons (35 percent), 'complex procedures' (31 percent), 'not aware' (24 percent) and 'not satisfied' (11 percent). Majority of households in the marginal (40 percent) and small category (42 percent) cited complex procedures to be the main reason for not insuring gram.

In Punjab, 'no need' was cited as the main reason for not insuring paddy (67 percent) and wheat (70 percent). Further, in case of paddy and wheat, 31 percent and 29 percent respectively were 'not interested' in insuring their crops. Similar pattern was evident across the landholding categories as well.

7.6 Reasons for not getting insurance claim amount (% of the total number of responses)

In Bihar, since no crop loss was reported during the last one year, reasons for not getting insurance claim amount are not applicable. In Gujarat, for crops such as paddy (100 percent), wheat (100 percent), groundnut (82 percent), cotton (92 percent), 'other' reason was cited for not getting insurance claim amount (**Table *7.8***). In MP, details on reasons for not getting insurance claim amount were not available. In Punjab, since no crop loss was reported during the last one year, reasons for not getting insurance claim amount are not applicable.

SUMMARY OF THE CHAPTER

1. In Bihar, only 14 households each have reported to have insured paddy and wheat. This constituted only 5 percent of the households growing these crops. None of the households in Bihar reported to have experienced any crop loss in case of paddy and wheat during the last one year (2018-19).

2. In Gujarat, considering the major crops such as paddy, wheat, cotton, groundnut and tobacco, the percentage of households who had insured cotton (59 percent) and groundnut (72 percent) was higher than those who had insured paddy (12 percent), wheat (17 percent) and tobacco (6 percent). The crop loss suffered was the highest for riskier crops such as groundnut (Rs 61236 per ha) and cotton (Rs 40399 per ha) compared to paddy (Rs 6456 per ha) and wheat (Rs 3430 per ha). In case of groundnut and cotton, the percentage of households that had experienced crop loss was quite high (47 percent and 53 percent respectively). The crop loss was high for the large (57 percent) and 'very large' category (71 percent). In case of cotton, in all categories, the percentage of households that experienced crop loss was higher than those that have not experienced it. Majority of households have not received compensation for the crop loss.

3. In MP, the percentage of households who had insured the major crops were 69 percent for paddy, 72 percent for wheat, 14 percent for soybean and 79 percent for gram. For wheat, the percentage of insured households was higher than the non-insured households across the landholding categories, except the marginal category and it increased with increasing

land size. In MP, all the households (100 percent) growing wheat and paddy have reported crop loss. In case of soybean, around 59 percent of the households reported crop loss. In case of gram, the highest crop loss was reported by households in the large category (93 percent) followed by those in the marginal (83 percent). Details have not been reported about the compensation received.

4. In Punjab, none of the households had reported to have insured their crops. In Punjab, none of the households reported to have experienced any crop loss during the last one year.

5. As for the reasons for not insuring crops, lack of awareness about insurance in general or about the existence of the insurance facility have been reported as the main reason in Bihar, Gujarat and MP. In Punjab, the main reason is 'no need for insurance'. This is possibly because of the extensive irrigation and assured MSP in Punjab.

Table 7.1: Percentage of insured, non-insured and loanee insured households

	Bihar						**Gujarat**												**MP**												**Punjab**	
	Paddy			Wheat			**Paddy**			Wheat			Groundnut			Cotton			**Paddy**			Wheat			Soyabean			Gram				
landholding categories	insured only when received loan	not insured	Total	insured only when received loan	not insured	Total	insured only when received loan	not insured	Total	insured only when received loan	not insured	Total	insured only when received loan	not insured	Total	insured only when received loan	not insured	Total	insured only when received loan	not insured	Total	insured only when received loan	not insured	Total	insured only when received loan	not insured	Total	insured only when received loan	not insured	Total	not insured in case of paddy	not insured in case of wheat
marginal	3	127	130	3	107	110	13	149	162	14	73	87	14	7	21	20	23	43	13	13	26	25	34	59	5	49	54	25	10	35	46	80
%	2	98	100	3	97	100	8	92	100	16	84	100	67	33	100	47	53	100	50	50	100	42	58	100	9	91	100	71	29	100	100	100
small	6	81	87	6	73	79	14	76	90	11	42	53	42	16	58	42	29	71	30	10	40	59	21	80	7	62	69	56	19	75	61	94
%	7	93	100	8	92	100	16	84	100	21	79	100	72	28	100	59	41	100	75	25	100	74	26	100	10	90	100	75	25	100	100	100
medium	2	49	51	2	49	51	5	47	52	5	26	31	33	15	48	46	31	77	21	8	29	79	21	100	18	70	88	74	12	86	65	70
%	4	96	100	4	96	100	10	90	100	16	84	100	69	31	100	60	40	100	72	28	100	79	21	100	20	80	100	86	14	100	100	100
large	3	24	27	3	24	27	5	27	32	3	19	22	17	6	23	21	9	30	7	2	9	46	9	55	9	42	51	31	9	40	43	44
%	11	89	100	11	89	100	16	84	100	14	86	100	74	26	100	70	30	100	78	22	100	84	16	100	18	82	100	78	23	100	100	100
very large	0	5	5	0	5	5	3	4	7	0	2	2	7	0	7	6	3	9	1	0	1	23	5	28	2	26	28	17	5	22	12	12
%	0	100	100	0	100	100	43	57	100	0	100	100	100	0	100	67	33	100	100	0	100	82	18	100	7	93	100	77	23	100	100	100
Total	14	286	300	14	258	272	40	303	343	33	162	195	113	44	157	135	95	230	72	33	105	232	90	322	41	249	290	203	55	258	227	300
%	5	95	100	5	95	100	12	88	100	17	83	100	72	28	100	59	41	100	69	31	100	72	28	100	14	86	100	79	21	100	100	100

Table 7.2: Percentage of households that experienced crop loss

	Bihar	**Gujarat**				**MP**			
	Paddy	Paddy	Wheat	Groundnut	Cotton	Paddy	Wheat	Soyabean	Gram

landholding categories	No	Total	No	Total	yes	no	Total	yes	no	Total	yes	no	Total	yes	no	Total	yes	Total	yes	Total	yes	no	Total	yes	no	Total
marginal	130	130	130	130	25	137	162	9	78	87	10	11	21	21	22	43	26	26	59	59	31	23	54	29	6	35
%	100	100	100	100	15	85	100	10	90	100	48	52	100	49	51	100	100	100	100	100	57	43	100	83	17	100
small	87	87	87	87	20	70	90	6	47	53	25	33	58	36	35	71	40	40	80	80	41	28	69	48	27	75
%	100	100	100	100	22	78	100	11	89	100	43	57	100	51	49	100	100	100	100	100	59	41	100	64	36	100
medium	51	51	51	51	11	41	52	2	29	31	21	27	48	43	34	77	29	29	100	100	51	37	88	67	19	86
%	100	100	100	100	21	79	100	6	94	100	44	56	100	56	44	100	100	100	100	100	58	42	100	78	22	100
large	27	27	27	27	11	21	32	3	19	22	13	10	23	18	12	30	9	9	55	55	32	19	51	37	3	40
%	100	100	100	100	34	66	100	14	86	100	57	43	100	60	40	100	100	100	100	100	63	37	100	93	8	100
very large	5	5	5	5	3	4	7	0	2	2	5	2	7	5	4	9	1	1	28	28	17	11	28	18	4	22
%	100	100	100	100	43	57	100	0	100	100	71	29	100	56	44	100	100	100	100	100	61	39	100	82	18	100
Total	300	300	300	300	70	273	343	20	175	195	74	83	157	123	107	230	105	105	322	322	172	118	290	199	59	258
%	100	100	100	100	20	80	100	10	90	100	47	53	100	53	47	100	100	100	100	100	59	41	100	77	23	100

Table 7.3: Percentage of households that received compensation out of those insured

	Gujarat													
	Paddy				Wheat		Groundnut				Cotton			
landholding categories	received in time	received but delayed	not received	Total	not received	Total	received in time	received but delayed	not received	Total	received in time	received but delayed	not received	Total
marginal	0	9	16	25	9	9	1	0	9	10	0	2	19	21
%	0	36	64	100	100	100	10	0	90	100	0	10	90	100
small	0	8	12	20	6	6	1	0	24	25	6	2	28	36
%	0	40	60	100	100	100	4	0	96	100	17	6	78	100
medium	0	2	9	11	2	2	2	0	19	21	4	3	36	43
%	0	18	82	100	100	100	10	0	90	100	9	7	84	100
large	0	0	11	11	3	3	1	1	11	13	2	3	13	18
%	0	0	100	100	100	100	8	8	85	100	11	17	72	100
very large	1	0	2	3			0	0	5	5	0	3	2	5
%	33	0	67	100			0	0	100	100	0	60	40	100
Total	1	19	50	70	20	20	5	1	68	74	12	13	98	123
%	1	27	71	100	100	100	7	1	92	100	10	11	80	100

Table 7.4: Average premium paid (Rs per ha)

	Bihar		Gujarat			
landholding categories	Paddy	Wheat	Paddy	Wheat	Groundnut	Cotton
marginal	132	108	327	286	77	60
small	221	179	146	163	171	284
medium	82	64	14	0	165	178
large	235	177	0	0	295	890
very large	0	0	25	0	0	281
total	156	123	102	98	167	391

Please note that in case of MP, since none of the households have insured additionally the crops reported by them, premium paid is not applicable to them.

Table 7.5: Crop loss suffered (Rs/ha)

landholding categories	**Gujarat**			**MP**			
	Paddy	Groundnut	Cotton	Soyabean	Paddy	Wheat	Gram
marginal	4283	42667	68412	3720	4193	8209	4072
small	7392	36809	47211	3052	4513	9204	3409
medium	2941	63317	46759	3039	4509	9093	4506
large	7846	52346	48012	3347	3810	9366	4024
very large	12200	110112	5752	3482	2933	8610	2713
total	6456	61236	40399	3323	4360	8933	3787

Please note that in Bihar, since the households growing paddy and wheat have not experienced crop loss, details on cause of crop loss in case of paddy', 'amount of loss', 'claim amount' are not applicable to them. In case of Punjab, no responses are reported for details regarding crop loss.

Table 7.6: Crop compensation received (Rs per ha)

landholding categories	**Gujarat**		
	paddy	groundnut	cotton
marginal	869	638	3181
small	1772	300	1833
medium	119	1322	2621
large	0	1591	2674
very large	275	0	1509
total	598	905	2311

Please note that for MP, there are no responses for details on crop compensation.

Table 7.7: Reasons for not insuring crops (% of the total number of responses)

	Bihar										**Gujarat**																			
	Paddy					Wheat					Paddy										Wheat									
landholding categories	not aware	not aware about availability of facility	not interested	not satisfied with terms & conditions	Total	not aware	not aware about availability of facility	not interested	not satisfied with terms & conditions	Total	not aware	delay in claim payment	others	not aware about availability of facility	not interested	noneed	insurance facility not available	nearest bank at a long distance	Total	not aware	not aware about availability of facility	not interested	noneed	insurance facility not available	nearest bank at a long distance	delay in claim payment	others	not aware & not aware about availability of facility	Total
marginal	101	18	1	7	127	101	18	1	7	127	62	8	14	26	24	4	10	1	149	35	21	6	2	0	1	1	6	1	73
%	80	14	1	6	100	80	14	1	6	100	42	5	9	17	16	3	7	1	100	48	29	8	3	0	1	1	8	1	100
small	67	7	5	2	81	67	7	5	2	81	31	2	3	24	12	4	0	0	76	19	13	3	1	0	0	0	6	0	42
%	83	9	6	2	100	83	9	6	2	100	41	3	4	32	16	5	0	0	100	45	31	7	2	0	0	0	14	0	100
medium	38	8	2	1	49	38	8	2	1	49	17	1	2	14	10	1	2	0	47	9	12	2	1	0	0	1	1	0	26
%	78	16	4	2	100	78	16	4	2	100	36	2	4	30	21	2	4	0	100	35	46	8	4	0	0	4	4	0	100
large	19	4	1	0	24	19	4	1	0	24	11	1	1	10	3	1	0	0	27	6	8	3	1	1	0	0	0	0	19
%	79	17	4	0	100	79	17	4	0	100	41	4	4	37	11	4	0	0	100	32	42	16	5	5	0	0	0	0	100
very large	3	1	0	1	5	3	1	0	1	5	2	0	0	1	0	1	0	0	4	1	0	1	0	0	0	0	0	0	2
%	60	20	0	20	100	60	20	0	20	100	50	0	0	25	0	25	0	0	100	50	0	50	0	0	0	0	0	0	100
Total	228	38	9	11	286	228	38	9	11	286	123	12	20	75	49	11	12	1	303	70	54	15	5	1	1	2	13	1	162
%	80	13	3	4	100	80	13	3	4	100	41	4	7	25	16	4	4	0	100	43	33	9	3	1	1	1	8	1	100

Table 7.7 contd...

