ECONOMIC ASSESSMENT OF CROP INSURANCE SCHEME IN KANGRA DISTRICT OF HIMACHAL PRADESH

THESIS

By

SONAL DHIMAN
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CHAUDHARY SARWAN KUMAR
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Dr. Rajesh Thakur
Professor

Department of Agricultural Economics,
Extension Education and Rural Sociology,
College of Agriculture,
CSK Himachal Pradesh Krishi Vishvavidyalaya
Palampur-176062 (H.P.) India

CERTIFICATE – I

This is to certify that the thesis entitled, **"Economic assessment of crop insurance scheme in Kangra district of Himachal Pradesh"** submitted in partial fulfilment of the requirements for the award of the degree of of **Master of Science (Agriculture)** in the discipline of **Agricultural Economics** of CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur is a bonafide research work carried out by **Ms. Sonal Dhiman (A-2019-30-008)** daughter of **Smt. Kamlesh and Sh. Surinder Kumar** under my supervision and that no part of this thesis has been submitted for any other degree or diploma.

The assistance and help received during the course of this investigation have been fully acknowledged.

Place : Palampur
Dated :

(Dr. Rajesh Kumar Thakur)
Major Advisor

CERTIFICATE- II

This is to certify that the thesis entitled**, "Economic assessment of crop insurance scheme in Kangra district of Himachal Pradesh"** submitted by **Ms. Sonal Dhiman (A-2019-30-008)** daughter of **Smt. Kamlesh and Sh. Surinder Kumar** to the CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur in partial fulfilment of the requirements for the degree of **Master of Science (Agriculture)** in the discipline of **Agricultural Economics** has been approved by the Advisory Committee after an oral examination of the student in collaboration with an External Examiner.

(Dr. Rajesh Kumar Thakur)
Chairperson
Advisory Committee

( )
External Examiner

(Dr. Virender Kumar)
Member

(Dr. S.S. Rana)
Member

(Dr. Amar Singh)
Dean's nominee

Head of the Department

Dean, Postgraduate Studies

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'Fond Memory brings the light/ Of other days around me,' wrote Thomas Moore in his one of the best pieces, "Oft, in the Stilly Night (Scotch Air)". Moore while remembering the past says that it can be enjoyable, bringing one to happy events and challenging dilemmas. However, remembering isn't the same as acknowledging the people for their efforts. The self-indulgence of what is called in Sanskrit "smriticharan" ('the grazing of one's own memory') may not interest others at all, who may nevertheless be curious about what actually happened and how the thoughts of another person can be understood - and shared.

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I solely claim the responsibility for errors and omissions in this work.

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LIST OF ABBREVIATIONS USED

S. No.	Abbreviation	Meaning
1.	*et al.*	*et alia* (and others)
2.	*i.e.*	id est (that is)
3.	*viz.*	videlicet (namely)
4.	@	at the rate
5.	AIC	Agriculture Insurance Company
6.	AY	Average Yield
7.	CCE	Crop Cutting Experiments
8.	CGR	Compound Growth Rate
9.	CCIS	Comprehensive Crop Insurance Scheme
10.	COVID	Corona Virus Disease
11.	CV	Coefficient of Variation
12.	FAO	Food and Agriculture Organisation
13.	GoI	Government of India
14.	ha	Hectare
15.	HDFC	Housing Development Finance Corporation Limited
16.	H.P.	Himachal Pradesh
17.	IA	Implementing Agency
18.	ICICI	Industrial Credit and Investment Corporation of India
19.	m	Million
20.	MNAIS	Modified National Agriculture Insurance Scheme
21.	MODIS	Moderate Resolution Imaging Spectro-Radiometer
22.	MR	Mean Relevance
23.	MRP	Mean Relevance Percentage
24.	MRS	Mean Relevance Score
25.	MPCI	Multi-Peril Crop Insurance
26.	NAIS	National Agriculture Insurance Scheme
27.	PCIS	Pilot Crop Insurance Scheme
28.	PMFBY	*Pradhan Mantri Fasal Bima Yojana*
29.	q	Quintal
30.	Rs.	Rupees
31.	SE	Standard Error
32.	SGR	Simple Growth Rate
33.	TY	Threshold Yield
34.	WBCIS	Weather Based Crop Insurance Scheme
35.	w.r.t.	with respect to

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Department of Agricultural Economics, Extension Education and Rural Sociology
College of Agriculture
CSK Himachal Pradesh Krishi Vishvavidyalaya Palampur – 176062 (HP)

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ABSTRACT

Agriculture has been and still is the major source of livelihood for more than 50 per cent of the total population of India but being highly dependent on the erratic and uneven monsoons, the sector is continuously facing unpredictability and higher exposure to various risks and uncertainties. Thus, to safeguard the interests of the farmers, agricultural insurance in India was first initiated in 1972 in H-4 cotton, which later extended to groundnut wheat and potato. Later on, several national and state level insurance schemes were implemented by increasing the sphere of coverage. At present, *Pradhan Mantri Fasal Bima Yojana* and Restructured Weather Based Crop Insurance Scheme and few state level schemes are in operation in the country. Himachal Pradesh is a model hilly state of the country as far as development of agriculture is concerned and the crop insurance in the state is in operation since 1999-2000. But very limited studies on crop insurance had been carried in the state, hence, the present endeavour was planned to study the status of crops insurance schemes, assess their coverage, cost, compensation, perceptions and problems faced by farmers and stakeholders in Kangra district of Himachal Pradesh. The study was based on primary and secondary data. The primary data were collected from 80 crop insurers through personal survey method by adopting two stage random sampling technique. The data have been analysed by working out averages, percentage, indices and functional analysis. The socio- economic parameters like age wise distribution, occupational pattern, farm inventories, cropping pattern, etc. were studied. The average size of land holding was quite low i.e. 0.5330 ha out of which 70 per cent was being cultivated with cropping intensity of 203.29 per cent. Out of the total respondents 96.25 per cent were loanee and about 75 per cent of the total cropped area of total respondents was insured. The perceptions of the respondents revealed that among the various components of risks, the production risk (83.75 per cent) was reported to be major concern followed by price risk (11.25 per cent). On account of these risks, production losses to extent of 2.43, 0.49q and 0.01q/farm were estimated in wheat, paddy and maize, respectively on sample farms. The coverage of crops under insurance with respect to area and farmers increased at the rate of 6.67 and 10.38 per cent/annum of compound growth rate, respectively, during 2000-01 to 2019-20 in the country, whereas these figures for state were at 35.36 and 24.25 per cent. During the period of 1999-2000 to 2019-20, the sum insured, premium paid by farmers and compensation received under different schemes in Himachal Pradesh increased at 43.77, 17.59 and 3.69 per cent/annum, respectively. Lack of awareness, difference between actual and threshold yields, procedural complexities, etc. were the major problems reported by the respondents. The measures like increasing the awareness regarding crop insurance, solutions for practical problems, availability of inputs on time, promotion of RWBCIS for covering fruits and vegetables, etc. are suggested to increase the adoption of crop insurance schemes in the study area.

(Sonal Dhiman)
Student
Date:

(Dr. Rajesh Kumar Thakur)
Major Advisor
Date:

Head of the Department

1. INTRODUCTION

Agriculture has been and still is the major source of livelihood for more than 50 per cent of the total population of India and it contributes to about 20 per cent of the country's GVA (at 2011-12 prices, GoI, 2021). Since independence, it has been among the top priorities of the government and over the period of time, many initiatives have been taken for its overall development. Through the concerted efforts of the planners, researchers, extension workers and farmers, there has been a significant increase in the production as well as yield levels of different agricultural commodities. The production of food grains in India has been increasing every year making it one of the top producers of wheat, rice, pulses, sugarcane and cotton. Globally, it is the highest producer of milk and second highest producer of fruits and vegetables. In 2019-20, India contributed 23.62 per cent to the world's pulses production, the highest for any single country, 21.50 per cent to rice production and 13.64 per cent to wheat production. The country has not only achieved self-sufficiency in food production but has also emerged as a major exporter of many agricultural commodities. It also accounted for about 25 per cent of the total quantity of cotton produced, besides being the second-highest exporter of cotton for the past several years (Deshpande, 2017).

The Indian agricultural sector, being highly dependent on the monsoons, is continuously facing unpredictability and higher exposure to various risks and uncertainties. The farmers are confronted with the problems like unforeseen natural calamities (droughts, floods and wind/hail storms), outbreaks of insect-pest& diseases, scarcity of labour, fluctuating market prices and non-availability of critical inputs in time. In lieu of all these uncertainties, there has been a low level of capital investment at the farmer's level for the adoption of modern agricultural production technologies, especially for irrigation infrastructure and farm mechanization. The crop losses in agriculture is a common phenomenon and is one of the major reasons for farmers' suicide in our country. In this scenario, identification and mitigation of the risks is an important aspect of decision-making to the farmers (Wahab, 2019).

Almost 7,000 natural disasters had occurred during 1995- 2015 worldwide, affecting 4.2 billion people with an estimated damage of US $ 2.2 trillion (Hess and

Hazel, 2016).India saw a decline of 4.35 and 9.75 per cent in the crop production due to extreme temperature and rainfall shocks, respectively, in the past decade (GoI, 2018). Unseasonal rainfall and hailstorms destroyed 24 million hectares of crop area between 2013 and 2015 in India. The losses from it were Rs. 260 billion (Bhushan *et al.*, 2015). According to the Economic Survey of India, 2017-18, there was 12.8 and 6.70 per cent average decline in crop yield during *kharif* and *rabi* seasons, respectively due to extreme drought conditions. In India, during *rabi* season of the year 2015, 18.23 million hectares of crops were damaged due to unseasonal rainfall accounting for more than Rs. 20,453 crores of economic loss (Bhushan *et al.*, 2015).As more than half of its cropped area is still rainfed and three-fourth of farmers being small and marginal, India is likely to be more vulnerable to climate change (Gulati *et al.*, 2018).

The risks and uncertainties associated with natural calamities and market forces remain a major issue for which crop insurance is recommended to cover the financial losses of the farmers. Thus to safeguard the interests of the farmers, agricultural insurance in India was first initiated in 1972-73, when the General Insurance Corporation (GIC) of India introduced a crop insurance scheme on H-4 cotton, which later extended to groundnut, wheat and potato. The idea of crop insurance in India started with Mr. J. S. Chakravarthi, Ex-Officio Financial Secretary to the Government of Mysore who made the first attempt to introduce the drought protection scheme in 1915 (Rajaram and Chetana, 2016).Benjamin Franklin was the first man to have thought about starting crop insurance in 1788. The first crop insurance scheme (hail insurance) started during the 1820s in Germany and France for Grapes and the first Multi-Peril Crop Insurance (MPCI) started in the US in 1939 (Rao, 2012). After gaining the experience, the Pilot Crop Insurance Scheme (PCIS) was launched by the GIC in 1979 and the Comprehensive Crop Insurance Scheme (CCIS) was introduced by the Central Government in 1985-86. The CCIS was subsequently replaced by the National Agricultural Insurance Scheme (NAIS) owing to its various shortcomings and it became operational from 1999-2000 (*rabi* season) and this scheme continued till 2015-2016. Based on the suggestions received from various corners, Modified National Agricultural Insurance Scheme (MNAIS) was implemented from 2013-14 to 2015-2016 under the auspices of the National Crop Insurance Programme.

To bring more farmers under the fold of crop insurance, Weather Based Crop Insurance Scheme (WBCIS) was launched from *kharif* 2007 *to rabi* 2013-14 *and* further

full-fledged up to *rabi* 2015-16. Lastly, holding the opinions from various states/Union Territories, a new scheme namely, *Pradhan Mantri Fasal Bima Yojana* (PMFBY) was launched in 2016 in place of all the schemes except WBCIS which was converted into Restructured Weather Based Crop Insurance Scheme (RWBCIS). Various studies have been conducted to assess the performance of crop insurance schemes. According to Cariappa *et al.*, 2018, in *kharif* 2016, around 24 per cent of farmers were insured. Faulty claim settlement, corruption and the widened discrepancies between payouts and actual losses were identified as major bottlenecks in crop insurance schemes. (Gulati *et al.*, 2018; Mobarak and Rosenzweig, 2012). So, it is important to get farmers into formal risk-mitigating measures like crop insurance so as to cover financial losses. Despite several advancements, agriculture still is a risky enterprise and the penetration of crop insurance schemes is not satisfactory in rural areas (Gine *et al.*, 2008; Akter*et al.*, 2017). Therefore, it is very important to know why farmers opt for crop insurance and also evaluate its impact.

Himachal Pradesh has a varied type of agro-climatic conditions ranging from Sub Mountain, Low Hills, Subtropical Zone (300- 650 m above mean sea level) to High Hills Temperate Dry Zone (2200 m above mean sea level) which are congenial for the cultivation of a wide range of crops like cereals, pulses, oilseeds, fodder, vegetables, flowers, herbs, medicinal crops, etc. in different parts of the state. The Department of Agriculture is promoting the cultivation of high-value crops like vegetables and flowers for the diversification of cropping systems of the state for increasing the income of the farmers. Given the domestic and market needs, the majority of the existing cropping systems in the state are mixed comprising cereals, pulses, oilseeds, fodder, vegetables and flowers. In order to compensate the losses of the field crops, the various crop insurance schemes as per the guidelines of central government are being implemented in the state from the last 20 years which might have provided relief to crop insurers. Thus, there is need for examining the farmers perceptions to various types of risks associated with crop production, which has not been done in the state so far. Therefore, the present endeavour has been planned to study the status of crop insurance schemes, assessment of coverage, cost and compensation in the Kangra district of Himachal Pradesh as among the different districts of the state, Kangra district has the highest number of cultivators and total cropped area. In view of above facts, the present study has been carried under following objectives:

1.1 Objectives

1. To study the status of crop insurance in Kangra district and to measure the risk in crop production.
2. To examine the cost, coverage and compensation of crop insurance and to study the perceptions and problems faced by farmers and stakeholders.

1.2 Organisation of the study:

The entire study has been systematically planned and arranged in five chapters. Chapter-1 describes the background and present scenario of research problem and its objectives. This is followed by Chapter-2 which presents the comprehensive review of relevant research done in India and abroad. Chapter-3 presents the detailed methodology adopted for selection of respondents, collection and analysis of data. The results of the study are documented with conclusions in various sections of Chapter-4. Finally, the major findings are summarized along with some suggestions for improvement. The references used in the study are enlisted under the literature cited.

2. REVIEW OF LITERATURE

The study has been conducted after reviewing the works of different researchers based on the related aspects of the present study in India and abroad. The review of literature highpoints the flaws of the previous studies, bring clarity to the subject and aids in the formulation of methodology for the study. The existing research work has been reviewed in chronological order under the following sub-heads:

2.1Risk and uncertainty in agriculture
2.2Status w.r.t. cost, coverage & compensation of crop insurance schemes
2.3Perceptions and problems regarding the adoption of crop insurance schemes

2.1 Risk and uncertainty in agriculture

Kahan (2008) has developed a farm management extension guide to manage the risk in farming. The author has discussed the most common sources of risks in agriculture (production, financial, market, institutional risk and human risk) and documented the various strategies to manage the risk under various situations. The study revealed that the majority of subsistence and market-oriented farmers were not able to withstand financial losses and farmers with high family commitments were risk aversers. The various ways and means to extension workers for guiding farmers in managing risk were also suggested. The role of extension workers was regarded as of paramount importance with respect to generating awareness and assisting farmers in decision-making for the management of the risk.

Aimin (2010) studied uncertainty, risk aversion and risk management in agriculture. The author analysed the farmer's choice of agriculture product under risk. The natural, market, family and policy-related risks and uncertainties were identified by the author as the main sources of risk in agriculture. The author marked both, the existing government schemes and the markets as a failure in solving the farmer's risk problems. The study also examined the market-based instruments in the context of risk management strategies.

Singh (2010) highlighted the dependence of Indian agriculture on uncertain rains and stressed the need for crop insurance as an alternative to manage production risk. The study reviewed the historical overview of crop insurance schemes and their performance in the country. It was followed by a discussion on the currently available crop insurance products for specific crops and regions. The two major schemes of crop insurance i.e., National Agricultural Insurance Scheme and Weather Based Insurance Scheme were discussed in detail. The paper also reflected the key shortcomings in these schemes.

Swain (2014) assessed the performance of the pilot Weather-Based Crop Insurance Scheme (WBCIS) and National Agriculture Insurance Scheme (NAIS) in Odisha. The author analyzed the performance of these two schemes using secondary time series data and the information gathered from the insurance users. The analysis concluded that because of better coverage, larger no. of beneficiaries, lower premium and more frequent compensation payment, WBCIS performed better than NAIS. The authors suggested the integration of the advantages of the two schemes and making one hybrid scheme in order to increase penetration, awareness and coverage of the schemes.

Langemeier (2015) discussed the methods to measure risk and uncertainty. The author in the article described variability and downside risk as two commonly used risk measures. The author discussed the creation of the distribution of outcomes in corn and soybean using a probability distribution to measure the risk and indicated that uncertainty cannot be measured as the risk because it does not have probability information. The author revealed that over the period of 1996-2014, corn was riskier than soybean.

Tesfaye *et al.* (2017) identified the challenges and opportunities for sustainable crop production concerning climate change and variability in Bihar. The study was based on the weather data of 30 years as a baseline. Weather data were collected from the 12 stations located across the state of Bihar. Heat stress was identified as the major risk for crop production. On the other hand, the increase in annual and seasonal rainfall amounts and extended crop growing period in the *kharif* season were cited as an opportunity. The authors suggested that the mitigation and adaptation strategies in the state should be site and location-specific.

Matheswaran *et al.* (2018) assessed flood risk using Moderate Resolution Imaging Spectro-Radiometer (MODIS) 8-day reflectance data to derive long-term (2001–2015) spatiotemporal flood patterns for South Asia. Three flood hotspots located in lower parts of the Indus basin in Pakistan, Gangetic plains in Bihar, India and Bangladesh regions were identified as sufferers of the recurrent flood. Madhubani, Darbhanga, Muzaffarpur and Sitamarhi districts were categorized as very high-risk districts by both methods signifying that interventions or risk transfer mechanisms such as parametric flood insurance introduced in these districts had the potential to mitigate on an average minimum of $20 million per year economic losses suffered by smallholder farmer communities.

Khanal *et al.* (2019) tested the association between risk preference and various risk management decisions in the Nashik district of Maharashtra. The data were collected from 643 onion growing farmers through a survey. It was found that there was a negative association between risk preference and adoption of farm diversification strategies, risk preference and adoption of good agricultural practice and a positive association between risk preference and farm concentration and specialization.

Kumar *et al.* (2019) reviewed the various research and policy issues relating to the impact of climate change, adaptation research and losses/damage in rural India focusing on agriculture and water resources. Based on the findings of various studies, it was concluded that climate change impact assessments using statistical models have proliferated recently which primarily was focused on the role of weather as opposed to climate, thereby biasing the context of impact. Further, there was an overlap between development and adaptation activities and it was expected that climate change impacts will exceed the adaptation limits, manifesting in loss/damage due to frequent and/or severe climate vents. The authors have stressed the need of expanding research to multidimensional aspects and effective transmission of scientific knowledge to policymakers.

2.2 Status of crop insurance schemes w.r.t. cost, coverage & compensation

Jain (2004) identified the challenges in the implementation of agriculture insurance and re-insurance in developing countries. The author discussed the need for agricultural insurance in developing countries and the conceptual framework of the

agriculture insurance programme. The author has also discussed the Indian experience in the operation of crop insurance schemes. The authors found that the penetration of the scheme was low in developing countries. It has been suggested that the problems of anti-selection and moral hazard can be mitigated if the group was sufficiently large and homogeneous.

Reddy (2004) conducted the study on agricultural insurance in India- a perspective. The author studied various crop insurance schemes working in the country. The author indicated several problems in the ongoing crop insurance programme of the country and reviewed the innovative techniques in agricultural/rural insurance which could overcome some of the disadvantages of yield-based group insurance. The author suggested rainfall (weather) index insurance as a better alternative/complement to the existing agricultural insurance scheme.

Bhise *et al.* (2007) analyzed the performance and discussed the role of agriculture insurance schemes in protecting farmers from agricultural production variability. The claims to premium ratio were found to be 3.11 at all India level and 2.07 in the case of Maharashtra. Among the total insurance claims in the country, a major portion of the claims i.e. 67.27 per cent pertains to the four states viz. Andhra Pradesh, Gujarat, Maharashtra and Karnataka. Paddy, wheat, groundnut and gram were the dominating crops that were covered under this scheme. The study revealed that indemnity claims were not payable under the rainfall insurance scheme because the rainfall during the insurance period had exceeded the assured rainfall of that period in these crops in the Aurangabad district of Maharashtra. It was suggested that there is a need for a transition to actuarial rates, financial institutions sharing the risk with the government and increasing the accuracy and timeliness of crop estimation methods.

Raju and Chand (2008) presented a study that looked at the genesis of agricultural insurance in India and examined various agricultural insurance schemes launched in the country from time to time and the coverage provided by them. The study focused on major issues and problems faced in implementing agricultural insurance in the country. The study estimated risk associated with crop production at the national level and disaggregate level. The state of Andhra Pradesh was selected to represent the disaggregated level. The study revealed that the risk was much higher for farm income

than production, as was evident from lower risk in the area and higher risk in production. State-wise results showed that only in the states where irrigation was very reliable, it helped in reducing the risk.

Raju and Chand (2008) studied the performance of the National Agricultural Insurance Scheme (NAIS) and suggested some modifications to make it more effective. The coverage of NAIS in terms of crop area, the number of farmers and the value of agricultural output were very small. The authors were of the view that the scheme was an important tool for agricultural risk management if coverage is increased at least by three to four-folds. To improve the coverage, it was suggested that there is a need to renew the government efforts in terms of designing appropriate mechanisms and providing financial support to agricultural and for the private sector. The study further suggested assigning achievable targets to different general insurance companies in the country to cover agricultural insurance.

Mahajan (2012) studied the growth of the National Agriculture Insurance Scheme in India. The study was based on secondary data and information through the interaction with the officials of banks, academicians, insurance companies and farmers. The author emphasized the need for the formation of self-help groups which would be helpful in making the scheme cost-effective at the grass-root level. The author further stated that proper knowledge of the scheme and its effective implementation could help in the reduction of risks and increasing food grain production.

Mani *et al.* (2012) examined the adaptability of crop insurance schemes in Tamil Nadu. The study was based on primary data collected from a sample of 90 farmers covered under the National Agricultural Insurance Scheme (NAIS) from three selected districts of Tamil Nadu, *viz*., Nagappattinam, Vellore and Madurai and 30 farmers covered under Varsha Bima, a weather-based insurance scheme from Nagapattinam district. The study revealed that poor awareness, delay in settlement of the claims, high premium rate, complex documentation procedures were some major problems in the implementation of the scheme. The authors suggested that there is a need for publicity to generate awareness.

Raju *et al.* (2016) analyzed the current status of the Weather Based Crop Insurance Scheme in India. The study revealed that the index-based weather insurance

uptake had not achieved the predicted numbers in the country despite its theoretical benefits. Financial literacy was found to be the major constraint in the rural environment where according to the authors, for the success of the scheme individual farmer's familiarity with the framework and confidence in the insurance seller was of paramount importance. The authors suggested a comparative statistical analysis of various insurance schemes as well as enhanced consumer protection legislation for indexed insurance products. The need for promoting the research on ways to combine information from different indices was emphasized in the study.

Swain & Patnaik (2016) assessed the performance of crop insurance schemes in Odisha. They analyzed and compared various indicators including their coverage, financial performance and operational efficiency in acting as a safety net to the farmers when they experience crop losses. The study was conducted in two drought-prone districts of Odisha i.e. Bolangir and Kalahandi. The primary data were collected from 100 beneficiaries of WBCIS and NAIS each from Bolangir and Kalahandi district respectively. The results showed that the area under crop insurance in these two schemes has increased from 10 to 16 per cent of the gross cropped area. The area under crop insurance by non-loanee farmers had substantially declined over time in the case of both NAIS and WBCIS. The performance of WBCIS was found better than the NAIS on account of the higher adoption rate, the higher percentage of farmers benefited, the lower premium, faster claims payment and the frequent indemnity payment.

Irshad (2017) presented a paper on agricultural risk and crop insurance in India. He examined the involvement of the public and private sectors in crop insurance. The study revealed that crop insurance has become a source of extracting capital rather than supporting the capital formation of calamity/risk-affected farmers. The study further indicated that companies were extracting money as premium payments from the farmers and paying a negligible percentage to them. It has opened more options to companies to expand their capital base and to contribute to the capital replacement of distressed farmers.

Sona and Muniraju (2018) examined the status of crop insurance in India with a special reference to the Kodagu district of Karnataka state. The primary data for identifying the various factors influencing crop insurance and constraints faced by the

farmers were collected from 50 randomly selected farmers representing 10 villages of the Kodagu district. The study revealed that landholding size of the farmers, age, income level, access to loan facilities, source of obtaining information about crop insurance program, number of years occupied in farming activities and loss of crop due to unfavorable weather conditions was identified as the major factors influencing the farmers to adopt crop insurance.

Ghosh (2019) evaluated the performance of *Pradhan Mantri Fasal Bima Yojana* with respect to governance, uptake and willingness to pay of the farmers for crop insurance. The study was based on a stratified sample of 1362 farmers from 27 districts of 9 states –*viz.*, Assam, Bihar, Gujarat, Himachal Pradesh, Maharashtra, West Bengal, Karnataka and Madhya Pradesh. It was found that farmers were willing to pay nearly 10per cent more premium, which indicated high reception for crop insurance products.

Mathur and Gupta (2019) examined *Pradhan Mantri Fasal Bima Yojana* (PMFBY) for its comparative superiority over the previous crop insurance schemes implemented in the Jammu district of Jammu and Kashmir. The data were collected from banks, insurance agencies and the Agriculture Department of Jammu. Interviews with employees of the bank and the government staff associated with PMFBY were also conducted. The data were analyzed using thematic analysis. The authors found that many farmers were not willing to go for crop insurance schemes. The majority of the farmers reported that loan defaulters were not eligible for policy benefits. The study revealed that the present condition of the farmers was not only because of the uncertain weather conditions but policies of insurance schemes have been unable to provide relief to the farmers.

Poddar (2019) reviewed the National Agriculture Crop Insurance Scheme (NAIS) and the Modified National Agriculture Crop Insurance Scheme (MNAIS). The need, advantages and disadvantages and the performance of crop insurance in India were studied by the author and the shortcomings of the scheme were provided with suggestions to overcome the same. It was indicated by the author that there was an unequal distribution of the benefits of NAIS and the majority of the households were insured under some obligation and not by choice. The equal participation of government

and private partners was suggested by the author for the efficient implementation of the scheme.

Rai (2019) assessed the performance of the *Pradhan Mantri Fasal Bima Yojana* (PMFBY) in terms of its adaptability and the achievement of the objective of "one nation, one scheme." The author found that the existing model, however, has failed to reduce the burden of debt repayment in the event of crop loss and neither helping to meet the consumption needs nor augmenting income. It was suggested that the government must tackle these fundamental flaws and iron out the policy wrinkles of the scheme that was meant to mobilize financial resources for eliminating the agricultural distress."

Cariappa *et al.* (2020) pinpointed the correlates of the adoption of crop insurance in India. The authors assessed the influence of crop insurance on farm income and debt. For the study, the author evaluated the data obtained from the National Sample Survey Office using several techniques. The authors found put that only 5 per cent of the households are getting insured and out of that 5 per cent, 87 per cent are not receiving the claims. Based on the results, the author emphasized the need of restructuring the scheme design. The study cited revenue-based indemnity calculation as a tool to increase the uptake of the scheme.

Chauhan and Marvadi (2020) evaluated the performance of crop insurance schemes in Gujarat. The authors chose a time span of 18 years i.e. 1999 to 2018 to evaluate the crop insurance schemes mainly National Crop Insurance Scheme, Weather Based Crop Insurance Scheme and *Pradhan Mantri Fasal Bima Yojana* (PMFBY). The authors concluded that PMFBY is much useful to the insurers with respect to the coverage and premium.

Devi *et al.* (2020) analysed the awareness and opinions of farmers regarding *Pradhan Mantri Fasal Bima Yojana*. The study was based on the survey of 150 farmers representing six villages from two blocks of Fatehpur i.e. Ashoher and Bahua. The results indicated that 26.00 per cent of the total respondents was educated up to high schools and 37.30 per cent of the farmers had an annual income between Rs.1, 00,000 to 1, 50,000. The study also revealed that the majority of the respondents were aware about the risks covered under the *Pradhan Mantri Fasal Bima Yojana*.

Mahesha and Nagaraja (2020) overviewed the crop insurance schemes in India based on the analysis of secondary data collected from various sources. The author concluded that the government had been unsuccessful in the achievement of the objectives of the crop insurance due to the lack of awareness among the farmers and the complex procedures in the implementation of the scheme. The author emphasized the need of initiating awareness programmes, simplifying the enrollment procedure and increasing the inclusion of farmers in such programmes.

Paulraj and Easwaran (2020) evaluated the revamped crop insurance scheme *Pradhan Mantri Fasal Bima Yojana* (PMFBY) among paddy farmers in Tamil Nadu. The authors in this paper have evaluated the changes proposed in the revamped scheme with reference to the major issues faced by various stakeholders of crop insurance. It was pointed out that the major problems faced by the insured farmers were the delay in claim settlement and on the contrary the uninsured farmers were facing, credibility issues for enrollment. Agriculture officials were also surveyed and their responses about the operation of the scheme were also collected. The paper stated that the scheme has been successful in implementation. The study revealed that the revamped measures of the scheme will address the lesser and delayed claim settlement issues.

Reddy (2020) studied the coverage of crop insurance schemes with special reference to *Pradhan Mantri Fasal Bima Yojana* (PMFBY). The study was based on the secondary data collected from various sources and the crop-wise area insured under all the crop insurance schemes in India was analysed. The authors in their study revealed that over the study period 2015-19, the area insured for various crops was not evenly distributed. From the analysis of state-wise progress under PMFBY, it was found that in 2018-19, the number of farmers covered under the PMFBY was highest in Maharashtra.

Shehrawat *et al.* (2020) tried to check the awareness and performance of agricultural development schemes including *Pradhan Mantri Fasal Bima Yojana.* The study was conducted in two districts of Haryana. The data were collected from 100 randomly selected farmers. The authors in their study found that 86per cent of the farmers were aware of crops covered under the scheme and 6per cent of farmers were aware of the premium paid for insurance.

Tiwari *et al.* (2020) presented the overview of *Pradhan Mantri Fasal Bima Yojana* (PMFBY) and examined the need, coverage, administration, benefit pattern of the insurance scheme. The findings of the study indicated that the demand-side issues of crop insurance have been ignored in PMFBY. Unjustified delays in claim settlement, procedural complexities and bureaucratic inefficiencies were identified as the main reasons for the lack of will among the farmers towards crop insurance. Further, the author suggested the increase in the velocity of claims settlement as a potent tool to improve the efficiency of the scheme.

Punia *et al.* (2021) presented the paper entitled, "Crop insurance in India: Status of PMFBY against different crop insurance schemes." The study revealed an inclination in benefits of the Comprehensive Crop Insurance Scheme towards few states. In the paper, the author concluded that the *Pradhan Mantri Fasal Bima Yojana* had failed to achieve its targets with respect to the insurance and coverage of farmers in the country.

2.3 Perceptions and problems regarding the adoption of crop insurance schemes

Mahul and Wright (2003) explored theoretical analysis of the design of an optimal (single) crop revenue insurance contract when the producer faces joint yield and price risk. The study revealed that if the indemnity schedule was contingent on individual yield and individual price, then the optimal insurance contract depends only on the individual gross revenue and it displays full insurance under trigger revenue. Investigation of insurance and hedging when indemnity schedule was contingent was carried out which revealed that in the context of the incomplete markets the indemnity schedule of an optimal single crop revenue insurance policy depends not only on the gross revenue index but also on the price index and the yield index.

