

International Journal of Statistics and Applied Mathematics

ISSN: 2456-1452
Maths 2023; SP-8(4): 796-801
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<https://www.mathsjournal.com>
Received: 04-05-2023
Accepted: 10-06-2023

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Assessment of sources of risk and utilization of risk management instruments among tribal households in Gujarat

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Abstract

Around 2 billion people in the world experience moderate or severe food insecurity. The major task facing the world today is that of feeding the ever-increasing population of over 7 billion people subject to climate change and natural resource constraints. The problem of food insecurity is prevalent all over the world but it is more common in developing countries like India. As per the latest National Family Health Survey of 2015-16 (NFHS - 4), Dang, one of six backward districts in Gujarat primarily tribal district-95% belong to the scheduled tribes-48.1% of children under five years were stunted, 72.2% of women were anaemic. This study attempted to investigate the access and utilization of available coping strategies against food insecurity using World Bank guidelines for assessing the sources of risk. The study is based on primary data collected from tribal district of Gujarat. There was high existence of pest and disease before harvesting of crop in Dang district as most of farmers realised its high intensity. Major health risk found was mortality and morbidity of livestock. Landless and marginal & small farmers showed high intensity of lack of financing/capital. household used crop diversification or production of less risky crops as coping mechanism for rainfall untimeliness at harvesting. It is suggested that the government should exhaustively work on facilitating credit availability and subsidize the farmers to reverse the problem of food insecurity and to enhance households coping capacity to food shortage and/or insecurity.

Keywords: Food insecurity, risk, tribal, coping strategies

1. Introduction

According to the latest UN report (2019) ^[1], about 2 billion people in the world experience moderate or severe food insecurity. The lack of regular access to nutritious and sufficient food that these people experience puts them at greater risk of malnutrition and poor health. Food security is one dimension of poverty, assessing whether a household can meet its food needs and its vulnerability to shocks. Therefore, it can be stated that food insecurity, poverty, malnutrition, income inequality and lack of decent employment opportunities reinforce each other in a vicious cycle by eroding human capital and decreasing labour productivity, thereby perpetuating poverty and social inequalities across generations. Therefore, creating new jobs and upgrading the quality of existing ones, particularly in rural areas, should be a core pillar of any development strategy addressing the global hunger challenge (FAO, 2006) ^[3].

The major task facing the world today is that of feeding the ever-increasing population of over 7 billion people subject to climate change and natural resource constraints. FAO (2012) ^[2] asserted that, "the global demand for food is expected to increase by 60 percent between 2005/2007 to 2050". The global food demand is further compounded by the production of biofuels in the industrialized countries; this alone posed a major stress to agriculture and food systems. To cope with these challenges, smallholder agriculture needs to effectively play a key role in addressing these challenges especially in developing countries.

The problem of food insecurity is prevalent all over the world but it is more common in developing countries like India which produces surplus food on one extreme but at the other extreme one third of the population is extremely poor and one half of the children are malnourished in one way or the other (Kannan *et al.*, 2000) ^[7]. India has achieved a fourth fold increase in food grains from 50 million tonnes in 1950 to 219.3 million tonnes in 2007 to 2008

against a threefold increase in population from 33 million to more than 100 million (Kumar, 2010) ^[8].

The concept of food security basically stands on three pillars, food availability, food stability and food accessibility. Availability of food is associated with purchasing power and food insecurity is caused by poverty. If people do not have purchasing power, they have substitute of food reserves. Food security and poverty are directly related to each other. So the needs of the poor should be protected by improving their purchasing power, through employment and income generation programmes. A large proportion of the world's underfed population starves not because of general food shortage but because of insufficient access to food supplies or insufficient consuming power of people. Availability of food will be of no use, until and unless people have means to buy the available food (Ghosh, 2000) ^[5].

India ranked 94 among 107 countries in the Global Hunger Index 2020 and is in the 'serious' hunger category with a score of 27.2. India features behind Nepal (73), Pakistan (88), Bangladesh (75), and Indonesia (70) among others despite of various initiatives by Government of India like Integrated Child Development Services (ICDS) Scheme, National Food Security Act, POSHAN Abhiyaan etc.

