

The Decision Making Process in Agriculture under Risk and Uncertainty: An Experiential Evidence

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Abstract

In India, agricultural risks are exacerbated by a variety of factors, ranging from weather variability, frequent natural disasters, uncertainties in yields and prices, weak rural infrastructure, imperfect markets and inadequate and sub-optimal financial services including the limited span and design of risk mitigation instruments such as credit and insurance. The poor infiltration and development of various risk management tools in India also represents huge opportunities for the emerging agricultural insurance and commodity markets in terms of pulling producers out of the poverty trap by insulating them from income shocks and ensuring that a fair share of the price goes to the producer. Farmers use a variety of formal and informal techniques to manage and mitigate risk, ranging from the use of drought resistant crop varieties to reduced consumption and sale of assets. The Government is also implementing a large number of schemes to provide succour to farmers facing adversity. Management of risk in agriculture is one of the major concerns of the decision makers and policy planners, as risk in farm output is considered as the primary cause for low level of farm level investments and agrarian distress. Both, in turn, have implications for output growth. In order to develop mechanisms and strategies to mitigate risk in agriculture it is imperative to know the sources and magnitude of fluctuations involved in agricultural output.

Key words: Decision Making process, Participation of People, Risk Management, Uncertainty.

Introduction

In agriculture production system, a cropping pattern or allocation of land to different type of crops varies with farmer's perspective of his land holding. For each farmer, profit becomes an objective function which he wishes to maximize. These problems of allocation of land for different crops, maximization of production of crops, maximization of profit, minimization of cost of production are addressed in agricultural management system. But with changing scenario of complex real life problem, several objectives need to be associated in the agricultural planning and management. Thus, some alternative methods were needed to handle this complex problem of decision-making, as the maximization of crop production cannot guarantee the maximization of profit. In the agriculture sector, profit or loss also depend on fluctuating demand, supply and

pricing of a particular crop with minimization of cost of cultivation needed for that crop. Thus, the maximization of profit turns out to be a multi objective decision-making problem.

Agricultural production is biological in nature and heavily depends on agro-climatic conditions and is carried out mostly in small sized holdings. Recurrent and speedy choices are to be taken up in agricultural production. Therefore, the farmer has to make decisions in extremely unstable and insecure circumstances (Nieuwoudt, 1972). Historically, risk and uncertainty behavior of decision makers have been studied quite well with respect to individual agricultural producers. Most farmers adopt risk-reducing strategies involving such elements as flexibility, liquidity and diversification are cautious in adopting new techniques and levels of input use that yield less than maximum expected returns. Any situation in which decision maker is challenged with a choice between alternatives actions constitutes a decision problem. Most economic theory has been developed for analysis of decisions under conditions of certainty where in the precise outcomes of all actions are assumed know. However, most "real world" decisions were taken in the face of risk or uncertainty. That is, precisely what outcome will occur as a result of taking a particular action is not known to the decision maker (Anderson, *et al.*, 1996).

Risk and Uncertainty in Agriculture

The terms 'risk' and 'uncertainty' can be defined in various ways. One common distinction is to suggest that risk is imperfect knowledge where the probabilities of the possible outcomes are known and uncertainty exists when these probabilities are not known. Ahuja (2010) defines risk as a situation which the outcome of a decision is uncertain but the probability of each possible outcome is known and can be estimated. The analysis of decision making and choice involving risk requires that the individual knows all the possible outcomes and also have some idea of the probability of occurrence of each possible outcome. For example, in tossing a coin there is equal chance of getting either head or tail. But this is not a useful distinction, since cases where probabilities are objectively 'known' are the exception rather than the rule in decision making. Instead, in line with common usage, we define uncertainty as imperfect knowledge and risk as uncertain consequences, particularly possible exposure to unfavourable consequences. Risk is therefore not value-free, usually indicating an aversion for some of the possible consequences. For

these decisions, risk may be judged to be significant. In farming, many farm management decisions can be taken with no need to take explicit account of the risks involved. But some risky farm decisions will warrant giving more attention to the choice among the available alternatives.