Rao (2010) studied the indexed-based crop insurance schemes and made a comparison with respect to different parameters. The author was of the view that the index-based crop insurance schemes as a way forward to many developing nations. In low-income countries, the weather index was found more promising because of the non-availability of the historical yield data whereas in countries where historical rainfall data were available the rainfall was used. The study further revealed that with achievements geographical information system, in the time to come satellite imagery-based yield estimates will be one of the best options for crop insurance. However, for best results of

the crop insurance products, the author has suggested that capturing production risks in agriculture by the careful design of the index and use of a combination of indices.

Soni and Trivedi (2013) studied the existing scenario regarding awareness and perception of crop insurance in Anandpur of Gujarat. In the study, the author has attempted to know the perceptions of those who have availed or not availed crop insurance in various villages of selected districts. The primary data for the study were collected through a survey based on a specifically designed questionnaire. The study revealed that crop insurance being a good option to avert risk, National Agricultural Insurance Scheme has very little penetration as only 3.64 per cent out of the total surveyed farmers were having crop insurance. The author emphasized the need for communication with farmers through *kisan sabha*, mass media, education programmes and group interactions.

Joseph *et al.* (2015) investigated the role of crop insurance and its prospects in India. The authors studied the influence of insurance on the risk attitude of the farmers. The data were collected from sugarcane and wheat farmers using the stratified multi-stage cluster sampling method. The results of the study showed that a continuous purchase of the insurance was seen when along with lookout of farms by sugar mills insurance, inputs and mechanization services were given.

Selvaraj (2015) attempted to find out the awareness level of the farmers about crop insurance schemes and the satisfaction level of the farmers about crop insurance schemes in India. The study concluded that despite various schemes launched from time to time in the country, agricultural insurance has served a very limited purpose. The coverage in terms of area, number of farmers and value of agricultural output are very small, payment of indemnity based on area approach miss affected farmers outside the compensated area and most of the schemes were not found viable. In the light of these findings and suggestions given by the sample respondents, several recommendations were made for the improvement of crop insurance.

Akter (2016) *et al.* examined the influence of gender and product design on farmer's preferences for weather-indexed crop insurance. To explore the preferences for weather index insurance through a gender lens, the author collected the primary data from 433 respondents in Bangladesh. The results of the study revealed that among

female insurers there was substantial insurance aversion no matter what the attributes of the scheme were. The key factors responsible for heterogeneous inclinations towards insurance were observed between men and women reason being the differences in financial literacy and level of trust in insurance.

Sarangi and Panigrahi (2016) identified various issues and challenges in crop insurance in India with special reference to Odisha. The authors stated that the current crop insurance schemes covered only 10 per cent of the farmers. Among the key issues, several issues such as difficulty in insuring crops, technical problems, implementation problems, political interference and farmers' lack of interest were identified by the authors. It was suggested that the optimization of the role of the public sector and at the same time harnessing the capacities and efficiencies of the private sector to improve the implementation and increasing the efficiencies in crop insurance. The study also emphasized the need for improving insurance literacy as well as financial literacy.

Singh *et al.* (2017) examined the role of socio-economic variables in the adoption of crop insurance using a discriminant function approach. Access to a source of credit, educational level, farm size, awareness and satisfaction level was identified as positive discriminators while the number of earning members obtained for age and income level were negative. In the study, authors found that the socio-economic characteristics of farmers significantly influence the adoption of crop insurance schemes. The authors further emphasized the need of creating awareness among the farmers for motivating them to avail themselves willingly of crop insurance.

Aditya *et al.* (2018) analyzed the adoption of crop insurance and its impact on Indian agriculture. The primary data were collected from the large-scale farmers and identified the factors that influence farmers' decision to buy crop insurance and subsequently assess its impact on farm income. The study revealed that the adoption of crop insurance by farmers is very poor, as only 4.80 and 3.17 percent of the sample farmers insuring their crops in *kharif* and *rabi* season, respectively. The educated farmers having better extension contacts were more likely found to insure their crops. Among the other factors, size of the land holding and subsidy on the premium were also found to increase the probability of farmers adopting crop insurance.

Kumbalep and Devaraju (2018) examined awareness and perceptions of farmers about crop Insurance in the Kolar district of Karnataka. The study analyzed the perception of beneficiaries and non-beneficiaries regarding the existing crop insurance schemes and documented the constraints faced by the farmers as well as the insurance agency in covering farming risks. The findings of the study revealed that there was no significant difference between the education level and economic conditions of farmers and only 20 percent of farmers were aware of crop insurance.

Sreejamol *et al.* (2018) studied the farmers' behaviors and attitudes towards crop insurance schemes in Kerela. Primary data was collected from 500 respondents through the questionnaire method. The results of the study showed that 8per cent of the farmers succeeded in encouraging the next generation into farming because of the weather-based crop insurance scheme. It was found that the knowledge about the various components of the insurance program did not vary with the gender and annual income of the respondents. The authors suggested that there is a need for coordination between state and central governments in the formulation and implementation of the schemes.

Mahto (2019) assessed the problems and prospects of crop insurance in India. The author studied the evolution of the crop insurance scheme in India and examined the present status and prospects of the scheme. The major crop insurance schemes viz., National Agriculture Insurance Scheme (NAIS), Modified National Agriculture Insurance Scheme (MNAIS), Weather Based Crop Insurance Scheme (WBCIS) and *Pradhan Mantri Fasal Bima Yojana* were studied. Penetration of the schemes was observed to be low and the performance of Madhya Pradesh in terms of the number of farmers insured and area brought under insurance cover was better under NAIS as compared to other states. The author indicated that WBCIS has performed well only in Rajasthan and Bihar.

Niranjan *et al.* (2019) carried out a study in randomly selected Umaria, Jabalpur and Sagar districts to assess the insurance behavior of insured farmers under *Pradhan Mantri Fasal Bima Yojana* (PMFBY) in Central India. The ICICI-Lombard, AIC and HDFC-ERGO were found to be major implementing agencies of PMFBY in Madhya Pradesh and from each agency 40 respondents were selected from the respective districts, constituting a sample size of 120 respondents. The results showed that 90 per

cent of the households insured their crops under PMFBY. It was found that more than 80 per cent of households aware of the scheme. The study further indicated that among the major events of crop losses yield was reported by 36.67 per cent of total sample farms followed by prevented sowing/planting due to deficit rainfall or adverse weather (3.33%). The study showed that 44 and 66 per cent of loanee and non-loanee insured households reported the losses to bank officials and local government officials respectively.

Singh and Aggarwal (2019) analyzed crop insurance schemes from the point of development, present status and performance in India by using the content analysis method. Over time several crop insurance schemes got introduced by the government were inconsistent and ineffective because of operational defects. The authors in their study revealed that the present crop insurance schemes were inappropriately running reason being the implementation problems at the state level. Insurance illiteracy and farmers' inclination for agriculture assistance outlays were identified as the major reasons for limited access to crop insurance in India.

Chakraborty (2020) was of the view that crop insurance is one of the effective measures of risk management in agriculture, however, coverage of the scheme is far behind the expected targets. The author has attempted to study the key determinants of the demand-side dynamics of crop insurance. The econometric estimates of the determinants of demand for crop insurance exhibited a reciprocal relationship between farm economic performance and demand for crop insurance. Among various factors of demand for insurance, farm income characteristics (farmers' affordability), farm management characteristics (farmers' decision-making ability) and farm characteristics (farmers' willingness to take on crop insurance) emerged as the key determinants of demand for crop insurance. The author further stated that subsidy in the insurance will improve the liquidity at the farm level and hence will help the more spread of the scheme, however, awareness about the insurance product was identified as a major constraint in the widespread of insurance schemes. In order to improve the insurance knowledge of the farmers, the institutional channels must be made more efficient and competent.

3. MATERIALS AND METHODS

The selection of appropriate methodological procedures ensures the precision and forms the base for any scientific investigation. The particularized framework of material and methods engaged in the study would also be helpful to future researchers in determining the data requirements for studies on the same or related fields. This chapter deals with the methodological procedures adopted for the selection of study area, sampling design, data collection and tools employed for analysis of data to fulfill specific requirements of the stated objectives of the study. The chapter has been divided into the following sub-heads:

3.1 Selection of the study area
3.2 Sampling Design
3.3 Data Collection
3.4 Analytical framework
3.5 Limitations of the study

3.1 Selection of the study area

The present study has been purposively conducted in the Kangra district of Himachal Pradesh, because the district has the highest number of cultivators and total cropped area among all the districts of the state. The major portion of the total cropped area of the district is occupied by the maize, paddy, wheat and barley which are eligible for insurance cover as per the guidelines of the government. The topography of the district is hilly and experiences variations in the agro-climatic conditions. Thus, in order to investigate the elements of risk/uncertainty in crop production, coverage, costs, compensation and problems associated with crop insurance, the district Kangra has been selected purposively. The details of the location of the study area in Himachal Pradesh are indicated through a map of Himachal Pradesh and Kangra district (Figures 3.1 & 3.2).

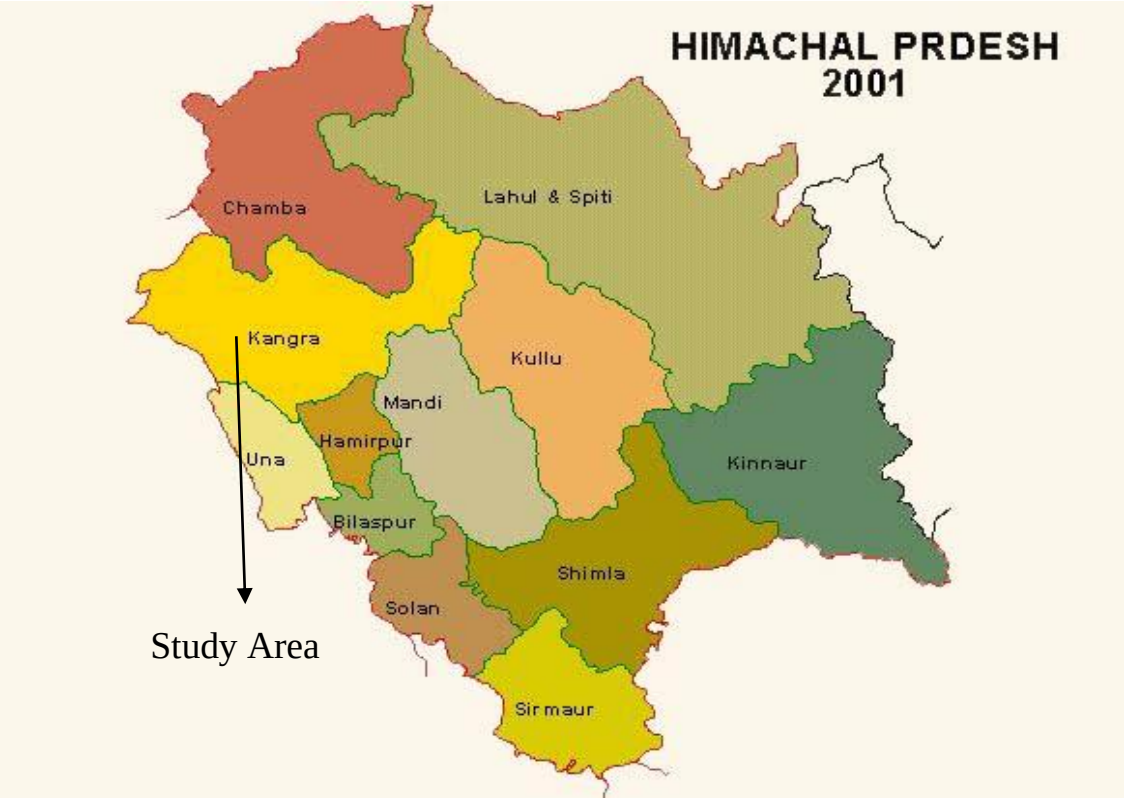

Figure 3.1: Depiction of the study district in Himachal Pradesh

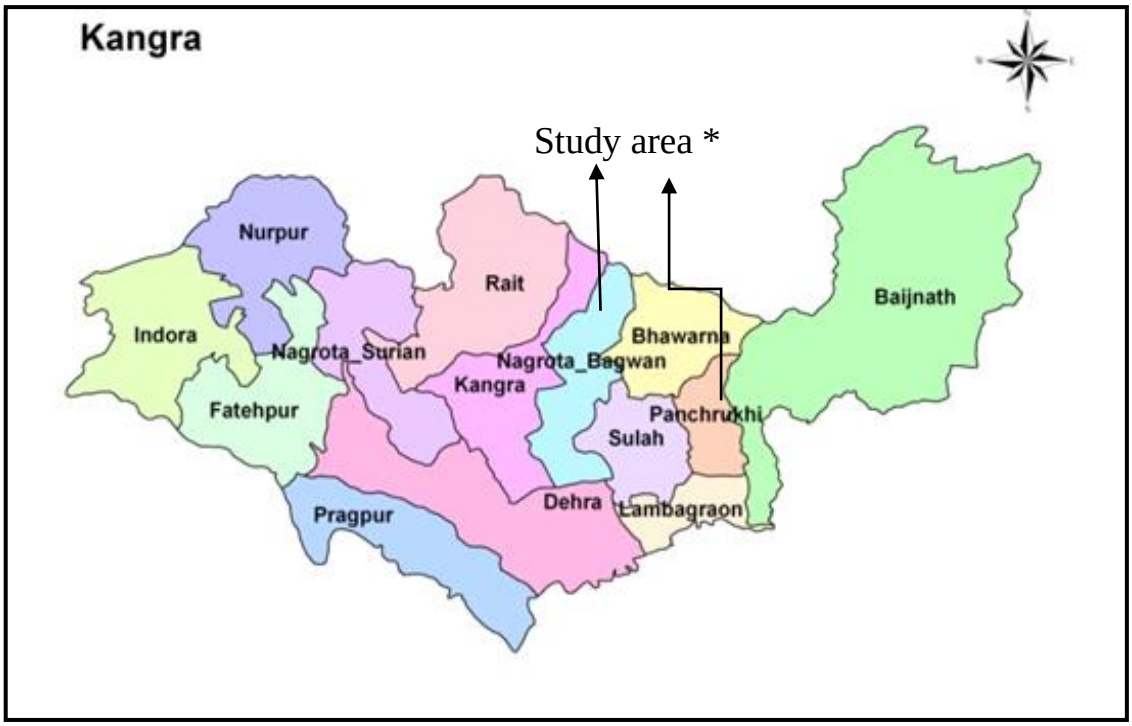

Figure 3.2: Depiction of selected blocks on in district Kangra

3.2 Sampling Design

A two-stage random sampling design was used for selecting the respondents from the study area. At the first stage of sampling, out of fifteen developmental blocks of district Kangra, two blocks; Nagrota Bagwan and Panchrukhi were selected randomly. At the second stage of sampling, the list of farmers who have insured their crop during the agricultural year 2019-20 was prepared in consultation with the officials of the department of agriculture and lead bank/insurance companies for the selected blocks. From the list so obtained, it was found that during the agricultural year 2019-20, 1496 and 409 farmers of Nagrota Bagwan and Panchrukhi, respectively insured their crops. Accordingly, through proportional allocation method, a random sample of 63 and 17 crop insurers was selected from Nagrota Bagwan and Panchrukhi block, respectively. The details of the sample for the block is presented in Table 3.1.

Table 3.1: Details of the farmers insured and sample drawn from selected blocks of Kangra district

Sr. No.	Name of the block	Total insurers	No. of farmers selected
1	**Nagrota Bagwan**	1496	63
2	**Panchrukhi**	409	17
	Total	1905	80

3.3 Data Collection

Both primary and secondary data were collected to meet out the requirements of the objectives of study. The details of the data collected are described as under:

3.31 Primary data

To fulfill the requirements of the specific objectives of the study, the primary data were collected from the respondents for the agricultural year 2019-20. The data were collected on specifically designed survey schedules. The preliminary survey schedule was prepared and pre-tested in April 2021. After making the necessary changes, the survey schedule was finalized and the primary data were collected from the selected households in April and May 2021. A copy of the final survey schedule has been appended in Appendix-I. The detailed information on the following aspects were obtained from the respondents:

- Socio-economic features, like age of heads of the families and family members and type of family system, gender-wise educational status, the occupational pattern of sample population and income from different sources, membership in local bodies, etc.
- Household inventories like buildings, land, livestock, farm tools, implements and machinery, etc.
- Land utilization pattern, status of irrigation, cropping pattern along-with details of production/yields, the crops covered under insurance, etc.
- The elements of risks faced by the respondents in crop production.
- Crops and area insured and premium paid for crop insurance.
- Perceptions of the respondents regarding crop insurance.
- Problems faced by farmers/stakeholders in crop insurance, etc.

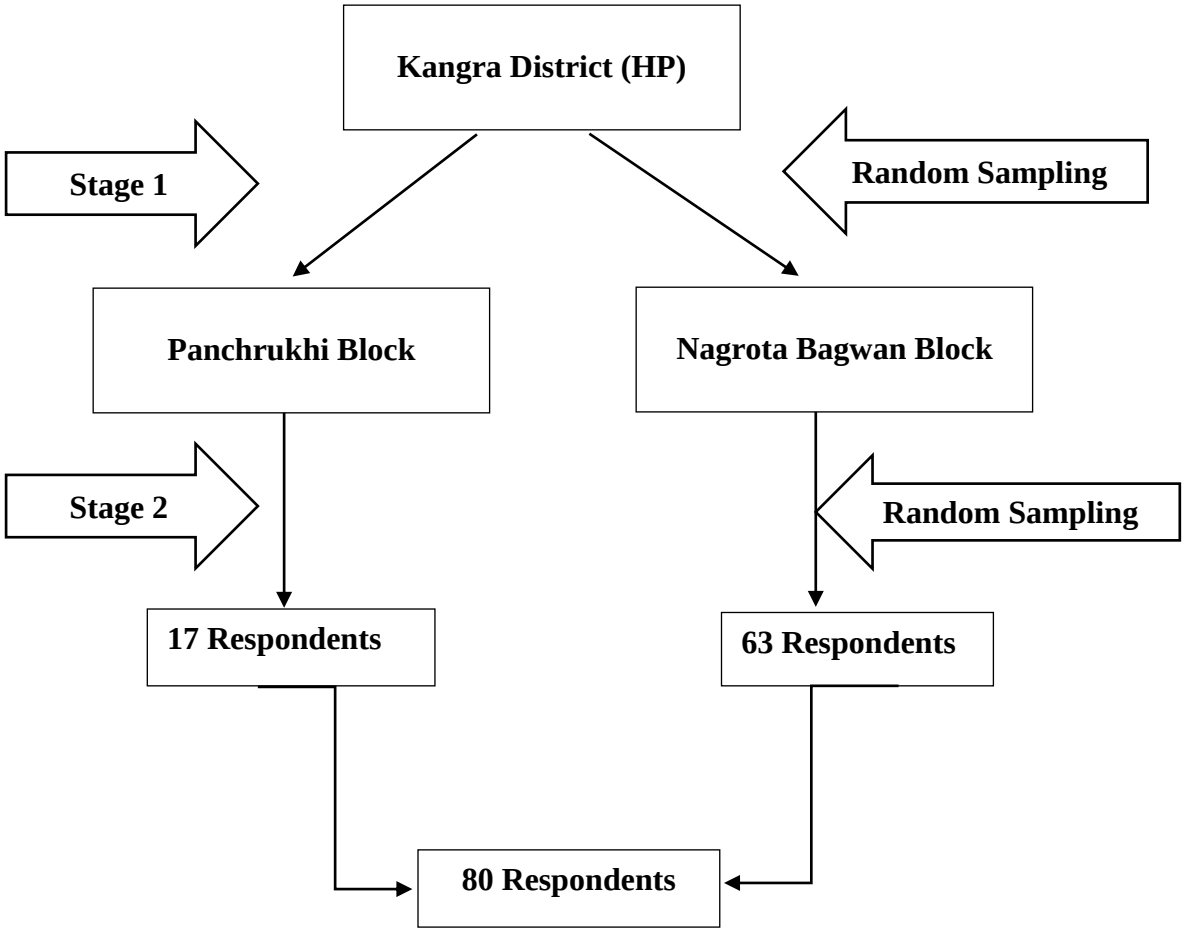

Figure 3.3: Schematic representation of sampling plan

3.32 Secondary data

The process of crop insurance in the country was accelerated in 1999-2000, with implementation of National Agriculture Insurance Scheme. Later on, keeping in view the requirements of the farmers in crop insurance, various other schemes like WBCIS (2007-08), MNAIS (2008-09) PMFBY (2016-17) and RWBCIS (2015-16) were also implemented in the country except the schemes which have been implemented by the states. Thus, an attempt has been made to collect scheme-wise information with respect to the number of farmers covered under crop insurance, crop area insured, claim settled, compensation paid to the farmers, etc. for India, Himachal Pradesh and Kangra district from various sources like reports of departmental/banks, websites, etc. for the period of 2000-01 to 2019-20, 1999-2000 to 2019-20 and 2017-18 to 2019-20, respectively.

3.4 Analytical Framework

The primary and secondary data so collected were compiled in an excel worksheet for further analysis to meet out the requirements of the specific objectives of the study. The simple tabular technique has been used for analysis and the results have been presented by working out the averages, percentages, ratios, indices, etc. by using suitable mathematical and statistical tools. The important tools used are as under:

3.4.1 Sex ratio

The role of gender cannot be overlooked, as the female workforce is dominant in hill agriculture. Sex ratio represents the number of females per thousand males and was calculated for the sample population by using the following formula:

$$\text{Sex Ratio} = \frac{\text{Total population of females}}{\text{Total population of males}} \times 1000$$

3.4.2 Literacy rate:

The literacy rate is an important factor among others that determines the quality of human resources available in the sample households. It is estimated by deducting the population below five years of age (non-school going) from the total sample population.

$$\text{Literacy rate (per cent)} = \frac{\text{Total number of illiterate persons}}{\text{Total population} - \text{population below 5 years}} \times 100$$

3.4.3 Composition of family:

The sample population was categorized into active workers and dependent members depending on their age and involvement in farming activities. The figures of dependent population and active workers available on per farm basis were estimated as under:

3.4.3.1 Dependent population

They were the family members whose contribution in the farm activities was quite low. This includes the elder persons (above 60 years) and the family members who were less than 15 years. During the survey, it was also found that the family members in the age group of 15 to 25 years of age were mostly college going (70 per cent), and also considered dependent. The dependent population was computed as under:

Dependent Population = Population below 15 years of age + population above 60 years of age + 70 per cent population of 15-25 years.

3.4.3.2 Active workforce population

This represents the population whose contribution in the farming operations was significant. The population between the age group of 25-60 years was considered as active workers. In addition to this, the fraction of population (30 per cent) in the age group of 15 to 25 years who had left the school/college was also considered as active workers. The active workers were estimated by the following formula:

Active workforce population = Population between 25 years of age to 60 years of age + 30 per cent population of 15- 25 years.

3.4.4 Cropping pattern

The cropping pattern refers to the proportion of area under various crops to the total cropped area during a particular agricultural year. The cropping pattern of the sample households for the agricultural year 2019-20 has been worked out by using following formula:

$$Pi = \frac{Ai}{At} \times 100$$

where,

Pi = Proportion of area under i^{th} crop

Ai = Actual area under i^{th} crop (ha.)

At = Total cropped area during the year on sample farm (ha.)

3.4.5 Cropping intensity

The cropping intensity indicates the degree of using cultivated area during a particular year. It has been estimated as a ratio of total cropped area to the net sown area and expressed in percentage terms.

$$\text{Cropping intensity (per cent)} = \frac{\text{Total cropped area (ha)}}{\text{Net sown area (ha)}} \times 100$$

3.4.6 Measurement of risk:

The risk associated with crop production pertains to the elements like production, price, institutional, human and financial risk. The extent and occurrence of these elements of risk varies across the farmers and regions. Accordingly, the perceptions of the respondents to particular type of risk element maybe none, low, medium, high and very high. Thus, the perceptions of the farmers for different risk elements were obtained and following measures were estimated:

3.4.6.1 Mean Relevance Percentage (MRP)

It is the number of respondents who scored the statements as low, medium, high and very high, which was converted into percentage by using:

$$\text{MRP}=\frac{\text{Frequency Score}}{\text{Number of respondents}}*100$$

3.4.6.2 Mean Relevance (MR)

It is the ratio of actual score obtained to the maximum possible scores (MPS) obtainable for each statement. The extent of risk of none, low, medium, high and very high were given weights of one, two, three, four and five, respectively and the mean relevance was calculated using the following formula:

$$\text{MR}= \frac{5*VH+4*H+3*M+2*L+1*N}{5*80}$$

where;

VH=Very high H= High M=Medium L= Low N=None

3.4.6.3 Mean Relevance Score (MRS)

It is the ratio of actual score obtained by the statements to the number of respondents. On the basis of the score thus obtained, the various forms of risks were arranged in an increasing order and their importance in the form of relevance was assessed. The MRS was calculated using the formula:

$$Mean\ Relevance\ Score\ (MRS) = \frac{5 \text{ x } VH + 4 \text{ x } H + 3 \text{ x} M + 2 \text{ x } L + 1 \text{ x } N}{80}$$

where,

VH, H, M, L and N represent the number of respondents under Very High, High, Medium, Low and None degree of risk, respectively

3.4.7 Growth Rate:

The time series data pertaining to the number of insurers, area insured, cost of insurance and compensation under different crop insurance schemes have been collected from various sources. In order to estimate the growth of these variables of crop insurance, compound and simple growth rates were estimated;

3.4.7.1 Compound Growth Rate:

The variables (cost, coverage and compensation) for which data was available for more than five years, compound growth rates were calculated using the following formula:

$$y = ab^x$$

In linear form of this equation is:

$$\text{Log } y = \text{Log } a + x \text{ Log } b$$

where,

y = dependent variable under consideration

x= Time and b= (1+r)

r is the compound growth rate. In terms of percentage, r is worked out as:

$$CGR\ (r) = (b-1) \times 100$$

The standard error (S.E.) of the compound growth rate has been worked out by using the following formula:

$$\frac{100b}{log10e}\sqrt{\frac{\log \sum y^2 - \log a \log \sum y - logb \sum x \log y}{(n-2)[\sum x^2 - \frac{(\sum x)^2}{n}]}}$$

where,

n is the number of observations

Student 't'distribution was used to test the significance of growth rates as:

t_{cal} = r/SE(r)

3.4.7.2 Simple Growth Rate:

Simple growth rates were calculated for the variables for which data were available for five or less than five years:

$$Simple\ growth\ rate\ (sgr) = \frac{(Vf - Vb) * 100/Vb}{n}$$

where,

Vf= Final year value

Vb= Base year value

n = Number of years in data series

3.4.8 Garrett's method of ranking:

This technique was used to rank the problems faced by the farmers. The method was used to convert the ranks of the problems into the numerical scores. The main benefit of this method over a basic frequency distribution is that the constraints are ordered according to the importance of the constraints from the respondents' perspective. As a result, different ranks can be assigned to the same number of respondents on two or more constraints. Garrett's formula for converting ranks into per cent is given by:

$$\text{Per cent position} = \frac{100 \times (R_{ij} - 0.5)}{N_j}$$

where,

R_{ij}= Rank given for i^{th} factor by j^{th} individual

N_j = Number of factors ranked by j^{th} individual

The per cent position of each rank was converted into scores referring to the table given by Garrett and Woodworth (1969). For each problem individual respondent scores were put together and divided by the total number of respondents for whom scores were

added. These mean scores for all the factors were arranged in descending order and most important problems were identified through the ranks assigned.

3.4.9 Terminology used in the study:

Insurance: Insurance is a mechanism that protects one from a slight chance of suffering a huge unexpected loss. It is a method of transferring and sharing risk in which losses sustained by a few are covered by funds acquired via tiny contributions made by many others who are exposed to similar risks. Insurance is not a means of making money; rather, it is a means of compensating an individual or corporation for unforeseen losses that could otherwise result in financial ruin.

Crop insurance: Crop insurance protects farmers from financial losses resulting from crop failures or losses caused by identified or unnamed risks beyond their control.

Sum insured: Individual farmer's sum insured is equal to the scale of finance per hectare multiplied by the area of the notified crop sought for insurance by the farmer. The term "area under cultivation" must always be expressed in terms of "hectares." Irrigated and non-irrigated lands may have separate sums insured. Scale of Finance is decided by the District Level Technical Committee.

Premium: The amount of insurance charges that an insurer must pay is called premium.

Loanee farmers: Farmers who have had agricultural loans sanctioned or disbursed by banks or financial institutions are referred to as loanee farmers.

Crop cutting experiments: Crop cutting experiments (CCE) have long been used to estimate agricultural production by obtaining dependable average yield rates. The majority of them are carried out by district/subdivision-level officials from the involved state governments' revenue, economics and statistics, or agriculture departments. The field where a CCE will take place is meant to be chosen using scientific sampling. The crop is then harvested, threshed, winnowed and weighed in a well-marked section of this field. If the produce is wet, it must be dried first before being weighed.

Threshold yield: The Threshold Yield (TY) or guaranteed yield for a crop in an insurance unit is the moving average of the previous three years average yield for rice and wheat and five years average yield for other crops, multiplied by the level of indemnity.

For all crops (cereals, millets, pulses, oilseeds and annual commercial / annual horticultural crops), three levels of indemnity, namely 90 per cent, 80per cent and 60per cent, corresponding to Low Risk, Medium Risk and High Risk areas, shall be available based on Coefficient of Variation (C.V.) in yield of the previous 10 years' data.

Actual yield: The insured crop's actual yield per hectare is computed using the required number of crop cutting experiments in the insured season for a specific area and within the policy period.

Nature of coverage and indemnity: If the 'Actual Yield' (AY) per hectare of the insured crop for the defined region falls short of the stated 'Threshold Yield' (TY) in the covered season, all insured farmers cultivating that crop in the defined area are judged to have incurred a yield deficit. The scheme aims to give protection against such an occurrence.
'Indemnity' shall be calculated as per the following formula:

$$\frac{Shortfall\ in\ yield}{Threshold\ yield} * Sum\ Insured$$

Shortfall in Yield = 'Threshold Yield - Actual Yield' for the defined area

3.4.10 Limitations of the study:

The study has been carried out by adopting a scientific methodology. The crop insurance has been implemented throughout the state having varying degree of crop production risks but due the time and budget constraints, the sample size was too small. Since, the sample as well as the study area were relatively small, the results may be applicable for area having similar characteristics. The responses of the respondents were entirely based on their memory as no systematic records with respect to area insured, production, premium paid, etc. were maintained by them. Moreover, the survey work of the study was carried out during the COVID-19 epidemic period, which may also have affected the responses of respondents. However every possible effort has been made to treat the respondents politely, biasness was minimized through scientific sampling and results have been presented in averages and as such any discrepancies in the findings if any, would be negligible.

4. RESULTS AND DISCUSSION

This chapter holds immense importance and focuses on the results obtained based on the research conducted in the study area. The results of the study have been presented in this chapter systematically under the following broad headings:

4.1 Description of the study area
4.2 Socio-economic profile of the sample households
4.3 Measurement of risk and uncertainty
4.4 Cost, coverage and compensation of crop insurance
4.5 Problems faced by farmers and stakeholders in crop insurance

4.1 Description of the study area

Himachal Pradesh, right in the lap of the Himalayas is popularly known as *Dev Bhoomi and Fruit Bowl* of India. Since 1956, it was a union territory and became a full-fledged 18th state of India on 25th January 1971. With an area of 55,673 sq. km, Himachal Pradesh is one of the smaller states of India and ranks 17th in terms of the area. The state accounts for 1.7 per cent of the total geographical area. The state is known for its quality fruit production especially apple, pomegranate, etc. The weather of the state also favours the production of off-season vegetables, herbs and spices. The state has twelve districts and Kangra holds the first rank in terms of population. The district not only has the highest number of villages among the twelve districts but also stands at the first position in terms of its working force. The district has nineteen tehsils and comprises fifteen developmental blocks which are Kangra, Nagrota Bagwan, Rait, Baijnath, Dehra, Bhawarna, Fatehpur, Indora, Lambagaon.Nurpur, Panchrukhi, Sulah, Pragpur, Nagrota Surian and Dharamshala. There are 748 panchayats and 3908 villages in the district. The district is also known for its attractive tourist destinations. Dharamshala, Palampur, Baijnath, Masroor and Jawalamukhi are famous places of interest for tourism. McLeodganj in Dharamshala, is a seat of the 14th Dalai Lama and it has become a place of international fame since 1966.