	Gujarat														
	groundnut							cotton							
landholding categories	not aware	not aware about availability of facility	not interested	insurance facility not available	delay in claim payment	others	Total	not aware	not aware about availability of facility	not interested	no need	insurance facility not available	delay in claim payment	others	Total
Marginal	3	3	0	1	0	0	7	15	2	1	0	3	2	0	23
%	43	43	0	14	0	0	100	65	9	4	0	13	9	0	100
Small	2	11	0	3	0	0	16	8	10	0	0	5	6	0	29
%	13	69	0	19	0	0	100	28	34	0	0	17	21	0	100
Medium	1	6	1	4	2	1	15	14	4	0	1	9	1	2	31
%	7	40	7	27	13	7	100	45	13	0	3	29	3	6	100
Large	0	5	0	1	0	0	6	2	2	0	1	4	0	0	9
%	0	83	0	17	0	0	100	22	22	0	11	44	0	0	100
Very Large								0	0	1	0	2	0	0	3
%								0	0	33	0	67	0	0	100
Total	6	25	1	9	2	1	44	39	18	2	2	23	9	2	95
%	14	57	2	20	5	2	100	41	19	2	2	24	9	2	100

Table 7.7 contd...

landholding categories	**MP**												**Punjab**							
	soyabean	paddy			wheat			gram					paddy				wheat			
	others	not aware	others	Total	not aware	others	Total	not aware	not satisfied	complex procedures	others	Total	not interested	no need	not satisfied with terms and conditions	Total	not interested	no need	not satisfied with terms &conditions	Total
Marginal	49	1	12	13	6	28	34	3	2	4	1	10	12	32	2	46	23	55	2	80
%	100	8	92	100	18	82	100	30	20	40	10	100	26	70	4	100	29	69	3	100
Small	62	2	8	10	2	19	21	3	1	8	7	19	21	40	0	61	26	68	0	94
%	100	20	80	100	10	90	100	16	5	42	37	100	34	66	0	100	28	72	0	100
Medium	70	1	7	8	0	21	21	5	1	3	3	12	19	45	1	65	20	49	1	70
%	100	13	88	100	0	100	100	42	8	25	25	100	29	69	2	100	29	70	1	100
Large	42	1	1	2	1	8	9	2	1	1	5	9	16	27	0	43	16	28	0	44
%	100	50	50	100	11	89	100	22	11	11	56	100	37	63	0	100	36	64	0	100
Very Large	26				0	5	5	0	1	1	3	5	3	9	0	12	2	10	0	12
%	100				0	100	100	0	20	20	60	100	25	75	0	100	17	83	0	100
Total	249	5	28	33	9	81	90	13	6	17	19	55	71	153	3	227	87	210	3	300
%	100	15	85	100	10	90	100	24	11	31	35	100	31	67	1	100	29	70	1	100

Table 7.8: Reasons for not getting insurance claim amount (% of the total number of responses)

	Gujarat									
	paddy		wheat		groundnut			cotton		
landholding categories	others	Total	others	Total	cause outside coverage	others	Total	cause outside coverage	others	Total
marginal	16	16	9	9	0	9	9	1	18	19
%	100	100	100	100	0	100	100	5	95	100
small	12	12	6	6	1	23	24	2	26	28
%	100	100	100	100	4	96	100	7	93	100
medium	9	9	2	2	6	13	19	2	34	36
%	100	100	100	100	32	68	100	6	94	100
large	11	11	3	3	3	8	11	3	10	13
%	100	100	100	100	27	73	100	23	77	100
very large	2	2			2	3	5	0	2	2
%	100	100			40	60	100	0	100	100
Total	50	50	20	20	12	56	68	8	90	98
%	100	100	100	100	18	82	100	8	92	100

CHAPTER 8: PROBLEMS AND RISKS IN FARMING, COPING STRATEGIES, GOVERNMENT SUPPORT AND SOCIAL NETWORKS

This section tries to address particularly the last objective of the study namely, to analyse the coping strategies of famers during economic hardships and their social networks. The section starts with a discussion on problems in farming wherein reasons for inadequate income from farming as reported by the sample households are examined. Thereafter the various economic risks faced by the households and the strategies undertaken by them to cope with these risks are discussed. Besides these coping strategies adopted by the households at an individual level, government support in the form of various schemes, access to technical advice and their social networks could also play a crucial role in enabling the households to overcome these risks. As such these latter aspects are also explored in this section.

8.1 Problems in farming

Over 90 percent of the households in the overall sample and in the states of Bihar, Gujarat and Punjab considered their present income from farming to be inadequate (**Table *8.1***). The pattern was similar across the landholding categories. The only exception was Madhya Pradesh (MP) wherein compared to other states, a relatively higher percentage of households stated their income from farming to be adequate (13 percent). Further, in MP, across the landholding categories, a relatively higher percentage of households in the marginal category (27 percent) had reported income from farming to be adequate compared to other categories.

8.1.1 Reasons for inadequate income from farming

Overall, no single factor emerged as the predominant reason for inadequate income from farming.

In Bihar, multiple reasons were reported by the households for inadequate income from farming. These reasons included declining yield, small land size, insufficient irrigation, non-remunerative price, too high temperature, rainfall fluctuating a lot, absence of storage facility, poor market facilities, non-availability and uncertainty of government support, limited sources of credit, bank credit available but inadequate, high interest rate of money lenders, rodent problem, other animal problem and labour shortage. Around 6 to 7 percent of the households had reported these reasons (Table 8.2). The pattern was similar across the landholding categories as well.

In Gujarat, among others, the main reasons reported by the households for inadequate income from farming were pest problem/crop diseases, other animal problem (7 percent each respectively), insufficient irrigation and un-remunerative price (6 percent each respectively) (Table 8.3). Across the landholding categories, unlike the ‘very large’ category, pest problem/crop diseases were reported mostly by households in the marginal (8 percent), small (7 percent), medium (6 percent) and large category (7 percent). Small land size was also a major reason for the inadequate income from farming for 9 percent of the households in the marginal category. Un-remunerative price was mostly reported by households in the small (6 percent), medium (7 percent), large (7 percent) and ‘very large’ category (6 percent). Other animal problem (ranging from 6 to 9 percent) and insufficient irrigation (ranging from 6 to 7

percent) were reasons stated by most of the households irrespective of the landholding categories considered.

In MP too, pest problem/crop diseases and other animal problem (6 percent each respectively) emerged to be the major reasons affecting income from farming (Table 8.4). Along with these issues, the other reasons were stated as too high rainfall (7 percent), yield fluctuating a lot and absence of storage facility (6 percent each respectively). Considering the landholding categories, too high rainfall was an issue of major concern for all the categories (ranging from 7 to 8 percent). Besides pest problem/crop diseases and other animal problem, the marginal and small category reported small land size affecting their income from farming (7 percent each respectively). Absence of storage facility (7 percent) and declining yield (7 percent) was an issue faced mostly by the households in the large and very large category respectively.

Similar to other states, in Punjab too, majority of the households reported pest problem/crop diseases (20 percent) and other animal problem (17 percent) to be the reasons for inadequate income from farming (Table 8.5). The pattern was more or less the same across the landholding categories with slight variations. Pest problem/crop diseases were mostly reported by households in all the landholding categories (ranging from 13 to 25 percent). Other animal problem was mainly affecting households in the marginal (20 percent), small (26 percent) and medium (18 percent) unlike those in the large (6 percent) and 'very large' category (8 percent). Besides other reasons, small land size was a major reason stated by households in the marginal category for inadequate income from farming (22 percent).

8.2 Economic risks faced

The main economic risks faced by the households during two years before the date of survey were in the form of lack of finance/capital, lack of access to inputs, sharp fluctuations in input prices and output prices, lack of demand or inability to sell agricultural and non-agricultural products; and seasonal unemployment. Though all the households reported to have faced these risks, ranking of these economic risks by the households showed that in states such as Bihar (65 percent), Gujarat (67 percent) and MP (29 percent), lack of finance/capital was ranked 1st by majority of the households (Table 8.6). The pattern was no different in case of all the landholding categories. This indicated that lack of finance/capital was the major economic risk faced by the households across all the landholding categories in these states. Among the states, Punjab was an exception, wherein seasonal unemployment emerged to be the major economic issue which was ranked 1st by 55 percent of the households. As per expectations, it was a major economic risk particularly for households in the marginal (98 percent) and small category (63 percent) unlike those in the large (5 percent) and very large category (8 percent).

Regarding the 2nd and 3rd ranking of risks, in Bihar, lack of access to inputs was ranked as 2nd main economic risks affecting majority of the sample households (35 percent) while sharp fluctuations in input and output prices were ranked as 3rd major economic risks by an equal percentage of households (35 percent each respectively). With respect to 2nd and 3rd major economic risks, in Bihar the pattern was the same across the landholding categories. In Gujarat, sharp fluctuations in output prices (22 percent) and lack of access to inputs (33 percent) were ranked as 2nd and 3rd major economic risks faced by the households. None of the households

from the 'very large' category ranked sharp fluctuations in output price as the 2nd major economic risk. In MP, other major economic risks faced by the households were sharp fluctuations in input prices (2nd rank, 24 percent) and lack of demand or inability to sell agricultural products (3rd rank, 26 percent). In Punjab, sharp fluctuations in input prices (2nd rank, 44 percent) followed by lack of finance/capital (3rd rank, 48 percent) were the other major economic risks faced by the households. These two risks were particularly reported by a higher percentage of households in the marginal category (71 percent and 75 percent respectively).

Thus, lack of capital/finance, sharp fluctuations in input / output prices and lack of access to inputs emerge as the main economic risks faced by the farmers.

8.3 Coping strategies adopted

To cope with various economic risks faced by the sample households as discussed in the earlier sub-section, several strategies were reported to be undertaken by them. In Bihar, carrying out primary processing was a major strategy undertaken by around 57 percent of the households followed by reduction in household consumption expenditure (17 percent) and storing of crops for better price (14 percent) (Table 8.7). Across the landholding categories too, carrying out primary processing was the major strategy of the households and it was particularly so for households in the very large category (83 percent). None of the households in the 'very large' category resorted to storing of crops. Reduction in household consumption expenditure was a strategy undertaken mostly by the households in the marginal category (20 percent).

In Gujarat, the major strategies adopted by the households to cope with economic risks were in the form of borrowing money from friends/relatives (20 percent), working for wage labour in the village (16 percent) and borrowing money from bank (15 percent) and money lender (13 percent) (Table 8.8). Across the landholding categories, the pattern was more or less similar with respect to borrowing of money irrespective of whether it was from moneylenders or friends/relatives. In case of borrowing from bank, a higher percentage of households in the large and 'very large' category (17 percent each respectively) reported it as a coping strategy compared to those in the marginal (15 percent) and small category (14 percent). This might be indicative of easier access to institutional finance by the larger landholding category unlike those with smaller lands. With regard to working for wage labour in the village, it was mainly a strategy for households in the marginal and small category (17 percent each respectively) unlike those in the 'very large' category (10 percent).

In MP, borrowing money from bank was one of the main coping strategies of the households (22 percent) followed by deferring of social and family functions (18 percent), taking children out of school (13 percent) (Table 8.9)). While measures such as borrowing from bank was the least undertaken strategy by marginal category (16 percent), deferring of social and family functions (21 percent) was mostly undertaken by these households. A drastic strategy such as taking children out of school was mostly reported by households in the marginal and small category (14 percent each respectively).

In Punjab, reducing household consumption expenditure (42 percent) and deferring social and family functions (29 percent) were the main coping strategies of the households (Table 8.10).

Reducing household consumption expenditure was mostly reported by households in the marginal (48 percent) and small category (56 percent). Deferring social and family functions was undertaken mostly by households in the marginal category (36 percent).

8.4 Government support

Government support is discussed in terms of procurement and awareness about minimum support price (MSP) and support under PM-KISAN.

8.4.1 MSP

Regarding awareness of MSP related to paddy, in the overall sample, only half of the sample households (52 percent) were aware of it (Table 8.11). Compared to other landholding categories, percentage of households reporting awareness of MSP for paddy was the least in marginal category (35 percent).

Turning to the state-wise trends, in Bihar, majority of the households were not aware of MSP for paddy (98 percent) and this must be due to the fact that there is no government procurement of the crops on account of abolition of Agricultural Produce Marketing Committee (APMC) Act in 2006. In Gujarat, an equal percentage of households (50) reported awareness and non-awareness of MSP for paddy. However, the pattern varied across the landholding categories. Awareness of MSP for paddy was relatively higher in 'very large' (100 percent), large (97 percent) and medium (65 percent) category unlike those in the marginal (35 percent) and small category (48 percent) which is an issue of concern. In MP and Punjab, all the sample households growing paddy reported being aware of MSP for the crop (100 percent).

With respect to procurement agencies to whom paddy was sold, in Gujarat, none of the sample households who had reported awareness of MSP for paddy had sold the crop to the procurement agencies (Table 8.12). The reason for it was stated to be the non-availability of procurement agencies (Table 8.13). In MP, while 76 percent of the households reported selling paddy to government agencies, 24 percent did not sell to any of the procurement agencies (Table 8.12). Poor quality of paddy was mainly cited as the reason for not selling the crop to the agencies (Table 8.13). In case of Punjab, though 100 percent of the farmers were aware about MSP for paddy, only 12 farmers knew the agencies to whom their crop was sold. Out of 12 farmers, 6 of them knew that their crop was sold to FCI and another 6 knew that their crop was sold to other agency such as PUNGRAIN (Table 8.12). This was because the produce was mainly picked up by arthiyas and the payment of MSP was also made by the procuring agencies to arthiyas, who then made the payment to farmers after deducting the loans advanced to farmers. Thus, farmers in Punjab knew very little about the agency procuring the crops.

8.4.2 Support under PM-KISAN

With regard to PM-KISAN wherein farmers are provided an income support of Rs 6000 per year in three instalments of Rs 2000 each, the average payment received under the scheme was lower in states such as MP (Rs 2327) and Punjab (Rs 3324) compared to Bihar (Rs 4703) and Gujarat (Rs 4606) (Table 8.14). This was because out of the total sample households in each of these states, the percentage of households reporting to have received the payment was relatively lower in MP (43 percent) and Punjab (48 percent) than in Bihar (78 percent) and Gujarat (74

percent). It was encouraging to note that irrespective of the states concerned, the percentage of households receiving payment was relatively higher in the marginal and small categories than in the medium, large and 'very large' category. Time taken for receiving the payment was more or less the same across the landholding categories.

8.4.3 Access to technical advice

In the overall sample, the households accessing technical advice were mainly reliant on sources such as private commercial agents (26 percent), progressive farmers (22 percent), extension agents (21 percent) and radio/tv/newspaper/internet (19 percent) (Table 8.15). The pattern was not much different across the landholding categories.