Types and Sources of Risk in Agriculture

Agriculture is often carried out in the field and always entails the management of inherently variable living plants and animals; it is especially exposed to risk. Production risks come from the unpredictable nature of the weather and uncertainty about the performance of crops or livestock, for example, through the incidence of pests and diseases, or from many other unpredictable factors.

A Price risk is also a standard attribute of farming activities. Because of the biological production lags mentioned above, production decisions have to be made far in advance of realizing the final product, so that the market price for the output is typically not known at the time these decisions have to be made. Price uncertainty is all the more relevant because of the inherent volatility of agricultural markets. Such volatility may be due to demand fluctuations, which are particularly important when a sizable portion of output is destined for the export market. Production uncertainty as discussed earlier, also contributes to price uncertainty because price needs to adjust to clear the market. In this process some typical features of agricultural markets are responsible for generating considerable price volatility, even for moderate production shocks (Giancarlo and David, 1999). Governments are another source of risk for farmers. Changes in the rules that affect farm production can have far-reaching implications for profitability. For example, a change in the laws governing the disposal of animal manure may have significant impacts; so too numerous changes in income-tax provisions, or in the availability of various incentive payments. Risks of these kinds may be called institutional risks. The people who operate the farm may themselves be a source of risk for the profitability and sustainability of the farm business. Major life crises, such as the death of the owner or the divorce of a couple owning a farm in partnership, may threaten the existence of the business. Prolonged illness of one of the principals may cause serious losses to production or substantially increased costs. And carelessness by the farmer or farm workers, in handling livestock or using machinery for example, may similarly lead to significant losses or injuries. Such risks may be called human or personal risks. The aggregate

effect of production, market, institutional and personal risks comprise business risks. Business risks are the risks facing the firm independently of the way in which it is financed. Such risks comprise the aggregate effect of all the uncertainty influencing the profitability of the firm. Business risks affect measures of farm business performance such as the net cash flow generated or the net income earned. Technological risk associated with the evolution of production techniques that may make quasi-fixed past investments obsolete, emerges as a marked feature of agricultural production. Technological improvement necessarily implies that the same level of input can now produce larger quantity of produce. The upward shift in the production function signifies that more output can be produced at each level of input after technological progress. Thus, improvement of knowledge or technological progress, which is a continuous phenomenon, may render some techniques less efficient and finally obsolete.

Risk Management and Decision Analysis

Many descriptions of the process of risk management view risk as rather like a disease that has to be treated. Decision-making involves setting your goals and objectives, identifying the problem, determining your alternatives, evaluating these alternatives, selecting an alternative, implementing that alternative, and bearing responsibility for the outcome. Decision-making in a risky environment also involves attitudes toward risk, ability to bear risk, and formation of expectations about the future. The decision-making process is complex, and farmers differ both in how they make decisions and in the decisions they make. Instead of treating risk management as something that is separate from general management of an organization, we see a need to account for risk as an integral part of all management decision-making. We take this view because just about every decision has its consequences in the future and we can never be certain about what the future may bring. So most if not all management decisions create some risk exposure. Making risk management a separate process ignores this reality. Moreover, economics teaches that profit is the reward for risk taking – no risk means no gain. So what is needed is a process to balance risk against possible rewards. Separating out the treatment of risk may ambiguous the need to get the balance right. Obviously, some decisions are more risky than others and those for which the range of possible consequences is narrow, with little or no chance of a really bad result, can be handled

easily with a bit of common sense. But there are also other decisions for which the range of possible consequence is wide, perhaps with a non-trivial chance of bad outcomes. For these decisions much more careful consideration will certainly be warranted. However, dealing with such risky choice is not easy – there may be many options to choose between and the consequences of each may depend on many uncertain factors. Decision analysis may be defined as the philosophy, theory, methods and practices necessary to systematically address important risky decisions. Decision analysis includes methods and tools for identifying, representing and assessing important aspects of a risky decision, leading to a recommended course of action consistent with careful consideration of the possible consequences of the alternative choices, the associated probabilities of those consequences and the relative preference for possible outcomes. In other words, it is a prescriptive theory of choice.