4.1.1 Location and boundaries

Kangra is situated in the Western Himalayas between latitude 31º2'-32º5' N, longitude 75º-75º45' E. The elevation of the district lies between 427 to 6401 meters above the sea level being lowest in the plains bordering the Gurdaspur district of Punjab in the west and the Una and Hamirpur districts to the south and highest being amidst the Dhauladhar mountain range which forms the border with Chamba and Kullu districts of the state.

4.1.2 Physiographic and geomorphology features

The district is endowed with a wide network of numerous perennial streams, famous river Beas which flows through the district covering a distance of about 94 kilometers. These rivers and streams are the major sources of irrigation that irrigate the valley and the river Beas flows through this valley. Kangra valley is a strike valley and extends from the foot of the Dhauladhar range to the south of river Beas. The highest peak on the Dhauladhar, White Mountain, marks the boundary between the valley and Chamba. The major physiographic units found in the district are:

- Wet sub-temperate zone.
- Humid sub-temperate zone.
- Humid sub-tropical zone and
- Sub humid subtropical zone.

4.1.3 Climate and Rainfall

In general, the district receives a good quantum of rainfall during the year. The snowfall is also received on higher altitudes of the district. The rainfall pattern of the district for a period of 11 years (2010-2020) has been compiled and depicted in Table 4.1. It may be observed from the table that during this period the annual rainfall varied between 1163.40 mm in 2017 to 2583.80 mm in 2018. The average annual rainfall in the district during the period was about 1812 mm with a coefficient of variation of 22.47 per cent. In general, the pattern of rainfall in the district was not throughout the year. The major portion of the total precipitation i.e. about 80 per cent is received during June-September. The district experiences summer during the period of April to June and winter during mid-November to mid-March where June and January are the hottest and coldest months respectively. The average maximum temperature is reported to range from about 35 °C in southern parts to around 25 °C in northern areas.

Table 4.1: Pattern of average annual rainfall in district Kangra (2010-2020)

Sr. No.	Year	Rainfall (mm)
1	2010	1619.60
2	2011	1928.80
3	2012	1854.50
4	2013	2398.00
5	2014	1522.30
6	2015	1744.00
7	2016	1430.00
8	2017	1163.40
9	2018	2583.80
10	2019	1914.90
11	2020	1778.40
	Average rainfall	1812.52
	CV (%)	22.47

Source: Statistical Outline of Himachal Pradesh (2018-19)

4.1.4 Soils

The soils of the district are mainly derived from lesser or outer Himalayas and Shivalik formations, where different rock types are found. Among these two sources, the former is composed of slate, gneiss, phyllites, sandstone and quartzite; the latter consists of calcareous conglomerates, sandstone, shale and unassorted alluvial deposits. The soils of the Himalayas are well developed with the presence of distinct A and B horizons while the soils of Shivalik formations have relatively less expressed horizons. The texture of soil also varies in both the formation types. Histosols (mainly composed of organic materials), ultisols (acidic soils), alfisols (soils having clay enriched subsoil), aridisols (or desert soils) and entisols (made of unconsolidated sediment or rock) are the main soil types found in the Kangra district.

4.1.5 Administrative set-up of district

The administrative setup of a region is very important to ensure overall development. Keeping this fact into consideration the district has been divided into 14 sub-divisions which account for about 20 per cent of the total sub-divisions of the state. For the effective implementation of various social welfare schemes of the centre and state government, there are 15 development blocks in the district which are supported by 748 Gram Panchayats. In addition to Gram Panchayats, there are 7 Municipal Councils and 15 Panchayat samitis. The district has 3908 revenue villages.

Table 4.2: Administrative set-up of Himachal Pradesh and Kangra district

Sr. No.	Particulars	Himachal Pradesh	Kangra
1	Tehsil	102	19
2	Sub-Tehsil	56	15
3	Sub-Divisions	69	14
4	Development Blocks	78	15
5	Panchayats	3226	748
6	Revenue Villages	20690	3908
7	Municipal Council	23	7

Source: Statistical Outline of Himachal Pradesh (2018-19)

4.1.6 Area and Population:

The details of the number of households and population of the district Kangra are presented in Table 4.3. The cursory glance at the table indicates that the district has 3,18,379 households having 15, 10,075 total human population accounting for 26.06 and 24.45 per cent of the total households and population of Himachal Pradesh, respectively. The table further reveals that among different blocks, Dehra block has the highest number of households (28,165) followed by the Nurpur (25,238). A similar trend can also be observed in case of population. It can be inferred by observing the data that the district is better off than the state with respect to the sex ratio (i.e. number of females per thousand males) i.e. 1025 in the district against 972 in Himachal Pradesh. Among the blocks of the district, Lambagaon block has the highest sex ratio (1190) followed by Sulah (1101) and the Indora block has the lowest sex ratio (917) followed by Dharamshala (946).

The scheduled caste and scheduled tribe population of the state were found to be 28 and 6.35 per cent of the total state's population and that of the district was 21.15 and 5.6 per cent, respectively. Among the blocks, SC and ST population ranges from 10.9 (Kangra) to 37.9 per cent (Panchrukhi) and 0.7 (Pragpur) to 16.59 per cent (Dharamshala), respectively. As far as the literacy rate was concerned, it was at 87.39 per cent in case district Kangra which is about 3 per cent point higher than that of state. It is highest in Pragpur block followed by Kangra i.e. about 88 and 87 per cent, respectively while the literacy rate was lowest in Baijnath block (81.49 per cent) followed by Indora (84.15 per cent).

Table 4.3: Pattern of human population in the study area and Himachal Pradesh

(Number)

Sr. No.	Particulars	Households	Population			Scheduled Cast	Scheduled Tribe	Sex ratio	Literacy Rate (%)
			Male	Female	Total				
1	HP	1221589	3481873	3382729	6176050	1729252	392126	972	82.20
2	KANGRA	318379	750591	759484	1510075	319385	84564	1025	85.42
3	The block-wise population of Kangra district								
I	Nurpur	25238	60307	58361	118668	25641	6508	984	85.67
ii	Indora	21482	54664	50687	105351	27940	4248	917	84.15
iii	Fatehpur	23376	55400	54548	109948	19681	1546	1013	85.23
iv	Nagrota Surian	21948	48550	50551	99101	18284	6291	1047	86.28
v	Pragpur	25932	55093	57596	112689	28828	857	1036	88.08
vi	Dehra	28165	61446	65358	126804	27040	1750	1069	86.16
vii	Kangra	22801	52414	52296	104710	11502	1421	1021	87.39
viii	Rait	22952	51148	52967	104115	24161	11054	1033	83.13
ix	Nagrota Bagwan	18381	41109	41896	83005	8395	2023	1039	86.64
x	Bhawarna	21328	45548	45828	91376	18458	15077	1006	85.36
xi	Lambagaon	19213	34998	41471	76469	23541	440	1190	85.07
xii	Baijnath	20524	45357	45017	90374	22472	12468	1035	81.49
xiii	Panchrukhi	14993	31464	31759	63223	23977	3388	1055	85.41
xiv	Sulah	16610	33192	36428	69620	13220	1825	1101	86.61
xv	Dharamshala	15436	34675	33666	68341	11662	11338	946	86.09

Source: Statistical Outline of Himachal Pradesh (2018-19)

Table 4.4: Land utilization pattern of Kangra district and Himachal Pradesh (ha)

Sr. No.	Particulars	HP	Kangra
1	Geographical Area	4577742	577681
2	Forest land	1125386	231518
		(24.58)	(40.08)
3	Miscellaneous tree crops & groves	66595	7474
		(1.45)	(1.29)
4	Permanent pastures & other grazing lands	1507965	84365
		(32.94)	(14.60)
5	Culturable waste	121714	27187
		(2.66)	(4.71)
6	Land put to nonagricultural uses	352407	75084
		(7.70)	(13.00)
7	Barren and un-culturable land	778998	19758
		(17.02)	(3.42)
8	Current fallows	55754	14111
		(1.22)	(2.44)
9	Other fallows	21367	1384
		(0.47)	(0.24)
10	Net area sown	547556	116800
		(11.96)	(20.22)
11	Area sown more than once	411667	123122
	Total cropped area	959223	239922

Source: Statistical Outline of Himachal Pradesh (2019-20)
Note: Figures in parentheses indicate the percentages to the total geographical area

4.1.7 Land utilization pattern

The total geographical area of the district is 5,739 sq. km which accounts for 10.30 per cent of the total geographical area of the state (55,673 sq. km). The land utilization pattern of the Kangra district is given in Table 4.4. It can be seen from the table that among the various land uses the area under forest was highest (231518 ha) accounting for about 40 per cent of the total geographical area of the district. The proportion of area under forest in the district was quite high as compared to state which is only about 24 per cent of the total geographical area of the state. The land put to non-agricultural uses, barren and un-culturable land accounted for about 16 and 25 per cent of the total geographical area of Kangra and Himachal Pradesh, respectively. The proportion of net area sown to total geographical area in the district is about 22 per cent while it was only about 12 per cent in case of the state as a whole. This can be attributed to the fact that a large tract of the area in the district is either close to the plain areas or most of it is in the form of valleys. The district has a cropping intensity of 185 per cent which is higher than state's (174 per cent). This reflects the fact that nearly two crops in a year are

commonly taken in a year in the district. The permanent pastures, the area under miscellaneous trees & groves, current and other fallows, accounted for 14.60, 4.71, 1.29, 2.44 and 0.24 per cent, respectively in case of Kangra district, while the corresponding figures for the state as a whole were at 32.94, 2.66, 1.45, 1.22 and 0.47 per cent, respectively.

Table 4.5: Area under major crops in Kangra district (ha)

Sr. No.	Particulars	2012-13	2019-20	% change
1	Wheat	92537	84667	-8.50
2	Maize	56790	56440	-0.62
3	Rice	36647	33915	-7.45
4	Barley	2036	2265	11.25
5	Ragi	28	2	-92.86
6	Pulses	3120	4068	30.38
7	Common Millets	618	96	-84.47
8	Chilies	2	3	50.00
9	Ginger	28	21	-25.00
10	Oilseeds	5140	3057	-40.53
11	Others	24884	55388	122.58
	Total	196946	184534	-6.30

Source: Statistical Outline of Himachal Pradesh (2018-19)

4.1.8 The area, production and productivity under major crops in Kangra:

The Table 4.5 depicts the area under various crops in the Kangra district of Himachal Pradesh. It can be clearly seen from the table that wheat crop occupied the highest area i.e. 84667 hectares followed by maize and rice i.e. 56440 and 33915 hectares, respectively in 2019-20 but the area under wheat, maize and paddy has decreased by 8.50, 0.62 and 7.45 per cent, respectively over 2012-13. The table further indicates that the area under ragi, common millets, ginger and oilseeds in 2019-20 decreased by 92.86, 84.47, 25.00 and 40.53, respectively over 2012-13 while the area increased by 11.25, 30.38 and 50 per cent in case of barley, pulses and chilies, respectively. The overall decrease in area under crops in 2019-20 was 6.3 per cent compared to 2012-13. As far production and productivity of crops were concerned, among the cereals wheat has highest productivity of. 2.25 t/ha which has increased by 27.12 per cent over the period of eight years (Table 4.6). In case of maize, the productivity increased from 1.88 t/ha in 2012-13 to 2.18 t/ha in 2019-20 while in rice it fell by 9.52 per cent. Among the various crops grown in the district, the highest increase of 242.59 per cent was achieved in case of productivity of pulses as it increased from 0.54 t/ha to 1.85 t/ha while there was a highest fall of 34 per

cent in chilies. Almost similar trend could be seen in the case of production of different crops. The production of wheat, maize and barley increased by 16.05, 15.46 and 37.76 per cent, respectively in 2019-20 over 2012-13 while the production of rice, ragi and common millets decreased by 16.21, 94.12 and 77.33 per cent, respectively during the same period.

Table 4.6: Production and productivity of major crops in Kangra

Sr. No.	Particulars	Production (tonne)		% change	Productivity (t/ha)		% change
		2012-13	2019-20		2012-13	2019-20	
1	Wheat	164134	190478	16.05	1.77	2.25	27.12
2	Maize	106784	123297	15.46	1.88	2.18	15.96
3	Rice	61478	51511	-16.21	1.68	1.52	-9.52
4	Barley	3173	4371	37.76	1.56	1.93	23.72
5	Ragi	34	2	-94.12	1.21	1	-17.36
6	Pulses	1698	7509	342.23	0.54	1.85	242.59
7	Common Millets	375	85	-77.33	0.61	0.89	45.90
8	Chilies	1	1	0	0.5	0.33	-34.00
9	Ginger	59	89	50.85	2.11	4.24	100.95
10	Oilseeds	2084	1814	-12.96	0.41	0.59	43.90

Source: Statistical Outline of Himachal Pradesh (2018-19)

Table 4.7: Livestock population in Kangra district of Himachal Pradesh

(Number)

Sr. No.	Livestock	Population
1	Cattle	359129
2	Buffaloes	149719
3	Sheep	84628
4	Goats	202694
5	Horses and ponies	3781
6	Mules	4068
7	Donkeys	390
8	Camels	16
9	Pigs	637
10	Yaks	54
11	Others	4
	Total	**805120**

Source: Livestock Census 2012.

4.1.9 Livestock population

The livestock population is an integral component of farming in all parts of Himachal Pradesh. The relationship between cropping pattern and livestock population goes hand in hand. The livestock population of the Kangra district as per the livestock census 2012 has been compiled in Table 4.7. It can be observed from the table that among the different livestock, the population of cattle was highest i.e. 3, 59,129 followed by

goats, buffaloes and sheep with a population of 2,02,694, 1,49,719 and 84,628, respectively. The population of mules, horses/ponies, donkeys camels was relatively low i.e. 4,068, 3,781 and 390, respectively. A meager population of pigs and yaks also inhabits in the district.

4.2 Socio-economic profile of sample households

The socio-economic characteristics of farm households play an important role in the management of farm as well as the adoption of schemes run by the government. The demographic characteristics like educational status family structure, land inventory and its utilization pattern, inventory of the farm buildings, machinery/implements, livestock, cropping pattern and production of different crops, etc. of the sample insurers are considered to be important. These factors are expected to exhibit the ongoing socio-economic scenario of the crop insurers, therefore, these parameters have been examined and presented in the following sections.

4.2.1 Age-wise distribution of the sample population

A household consists of individuals of various age groups, gender (male & female), physical and skill capabilities etc. Age-wise distribution of population is important because it indicates the availability of active workforce on the farm as well as the family composition with respect to adults, children and senior citizens. The young are believed to be more aware owing to their more exposure to the technology than the older population.

4.2.1.1 Age-wise distribution of heads of families

The heads of the families are mainly involved in decision making, organizing and managing the various tasks whether household or agricultural. The age groups to which the heads of the family belong, becomes important as it reflects the kind of exposure they have towards technology and the level of awareness. The age-wise distribution of heads of the families of the sample farm-households is given in Table 4.8. The table shows that the majority of the female heads (83.33per cent) of the families belong to the age group of 40-60 years. The majority of heads (57.50per cent) of the families belong to the age group of 40-60 years followed by the age group >60 years accounting for 35 per cent total heads of the families. The data further indicates that none of the heads of the families in the sample was less than 25 years of age and the proportion of heads of the families in 25-40

years was only 7.50 per cent of the total sample households. The analysis clearly indicates that the heading of the families was dominated by males and the majority of heads were middle-aged i.e. in the age group of 40-60 years.

Table 4.8: Age-wise distribution of heads of families of sample households

Sr. No.	Age Group (in years)	Male		Female		Total	
		Number	Per cent	Number	Per cent	Number	Per cent
1	<25	0	0	0	0	0	0
2	25-40	6	8.11	0	0	6	7.50
3	40-60	41	55.41	5	83.33	46	57.50
4	>60	27	36.49	1	16.67	28	35.00
	Total	74	100.00	6	100.00	80	100.00

4.2.1.2 Age-wise distribution of family members

The age-wise distribution of the family members is as important as that of the heads of the family members because the various farm activities including decision making involve the family members as a unit and gives an idea about the availability of family labour to carry out various farm operations. The age-wise distribution of the family members has been examined and given in Table 4.9. It can be clearly seen from the table that in the sample farm population, highest proportion of total population i.e about 30 per cent falls in the age group 40-60 years followed by 23.23 per cent which falls in the age group of more than 60 years age group and 20 per cent belonged to the age group of 25-40 years. The proportion of population in the age group of less than 15 years was 19.86 per cent.

The age wise distribution also indicates the composition of the family with respect to active workers and dependent population. Depending on the age of the family members, they were categorized into workers and dependent population (Table 4.10). The population above 60 years and below 15 years was considered as dependent as their contribution in the farming was not significant. Similarly, about 70 per cent of the population in the age group of 15-25 years were school/college going, hence were also considered as dependent. The population in the age group of 25-60 years and 30 per cent of the population in age group of 15-25 years, who have left the school/college, were considered as active workers. The table indicates that the average size of the family was 5.41 because there was prevalence of joint and nucleus family systems in the study area. On an average, on sample farms there were 2.89 active workers while 2.52 members/farm were dependent, accounting for 53.42 and 46.58 per cent of total family members,

respectively. The active male workforce present on the farm was 52.57 per cent and that of the female was 54.28 per cent. The male and female dependent population was 47.43 and 45.72 per cent, respectively. The male and female dependency ratio in case of male and female was estimated at 0.90 and 0.84, respectively while for total population it found to be at 0.87. The sex ratio i.e females per thousand males of the sample population was 986.

Table 4.9: Age wise distribution of family members of sample households

Sr. No.	Age group (in years)	Male		Female		Total	
		Number	Per cent	Number	Per cent	Number	Per cent
1	<15	45	20.64	41	19.07	86	19.86
2	15-25	25	11.47	23	10.70	48	11.09
3	25-40	39	17.89	49	22.79	88	20.32
4	40-60	68	31.19	61	28.37	129	29.79
5	>60	41	28.47	41	19.62	82	23.23
	Total	218	100	215	100.00	433	100.00

Table 4.10: Active work force availability on sample households

Sr. No.	Particulars	Male	Female	Total
1	Active workers	1.43	1.46	2.89
		(52.57)	(54.28)	(53.42)
2	Dependent Population	1.29	1.23	2.52
		(47.43)	(45.72)	(46.58)
3	Family Size	2.72	2.69	5.41
		(100.00)	(100.00)	
4	Dependency ratio	0.90	0.84	0.87
5	Sex Ratio			986

4.2.2 Educational status of the sample population

Education plays a vital role in uplifting the socio-economic status of the family and society as a whole. Education brings awareness among the individuals and plays an important role in adoption of suitable strategies to mitigate risks and to implement the new technologies to allocate the resources efficiently and maximizing the returns per unit of input. Education ensures that the farmer is well prepared to take suitable decisions by using up-to-date information with respect to various government schemes and technology.

4.2.2.1 Heads of the families

The education is of vital importance to the heads of the families as they are responsible for ultimate decision-making on the farm. Being cognizant of this view the

educational status of the heads of the families has been depicted in Table 4.11. On the sample farms the fraction of the heads of the families studied up to secondary level was highest (36.25 per cent) followed by middle (30.00 per cent) and matriculation (13.75per cent). Surprisingly, the proportion of the heads of the families having diploma, graduation and post-graduation was quite low i.e. 1.25, 5.00 and 3.75 per cent, respectively. It can be concluded that the educational status of the sample heads of the families was fairly good as only 2.50 per cent of the heads were illiterate.

Table 4.11: Educational status of the heads of the families on sample households

Sr. No.	Particulars	Male		Female		Total	
		Number	Per cent	Number	Per cent	Number	Per cent
1	Illiterate	1	1.45	1	16.67	2	2.50
2	Primary	6	8.70	0	0.00	6	7.50
3	Middle	22	29.73	2	33.33	24	30.00
4	Matriculation	10	14.49	1	16.67	11	13.75
5	Senior Secondary	27	39.13	2	33.33	29	36.25
6	Diploma	1	1.45	0	0.00	1	1.25
7	Graduation	4	5.80	0	0.00	4	5.00
8	PG	3	4.35	0	0.00	3	3.75
	Total	74	100.00	6	100.00	80	100.00
	Literacy Rate (%)		96.06		87.88		92.02

4.2.2.2 Family members

Education of the family members becomes important as family members play an important role in acquainting the head with the pros and cons of the decision he/she makes. The Table 4.12 represents the educational status of the family members on the sample farms. It can be clearly seen from the table that the illiterate population on the sample farms was only 6.24 per cent. The fraction of the population educated up to primary, middle and matriculation were 6.70, 9.93 and 9.47 per cent, respectively. There were 15 per cent graduates in the sample population and 3.46 per cent of people were post graduates. The table further indicates that on an average 21.48 per cent of the population on the sample farm had studied up to the secondary level which was highest. The overall literacy rate of the sample was quite good i.e. 85.39 per cent. However, the literacy rate of females was relatively low (80.93 per cent) to their male counterpart (89.69 per cent).

Table 4.12: Educational status of family members of sample households

Sr. No.	Particulars	Male		Female		Total	
		Number	Per cent	Number	Per cent	Number	Per cent
1	Illiterate	8	3.59	24	11.16	32	7.31
2	Primary	14	6.28	15	6.98	29	6.62
3	Middle	25	11.21	18	8.37	43	9.82
4	Matriculation	19	8.52	22	10.23	41	9.36
5	Secondary	56	25.11	37	17.21	93	21.23
6	Diploma	1	0.45	4	1.86	5	1.14
7	Graduation	29	13	33	15.35	62	14.16
8	PG	7	3.14	8	3.72	15	3.42
9	SG	49	21.97	37	17.21	86	19.63
10	NS	15	6.73	17	7.91	32	7.31
	Total	223	100.00	215	100.00	438	100.00
	Literacy Rate		89.69		80.93		85.39

Note: PG- Post graduates, SG: School going, NS: Non-school going

4.2.3 Occupational pattern of sample farms

The occupational pattern of the sample households indicates the various activities in which the respondents and their family members are involved in. Along with agriculture, the farmers were associated with some of the off-farm occupations to supplement their family income. The occupational pattern of the heads of the families and their family members on the sample households has been discussed as under:

4.2.3.1 Heads of the families

The occupational pattern of the heads of families has been demonstrated in Table 4.13. The table shows that a large proportion of the heads i.e. 60 per cent was involved in agriculture as the main occupation. Business was reported to be the major occupation for about 16 per cent of the heads while government job was major occupation of about 9 per cent of the heads. As far as the subsidiary occupation was concerned, among different occupations, agriculture was also the major subsidiary occupation of about 55 per cent of the households followed by pension and business.

4.2.3.2 Family members of the respondents

The occupational pattern of the family members on the sample farms has been depicted in Table (4.14). It can be seen from the table that the majority of the population on sample farms (about 40 per cent) was involved in agricultural activities as major

occupation followed by 17.88 per cent in private job, 16.56 per cent in business and 13.91 per cent in government service/ pension. On the other hand, a majority of the population i.e. 82.78 per cent was involved in agriculture as subsidiary occupation followed by 16 per cent in government service/pension. This indicates that in order to meet the diverse needs of households, the family members of the sample households were performing diversified activities as per their capabilities.

Table 4.13: Occupational pattern of the heads of the families of sample households

Sr. No.	Particulars	Main		Subsidiary	
		Number	Per cent	Number	Per cent
1	Agriculture	48	60.00	31	55.36
2	Business	13	16.25	8	14.28
3	Government	7	8.75	2	3.57
4	Pension	0	0.00	10	17.86
5	Other	12	15.00	5	8.93
	Total	80	100.00	56	100.00

Table 4.14: Occupational pattern of the family members of sample households

Sr. No.	Particulars	Main		Subsidiary	
		Number	Per cent	Number	Per cent
1	Agriculture	60	39.74	149	82.78
2	Business	25	16.56	8	4.44
3	Govt. service/pension	21	13.91	16	8.89
4	Private job	27	17.88	0	0.00
5	Labour	18	11.92	7	3.89
	Total	151	100	180	100.00

4.2.4 Farm inventories on the sample farms

In order to undertake the different farm operations, a farm household needs to maintain the inventory of various assets. In general, inventories of the farm households include land, residential and non-residential buildings (cattle shed, storehouse), farm machinery, livestock, etc. The magnitude of these assets also reflects the socio-economic status of any family in society. The status and pattern of farm inventories of sample households have been examined and presented in the following section;

4.2.4.1 Farm buildings

The Table 4.15 presents the inventory of buildings and investments made on them for the sample households. It can be seen from the table that on average, sample households had one residential building and 0.7 cattle shed. Out of total buildings, 60.23

per cent were residential buildings and 39.77 per cent were cattle sheds. It may be observed from the table that about 72 per cent residential houses were *pucca* and about 4 per cent were of mixed type. The average investment on the buildings accounted for Rs. 7, 34,414 per farm. The major portion of the total investment on buildings was done on residential buildings accounting for about 92 per cent and the remaining was done on the cattle sheds.

Table 4.15: Inventory of farm buildings on sample households

Sr. No.	Particulars	Number	per cent	Value (Rs.)	per cent
1	Residential House	1.06	60.23	674750	91.88
i	*Kuccha*	0.26	14.77	78560	10.70
ii	*Pucca*	0.76	43.18	278300	37.89
iii	Mixed	0.04	2.27	317890	43.28
2	Cattle shed	0.7	39.77	59664	8.12
i	*Kuccha*	0.45	25.57	17862	2.43
ii	*Pucca*	0.21	11.93	29254	3.98
iii	Mixed	0.04	2.27	12548	1.71
	Total	1.76	100.00	734414	100.00

4.2.4.2 Farm machinery and implements

Farm machinery plays an important role in reducing the drudgery of the farmers. Since the times of primitive agriculture, there has been a significant improvement in the technology of farm tools and implements involved in agriculture. Farm tools and machineries help the farmer in making many agricultural operations easier and at the same time save considerable effort. The farm machinery and implements possessed by average sample household have been presented in Table 4.16. The table indicates that on an average, a household in absolute numbers has 6.93 machinery/tools/implements on the farm. In contrast to the major implements, minor implements were quite high i.e. 6.16 which accounted for 89.17 per cent of the total implements. It can be clearly seen from the table that among minor implements sickle had the highest share of 48.19 per cent in total inventory followed by hoe and rake. Further, the data indicate that among the major implements power tiller had the highest share i.e. 3.79 per cent followed by the chaff cutter and the sprayer. On average, per farm investment on the machinery was Rs. 29,370/farm. It is interesting to note that the trend of major and minor implements got reversed when the value of implements is taken into account. The major implements account for about 96.50 per cent despite their less number. It is mainly because the major implements were quite costly as compared to the minor tools used in farming.

Table 4.16: Inventory of farm machinery, tools and implements on sample farms

Sr. No.	Particulars	Number	per cent	Value (Rs.)	per cent
1	Major farm machinery	0.75	10.82	28361	96.56
i.	Tractor	0.03	0.43	15000	51.07
ii.	Power tiller	0.26	3.75	11813	40.22
iii.	Thresher	0	0	0	0
iv.	Chaff-cutter	0.24	3.46	1188	4.04
v.	Sprayer	0.23	3.32	360	1.23
vi.	Sprinklers	0	0	0	0
2	Minor farm implements	6.18	89.18	1009	3.44
i.	Wooden plough	0.33	4.76	228	0.78
ii.	Spade	0.38	5.48	94	0.32
iii.	Hoe	0.98	14.14	195	0.66
iv.	Rake	0.74	10.68	110	0.37
v.	Sickle	3.34	48.2	267	0.91
vi.	Axe	0.43	6.2	115	0.39
vii.	Others	0	0	0	0
	Total	6.93	100.00	29370	100.00

Table 4.17: Inventory and investment pattern of livestock on sample farms

Sr. No.	Particulars	Quantity (Per farm)		Value (Rs/Farm)	
		Number	per cent	Value	per cent
1	Cattle	1.17	66.48	35936.06	88.11
i	**Local**	0.22	18.80	2870.30	7.99
a	Dry	0.04	18.18	338.60	11.80
b	In milk	0.18	81.82	2531.70	88.20
ii	**Improved**	0.95	81.20	33065.76	92.01
a	Dry	0.04	4.21	782.60	2.37
b	In milk	0.91	95.79	32283.16	97.63
2	Buffalo	0.05	2.84	2084.12	5.12
i	In milk	0.04	80.00	1834.12	88.00
ii	Dry	0.01	20.00	250.00	12.00
3	Bullocks	0.10	5.68	459.40	1.13
4	Heifers	0.10	5.68	786.90	1.93
5	Calves	0.05	2.84	184.20	0.45
6	Sheep & Goat	0.29	16.48	13360	3.28
7	Poultry	0.04	2.27	10.20	0.03
	Total	1.76	100.00	40786.68	100.00

4.2.4.3 Livestock Inventory

The majority of land holdings in the study area are small and marginal, which restrict the scopes of increasing farm income from crop production alone. Thus, rearing of livestock is one of the options for increasing the farm income and employment generation opportunities. It also provides stability to the farm income as this component is less

vulnerable to vagaries of nature compared to crops. The livestock inventory of the sample households was examined and presented in Table 4.17. It may be observed from the table that the average size of the livestock unit was quite small. It was estimated at 1.76, in which the number of cattle was found to be highest i.e. 1.17 accounting for 66.48 per cent of the total livestock population. Among cattle, the major portion was of improved breeds (Jersey, Holstein Friesian) i.e., 81.20 per cent and local breeds accounted for 18.80 per cent. The table indicates that out of the total local cattle population, 81.82 per cent were in milk, 18.18 per cent were dry and while among improved breeds 95.79 per cent were in milk and 4.21 per cent were dry. The data further reveals that 2.84 per cent of the total cattle population accounted for buffalo and calves each, 5.68 per cent represented bullocks and heifers each. The meager population of bullock, buffalo and heifer may be attributed mainly to the fact that the average size of holding on the sample farms was quite low, therefore they were not able to maintain larger units due to scarcity of fodder. The majority of the respondents were of the view that the ploughing and transportation of the crops were performed through the use of mechanical power and there is no need of keeping bullocks. Thus, it can be concluded that the sample households mainly rear milch animals, especially to meet the household requirement for milk and milk products. Apart from these, few sample households had also kept sheep, goat and poultry but their proportion was quite low. The total investment on livestock unit was estimated at Rs. 40,787/farm.

2.3.5 Land inventory and utilization pattern

The land is the basic requirement for undertaking various farm activities. The size of the land holding determines the selection as well as the scale of farm enterprises. Over time, on account of the increase in population and division of holdings, the average size of holdings has declined continuously. The small size of the holdings restricts the scope of diversification and expansion of enterprises. The Table 4.18 presents the land inventory and its utilization pattern on the sample households. It may be observed from the table that the average land holding on the sample farms was low i.e. 0.53 ha. The irrigation facilities in the study area were found to be good as about 52.02 per cent of the total land holding was irrigated i.e. 0.28 ha. It was reported by the majority of the farmers that in the past they used to keep land fallow on account of lack of irrigation facilities,

which improved a lot in the current scenario. The available land was being utilized for crop production, forest, pasture and grasslands, orchards and constructing buildings.