According to the latest National Family Health Survey of 2015-16 (NFHS - 4), Dang, one of six backward districts in Gujarat primarily tribal district--95% belong to the scheduled tribes--48.1% of children under five years were stunted, 72.2% of women were anaemic, and only 44.3% of children under two were fully immunised, despite the district's investments in health infrastructure. The majority of Dang residents rely on rain-fed subsistence farming of rice, millet, and legumes. Agricultural productivity is low in this region, with 31% of the land under cultivation and 13% irrigated. Gujarat's per capita income is Rs 122,502, which is 39% higher than the Indian average of Rs 82,269, but 75% of Dang's population are poor. As a result, it is critical to investigate the status of food insecurity among tribal households and the different coping mechanisms available to them in order to minimise food insecurity losses. In this connection this study attempted to investigate the access and utilization of available coping strategies against food insecurity.

2. Methodology

2.1 Primary Data

The study was conducted in Dang district, which has the greatest population of scheduled tribes (ST) in Gujarat. The study relied heavily on primary data acquired using a semi-structured questionnaire. The semi-structured questionnaire used to collect primary data focused primarily on the factors hypothesised to have an effect on households' food insecurity status. The survey questionnaire addressed socioeconomic and institutional characteristics. Besides this, primary data was collected pertaining to availability, access and utilization of various food insecurity coping strategies households deal with. Secondary data were gathered from published and unpublished sources to describe the research region, population size, nutritional equivalent of unit food item consumed by households, and other recommended food benchmarks, as well as main economic activities in the Dang district.

2.3. Sampling Design

The Dang district has a population of 2,28,291 people and 44,699 homes. Dang is divided into three administrative districts. To pick 150 sample houses, multistage random

sampling with proportionate to size was utilised. In the first stage, two tehsils, Waghai and Ahwa, were chosen at random. In the second stage, three village panchayats were chosen at random from each tehsil. Finally, a sample of 150 homes was taken at random from villages within six village panchayats. The sample homes were chosen based on the frequency distribution of each land size category, namely landless, marginal, small, medium, and large.

2.4 Statistical Technique

In the context of rural farm households, risks pertaining to the environmental, health and economic aspects have a bearing on the production, income, assets, consumption and productive capacity of these households. Hence, taking the one from the World Bank guidelines for assessing the sources of risk (Heitzmann et al., 2002) ^[6]. The data collected on several aspects like sources of risk, extent and outcome of its realization has been analysed.

2.4.1 Risk Profiling and Utilization of Risk Management Instruments

Risk means exposure to the possibility of loss, injury or other adverse or unwelcome circumstances. Risk is ubiquitous in all areas of life. In the context of rural farm households, risks pertaining to the environmental, health and economic aspects have a bearing on the production, income, assets, consumption and productive capacity of these households. The data collected on several aspects like sources of risk, extent and outcome of its realization has been analysed. The factors conditioning the usage of various risk management options have been studied using descriptive statistics.

2.4.2 Sources of risk

The events and conditions that lead to these types of risks considered in the study are as follows:

Environmental risks

Irregular rainfall: The Dang regions face adverse impact of untimely rain which may cause loss of productive asset in the field. Untimed rain is more prevalent in regions hence can form source of risk.

Pests/disease that affected crops before they were harvested: Affected crop result into lower yield which can cause reduction in income of the household and also reduce food consumption.

Pests or disease that affected livestock: Pest and disease that affects livestock can cause severe income loss of household.

Health risks

The data were collected on specifics of health risk like illness of household members, Injury of family member, mortality and morbidity of household member and livestock, epidemics like COVID19. Minor as well as severe illness of any member of household has multidirectional impact on household in the form of economic and mental loss. It may cause income loss due to reduced capacity to work and health expenditure.