Keeping the above issues in mind the present section provides a basis for the research study that how farmers across social groups take decisions under risk and uncertainty situation in agriculture activities. Few major issues have been identified to elicit the opinion of the farmers in the study area and how they take decisions. Risk is an integral part of Agriculture. Each day farmer confront with different types of risks. In India Agriculture risks are exacerbated by a variety of factors, ranging from climate variability and change, frequent natural disasters, uncertainties in yields and prices, weak rural infrastructure, imperfect markets and lack of financial services etc. The primary sources of risk in agriculture are as follows.

Production Risk

Agriculture is often characterized by high variability of production outcomes or production risk. Unlike most other entrepreneurs, farmers are not able to predict with certainty the amount of output that the production process will yield due to external factors such as weather, pests, and diseases. Farmers can also be hindered by adverse events during harvesting or threshing that may result in production losses. Development and adoption of innovations also add to production risk in agriculture. In India, more than 60 per cent of land is vulnerable to droughts. Droughts lead to economic losses resulting from low agricultural production, loss of animal wealth, reduced nutrition and loss of health of workers.

Table I: Distribution and extent of Production Risks across Social Groups and Regions
(per cent)

| Social Groups | Production Risks | | | |
|-------------------------|------------------|--------|-------|--------|
| | Low | Medium | High | Total |
| Dry Region | | | | |
| SCs | 16.67 | 50.00 | 33.33 | 100.00 |
| STs | 33.33 | 33.33 | 33.33 | 100.00 |
| OBCs | 44.44 | 25.00 | 30.56 | 100.00 |
| Others | 41.67 | 25.00 | 33.33 | 100.00 |
| Total | 37.50 | 30.83 | 31.67 | 100.00 |
| Irrigated Region | | | | |
| SCs | 33.33 | 50.00 | 16.67 | 100.00 |
| STs | 50.00 | 33.33 | 16.67 | 100.00 |
| OBCs | 58.33 | 27.78 | 13.89 | 100.00 |
| Others | 41.67 | 33.33 | 25.00 | 100.00 |
| Total | 50.83 | 33.33 | 15.83 | 100.00 |
| All | | | | |
| SCs | 25.00 | 50.00 | 25.00 | 100.00 |
| STs | 41.67 | 33.33 | 25.00 | 100.00 |
| OBCs | 51.39 | 26.39 | 22.22 | 100.00 |
| Others | 41.67 | 29.17 | 29.17 | 100.00 |
| Total | 44.17 | 32.08 | 23.75 | 100.00 |

Source: Primary data

Table I presents the information on the production risks experienced by the sample households in the study area across social groups and regions. At the aggregate level only 23.75 per cent of households had undergone high risks as compared to medium and low. It was also observed that dry region has experienced more risks as compared to irrigated region. The reasons weather, pests, and diseases could be attributed in the case of dry regions. Farmers can also be

hindered by adverse events during harvesting or threshing that may result in production losses. Going by social groups, the proportion of production taken by the SCs, STs and Others households in the dry was quite significant as compared to the households of irrigated region. This implies that the farmers belong to socially disadvantaged and marginalised groups have experienced high risks as compared to others, but even then the sample households take decisions under risks and uncertainty situation in agricultural activities. Under these circumstances, famers keep hope for better results from their decisions.

Price or Market Risks

The price or market risks relate to agricultural production, in which majority of the people are depended on this profession. Every farmer is always expect good yield from their agricultural activities. But in the recent past farmers are not able to earn good income or returns due to various reasons. This has hindered the living standard of the people particularly in the rural areas. Price or market risk refers to uncertainty about the prices producers will receive for commodities or the prices they must pay for inputs. The nature of price risk varies significantly from commodity to commodity. The market risks result from fluctuations in the prices of inputs and outputs, outside competition, changing supply and demand, market imperfections, changing consumer preferences, etc. Sale of farm produce under distress may take place due to lack of post-harvest processing and lack of infrastructure storage facilities. Table II presents the extent and magnitude of the problems related to the price or market risks. It is clear from the table that at the aggregate level that majority of the sample households have experienced low risks with a per cent of 51.25 followed by medium and high risks accounting for 33.75 and 15.00 per cent, respectively in the study area. When it comes to region, the experience of sample households with high risk was quite significant in dry region as compared to that of in irrigated region.