Table 4.18: Land inventory and utilization pattern on sample farms (ha)

Sr. No.	Particulars	Irrigated		Rainfed		Total	
		Area	Per cent	Area	Per cent	Area	Per cent
1	**Owned**	0.2773	-	0.2557	-	0.533	-
2	**Leased in**	-	-	-	-	-	-
3	**Leased out**	-	-	-	-	-	-
4	**Size of the landholding**	0.2773	100.00	0.2557	100.00	0.533	100.00
5	**Land Utilization**						
i	Cultivated Land	0.2408	86.84	0.1333	52.13	0.3741	70.19
ii	Forest	0	0	0.0005	0.20	0.0005	0.09
iii	Pasture	0.002	0.72	0.005	1.96	0.007	1.31
iv	Orchard	0.0345	12.44	0.056	21.90	0.09	16.89
v	Wasteland (Fallow)	0.00	0.00	0.06	23.03	0.0629	11.80
vi	Misc. (Forest, Grasses, Trees)	0	0	0.0005	0.20	0.0005	0.09
vii	Area under buildings	0	0	0.0015	0.59	0.002	0.38
viii	Others	0	0	0	0	0	0
	Total	0.2773	100.00	0.2557	100.00	0.533	100.00

Among the different categories of land uses a high proportion of land was allocated for the cultivation of crops which was estimated at 0.37 ha accounting for about 70 per cent of the total land holding. The field and horticultural crops were given priority in terms of land utilization. The area under orchards was estimated at 0.09 ha accounting for 16.89 per cent of the total land holding. The important category with respect to the area was wastelands which accounted for about 12 per cent of the total holding. The topography of the study area was undulating and comprises hilly terrain hence the land can't be put under cultivation or plantations of fruits crops. The area under pastures & grasslands, buildings, forests, etc. was quite low i.e. 1.31, 0.38 and 0.09 per cent of the total land holding, respectively. From the above discussion, it may be concluded that the average size of land holding the area was small and major portion of the cultivated land was quite i.e. 70 per cent of the cultivated.

4.2.6 Cropping pattern

The cropping pattern of a region represents the allocation of total cropped area among various field crops during an agricultural year. It indicates the relative importance of crops in a particular region and helps the different stakeholders in planning for arranging farm inputs and disposal produce. The cropping pattern of the sample farms

has been shown in Table 4.19. The cursory look at the table reveals that on average the total cropped area of the sample house was 0.7605 ha, while the net cultivated area was 0.3741 hectare and cropping intensity was around 203 per cent.

Table 4.19: Cropping pattern on sample farms

Sr. No	Particulars	Area	Percent
A	***Kharif***	0.3774	49.63
1	**Cereals**		
i	Maize	0.0758	9.97
ii	Paddy	0.2027	26.65
2	**Pulses**	-	-
3	**Oilseeds**		
i.	Sesamum	-	-
ii.	Soybean	0.0005	0.07
4	**Vegetables**	0.0747	9.82
i	Brinjal	0.0198	2.60
ii	Cucurbits	0.0297	3.91
iii	Okra	0.0152	2.00
iv	Others vegetables	0.0100	1.31
5	**Fodder**	0.0237	3.12
i	Sorghum	0.0187	2.46
ii	Bajra	0.0050	0.66
B	***Rabi***	0.3831	50.37
i	Wheat	0.2947	38.75
ii	Barley	-	-
2	**Pulses**	-	-
3	**Oilseeds**	-	-
i	Mustard	0.0005	0.07
ii	Toria	-	-
4	**Vegetables**	0.0737	9.69
i	Cauliflower	0.0380	5.00
ii	Cabbage	0.0198	2.60
iii	Garlic	0.0049	0.64
iv	Others	0.0110	1.45
5	**Fodder**	0.0142	1.87
i	Oats	0.0092	1.21
ii	Berseem	0.0050	0.66
	Total cropped area	0.7605	100.00
	Net Cultivated Area	0.3741	
	Cropping Intensity		203.29

The sample farmers were growing a wide range of field crops like cereals, oilseeds, vegetables and fodder crops. It can be observed from the table that the cropping pattern of the sample households were dominated by cereal crops (0.5762 ha) as these accounted for 75.37 per cent of the total cropped area. In *kharif* season 26.65 per cent area was occupied by paddy which was the highest followed by maize and vegetables. In *kharif* season, brinjal, cucurbits and okra were the main vegetables grown by the farmers which accounted for 9.82 per cent of the total cropped area. In *rabi* season, wheat was the main crop grown on 38.75 per cent of the total cropped area. The vegetables such as cauliflower, cabbage, garlic, etc. were grown in 9.69 per cent of the area.

In addition to cereals and vegetable crops the farmers have also grown fodder crops like sorghum, bajra in *kharif* and berseem and oats in *rabi* season. On an average these fodder crops accounted for 7.45 per cent of the total cropped area comprising 5.58 per cent in *kharif and* 1.87 per cent of total cropped in *rabi.* The table further indicates that the farmers were not found to grow pulses and oilseeds in both the seasons except mustard in *rabi* season which accounted for negligible area (0.07 per cent). The farmers were of the view that the productivity of these crops is quite low and they are easily getting pulses and edible oil under public distribution system.

4.2.7 Production and productivity of major crops on the sample farms:

The production and productivity of major crops grown on the sample farms have been presented in Table 4.20. The production of different crops on average farm of sample households indicates that among different crops the total production of wheat was highest. It was estimated at 8.33 q/farm followed by paddy (7.71 q/farm). Among cereals the production of maize was lowest i.e. 2.19 q/farm. As far as the production of vegetables was concerned, it ranged between 0.21 q/farm in case of garlic to 4.85 q/farm of cucurbits. It was reported by the majority of the farmers that more than 80 per cent of the vegetable produce was marketed in the market whereas the major portion of cereals was consumed at home for domestic purpose and animal feed, etc.

The cursory glance at the table further reveals that the productivity of the cereals *viz.*, maize, paddy and wheat was 28.93, 38.03 and 28.27 q/ha, respectively which was quite better than the district averages. The *kharif* season vegetables like brinjal, cucurbits and okra had the productivity of 88.99, 163.21 and 103.64 q/ha, respectively while

cabbage, cauliflower and garlic were being grown in the *rabi* season with the productivity of 135.91, 126.06 and 42.71 q/ha, respectively.

Table 4.20: Production and productivity of crops on sample households

Sr. No.	Particulars	Production (q)	Productivity (q/ha)
A	***Kharif***		
1.	**Cereals**		
i	Maize	2.19	29.41
ii	Paddy	7.71	37.95
2.	**Oilseeds**		
i.	Soybean	0.01	11.35
3	**Vegetables**		
i.	Brinjal	1.78	89.99
ii.	Cucurbits	4.85	163.21
iii.	Okra	1.58	103.64
iv.	Others vegetables	1.45	145.41
4	**Fodder**		
i.	Sorghum	4.11	220.00
ii.	Bajra	1.23	245.00
B	***Rabi***		
1.	**Cereals**		
i	Wheat	8.33	26.55
2	**Oilseeds**		
i.	Mustard	0.01	10.55
3	**Vegetables**		
i.	Cauliflower	4.79	126.06
ii.	Cabbage	2.69	135.91
iii.	Garlic	0.21	42.71
iv.	Others	1.28	116.12
5	**Fodder**		
i.	Oats	2.58	280.00
ii.	Berseem	1.55	310.00

4.3 Measurement of risk and uncertainty

The food is one of the foremost indispensable requirements for the existence of all forms of life on earth. As per the estimates of FAO, the world's human population is expected to exceed 9 billion by 2050 and there is a need to upscale the existing level of agricultural production by 60 per cent to ensure food security. This demands the collective and coordinated efforts of the various stakeholders to increase agricultural production to the desired level. Agricultural production is a biological process and is

sensitive to a large number of factors like weather & climate, insect-pests & diseases, market forces, institutional factors and unforeseen natural calamities. The trends of climate change and global warming are being reported by renowned national and international organizations associated with environmental studies from different corners of the world. These are responsible for the rising temperature, change in rainfall patterns, frequent droughts, floods, etc. Thus, risk and uncertainty in agriculture are quite apparent and pose a higher degree of threat to the sustainability of agricultural production. Despite multiple threats and risks to farming, agriculture is the major source of livelihood than other sectors of the economy for about 70 per cent of rural households in India.

The agricultural risks are the consequences of various factors stated above which are difficult to forecast. Among the various risk posing factors, government policies, market forces, weather variables, etc. are external in nature while the time of sowing/harvesting, management of crops, marketing of produce, etc. are under the farmers' purview. The farming community is directly associated with the production and marketing of agricultural produce and is also aware of the different elements of risks. In this section an attempt has been made to examine the farmers' perceptions regarding general changes in agriculture which they captured over time, timeline regarding origin of risk in agriculture and extent of risk of on account of different elements of risk.

4.3.1 General changes in agriculture

The adoption of agricultural enterprises to a greater extent is influenced by a large number of factors *viz.*, weather, climate, availabilities of agricultural technologies, market prices, etc. These factors bring about gradual changes in the adoption of technologies, yield levels and risks associated with agricultural production. In this context, an attempt has been made to draw and document the farmers' perceptions with respect to general changes which have taken place over time and risks associated with the major crop enterprises. The process of agricultural development is continuous and over the time, various new technologies, with respect to varieties, plant protection, farm implements and tools, etc. have been developed by ICAR, SAUs and the corporate sector. In the same manner, various changes in agro-climatic conditions are also visible like rising temperature, the pattern of precipitation, emergence of insect- pest and diseases, etc. The extent of adoption of new technologies and adaptation strategies to climate changes in crop production varies from farmer to farmer, such changes has been captured and

presented in Table 4.21. Among the various changes, the majority of the farmers i.e. about 91 per cent believed that there has been a great change in the adoption of varieties. They were of the view that the yield levels of traditional local varieties of crops were low and over time these have been replaced by HYVs/hybrids, which have high yield potentials. Traditionally, crop production has been a labour intensive process but now emphasis has been given to farm mechanization. In the hilly region, there has been partial mechanization in farming, however, the land preparation and threshing activities of crop production have been mechanized to a greater extent as is evident that 84 per cent of farmers admitted that the bullock population has reduced to a greater extent. The substantial number of farmers also stated that with the improvement in crop varieties there has been a surge in insect pests (21.25 per cent) and diseases (46.25 per cent).

Table 4.21: Perceptions of respondents regarding general changes in farming on sample farms

Sr. No.	Particulars	No	Per cent
1	Improved crop varieties	73	91.25
2	Improved livestock breeds	7	8.75
3	Improved farm tools	41	51.25
4	Improved farm implements and machinery	69	86.25
5	Climate change	54	67.50
6	Changes in precipitation pattern	14	17.50
7	Cropping pattern	13	16.25
8	Increased insect-pest infestation	17	21.25
9	Extinction of traditional varieties of crops	28	35.00
10	New varieties susceptible to diseases	37	46.25
11	High input requirement	35	43.75
13	Decrease in area under pulses	26	31.25
14	Area shifted to vegetables	54	67.50
15	More diseases in livestock	13	16.25
16	Bullock population decreased	67	83.75
17	Others	9	11.25

Apart from this, 35 per cent of the farmers claimed that the traditional varieties are no longer in existence now and nearly 44 per cent farmers were of the view that as a result of change in crop varieties the input requirement has increased over time. Furthermore, the data suggest that respondents have also observed changes in climatic parameters like change in temperature (67.50 per cent) and precipitation pattern (17.50 per cent). Over the time there has been a significant improvement in farm mechanization i.e. 51.25 per cent

of the farmers of the sample households admitted that they have observed the changes in farm tools and implements. The livestock component has always been closely associated with crop production and thus, with the advancement in crop production technology 8.75 per cent of the farmers on the sample farms believed that the livestock breeds have also changed. The change in cropping pattern with respect to increase in area under vegetables and others were stated by 67.50 per cent farmers. Over the time, the farmers have observed the improvement in technology to increase production, mechanization to reduce drudgery while the climatic factors and incidence of insect pest have increased which have posed significant threat to crop production.

4.3.2 The timeline of origin of risk:

An attempt has been made to examine the timeline for origin of major elements of risk like rainfall, insect pest, plant diseases, etc. on the sample farms. The farmers' perceptions about these have been summarized in Table 4.22.

Table 4.22: Timeline of origin of risk on sample farms

Sr. No.	Particulars	<2 years		2-5 years		5-10 years		10-15 years	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent
1	Fire	0	0	0	0	1	1.25	0	0
2	Rainfall	2	2.5	22	27.5	48	60	7	8.75
3	Insect pest	0	0	16	20	37	46.25	4	5
4	Plant diseases	0	0	19	23.75	38	47.5	7	8.75
5	Non availability of irrigation	0	0	14	17.5	35	43.75	12	15
6	Inadequate irrigation	2	2.5	20	25	33	41.25	14	17.5
7	Low Prices	1	1.25	2	2.5	8	10	3	3.75
8	Bullocks/Tractor availability on time	0	0	1	1.25	2	2.5	0	0
9	Bullocks/Tractor hiring cost high	0	0	0	0	1	1.25	0	0
10	Illness	0	0	0	0	1	1.25	0	0
11	Stray animals	0	0	0	0	30	37.5	19	23.75

The table reveals that the most commonly observed production risks over the time were the risk of insect-pest infestation, plant diseases and irrigation. The majority of the respondents i.e. 60, 46.25, 47.5, 43.75 and 41.25 per cent were of the view that the production risks i.e. risks associated with rainfall, insect-pest infestation, plant diseases non-availability of irrigation and inadequacy of irrigation have started to occur more

frequently since past five to ten years. About 37.50 per cent of the farmers believed that the risk of stray animals has emerged as a potential risk for during the last five to ten years.

4.3.3 Risk in crop production:

Farmers associated with crop production are always confronted with one or another type of risk originating from principle factors. Broadly, the agricultural risk may be categorized into production, price, financial, institutional and human risk. The degree of risks associated with major crops grown by respondents has been discussed in detail in the following section:

4.3.3.1 Production Risk:

Agriculture is known for its significant unpredictability in production outcomes, often known as production risk. Farmers, unlike most other entrepreneurs, are unable to anticipate the amount of output that the production process will produce with accuracy because of external influences such as weather, pests, droughts, etc. Farmers may also be hampered by unfavourable weather conditions during harvesting or threshing, which can lead to production losses. The responses of the respondents with respect to the degree (none, low, medium, high and very high) of different elements of production risks associated with major crops were recorded and analyzed and discussed as under.

i) Weather Risk:

The Table 4.23 depicts the weather-related risks of major crops grown by the sample households. It can be clearly seen from the table that in the case of maize weather risks were considered of low degree by the highest number of the respondents i.e. 31.25 per cent followed by the fraction of 28.75 per cent of the farmers who were of the view that weather risk in maize is of medium degree. It was mainly due to the fact that maize crop is grown in *kharif* season i.e. June-September during which usually the rainfall and other climatic factors are congenial for crops. However, around 21 and 11 per cent of the respondents report that the weather risk is of high and very high degrees, respectively. They were of the view that heavy rainfall and storm are common during the rainy season which result in lodging of the crop and adversely affected the production. However, 7.50 per cent of the farmers were of the view that maize is a hardy crop and as such, there is no weather risk. Wheat and paddy were dominating the cropping pattern of the study area

and both the crops were considered to be exposed to weather risks. As far as wheat was concerned, weather-related risks were considered of high degree by 72.50 per cent of the farmers and very high by 16.75 per cent of the sample farmers. It was reported that in *rabi* season precipitations are limited and their pattern is also not uniform as in the case of *kharif*. Sometimes the sowing of wheat is delayed due to the lack of timely rains. There is a situation of water scarcity and hailstorm in May i.e. at the time of harvesting. About 10 per cent of the farmers attributed wheat as a medium risk crop as the field operations may get hindered by the untimely rains, the crops may get damaged by the hailstorm and in some cases the harvesting may get delayed due to unfavorable weather conditions. Only 3 per cent of the farmers considered the crop as a low-risk crop. A similar scenario was found in the case of paddy in which 50.00, 11.25 and 17.5 per cent of the farmers reported paddy as high, very high risk and medium degree, respectively. The table further shows that in case of paddy, 13.75 and 7.50 per cent of the farmers believed that the weather risk associated was of low and none-risk, respectively. In the case of vegetables, weather risk was of high, medium and very high degree as reported by 42.50, 17.25 and 15 per cent of farmers, respectively. On the contrary, 8.75 and 16.25 per cent of the farmers claimed none and low extent weather risks in vegetable crops, respectively. It may be due to the fact that they might have assured irrigation facilities.

Table 4.23: Extent of risks associated to weather in major crops on sample farms

Sr. No.	Particulars	None	Low	Medium	High	Very High
1	Maize	6	25	23	17	9
		(7.50)	(31.25)	(28.75)	(21.25)	(11.25)
2	Wheat	0	3	8	58	11
		(0.00)	(3.75)	(10.00)	(72.50)	(13.75)
3	Paddy	6	11	14	40	9
		(7.50)	(13.75)	(17.50)	(50.00)	(11.25)
4	Vegetables	7	13	14	34	12
		(8.75)	(16.25)	(17.5)	(42.50)	(15.00)

Note: Figures in parentheses represent the percentage to the total in each category

ii) Insect-Pest Risk:

The perceptions of the respondents with respect to the risks associated with insect-pests in major crops have been depicted in Table 4.24. Among the crops, the degree of risk on account of insect-pests was relatively high in the case of vegetable crops

compared to maize, paddy and wheat. The majority of the farmers i.e. about 59 per cent reported a high degree of risk in vegetables while 20 per cent were of the view that the risk was of a very high degree. In wheat, the risk was relatively low as only about 4 per cent of farmers admitted that risk was to the extent of high and very high category and the majority 52.50 and 32.50 per cent of the respondents admitted that the risk is of low and medium category, respectively in wheat. Almost similar trend was also observed in the case of paddy, where the proportion of respondents reporting high and very high extent of risk was about 9 and 6 per cent, respectively.

Table 4.24: Extent of risks associated to insect-pest infestation in major crops on sample farms

Sr. No.	Particulars	None	Low	Medium	High	Very High
1	Maize	13	17	22	17	11
		(16.25)	(21.25)	(27.50)	(21.25)	(13.75)
2	Wheat	9	42	26	2	1
		(11.25)	(52.50)	(32.50)	(2.50)	(1.25)
3	Paddy	11	35	22	7	5
		(13.75)	(43.75)	(27.50)	(8.75)	(6.25)
4	Vegetables	0	6	11	47	16
		(0.00)	(7.50)	(13.75)	(58.75)	(20.00)

Note: Figures in parentheses represent the percentage to the total in each category

iii) Disease Risk

The diseases also cause significant losses in crop production. The perceptions of the respondents with respect to degree of disease risk in different crops have been compiled in Table 4.25. The cursory glance at the table reveals that the extent of disease risk was relatively higher in the case of vegetables as compared to other crops. The proportion of farmers who reported disease risk to the extent of high and very high degree was estimated at 41.25 and 26.25 per cent, respectively. None of the respondents was in the none-risk category while 7.50 per cent believed that the risk was of a low degree. As far as wheat was concerned, the yellow rust was reported as the main disease prevalent in wheat and thus the incidence was reported in the category of high degree by 16.25 per cent and of very high degree by 3.75 per cent of the total respondents. About 21 per cent of the respondents reported that the degree of risk in wheat was below medium degree. The data further indicates that the majority of the respondents i.e. 58.75 per cent believed that risk is of medium degree. In paddy false smut was the commonly prevalent diseases which affect the production of paddy. The proportion of the farmers who considered the risk as a high and very high degree was 20 and 16.25 per cent, respectively. About 16 and

19 per cent of farmers believed that there is none risk and low risk in paddy which can be managed easily.

In maize, the common diseases reported were northern and southern blights which were categorized of high and very high degree by 15 and 6.25 per cent of the farmers, respectively. The majority of the farmers i.e. about 57 per cent were of the view that the risk was of below medium degree in the case of maize.

Table 4.25: Extent of risks associated to diseases in major crops on sample farms

Sr. No.	Particulars	None	Low	Medium	High	Very High
1	Maize	19	27	17	12	5
		(23.75)	(33.75)	(21.25)	(15.00)	(6.25)
2	Wheat	2	15	47	13	3
		(2.50)	(18.75)	(58.75)	(16.25)	(3.75)
3	Paddy	13	15	23	16	13
		(16.25)	(18.75)	(28.75)	(20.00)	(16.25)
4	Vegetables	3	6	17	33	21
		(3.75)	(7.50)	(21.25)	(41.25)	(26.25)

Note: Figures in parentheses represent the percentage to the total in each category

iv) Irrigation Risk

The availability of irrigation at the critical stages of growth is considered as vital for crop production. The Table 4.26 represents the degree of risk associated with the availability of irrigation water in major crops.

Table 4.26: Extent of risks associated to irrigation in major crops on sample farms

Sr. No.	Particulars	None	Low	Medium	High	Very High
1	**Maize**	11	43	22	3	1
		(13.75)	(53.75)	(27.50)	(3.75)	(1.25)
2	**Wheat**	2	3	11	28	36
		(2.50)	(3.75)	(13.75)	(35.00)	(45.00)
3	**Paddy**	9	21	37	11	2
		(11.25)	(26.25)	(46.25)	(13.75)	(2.50)
4	**Vegetables**	2	9	16	36	17
		(2.50)	(11.25)	(20.00)	(45.00)	(21.25)

Note: Figures in parentheses represent the percentage to the total in each category

A quick peek at the table reveals that the fraction of farmers who believed a high degree of irrigation risk was associated with paddy accounted for 13.75 per cent, while 2.50 per cent of the farmers believed it as of very high degree. In case of maize, the risk

was considered of low and medium degree by 53.75 and 27.50 per cent farmers, while 13.75 per cent farmers believed none risk in maize with respect to irrigation. When the responses of the respondents were analyzed in case of wheat, it was found that 13.75 and 35 per cent of respondents considered it as of medium and high degree, while only a meager fraction of sample farms i.e. 2.5 and only 3.75 per cent thought that the risk was of none and low importance. Among the different crops, the irrigation requirements of vegetables was quite high except paddy. In vegetables, the risk was considered of medium and high degree by 20 and 45 per cent of the total respondents, respectively while 2.50 and 11.25 per cent farmers were of the view that there was none and low degree risk associated with vegetable production.

4.3.3.2 Price or Market Risk:

The price risk affects the farmers in two ways. On one side they have to purchase the various inputs and services required for the production of crops and on the other hand, they have to sell the produce in the market. Thus, the volatility of the input and output prices is a significant source of market risk. The prices of agricultural commodities are notoriously volatile. Market shocks, both endogenous and exogenous, cause output price fluctuations. Another type of market risk comes during the delivery of the product in the market. Producers' efforts can be hampered by their inability to get perishable items to the right market at the right time. This is a substantial source of risk and is due to a lack of infra-structure and well-developed market places.

Table 4.27: Extent of risks associated to output prices in major crops on sample farms

Sr. No.	Particulars	None	Low	Medium	High	Very High
1	Maize	29	27	16	5	3
		(36.25)	(33.75)	(20.00)	(6.25)	(3.75)
2	Wheat	31	24	14	7	4
		(38.75)	(30.00)	(17.50)	(8.75)	(5.00)
3	Paddy	21	23	17	13	6
		(26.25)	(28.75)	(21.25)	(16.25)	(7.50)
4	Vegetables	7	17	29	16	11
		(8.75)	(21.25)	(36.25)	(20.00)	(13.75)

Note: Figures in parentheses represent the percentage to the total in each category

The Table 4.27 indicates the degree of risk associated with output prices from the farmers' point of view for major crops. The opinions of the majority of the farmers were

found to be skewed towards none, low and medium categories of the degrees of risks for all the crops. The reason being, farmers keep the cereal produce for themselves and sell it to the neighbours or the relatives at the prevalent market prices. Therefore, the output-price risk was regarded as of high degree by only a small fraction of the farmers i.e. only about 10, 14 and 24 per cent farmers in maize, paddy and wheat, respectively.

However, the prices of inputs such as fertilizers, herbicides, pesticides, labour, hired machinery, etc. are also the kinds of risks faced by the farmers as potential risks for the crops. The Table 4.28 represents the extent of input price risk faced by the farmers. It can be seen from the table that 30.00, 13.75 and 11.25 per cent of the farmers indicated that None category of risk was associated to input prices in cereals like maize, wheat and paddy, respectively, while 26.75, 21.25 and41.25 per cent of stated it as of low degree, respectively. On the other hand, 36.25, 20.00 and 13.75 per cent of the respondents were of the view that in vegetables were shadowed by a medium, high and very high degree of input price risk.

Table 4.28: Extent of risks associated to input prices in major crops on sample farms

Sr. No.	Particulars	None	Low	Medium	High	Very High
1	Maize	24	21	14	13	8
		(30.00)	(26.25)	(17.50)	(16.25)	(10.00)
2	Wheat	11	17	33	11	8
		(13.75)	(21.25)	(41.25)	(13.75)	(10.00)
3	Paddy	9	33	17	15	6
		(11.25)	(41.25)	(21.25)	(18.75)	(7.50)
4	Vegetables	7	17	29	16	11
		(8.75)	(21.25)	(36.25)	(20.00)	(13.75)

Note: Figures in parentheses represent the percentage to the total in each category

4.3.3.3 Financial & Credit risk:

Many companies are concerned about how corporations finance their operations, agriculture, too, has its own quirks in this regard. Agricultural production cycles take a long time to complete and farmers must budget for expenses that will only be recouped once the product is sold. This can lead to cash flow issues, which are compounded by a lack of insurance services, credit and excessive borrowing costs. These issues fall under the category of financial risk. On the sample farms, the financial risk was not regarded as of much importance by the farmers, the reason being that the majority of the farmers were

not solely dependent on agriculture but were also associated with the subsidiary activities. The household income was also being supplemented by the livestock rearing by majority of the households. Thus, the majority of the farmers of sample households claimed that there was a very small degree of financial risk associated with the crop production as scale of operation was small.

4.3.3.4 Institutional risk:

Institutional risk is caused by unanticipated changes in legislation that govern farmers' activities, which is another key source of uncertainty for farmers. Regulations, banking services, income support payments and subsidies, etc. all have a substantial impact on the profitability of farming operations. The government policies like the announcement of Minimum Support Price for the crops at the start of each cropping season, the recent farm bills, etc. are the unanticipated changes that are faced by the farmers and pose risk in crop production. The Table 4.29 indicates the perception of respondents about the degree of institutional risk associated with the major crops.

The responses of the farmers reflected that the wheat crop is highly associated with the institutional risk as 33.75 and 46.25 per cent of farmers attributed the risk to be of high and very high degree. Further in the case of paddy the majority of the farmers i.e. 51.25 per cent believed that the crop is highly associated with institutional risk. Wheat and paddy are grown by the majority of the farmers in the study area and it might become difficult for the farmers to sell out their produce at reasonable prices. The government procures the grains from farmers at a minimum support price but no procurement center has been opened by the Food Corporation of India in Kangra district during both the *kharif* marketing season *and* the *rabi* marketing season.

Table 4.29: Extent of risks associated to institutions in major crops on sample farms

Sr. No.	Particulars	None	Low	Medium	High	Very High
1	Maize	7	46	19	5	3
		(8.75)	(57.5)	(23.75)	(6.25)	(3.75)
2	Wheat	2	5	9	27	37
		(2.50)	(6.25)	(11.25)	(33.75)	(46.25)
3	Paddy	2	7	24	41	6
		(2.50)	(8.75)	(30.00)	(51.25)	(7.50)

Note: Figures in parentheses represent the percentage to the total in each category

4.3.3.5 Human risk: Farm households, like any other business, face personal risks impacting the livelihood and well-being of farm workers, as well as are confronted with risks like floods, cyclones and droughts, damage or theft of production equipment and

other farm assets. The human injury, illness, family functions and other socio-cultural issues were cited by the farmers in case of human risk. The Table (4.30) depicts the nature of human risk associated with the major crops grown on the sample farms. The risk was ranked as of the lowest degree by the maximum number of farmers (26.25 per cent) in the case of maize crop as it required the minimum field visits while it was ranked as of the very high degree by 13.75 per cent farmers each in case of vegetables and paddy as these crops require high human effort in the crop management and harvesting practices.

In the case of wheat, the maximum number of farmers (27.50 per cent) were of the view that the risk is low degree while 21.25 per cent of farmers considered that there isn't any risk associated with the crop. The risk was considered of the medium, high and very high degree by 26.25, 23.75 and 23.75 per cent of farmers. The human illness and injury were the major forms of human risk found on the sample farms and the crops like vegetables, paddy and wheat which require frequent watch and ward were mentioned to be of high degree by 18.75, 38.75 and 23.75 of the farmers, respectively.

Table 4.30: Extent of risks associated to humans in major crops on sample farms

Sr. No.	Particulars	None	Low	Medium	High	Very High
1	Maize	21	24	17	12	6
		(26.25)	(30.00)	(21.25)	(15.00)	(7.50)
2	Wheat	17	22	21	19	1
		(21.25)	(27.50)	(26.25)	(23.75)	(1.25)
3	Paddy	5	9	24	31	11
		(6.25)	(11.25)	(30.00)	(38.75)	(13.75)
4	Vegetables	4	13	37	15	11
		(5.00)	(16.25)	(46.25)	(18.75)	(13.75)

Note: Figures in parentheses represent the percentage to the total in each category

The perceptions of the farmers for the various types of risk were also extracted from the respondents on overall basis irrespective of crops and presented in Table 4.31. It can be seen from the table that 83.75 per cent of the sample households claimed that the production risks were of major concern among the other types of risks. Next to production risk, price risk was attributed as a risk of major concern by 11.25 per cent of the respondents followed by 7.50 per cent who believed that human risk was the risk of major concern to crop production. Only a small fraction of the respondents accounting for 3.75 and 1.25 per cent attributed institutional and financial as risks of major concern, respectively.

Table 4.31: Perceptions of farmers pertaining to different components of risk on sample farms

Sr. No.	Particulars	Number	Per cent
1	Production risk	67	83.75
2	Price risk	9	11.25
3	Financial risk	1	1.25
4	Institutional risk	3	3.75
5	Human risk	6	7.50

4.3.4 Relevance of the risk components to the farmers

Various forms of risks i.e. production, price, financial, institutional and human risks were discussed with the farmers and farmers were requested to rank them under none, low, medium, high and very high categories. Based on the analysis of the proportion of farmers under each category and their opinions (none, low, medium, high and very high), the relevance for each form of risk was calculated, analyzed and afterward, the relevance scores were calculated for each of them. The Table 4.32 indicates the relevance percentage (RP), mean relevance (MR) and mean relevance score (MRS) of various forms of risk associated with the different crops which were insured in the district i.e. maize, paddy and wheat. Barley also qualifies for the insurance cover but has not been included as it was not grown by the sample farmers.

The risks were arranged in increasing order of the MRS and therefore the relevance has been represented separately for maize, paddy and wheat. The risks were categorized based on MRS score into low relevance (0-1.5), moderate relevance (1.5-2.5), high relevance (2.5-3.5) and extreme relevance (3.5-4.5). In case of maize, the analysis revealed that the insect-pest, weather, diseases, demand of output, family problems and price of input were the highly relevant risks. As far as wheat is concerned, weather, government and irrigation issues were the risks of extreme relevance and in case of paddy the risks of extreme relevance were institutional risks and none form of risk was found to be extreme in maize. In case of paddy, the extreme forms of risks had a relevancy percentage of 79.5 per cent and in the case of wheat, it ranged from 82.75 to 87.25 per cent. The MRS for the risks categorized as extremely relevant *viz.* weather, institutional risk, government policies and irrigation related risks was 3.96, 4.15, 4.15 and 4.16, respectively for wheat. In case of paddy MRS for the extreme forms of risks i.e. institutional risk, government policies, was calculated at 3.53 each.

It can be observed from the table that the relevance percentage of the highly relevant risks in the case of maize ranged between 58 to 76.25 per cent. Among these highly relevant forms of risks in maize, MRS of insect-pests was calculated at 2.95, weather at 2.98, diseases at 3.04. The minimum in inter-cultural operations of weeding, field sanitation and earthing up in maize may be regarded as the possible reasons for such results. Next to these three elements, supply of input, the demand of output, family problems and prices of inputs were the extreme risks associated with maize production for which the mean relevance score ranged from 2.5 to 2.65.

The table further indicates that paddy and wheat crops were associated with seven and nine highly relevant risks, respectively. The highly relevant risks in the case of wheat were family problems, personal problems, price of the input and entire range of 60 to 78.50 per cent. Among highly relevant risks, the disease associated risk has the highest mean relevance score (3.45) followed by weeds (3.03) while personal problems and family problems had the lowest relevance score of 2.56 and 2.5 respectively. In case of paddy price of output, insect-pests, weeds, price of the input, irrigation, supply of input, diseases, personal problem and weather were the risks of high relevance. The relevance percentage for each of these forms of risks ranged between 60 and 78 per cent while the mean relevance score was highest for weather risk i.e. 3.44 and lowest for insect pest and price of output i.e. 2.5.