Going by the state-wise trends, in case of Bihar, extension agents were reported to be the main source of technical advice for majority of the sample households (39 percent). Other sources accessed by the households were Krishi Viyan Kendra, progressive farmers, radio/tv/newspaper/internet/veterinary department (15 percent each respectively). Across the landholding categories too, extension agents were the main source accessed by households, with a higher percentage of households in the marginal category reporting its reliance on it (60 percent). The households in the 'very large' category did not seem to be reliant on any of the sources except for one household which had accessed progressive farmer.

In Gujarat, the main sources of technical advice accessed by the households were radio/tv/newspaper/internet (33 percent), progressive farmers (26 percent), extension agents (18 percent) and private commercial agents (15 percent). The pattern was the same across the landholding categories as well.

In MP, an equal percentage of households were reliant on extension agents and private commercial agents (29 percent each respectively) followed by progressive farmer (22 percent). Across the landholding categories too, the pattern was more or less the same.

Thus, in states such as Bihar, Gujarat and MP, there was a reliance on a combination of extension services – both public and private – for accessing technical advice. However, in case of Punjab, except for one household in the large category, none of the households have accessed extension agents. Around 59 percent of the households were reliant on private commercial agents (possibly arthiyas) followed by radio/tv/newspaper/internet (18 percent) and progressive farmers (11 percent). Further, it is found that except for Bihar wherein 15 percent of the households had accessed veterinary department for advice, the figures were abysmally meagre for other states (Gujarat- 0.5 percent, MP- 9 percent, Punjab- 5 percent). With regard to adoption of the recommended advice, it was encouraging to note that majority of the households in the sample had adopted the recommended advice from the sources accessed (**Table 8.16**). This was so for all the four states.

8.5 Social networks

Social networks are discussed in terms of membership in various organisations such as gram panchayat, dairy/milk cooperative societies, employee union, mahila mandal, self-help group, farmers producers organisation, farmers activist group, political party, caste association, NGO and credit cooperative society and the benefits accruing from it.

8.5.1 Membership in organisations

Among the several organisations, in Bihar, households had membership in dairy/milk cooperative societies (74 percent), self-help group (15 percent) and gram panchayat (11 percent) (Table 8.17). Across the landholding categories too, majority of the households reported to have membership in dairy/milk cooperatives (over 60 percent).

In Gujarat though households had reported to have membership in several organisations, majority of the households were members of dairy/milk cooperative societies (45 percent) and agricultural cooperative society (25 percent). Compared to other landholding categories, households in the marginal category had the least membership in agricultural cooperative societies (19 percent) while a relatively lower percentage of households in the 'very large' category were members of dairy/milk cooperative societies.

In MP, an equal percentage of households were members of agricultural cooperative societies and credit cooperative societies (43 percent each respectively). Across the landholding categories too, agricultural cooperative societies as well as credit cooperative societies were equally important organisations for majority of the households. However, the membership of households in the marginal category was relatively lower in both these organisations (39 percent each respectively) as compared to the other landholding categories.

In case of Punjab too, around 81 percent of the households reported to have membership in agricultural cooperative societies followed by farmer producer organisation (FPO) (11 percent) and dairy cooperative society (8 percent). Considering the landholding categories, none of the households in the 'very large' category were members of FPO and merely 2 percent of the households in the small category were members of dairy cooperative society.

8.5.2 Capacity of engagement

Regarding the capacity of engagement in the organisations, in Bihar, all the households having membership in dairy/milk cooperative societies reported themselves to be active members (**Table *8.18***). In MP too, in case of membership in agricultural cooperative society and credit cooperative society, all the households were engaged as active member. In Gujarat, majority of the households were active members of agricultural cooperative society and dairy/milk cooperative society (54 percent and 77 percent). Exception was the households in the small category wherein around 65 percent of the households were engaged as ordinary member in the agricultural cooperative society.

Contrary to other states, in Punjab, majority of the members in agricultural cooperative society were engaged as ordinary members (62 percent). While 38 percent of the households were active members and 2 households were engaged as office bearers. Compared to other landholding categories, households in the marginal category were mostly engaged as ordinary member and the least as active member (21 percent). Office bearers were from the small and medium category.

8.5.3 Benefits of membership in organisations

In Bihar, the main benefit accruing to all the households having membership in agricultural cooperative society was in the form of getting access to information on prices and market (100 percent) (**Table *8.19***).

In case of Gujarat, various combinations of the benefits from being a member of agricultural cooperative society and dairy/milk cooperative society were reported. These benefits include sharing of information on agricultural practices and livestock and management; input usage; credit sources; prices and markets; and government schemes. Around 72 percent of the households reported to have got the combinations of all these benefits from being a member of agricultural cooperative society. However, all the benefits accrued least to the households in the marginal category (42 percent) as compared to other landholding categories. This might perhaps be reflective of the capacity of engagement of marginal households as ordinary member rather than active member as observed in Table 8.18. Regarding benefits of being a member of dairy cooperative society, around 30 percent of the members reported getting of benefit in terms of sharing of information on agricultural practices and livestock management while 20 percent received information on credit sources. A higher percentage of households in the marginal category had reported to have received the information on agricultural practices (40 percent) and credit sources (30 percent).

In MP, the benefits accruing to members of agricultural cooperative society were mainly in terms of sharing of information on input usage (43 percent) and credit sources (28 percent). Despite all the households being active member in agricultural cooperative society, the benefit in terms of getting information on input usage was reported the least by those in the marginal category (33 percent). On the other hand, a higher percentage of households in the marginal category were able to avail information on credit sources through agricultural cooperative society (37 percent). All the members of the credit cooperative society were able to avail the benefit of getting information on credit sources (100 percent).

In Punjab, members of agricultural cooperative society were able to get benefits in terms of availing information only on credit sources (35 percent) as well as both credit sources and government schemes (32 percent). The benefit of getting information on credit sources was least accrued to households in the marginal category (29 percent), however, majority of them were able to avail information on both credit sources and government schemes (42 percent).

SUMMARY OF THE CHAPTER

Problems in farming

1. More than 90 percent of the households in the overall sample considered their present income from farming to be inadequate. The pattern was similar across the landholding categories.

2. The only exception was Madhya Pradesh (MP) wherein compared to other states, a slightly higher percentage of households stated their income from farming to be adequate (13 percent). Further, in MP, across the landholding categories, a relatively higher percentage

of households in the marginal category (27 percent) had reported income from farming to be adequate compared to other categories.

3. Overall, no single factor emerged as the predominant reason for inadequate income from farming. In Bihar, multiple reasons were reported by the households for inadequate income from farming. In Gujarat, the main reasons reported by the households for inadequate income from farming were pest problem/crop diseases, other animal problem, high rainfall (7 percent), insufficient irrigation and non-remunerative price, pest problem/crop diseases and other animal problem, yield fluctuations and absence of storage facility (6 percent each). In Punjab, majority of the households reported pest problem/crop diseases (20 percent) and other animal problem (17 percent) to be the reasons for inadequate income from farming.

4. Generally, small land size and non-remunerative price were mostly reported by marginal and small farmers while pest problem was reported by the larger size groups.

Major economic risks faced

5. Lack of capital/finance, sharp fluctuations in input / output prices and lack of access to inputs emerge as the main economic risks faced by the farmers. Lack of finance/capital was the major economic risk faced by the households across all the landholding categories in three states. Punjab was an exception, wherein seasonal unemployment emerged to be the major economic issue which was ranked 1st by 55 percent of the households. As per expectations, it was a major economic risk particularly for households in the marginal (98 percent) and small category (63 percent) unlike those in the large (5 percent) and very large category (8 percent).

Coping strategies for the economic risks

6. Several strategies were reported to be undertaken in Bihar. Main strategies were carrying out primary processing (57 percent of the households), reduction in household consumption expenditure (17 percent) and storing of crops for better price (14 percent). Reduction in household consumption expenditure was undertaken mostly by the households in the marginal category.

7. In Gujarat, the major strategies were in the form of borrowing money from friends/relatives (20 percent), working for wage labour in the village (16 percent) and borrowing money from bank (15 percent) and money lender (13 percent). Borrowing from bank was reported more by the very large category while working for wage labour by the marginal and small.

8. In MP, borrowing money from bank was one of the main coping strategies of the households (22 percent) followed by deferring of social and family functions (18 percent), taking children out of school (13 percent). Marginal farmers mostly reported the last strategy, which is a drastic measure.

9. In Punjab, reducing household consumption expenditure (42 percent) and deferring social and family functions (29 percent) were the main coping strategies of the households. Reducing household consumption expenditure was mostly reported by households in the marginal (48 percent) and small category (56 percent).

MSP and public procurement

10. In the overall sample, only half of the sample households (52 percent) were aware of MSP. Percentage of households reporting awareness of MSP for paddy was the least in marginal category (35 percent). Very few paddy farmers reported awareness in Bihar (2%) while about 50% were aware in Gujarat. In MP and Punjab, awareness was 100 percent.

11. In Bihar, none of the households sold to any public agency, possibly because of absence of public procurement in the state. In Gujarat again, none of the households sold to any public agency because the procurement agency did not operate in the region. In MP, about 24 percent could not sell to public agencies because of the 'poor quality of the crop'. In Punjab, farmers knew very little about the public agency procuring their crop because they almost entirely operated through the arthiyas (commission agents)

PM KISAN

12. The percentage of households that reported to have received payment was relatively lower in MP (43 percent) and Punjab (48 percent) than in Bihar (78 percent) and Gujarat (74 percent). The average payment received also followed a similar pattern with MP (Rs 2327 per household) and Punjab (Rs 3324) compared to Bihar (Rs 4703) and Gujarat (Rs 4606).

13. It was encouraging to note that irrespective of the states concerned, the percentage of households receiving payment was relatively higher in the marginal and small categories than in the medium, large and 'very large' category. Time taken for receiving the payment was more or less the same across the landholding categories.

Technical Advice

14. In the overall sample, households were mainly reliant on sources such as private commercial agents (26 percent), progressive farmers (22 percent), extension agents (21 percent) and radio/tv/newspaper/internet (19 percent) for technical advice (**Error! Reference source not found.**). The pattern was not much different across the landholding categories. Majority of the households in the sample had adopted the recommended advice from the sources accessed

15. In Bihar, Gujarat and MP, there was a reliance on a combination of extension services – both public and private – for accessing technical advice. However, in Punjab, except for one household in the large category, none of the households have accessed extension agents. Around 59 percent of the households were reliant on private commercial agents (possibly arthiyas) followed by radio/tv/newspaper/internet (18 percent) and progressive farmers (11 percent).

16. Except in Bihar where 15 percent of the households accessed veterinary department for advice, the figures were abysmally meagre for other states.

Social capital

Across states, majority of the respondents have membership of dairy cooperatives / agricultural /credit cooperative societies. Membership of marginal farmers is relatively lower. In Bihar, Gujarat and MP most of the members are active members while in Punjab the majority are ordinary members.

Tables

Table 8.1: Whether income from farming is adequate

	Bihar			Gujarat			MP			Punjab			overall sample		
categories	yes	no	Total	yes	no	Total	yes	no	Total	yes	no	Total	yes	no	Total
marginal	0	130	130	0	315	315	22	59	81	3	77	80	25	581	606
%	0	100	100	0	100	100	27	73	100	4	96	100	4	96	100
small	0	87	87	3	236	239	17	96	113	3	91	94	23	510	533
%	0	100	100	1	99	100	15	85	100	3	97	100	4	96	100
medium	4	47	51	2	154	156	10	111	121	3	67	70	19	379	398
%	8	92	100	1	99	100	8	92	100	4	96	100	5	95	100
large	3	24	27	3	73	76	2	55	57	0	44	44	8	196	204
%	11	89	100	4	96	100	4	96	100	0	100	100	4	96	100
very large	0	5	5	0	14	14	0	28	28	0	12	12	0	59	59
%	0	100	100	0	100	100	0	100	100	0	100	100	0	100	100
Total	7	293	300	8	792	800	51	349	400	9	291	300	75	1725	1800
%	2	98	100	1	99	100	13	87	100	3	97	100	4	96	100

Table 8.2: Reasons for inadequate income from farming- Bihar

categories	Yield going down	Small land size	Insufficient Irrigation	Price not remunerative	Temperature too high	Rainfall fluctuating a lot	Absence of storage facility	Poor market facilities	Government support not available	Government support available but uncertain	limited sources of credit	Bank credit available but inadequate	High interest rate of money lenders	Rodent problem	Other animal problem	Labour shortage	total
marginal	130	130	115	110	130	102	101	102	130	102	102	102	102	102	130	102	1792
%	7	7	6	6	7	6	6	6	7	6	6	6	6	6	7	6	100
small	87	87	78	78	87	70	72	70	87	70	71	71	73	70	87	70	1228
%	7	7	6	6	7	6	6	6	7	6	6	6	6	6	7	6	100
medium	47	47	43	43	48	43	41	43	48	43	41	41	41	43	48	43	703
%	7	7	6	6	7	6	6	6	7	6	6	6	6	6	7	6	100
large	24	24	24	24	26	21	24	21	26	21	22	22	20	21	26	21	367
%	7	7	7	7	7	6	7	6	7	6	6	6	5	6	7	6	100
very large	5	5	5	5	5	4	4	4	5	4	4	4	5	4	5	4	72
%	7	7	7	7	7	6	6	6	7	6	6	6	7	6	7	6	100
Total	293	293	265	260	296	240	242	240	296	240	240	240	241	240	296	240	4162
%	7	7	6	6	7	6	6	6	7	6	6	6	6	6	7	6	100