Table II: Distribution and extent of Price and Market Risks acrosss Social Groups and Regions (per cent)

| Social Groups | Price or Market Risks | | | |
|---------------|-----------------------|--------|------|-------|
| | Low | Medium | High | Total |

| Dry Region | | | | |
|-------------------------|-------|-------|-------|--------|
| SCs | 50.00 | 33.33 | 16.67 | 100.00 |
| STs | 50.00 | 50.00 | 0.00 | 100.00 |
| OBCs | 47.22 | 30.56 | 22.22 | 100.00 |
| Others | 41.67 | 41.67 | 16.67 | 100.00 |
| Total | 47.50 | 34.17 | 18.33 | 100.00 |
| Irrigated Region | | | | |
| SCs | 58.33 | 33.33 | 8.33 | 100.00 |
| STs | 58.33 | 33.33 | 8.33 | 100.00 |
| OBCs | 54.17 | 31.94 | 13.89 | 100.00 |
| Others | 50.00 | 41.67 | 8.33 | 100.00 |
| Total | 55.00 | 33.33 | 11.67 | 100.00 |
| All | | | | |
| SCs | 54.17 | 33.33 | 12.50 | 100.00 |
| STs | 54.17 | 41.67 | 4.17 | 100.00 |
| OBCs | 50.69 | 31.25 | 18.06 | 100.00 |
| Others | 45.83 | 41.67 | 12.50 | 100.00 |
| Total | 51.25 | 33.75 | 15.00 | 100.00 |

Source: Primary data

In case of social groups, the OBCs have faced greater risks (22.22 %) followed by SCs and Others with 16.67 per cent each in the dry region. Similar trend was also observed even in the irrigated region. This clearly indicates that the sample households have experienced less high risks when compared low and medium risks as far as price and market is concerned in the study area. It was quite interesting to note that the SCs and STs have experienced low risk in both the regions as compared to that of OBCs and Others. Further, the field insights also support the argument that the upper castes farmers take decisions to enhance their income even under unfavourable situations. This sometimes affects not only the decisions of the farmers but also on the returns from

their agricultural activities in the study area. The farmers have said that whether they get good yield of returns from their agricultural operations, but they have to take firm decisions under risks and uncertainty situations with a hope of getting better production.

Fianancial and Creidt Risks

Many agricultural production cycles stretch over long periods of time, and farmers must anticipate expenses that they will only be able to recuperate once the product is marketed. This leads to potential cash flow problems exacerbated by lack of access to insurance services, credit and the high cost of borrowing. This also creates an obligation to repay debt. Rising interest rates, the prospect of loans being called by lenders, and restricted credit availability to the farmers lead to financial risks.

It is quite evident from the fact that the farmers prefer to get in to full-fledged agricultural activities as soon as monsoon begins. The land preparation and cultivation activities will gear up once famers felt that the arrival of monsoon is enough to take crop activities. Keeping hopes and continuation of favourable conditions, a large number of farmers prefer to take credit either from institutional sources or from non-institutional sources so as to spend on various agricultural operations. In this regard, farmer takes decisions to incur money on various agricultural inputs, while take such decisions family members will be consulted in most of the cases/households. Invariably, majority of the farmers would like to avail agricultural credit for different purposes. This clearly indicates that the decisions will be taken by each and every farmer under risk and uncertainty condition to improve agricultural production.