Further, the table reveals that the irrigation-related risks, government policies, weeds and personal problems were the risks of moderate relevance on the sample farms in the case of maize. Among these, the relevance percentage was highest for government policies i.e. 73.75 per cent with a mean relevance score of 2.39. The mean relevance score was highest for personal problems i.e. 2.48 and lowest for irrigation-related risks i.e. 2.25. In the case of wheat, the risks related to the price of output and insect pests were categorized as moderate risks whereas in paddy, the family problems and demand of output were categorized as moderate forms of risks. It can be clearly seen from the table that the forms *viz.*, loans due, repayment issues and socio-cultural issues have been ranked lowest in terms of relevance. The RP, MR and MRS for all these aforementioned forms of risk were found to be zero in case of maize crop while for wheat and paddy, the repayment issues had 0.01 MR each with one per cent and 0.03 RP and MR, respectively.

Table 4.32: Relevance scores of risk components in major crops on sample farms

S.N.	Particulars	Maize			Particulars	Wheat			Particulars	Paddy		
		RP	MR	MRS		RP	MR	MRS		RP	MR	MRS
1	Loans due	0	0	0	Loans due	0	0	0	Loans due	0	0	0
2	Repayment issues	0	0	0	Socio Cultural	0	0	0	Socio Cultural	0	0	0
3	Socio Cultural	0	0	0	Repayment issues	1	0.01	0.03	Repayment issues	1	0.01	0.03
4	Price of Output	51.75	0.42	2.08	Price of Output	50	0.42	2.11	Family Problems	48.75	0.44	2.19
5	Irrigation	69.25	0.45	2.25	Insect-pests	71.25	0.46	2.3	Demand of output	53.5	0.46	2.3
6	Institutional Risk	73.75	0.48	2.39	Family Problems	60	0.5	2.5	Price of Output	60.5	0.5	2.5
7	Govt. Policies	73.75	0.48	2.39	Personal Problem	63.25	0.51	2.56	Insect-pests	70.25	0.5	2.5
8	Weeds	60.75	0.49	2.45	Price of Input	71	0.57	2.85	Weeds	69.75	0.51	2.55
9	Personal Problem	60.5	0.5	2.48	Demand of output	70.5	0.58	2.88	Price of Input	72.5	0.54	2.7
10	Price of Input	58	0.5	2.5	Supply of input	76.25	0.59	2.96	Irrigation	71.5	0.54	2.7
11	Family Problems	63	0.53	2.64	Weeds	75	0.61	3.03	Supply of input	71	0.55	2.73
12	Demand of output	64.75	0.53	2.64	Diseases	78.75	0.69	3.45	Diseases	70.25	0.6	3.01
13	Supply of input	63.5	0.53	2.65	Weather	82.75	0.79	3.96	Personal Problem	77.75	0.69	3.43
14	Insect-pests	69.75	0.59	2.95	Institutional Risk	87.25	0.83	4.15	Weather	76.25	0.69	3.44
15	Weather	76.25	0.6	2.98	Govt. Policies	87.25	0.83	4.15	Institutional Risk	79.5	0.71	3.53
16	Diseases	72.25	0.61	3.04	Irrigation	87	0.83	4.16	Govt. Policies	79.5	0.71	3.53

RP: Relevancy Percentage, MR: Mean Relevance, MRS: Mean Relevance Score

4.3.5 Rainfall variability in district Kangra:

The Table 4.33 presents the monthly data of rainfall and their deviation from normal rainfall for the last four years. A quick look at the table reveals that during the period, the pattern of monthly rainfall exhibited wide variations. In January, the rainfall varied from 7.6 mm in 2016 to 124.2 mm in 2020 indicating a deviation from normal rainfall from 91 per cent to 73 per cent, during the period. Similar type of variation in rainfall may be observed among other months during the period of four years.

Table 4.33: Variability of monthly rainfall pattern in district Kangra (mm)

Sr. No.	Month	Particulars	2016	2017	2018	2019	2020
1	January	Rainfall	7.6	114.3	14	92.8	124.2
		PDFNR	-91	38	-83	30	73
2	February	R/F	36.8	30.9	40.7	219.8	12
		PDFNR	-54	-61	-49	158	-86
3	March	R/F	98.8	36.6	33.3	38.4	226.8
		PDFNR	16	-57	-61	-53	180
4	April	R/F	13.2	45.5	48.8	45.3	53.7
		PDFNR	-67	14	22	11	32
5	May	R/F	89.8	54.6	39.5	39.6	80.2
		PDFNR	99	21	-12	-26	51
6	June	R/F	132.6	220.3	214.2	37.5	149.3
		PDFNR	-9	51	47	-79	-16
7	July	R/F	529.6	637.4	554.9	447.2	390
		PDFNR	-9	9	-5	-23	-32
8	August	R/F	585.4	636.3	924.8	575.9	620.5
		PDFNR	-5	3	49	-6	1
9	September	R/F	111.5	134.3	428.8	253.6	57.5
		PDFNR	-52	-43	83	11	-75
10	October	R/F	3.9	2.3	7.9	24.9	0
		%DEP	-92	-95	-84	-21	-100
11	November	R/F	0	0.3	25.6	44.9	23.9
		%DEP	-100	-98	62	197	58
12	December	R/F	3.4	80.3	6.8	95	40.3
		%DEP	-92	97	-83	145	4
		Kharif (May-October)	1452.8	1685.2	2170.1	1378.7	1297.5
		Rabi (November -April)	159.8	307.9	169.2	536.2	480.9
				Kharif	***Rabi***		
		Mean		1596.86	330.8		
		Std Deviation (mm)		314.44	155.31		
		Coefficient of variation (%)		19.69	46.95		

PDFNR: Per cent deviation from normal rainfall
Source: Indian Meteorological Website

The season wise precipitation pattern indicates that the bulk of rainfall was concentrated in *kharif* season during the period. It was found to be highest in 2018 (2170.10 mm) followed by 2017 (1685.20 mm). The average *kharif* rainfall during the period was about 1597 mm with a standard deviation of 314.4 mm and coefficient of variation of 19.6 9 per cent. As far as *rabi* season was concerned, during the period only about 17 per cent of the total rainfall was received with an average of 330.80 mm. The mean deviation and coefficient of variation for the rainfall during *rabi* season were estimated at about 155 mm and 47 per cent, respectively. The analysis of data revealed that the pattern of rainfall exhibits a high degree of risk in planning of sowing and other crop production operations such as watch & ward, weeding, spray of herbicides and pesticides, irrigation, harvesting, etc.

4.3.6 Production and productivity of major crops on sample households:

There are various factors that govern the production of the crops and thus the productivity of crops among different households may vary. The Table 4.34 represents the production and productivity of maize, paddy and wheat on the sample farms. On an average, the area under maize, paddy and wheat on sample households accounted for 6.06, 16.22 and 23.58 ha, with a production of 178.25, 615.5 and 626.10 quintals, respectively.

Table 4.34: Production and Productivity of major crops on sample households

Sr. No.	Particulars	Maize	Paddy	Wheat
1	Area under crop (ha)	6.06	16.22	23.58
2	Production (quintals)	178.25	615.5	626.10
	Mean Production (quintals)	5.24	9.62	8.03
	Standard Deviation (quintals)	4.13	7.52	5.73
	Coefficient of Variation (%)	78.82	78.17	71.36
3	Productivity (q/ha)	29.41	37.95	26.55
	Mean Productivity (q/ha)	30.74	38.62	28.47
	Standard Deviation (q/ha)	5.41	7.64	6.14
	Coefficient of Variation (%)	17.60	19.78	21.57

The production was found to be more clustered around the mean in the case of maize and wheat as the standard deviation of the different production levels on different sample households was found to be 4.13 and 5.73 q, respectively while in the case of paddy it was comparatively little dispersed as the standard deviation was found to be 7.52

q. Furthermore, the table reveals that the productivity of maize, paddy and wheat was estimated at 29.41, 37.95 and 26.55 q/ha, respectively. As in the case of production, the productivity was also found to be more dispersed in the case of paddy as the standard deviation accounted for 7.64 q/ha which was more than that of maize (5.41 q/ha) and wheat (6.14 q/ha). This may be attributed relatively to the variations in irrigation and disease incidences in paddy as compared to maize and wheat.

4.3.7 Extent of losses:

The occurrence of any of the risk elements stated above, cause a considerable loss in crop production. The Table 4.35 shows the crop losses experienced by the farmers in 2019-20 in maize, paddy and wheat. The cursory glance at the table reveals that the crop losses on account of rainfall were highest. In the case of wheat, the losses of 2.11, 0.03, 0.26 and 0.01 q/farm were reported due to rainfall, scarcity of irrigation water and plant diseases each, stray animals and personal problems, respectively. The table further reveals that in case of paddy, the losses were highest because of the risk associated with irrigation (0.14 q/farm), followed by the stay animals, personal problems, rainfall, plant diseases and failure of technology which accounted for 0.11, 0.09, 0.06, 0.05 and 0.04 q/farm, respectively. The crop losses to the extent of 0.01 q/farm were reported in maize on account of the stray animals.

Table 4.35: Extent of losses reported by farmers due to various reasons on sample households (q/farm)

S. N.	Particulars	Proportion of farmers	Wheat			Paddy			Maize		
			Expected Yield	Actual Yield	Loss	Expected Yield	Actual Yield	Loss	Expected Yield	Actual Yield	Loss
1	Rainfall	0.56	4.24	2.13	2.11	0.25	0.19	0.06	0	0	0
2	Scarcity of irrigation	0.05	0.08	0.05	0.03	0.34	0.2	0.14	0	0	0
3	Plant Diseases	0.03	0.1	0.08	0.03	0.15	0.1	0.05	0	0	0
4	Failure of technology	0.01	0	0	0	0.08	0.04	0.04	0	0	0
5	Stray animals	0.08	0.38	0.12	0.26	0.26	0.15	0.11	0.15	0.14	0.01
6	Personal Problems	0.03	0.03	0.01	0.01	0.15	0.06	0.09	0	0	0
	Total	0.75	4.82	2.39	2.43	1.23	0.74	0.49	0.15	0.14	0.01

4.3.8 Risk Management Strategies:

Understanding the strategies and mechanisms adopted by farmers to deal with risk is important when discussing how to design appropriate risk management policies. It is also important to distinguish between informal and formal risk management mechanisms, as well as ex-ante and ex-post strategies. The ex-ante or ex-post classification refers to the moment in time when a person reacts to a risk: before the potentially harmful event occurs (ex-ante) or after the event has already occurred (ex-post).

Agriculture's ability to protect itself from the whims and aberrations of nature is seen as crucial to its development and expansion. Many circumstances, including disasters, might stifle development in the short term by limiting domestic food sources and raw materials. Natural disasters such as droughts, floods and cyclones pose a significant threat to agriculture. Drought poses a threat to more than two-thirds of the crop production and in varying degrees. Natural calamities and bad seasonal circumstances in the country destroy crops on 12 million hectares every year, severely reducing agricultural productivity and production.

On the sample farms, the various strategies adopted for risk management have been presented in Table 4.36. Among the various strategies; cent per cent farmers were insured followed by 83.75 per cent farmers who adopted intercropping and 65 per cent involved themselves in allied enterprises. The farmers who adopted the strategies like cleaning the surroundings, fencing and crop diversification were 57.5, 8.75 and 5 per cent, respectively.

Table 4.36: Risk management strategies adopted by farmers

Sr. No.	Particulars	Number	per cent
1	Crop Diversification	4	5
2	Fencing	7	8.75
3	Cleaning the surroundings	46	57.5
4	Intercropping	67	83.75
5	Adoption of allied enterprises	52	65
6	Crop insurance	80	100

The need of agriculture insurance cannot be overstated, as it is a highly risky economic activity due to its vital reliance on weather conditions. Designing and implementing an adequate insurance scheme for agriculture is thus a difficult and time-

consuming task. Crop insurance was first proposed in India in the early twentieth century. However, it was not used substantially until the 1990s. In terms of extent, spread and structure, it is still evolving. Agricultural insurance is a system that protects farmers from crop output uncertainty caused by natural forces beyond their control. It is also a financial mechanism that reduces the risk of crop loss by factoring in a large number of unknowns that affect crop yields and sharing the loss burden. Crop insurance plays a critical function in a country like India, where crop production is exposed to the whims of nature and large-scale devastation from pests and diseases.

4.4 Coverage, cost and compensation

Agriculture has been and still is the major source of livelihood for more than 50 per cent of the population of India. Since independence, it has been among the top priorities of the government and over the time, many initiatives have been taken for its overall development. Through the concerted efforts of the planners, researchers, extension workers and farmers there has been a significant increase in the production as well as yield levels of different agricultural commodities. Since, it is prone to many negative forces like, excessive rains, droughts, insect-pest and diseases, market uncertainties, etc. due to which the expected yields or profits are not realized by the farmers. These elements of risk and uncertainties associated with farming continue to be the key issues for which crop insurance has been advocated to cover the financial losses of the farmers. In this context, the Comprehensive Crop Insurance Scheme was the first nationwide crop insurance scheme introduced in *kharif* 1985. Later on, National Agriculture Insurance Scheme (NAIS) replaced this scheme in *rabi* 1999-2000, which was further improved in r*abi* 2010-11 as Modified National Agriculture Insurance Scheme and was implemented in some of the states of the country along with NAIS.

The premium rates for NAIS and MNAIS have been presented in Tables 4.37 and 4.38. The premium rates under NAIS varied from 2.5 to 3.5 per cent of the sum insured or the actuarial rate in *kharif* season and from 1.5 to 2.5 per cent of the sum insured or the actuarial rate in *rabi* season for cereals and other crops such as millets and pulses. Under MNAIS, the premium slab ranged from 2 to 15 per cent and the subsidies for different slabs ranged from zero to six per cent. During this period, along with these schemes, several other schemes such as Seed Crop Insurance (1999-2000), Farm Income Crop Insurance Scheme (*rabi* 2003-04) and Weather Based Crop Insurance Scheme (*kharif*

2007) were also introduced from time to time keeping in view the specific needs of the farmers.

Table 4.37: Premium rates for insuring crops under NAIS

Sr. No.	Season	Crops	Premium rate
1	*Kharif*	Bajra & Oilseeds	3.5% of SI or AR, whichever less
		Other crops (cereals, other millets & pulses)	2.5% of SI or AR, whichever less
2	*Rabi*	Wheat	1.5% of SI or AR, whichever less
		Other crops (other cereals, millets, pulses & oilseeds)	2.0% of SI or AR, whichever less
3	*Kharif* & *Rabi*	Annual Commercial / annual Horticultural crops	AR

AR: Actuarial Rates
Source: NAIS operational guidelines

Table 4.38: Premium rates for insuring crops under MNAIS

Sr. No	Premium slab	Subsidy to Farmers
1	Up to 2%	Nil
2	>2 - 5%	40% subject to minimum net premium of 2%
3	>5 – 10%	50% subject to minimum net premium of 3%
4	>10 –15%	60% subject to minimum net premium of 5%
5	>15%	75% subject to minimum net premium of 6%.

Source: MNAIS operational guidelines

Table 4.39: Premium rates for insuring crops under PMFBY and RWBCIS

S. No	Season	Crops	Maximum Premium payable by farmer (% of Sum Insured)
1	***Kharif***	All food grain and Oilseeds crops (all Cereals, Millets, Pulses and Oilseeds crops)	2.0% of SI or AR, whichever is less
2	***Rabi***	All food grain and Oilseeds crops (all Cereals, Millets, Pulses and oilseeds)	1.5% of SI or AR, whichever is less
3	***Kharif* and *Rabi***	Annual Commercial/ Annual Horticultural crops	5% of SI or AR, whichever is less
		Perennial horticultural crops (pilot basis)	5% of SI or AR, whichever is less

AR: Actuarial Rates
Source: PMFBY & RWBCIS operational guidelines

Amidst the limitations of the existing schemes, the government introduced a new scheme i.e. *Pradhan Mantri Fasal Bima Yojana* (PMFBY) and at the same time

Restructured Weather Based Crop Insurance Scheme (RWBCIS) in *kharif* 2016. The premium rates under PMFBY *and* RWBCIS have been depicted in Table no. 4.39.

For *kharif* season crops *viz.*, food grains, oilseeds, the premium rate was 2 per cent while for *rabi* season food grains and oilseeds, the premium rate was 1.5 per cent of the sum insured. For horticultural crops of *rabi* and *kharif* season, the premium rate was 5 per cent of the sum insured or the actuarial rate. The achievements of these schemes with respect to area insured, farmer, covered, sum assured, premium paid, claim settled and farmers benefited have been discussed with respect to India, Himachal Pradesh, Kangra district and sample households in the following section:

4.4.1 Coverage, cost and compensation in India

Coverage of crop insurance has been examined with respect to area insured and number of farmers covered under different crop insurance schemes and is discussed below:

4.4.1.1 Area insured under different crop insurance schemes

The cursory look at the table revealed that the total area under the crop insurance increased from 16.33 million hectares in 2000-01 to 47.47 million ha in 2019-20 (Table 4.45). In the year 2001-02, it declined from 16.33 to 16.03 million ha i.e. registering a decline of 1.83 per cent. Similarly a decline of 3.81, 6.30, 1.60, 7.65, 3.89 and 10.39 per cent was observed in 2003-04, 2005-06, 2006-07, 2008- 09, 2013-14 and 2017-18 over previous years, respectively. In the rest of the years, there has been an increase in area insured over the previous years. The increase varied from 1.13 per cent in 2010-11 to 37.33 per cent in 2004-05. The table further indicates that the increase in the area insured was relatively gradual from 2000-2001 to 2003-04 after which there was an abrupt increase in the area insured i.e. from 18.82 million hectares in 2003-04 to 29.62 million hectares in 2004-05 registering an increase of 57.62 per cent. The area declined for two successive years i.e. from 2004-04 to 2006-07. After that, the Government of India also introduced new schemes i.e. Weather Based Crop Insurance Scheme in 2007-08, Modified National Agricultural Insurance Scheme in 2011 and *Pradhan Mantri Fasal Bima Yojana* in 2016-17 and Restructured Weather Based Crop Insurance Scheme in 2016-17 and the area under crop insurance continued to increase except in 2008-09, 2013-14, 2017-18 and 2019-20. In that period, various new schemes were introduced while

some of the ongoing schemes were also closed or getting modified. In 2015-16, the National Agricultural Insurance Scheme, Weather Based Crop Insurance Scheme and Modified National Agricultural Insurance Scheme were closed and clubbed into *Pradhan Mantri Fasal Bima Yojana* and Restructured Weather Based Crop Insurance Scheme. The overall insured area in the country registered a significant growth of 6.67 per cent per annum during the period which was statistically significant at 1 per cent level of significance.

Table 4.40: Pattern of crop area insured and farmers covered under NAIS in India (2000-01 to 2015-16)

S. N.	Years	Area Insured				Farmers insured		
		Area (m ha)	PAITTAIUS	YWC (%)	PAITTCA	Number (million)	PFCTTFCUS	YWC (%)
1	2000-01	16.33	100.00	-	8.81	10.50	100.00	-
2	2001-02	16.03	100.00	-1.82	8.52	10.65	100.00	1.44
3	2002-03	19.57	100.00	22.06	11.15	12.10	100.00	13.55
4	2003-04	18.82	100.00	-3.81	9.90	12.39	100.00	2.45
5	2004-05	29.62	100.00	57.33	15.46	16.22	100.00	30.87
6	2005-06	27.75	100.00	-6.30	14.37	16.72	100.00	3.11
7	2006-07	27.31	100.00	-1.60	14.19	17.91	100.00	7.11
8	2007-08	28.14	96.34	3.06	14.42	18.44	96.45	2.96
9	2008-09	26.49	98.21	-5.86	13.56	19.20	98.08	4.12
10	2009-10	33.67	90.77	27.08	17.80	23.93	91.01	24.64
11	2010-11	24.05	64.11	-28.58	12.16	17.65	64.63	-26.26
12	2011-12	23.39	57.90	-2.75	11.94	16.79	56.55	-4.85
13	2012-13	24.38	54.82	4.27	12.56	16.79	50.27	-0.02
14	2013-14	20.71	48.44	-15.08	10.30	13.72	41.28	-18.29
15	2014-15	20.77	47.15	0.30	10.47	16.74	45.14	22.00
16	2015-16	33.91	64.72	63.24	17.21	30.91	63.66	84.65
	Total	390.94				270.67		
	Mean	24.43				16.92		
	Std Dev.	5.53				5.09		
	CV	0.23				0.30		
	CGR	2.30*				4.15*		
	Std Error	0.5607				0.5692		
	t cal	4.10				7.29		

PAITTAIUS: Percentage of area insured to total area insured under scheme,
YWC: Year wise change,
PAITTCA: Percentage of area insured to total cropped area under scheme,
PFCTTFCUS: Percentage farmers covered to total farmers covered under scheme
*significant at 1 per cent level of significance
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

Table 4.41: Pattern of crop area insured and farmers covered under WBCIS in India (2007-08 to 2015-16)

S. N.	Years	Area Insured				Farmers insured		
		Area (m ha)	PAITTAIUS	YWC (%)	PAITTCA	Number (million)	PFCTTFCUS	YWC (%)
1	2007-08	1.07	3.66		0.55	0.68	3.55	
2	2008-09	0.48	1.79	-54.87	0.25	0.38	1.92	-44.71
3	2009-10	3.42	9.23	609.77	1.81	2.36	8.99	529.88
4	2010-11	13.14	35.03	283.96	6.65	9.30	34.06	293.60
5	2011-12	15.63	38.70	18.99	7.98	11.67	39.30	25.50
6	2012-13	17.11	38.47	9.46	8.81	13.60	40.71	16.52
7	2013-14	16.51	38.63	-3.50	8.22	14.16	42.59	4.10
8	2014-15	12.78	29.00	-22.63	6.44	11.25	30.35	-20.52
9	2015-16	9.44	18.01	-26.14	4.79	9.03	18.60	-19.74
	Total	89.58				72.43		
	Mean	9.95				8.05		
	Std Dev.	6.67				5.47		
	CV	0.67				0.68		
	CGR	44.19*				50.48*		
	Std Error	7.93				7.84		
	t cal	5.57				6.44		

PAITTAIUS: Percentage of area insured to total area insured under scheme,
YWC: Year wise change,
PAITTCA: Percentage of area insured to total cropped area under scheme,
PFCTTFCUS: Percentage farmers covered to total farmers covered under scheme
*significant at 1 per cent level of significance
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

As far as scheme-wise progress of area insured was concerned (Figure 4.1), the data indicates that among different schemes, National Agriculture Insurance Scheme was in operation for 16 years (2000-01 to 2015-16). During this period, the area insured under the scheme increased from 16.33 million hectares to 33.91 million ha (Table 4.40). Up to 2006-07, it was the only scheme in operation which contributed solely towards the total area insured in the country. In 16 years of the scheme in operation, the highest increase in area insured under the scheme i.e. 63.24 per cent was achieved during 2015-16 followed by 57.33 and27.08per cent during 2004-05 and 2009-10, respectively. The crop area insured under the scheme also witnessed the highest decline of 28.58 per cent during 2010-11 followed by 15.08 per cent in 2013-14 and 6.30 per cent in 2005-06. However,

the compound annual growth rate of the area insured under the scheme was estimated at 2.3 per cent which was significant at 1 per cent level of significance.

Table 4.42: Pattern of crop area insured and farmers covered under MNAIS in India (2010-11 to 2015-16)

S. N.	Years	Area Insured				Farmers insured		
		Area (m ha)	PAITTAIUS	YWC (%)	PAITTCA	Number (million)	PFCTTFCUS	YWC (%)
1	2010-11	0.32	0.86	-	0.16	0.36	96.41	-
2	2011-12	1.37	3.40	324.12	0.70	1.23	96.20	241.67
3	2012-13	2.98	6.70	117.12	1.53	3.01	96.28	144.72
4	2013-14	5.53	12.93	85.45	2.75	5.36	99.99	78.07
5	2014-15	10.51	23.85	90.08	5.30	9.09	96.41	69.59
6	2015-16	9.05	17.27	-13.92	4.59	8.62	96.20	-5.17
	Total	29.76				27.67		
	Mean	4.96				4.61		
	Std Dev.	4.15				3.71		
	CV	0.84				0.80		
	CGR	94.99*				89.95*		
	Std Error	9.84				8.65		
	t cal	9.65				10.39		

PAITTAIUS: Percentage of area insured to total area insured under scheme,
YWC: Year wise change,
PAITTCA: Percentage of area insured to total cropped area under scheme,
PFCTTFCUS: Percentage farmers covered to total farmers covered under scheme
*significant at 1 per cent level of significance
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

The Weather Based Crop Insurance Scheme was introduced during 2007-08 with coverage of 1.07 million hectare area and remained in operation for a period of 9 years i.e. up to 2015-16 (Table 4.41). In the second year of scheme in operation, the scheme got a setback as the area was declined to 0.48 million hectares registering a decline of 54.87 per cent. In the third year i.e. 2009-10, the scheme got a boost in the area as the area insured increased from 0.48 million ha in 2008-09 to 3.42 million ha registering an increase of about 610 per cent. The increase continued and the area insured further increased to 13.14 million ha during 2009-10 to 2010-11 registering an increase of about 284 per cent. The increasing trend continued till 2012-13 when the scheme attained its highest coverage of 17.11 million hectares. After 2012-13, the coverage of the area under the scheme continuously declined for three years i.e. 16.51 million hectares in 2013-14, 12.78 million hectares in 2014-15 and 9.43 million hectares in 2015-16. The percentage decline in the area during these three years over the respective previous years was

estimated at 3.50, 22.63 and 26.14 per cent for 2013-14, 2014-15 and 2015-16, respectively. The average annual compound growth rate of the area insured under the scheme for a period of 9 years of its operation was about 44.19 per cent. The growth rate was statistically significant at 1 per cent level of significance. The Modified National Agricultural Insurance Scheme was introduced in 2010-11 and was in operation till 2015-16. The coverage of farmers under the scheme has been presented in the (Table 4.42). In the first year of the operation of the scheme, it covered an area of 0.32 million hectares. The coverage of the scheme with respect to the area insured exhibited an increasing trend during the entire period of its operation except in the last year i.e. 2015-16 in which the area declined by about 14 per cent over 2014-15. During the period of 2010-11 to 2014-15, there has been a significant increase in the coverage of the area. The scheme has registered an increase of about 324, 117, 85 and 90 per cent during 2011-12, 2012-13, 2013-14 and 2014-15, respectively over the respective previous years. The overall compound annual growth rate of the scheme was at 94.99 per cent which was statistically significant at 1 per cent level of significance.

Table 4.43: Pattern of crop area insured and farmers covered under PMFBY in India (2016-17 to 2019-20)

S. N.	Years	Area Insured				Farmers insured		
		Area (m ha)	PAITT AIUS	YWC (%)	PAITT CA	Number (million)	PFCTT FCUS	YWC (%)
1	**2016-17**	55.01	96.97	-	27.48	56.27	96.41	-
2	**2017-18**	48.77	95.93	-11.35	24.38	51.27	96.20	-8.89
3	**2018-19**	50.70	96.93	3.96		55.53	96.28	8.31
4	**2019-20**	47.47	100.00	-6.37		58.55	99.99	5.44
	Total	201.94				221.62		
	Mean	50.48				55.41		
	Std Dev.	3.29				3.04		
	CV	0.07				0.05		
	SGR	-3.43*				1.01*		

PAITTAIUS: Percentage of area insured to total area insured under scheme,
YWC: Year wise change,
PAITTCA: Percentage of area insured to total cropped area under scheme,
PFCTTFCUS: Percentage farmers covered to total farmers covered under scheme
*significant at 1 per cent level of significance
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

Pradhan Mantri Fasal Bima Yojana (Table 4.43) a comprehensive crop insurance scheme covering all the other schemes at the national level except Weather Based Crop Insurance Scheme was introduced in 2016-17. The area under the scheme at its inception was quite high compared to all the schemes implemented in 2016-17 i.e. 55.01 million hectares. The area insured under the scheme in 2019-20 decreased to 47.47 million hectares. Overall, the area insured under the scheme decreased at the rate of 3.43 per cent per annum.

Table 4.44: Pattern of crop area insured and farmers covered under RWBCIS in India (2016-17 to 2019-20)

S. N.	Years	Area Insured				Farmers insured		
		Area(mha)	PAITTAIUS	YWC (%)	PAITTCA	Number (million)	PFCTTFCUS	YWC (%)
1	2016-17	1.72	3.03		0.86	2.1	96.41	
2	2017-18	2.07	4.07	20.30	1.03	2.02	96.20	-3.81
3	2018-19	1.61	3.07	-22.36		2.14	96.28	5.94
4	2019-20			-			99.99	
	Total	5.39				6.26		
	Year (N)	3.00				3.00		
	Mean	1.80				2.09		
	Std Dev.	0.24				0.06		
	CV	0.13				0.03		
	SGR	-2.20*				0.63*		

PAITTAIUS: Percentage of area insured to total area insured under scheme,
YWC: Year wise change,
PAITTCA: Percentage of area insured to total cropped area under scheme,
PFCTTFCUS: Percentage farmers covered to total farmers covered under scheme
*significant at 1 per cent level of significance
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

Restructured Weather Based Crop Insurance Scheme (Table 4.44) was implemented along-with PMFBY and insured an area of 1.72, 2.07 and 1.61 million hectares in 2016-17, 2017-18 and 2018-19, respectively. The simple annual growth rate of the scheme with respect to area insured was estimated at -2.2 per cent/ annum.

Table 4.45: Pattern of crop area insured and farmers covered under different crop insurance schemes in India (2016-17 to 2019-20)

S. N.	Years	Area insured			Farmers Covered	
		Area (m ha	YWC (%)	PAITTCA	Number (million)	YWC (%)
1	2000-01	16.33		8.81	10.50	
2	2001-02	16.03	-1.82	8.52	10.65	1.44
3	2002-03	19.57	22.06	11.15	12.10	13.55
4	2003-04	18.82	-3.81	9.90	12.39	2.45
5	2004-05	29.62	57.33	15.46	16.22	30.87
6	2005-06	27.75	-6.30	14.37	16.72	3.11
7	2006-07	27.31	-1.60	14.19	17.91	7.11
8	2007-08	29.21	6.98	14.97	19.12	6.75
9	2008-09	26.98	-7.65	13.81	19.58	2.39
10	2009-10	37.09	37.50	19.61	26.30	34.32
11	2010-11	37.51	1.13	18.97	27.31	3.85
12	2011-12	40.39	7.68	20.62	29.70	8.74
13	2012-13	44.48	10.12	22.90	33.40	12.48
14	2013-14	42.75	-3.89	21.27	33.24	-0.50
15	2014-15	44.05	3.05	22.21	37.08	11.56
16	2015-16	52.39	18.92	26.59	48.56	30.95
17	2016-17	56.73	8.28	28.34	58.37	20.21
18	2017-18	50.83	-10.39	25.41	53.29	-8.69
19	2018-19	52.30	2.89		57.67	8.22
20	2019-20	47.47	-9.24		58.55	1.52
	Total	717.61			598.65	
	Mean	35.88			29.93	
	Std Dev.	12.94			17.00	
	CV	0.36			0.57	
	CGR	6.67*			10.38*	
	Std Error	0.25			0.16	
	t cal	25.68			64.31	

YWC: Year wise change,
PAITTCA: %age of area insured to total cropped area under scheme
*significant at 1 per cent level of significance
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

4.4.1.2 Per farmer area insured under different crop insurance schemes

Area insured on per farm basis has also been calculated and presented in Table 4.46. It can be seen from the table that despite the fact that the area insured and the number of farmers covered under the scheme have increased (Table 4.45), the area insured per household has decreased over the time ranging from 0.81 (2019-20) to 1.83 (2004-05). This can be attributed to the fact that the fragmentation of land has increased

and the landholding per head had decreased in the country. Further, it can be seen from the table that the scheme wise area insured per insurer has also decreased over the years. Under NAIS, the area insured decreased from 1.56 ha (2000-01) to 1.10 ha (2015-16). Similar pattern of per farmer area insured can be seen in case of other schemes except MNAIS in which increased from 0.90 to 1.05 ha.