Table 8.3: Reasons for inadequate income from farming- Gujarat

Landholding categories	Yield going down	Yield fluctuating a lot	Small land size	Absence of irrigation	Insufficient Irrigation	Price not remunerative	Price fluctuating a lot	Temperature too high	Temperature too low	Temperature fluctuating a lot	Rain fall too high	Rain fall too low	Rain fall fluctuating a lot	Pest problem/crop diseases	Not available / inadequate supply of pesticide	Not available / inadequate supply of fertiliser	Absence of storage facility	Absence of market facilities	Poor market facilities	Poor road connectivity	Government support not available	Government support available but uncertain	limited sources of credit	Bank credit not available	Bank credit available but inadequate	High interest rate of money lender	Rodent problem	Other animal problem	Labour shortage	others	total
marginal	78	54	209	116	159	122	139	11	9	63	7	44	119	192	60	58	47	24	78	5	108	74	25	11	24	37	79	208	139	132	2431
%	3	2	9	5	7	5	6	0	0	3	0	2	5	8	2	2	2	1	3	0	4	3	1	0	1	2	3	9	6	5	100
small	98	68	118	69	146	143	104	5	5	71	6	90	106	151	73	82	56	44	58	13	89	111	59	28	54	46	68	129	120	76	2286
%	4	3	5	3	6	6	5	0	0	3	0	4	5	7	3	4	2	2	3	1	4	5	3	1	2	2	3	6	5	3	100
medium	82	57	26	30	100	114	86	5	6	44	3	71	70	100	37	51	45	36	49	10	65	77	48	16	50	31	62	89	83	45	1588
%	5	4	2	2	6	7	5	0	0	3	0	4	4	6	2	3	3	2	3	1	4	5	3	1	3	2	4	6	5	3	100
large	38	31	7	14	42	53	45	4	4	19	2	36	37	53	16	27	17	15	22	5	34	44	16	6	19	15	30	46	39	23	759
%	5	4	1	2	6	7	6	1	1	3	0	5	5	7	2	4	2	2	3	1	4	6	2	1	3	2	4	6	5	3	100
very large	9	8	0	2	9	10	7	0	0	6	2	7	5	8	5	5	4	3	4	1	5	10	7	5	4	2	7	9	9	2	155
%	6	5	0	1	6	6	5	0	0	4	1	5	3	5	3	3	3	2	3	1	3	6	5	3	3	1	5	6	6	1	100
Total	305	218	360	231	456	442	381	25	24	203	20	248	337	504	191	223	169	122	211	34	301	316	155	66	151	131	246	481	390	278	7219
%	4	3	5	3	6	6	5	0	0	3	0	3	5	7	3	3	2	2	3	0	4	4	2	1	2	2	3	7	5	4	100

Table 8.4: Reasons for inadequate income from farming- MP

Landholding categories	yield going down	yield fluctuating a lot	small land size	absence of irrigation	insufficient irrigation	price not remunerative	price fluctuating a lot	temperature too high	temperature too low	temperature fluctuating a lot	rainfall too high	rainfall too low	rainfall fluctuating a lot	pest problem/crop diseases	not available/inadequate supply of pesticides	not available/inadequate supply of fertilizers	absence of storage facility	absence of market facilities	poor market facilities	poor road connectivity	govt support not available	govt support available but uncertain	limited source of credit	bank credit available but uncertain	high interest rate from moneylenders	rodent problem	other animal problem	labour shortage	Total
marginal	4	50	59	1	15	37	12	20	17	33	59	15	39	52	23	12	37	1	27	6	36	23	18	27	48	42	55	30	798
%	1	6	7	0	2	5	2	3	2	4	7	2	5	7	3	2	5	0	3	1	5	3	2	3	6	5	7	4	100
small	21	84	91	6	30	46	18	35	23	56	96	10	64	74	46	25	67	5	51	12	48	48	24	55	66	65	83	66	1315
%	2	6	7	0	2	3	1	3	2	4	7	1	5	6	3	2	5	0	4	1	4	4	2	4	5	5	6	5	100
medium	64	90	72	1	21	58	25	31	22	81	111	9	66	88	46	20	85	25	66	16	58	53	32	62	75	65	81	81	1504
%	4	6	5	0	1	4	2	2	1	5	7	1	4	6	3	1	6	2	4	1	4	4	2	4	5	4	5	5	100
large	45	39	7	2	10	34	10	15	18	46	55	5	27	42	24	11	50	20	37	13	19	36	20	35	40	26	35	39	760
%	6	5	1	0	1	4	1	2	2	6	7	1	4	6	3	1	7	3	5	2	3	5	3	5	5	3	5	5	100
very large	27	16	0	3	7	10	3	3	9	24	28	3	18	19	12	6	24	12	21	7	8	20	11	21	17	12	16	16	373
%	7	4	0	1	2	3	1	1	2	6	8	1	5	5	3	2	6	3	6	2	2	5	3	6	5	3	4	4	100
Total	161	279	229	13	83	185	68	104	89	240	349	42	214	275	151	74	263	63	202	54	169	180	105	200	246	210	270	232	4750
%	3	6	5	0	2	4	1	2	2	5	7	1	5	6	3	2	6	1	4	1	4	4	2	4	5	4	6	5	100

Table 8.5: Reasons for inadequate income from farming- Punjab

landholding categories	yield going down	yield fluctuating a lot	small land size	absence of irrigation	insufficient irrigation	price not remunerative	price fluctuating a lot	rain fall too high	rainfall fluctuating a lot	pest prob/ crop diseases	Absence of storage facility	Absence of market facilities	Poor market facilities	Poor road connectivity	Govt support not available	Govt support uncertain	limited sources of credit	Bank credit not available	High interest of money lenders/CA	rodent prob	other animal prob	lab shortage	high lease rent	high input costs	prob of paddy straw	total
marginal	1	0	49	0	1	12	0	3	3	46	0	0	0	0	7	0	21	2	12	0	45	0	1	16	4	223
%	0	0	22	0	0	5	0	1	1	21	0	0	0	0	3	0	9	1	5	0	20	0	0	7	2	100
small	1	1	18	0	0	23	0	1	4	60	0	0	0	1	15	1	6	0	11	1	63	1	7	20	4	238
%	0	0	8	0	0	10	0	0	2	25	0	0	0	0	6	0	3	0	5	0	26	0	3	8	2	100
medium	1	12	5	2	0	5	3	0	12	45	0	0	0	0	5	1	3	0	11	1	38	6	10	31	22	213
%	0	6	2	1	0	2	1	0	6	21	0	0	0	0	2	0	1	0	5	0	18	3	5	15	10	100
large	0	15	5	1	0	14	10	0	24	26	4	2	3	0	9	0	4	0	8	0	12	2	17	17	35	208
%	0	7	2	0	0	7	5	0	12	13	2	1	1	0	4	0	2	0	4	0	6	1	8	8	17	100
very large	0	2	0	0	0	2	2	0	6	9	1	0	0	0	1	1	0	0	2	0	5	4	6	6	12	59
%	0	3	0	0	0	3	3	0	6	15	2	0	0	0	2	2	0	0	3	0	8	7	10	10	20	100
Total	3	30	77	3	1	56	15	4	49	186	5	2	3	1	37	3	34	2	44	2	163	13	41	90	77	941
%	0	3	8	0	0	6	2	0	5	20	1	0	0	0	4	0	4	0	5	0	17	1	4	10	8	100

Table 8.6: Ranking of economic risks faced by the households

	Bihar				**Gujarat**			**MP**			**Punjab**		
	lack of finance/capital	lack of access to inputs	sharp fluctuations in input prices	sharp fluctuations in output prices	lack of finance/capital	sharp fluctuations in output prices	lack of access to inputs	lack of finance/ capital	sharp fluctuations in input prices	lack of demand or inability to sell agricultural products	seasonal unemployment	sharp fluctuations in input prices	lack of finance/capital
categories	1st	2nd	3rd	3rd	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
marginal	84	46	46	46	208	73	109	23	18	33	78	57	60
%	65	35	35	35	66	23	35	28	22	41	98	71	75
small	55	29	31	30	159	51	76	39	35	28	59	50	52
%	63	33	36	34	67	21	32	35	31	25	63	53	55
medium	33	18	18	18	108	40	39	30	24	28	24	18	26
%	65	35	35	35	69	26	25	25	20	23	34	26	37
large	19	10	9	9	50	14	31	17	14	10	2	6	5
%	70	37	33	33	66	18	41	30	25	18	5	14	11
very large	3	1	2	1	7	0	6	7	5	4	1	1	1
%	60	20	40	20	50	0	43	25	18	14	8	8	8
Total	194	104	106	104	532	178	261	116	96	103	164	132	144
%	65	35	35	35	67	22	33	29	24	26	55	44	48

Table 8.7: Coping strategies undertaken by the households with respect to the economic risks faced- Bihar

Landholding categories	stored crops for better price	carried out primary processing	Reduced household consumption expenditure	mortgaged/ leased out land	Borrowed money from bank	Borrowed money from moneylenders	Borrowed from friends and relatives	Worked for wage labour in the village	Total
marginal	27	103	38	0	3	0	1	16	188
%	14	55	20	0	2	0	1	9	100
small	18	69	16	7	6	1	0	0	117
%	15	59	14	6	5	1	0	0	100
medium	10	41	12	3	2	0	0	0	68
%	15	60	18	4	3	0	0	0	100
large	5	22	5	5	3	0	0	0	40
%	13	55	13	13	8	0	0	0	100
very large	0	5	1	0	0	0	0	0	6
%	0	83	17	0	0	0	0	0	100
Total	60	240	72	15	14	1	1	16	419
%	14	57	17	4	3	0	0	4	100

Table 8.8: Coping strategies undertaken by the households with respect to the economic risks faced- Gujarat

Landholding categories	stored crops for better price	carried out primary processing	reduced hh consumption	reduced health exp	took children out of school	deferred social and family functions	sold land	sold livestock	mortgaged/leased out land	borrowed money from bank	borrowed money from money lender	borrowed money from friends/relatives	worked for wage lab in the village	started petty business	others	Total
marginal	48	3	92	5	27	72	28	34	63	194	176	275	221	69	4	1311
%	4	0	7	0	2	5	2	3	5	15	13	21	17	5	0	100
small	40	7	62	16	20	57	29	31	47	135	132	194	172	48	6	996
%	4	1	6	2	2	6	3	3	5	14	13	19	17	5	1	100
medium	34	4	33	5	14	42	19	23	19	101	83	123	91	31	1	623
%	5	1	5	1	2	7	3	4	3	16	13	20	15	5	0	100
large	25	1	14	0	7	10	11	7	11	52	38	66	43	24	0	309
%	8	0	5	0	2	3	4	2	4	17	12	21	14	8	0	100
very large	5	1	0	1	0	1	4	1	2	9	6	9	5	8	0	52
%	10	2	0	2	0	2	8	2	4	17	12	17	10	15	0	100
Total	152	16	201	27	68	182	91	96	142	491	435	667	532	180	11	3291
%	5	0	6	1	2	6	3	3	4	15	13	20	16	5	0	100

Table 8.9: Coping strategies undertaken by the households with respect to the economic risks faced- MP

Landholding categories	stored crops for better price	carried out primary processing	reduced hh consumption	reduced health exp	took children out of school	deferred social and family functions	sold land	sold livestock	mortgaged/leased out land	borrowed money from bank	borrowed money from money lenders	borrowed money from friends/relatives	worked for wage lab in the village	started petty business	total
marginal	0	13	31	29	34	51	0	3	7	40	4	1	25	10	248
%	0	5	13	12	14	21	0	1	3	16	2	0	10	4	100
small	0	27	32	31	51	63	1	5	9	83	8	4	35	8	357
%	0	8	9	9	14	18	0	1	3	23	2	1	10	2	100
medium	17	28	42	38	44	65	1	7	5	100	12	0	21	6	386
%	4	7	11	10	11	17	0	2	1	26	3	0	5	2	100
large	31	14	16	7	25	33	2	5	1	48	10	1	0	11	204
%	15	7	8	3	12	16	1	2	0	24	5	0	0	5	100
very large	24	4	7	9	11	20	0	5	0	23	4	1	0	4	112
%	21	4	6	8	10	18	0	4	0	21	4	1	0	4	100
Total	72	86	128	114	165	232	4	25	22	294	38	7	81	39	1307
%	6	7	10	9	13	18	0	2	2	22	3	1	6	3	100

Table 8.10: Coping strategies undertaken by the households with respect to the economic risks faced- Punjab

Landholding categories	stored crops for better price	Reduced household consumption expenditure	deferred social & family functions	Borrowed money from bank	Borrowed money from input dealer/commission agents	Borrowed from friends and relatives	started petty business /shops	total
marginal	0	12	9	0	1	1	2	25
%	0	48	36	0	4	4	8	100
small	0	9	4	0	2	0	1	16
%	0	56	25	0	13	0	6	100
medium	2	10	9	3	1	0	2	27
%	7	37	33	11	4	0	7	100
large	5	10	7	3	3	1	0	29
%	17	34	24	10	10	3	0	100
very large	2	2	1	0	0	0	0	5
%	40	40	20	0	0	0	0	100
Total	9	43	30	6	7	2	5	102
%	9	42	29	6	7	2	5	100

Table 8.11: Whether aware of MSP related to paddy

	Bihar			Gujarat			MP			Punjab			Overall sample		
categories	yes	no	Total	yes	no	total	yes	no	total	yes	no	total	yes	no	total
marginal	0	130	130	57	105	162	26	0	26	46	0	46	129	235	364
%	0	100	100	35	65	100	100		100	100		100	35	65	100
small	3	84	87	43	47	90	40	0	40	61	0	61	147	131	278
%	3	97	100	48	52	100	100		100	100		100	53	47	100
medium	2	49	51	34	18	52	29	0	29	65	0	65	130	67	197
%	4	96	100	65	35	100	100		100	100		100	66	34	100
large	0	27	27	31	1	32	9	0	9	43	0	43	83	28	111
%	0	100	100	97	3	100	100		100	100		100	75	25	100
very large	0	5	5	7	0	7	1	0	1	12	0	12	20	5	25
%	0	100	100	100		100	100		100	100		100	80	20	100
Total	5	295	300	172	171	343	105	0	105	227	0	227	509	466	975
%	2	98	100	50	50	100	100		100	100		100	52	48	100