Economic risks

There are several situations that lead to distress of household due to economic backwardness as well as market behavior. Some of them are expressed below:

Lack of finance or capital: Most of the economically backward households do not adopt various modern production technologies in order to increase quality and quantity of production. Lack of finance always lead to delay in decision making in agriculture which may affect badly to household.

Lack of access to inputs: There is discriminatory access to the farm inputs during the condition of scarcity which may lead to underutilization of farm resources and income loss.

Increase in input prices - Increase in prices of farm inputs keeps farming households away from adopting it. Disproportionate input price rise to output prices is a major concern that put farmers in stress.

Decrease in output prices: It may prevalent in market and cause severe loss to the farmers in the form of reduced net profit. Agricultural prices are highly volatile and affect farm income.

Lack of demand or inability to sell: Lack of demand for particular commodity or variety that produced by farmer may cause income loss. Inability to sell the particular commodity due to less infrastructure facilities or market information can reduce farmers income.

Unemployment and harvest failure: Agriculture is a seasonal business. Thus in slack season it is difficult to find employment which may lead to less earnings and stress.

2.4.3 Available coping strategies against food insecurity

The use of particular coping strategy is depending on household socioeconomic status. Consequently, these coping mechanisms were identified and analysed for their access and utilization by using descriptive statistics (that is percentage).

The probable strategies to cope up with food insecurity emerged out of various references are increased land use for farming, using improved seed/varieties, changing crop plantation schedule, crop diversification, Mixed farming, Insurance, Government relief, rescheduling loan facility, multiple job, borrowing money from friends or relatives, selling of real assets, reduced food consumption, spent savings or investments etc. Besides these, various other strategies may also be involved after discussion with respondents and key informants in the study area.

3. Empirical Results

Food insecurity is subject to exposure and realisation of various risk factors. Risk can be defined as that affects household adversely to make them vulnerable may occur in any form such as environmental, health or economic, etc. In this regard, an attempt was made to study intensity of various events and situations in last 2 years that lead to environmental, health and economic risk. Further three sub categories *viz.* low, medium and high were made for intensity of risk events perceived by respondents in last 2 years. Intensity of an event signifies the severity of adverse outcome of it. Thus, higher the Intensity of event, badly it affects the household. Analysis was carried out in Dang district of south Gujarat to capture the variation in susceptibility of households to various risks.

3.1 Environmental risk

It was found that, 25% household in Dang district realised rainfall untimeliness at harvesting like situations less than 1 years out of last 2 years (Table 1). Around 55% households in

Dang region felt that untimeliness rainfall at harvesting occurred with medium intensity in last 2 years whereas only 20% households of Dang region realised high intensity of severe untimeliness of rainfall at harvesting. Thus, this can be perceived that, there was variation in intensity of occurrence of rainfall untimeliness at harvesting reported by respondents. This might be due to various household level factors that have hold on realisation of negative impact of risk event.

Table 1: Intensity of Major Environmental risks (% of HHs)

Specifics of risk	Low	Moderate	High
Rainfall untimeliness at harvesting	25	55	20
pests/diseases that affected crops before they were harvested	24.64	36.23	39.13
pests or diseases that affected livestock	63.16	15.79	21.05

Prevalence of pest and disease before harvesting of crop was higher in Dang district. In Dang region, 39.13% of farmers realised its high intensity. Pest and disease outbreak was a major concern as it reduces yield and quality of produce which may contribute in fewer earnings to the farmers. The study found that major crop grown were Rice, small millets, brinjal, black gram, okra etc. severity of various pest and diseases in these crops in the middle or last stage of plant growth caused high yield losses.

The study found that 63.16 % household faced low intensity of pests and diseases that affected livestock in Dang region in last two years. Whereas 15.79 % household realised moderate impact of pests or diseases that affected livestock. Pest and disease that affected animals had major impact on household income. It was come to know that 21.05% household perceived high intensity of pest or diseases that affected livestock in Dang region in last two years.