Table III Distribution and extent of Financial and Credit Risks across Social Groups and Regions (per cent)

| Social Groups | Financial and Credit Risks | | | |
|-------------------------|----------------------------|--------|-------|--------|
| | Low | Medium | High | Total |
| Dry Region | | | | |
| SCs | 33.33 | 50.00 | 16.67 | 100.00 |
| STs | 50.00 | 33.33 | 16.67 | 100.00 |
| OBCs | 38.89 | 33.33 | 27.78 | 100.00 |
| Others | 25.00 | 58.33 | 16.67 | 100.00 |
| Total | 37.50 | 39.17 | 23.33 | 100.00 |
| Irrigated Region | | | | |
| SCs | 50.00 | 41.67 | 8.33 | 100.00 |
| STs | 66.67 | 16.67 | 16.67 | 100.00 |
| OBCs | 44.44 | 34.72 | 20.83 | 100.00 |
| Others | 50.00 | 33.33 | 16.67 | 100.00 |
| Total | 48.33 | 34.17 | 17.50 | 100.00 |
| All | | | | |
| SCs | 41.67 | 45.83 | 12.50 | 100.00 |
| STs | 58.33 | 25.00 | 16.67 | 100.00 |
| OBCs | 41.67 | 34.03 | 24.31 | 100.00 |
| Others | 37.50 | 45.83 | 16.67 | 100.00 |
| Total | 42.92 | 36.67 | 20.42 | 100.00 |

Source: Primary data

The field insights clearly suggest that the majority of the sample households have availed agricultural credit for various operations. Table II presents the distribution of sample households taking decision to avail credit for various agricultural operations under risk and uncertainty conditions. At the aggregate level, the data clearly reveals that only 20.42 per cent have

experienced high risk. Whereas, majority of the sample households have undergone less risk with 42.92 per cent followed by 36.67 per cent.

At the region wise, 23.33 per cent of the sample households in dry region have experienced high risk as compared to that of in irrigated region with 17.50 per cent. While the 39.17 per cent of the sample households in dry region have experienced medium risk as compared to irrigated regions sample households with 34.17 per cent and nearly 48.33 per cent of the sample households in irrigated region have experienced low risk when compared to sample households of dry region with 37.50 per cent. At the aggregate across social groups' level, it was noticed that the OBCs have faced high risk as compared to Others, SCs and STs. This indicates that farmers have to make decision to avail agricultural loan for various agricultural operations under risk and uncertainty conditions.

Institutional Risk

Important source of uncertainty for farmers is institutional risk, generated by unexpected changes in regulations that influence farmers' activities. Changes in regulations, financial services, level of price or income support payments and subsidies can significantly alter the profitability of farming activities. Table IV presents the distribution of sample households in decision making process on the human risk in agricultural operations. It is quite evident from the table that the sample households have experienced risk while availing agricultural loans for agricultural activities. The respondents have expressed that when they approach agricultural credit from the commercial banks, the rate of interest and repayment schedule was normal one, but when they actually got loans from such banks the rate of interest was something different. After enquiry they came to know that because of institutional policy/changes resulted in increase in the rate of interest. This has affected many farmers in the study area. The data reveals that at aggregate level 24.58 per cent of the sample households have experienced high risk because of institutional changes, but majority of the farmers have experienced low risk (40.83 %) as compared to medium risk (34.58 %) in the study area.

Table IV: Distribution of Sample households in decision making process on Institutional Risk in agricultural operations (per cent)

| Social Groups | Institutional Risk | | | |
|-------------------------|--------------------|--------|-------|--------|
| | Low | Medium | High | Total |
| Dry Region | | | | |
| SCs | 29.17 | 50.00 | 20.83 | 100.00 |
| STs | 33.33 | 33.33 | 33.33 | 100.00 |
| OBCs | 41.67 | 30.56 | 27.78 | 100.00 |
| Others | 25.00 | 58.33 | 16.67 | 100.00 |
| Total | 36.67 | 37.50 | 25.83 | 100.00 |
| Irrigated Region | | | | |
| SCs | 41.67 | 41.67 | 16.67 | 100.00 |
| STs | 66.67 | 16.67 | 16.67 | 100.00 |
| OBCs | 44.44 | 30.56 | 25.00 | 100.00 |
| Others | 33.33 | 33.33 | 33.33 | 100.00 |
| Total | 45.00 | 31.67 | 23.33 | 100.00 |
| All | | | | |
| SCs | 35.42 | 45.83 | 18.75 | 100.00 |
| STs | 50.00 | 25.00 | 25.00 | 100.00 |
| OBCs | 43.06 | 30.56 | 26.39 | 100.00 |
| Others | 29.17 | 45.83 | 25.00 | 100.00 |
| Total | 40.83 | 34.58 | 24.58 | 100.00 |