Table 8.12: Agency to whom paddy was sold

	Gujarat		**MP**			**Punjab**		
categories	did not sell	Total	NAFED	did not sell	Total	FCI	others	Total
marginal	57	57	22	4	26	0	1	1
%	100	100	85	15	100	0	100	100
small	43	43	32	8	40	0	2	2
%	100	100	80	20	100	0	100	100
medium	34	34	22	7	29	5	0	5
%	100	100	76	24	100	100	0	100
large	31	31	4	5	9	0	2	2
%	100	100	44	56	100	0	100	100
very large	7	7	0	1	1	1	1	2
%	100	100	0	100	100	50	50	100
Total	172	172	80	25	105	6	6	12
%	100	100	76	24	100	50	50	100

Table 8.13: Reasons for not selling to agencies procuring crops at MSP

Landholding categories	**Gujarat**		**MP**		
	Paddy				
	procurement agency not available	Total	poor quality of crop	others	Total
marginal	57	57	2	2	4
%	100	100	50	50	100
small	43	43	4	4	8
%	100	100	50	50	100
medium	34	34	2	5	7
%	100	100	29	71	100
large	31	31	2	3	5
%	100	100	40	60	100
very large	7	7	1	0	1
%	100	100	100	0	100
Total	172	172	11	14	25
%	100	100	44	56	100

Table 8.14: Average payment received under PM-KISAN and time taken

	Bihar			**Gujarat**			**MP**			**Punjab**		
Landholding categories	payment received (Rs)	no of households who received the payment	time taken (in months)	payment received (Rs)	no of households who received the payment	time taken (in months)	payment received (Rs)	no of households who received the payment	time taken (in months)	payment received (Rs)	no of households who received the payment	time taken (in months)
marginal	4708	130(100)	9	4746	260 (83)	7	2350	40 (49)	1	3433	60 (75)	2
small	4667	87 (100)	9	4471	191 (80)	6	2385	52 (46)	1	2982	55 (59)	2
medium	5000	4 (8)	9	4404	109 (70)	6	2308	52 (43)	1	3636	22 (31)	2
large		0		4847	59 (78)	6	2111	18 (32)	1	4000	8 (18)	2
very large	6000	1 (20)	9	4250	8 (57)	5	2444	9 (32)	1		0	
total	4703	222 (78)	9	4606	627 (74)	6	2327	171 (43)	1	3324	145 (48)	2

Please note figures in parentheses are percentages of households who received the payment out of the total sample households.

Table 8.15: Sources of technical advice accessed by the households

	Bihar						Gujarat									MP							
Landholding categories	extension agent	Krishi vigyan kendra	progressive farmers	radio/tv/newspaper/internet	veterinary dept	Total	extension agent	Krishi vigyan kendra	agricultural university/college	private commercial agents	progressive farmers	radio/tv/newspaper/internet	veterinary dept	NGO	Total	extension agents	Krishi vigyan kendra	agri uni	private commercial agents	progressive farmer	radio/tv/newspaper/internet	veterinary dept	Total
marginal	18	3	3	3	3	30	52	3	13	28	75	119	2	6	298	73	14	5	73	58	13	22	258
%	60	10	10	10	10	100	17	1	4	9	25	40	1	2	100	28	5	2	28	22	5	9	100
small	13	6	6	6	6	37	55	4	8	60	100	129	1	11	368	98	21	9	95	68	18	30	339
%	35	16	16	16	16	100	15	1	2	16	27	35	0	3	100	29	6	3	28	20	5	9	100
medium	6	4	5	4	4	23	56	6	12	56	82	91	2	14	319	106	16	8	105	81	16	28	360
%	26	17	22	17	17	100	18	2	4	18	26	29	1	4	100	29	4	2	29	23	4	8	100
large	4	3	1	3	3	14	40	3	11	30	43	50	1	5	183	54	5	2	50	36	6	12	165
%	29	21	7	21	21	100	22	2	6	16	23	27	1	3	100	33	3	1	30	22	4	7	100
very large	0	0	1	0	0	1	10	0	3	9	11	12	0	4	49	27	1	0	25	24	3	13	93
%	0	0	100	0	0	100	20	0	6	18	22	24	0	8	100	29	1	0	27	26	3	14	100
Total	41	16	16	16	16	105	213	16	47	183	311	401	6	40	1217	358	57	24	348	267	56	105	1215
%	39	15	15	15	15	100	18	1	4	15	26	33	0.5	3	100	29	5	2	29	22	5	9	100

Table 8.15 contd…

	Punjab									overall sample								
Landholding categories	extension agents	Krishi vigyan kendra	agri uni	private commercial agents	progressive farmer	radio/tv/newspaper/internet	veterinary dept	NGO	total	extension agents	Krishi vigyan kendra	agri uni	private commercial agents	progressive farmer	radio/tv/newspaper/internet	veterinary dept	NGO	total
Marginal	0	0	1	57	11	19	0	0	88	143	20	19	158	147	154	27	6	674
%	0	0	1	65	13	22	0	0	100	21	3	3	23	22	23	4	1	100
Small	0	0	6	68	12	19	3	0	108	166	31	23	223	186	172	40	11	852
%	0	0	6	63	11	18	3	0	100	19	4	3	26	22	20	5	1	100
Medium	0	3	8	51	8	13	1	0	84	168	29	28	212	176	124	35	14	786
%	0	4	10	61	10	15	1	0	100	21	4	4	27	22	16	4	2	100
Large	1	4	7	33	5	11	4	0	65	99	15	20	113	85	70	20	5	427
%	2	6	11	51	8	17	6	0	100	23	4	5	26	20	16	5	1	100
Very large	0	1	2	7	4	3	2	0	19	37	2	5	41	40	18	15	4	162
%	0	5	11	37	21	16	11	0	100	23	1	3	25	25	11	9	2	100
Total	1	8	24	216	40	65	10	0	364	613	97	95	747	634	538	137	40	2901
%	0	2	7	59	11	18	3	0	100	21	3	3	26	22	19	5	1	100

Table 8.16: Households adopting recommended advice from the sources

	Bihar	**Gujarat**				**MP**			**Punjab**		
Landholding categories	extension agents	extension agents	private commercial agents	progressive farmers	radio/tv/newspaper/internet	extension agents	private commercial agents	progressive farmers	private commercial agents	progressive farmer	radio/tv/newspaper/internet
	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
marginal	18	50	28	68	111	66	73	58	57	11	19
%	100	96	100	91	93	90	100	100	100	100	100
small	13	53	60	96	122	89	95	68	68	12	19
%	100	96	100	96	95	91	100	100	100	100	100
medium	6	55	56	81	82	96	105	81	51	8	13
%	100	98	100	99	90	91	100	100	100	100	100
large	4	39	30	43	49	44	50	36	33	5	11
%	100	98	100	100	98	81	100	100	100	100	100
very large	0	10	9	11	11	26	25	24	7	4	3
%		100	100	100	92	96	100	100	100	100	100
Total	41	207	183	299	375	321	348	267	216	40	65
%	100	97	100	96	94	90	100	100	100	100	100

Please note that the table on households adopting recommended advice are provided only for those sources for which substantial response was reported in terms of accessing these sources.

Table 8.17: Membership of the households in organisations during the last 3 years

	Bihar				**Gujarat**											**MP**								**Punjab**					
categories	gram panchayat	dairy/ milk cooperative societies	SHG	total	gram panchayat	agri coop societies	dairy/ milk cooperative societies	mahila mandal	SHG	farmer producer org	Farmers activists group	political party	caste association	credit coop society	Total	gram panchayat	agri coop societies	mahila mandal	SHG	political party	caste association	credit coop society	Total	agri coop societies	dairy coop societies	employee union	SHG	farmer producers org	total
marginal	7	36	9	52	16	57	138	33	33	1	13	0	1	11	303	5	30	3	5	3	1	30	77	77	7	0	0	13	97
%	13	69	17	100	5	19	46	11	11	0	4	0	0	4	100	6	39	4	6	4	1	39	100	79	7	0	0	13	100
small	4	31	4	39	16	68	119	16	17	0	13	0	1	8	258	8	56	2	3	0	5	56	130	91	2	0	0	13	106
%	10	79	10	100	6	26	46	6	7	0	5	0	0	3	100	6	43	2	2	0	4	43	100	86	2	0	0	12	100
medium	2	17	4	23	13	59	93	7	7	1	10	1	0	2	193	8	55	3	2	1	1	55	125	69	7	1	1	7	85
%	9	74	17	100	7	31	48	4	4	1	5	1	0	1	100	6	44	2	2	1	1	44	100	81	8	1	1	8	100
large	2	11	3	16	17	33	47	4	4	3	5	0	0	3	116	2	23	1	0	2	0	23	51	43	10	0	0	5	58
%	13	69	19	100	15	28	41	3	3	3	4	0	0	3	100	4	45	2	0	4	0	45	100	74	17	0	0	9	100
very large	0	5	0	5	3	10	7	0	0	2	3	0	0	0	25	0	9	1	0	0	0	9	19	12	3	0	0	0	15
%	0	100	0	100	12	40	28	0	0	8	12	0	0	0	100	0	47	5	0	0	0	47	100	80	20	0	0	0	100
Total	15	100	20	135	65	227	404	60	61	7	44	1	2	24	895	23	173	10	10	6	7	173	402	292	29	1	1	38	361
%	11	74	15	100	7	25	45	7	7	1	5	0	0	3	100	6	43	2	2	1	2	43	100	81	8	0	0	11	100

Table 8.18: Capacity of engagement in the organisations

	Bihar	**Gujarat**						**MP**		**Punjab**			
	dairy/milk cooperative societies	agri coop societies			dairy/milk cooperative societies			agri coop societies	credit coop society	agri coop societies			
categories	active member	Ordinary member	active member	Total	Ordinary member	active member	Total	active member	active member	ordinary member	active member	office bearer	Total
marginal	36	19	38	57	19	119	138	30	30	61	16	0	77
%	100	33	67	100	14	86	100	100	100	79	21	0	100
small	31	44	24	68	45	74	119	56	56	55	35	1	91
%	100	65	35	100	38	62	100	100	100	60	38	1	100
medium	17	27	32	59	17	76	93	55	55	33	35	1	69
%	100	46	54	100	18	82	100	100	100	48	51	1	100
large	11	11	22	33	7	40	47	23	23	25	18	0	43
%	100	33	67	100	15	85	100	100	100	58	42	0	100
very large	5	4	6	10	3	4	7	9	9	6	6	0	12
%	100	40	60	100	43	57	100	100	100	50	50	0	100
Total	100	105	122	227	91	313	404	173	173	180	110	2	292
%	100	46	54	100	23	77	100	100	100	62	38	1	100

Please note that the table on capacity of engagement in the organisations is provided only for those organisations for which substantial response was reported in terms of membership in these organisations.

Table 8.19: Benefits of having membership in organisations

Landholding categories	**Bihar**	**Gujarat**											
	dairy/milk coop societies	agri coop societies											
	Sharing of information on												
	prices and market	agricultural practices and livestock management	agricultural practices and livestock management & input usage	agricultural practices and livestock management & input usage & credit sources	input usage	input usage & credit sources	input usage & prices and markets	input usage & govt schemes	credit sources	credit sources & govt schemes	government schemes	all the benefits	Total
marginal	36	14	1	4	2	2	1	4	4	1	0	24	57
%	100	25	2	7	4	4	2	7	7	2	0	42	100
small	31	2	0	3	0	0	1	3	1	0	2	56	68
%	100	3	0	4	0	0	1	4	1	0	3	82	100
medium	17	0	0	2	2	0	0	2	1	0	0	52	59
%	100	0	0	3	3	0	0	3	2	0	0	88	100
large	11	1	0	0	1	0	0	2	3	0	1	25	33
%	100	3	0	0	3	0	0	6	9	0	3	76	100
very large	5	0	0	1	0	0	2	0	0	0	0	7	10
%	100	0	0	10	0	0	20	0	0	0	0	70	100
Total	100	17	1	10	5	2	4	11	9	1	3	164	227
%	100	7	0	4	2	1	2	5	4	0	1	72	100

Table 8.19 contd…

Landholding categories	**Gujarat**							**MP**						**Punjab**							
	dairy/milk cooperative societies							agri coop societies					credit coop society	agri coop societies							
	Sharing of information on																				
	agricultural practices and livestock management	credit sources	credit sources & prices and markets	agricultural practices and livestock management & input usage & credit sources	agricultural practices and livestock management & inut usage & credit sources & prices and markets	all	Total	input usage	credit sources	price and markets	government schemes	total	credit sources	agricultural practices & livestock management % on credit sources	agricultural practices and livestock management; credit sources; govt schemes	input usage	credit sources	credit sources; on govt schemes	prices & markets	govtschemes	Total
Marginal	56	42	2	19	4	16	139	10	11	3	6	30	30	1	0	2	22	32	6	14	77
%	40	30	1	14	3	12	100	33	37	10	20	100	100	1	0	3	29	42	8	18	100
Small	25	20	0	21	17	36	119	21	13	11	11	56	56	1	1	1	28	28	0	32	91
%	21	17	0	18	14	30	100	38	23	20	20	100	100	1	1	1	31	31	0	35	100
Medium	24	12	0	14	29	14	93	23	18	3	11	55	55	0	0	0	27	17	0	25	69
%	26	13	0	15	31	15	100	42	33	5	20	100	100	0	0	0	39	25	0	36	100
Large	17	8	0	5	12	5	47	14	4	2	3	23	23	0	0	0	18	13	0	12	43
%	36	17	0	11	26	11	100	61	17	9	13	100	100	0	0	0	42	30	0	28	100
Very large	1	1	0	1	2	2	7	7	2	0	0	9	9	0	0	0	7	3	0	2	12
%	14	14	0	14	29	29	100	78	22	0	0	100	100	0	0	0	58	25	0	17	100
Total	123	83	2	60	64	73	405	75	48	19	31	173	173	2	1	3	102	93	6	85	292
%	30	20	0	15	16	18	100	43	28	11	18	100	100	1	0	1	35	32	2	29	100

CHAPTER 9: ECONOMETRIC ANALYSIS

In this chapter, we explore the underlying relationships in various markets though econometric analysis. In Section 1.3 we have seen that the imperfections in labour and land markets manifest most likely in the form of decreasing land productivity and increasing per capita output as the farm size increases. It is also likely that the larger farms face a supervision constraint; make more intensive use of inputs and land use; possess better access to mechanization and credit, all of which could have a positive impact on per capita output. Hence, the following hypotheses have been tested using the household data.