3.2 Health risk

Health risk is the most common idiosyncratic shock and the most important reason for food insecurity in household. A household said to face health risk when an illness or injury weakens the health status of its member and generate a welfare loss for the household such shocks have direct and indirect impact on household economy. Direct impact is in the form of expenditure incurred during medical care like hospitalization and outpatient treatment. Indirect impact refers to loss of productive labour time and thus earning of patients and care givers. A try was given to know the frequency of realization of health shocks among household in Dang region. It was found that, illness of any household member that seriously realised by household was less. Most of the households reported for low occurrence of the event and hence have less adverse impact on their economy.

The study revealed that there was high incidence of illness of household member. It was found that, illness of any household member that seriously realised by households was 32.61% (table 2). Most of the households reported for low intensity of the event and hence have less adverse impact on their economy. 40% Household was realised low impact of injury of household head or member. Around 33% household faced moderate intensity of Injury of household member and only 26.67% household realised high intensity of injury of household member.

For mortality and morbidity of household member 57.90% household faced high intensity of the risk. Whereas, 21.05% household realised moderate and low intensity of this particular risk in Dang region.

Table 2: Intensity of major health risks (% of HHs)

Specifics of risk	Low	Moderate	High
Illness of household members	26.09	41.30	32.61
Injury	40	33.33	26.67
Mortality and morbidity of household member	21.05	21.05	57.90
Mortality and morbidity of livestock	22.22	11.11	66.67

For mortality and morbidity of livestock 66.67% household faced high intensity of the risk. Whereas 11.11% household moderate and 22.22% household realised low intensity of this particular risk in Dang region. Mortality and morbidity of livestock resulted in loss of supplemental income of the household. The study found that COVID19 had high intensity on affected household.

3.3 Economic Risk

The major concerns behind the study of different types of risks were its impact on household’s economic position. With existence of environmental and health risks, an attempt was made in the direction to know impact of prevalence of various adverse economic situations in the form of its intensity of particular risk perceived by respondents. Size of operational land holding always signifies the socio-economic status of farmer household. Larger holding size indicates the strong asset position and reputation of household in the society. Social connections always have positive effect towards reducing strong psychological beliefs. Greater number of social connections is significantly associated with reduction in suicidal attempt. Hence intensity of economic risks perceived by respondents with different land holding size was studied. seven major sources of economic risks were identified to know their realization in last two years among different household groups.

It can be seen in table 3 that, landless and marginal & small farmers showed high intensity of lack of financing/capital with 66.67% and 29.41% respectively. Large farmers were among the least that, realised lack of financing/capital as a major source of economic risks. Sometimes situation occurs like scarcity or unavailability of inputs with the dealers. During such situations, landless and marginal & small farmers has limited and discriminatory access over large farmers. Same trend was found as farmers with larger holdings realised that, access to inputs was not a major deal. This discriminatory situation prevailed due to financial condition of two respective categories. Its further percolates in more risky occasion due to unavailability of resources on time. Increase in input prices over the period of time against constant or disproportioned increase in output push agrarian community in trouble. It can be seen that, large farmers faced moderate intensity of fluctuations in input prices. Large and marginal & small farmers have realised sharp fluctuations in output prices with high intensity of 63.64 % and 61.54 % respectively. Whereas 36.36% large farmers and 38.46% marginal & small farmers realised moderate intensity of fluctuations in output prices. The study found that 51.85% large farmers and 64.71% marginal & small farmers faced high intensity of lack of demand or inability to sell agricultural products in last two years. Whereas 44.44% large farmers and 23.53% marginal and small farmers faced moderate intensity of this risk. Occurrence of seasonal unemployment throughout the year was always an issue in case of landless and marginal and small farmers. It was found that, these two farm categories faced high intensity of problem of unemployment in last two years; whereas, large farmers were available with sizable employment throughout the year.