Source: Primary data

The region wise data reveals that the dry region famers have experienced have high risks (25.83 %) as compared to irrigated region (23.33 %). It was quite interesting to note that the farmers of irrigated region have experienced low risks (45.00 %) as compared to dry region (36.67

%) and in the case of medium risk, it was dry region farmers have experienced (37.50 %) more than the farmers of irrigated region (31.67 %).

Across social groups at the aggregate level data clearly suggests that the respondents of OBCs have experienced slightly more risk (26.39 %) than the respondents of STs (25.00 %) and others (25.00 %) in the study area. Among the lot, farmers from the SCs category have experienced high risk accounting for 18.75 per cent. When it comes to the low risk faced by the respondents because of institutional changes, the data shows that the STs have experienced low risk accounting for 50.00 per cent followed by OBCs (43.06 %) SCs (35.42 %) and Others (29.17 %). In the case of medium risk, 45.83 per cent each of the farmers belongs to SCs and others have experienced more as compared to OBCs (30.56 %) and STs (25.00 %). This clearly indicates that almost all respondents in the study area have experienced one or the other risks due to institutional changes.

Human Risk

This risk refers to factors such as problems with human health or personal relationship that can affect the agriculture. Agricultural households, as any other economic entrepreneur, are exposed to personal risks affecting the life and the wellbeing of people who work on the farm, as also asset risks. The table V reveals that at the aggregate level, majority of the sample households (51.25 %) have experienced less/low risks as far as human or personal risks are concerned in the selected region. It was also noticed that only 16.67 per cent of the sample households have experienced high risks when compared to medium risk, accounting for 32.08 per cent.

Region wise data analyses that the dry region sample households have experienced high risk (19.17 %) as compared to that of in irrigated region (14.17 %). And even in the case of low risks the sample households of dry region have experienced less (44.17 %) when compared to that of irrigated region (58.33 %). The dry region farmers have underwent many bitter experiences while taking any decisions on various aspects of agricultural activities under risk and uncertainty.

This has resulted in many losses to many of the households in the dry region. But, in the case of irrigated region farmers have not lost much as compared to that of in dry region.

Table V: Distribution of Sample households in decision making process on Human Risk in agricultural operations (per cent)

| Social Groups | Human Risk | | | |
|-------------------------|------------|--------|-------|--------|
| | Low | Medium | High | Total |
| Dry Region | | | | |
| SCs | 50.00 | 41.67 | 8.33 | 100.00 |
| STs | 50.00 | 33.33 | 16.67 | 100.00 |
| OBCs | 41.67 | 36.11 | 22.22 | 100.00 |
| Others | 41.67 | 33.33 | 25.00 | 100.00 |
| Total | 44.17 | 36.67 | 19.17 | 100.00 |
| Irrigated Region | | | | |
| SCs | 58.33 | 33.33 | 8.33 | 100.00 |
| STs | 83.33 | 16.67 | 0.00 | 100.00 |
| OBCs | 52.78 | 29.17 | 18.06 | 100.00 |
| Others | 66.67 | 16.67 | 16.67 | 100.00 |
| Total | 58.33 | 27.50 | 14.17 | 100.00 |
| All | | | | |
| SCs | 54.17 | 37.50 | 8.33 | 100.00 |
| STs | 66.67 | 25.00 | 8.33 | 100.00 |
| OBCs | 47.22 | 32.64 | 20.14 | 100.00 |
| Others | 54.17 | 25.00 | 20.83 | 100.00 |
| Total | 51.25 | 32.08 | 16.67 | 100.00 |

Source: Primary data

Among social groups, the data clearly shows that OBCs (20.14 %) and others (20.83 %) have experienced high risks as compared to SCs and STs (8.33 %each). As far low risks is

concerned that STs (66.67 %) have experienced less risks followed by others and (54.17 % each) and in OBCs (47.22 %). This clearly indicates that while taking decisions under risks and uncertainty situations, sometimes results in poor performance and moreover on some occasions crop failure hinder on the family income.