1) Does the inverse relation (IR) between land productivity and farm size hold?
2) Does the direct relation (IR) between per capita output (labour productivity) and farm size hold?
3) Does ratio of family labour to hired labour decrease with farm size?
4) Does consumption of fertilizers vary with farm size?
5) Does cropping intensity vary with farm size?
6) Does access to bank credit vary with owned land (collateral effect)?

Since many of these endogenous variables are dependent on region-specific, agro-economic factors on the supply side such as soil and weather type, marketing infrastructure, bank density etc, which vary across states and even across villages, we control for the state and village effects in our analysis through the use of appropriate dummies. We also test for the differences in the marginal effects of our variable of interest (farm size) across villages (and states) through appropriate interactions. However, since we do not have data at different points of time or plot level data, we are unable to control for household level effects. This is one limitation of our analysis. Since heteroscedasticity is a persistent problem in cross-section studies, which is also the case in our data, we have used White's heteroscedasticity-corrected standard errors.

The estimated equations are as follows. The expected sign, *a priori*, is indicated below each variable.

9.1 Econometric Model

1. Land productivity-farm size relationship (negative with operated area)

$VA1perha = f$ (SD or VD, OPA, FLPD/HLPD, OWA, %IA, FERT/ha, interactions of VD with OPA or OWA)
+/- - - + + + +/-

2. Output per capita-farm size relationship (positive with operated area)

$VA1percapita = f$ (SD or VD, OPA, FLPD/HLPD, OWA, %IA, FERT/ha, interactions of VD with OPA or OWA)
+/- + - + + + +/-

3. Ratio of family labour to hired labour (supervision constraint)

FLPD/HLPD = *f* (SD OR VD,OPA,CI, interactions of VD or SD with OPA)

+/- - + +/-

4. Fertilizer consumption per hectare

FERT/ha = *f* (SD or VD,OPA, % IA, %RICWHT, interactions of VD or SD with OPA)

+/- + +/- + +/-

5. Cropping intensity

CI = *f* (SD or VD,OPA, % IA, FLPD/HLPD, interactions of VD or SD with OPA)

+/- + +/- + +/-

6. Bank credit per hectare

BANCRE = *f* (SD or VD,OWA, interactions of VD or SD with OWA)

+/- + +/-

Notation of the variables

L_ denotes natural log

L_VA1PERHA: Value added per hectare (Rs/ha)

L_OPAREA: Operated area (ha)

L_OWN_LAND: Owned land (ha)

PER_IRR_OP: Percentage of irrigated area to operated area (%)

PER_AR_PDWHSUG: Percentage of area under paddy, wheat and sugarcane to total area (%)

L_EXP_FERT_HA: Expenditure on fertilizer consumption (Rs/ha)

L_VA1PERPRN: Value added per capita (Rs/ha)

RATIO_FL_HL_DAYS: Ratio of person-days of family labour to hired labour (%)

CI_CROP_INTEN: Cropping intensity (GCA/operated area)

AMT_GOVBNK: Amount borrowed from Bank (Rs/ha)

9.2 Analysis and Results

9.2.1 Land Productivity (**Table *9.1***)

Small farms show higher intensity of family labour due to various factors like non-clearing labour markets due to wage rate below the reservation wage, lower skill endowments, missing

markets for women, children and certain types of labour. The better quality and commitment of family labour on small farms (in comparison to the hired labour) and the higher supervision costs (of the hired labour) on large farms are expected to lead to, *ceteris paribus*, decreasing output per acre net of costs with increase in farm size.

Six different models have been estimated to test this hypothesis. Models 1-3 include state dummies; state and operated area interactions; and state and owned area interactions respectively. The next three models, Models 4-6, use village dummies instead of state dummies. The state and village dummies are expected to capture the state and village level heterogeneity respectively. The interactions help to discern the slope differences, if any, across states and villages. The state of Bihar and village Kesabe (Bihar) constitute the base group in these two sets of regressions. Proportion of irrigated area and fertilizer consumption per hectare have been included to account for higher yield due to these inputs. Proportion of area under MSP-supported crops has been included to factor in the better price realization of farmers due to MSP, which in turn, may help realize better value added per capita. The results are presented in **Table *9.1***.

In all the three models 1-3, our variable of interest which is the operated area (farm size), shows a negative and a statistically significant effect on land productivity. A one percent increase in farm size leads to a decrease in land productivity ranging from 0.26 percent to 0.33 percent. This is strongly suggestive of the presence IR. This is different from the results of our tabular analysis in Chapter 3. In needs to be noted that in our tabular analysis, the other relevant factors such as irrigation, fertilizer usage and village-specific effects have not been controlled. Once all these other factors are controlled for, the relation between value added and farm size becomes sharper.

The owned area also shows the expected positive effect (0.40 to 0.42) and is statistically significant, showing the positive effect of better access to credit, mechanization etc on land productivity. The percentage of irrigated area (to total cropped area), area under MSP crops and fertilizer consumption (per ha) – all show statistically significant and positive effects on land productivity. The intercept dummies are significant for all three states but the slope dummies are not, showing very little difference in marginal effects (of operated area) across states.

In the next three models, Model 4-6, we control for village level heterogeneity. The effect of operated area (farm size) is negative and significant in all three models, ranging from -0.32 to -0.53. The coefficient value increases from -0.32 to -0.53 and the Adjusted R sq also increases significantly when interaction terms are included. Many of the interaction terms are statistically significant showing that the marginal effect of farm size on land productivity varies across villages. The interaction term is significant in nearly 21 villages, out of 44 villages for which village interaction dummies were included (**Table *9.7***). The coefficient of owned land also shows significant positive effect (0.32 to 0.48). The coefficients of area under MSP crops and fertilizer consumption show little change and are statistically significant. The only notable change is in the effect of percentage area irrigated, which although positive, is statistically

insignificant suggesting that irrigation is perhaps not an important factor in determining land productivity once village level heterogeneity is accounted for.

9.2.2 Value added per capita (**Table *9.2***)

Given the better access to credit of the large farmers and the resulting farm investment and mechanization, the *output per capita (or income per capita) is expected to be much higher for large farmers*. We test this hypothesis using six models with the same set of explanatory variables used in the previous set of regressions (of value added per hectare). The only difference is that the dependent variable is 'value added per capita'.

As expected, the operated area shows positive and significant effect on the dependent variable. This is in agreement with the results in Chapter 3 (section 3.5). All other explanatory variables, except irrigation, show significant positive effect. Irrigation, as in the previous set of regressions, turns insignificant when village level heterogeneity is controlled for. The coefficients are robust across specifications. The interaction term is significant in 18 villages (**Table *9.8***).

9.2.3 Labour use (**Table *9.3***)

As discussed in section 1.3, intensive use of family labour on small farms and the supervision constraint faced by are hypothesized to be the main factors behind the IR. If true, this implies that the ratio of family labour to hired labour is highest in the smallest land category and declines as the farm size increases. We formally test this with equation 3, wherein ratio of the person days of family labour to hired labour is regressed on farm size. We have controlled for cropping intensity (ratio of total cropped area under various crops to the operated area). We have included state & village dummies; and their interactions with operated area. The results support the hypothesis regarding family labour use. The farm size has a negative and significant effect on the dependent variable while the cropping intensity is insignificant (**Table *9.3***). The interaction term is significant in 28 villages (**Table 9.9**). These results confirm the hypotheses about the intensive use of family labour on marginal & small farms and the supervision constraint faced by the larger farms. These results are in agreement with the results of the tabular analysis in Chapter 5 (in section 5.1).

9.2.4 Fertilizer Consumption Expenditure (**Table *9.4***)

Is it possible that the IR is due to factors other than intensive labour use? To check this, we test the relation by regressing fertilizer consumption expenditure per hectare on operated area (farm size). Since fertilizer consumption expenditure is expected to be more for irrigated lands and for crops like rice, wheat and sugarcane, we control for percentage of irrigated area and area under these crops. The results do not support the hypothesis that fertilizer consumption is higher on smaller farms (**Table *9.4***). This is in agreement with the results from our tabular analysis in Chapter 3 (section 3.8). However, the interaction term is significant in 18 villages though (**Table *9.10***).

Percentage of irrigated area and area under paddy, wheat and sugarcane show positive and statistically significant effect when village-level heterogeneity is accounted for (the economic effect of these variables or magnitude of the coefficient is small though). Thus, it can be inferred that the fertilizer consumption is not explained by the farm size but more by irrigation and area under fertilizer-intensive crops.

9.2.5 Cropping intensity (**Table *9.5***)

Next we turn to cropping intensity. Is it possible that the observed IR is due to an intensive use of land, and not labour? To test this, we regress cropping intensity on farm size, percentage of irrigated area and ratio of family labour days to hired labour days. Cropping intensity is expected to be higher on farms with better irrigation and with better quality, committed labour. The results do not support the hypothesis of more intensive use of land on smaller farms (**Table *9.5***). The percentage of irrigated area has a significant positive effect on the dependent variable. The interaction term is significant in 18 villages (**Table *9.11***).

9.2.6 Bank Credit (**Table *9.6***)

Access to formal credit from the banks is expected to affect value of the output through higher use of inputs and complementary investment. Also, because of the collateral value of land, smaller farmers may not be considered credit-worthy and may have relatively less access to bank credit than the larger farmers. We test this hypothesis by regressing amount of bank credit per hectare on owned area. We use owned land since only owned land can be used as collateral and not the operated land. There is a large number of farmers who have not borrowed from the bank. Also, amount borrowed can never be negative. This means that the distribution of borrowers is left censored and is lumped at zero. Thus, OLS is not an appropriate methodology and therefore we have used Tobit for estimation. Although the total number of observations in our sample is 1798, only 556 observations are left after censoring at zero. Thus, we could not use the either village dummies or any of the interaction terms because of the degrees of freedom constraint and only used the state dummies. The results show that the owned land has a positive and significant effect on the credit availability. This is broadly in keeping with the results of tabular analysis in Chapter 6 (section 6.1). The state dummies are also positive and significant, indicating that the credit availability in Gujarat, MP and Punjab is significantly higher than in Bihar. However, due to the absence of the interaction terms, it is not possible to say anything about the change in the marginal effects across states, if any.

The results are presented in the following tables.

Table 9.1: Value Added (per ha)

EQUATION NAME	VALUE ADDED (per ha)					
Dependent variable:	L_VA1PERHA					
Explanatory variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
C	6.30***	6.32***	6.34***	7.55***	7.62***	7.71***
L_OPAREA	-0.26***	-0.33***	-0.26***	-0.32***	-0.53***	-0.35***
L_OWN_LAND	0.41***	0.42***	0.40***	0.47***	0.48***	0.32***
PER_IRR_OP	0.005**	0.005**	0.005**	0.003	0.002	0.002
PER_AR_PDWHSUG	0.007***	0.007***	0.007***	0.003**	0.004**	0.004**
L_EXP_FERT_HA	0.31***	0.30***	0.30***	0.21***	0.22***	0.21***
State dummies	Yes	Yes	Yes			
State interaction dummies	No	Yes	Yes			
State interacted with		Operated Area	Own Land			
Village dummies				Yes	Yes	Yes
Village interaction dummies				No	Yes	Yes
Village interacted with					Operated Area	Own Land
Adjusted R sq	0.36	0.36	0.36	0.48	0.5	0.5
Log-likelihood	-1785.85	-1784.17	-1784.42	-1613.7	-1560.25	-1562.74
No. of included observations	1503	1503	1503	1503	1503	1503

Note: Level of significance - *,**,*** denote significance at 10%, 5% and 1% respectively

Table 9.2: Value added (per person or per capita)

EQUATION NAME	VALUE ADDED (per person or per capita)					
Dependent variable:	L_VA1PERPRN					
Explanatory variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
C	7.22***	4.64***	4.66***	6.03***	6.02***	6.10***
L_OPAREA	0.60***	0.68***	0.62***	0.53***	0.46***	0.52***
L_OWN_LAND	0.47***	0.43***	0.53***	0.53***	0.50***	0.44***
PER_IRR_OP	0.01***	0.01***	0.01***	0.002	0.002	0.002
PER_AR_PDWHSUG	0.01***	0.01***	0.01***	0.004***	0.005***	0.005***
L_EXP_FERT_HA		0.28***	0.28***	0.20***	0.21***	0.20***
State dummies	Yes	Yes	Yes			
State interaction dummies	No	Yes	Yes			
State interacted with		Operated Area	Own Land			
Village dummies				Yes	Yes	Yes
Village interaction dummies				No	Yes	Yes
Village interacted with					Operated Area	Own Land
Adjusted R sq	0.64	0.65	0.65	0.71	0.72	0.72
Log-likelihood	-1953.41	-1932.61	-1931.32	-1779.15	-1724.97	-1724.92
No. of included observations	1504	1503	1503	1503	1503	1503

Note: Level of significance - *,**,*** denote significance at 10%, 5% and 1% respectively

Table 9.3: Intensity of family labour use

EQUATION NAME	Labour			
Dependent variable:	RATIO_FL_HL_DAYS			
Explanatory variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**
C	1.51***	1.69***	1.09**	0.97*
L_OPAREA	-0.90***	-0.98***	-1.24***	-0.71***
CI_CROP_INTEN	-0.002	-0.003	0.002	0.001
State dummies	Yes	Yes		
State interaction dummies	No	Yes		
State interacted with		Operated Area		
Village dummies			Yes	Yes
Village interaction dummies			No	Yes
Village interacted with				Operated Area
Adjusted R sq	0.22	0.22	0.35	0.38
Log-likelihood	-4085.89	-4080.4	-3935.72	-3889.41
No. of included observations	1420	1420	1420	1420