Table 3: Intensity of Major Economic risks (% of HHs)

Household type	Intensity	Lack of financial/capital	Lack of access to inputs	Sharp fluctuations in input prices	Sharp fluctuations in output prices	Lack of demand or inability to sell agricultural products	Seasonal unemployment	Harvest failure
Landless	Low	-	-	-	-	-	23.08	-
	Moderate	33.33	-	-	-	-	23.08	-
	High	66.67	-	-	-	-	53.84	-
Small & Marginal	Low	29.41	-	-	-	11.76	-	-
	Moderate	41.18	100	-	38.46	23.53	40	100
	High	29.41	-	-	61.54	64.71	60	-
Large	Low	55.56	-	-	-	3.71	-	-
	Moderate	44.44	-	100	36.36	44.44	-	40
	High	-	-	-	63.64	51.85	-	60

As they perceive low intensity of the event. Failure to get expected production has its roots back to the adverse environmental conditions. Surprisingly 60% of marginal and small farmers and 53.84% landless realized high intensity of seasonal unemployment in last two years.

The study revealed that small and medium farmers realized harvest failure with moderate intensity while for large farmers it was 40% and 60% large farmers faced high intensity of harvest failure in last two years. One of the major reasons behind these surprising responses over harvest failure that, farmers were too confident that they could grow much more from their fields but lack of public support in the form of irrigation, cheap inputs and technical guidance push them on back foot.

Table 4: Impact during most recent event (% of Households)

Specific of risk	Income decreased		Reduction in consumption	Others
	Crop	Livestock		
Environmental risk	57.33	13.33	20.67	8.67
Health risk	-	6	62.67	31.33
Economic risk	65.33	-	18	16.67

Food security of a household is directly related to the notion of risk. Risk is characterised by some probability distribution of uncertain event. A household is actually exposed or susceptible to risk is depends on various factors such as asset position, existing health, and nutritional status, educational attainment etc. all these factors determine response of households to a particular shock to know outcome, which is

some measure of welfare. Given the different distribution of asset among households, one particular event may have different welfare effects. It is worthwhile to measure the extent of outcome of major risks like environmental, health and economic. Table 4 shows outcomes realised by households due to various risk under the different headings of losses. Specific shock may result in single type of loss or loss in combination. It shows that various risks faced by household in the study area resulted in 57% household decreased in crop income and 13% household faced income loss obtained from livestock. Whereas due to environmental risk 20.67% household reported reduction in consumption. Other losses include decreased in asset. It can be seen that environmental risk has multi-directional adverse effect on household.

Environmental shocks have adverse multi directional impact on households and it depends on the socio-economic situation to tackle them. Farmer invests his capital to raise crop and livestock with hopes of remunerative return but could not get desired results and he continuously loses capital and labour

invested throughout the process.

Various Health risks faced by household like illness of household member, injury, mortality and morbidity of household member and livestock reduced consumption of 62.67% household. Thus, health risks have sizable effect on socio-economic condition of households. It was found that 65% household faced decreased in crop income and 18% household resulted in decrease in consumption due to various economic risks.

Table 5 shows result of coping mechanism for particular environmental risk faced by households. For rainfall untimeliness at harvesting 60% household used crop diversification or production of less risky crops, 5% household had insurance of agricultural or livestock, 10% household used social assistance to cope up with this particular risk. Whereas 10% household rescheduled loan facility and 15% household had done multiple job as a coping mechanism to reduce this particular risk.

Table 5: Coping mechanism for environmental risk particulars (% of HHs)

Coping mechanism	Rainfall untimeliness at harvesting	Pests/diseases that affected crops before they were harvested	Pests or diseases that affected livestock
Using improved seed/varieties	-	13.04	-
Changing crop plantation schedule/crop rotation	-	2.90	-
Crop diversification/production of less risky crops	60	26.08	-
Insurance: agricultural/livestock	5	18.84	31.58
Government relief: transfer/ social assistance/subsidies	10	-	26.32
Rescheduling loans facility	10	4.36	26.32
Multiple jobs	15	34.78	15.78

The study shows that there were major incidence of pest and disease that affected crops before they were harvested. For this particular risk 34.78% household responded with multiple jobs and 26.08% households used crop diversification or less risky crops to decrease losses. To mitigate pest and disease that affected livestock 31.58% household had livestock insurance to combat adverse effect of this particular risk. Whereas 26 % household got social assistance and loan facility to cope this environmental risk.