Table 4.46: Per household area insured under different crop insurance schemes in India (hectare)

Year	NAIS	WBCIS	MNAIS	PMFBY	RWCIS	Total
2000-01	1.56	-	-	-	-	1.56
2001-02	1.51	-	-	-	-	1.51
2002-03	1.62	-	-	-	-	1.62
2003-04	1.52	-	-	-	-	1.52
2004-05	1.83	-	-	-	-	1.83
2005-06	1.66	-	-	-	-	1.66
2006-07	1.52	-	-	-	-	1.52
2007-08	1.53	1.57	-	-	-	1.53
2008-09	1.38	1.29	-	-	-	1.38
2009-10	1.41	1.45	-	-	-	1.41
2010-11	1.36	1.41	0.90	-	-	1.37
2011-12	1.39	1.34	1.12	-	-	1.36
2012-13	1.45	1.26	0.99	-	-	1.33
2013-14	1.51	1.17	1.03	-	-	1.29
2014-15	1.24	1.14	1.16	-	-	1.19
2015-16	1.10	1.04	1.05	-	-	1.08
2016-17	-	-	-	0.98	0.82	0.97
2017-18	-	-	-	0.95	1.02	0.95
2018-19	-	-	-	0.91	0.75	0.91
2019-20	-	-	-	0.81	-	0.81
Total	23.59	11.67	6.25	3.65	2.59	26.80
n	16.00	9.00	6.00	4.00	3.00	20.00
Mean	1.47	1.3	1.04	0.91	0.86	1.34
Standard Dev.	0.17	0.17	0.09	0.07	0.14	0.28
CV	0.12	0.13	0.09	0.08	0.16	0.21
CGR	-1.79*	-4.18*	2.65*	-0.04*	-0.03*	-3.37*
Std Error	0.21	0.34	0.92	-	-	0.17
t cal	-8.42	-12.45	2.90	-	-	-19.45

*significance at 1 per cent level of significance

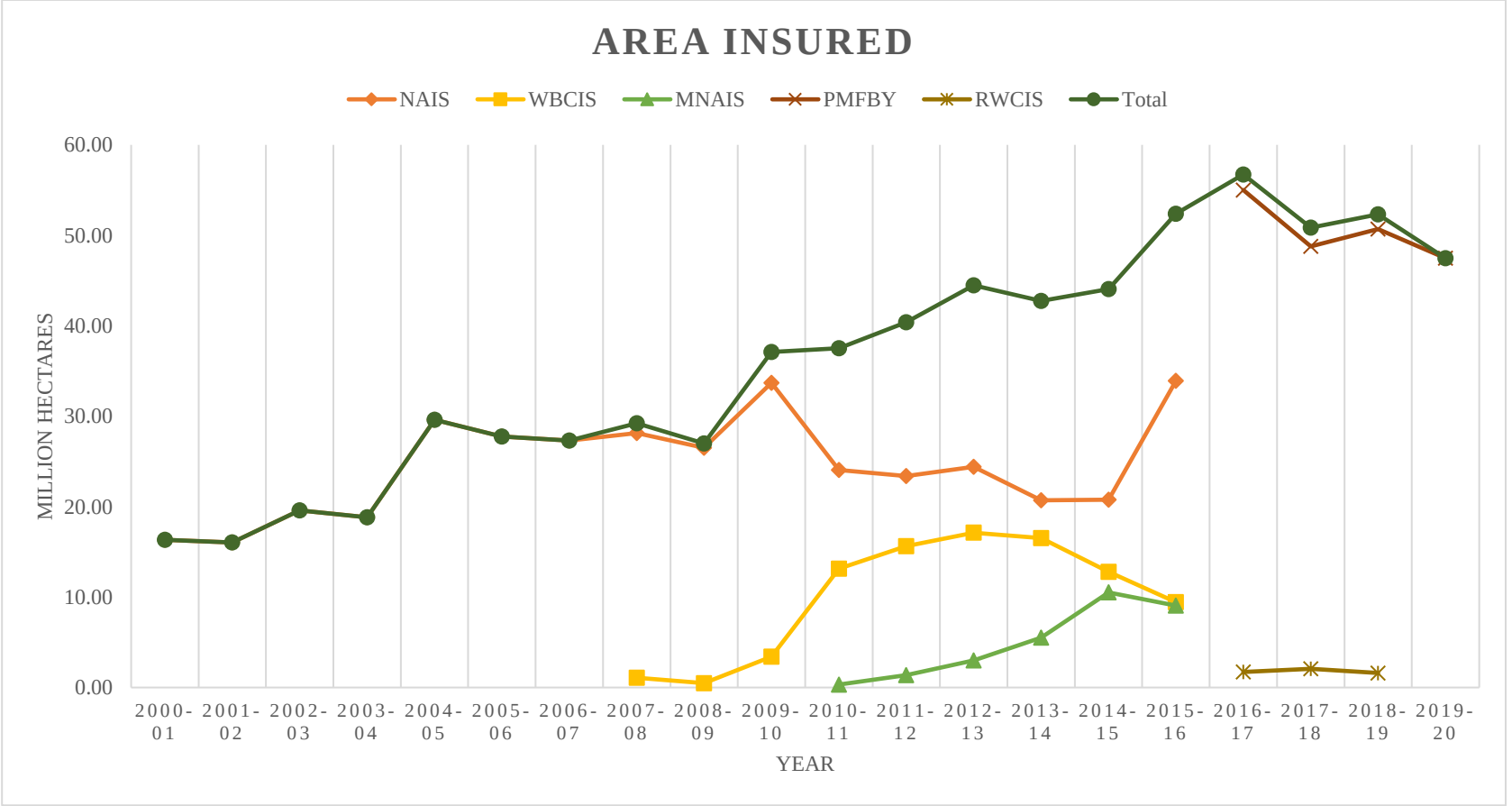

Figure 4.1: Area insured under different crop insurance schemes in India (2000-01 to 2019-20)

4.4.1.3 Number of crop insurers

The number of farmers and percentage change in farmers covered under different crop insurance schemes has been presented in Table 4.40, 4.41, 4.42, 4.43, 4.44 and 4.45. The cursory look at the Table 4.45 indicates that in 2000-01, the number of farmers who insured their crops were 10.50 million which increased to 58.55 million in 2019-20. It can be examined from the data that during the period of 20 years i.e. 2000-01 to 2019-20, there has been an increase in the number of farmers insured except for 2013-14 and 2017-18 when a decline of 0.50 and 8.69 per cent, respectively over the respective previous years. The per cent increase in the number of farmers was found to be highest in 2009-10 (34.32%) followed by 2015-16 (30.95%) and 2004-05 (30.87%). The number of farmers who insured their crops increased at the rate of 10.38 percent per annum. The growth rate was statistically significant at 1 per cent level of significance.

The scheme-wise pattern reveals that under the National Agriculture Insurance Scheme (Table 4.40) during the period of 16 years (2000-2016), the number of farmers who registered for crop insurance increased by about three times i.e. from 10.50 million in 2000-2001 to 30.9 1 million in 2015-16. The data indicates that in the initial 10 years of operation of the scheme i.e. up to 2009-10, there has been a continuous increase in the number of farmers (Figure 4.2) while numbers declined during 2011-12 to 2013-14 by 26.26, 4.85, 0.02 and 18.29 per cent, respectively, over the respective previous years. However, during the last two years of the scheme in operation, the number of farmers registered an increase of 22 and 84.65 per cent in 2014-15 and 2015-16, respectively. On average, the number of farmers who insured their crops under NAIS increased at the rate of 4.15 per cent per annum compound growth rate. The growth rate was statistically significant at 1 per cent level of significance.

As far as Weather Based Crop Insurance Scheme (Table 4.41) was concerned, the coverage of farmers under crop insurance increased from 0.68 million in 2007-08 to 9.03 million in 2015-16. However, during the span of 9 years, the decline in the number of farmers was observed in second, eighth and ninth year of the scheme in operation which were to the tune of 44.71, 20.52 and 19.74 per cent, respectively, over the previous years. The number of farmers who registered for crop insurance witnessed a spectacular increase (Figure 4.2) of 529.88 and 293.60 per cent during 2009-10 and 2010-11, respectively, while the lowest increase in the number of farmers was during 2013-14 (4.10 per cent).

The compound growth of the farmers insured under the scheme was estimated at 50.48 per cent per annum which was statistically significant at 1 per cent level of significance.

The Modified National Agriculture Insurance Scheme (Table 4.42) was introduced in 2010-11 and was in operation till 2015-16. During the six years of the scheme in operation, the number of farmers who insured their crops increased from 0.36 million to 8.62 million. During the entire period of the scheme in operation, a continuous increase was observed in the number of farmers who insured crops except for the last year (2015-16) where the number has decreased from 9.09 million in 2014-15 to 8.62 million. Out of the six years of the scheme in operation, the increase in farmers was the highest during 2011-12 i.e. 241.67 per cent over 2010-11 followed by 144.72 in 2012-13 and 78.07 per cent in 2013-14. On average the number of farmers who insured their crops increased at 89.95 per cent /annum compound growth rate which was statistically significant at 1 per cent level of significance.

The *Pradhan Mantri Fasal Bima Yojana* (Table 4.43) was introduced in 2016-17 in the country and is still in operation. The table indicates that during the first year i.e. 2016-17, 56.27 million farmers in the country insured their crops which increased to 58.55 million in 2019-20. During the period of four years, there has been a gradual increase in the number of farmers who insured their crops except 2017-18 when the number of farmers decreased by about 8.89 per cent compared to 2016-17. An almost similar pattern of increase in the number of farmers under Restructured Weather-Based Crop Insurance Scheme (Table 4.44) was observed. However, the number of farmers covered under these RWBCIS was quite low compared to *Pradhan Mantri Fasal Bima Yojana*. The simple annual growth rate in the number of farmers was estimated at 1.01 and 0.63 per cent under PMFBY and RWBCIS, respectively.

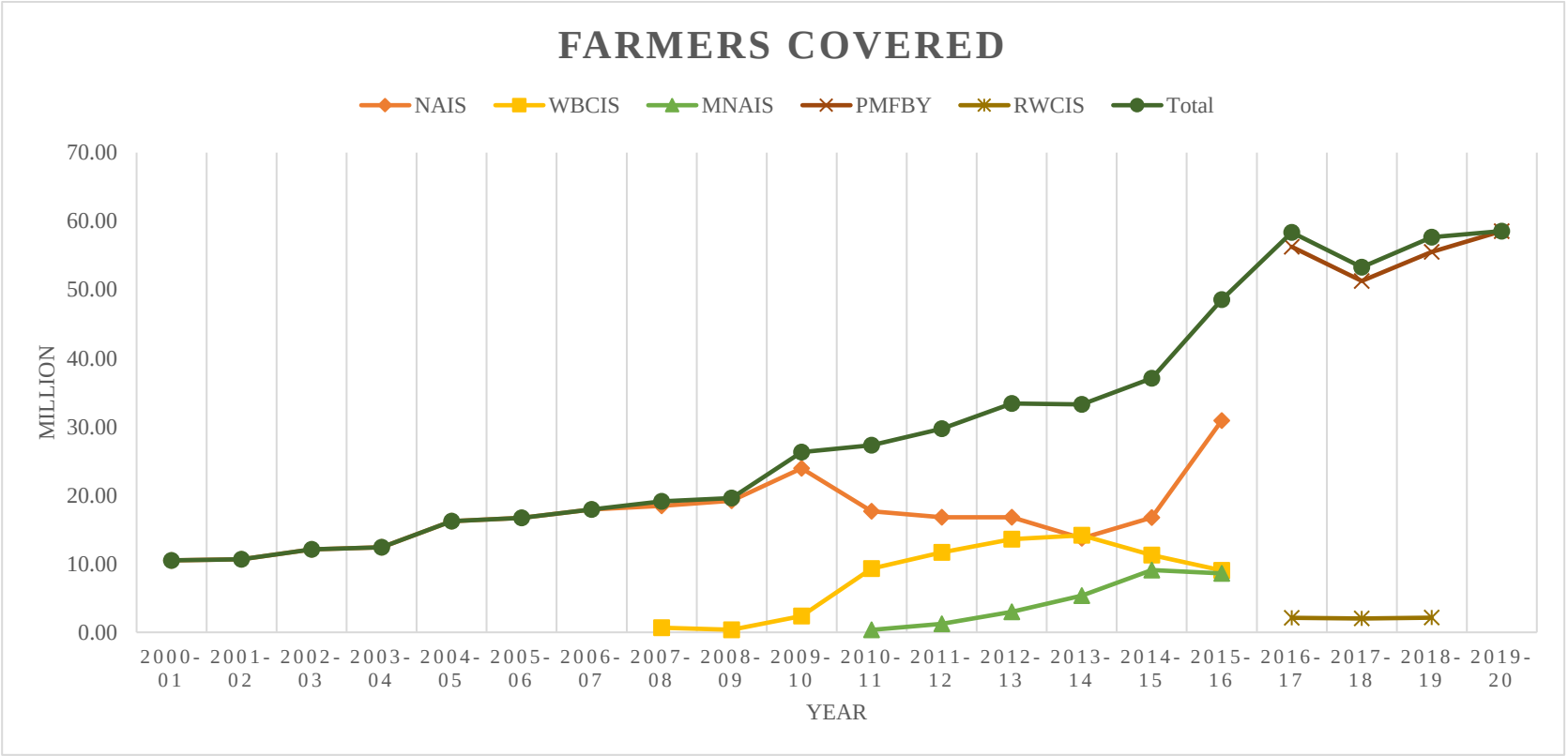

Figure 4.2: Farmers covered under different crop insurance schemes in India (2000-01 to 2019-20)

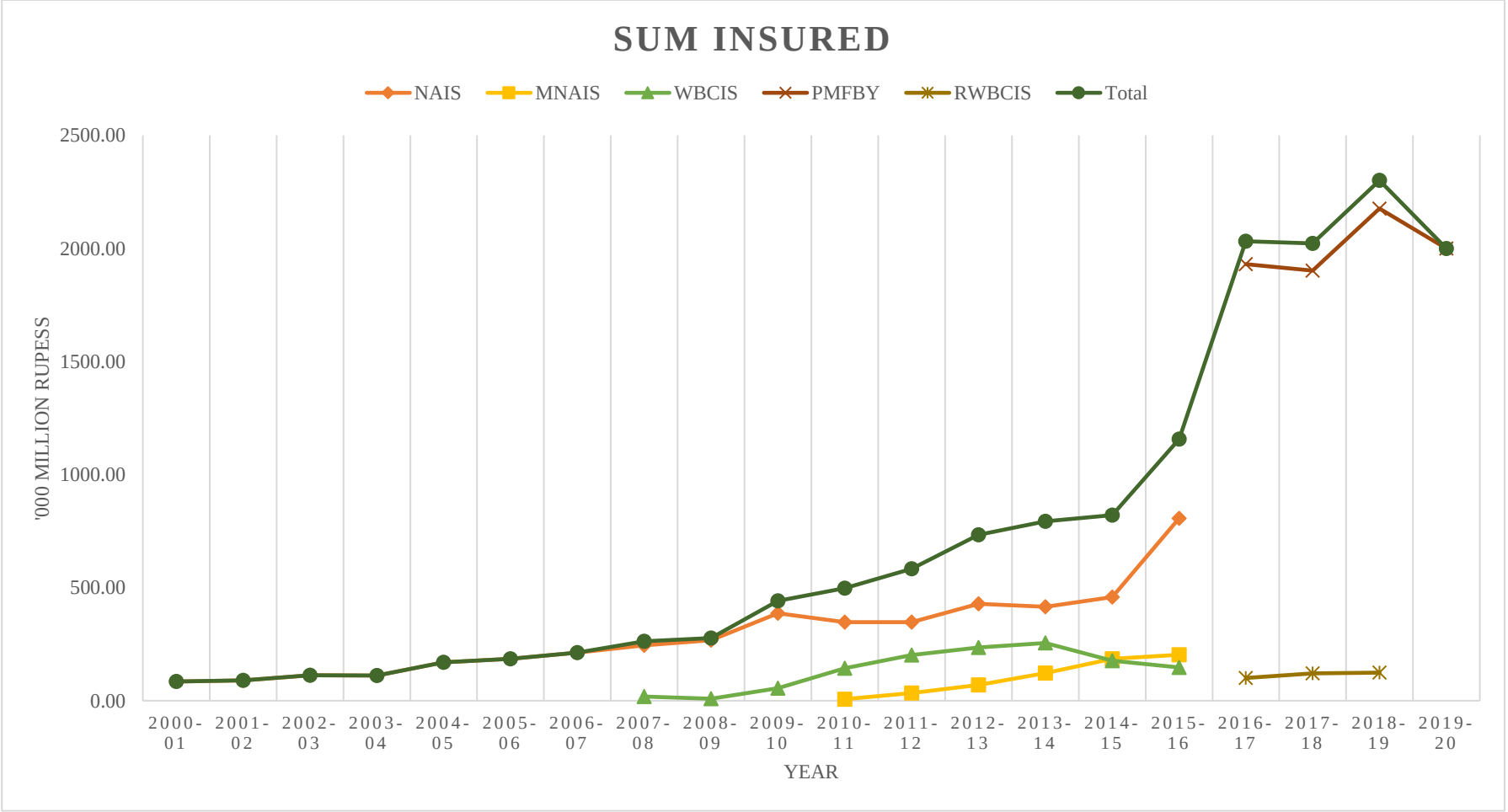

Figure 4.3: Sum Insured under different crop insurance schemes in India (2000-01 to 2019-20)

4.4.1.4 Sum insured under different crop insurance schemes

The sum insured and the percentage change in sum insured over the years has been given in Table 4.52. The table reveals that the amount of sum insured during the inception of the scheme (NAIS) i.e. 2000-01 was 85.06 thousand million rupees which after a decade i.e. in 2010-11 increased to 497.26 thousand million rupees and in 2019-2020, the sum insured was 1999.46 thousand million rupees. The sum insured exhibited an increasing trend during the period of 20 years with small dips in between (Figure 4.3). The sum insured increased by 5.81 per cent in the year 2001-02 and in the next year, it increased by 25.21 per cent which could be seen as the successful implementation of the crop insurance programme during its inception. After a small dip of 0.94 per cent, the amount insured showed a sharp rise of 51.79 per cent in 2004-05 and as discussed earlier the change in farmers' covered during this year was 30.87 per cent (Table 4.45). A fluctuating trend was observed in sum insured from the years 2007-08 to 2016-17 with highest increase of 75.60 per cent in 2016-17, however the growth declined by 0.42 and 13.09 per cent in the later years of 2017-18 and 2019-20, respectively. During 2019-20 the sum insured decreased by 13.09 per cent and the farmers covered during this period did not show much of an increase. The amount of sum insured increased at the rate of 20.43 per cent which was significant at 1 per cent level of significance.

As far as the scheme-wise pattern is concerned, the National Agriculture Insurance Scheme (Table 4.47) started with insuring a sum of about 85 thousand million rupees in 2000-01 which increased to 806.22 thousand million rupees in 2015-16 which was the last year of the scheme in operation. During this period of fifteen years, the scheme insured about 170 thousand million rupees in 2004-05 which increased to 386.24 thousand million rupees in 2009-09. It can be seen from the table that the sum insured increased over the years by 25.21 per cent in 2002-03 in two years, immediately after its inception. After a small fall of 0.94 per cent in 2003-04, the sum insured increased with a fluctuating trend from 2004-05 to 2009-10 and declined by 10.10 per cent in 2010-11. On average, the sum insured increased at a rate of 33.76 per cent per annum of compound annual growth rate which was significant at 1 per cent level of significance.

Further, the Modified National Agriculture Insurance Scheme (Table 4.48) was implemented in some states along with NAIS and in the very beginning, it insured a sum of 6.94 thousand million rupees which increased by 383.82 per cent to 33.56 thousand million rupees in 2011-12. The sum insured over the years no doubt increased over the

respective previous years but it increased at a decreasing rate. The table clearly reveals that the sum insured increased by 107.81, 75.42, 51.29 and 9.75 per cent during the years 2011-12, 2012-13, 2014-15 and 2015-16, respectively which led to 203.13 thousand million rupees insured in 2015-16. The scheme on average showed an increasing compound growth rate of 90.56 per cent/ year. It was found to be significant at1 per cent level of significance.

Table 4.47: Pattern of sum insured and gross premium paid for crop insurance in India under NAIS (2000-01 to 2015-16) ('000' million rupees)

Year	SI (Rs)	Premium				% in GP		% of FP to SI	% of Gv. P to SI
		Farmer	SG	CG	GP	Farmer	Gov.		
2000-01	85.06	1.79	0.28	0.28	2.35	76.28	23.72	2.10	0.66
2001-02	90.00	2.36	0.28	0.28	2.92	81.01	18.99	2.63	0.62
2002-03	112.69	3.12	0.26	0.26	3.64	85.83	14.17	2.77	0.46
2003-04	111.64	3.17	0.15	0.15	3.47	91.17	8.83	2.84	0.27
2004-05	169.45	5.11	0.12	0.12	5.35	95.47	4.53	3.01	0.14
2005-06	185.91	5.29	0.13	0.13	5.55	95.37	4.63	2.85	0.14
2006-07	213.02	5.72	0.24	0.14	6.10	93.78	6.22	2.69	0.18
2007-08	244.75	6.38	0.28	0.17	6.83	93.46	6.54	2.61	0.18
2008-09	268.15	7.02	0.85	0.21	8.08	86.86	13.14	2.62	0.40
2009-10	386.24	10.22	1.01	0.31	11.55	88.56	11.44	2.65	0.34
2010-11	347.21	8.80	1.10	0.29	10.20	86.31	13.69	2.54	0.40
2011-12	347.71	8.57	0.90	0.25	9.72	88.12	11.88	2.46	0.33
2012-13	429.09	10.42	2.54	0.30	13.26	78.54	21.46	2.43	0.66
2013-14	415.54	10.25	2.20	0.30	12.75	80.40	19.6	2.47	0.60
2014-15	458.81	11.54	2.05	0.39	13.98	82.56	17.44	2.52	0.53
2015-16	806.22	20.19	3.77	1.42	25.37	79.57	20.43	2.50	0.64
Total	4671.49	119.95	16.16	5.00	141.12				
Mean	291.97	7.50	1.01	0.31	8.82				
CGR	14.39*	13.94*	23.59*	7.35*	14.35*				
Std Error	0.43	0.54	1.79	1.37	0.44				
t cal	33.76	25.89	13.15	5.37	32.65				

SI: Sum Insured,
SG: State Government,
CG: Central Government,
GP: Gross Premium,
FP: Farmer Premium,
Gv.P: Government Premium
*significant at 1 per cent level of significance
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

Weather Based Crop Insurance Scheme was implemented in 2007-08 and during this year, the scheme insured a sum of 17.92 thousand million rupees which decreased by 50.48 per cent to 8.87 thousand million rupees in 2008-09 (Table 4.49). After this dip, the sum insured increased continuously till 2013-14 with 520.14, 160.04, 41.22, 16.41 and 8.50 per cent rates of change over the respective previous years. The scheme no doubt showed the spectacular increase in sum insured during its implementation but during the last two years of the scheme in operation i.e. in 2014-15 and 2015-16, the sum insured decreased by 30.88 and 16.47 per cent over the respective previous years. The scheme has grown over the years with a compound growth rate of 41.82 per cent which was significant at 1 per cent level of significance.

Pradhan Mantri Fasal Bima Yojana was implemented in 2016-17 during which it insured 1930.59 thousand million rupees which in the next year saw a decline of 1.49 per cent and the sum insured fell to 1901.90 thousand million rupees in 2017-18 (Table 5.50). The sum insured for the year 2018-19 increased by 14.43 per cent over the previous year and the sum insured reached 2176.36 thousand million rupees. For the next year, the sum insured fell by 8.13 per cent and the amount came down to 1999.46 thousand million rupees. For the period of four years, the sum insured increased at simple growth of only 0.89 per cent/ annum.

Along with *Pradhan Mantri Fasal Bima Yojana*, Restructured Weather Based Crop Insurance Scheme was also implemented and during its inception in 2016-17 (Table 4.51), the scheme insured a sum of 100.62 thousand million rupees which increased by 20.01 per cent in 2017-18 (120.75 thousand million rupees). Furthermore, for the period of three years, the sum insured registered a simple growth of 7.83 per cent/ annum.

4.4.1.5 Gross premium paid under different crop insurance schemes

The premium is the amount charged by crop insurance companies for the insurance of crops. In order to motivate the farmers for crop insurance, the government provides subsidy in crop insurance premium. As per the guidelines, the amount of subsidy extended to the famers is shared by state and central government almost equally up to 2020. Recently, the central government has capped its contribution to the extent 25 and 30 per cent of the subsidy for irrigated and rainfed conditions, respectively. The Table 4.52 indicates that when the crop insurance program started the gross premium was 2.35 thousand million rupees which has increased continuously till date. In the year 2001-02,

the gross premium paid was comparatively higher than the previous year and after a decade i.e. in 2010-11, the premium increased to 23.57 thousand million rupees. During the period of ten years, the increase was continuous except for the year 2003-04 (Figure 4.4). In 2011-12, the premium was 31.03 thousand million rupees which increased to 49.46 thousand million rupees in 2014-15. In 2015-16, three schemes i.e. NAIS, MNAIS and WBCIS were closed and the gross premium in that year was 56.14 thousand million rupees. The comprehensive PMFBY and RWBCIS worked hand in hand from 2016-17 and amount of the gross premium was 215.74 thousand million rupees, which jumped to 282.25 thousand million rupees in 2019-20. On an average the gross premium over the years has increased at a compound growth rate growth rate of 30.94per cent per/annum which was found to be significant at 1per cent level of significance.

As far as scheme-wise premium is concerned, firstly in NAIS, the gross premium was 2.35 thousand million rupees in 2000-01 which increased continuously for the next two years i.e. till 2002-03 (Table 4.47). In the next year (2003-04) the gross premium declined to 3.47 thousand million rupees after which it increased continuously for the years 2004-05 (5.35 thousand million rupees), 2005-06 (5.55 thousand million rupees), 2006-07 (6.10 thousand million rupees), 2007-08 (6.83 thousand million rupees), 2008-09 (8.08 thousand million rupees) and 2009-10 (11.55 thousand million rupees). After a decline in the next two consecutive years, the premium amount increased to 13.26 thousand million rupees in 2012-13. After a small dip in 2013-14 (12.75 thousand million rupees), the premium amount increased continuously for the next two years i.e. in 2014-15 (13.98 thousand million rupees) and 2015-16 (25.37 thousand million rupees) after which the scheme was closed. On an average, the premium amount increased by a growth rate of 14.35 per cent/ annum. It was found to be significant at 1 per cent level of significance.

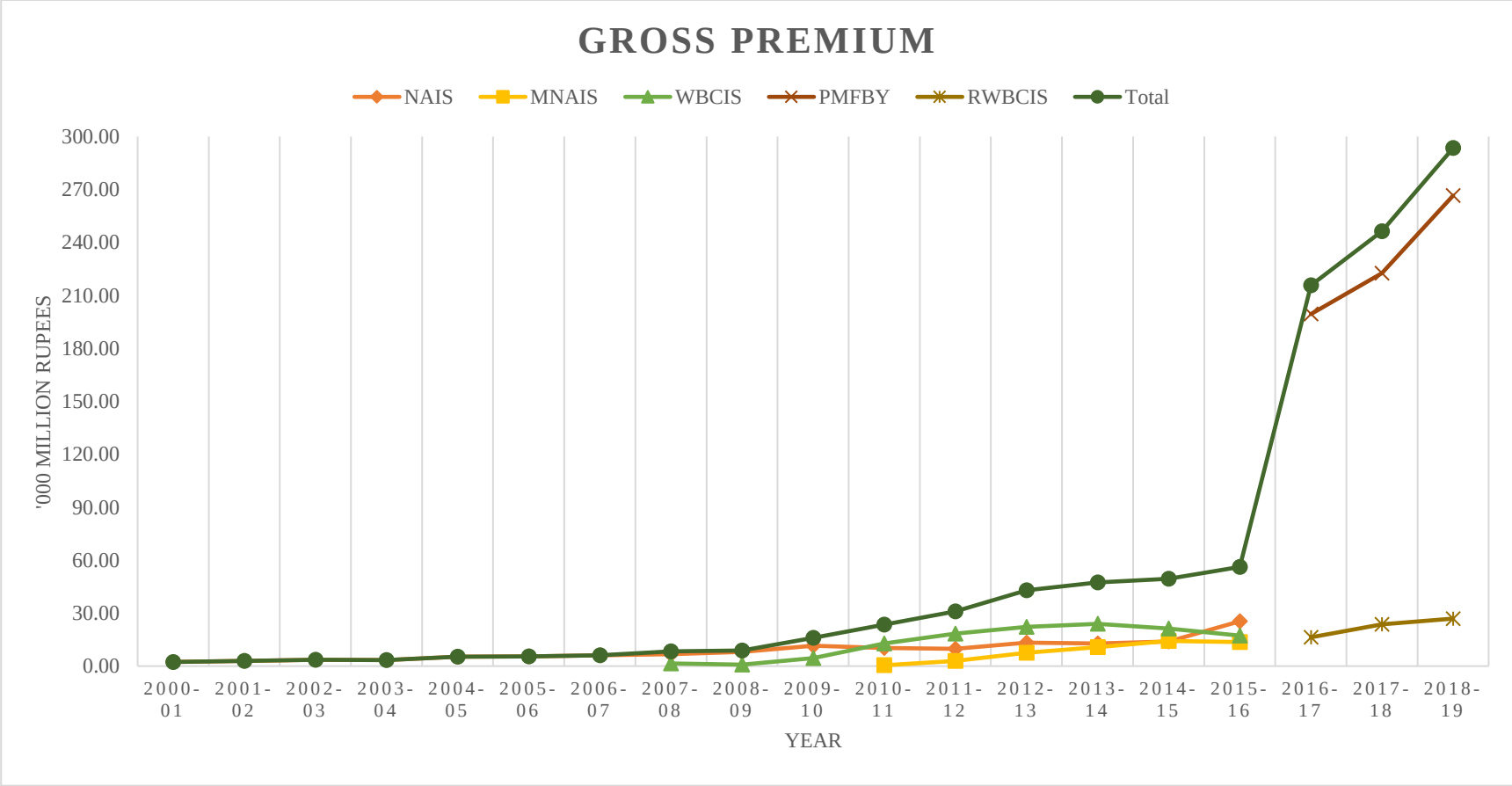

Figure 4.4: Sum Insured under different crop insurance schemes in India (2000-01 to 2019-20)

Table 4.48: Pattern of sum insured and gross premium paid for crop insurance in India under MNAIS (2010-11 to 2015-16) ('000' million rupees)

Year	SI	Premium				% in GP		% of FP to SI	% of Gv. P to SI
		Farmer	SG	CG	GP	Farmer	Gov.		
2010-11	6.94	0.24	0.12	0.12	0.47	50.21	49.79	3.43	3.46
2011-12	33.56	1.18	0.88	0.81	2.87	41.10	58.90	3.51	5.04
2012-13	69.74	2.95	2.34	2.24	7.54	39.19	60.81	4.23	6.57
2013-14	122.34	4.63	3.11	3.00	10.74	43.12	56.88	3.79	4.99
2014-15	185.08	6.14	4.19	3.92	14.26	43.07	56.93	3.32	4.38
2015-16	203.13	6.14	3.67	3.66	13.56	45.30	54.70	3.02	3.61
Total	620.79	21.28	14.31	13.75	49.44				
Mean	103.47	3.55	2.39	2.29	5.49				
CGR	90.56*	85.41*	87.86*	88.09*	47.84*				
Std Error	9.81	11.35	14.91	14.38	6.50				
t cal	9.23	7.53	5.89	6.12	7.36				

SI: Sum Insured,
SG: State Government,
CG: Central Government,
GP: Gross Premium,
FP: Farmer Premium,
Gv.P: Government Premium
*significant at 1 per cent level of significance
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

The Modified National Agriculture Insurance Scheme (Table 4.48) during its inception (2010-11) had a gross premium of 0.47 thousand million rupees which increased continuously for the years 2011-12 (2.87 thousand million rupees), 2012-13 (7.54 thousand million rupees), 2013-14 (10.74 thousand million rupees) and 2014-15 (14.26 thousand million rupees). For the year 2015-16, the gross premium saw a small dip and it reached 13.56 thousand million rupees. The gross premium under the scheme over the years increased at a compound growth rate of 47.84 per cent per annum which was found to be significant at 1 per cent level of significance.