Note: Level of significance - *,**,*** denote significance at 10%, 5% and 1% respectively

Table 9.4: Fertilizer consumption expenditure

EQUATION NAME	Fertilizer			
Dependent variable:	L_EXP_FERT_HA			
Explanatory variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**
C	8.91***	8.89***	8.86***	8.83***
L_OPAREA	-0.004	0.06***	-0.03**	0.03
PER_IRR_OP	0.005***	0.005***	0.004***	0.003***
PER_AR_PDWHSUG	0.001**	0.001	0.004***	0.005***
State dummies	Yes	Yes		
State interaction dummies	No	Yes		
State interacted with		Operated Area		
Village dummies			Yes	Yes
Village interaction dummies			No	Yes
Village interacted with				Operated Area
Adjusted R sq	0.24	0.24	0.41	0.44
Log-likelihood	-1461.27	-1452.21	-1218.2	-1150.14
No. of included observations	1797	1797	1797	1797

Note: Level of significance - *,**,*** denote significance at 10%, 5% and 1% respectively

Table 9.5: Cropping intensity

EQUATION NAME	Cropping Intensity			
Dependent variable:	CI_CROP_INTEN			
Explanatory variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**
C	92.66***	90.91***	110.93***	110.91***
L_OPAREA	-6.13***	3.94**	-2.38**	-1.76
PER_IRR_OP	0.29***	0.28***	0.10**	0.09**
RATIO_FL_HL_DAYS	-0.16	-0.27	0.14	0.06
State dummies	Yes	Yes		
State interaction dummies	No	Yes		
State interacted with		Operated Area		
Village dummies			Yes	Yes
Village interaction dummies			No	Yes
Village interacted with				Operated Area
Adjusted R sq	0.45	0.47	0.66	0.7
Log-likelihood	-7173.92	-7145.24	-6805.01	-6709.88
No. of included observations	1420	1420	1420	1420

Note: Level of significance - *,**,*** denote significance at 10%, 5% and 1% respectively

Table 9.6: Access to Bank Credit

EQUATION NAME	Credit
Dependent variable:	AMT_GOVBNK
Explanatory variables	**Model 1**
C	-3596922***
L_OWN_LAND	114182.4***
State dummies	Yes
State interaction dummies	No
State interacted with	-
Adjusted R sq	
Log-likelihood	-7411.506
No. of included observations	556

Note: Level of significance - *,**,*** denote significance at 10%, 5% and 1% respectively

Table 9.7: State and village effects: Value added per hectare

State/village No.	State / Village name	Operated Area		Owned land	
		Intercept effect	Interaction (slope) effect	Intercept effect	Interaction (slope) effect
1	Gujarat	***		***	
2	MP	***	**	***	
3	Punjab	***		***	
	Villages				
2	Korai				**
3	Kurpat		**		***
4	Rangra				
5	Nabaganj		*		**
6	Narayanpur				*
7	Sahij	***	**	***	*
8	Vanch	***		***	
9	Moti Pavad				
10	Vasana	***	***	***	***
11	Vasana-Vatam				
12	Umalla	***		***	
13	Otha	***		***	
14	Shirvaniya				
15	Haripar				
16	Theba	***		***	
17	Heranj	***	***	***	**
18	Savali	***	***	***	***
19	Janod	***	**	***	*
20	Limbadiya				
21	Vad		***		***
22	Kumbhari	***		***	
23	Kikakui				
24	Butte Hajari	***	***	***	***
25	Merigaon	***		***	
26	Gadariya	***		***	
27	Rampura	***		***	
28	Badgama	***	***	***	***
29	Palduna	***	*	***	
30	Badkhera Gambheer	**		**	
31	Badkhera Kachwa		***		***
32	Ghuman Kalan	***		***	
33	Kararwala	***		***	
34	Asalpur	***	***	***	***
35	Khun Khun Khurd	***	***	***	***
36	Khusrpur	***	***	***	***
37	Lachowal	***	***	***	***
38	Madiala	***	***	***	***
39	Nainowal Vaid	***	***	***	***
40	Pathial	***	***	***	***
41	Rampur	***	***	***	***
42	Sherpur	***	***	***	***
43	Sikri	***	***	***	***
44	Bhinder Khurd	***		***	*
45	Chuhar Chak	***		***	

Villages showing significant interaction effect– 3, 5, 7, 10, 17-19, 21, 24, 28, 31, 34-43 – Total 21 villages

Table 9.8: State and village effects: Value added per capita

State/village No.	State / Village name	Operated Area		Owned land	
		Intercept effect	Interaction (slope) effect	Intercept effect	Interaction (slope) effect
1	Gujarat	***		***	**
2	MP	***		***	
3	Punjab	***	*	***	**
	Villages				
2	Korai				**
3	Kurpat	*	***		***
4	Rangra				*
5	Nabaganj		*		**
6	Narayanpur				*
7	Sahij	***		***	
8	Vanch	***		***	
9	Moti Pavad				
10	Vasana	***	***	***	***
11	Vasana-Vatam				
12	Umalla	***		***	
13	Otha	***		***	
14	Shirvaniya				
15	Haripar			**	
16	Theba	***		***	
17	Heranj	***		***	
18	Savali	***	***	***	***
19	Janod	***	**	***	*
20	Limbadiya	***		***	
21	Vad	**	***	**	***
22	Kumbhari	***		***	
23	Kikakui				
24	Butte Hajari	***	*	***	
25	Merigaon	***		***	
26	Gadariya	***		***	
27	Rampura	***		***	
28	Badgama	***	**	***	*
29	Palduna	***		***	
30	Badkhera Gambheer	***		***	
31	Badkhera Kachwa	**	**	**	**
32	Ghuman Kalan	***		***	
33	Kararwala	***		***	
34	Asalpur	***	***	***	***
35	Khun Khun Khurd	***	***	***	***
36	Khusrpur	***	***	***	***
37	Lachowal	***	***	***	***
38	Madiala	***	***	***	***
39	Nainowal Vaid	***	***	***	***
40	Pathial	***	***	***	***
41	Rampur	***	***	***	***
42	Sherpur	***	***	***	***
43	Sikri	***	***	***	***
44	Bhinder Khurd	***		***	
45	Chuhar Chak	***		***	

Villages showing significant interaction effect – 3, 5, 10, 18-19, 21, 28, 31, 34-43 – Total 18 villages

Table 9.9: State and village effects: Ratio of family labour to hired labour

State/village No.	State / Village name	Operated Area	
		Intercept effect	Interaction (slope) effect
1	Gujarat	***	
2	MP	**	***
3	Punjab	***	
Villages			
2	Korai		
3	Kurpat		
4	Rangra		
5	Nabaganj		**
6	Narayanpur		
7	Sahij	***	***
8	Vanch	**	
9	Moti Pavad	**	**
10	Vasana		***
11	Vasana-Vatam	**	
12	Umalla	***	
13	Otha	**	
14	Shirvaniya	***	
15	Haripar	***	
16	Theba	**	
17	Heranj	***	
18	Savali	***	***
19	Janod	***	***
20	Limbadiya	***	***
21	Vad	*	
22	Kumbhari		
23	Kikakui		**
24	Butte Hajari	***	***
25	Merigaon	***	***
26	Gadariya	***	***
27	Rampura	***	***
28	Badgama	**	***
29	Palduna	***	***
30	Badkhera Gambheer	***	***
31	Badkhera Kachwa	***	***
32	Ghuman Kalan	***	
33	Kararwala	***	***
34	Asalpur	***	***
35	Khun Khun Khurd	***	***
36	Khusrpur	***	***
37	Lachowal	***	***
38	Madiala	***	***
39	Nainowal Vaid	***	***
40	Pathial	***	***
41	Rampur	***	***
42	Sherpur	***	***
43	Sikri	***	***
44	Bhinder Khurd		
45	Chuhar Chak	***	*

Villages showing significant interaction effect – 2, 5, 7, 9, 10, 18-20, 24-31, 33-43, 45 – Total 28 villages

Table 9.10: State and village effects: Fertilizer consumption expenditure

State/village No.	State / Village name	Operated Area	
		Intercept effect	Interaction (slope) effect
1	Gujarat	***	***
2	MP	***	
3	Punjab	***	
Villages			
2	Korai		
3	Kurpat		
4	Rangra		
5	Nabaganj		
6	Narayanpur		
7	Sahij	***	
8	Vanch	***	***
9	Moti Pavad		*
10	Vasana		
11	Vasana-Vatam	**	**
12	Umalla	***	**
13	Otha		
14	Shirvaniya	***	
15	Haripar	***	**
16	Theba	***	
17	Heranj	***	
18	Savali	***	***
19	Janod	***	
20	Limbadiya	***	***
21	Vad	***	
22	Kumbhari	***	
23	Kikakui	***	
24	Butte Hajari	***	
25	Merigaon	***	**
26	Gadariya	***	
27	Rampura	***	
28	Badgama	***	
29	Palduna		
30	Badkhera Gambheer	***	
31	Badkhera Kachwa	***	
32	Ghuman Kalan	***	
33	Kararwala	***	***
34	Asalpur	***	**
35	Khun Khun Khurd	***	**
36	Khusrpur	***	**
37	Lachowal	***	**
38	Madiala	***	**
39	Nainowal Vaid	***	**
40	Pathial	***	**
41	Rampur	***	**
42	Sherpur	***	**
43	Sikri	***	**
44	Bhinder Khurd	***	
45	Chuhar Chak	***	**

Villages showing significant interaction effect – 8, 11, 12, 18, 20, 25, 33-43, 45 – Total 18 villages

Table 9.11: State and village effects: Cropping Intensity

State/village No.	State / Village name	Operated Area	
		Intercept effect	Interaction (slope) effect
1	Gujarat	***	***
2	MP	***	
3	Punjab	***	
Villages			
2	Korai		
3	Kurpat		*
4	Rangra		
5	Nabaganj		
6	Narayanpur		
7	Sahij	***	**
8	Vanch	***	**
9	Moti Pavad	***	***
10	Vasana		
11	Vasana-Vatam	***	
12	Umalla	***	
13	Otha		
14	Shirvaniya	***	
15	Haripar	***	
16	Theba	***	
17	Heranj		
18	Savali	***	***
19	Janod		
20	Limbadiya	***	*
21	Vad	***	
22	Kumbhari	***	
23	Kikakui		
24	Butte Hajari	***	
25	Merigaon	***	
26	Gadariya	***	
27	Rampura	***	
28	Badgama	***	
29	Palduna	***	
30	Badkhera Gambheer	***	
31	Badkhera Kachwa	***	
32	Ghuman Kalan	***	
33	Kararwala	***	***
34	Asalpur	***	**
35	Khun Khun Khurd	***	**
36	Khusrpur	***	**
37	Lachowal	***	**
38	Madiala	***	**
39	Nainowal Vaid	***	**
40	Pathial	***	**
41	Rampur	***	**
42	Sherpur	***	**
43	Sikri	***	**
44	Bhinder Khurd	*	**
45	Chuhar Chak	***	

Villages showing significant interaction effect – 7-9, 18, 20, 33-44, 45 – Total 18 villages

Table 9.12: State effects: Credit

State/village No.	State / Village name	Intercept effect
1	Gujarat	*
2	MP	*
3	Punjab	**

CHAPTER 10: SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS

The gap between income of agricultural workers vis-a-vis non-agricultural workers has become quite wide since the 1990s (Niti Ayog 2020) and improving farmers' income has emerged as the key policy focus in recent times. In realizing this objective, functioning of the markets is very critical and market imperfections can vastly increase the production and transaction costs of the farmers. The present study attempts to explore the imperfections (if any) in some of the important markets viz. output, input, factor and credit markets and their possible effect on the erosion of farm profitability. The study also takes into account the asset base, skill endowments, coping strategies of farmers in the face of economic hardships and their social capital. Some of the important government programs have also been analyzed. The study has been conducted in four states – Bihar, Gujarat, Madhya Pradesh and Punjab. Multi-stage sampling methodology has been adopted for the study with one district in each of the agro-climatic zones of the state forming the first stage units (FSU). These are followed by villages and households at subsequent stages. A total of 1800 households spread over 45 villages have been surveyed across the four states. A summary of the results is presented below. The results are presented in a preliminary tabular form and a more rigorous econometric analysis at the household level.

I Tabular Analysis

Crop Sector

Results of the tabular analysis show that the yield, value of output and value of marketed surplus of major crops such as paddy and wheat increased with farm size but there was no such pattern for other crops. In Bihar and Gujarat, local private dealer is the main marketing channel for most crops. In Punjab and MP, paddy & wheat are marketed through cooperatives & government agencies. On the side of inputs, in the overall sample, the total input costs and costs on individual inputs like seeds (paddy, wheat and maize), irrigation, human labour, animal labour, interest, cost of hiring machinery and other expenses varied inversely with farm size. Costs on inputs like plant protection chemicals, diesel and minor repairs varied directly with farm size. There was no clear pattern in the costs on fertilizers.