Table 6 shows that for various health risks particulars different kind of coping mechanism were used according to accessibility and availability. The study found that 39.13%

household borrowed money from relatives or friends and 36.96% household spent saving during illness of household member. 40% household borrowed money in case of injury of household member. It was found that 42% household spent their saving to cope with mortality and morbidity of household member. In case mortality and morbidity of household 33 % household borrowed money and reduced consumption. In severe condition of household member due to COVID19 60% household borrowed money to mitigate the risk. Various 20% household sold their real assets to cope with this risk.

Table 6: Coping mechanism for health risk particulars (% of HH)

Coping mechanism	Illness of household members	Injury	Mortality and morbidity of household member	Mortality and morbidity of livestock	Epidemics/ COVID19
Selling of real assets	-	-	10.53	33.33	20
Borrowing from moneylender/relatives/friends	39.13	40	21.05	22.22	60
Reduced food consumption	15.22	26.67	10.53	33.33	20
Spent savings or investments	36.96	33.33	42.11	11.11	-
Worked more, if already working	8.69	-	15.78	-	-

One of the major risk coping strategies was financial borrowings. The source of borrowings may be formal or informal depending upon the emergency and access It was analysed separately that, effect of various household characteristics on formal and informal borrowings. It was

observed that, older household heads were more prone to borrow from informal lenders. On the other side, household with higher operational land holding, monthly per capita expenditure and heads educational attainment was found preferring formal borrowings from banks and co-operatives.

Table 7: Coping mechanism for economic risk particulars (% of HH)

Coping mechanism	Lack of financial/capital	Lack of access to inputs	Sharp fluctuations in input prices	Sharp fluctuations in output prices	Lack of demand or inability to sell agricultural products	Seasonal unemployment	Harvest failure
Selling of real assets	11.54		-	16.67	13.64	-	33.33
Borrowing from money lender	23.07	100	-	16.67	20.45	-	-
Borrowing from relatives/friends	42.31	-	100	37.5	29.55	-	-
Reduced food consumption	-	-	-	-	-	-	-
Spent savings or investment	23.08	-	-	29.16	36.36	100	66.67

Table 7 shows that to cope with lack of capital 42% household borrowed money from relatives and friends. Around 12% household sold their asset and 23 % household spent their savings. It was found that for fluctuation in input and output prices household used financial borrowing from money lender and relatives or friends to cope with the economic risk. For lack of access to inputs household borrowed money from money lender. During lack of demand or inability to sell agricultural products 36% household spent their saving to reduce impact of this particular risk. Similarly, in case of seasonal unemployment and harvest failure majority of household used coping strategies was spent savings.

Policies should be targeted for particular bunch of households with similar socio-economic background, interest and mindset. For example, household not having any savings cannot use spending of it as an instrument nor household need emergency finance will not go to formal sources. This type of variation among households should be rectified prior to framing social protection tool. In order to achieve this, a thorough survey needs to be conducted prior to developing policy support to tackle adverse condition.

4. Conclusion

Prevalence of pest and disease before harvesting of crop was higher in Dang district as most of farmers realised its high intensity. Major health risk found was mortality and morbidity of livestock. Landless and marginal & small farmers showed high intensity of lack of financing/capital. Marginal & small farmers and landless household realized high intensity of seasonal unemployment in last two years. Sizable population of household used crop diversification or production of less risky crops as coping mechanism for rainfall untimeliness at harvesting. In order to cope with lack of capital, household borrowed money from relatives and friends. As a policy implication the government should exhaustively work on facilitating credit availability and subsidize the farmers to reverse the problem of food insecurity and to enhance households coping capacity to food shortage and/or insecurity. Enhancing household's farm income-earning opportunities through provision of sufficient input to enhance agricultural production and productivity; and improving households' technical skill as well as their awareness on utilization of the off-farm and non-farm income to improve households' food security situation.

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