In WBCIS (Table 4.49) which was implemented in 2007-08, the gross premium was 1.48 thousand million rupees which fell in 2008-09 (0.82 thousand million rupees). After 2008-09 the premium increased continuously till 2013-14 (23.94thousand million rupees) and declined to 21.22thousand million rupees in the year 2014-15 of its operation. The gross premium under the scheme has increased at a growth rate of 42.27 per cent per annum compound growth. It was found significant at 1 per cent level of significance.

Table 4.49: Pattern of sum insured and gross premium paid for crop insurance under WBCIS in India (2007-08 to 2015-16) 0('000' million rupees)

Year	SI	Premium				% in GP		% of FP to SI	% of Gv. P to SI
		Farmer	SG	CG	GP	Farmer	Gov.		
2007-08	17.92	0.45	0.52	0.12	1.48	30.46	69.54	2.52	5.80
2008-09	8.87	0.21	0.31	0.81	0.82	25.51	74.49	2.35	6.88
2009-10	55.03	1.19	1.68	2.24	4.50	26.53	73.47	2.17	6.01
2010-11	143.11	3.44	4.89	3.00	12.89	26.71	73.29	2.41	6.6
2011-12	202.09	5.40	6.59	3.92	18.44	29.28	70.72	2.67	6.46
2012-13	235.26	6.62	7.78	3.66	22.18	29.85	70.15	2.81	6.61
2013-14	255.26	9.72	7.26	0.12	23.94	40.59	59.41	3.81	5.57
2014-15	176.43	9.39	5.93	0.81	21.22	44.23	55.77	5.32	6.71
2015-16	147.37	7.87	4.68	2.24	17.21	45.72	54.28	5.34	6.34
Total	1241.34	44.29	39.64	39.64	38.79	-	-	-	-
Mean	137.93	4.92	4.4	4.4	4.31	-	-	-	-
CGR	41.82*	58.68*	41.99*	41.99*	42.27*	-	-	-	-
Std Error	6.71	6.44	6.65	6.65	6.59	-	-	-	-
t cal	6.23	9.11	6.31	6.31	6.41	-	-	-	-

SI: Sum Insured,
SG: State Government,
CG: Central Government,
GP: Gross Premium,
FP: Farmer Premium,
Gv.P: Government Premium
*significant at 1 per cent level of significance
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

4.4.1.6 Premium paid by farmers under different crop insurance schemes

During the duration of 2000-01 to 2019-20, the farmers' premium under different crop insurance schemes and the percentage share of the farmers in sum insured along with the percentage of farmers' premium to gross premium has been presented in Table no. 4.47 to 4.52.

The amount paid by the farmers as a premium for insuring their crops has increased over the years (Table 4.52). In the year 2000-01, the aggregate amount of premium paid by the farmers who insured their crops was 1.79 thousand million rupees which increased over the years and after decade i.e. in 2010-11, the amount paid by the farmers as premium for the insurance of the crops was 12.49 thousand million rupees. Further, after another decade, the amount of premium was found to be 38.15 thousand million rupees in 2019-20. When the share of the farmers' premium in sum insured was

calculated, it varied between 1.91 to 3.33 per cent, the lowest being in 2019-20 and the highest in 2014-15. In 2000-01, the only scheme operational was National Agricultural Insurance Scheme and during this time farmers' premium was 2.1 per cent of the sum insured which increased to 3.01 percent in 2004-05 and down to 2.69 per cent in 2006-07. Further in 2007-08, two schemes were operational in the country viz., National Agricultural Insurance Scheme, Weather Based Crop Insurance Scheme and during their first year of joint operation the share of farmers premium in sum insured was 2.6 per cent which did not exhibit any substantial change and fell down to 2.59 per cent. After this, three schemes (NAIS, WBCIS and MNAIS) were in operation from 2010-11 to 2015-16 during which it varied from 2.51 percent in 2010-11 to 3.3 percent in 2014-15. From 2016-17 to 2019-20, the percentage of farmers' premium to sum insured was comparatively lower and in 2019-20 it was found to be 1.91 per cent. The premium paid by the farmers increased at a compound growth rate of 19.33 per cent/ annum which was found to be significant at 1 per cent level of significance.

Table 4.50: Pattern of sum insured and gross premium paid for crop insurance under PMFBY in India (2016-17 to 2019-20) ('000' million rupees)

Year	SI	Premium				% in GP		% of FP to SI	% of Gv. P to SI
		Farmer	SG	CG	GP	Farmer	Gov.		
2016-17	1930.59	36.38	83.05	79.99	199.42	18.24	81.76	1.88	8.45
2017-18	1901.90	37.28	93.77	91.64	222.68	16.74	83.26	1.96	9.75
2018-19	2176.36	43.23	113.47	109.87	266.57	16.22	83.78	1.99	10.26
2019-20	1999.46	38.15	124.80	119.30	282.25	13.51	86.49	1.91	12.21
Total	8008.31	155.04	415.09	415.09	970.92	-	-	-	-
Mean	2002.08	38.76	103.77	103.77	242.73	-	-	-	-
Std Dev.	123.19	15.95	43.24	43.24	100.77	-	-	-	-
CV	41.11	7.92	18.17	18.17	15.79	-	-	-	-
SGR	0.89*	1.22*	12.57*	12.29*	10.38*	-	-	-	-

SI: Sum Insured,
SG: State Government,
CG: Central Government,
GP: Gross Premium,
FP: Farmer Premium,
Gv.P: Government Premium
*significant at 1 per cent level of significance
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

Table 4.51: Pattern of sum insured and gross premium paid for crop insurance under RWBCIS in India (2016-17 to 2019-20) ('000' million rupees)

Year	SI	Premium				% in GP		% of FP to SI	% of Gv. P to SI
		Farmer	SG	CG	GP	Farmer	Gov.		
2016-17	100.62	4.04	6.14	6.14	16.32	24.76	75.24	4.02	12.2
2017-18	120.75	4.62	9.53	9.53	23.67	19.5	80.5	3.82	15.78
2018-19	124.25	5.30	10.87	10.74	26.91	19.69	80.31	4.27	17.39
Total	345.62	13.96	26.54	26.41	66.90	-	-	-	-
Mean	115.21	4.65	8.85	8.8	22.3	-	-	-	-
Std Dev.	12.75	1.72	3.34	3.32	8.36	-	-	-	-
CV	36.81	13.55	27.57	27.05	53.81	-	-	-	-
SGR	7.83*	10.14*	25.68*	24.97*	21.63*	-	-	-	-

SI: Sum Insured,
SG: State Government,
CG: Central Government,
GP: Gross Premium, FP: Farmer Premium,
Gv.P: Government Premium
*significant at 1 per cent level of significance
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

As far as the share of farmers' premium to gross premium is concerned, the Table 4.52 clearly indicates that it increased till 2004-05 where the farmer was paying 95.47 per cent of gross premium and after that it declined continuously and is presently at 13.51 per cent (2019-20). On an average, the farmers' premium increased by 19.33 per cent/ annum of compound growth rate which was significant at 1 per cent level of significance.

The scheme wise pattern of farmers' premium indicates that, the National Agriculture Insurance Scheme (Table 4.47) during its inception in 2000-01, the farmers premium was found to be 1.79 thousand million rupees which after a decade increased to 8.80 thousand million rupees and during the time of closure of the scheme, it ended up with the farmers' premium amount of 20.19 thousand million rupees. The percentage share of farmers' premium to the sum insured during the implementation of the NAIS was lowest i.e. 2.1 per cent in 2000-01 and the highest i.e. 3.01 per cent in the year 2004-05. It can be clearly seen from the table that the share of farmers' premium in sum insured has increased under the scheme as in the last year of its implementation it was found to be 2.5 per cent which was more than the share during its inception. As observed that the overall farmers' share in gross premium has declined over the years but the same is not true for the NAIS as in the beginning of the scheme, 76.28 per cent share of the premium was paid by the farmer which increased to 79.57 per cent in 2015-16. During the period of

fifteen years, this share increased continuously till 2004-05 and then began to decline till 2012-13. The farmers' premium under the scheme has increased over the years with the growth rate of 13.94 per cent per annum compound growth which was found statistically significant at 1 per cent level of significance.

The Modified National Agricultural Insurance Scheme (Table 4.48) was implemented in 2010-11 and during the year of inception, the farmers paid a premium of 0.24 thousand million rupees which continued to increase till 2015-16 during which it was found to be 6.14 thousand million rupees. In MNAIS, the farmers paid 21.28 thousand million rupees from 2010 to 2016. The percentage farmers' premium to sum insured, during its inception was 3.43 per cent which decreased to 3.02 per cent in 2015-16 when the scheme was closed. Additionally, when the share of farmers in gross premium was examined it was found that it decreased from 50.21 per cent in 2010-11 to 45.3 per cent in 2015-16. On average, the farmers' premium under the scheme increased by 85.41 per cent per annum compound growth rate which was found to be significant at 1 percent level of significance.

Under the Weather Based Crop Insurance Scheme (Table 4.49), the premium paid by the farmers during 2007-08 was 0.45 thousand million rupees which increased continuously till 2013-14 and during the final year of its implementation it was 7.87 thousand million rupees. The percentage of the farmers' premium to sum insured during the implementation of the scheme varied from 2.17 per cent to 5.34 per cent. When the scheme began it was found to be 2.52 per cent and continued to decrease till 2009-10 (2.17 per cent). From 2010-11, it increased from 2.41 to 2.81 per cent in 2013-14 and 5.34 per cent in 2015-16, over the respective previous year. The share of the premium paid by the farmer was 30.46 per cent to the gross premium in 2007 which declined to 29.85 per cent in 2012-13 but after that, it increased to 45.72 per cent in 2015-16. During the period of its implementation, the share of the premium paid by the farmer increased by 58.68 per cent per annum compound growth which was found to be significant at 1 per cent level of significance.

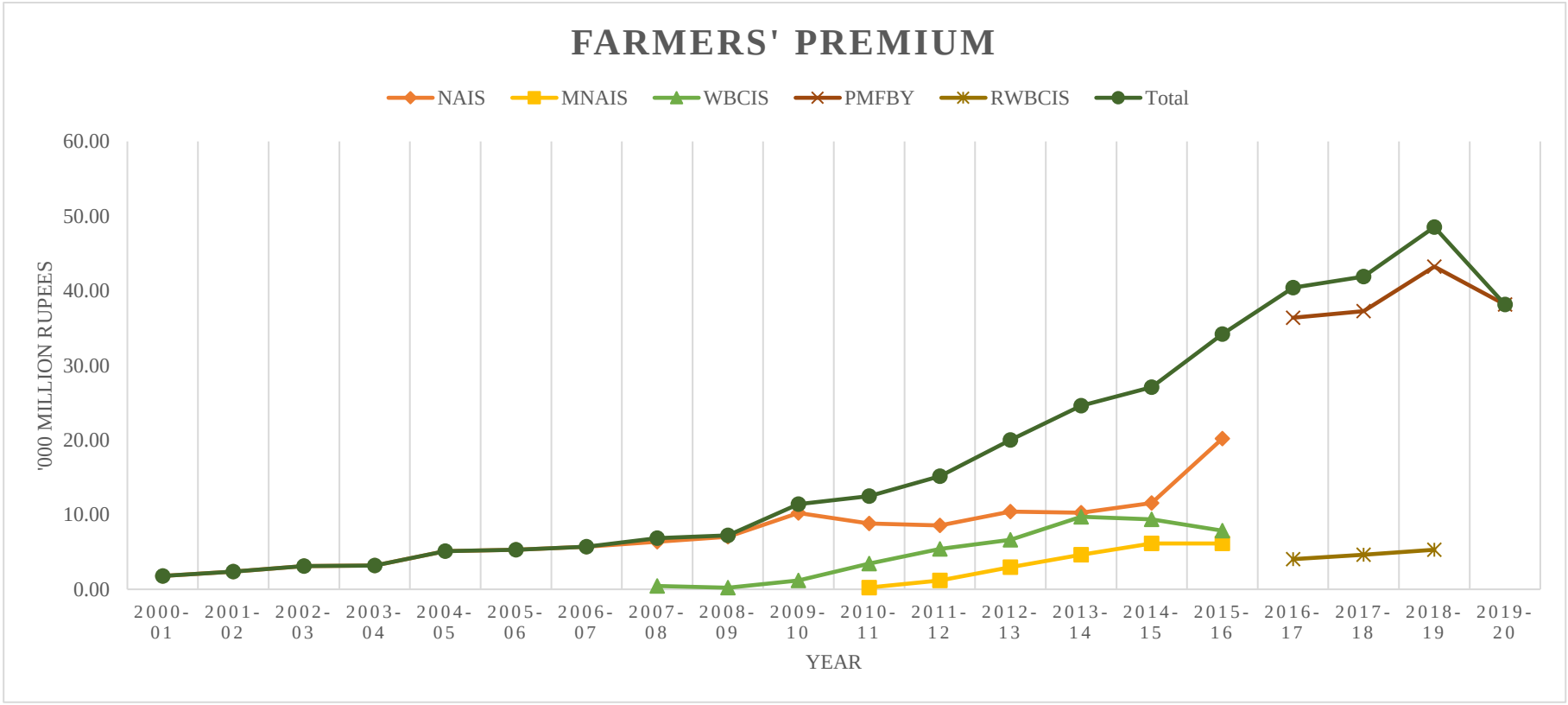

Figure 4.5 : Sum Insured under different crop insurance schemes in India (2000-01 to 2019-20)

Table 4.52: Pattern of sum insured and gross premium paid for crop insurance under different schemes in India (2000-01 to 2019-20)('000' million rupees)

Year	SI	Premium				% in GP		% of FP to SI	% of Gv. P to SI
		Farmer	SG	CG	GP	Farmer	Gov.		
2000-01	85.06	1.79	0.28	0.28	2.35	76.28	23.72	2.10	0.66
2001-02	90.00	2.36	0.28	0.28	2.92	81.01	18.99	2.63	0.62
2002-03	112.69	3.12	0.26	0.26	3.64	85.83	14.17	2.77	0.46
2003-04	111.64	3.17	0.15	0.15	3.47	91.17	8.83	2.84	0.27
2004-05	169.45	5.11	0.12	0.12	5.35	95.47	4.53	3.01	0.14
2005-06	185.91	5.29	0.13	0.13	5.55	95.37	4.63	2.85	0.14
2006-07	213.02	5.72	0.24	0.14	6.10	93.78	6.22	2.69	0.18
2007-08	262.67	6.84	0.79	0.68	8.31	82.22	17.78	2.6	0.56
2008-09	277.02	7.22	1.15	0.52	8.89	81.22	18.78	2.61	0.60
2009-10	441.28	11.42	2.69	1.94	16.04	71.17	28.83	2.59	1.05
2010-11	497.26	12.49	6.11	4.97	23.57	52.98	47.02	2.51	2.23
2011-12	583.36	15.14	8.37	7.52	31.03	48.8	51.2	2.60	2.72
2012-13	734.09	19.99	12.66	10.32	42.98	46.51	53.49	2.72	3.13
2013-14	793.14	24.60	12.57	10.26	47.43	51.87	48.13	3.10	2.88
2014-15	820.32	27.07	12.17	10.22	49.46	54.73	45.27	3.30	2.73
2015-16	1156.73	34.20	12.12	9.74	56.14	60.91	39.09	2.96	1.89
2016-17	2031.21	40.42	89.18	86.13	215.74	18.74	81.26	1.99	8.63
2017-18	2022.65	41.89	103.29	101.16	246.35	17.01	82.99	2.07	10.11
2018-19	2300.60	48.53	124.34	120.61	293.48	16.54	83.46	2.11	10.65
2019-20	1999.46	38.15	124.80	119.30	282.25	13.51	86.49	1.91	12.21
Total	14887.56	354.52	511.70	484.73	1351.05	-	-	-	-
Mean	744.38	17.73	25.59	24.24	67.55	-	-	-	-
Std Dev.	749.79	15.48	44.30	43.03	100.92	-	-	-	-
CV	100.73	87.31	173.11	177.52	149.4	-	-	-	-
CGR	20.43*	19.33*	49.22*	49.01*	30.94*	-	-	-	-
Std Error	0.30	0.34	2.11	2.36	0.76	-	-	-	-
t cal	65.95	56.18	23.27	20.73	40.49	-	-	-	-

SI: Sum Insured,
SG: State Government,
CG: Central Government,
GP: Gross Premium,
FP: Farmer Premium,
Gv.P: Government Premium
*significant at 1 per cent level of significance
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

4.4.1.7 Premium paid by government under different crop insurance schemes

The premium paid by the government and its percentage to the sum insured has been presented in Table no. 4.47 to 4.52. An amount of 0.28 thousand million rupees (state and central govt. each) was paid as subsidy in 2000-01 which increased to 124.80and 119.30 thousand million rupees for state and central govt. respectively in 2019-20. As far as the percentage of government's premium to gross premium is concerned it can be clearly seen from the table that this percentage has increased over the years. In 2000-01 the percentage of the government's premium to sum insured was found to be 0.66 per cent which continued to decline and is presently at12.21 per cent. The premium paid by the central and state government increased at a compound annual growth rate of 49.22 and 49.01 per cent respectively.

Under the National Agriculture Insurance Scheme, the premium paid by the state and central government accounted for 0.28 thousand million rupees each in 2000- 01 which increased to 3.77 and 1.42thousand million rupees, respectively in 2015-16. But this rise was not continuous during the years of the implementation of the scheme. Under the scheme, the percentage of the government's premium to sum insured ranged from 0.14 per cent to 0.66 per cent. Overall, the state and central government's premium under the NAIS increased by 23.59 and 7.35 per cent/ annum, respectively. It was found to be significant at 1 per cent level of significance.

In Modified National Agriculture Insurance Scheme (Table 4.48), which was implemented in few states of the country in 2010-11, the state and central government premium was 0.12 thousand million rupees each during its inception which increased continuously till 2014-15. The percentage of government premium to sum insured was found to be 3.46 per cent in 2010-11 and6.57 per cent in 2012-13. The percentage declined to 3.61 per cent in 2015-16 after which the scheme was closed. During the period of its operation, the state and central government premium has increased at a compound growth rate of 87.86 and 88.09 per cent/ annum which was found to be significant at 1 percent level of significance.

In Weather Based Crop Insurance Scheme (Table 4.49), which was implemented in 2007 with the National Agriculture Insurance Scheme accounted the state and central government to pay a premium of 0.52 and 0.12 thousand million rupees during its inception. The share of the government in the sum insured under the scheme ranged from

5.57 to 6.88 per cent. The premium paid by the state and central government increased by 41.99 percent/ annum compound growth rate each.

The comprehensive scheme *viz.*, *Pradhan Mantri Fasal Bima Yojana* was implemented in 2016-17 during which the state and central government paid a premium of 83.05 and 79.99thousand million rupees and this premium increased to 124.80 and 119.30 thousand million rupees, respectively in 2019-20. The percentage of the government premium to the sum insured was 8.45 per cent in 2016-17 and it increased to 12.21 per cent in 2019-20. Overall, the premium paid by the state and central government under the scheme increased by the simple growth rate of 12.57 and 12.29 per cent/annum, respectively.

Further, the Restructured Weather Based Crop Insurance Scheme was implemented along with PMFBY and during its inception in 2016-17 state governments paid an amount of 6.14 thousand million rupees each as a share in premium and in 2018-19 premium amount paid by the state government increased to 10.87 thousand million rupees. The government's premium to sum insured under this scheme was 12.20 per cent in 2016-17 which increased continuously till 2018-19 and was found to be at the rate of 17.39 per cent. On average, the premium paid by the state government under the scheme increased by 27.57 and 27.05 per cent/ annum, respectively.

4.4.1.8 Claims paid to the farmers under different crop insurance schemes

The insurance cover provides the claims to the farmers who report the crop losses experienced by them. The claims reported by the farmers, the proportion of claims paid to claims reported and to sum insured and claims paid to the farmers have been represented in Table 4.58. During the period of twenty years i.e. from 2000-2020, the claims reported have increased significantly. In the year 2000-01, claim of 12.82 thousand million rupees was reported by the farmers and 100 per cent of the claims were paid to them. Next year the claims reported by the farmers fell to 5.58 thousand million rupees and in 2002-03, the claims reported increased to 20.13 thousand million rupees. The increase was not continuous and in the next year i.e. in 2003-04, the claims reported fell down to 11.50 thousand million rupees. After that, the increase was continuous for the next three years and the claims reported increased to 22.92 thousand million rupees (2006-07) and for the next four years that is up to 2010-11, the claims reported increased to 29.50 thousand million rupees. During all this time from 2000 to 2011, the proportion of claims reported

to claims paid was 100 per cent which means that all the claims which were reported by the farmers were paid. After 2010-11, the claims reported by the farmers increased continuously till 2015-16 where the claims reported were 35.67 thousand million rupees (2011-12), 74.94 thousand million rupees (2012-13), 77.72 thousand million rupees (2013-14), 78.49 thousand million rupees (2014-15) and 216.08 thousand million rupees (2015-16) and during this, the claims paid were 97.53, 95.21, 98.46, 98.92 and 94.13 per cent of the claims reported, respectively. Further, the tables reveal that the claims reported in 2016-17 were 167.75 thousand million rupees and for the next three years *viz.*, 2017-18, 2018-19 and 2019-20 the claims paid were 99.91, 99.98, 96.49 and 95.66 per cent, respectively of the claims reported. The proportion of the claims paid to the sum insured under the crop insurance program varied from 5.93 to 17.86 per cent. The proportion was 15.07 per cent in 2000-01 and over the years this proportion did not show a uniform trend and in 2019-20 the proportion was 10.76 per cent. The claims reported under the crop insurance program over the years have increased at a growth rate of 21.05 per cent per annum compound growth and on the contrary, the claims paid grew at a comparatively lesser growth rate i.e. 20.81 per cent per annum. Both the growth rates were found to be significant at 1 per cent level of significance.

In NAIS, the proportion of claims paid out of the claims reported were 100 per cent from the year 2000-01 till 2010-11 and during this period the claims reported increased but not in a uniform pattern (Table 4.53). During the inception of the scheme, the claims reported were 12.82 thousand million rupees which after a decade i.e. in 2010-11 increased to 23.00 thousand million rupees. During this period of ten years, the claims reported were highest in the year 2006-07 i.e. 22.92 thousand million rupees and the lowest after the year of its inception i.e. in 2000-01 the claims reported were 5.58 thousand million rupees. In 2011-12 the claims reported were 22.09 thousand million rupees out of which 99.96 per cent of the claims were paid to the farmers. The claims reported increased next year to 48.95 thousand million rupees out of which 99.74 per cent claims were paid back to the farmers and in the year 2015-16 when the scheme was closed the claims reported were 174.85 thousand million rupees out of which 94.73 per cent claims were paid to the farmers. The proportion of the claims paid to the sum insured under the scheme was highest in 2015-16 i.e. 20.55 per cent followed by 17.86 per cent (2002-03), 15.07 per cent (2000-01), 13.25 per cent (2009-10), 11.38 per cent (2013-13)

and 10.76 per cent (2006-07) while it was lowest in the year 2001-02 (6.2 per cent). The claims reported and paid under the scheme increased at a rate of 15.34 and 15.18 per cent per annum compound growth, respectively which was found to be significant at 1 per cent level per cent of significance.

In MNAIS the claims reported have continuously increased from the year 2010-11 (0.16 thousand million rupees) to 2015-16 (20.39 thousand million rupees)(Table 4.54). Under the scheme, the claims paid to the farmers were 100 per cent of the claims reported in the year 2010-11 and the percentage decreased to 88.86 per cent (2015-16). The decrease in the claims paid to the claims reported has been continuous over the years of its operation. The proportion of the claims paid to the sum insured was highest in the year 2013-14 (11.38 per cent) followed by 2012-13 (9.71 per cent) while it was found to be lowest in the year 2010-11 (2.33 per cent) and 2011-12 (5.35 per cent). During the last year of its operation, claims of 8.92 per cent of the sum insured were paid under the scheme. The claims reported under the scheme increased at a rate of 145.04 per cent per annum compound growth rate and the claims paid increased at a growth rate of 140.44 per cent per annum compound growth rate which was found to be significant at 1 per cent level percent of significance.

After all the three previous schemes were clubbed into the two schemes i.e. PMFBY and RWBCIS, the claims reported by the farmers under PMFBY were found to be 151.15 thousand million rupees in 2016-17 out of which 99.90 per cent of the claims was paid back to the farmers. The compensation under the schemes has been presented in Table 4.56. The claims reported by the farmers increased continuously for the next two years and 251.09 thousand million rupees were reported in the year 2018-19 out of which 96.89 per cent were paid back to the farmers. The proportion of the claims paid to the sum insured under PMFBY was constant at 11.00 per cent from 2017-20 but during the year of its inception, it was 8.00 per cent (2016-17). The claims reported by the farmers increased at a growth rate of 0.12 per cent per annum and the claims paid back to the farmers also increased at nearly 0.11 per cent per annum.

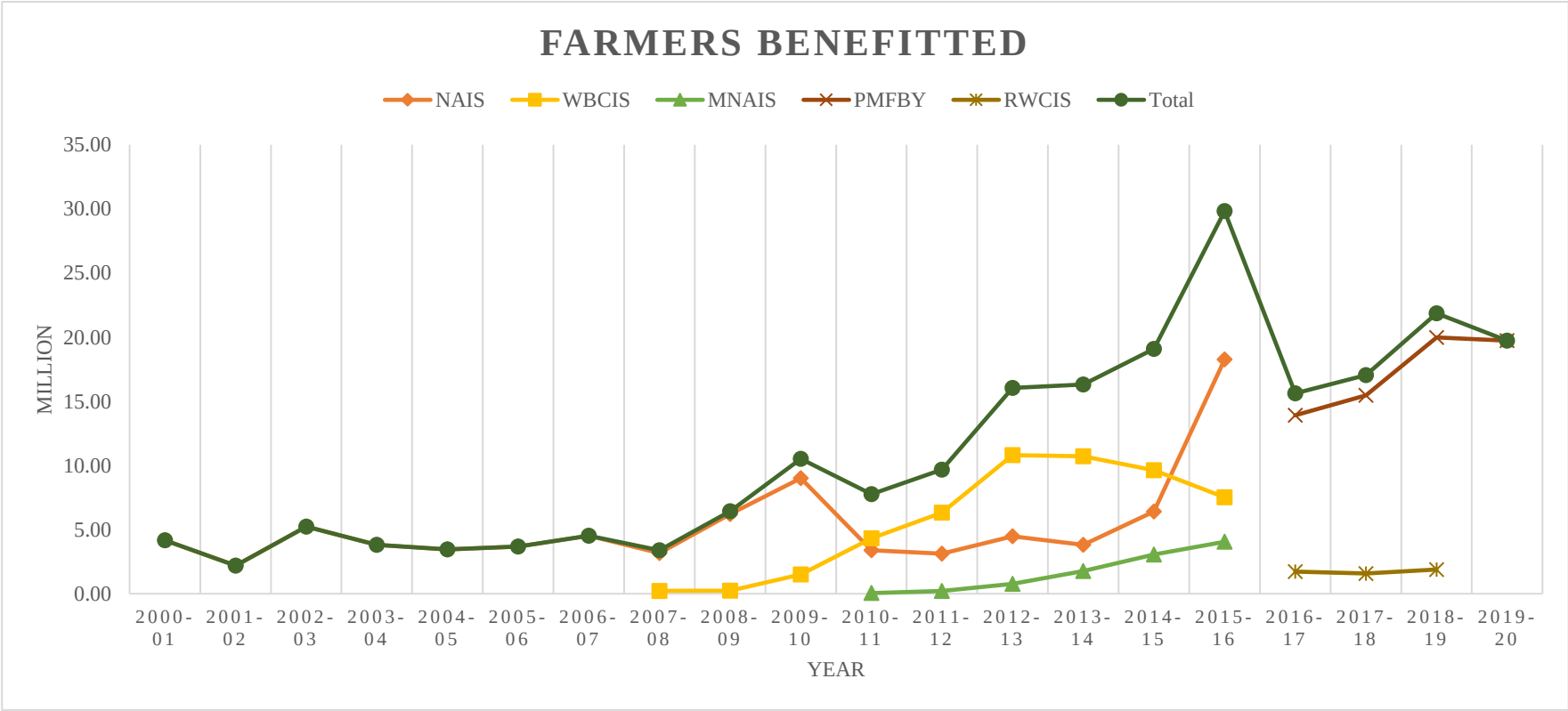

Figure 4.6: Farmers benefitted under different crop insurance schemes in India (2000-01 to 2019-20)

Under RWBCIS, the claims reported by the farmers (Table 4.57) in 2016-17 were 16.60 thousand million rupees and 100 per cent of the claims reported were paid to the farmers. On an average, claims of 23.84 thousand million rupees were reported and 23.09 crore rupees were paid as compensation. The claims reported and claims paid under the scheme increased at a rate of 38.95 and 34.40 per cent/ annum, respectively.

Table 4.53: Pattern of farmers benefitted, claims reported and claims paid under NAIS (2000-01 to 2015-16) in India

('000 million rupees) (Number in millions)

NAIS/ Year	FB	% FB to covered	CR	CP	% of CP to SI	% of CP to CR
2000-01	4.16	39.63	12.82	12.82	15.07	100.00
2001-02	2.20	20.61	5.58	5.58	6.20	100.00
2002-03	5.22	43.19	20.13	20.13	17.86	100.00
2003-04	3.81	30.75	11.50	11.50	10.30	100.00
2004-05	3.45	21.26	11.99	11.99	7.08	100.00
2005-06	3.67	21.94	14.25	14.25	7.66	100.00
2006-07	4.52	25.25	22.92	22.92	10.76	100.00
2007-08	3.17	17.19	17.26	17.26	7.05	100.00
2008-09	6.20	32.28	38.88	38.88	14.5	100.00
2009-10	9.01	37.65	51.18	51.18	13.25	100.00
2010-11	3.39	19.22	23.00	23.00	6.62	100.00
2011-12	3.13	18.65	22.09	22.08	6.35	99.96
2012-13	4.47	26.61	48.95	48.83	11.38	99.74
2013-14	3.81	27.76	43.24	43.10	10.37	99.68
2014-15	6.41	38.31	42.86	42.60	9.29	99.41
2015-16	18.25	59.06	174.85	165.65	20.55	94.73
Total	84.88		561.50	551.77	-	-
Mean	5.30		35.09	34.49	-	-
CGR	5.40*		15.34*	15.18*	-	-
Std Error	1.21		1.37	1.35	-	-
t cal	4.45		11.16	11.23	-	-

FB: Farmers benefitted,
FC: Farmers Covered,
CR: Claims Reported,
CP: Claims Paid,
SI: Sum Insured
*significant at 1 per cent level of significance
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

Table 4.54: Pattern of farmers benefitted, claims reported and claims paid under MNAIS (2010-11 to 2015-16) in India

('000 million rupees) (Number in millions)

MNAIS/ Year	FB	% FB to covered	CR	CP	% of CP to SI	% of CP to CR
2010-11	0.05	13.08	0.16	0.16	2.33	100.00
2011-12	0.22	18.14	1.81	1.80	5.35	99.43
2012-13	0.77	25.61	6.78	6.77	9.71	99.91
2013-14	1.78	33.25	14.32	13.92	11.38	97.21
2014-15	3.06	33.64	15.20	14.88	8.04	97.84
2015-16	4.05	46.95	20.39	18.12	8.92	88.86
Total	9.93		58.66	55.65	-	-
Mean	1.66		9.78	9.28	-	-
CGR	140.46*		145.04*	140.44*	-	-
Std Error	12.18		22.89	22.94	-	-
t cal	11.52		6.33	6.12	-	-

FB: Farmers benefitted,
FC: Farmers Covered,
CR: Claims Reported,
CP: Claims Paid,
SI: Sum Insured
*significant at 1 per cent level of significance
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

4.4.1.9 Farmers benefitted under different crop insurance schemes

The farmers who register for crop insurance are paid claims when they report the losses, therefore out of the total number of farmers covered, claims are paid to those farmers who either face losses due to the production risks and their produce is less than the threshold yield of the notified areas or report losses on time. The total number of farmers benefitted and their proportion in the farmers covered has been presented in Table 4.58. During the period of twenty years, the number of farmers benefitted have undoubtedly increased but not at an impressive rate. In 2000-01, 4.16 million farmers were benefitted which were about 40 per cent of the total farmers covered. The largest number of farmers *viz.* 29.82 million were benefitted in 2015-16, when NAIS, MNAIS and WBCIS were operational for the last time. The percentage of the number of farmers benefitted out of the total farmers covered varied from 20.61 per cent in 2001-02 to 61.41 per cent in 2015-16. The increase in the number of farmers benefitted under different crop insurance schemes was not uniform and the number increased at a compound annual growth rate of 12.87 per cent/ annum.