Given these somewhat opposite trends in output value and input costs, we look at the value-added per unit area and per capita. Aggregating all the crops and netting out the paid-out costs on inputs (excluding family labour), we find no discernible link between value added (per unit area) and farm size. This is possibly due to the opposite trends seen above. This is also in line with the recent evidence of a weakening of the IR (Barrett et al 2010, Deininger et al. 2018). But when *family labour is imputed using market wage rates*, value added per hectare increased with farm size. This indicates that the chief advantage of smaller landholdings is the availability of cheap family labour. It is important to note here that the imputation of market wage to family labour may not be totally appropriate because of missing or incomplete markets for women and some members of the household. Use of an appropriate shadow price, instead of market

wage, may be more informative. *Value added in per capita terms (farm income per capita) increased with farm size in all the states showing the viability of larger farms.*

Perceptions of farmers about crop sector

Except Punjab, a large majority of farmers in MP, Gujarat and Bihar are dissatisfied with sale of crops. Receiving a lower price than the market, delayed payments, deductions from the payments for loans and faulty weighing are some of the problems reported by farmers. As for reasons for receiving lower prices, farmers reported lack of government purchase or a minimum purchase price, presence of very few buyers in the market and collusion of buyers as some of the reasons. On the side of inputs, except in Gujarat and few inputs in other states, prices of most of the inputs have been reported to be reasonable. Out of those who found prices of inputs to be unreasonable, majority cited lack of government sale or an upper price limit, lack of subsidies and collusion of sellers as the reasons for unreasonable price of inputs. **Thus, in the output as well as input markets, farmers seem to express a need for greater role of the government, both through direct participation and better regulation of private players.**

Livestock sector

The sale value of livestock products and cost of inputs increased with farm size. In all the states, except Bihar, majority of the farmers expressed dissatisfaction with sale of milk and that they received a lower price than the market price. Lack of government purchase or a minimum purchase price have been reported to be the major reasons for receiving lower prices for livestock products. On the side of inputs, a majority of the farmers felt that the prices of inputs are reasonable, except for concentrates.

Labour Market

On the demand side for labour, in all the four states, the average person-days per ha of family labour and farm servants show an inverse relationship with farm size, indicating that the smaller landholdings are using more family labour. As for hired labour, although a majority of farmers reported wage rate to be reasonable, the remaining cited MNREGS and limited labour supply as the major reasons for unreasonable wage rates. However, participation in MNREGS as a possible reason for higher wage rates seems unfounded as can be seen below.

On the supply side of labour (households participating in labour market), only 9 percent of the households were engaged in MNREGS and these households mainly belonged to the marginal and small categories. The remaining households were engaged on other farms. The main problems reported by households engaged in wage labour were that the work was available for a very limited period of time in a year and the wages were very low. **It appears that there a greater need to increase the availability of employment under MNREGS.**

Credit Market

Majority of the respondents have borrowed from institutional sources such as cooperative society and government banks. While the marginal farmers mainly borrowed from the cooperative society, large farmers mostly borrowed from government banks. The interest rates ranged widely from 7% in the institutional sources to 22-24% by the money lenders/fellow farmers. It is interesting to note the reasons cited for non-repayment of the loans. Marginal and

small farmers mostly reported income being less than expenditure as the most important reason whereas the larger categories of farmers reported expected debt waiver as the reason for non-repayment of loans!

Insurance market

The proportion of households that insured their crop was higher in case of certain crops like cotton and groundnut and incidentally these are the crops that reported higher crop loss. The proportion of households that received compensation is very low, showing that the functioning of insurance market in these states needs a lot of improvement. Insurance was lower for crops like paddy, wheat and soybeans. It is notable that none of the farmers in Punjab has insured crops.

The reasons for not insuring are also revealing. Lack of awareness about insurance in general or about existence of the facility for insurance have been reported as the main reasons in Bihar, Gujarat and MP. In Punjab, the main reason is 'no need for insurance', possibly due to extensive irrigation and assured MSP in the state. **Thus, awareness about insurance needs to be increased and claim settlement also needs to be improved. The implicit insurance function of irrigation and effective support price, as in Punjab, needs to be recognized.**

Problems in farming

Nearly 90 percent of the households in the sample reported that their present income from farming is inadequate. Multiple reasons were reported for this inadequacy. Generally, small land size and non-remunerative price were reported mostly by marginal and small farmers while pest problem was reported by the larger size groups. As for economic risks faced, farmers reported lack of capital/finance, sharp fluctuations in input / output prices and lack of access to inputs as the major risks. Punjab is an exception though, where seasonal unemployment was reported as the major economic risk, mainly for households in the marginal and small category.

Reducing household consumption, borrowing money from friends and relatives, taking children out of school and deferring social functions were some of the coping strategies adopted by the sample households. Marginal and small farmers resorted to the first three while the larger categories adopted the last. **Thus, access to consumption credit needs to be improved.**

Social capital

Across states, majority of the respondents have membership of dairy cooperatives / agricultural /credit cooperative societies. Membership of marginal farmers is relatively lower. In Bihar, Gujarat and MP most of the members are active members while in Punjab the majority are ordinary members. **Thus, it appears that most of the farmers have a very modest social capital, particularly the small and marginal farmers.**

MSP and public procurement

Although MSP has been in operation in the country for more than five decades, only half of the sample households (52 percent) were aware of MSP. Percentage of households reporting awareness of MSP for paddy was the least in marginal category (35 percent). Very few paddy

farmers reported awareness in Bihar (2%) while about 50% were aware in Gujarat. In MP and Punjab, awareness was 100 percent. In Bihar, none of the households sold to any public agency, possibly because of absence of public procurement in the state. In Gujarat again, none of the households sold to any public agency because the procurement agency did not operate in the region. In MP, about 24 percent could not sell to public agencies because of the 'poor quality of the crop'. In Punjab, farmers almost entirely operated through the arthiyas (commission agents) and therefore knew very little about the public agency procuring their crop. **The knowledge and awareness about MSP needs to be improved and assured procurement is needed to make MSP effective.**

PM KISAN

PM KISAN, the flagship program of the Union Government to provide direct payments to farmers, though functioning reasonably, the performance across states varied quite a bit. In MP and Punjab, the percentage of households that have received the payment was relatively lower at 43 percent and 48 percent respectively than in Bihar (78 percent) and Gujarat (74 percent). The average payment received also followed a similar pattern with MP (Rs 2327 per household) and Punjab (Rs 3324) compared to Bihar (Rs 4703) and Gujarat (Rs 4606).

However, it is encouraging to note that across the states, the percentage of households receiving payment was relatively higher in the marginal and small categories than in the medium, large and very large categories. Time taken for receiving the payment was more or less the same across the landholding categories.

Technical Advice

The sample households were mainly reliant on sources such as private commercial agents, progressive farmers, extension agents and radio/tv/newspaper/internet for technical advice, in that order. The pattern was not much different across the landholding categories. Majority of the households in the sample had adopted the recommended advice from the sources accessed. There are some variations across states though. In Bihar, Gujarat and MP, there was reliance on a combination of public and private extension services. However in Punjab, more than half (59 percent) of the households were depending on private commercial agents (possibly arthiyas) followed by radio/tv/newspaper/internet (18 percent) and progressive farmers (11 percent). As for accessing veterinary department for advice, except in Bihar where 15 percent of the households accessed veterinary department for advice, the figures were abysmally meagre in other states. **Thus, performance of public extension system, particularly in veterinary services, needs to be improved.**

II Econometric analysis

The results in the tabular analysis are the averages for different land categories, across states and the overall sample. Also, the effect of other possible explanatory factors are not factored in. To overcome these limitations of tabular analysis, we undertook a more systematic econometric analysis. In this we have controlled for state-specific and village-specific factors and their interactions with important variables; controlled for other major explanatory variables

such as irrigation, fertilizer use etc for their possible effect on various outcome variables. ***The results of the econometric analysis (Chapter 9) show that there is a strong inverse relation between land productivity and farm size and this is almost entirely driven by an intensive use of family labour on smaller farms.*** There is little or no evidence of such intensive use in case of any other factor or input. There is also evidence of a binding supervision constraint for larger farms. The *value added per capita* or the *per capita income* increases with the farm size, underlining the possible effect of better access to technology, credit of larger farmers.

Policy implications

1. Intensive use of family labour by the small & marginal farmers and inverse relation between farm size and land productivity point to prevalence of imperfection in the land and labour markets. Labour market imperfections need to be addressed through expanding rural employment opportunities and land market reforms need to be initiated through easier leasing of land. *The Model Land Leasing Act 2016* (GoI, 2016) may be a good starting point.

2. There is very low participation of labour households in MNREGS and a problem of seasonal unemployment particularly for marginal & small farmers in Punjab. There is a greater need for improving the functioning of MNREGS and to increase the availability of employment under MNREGS.

3. The feedback from the farmers underlines the need for government intervention through direct participation in the markets and also regulation of the markets to ensure remunerative prices for their output and affordable prices of inputs.

4. Fertilizer use and cropping intensity do not seem to depend on the farm size but depend only upon crop structural factors like irrigation and cropping pattern, indicating that the input markets are somewhat free of any major imperfection. However, the supply of inputs and their price need to be carefully regulated. Farmers also expressed the need for this.

5. In the credit market, small & marginal farmers are more dependent on the co-operative societies whereas the larger farmers have better access to banks. *Thus strengthening of primary agricultural cooperative societies is needed for better access to credit of the marginal & small farmers.*

6. Small & marginal farmers reported financial difficulties as the main reason for non-repayment of loans while larger farmers reported expected loan waivers as the reason. The moral hazard problem among large farmers needs to be addressed.

7. Small & marginal farmers resort to more drastic measures like reducing consumption expenditure and taking children out of school to cope with economic risks. They borrow mostly from non-institutional sources, often at very high interest rates. Most of these

farmers have a very modest social capital. Thus, improving their access to consumption credit is extremely important.

8. Awareness about insurance needs to be increased and claim settlement needs to be improved. The implicit insurance through irrigation and effective support price, as in Punjab, need to be ensured in other states too.

9. As for government support programs, awareness about MSP needs to be improved and procurement is needed to make MSP effective. The inter-state variations in functioning of PM-KISAN have to be addressed. Performance of public extension system, particularly in veterinary services, needs to be improved.

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Referee's Comments on the Draft Report
"Agricultural Market Imperfections and Farm Profitability"
submitted by AER Unit, IEG, Delhi

1. Title of the draft report examined:

Agricultural Market Imperfections and Farm Profitability

2. Date of receipt of the draft report: 09th April, 2021

3. Date of dispatch of the comments: 06th June, 2021

4. Comments on the objectives of the study:

The study aims a detailed examination of imperfections in agricultural markets with four main objectives, namely; analyzing product markets; input markets; government support structure and coping strategy of farmers. The objectives are well defined and set the right tempo of the study.

5. Comments on the methodology, analysis, organization, presentation etc.,

In any economy, where agriculture is the primary source of livelihood for about 60 per cent of rural houses and more than 80 per cent of them being marginal and small landholding size groups, may not ensure the sustainability and profitability of agriculture with multiple market imperfections. The imperfections, be it in output, input, factor and credit markets services are bound to have adverse impact and policies have to be evolved and strategies to be deployed to remove these market imperfections.

Methodology Adopted
The sheer size of the study, covering 45 villages, representing most of the agro-climatic regions of the country, in 21 districts spread in four states, collecting the data from 1800 households. Such a study warrants clear planning and detailed logistics and the researchers certainly deserve credit for planning a study in such diverse agro-climatic conditions for not only collection of the primary data but its analysis in perfect synchronization. The objective of the study is examination of market imperfections – output, input, factors and credit markets across different landholding groups. Accordingly, the study has sample representing different landholding groups, viz., marginal, small, medium and large farmers.

Major Findings: The results have supported to hypothesize the following aspects;

- **Farm size and productivity**: There is an inverse relation between farm size and productivity. This appears to be driven by the intensive use of family labour on smaller farms. At the other end of the spectrum, the *value-added per capita* or the *per capita income* increased with the farm size, underlining the possible effect of better access of larger farmers to technology and credit.

- **Imperfections at Output level**: Awareness about MSP and insurance programs is very low. Claim settlement under crop insurance does not appear satisfactory.
- **Imperfection at Credit Services**: Knee-jerk reaction to the financial hardships are reducing the consumption expenditure, taking children out of school as the majority of farmers have low resilience capacity. The small & marginal farmers are more dependent on the co-operative societies whereas the larger farmers reported better access to banks. Financial difficulties for small and marginal farmers and speculation of loan waiver were reasons for the non-repayment of loans.

Policy Inputs: The study findings have suggested the following aspects that require further attention, viz.,

Policy Implication	**Suggestions**
Labour market imperfections need to be addressed	Expand rural employment opportunities, both in terms of functioning and availability of MGNREGA
Need for land market reforms	Change in legal frame for easier leasing of land
Inadequate Primary Agricultural Coop Societies (PACS)	Need to strengthen PACS
Negligible resilience of small and marginal farmers	Improve access to the credit services

Critical Appreciation of the Study

The study is topical in nature. During the current pandemic situation and consequent economic drag, the study findings can help the policymakers to overcome the present economic stall as the study has its focus on most pressing issues of Indian agriculture. The objectives of the study are in perfect alignment with the vision of the government policies to enhance the sustainability and also the economic viability of farming. The study has adopted most appropriate for its primary data collection, i.e., covering the majority of the agro-climatic zones and thus different cropping patterns. The findings of the study are also quite valid and add to the existing knowledge base. The study validity and usefulness can be enhanced if the researchers can also highlight problem resolution and do not restrict to outlining only the imperfections existing in the system as has been the main objective of the study.

6. Overall view on acceptability of report

The report is acceptable while I suggest incorporating few changes as suggested above in the report.

Action taken on the reviewer's comments

As can be seen from the comments above, the Reviewers of the study from ISEC, Bengaluru have found the study to be relevant, the sample size and methodology used to be appropriate and the findings to be useful to policymakers. There were no major comments critical of the study

One major comment of the reviewer on the report titled "Agricultural market imperfections and farm profitability" was as follows:

"The study validity and usefulness can be enhanced if the researchers can also highlight problem resolution and do not restrict to outlining only the imperfections existing in the system as has been the main objective of the study."

Response to the comment: The issue pointed out with respect to 'highlighting of problem resolution' has been addressed in the form of detailed section on policy implications emanating from the study. Kindly refer to chapter 10 ("Summary, Conclusions and Policy implications"), page numbers '183' to '185' in the report for the same.