Resource Risk

The resource risks include uncertain supply or non- availability of labour (skilled labour), credit, irrigation water, timely supply of desired seed, and also fertilizer or plant protection chemicals. Supply of spurious seeds and plant protection chemicals pose a great risk to the producers. Failure of crops due to sub-standard seed or spurious plant protection chemicals causes drain of resources of the farmer. It inflicts considerable damage on the psyche of the farmer sometimes leading to suicides by the farmers.

Table VI: Distribution of Sample households in decision making process on Resource Risk in agricultural operations (per cent)

| Social Groups | Resource Risk | | | |
|-------------------------|---------------|--------|-------|--------|
| | Low | Medium | High | Total |
| Dry Region | | | | |
| SCs | 58.33 | 33.33 | 8.33 | 100.00 |
| STs | 50.00 | 33.33 | 16.67 | 100.00 |
| OBCs | 41.67 | 38.89 | 19.44 | 100.00 |
| Others | 41.67 | 41.67 | 16.67 | 100.00 |
| Total | 45.83 | 37.50 | 16.67 | 100.00 |
| Irrigated Region | | | | |
| SCs | 54.17 | 29.17 | 16.67 | 100.00 |
| STs | 66.67 | 16.67 | 16.67 | 100.00 |
| OBCs | 47.22 | 27.78 | 25.00 | 100.00 |
| Others | 50.00 | 33.33 | 16.67 | 100.00 |

| | | | | |
|------------|-------|-------|-------|--------|
| Total | 50.83 | 27.50 | 21.67 | 100.00 |
| All | | | | |
| SCs | 56.25 | 31.25 | 12.50 | 100.00 |
| STs | 58.33 | 25.00 | 16.67 | 100.00 |
| OBCs | 44.44 | 33.33 | 22.22 | 100.00 |
| Others | 45.83 | 37.50 | 16.67 | 100.00 |
| Total | 48.33 | 32.50 | 19.17 | 100.00 |

Source: Primary data

The distribution of sample households by resource risks by social groups and region is presented in table VI the data reveals that at the aggregate level around 19.17 per cent of the households have experienced high risks as far as resources is concerned. But majority of the sample households have experienced low/less resources risk (48.33 %) as compared to medium risks with 32.50 per cent.

The region wise data shows that the majority of the sample households in the irrigated have experienced low/less risks (50.83 %) as compared to dry region (45.83 %). The proportion of high risks in the case of sample households of irrigated region was high (21.67 %) as compared to dry region (16.67 %), but in the case of medium risks the sample households of dry region have experienced high risk (37.50 %) as compared to irrigated region (27.50 %).

The Social Groups' data indicates that the OBCs have experienced high risks (22.22 %) as compared to STs, Others and SCs, which accounts for 16.67 per cent each in the case of STs and Others and it is 12.50 per cent in the case of SCs. But the majority of the sample households have less risk as compared to medium and high risks. The data shows that STs have experienced less risk (58.33 %) as compared to SCs (56.25 %), Others (45.83 %) and OBCs (44.44 %). Others in case of medium risk have experienced relatively high risk (37.50 %) when compared to OBCs (33.33 %), SCs (31.25 %) and STs (25.00 %). This clearly shows that the famers of OBCs and Others have always takes a decision under risk and uncertainty situations, whether it is beneficial

or not while spending money on various agricultural inputs (resources) without bothering too much on the end results. On the other side, the SCs and STs do not take much risk.

Health Risk

The health risk arises due to sickness or injury to the farmer, low labour productivity due to poor labour management, family disputes, accidental death, etc. The distribution of sample households by health risk across social groups and region is presented in table VII. The data shows that due to sickness during rainy days and natural health problems has severely affected on the overall agricultural productivity in the study area. According to the opinion of the sample households that nearly 20.00 per cent have experienced high risk as compared to low (45.00 %) and medium risk (35.00 %) in the both the region at the aggregate level of the study area. It was also noticed that dry region farmers have experienced relatively high risk (21.67 %) as compared to irrigated region (18.33 %).

Table VII: Distribution of Sample households in decision making process On Health Risk in agricultural operations (per cent)

| Social Groups | Health Risk | | | |
|-------------------------|-------------|--------|-------|--------|
| | Low | Medium | High | Total |
| Dry Region | | | | |
| SCs | 50.00 | 41.67 | 8.33 | 100.00 |
| STs | 41.67 | 25.00 | 33.33 | 100.00 |
| OBCs | 38.89 | 41.67 | 19.44 | 100.00 |
| Others | 50.00 | 33.33 | 16.67 | 100.00 |
| Total | 42.50 | 39.17 | 18.33 | 100.00 |
| Irrigated Region | | | | |
| SCs | 50.00 | 33.33 | 16.67 | 100.00 |
| STs | 66.67 | 16.67 | 16.67 | 100.00 |
| OBCs | 44.44 | 30.56 | 25.00 | 100.00 |

| | | | | |
|------------|-------|-------|-------|--------|
| Others | 41.67 | 41.67 | 16.67 | 100.00 |
| Total | 47.50 | 30.83 | 21.67 | 100.00 |
| All | | | | |
| SCs | 50.00 | 37.50 | 12.50 | 100.00 |
| STs | 54.17 | 20.83 | 25.00 | 100.00 |
| OBCs | 41.67 | 36.11 | 22.22 | 100.00 |
| Others | 45.83 | 37.50 | 16.67 | 100.00 |
| Total | 45.00 | 35.00 | 20.00 | 100.00 |

Source: Primary data

In case of social groups, at the aggregate level, STs sample households have experienced more high risk (25.00 %) as compared to OBCs (22.22 %), Others (16.67 %) and SCs (12.50 %). On the other side, same trend has been observed correspondingly in the case of low risk as well as in medium risk also.

The above analysis clearly manifest that the SCs and STs Sample households have experienced less risk as compared to OBCs and Others. Similar trends were also observed in the case of medium and high risks.

Conclusion

From the field study analysis, it can be concluded that on one side, the larger participation of men alone in decision making in the activity namely the type of fertilizers to be purchased was found to be highly significant than others, on the other side, with regard to the installation of tube well and the kind of implements to be used/purchased for production activities, the major decision were taken by men and women together when compared to others in the study area.

It was concluded from the analysis, the distribution of sample households in decision making by social groups and regions on the several activities related to quantity to be stored, crop to be stored, place where the quantity should be kept and method to be adopted for storage of crops in selected region for the study. It clearly indicates that higher participation of men alone was

found in activities like crop to be stored and place where the quantity should be kept when compared to others, whereas in the case of quantity to be stored and the method to be adopted for storage of crops in selected region was found to be more participation of men and women together than others. While in the case of women alone participation was found to be relative less when compared to others.

It can be concluded from the primary data analysis that the larger participation of men alone was found to be significant in making decisions related to livestock and other activities when compared to that of men and women joint participation and women alone in the study area.

Management of risk in agriculture is one of the major concerns of the decision makers and policy planners, as risk in farm output is considered as the primary cause for low level of farm level investments and agrarian distress. Both, in turn, have implications for output growth. In order to develop mechanisms and strategies to mitigate risk in agriculture it is imperative to know the sources and magnitude of fluctuations involved in agricultural output. Farmers are exposed to risk from rainfall variability, market price fluctuations, credit uncertainty and adoption of new technology. The diversities in the sources of risks require a variety of instruments for protecting the farmers. In India, these include crop insurance, rainfall insurance, farm income insurance and a calamity relief fund. Most of these measures other than crop insurance are in the experimental stage.

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