Table 4.55: Pattern of farmers benefitted, claims reported and claims paid under WBCIS (2007-08 to 2015-16) in India

('000 million rupees) (Number in millions)

WBCIS/ Year	FB	% FB to covered	CR	CP	% of CP to SI	% of CP to CR
2007-08	0.23	33.30	1.06	1.06	5.90	100.00
2008-09	0.23	61.25	0.49	0.49	5.58	100.00
2009-10	1.50	63.62	3.45	3.44	6.26	99.81
2010-11	4.32	46.42	6.35	6.34	4.43	99.95
2011-12	6.33	54.23	11.77	10.91	5.40	92.73
2012-13	10.81	79.45	19.21	15.76	6.70	82.03
2013-14	10.72	75.74	20.17	19.51	7.64	96.71
2014-15	9.62	85.54	20.43	20.16	11.43	98.68
2015-16	7.52	83.26	20.83	19.63	13.32	94.20
Total	51.28		103.76	97.30	-	-
Mean	5.70		11.53	10.81	-	-
CGR	65.07*		58.78*	57.38*	-	-
Std Error	8.14		6.18	5.88	-	-
t cal	7.99		9.51	9.74	-	-

FB: Farmers benefitted,
FC: Farmers Covered,
CR: Claims Reported,
CP: Claims Paid,
SI: Sum Insured
*significant at 1 per cent level of significance
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

As far as the scheme wise pattern is concerned, under the NAIS, 4.16 million farmers were benefitted in 2000-01 which were 39.63 per cent of the total farmers covered (Table 4.53). The farmers benefitted increased to 9.01 million after a decade i.e. in 2009-10. Under the scheme, the highest proportion of farmers covered i.e. 59.06 per cent was benefitted in the last year of its operation i.e. in 2015-16. On an average, the number of farmers benefitted increased at a compound growth rate of 5.4 per cent/ annum.

Along with the NAIS, WBCIS was implemented in 2007-08 and started with benefitting 0.23 million farmers. In total, the scheme benefitted 51.28 million farmers and on an average the scheme benefitted 5.7 million farmers /year (Table 4.55). The farmers benefitted under the scheme increased at a compound growth rate of 65.07 per cent/ annum.

Table 4.56: Pattern of farmers benefitted, claims reported and claims paid under PMFBY (2016-17 to 2019-20) in India

('000 million rupees) (Number in millions)

PMFBY/ Year	FB	% FB to covered	CR	CP	% of CP to SI	% of CP to CR
2016-17	13.91	24.72	151.15	151.00	8.00	99.9
2017-18	15.46	30.16	202.22	202.18	11.00	99.98
2018-19	19.98	35.98	251.09	243.29	11.00	96.89
2019-20	19.74	33.71	224.89	215.13	11.00	95.66
Total	69.09		829.35	811.60	-	-
Mean	17.27		207.34	202.9	-	-
Std Dev.	3.06		42.45	38.62	-	-
CV	0.18		20.47	19.03	-	-
SGR	10.48*		12.20*	10.62*	-	-

FB: Farmers benefitted,
FC: Farmers Covered,
CR: Claims Reported,
CP: Claims Paid,
SI: Sum Insured
*significant at 1 per cent level of significance
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

Table 4.57: Pattern of farmers benefitted, claims reported and claims paid under RWBCIS (2016-17 to 2019-20) in India

('000 million rupees) (Number in millions)

RWBCIS /Year	FB	%FB to covered	CR	CP	% of CP to SI	% of CP to CR
2016-17	1.72	82.15	16.60	16.60	16.00	100.00
2017-18	1.58	77.94	18.95	18.94	16.00	99.97
2018-19	1.89	88.03	35.98	33.73	27.00	93.73
Total	5.19		71.53	69.27	-	-
Mean	1.73		23.84	23.09	-	-
Std Dev.	0.16		10.58	9.29	-	-
CV	0.09		44.38	40.23	-	-
SGR	3.29*		38.92*	34.40*	-	-

FB: Farmers benefitted,
FC: Farmers Covered,
CR: Claims Reported,
CP: Claims Paid,
SI: Sum Insured
*significant at 1 per cent level of significance
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

Table 4.58: Pattern of farmers benefitted, claims reported and claims paid under different crop insurance schemes in India (2000-01 to 2019-20)

('000 million rupees) (Number in millions)

Total/ Year	FB	%FB to covered	CR	CP	% of CP to SI	% of CP to CR
2000-01	4.16	39.63	12.82	12.82	15.07	100.00
2001-02	2.20	20.61	5.58	5.58	6.20	100.00
2002-03	5.22	43.19	20.13	20.13	17.86	100.00
2003-04	3.81	30.75	11.50	11.50	10.3	100.00
2004-05	3.45	21.26	11.99	11.99	7.08	100.00
2005-06	3.67	21.94	14.25	14.25	7.66	100.00
2006-07	4.52	25.25	22.92	22.92	10.76	100.00
2007-08	3.40	17.76	18.31	18.31	6.97	100.00
2008-09	6.43	32.84	39.37	39.37	14.21	100.00
2009-10	10.51	39.98	54.63	54.63	12.38	100.00
2010-11	7.76	28.40	29.50	29.50	5.93	100.00
2011-12	9.68	32.61	35.67	34.79	5.96	97.53
2012-13	16.04	48.03	74.94	71.35	9.72	95.21
2013-14	16.31	49.08	77.72	76.52	9.65	98.46
2014-15	19.10	51.50	78.49	77.64	9.46	98.92
2015-16	29.82	61.41	216.08	203.40	17.58	94.13
2016-17	15.63	26.78	167.75	167.60	8.25	99.91
2017-18	17.04	31.97	221.17	221.13	10.93	99.98
2018-19	21.87	37.91	287.08	277.01	12.04	96.49
2019-20	19.74	33.71	224.89	215.13	10.76	95.66
Total	220.36		1624.79	1585.57	-	-
Mean	10.49		77.37	75.5	-	-
Std Dev.	7.88		89.2	86.21	-	-
CV	0.75		115.29	114.19	-	-
CGR	12.87*		21.05*	20.81*	-	-
Std Error	0.68		0.82	0.81	-	-
t cal	18.79		25.49	25.46	-	-

FB: Farmers benefitted,
FC: Farmers Covered,
CR: Claims Reported,
CP: Claims Paid,
SI: Sum Insured
*significant at 1 per cent level of significance
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

MNAIS was implemented in 2010-11 and benefitted 0.05 million farmers in the first year of its implementation. The number of farmers benefitted under the scheme increased continuously during the period of six years (Table 4.54). The percentage of the farmers benefitted under the scheme varied from 13.08 to 46.95 per cent/ annum and

increased at a compound growth rate of 140.46 per cent which was statistically significant at 1 per cent level of significance.

The farmers benefitted under PMFBY and WBCIS have been presented in Table 4.56 and 4.57. The PMFBY was implemented in 2016-17 along with RWBCIS. Under PMFBY, so far 69.09 crore farmers have been benefitted and on an average 17.27 million farmers were benefitted per year. RWBCIS has benefitted 5.19 million farmers from 2016-17 to 2018-19 which varied at a simple growth rate of 3.39 per cent per annum. The farmers benefitted under PMFBY, increased at a growth rate of 10.48 per cent/ annum. The growth rates were found to be significant at 1 per cent level of significance.

Table 4.59: Pattern of claims paid/ rupee of premium paid under different crop insurance schemes (2000-01 to 2019-20) in India (Rs.)

Year	NAIS	WBCIS	MNAIS	PMFBY	WBCIS	Total
2000-01	7.16	-	-	-	-	7.16
2001-02	2.36	-	-	-	-	2.36
2002-03	6.45	-	-	-	-	6.45
2003-04	3.63	-	-	-	-	3.63
2004-05	2.35	-	-	-	-	2.35
2005-06	2.69	-	-	-	-	2.69
2006-07	4.01	-	-	-	-	4.01
2007-08	2.71	2.36	-	-	-	2.68
2008-09	5.54	2.33	-	-	-	5.45
2009-10	5.01	2.89	-	-	-	4.78
2010-11	2.61	1.84	0.67	-	-	2.36
2011-12	2.58	2.02	1.53	-	-	2.30
2012-13	4.69	2.38	2.29	-	-	3.57
2013-14	4.20	2.01	3.01	-	-	3.11
2014-15	3.69	2.15	2.42	-	-	2.87
2015-16	8.20	2.49	2.95	-	-	5.95
2016-17	-	-	-	4.15	4.11	4.15
2017-18	-	-	-	5.42	4.10	5.28
2018-19	-	-	-	5.63	6.36	5.71
2019-20	-	-	-	5.64	-	5.64

4.4.1.10 Output input pattern in crop insurance

The output-input pattern of the crop insurance schemes was calculated and has been presented in Table 4.59. Overall under different crop insurance schemes, on per rupee of the premium paid by the farmer, a claim of 7.16 rupees was paid in 2000-01. It was highest in the twenty years i.e. from 2000-01 to 2019-20. From 2000-01 to 2006-07, only one crop insurance scheme was in operation and during this period the per rupee

return under this scheme varied from 2.35 to 7.16 rupees. From 2007-08 to 2009-10, with NAIS, WBCIS also worked to protect the interests of the farmers and during this period, claims of 2.68, 5.45 and 4.78 rupees/ rupee premium were paid to the farmers under both the schemes in 2007-08, 2008-09 and 2009-10. Further, in 2011-12, MNAIS was introduced and during the period of 2010-11 to 2015-16, under these three schemes this return varied from 2.30 to 5.95 rupees. Under MNAIS alone, the returns varied from 0.67 rupees in 2010-11 to 3.01 rupees in 2013-14. The revolutionary schemes i.e. PMFBY *and* RWBCIS were introduced in 2016-17 and the returns under both the scheme were highest in 2019-20 (5.64 rupees) and lowest in 2016-17 (4.15 rupees). Under PMFBY, the returns per rupee of the premium increased continuously from 2016-17 (4.15 rupees) to 2019-20 (5.64 rupees) and similar could be seen in case of RWBCIS.

4.4.2 Coverage, cost and compensation in Himachal Pradesh

The crop insurance schemes like National Agriculture Insurance Scheme, Weather Based Crop Insurance Scheme, *Pradhan Mantri Fasal Bima Yojana* and Restructured Weather Based Crop Insurance Scheme have been implemented in the state. The schemes have been implemented in Himachal Pradesh for the welfare of the farmers and covering the production risk faced by the farmers which leads to crop losses. The various crop insurance schemes implemented till date in Himachal Pradesh have been discussed with respect to cost, coverage and compensation in the following sections:

4.4.2.1 Crop area covered under different crop insurance schemes

The cropping pattern of the Himachal Pradesh is dominated by maize, paddy, wheat and barley accounting for more 85 per cent of total cropped area of the state. These major crops also qualify for crop insurance and the schemes which implement at national level were also implemented in the state for crop insurance. The crop area insured, the percentage change in the area insured and coverage of different schemes have been presented in tables 4.64. It may be observed from the table that in 1999-2000, the total area insured was 0.27 thousand hectares. During the first decade of crop insurance i.e. up to 2011, it was highest in 2008-09. The increase in the area insured was not uniform, it found to decrease by 81.77, 67.70, 46.1338.21 and 1.12per cent in 2002-03, 2004-05, 2007-08, 2009-10 and 2011-12, over respective previous years, respectively. After 2010-11, the crop area insured decreased continuously till 2013-14 (13.46 thousand ha). With

implementation of PMFBY and RWBCIS, there has been a tremendous increase in the area insured which was highest in 2017-18 i.e. 1274.84 thousand hectare registering an increase of 884.89 per cent over 2016-17. The area insured again decreased during 2018-19 (1199.62 thousand ha.) and 2019-20 (94.58 ha).

Table 4.60: Pattern of crop area insured and farmers covered under NAIS in H.P. (1999-2000 to 2015-16)

NAIS /Year	AI (000 ha)	% change in AI	% coverage across schemes	FC (000)	% change in FC	% coverage across schemes
1999-2000	0.27		100.00	0.49		100.00
2000-01	2.04	655.56	100.00	2.36	381.63	100.00
2001-02	35.33	1631.86	100.00	66.76	2728.81	100.00
2002-03	6.44	-81.77	100.00	7.08	-89.39	100.00
2003-04	16.10	150.00	100.00	24.92	251.98	100.00
2004-05	5.20	-67.70	100.00	7.14	-71.35	100.00
2005-06	9.26	78.08	100.00	10.28	43.98	100.00
2006-07	22.76	145.79	100.00	20.5	99.42	100.00
2007-08	12.26	-46.13	100.00	13.48	-34.24	100.00
2008-09	38.04	210.28	99.76	49.49	267.14	98.74
2009-10	22.01	-42.14	93.42	28.04	-43.34	85.05
2010-11	26.86	22.04	81.59	31.17	11.16	64.91
2011-12	25.68	-4.39	78.89	28.68	-7.99	59.97
2012-13	20.91	-18.57	64.80	23.19	-19.14	47.17
Total	243.16	-	-	313.58	-	-
Mean	17.37	-	-	22.4	-	-
Std Dev.	11.53	-	-	17.8	-	-
CV	0.66	-	-	0.79	-	-
CGR	24.12*	-	-	20.92*	-	-
Std Error	4.02	-	-	4.04	-	-
t cal	5.99	-	-	5.17	-	-

AI: Area Insured,
FC: Farmers Covered
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

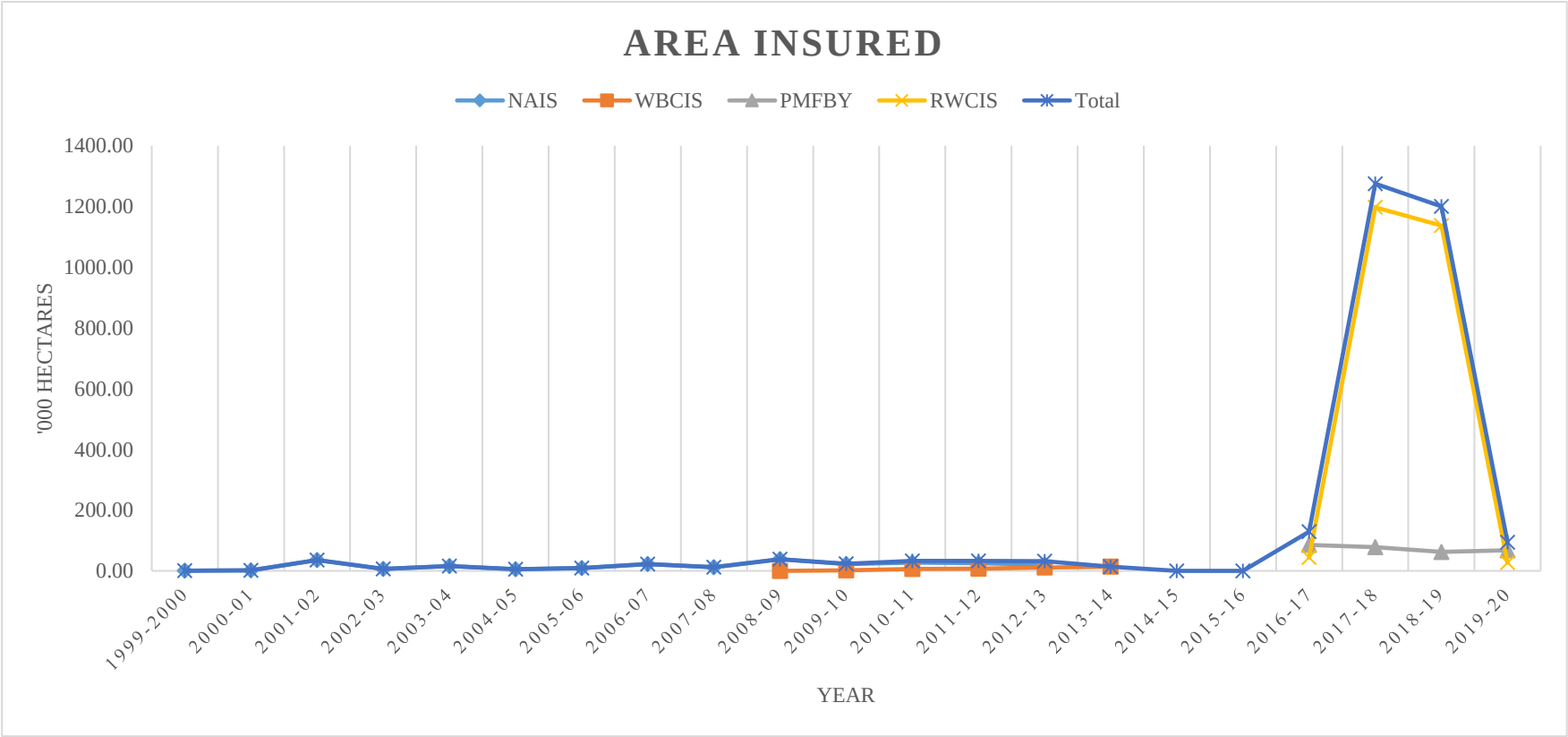

Figure 4.7: Area Insured under different crop insurance schemes in Himachal Pradesh (1999-2000 to 2019-20)

The scheme wise coverage of area indicates that 1999-2000 to 2007-08, NAIS was the only schemes in operation and hence the accounts for 100 per area insured in the state (Table 4.60). The decrease in proportion of coverage under NAIS ranged between 64.80 and 99.76 of total area insured during the period of 2008-09 to 2013-14 as WBCIS was also introduced in 2008-09, which covers the rest of insured area in the state. The NAIS closed down and WBCIS was restructured as RWBCIS and PMFBY was launched a comprehensive scheme in 2016-17, thus, afterward the area insured was shared by these new schemes in the state. The coverage of the schemes under WBCIS, PMFBY *and* RWBCIS has been presented in Table 4.61, 4.62 and 4.63, respectively. Among these, the major portion of the area insured was covered by PMFBY in 2016-17 and 2019-20 while in other two years the coverage of area was relatively higher under RWBCIS. The total area under different schemes in Himachal Pradesh has increased at a growth rate of 35.36 per cent/annum of compound growth rate which was found to be significant at 1 per cent level percent of significance.

Table 4.61: Pattern of crop area insured and farmers covered under WBCIS in H.P. (2008-09 to 2013-14)

WBCIS/ Year	AI (000 ha)	% change in AI	% coverage across schemes	FC (000)	% change in FC	% coverage across schemes
2008-09	0.09		0.24	0.63		1.26
2009-10	1.55	1622.22	6.58	4.93	682.54	14.95
2010-11	6.06	290.97	18.41	16.85	241.78	35.09
2011-12	6.87	13.37	21.11	19.14	13.59	40.03
2012-13	11.36	65.36	35.20	25.97	35.68	52.83
2013-14	13.46	18.49	-	31.18	20.06	100.00
Total	39.39	-	-	98.7	-	-
Mean	6.57	-	-	16.45	-	-
Std Dev.	4.8	-	-	10.79	-	-
CV	0.73	-	-	0.66	-	-
CGR	143.44*	-	-	102.08*	-	-
Std Error	25.78	-	-	16.32	-	-
t cal	5.56	-	-	6.25	-	-

AI: Area Insured,
FC: Farmers Covered
*significant at 1 per cent level of significance
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

The scheme wise performance (Figure 4.7) of crop insurance indicates that from 1999-2000 to 2012-13, only NAIS was in operation and the area covered under the scheme ranged from 0.27 to 38.04 thousand hectares with an annual average of 17.37 thousand hectares (Table 4.60). The annual compound growth rate of area insured under the scheme was estimated at 24.12 per cent which statistically significant at 1 per cent level of significance. The WBCIS was introduced in the state during 2008-09 and remained in operation till 2015-16. The area insured varied between 0.09 to 13.46 thousand hectares with an average area of 6.57 thousand hectare/year (Table 4.61). The area insured under the scheme exhibited a continuous increasing trend and registered a compound growth rate of 143.44 per cent/annum.

Table 4.62: Pattern of crop area insured and farmers covered under PMFBY in H.P. (2016-17 to 2019-20)

PMFBY/ Year	AI (000 ha)	% change in AI	% coverage across schemes	FC (000)	% change in FC	% coverage across schemes
2016-17	85.42		65.99	260.57		68.58
2017-18	77.65	-9.10	6.09	230.84	-11.41	57.83
2018-19	62.47	-19.55	5.21	157.05	-31.97	62.85
2019-20	67.92	8.72	71.81	183.93	17.12	65.66
Total	293.46	-	-	832.39	-	-
Mean	73.37	-	-	208.1	-	-
Std Dev.	8.83	-	-	40.19	-	-
CV	0.12	-	-	0.19	-	-
SGR	-5.12*	-	-	-7.35*	-	-

AI: Area Insured,
FC: Farmers Covered
*significant at 1 per cent level of significance
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

In 2016-17, the PMFBY was introduced as a comprehensive crop insurance scheme in the state. The area insured under the scheme in 2016-17 was 85.42 thousand ha which was quite high as compared the previous schemes (Table 4.62). By and large the

area insured under scheme exhibited a declining trend which resulted a negative simple growth of 5.12 per cent/annum. Similar pattern of area insured was observed in RWBCIS where the area insured declined at the rate of 9.86 per cent/annum of simple growth rate (Table 4.63).

Table 4.63: Pattern of crop area insured and farmers covered under RWBCIS in H.P. (2016-17 to 2019-20)

RWBCIS/ Year	AI (000 ha)	% change in AI	% coverage across schemes	FC (000)	% change in FC	% coverage across schemes
2016-17	44.02		34.01	119.36		31.42
2017-18	1197.19	2619.65	93.91	168.32	41.02	42.17
2018-19	1137.15	-5.02	94.79	92.85	-44.84	37.15
2019-20	26.66	-97.66	28.19	96.18	3.59	34.34
Total	2405.02	-	-	476.71	-	-
Mean	601.26	-	-	119.18	-	-
Std Dev.	566.35	-	-	30.15	-	-
CV	0.94	-	-	0.25	-	-
SGR	-9.86*	-	-	-4.86*	-	-

AI: Area Insured,
FC: Farmers Covered
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

4.4.2.2 Farmers covered under different crop insurance schemes

The number of farmers covered, percentage change over the years and the proportion of farmers covered under different crop insurance schemes has been given in Table 4.60 to 4.64.

It can be observed from the table that in 1999-2000 when the crop insurance was initiated in the state, the number of farmers who insured their crops were 0.49 thousand and number has increased to 280.11 in a period of 21 years (Table 4.64). The data indicate that during the first 10 years, the increase in number of farmers who insured their crops was gradual, however even then the number has changed abruptly (Figure 4.8).

This was 66.76 thousand in 2001-02, which fell to 7.14 thousand in 2004-05. There has been a tremendous increase in the number of farmers after 2015-16 i.e. 379.93 and 399.16 thousand in 2016-17 and 2017-18, respectively, which again came down to 280.11 thousand by 2019-20. The Table 4.60 clearly shows that from 1999-2008,100 per cent farmers were covered by NAIS and after 2007-08, the coverage of the farmers was then shared by both WBCIS and NAIS.

As far as the scheme wise pattern is concerned, under NAIS, the number of farmers covered increased from 0.49 thousand in 1999-2000 to 23.19 thousand in 2012-13 (Table 4.60), on an average covering 22.40 thousand farmers per year. During the implementation period of scheme the number of farmers were found to be highest (66.76 thousand) in 2001-02 followed by 49.49 thousand in 2008-09 and 31.17 thousand in 2010-11. The year wise percentage increase over the respective previous years indicates that highest increase of 2728.81 per cent was observed in 2001-02 followed by 381.63 per cent in 2000-01, 267.14 per cent in 2008-09. However, the percentage change in the farmers covered was also negative during 2002-03, 2004-05, 2007-08, 2009-10, 2011-12 and 2012-13 which was highest (89.39 per cent) in 2002-03 and 71.35 per cent in 2004-05. The number of farmers registered for crop insurance on an average increased by 20.92 per cent of compound growth rate which was statistically significant at 1 per cent level of significance.

In case of WBCIS (Table 4.61), the number of farmers continuously increased from 0.63 thousand to 31.18 thousand. The average registration of farmers for crop insurance under the scheme was about 16 thousand per year. The year wise percentage change over the previous years of registration of farmers varied from 13.59 per cent in 2011-12 to about 682.54 per cent in 2009-10. The number of farmers under the scheme have exhibited a tremendous growth i.e. 102.08 per cent per annum of compound growth rate.

The PMFBY and RWBCIS are the present ongoing schemes in the state. The PMFBY covered 260.57 thousand farmers in 2016-17 which fell by 11.41 (230.84 thousand) and 31.97 per cent (157.05 thousand) in 2017-18 and 2018-19, respectively. In the year 2019-20, 183.93 thousand farmers were covered under the scheme which was 17.12 per cent more than that of the previous year.

Table 4.64: Pattern of crop area insured and farmers covered under different crop insurance schemes in H.P. (2016-17 to 2019-20)

Total/ Year	AI ('000 ha)	% change in AI	FC (000)	% change in FC
1999-2000	0.27		0.49	
2000-01	2.04	655.56	2.36	381.63
2001-02	35.33	1631.86	66.76	2728.81
2002-03	6.44	-81.77	7.08	-89.39
2003-04	16.10	150.00	24.92	251.98
2004-05	5.20	-67.70	7.14	-71.35
2005-06	9.26	78.08	10.28	43.98
2006-07	22.76	145.79	20.50	99.42
2007-08	12.26	-46.13	13.48	-34.24
2008-09	38.13	211.01	50.12	271.81
2009-10	23.56	-38.21	32.97	-34.22
2010-11	32.92	39.73	48.02	45.65
2011-12	32.55	-1.12	47.82	-0.42
2012-13	32.27	-0.86	49.16	2.80
2013-14	13.46	-58.29	31.18	-36.57
2014-15	-	-	-	-
2015-16	-	-	-	-
2016-17	129.44	-	379.93	-
2017-18	1274.84	884.89	399.16	5.06
2018-19	1199.62	-5.90	249.90	-37.39
2019-20	94.58	-92.12	280.11	12.09
Total	2981.03	-	1721.38	-
Mean	141.95	-	81.97	-
Std Dev.	356.87	-	123.63	-
CV	2.51	-	1.51	-
CGR	35.36*	-	24.35*	-
Std Error	4.54	-	4.15	-
t cal	7.78	-	5.86	-

AI: Area Insured,
FC: Farmers Covered
*significant at 1 per cent level of significance
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

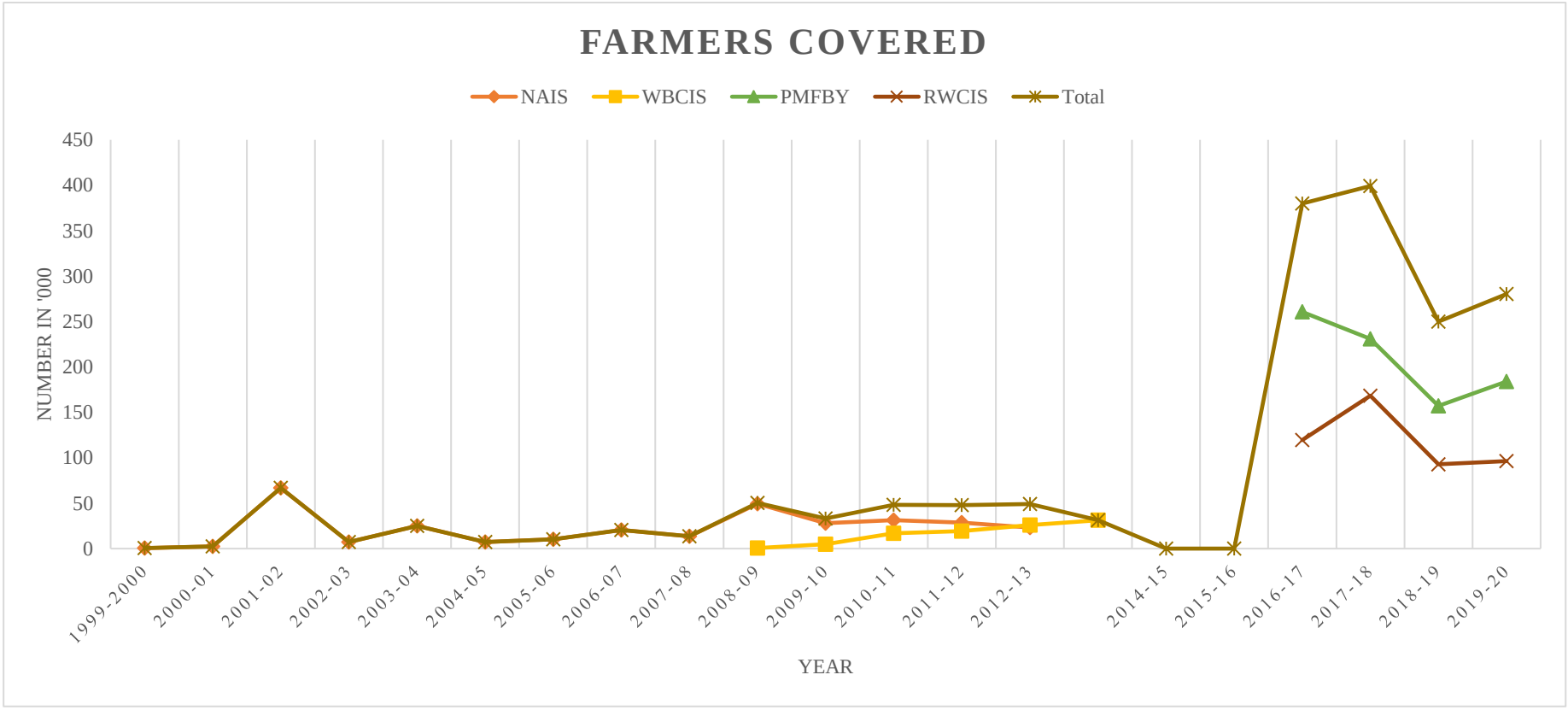

Figure 4.8: Farmers covered under different crop insurance schemes in Himachal Pradesh (1999-2000 to 2019-20)

4.4.2.2 Sum Insured and gross premium paid under different crop insurance schemes

The sum insured and gross premium paid for crop insurance in Himachal Pradesh has been presented in Table 4.69. It can be seen from the table that in 1999-2000, the sum insured was only Rs 0.23 crores for which a gross premium of Rs 0.01 crores was paid. The pattern of sum insured indicates that within a period of twelve years, it surpassed 100 crores i.e. 171.35 crores rupees in 2010-11 and the corresponding gross premium paid was 11.35 crores rupees. From 2010-11 to 2012-13, the sum insured increased steadily but from 2016-17 and onward its increase was considerably higher (Figure 4.9). The amount of sum insured was about 899, 1321, 1806 and2325 crore rupees in 2016-17, 2017-18, 2018-19 and 2019-20, respectively. Since, the gross premium paid for the crop insurance was directly related to sum insured, hence, it followed the same trend during the discussed period. It increased from 0.01 crore rupees in 1999-2000 to 272.03 crore rupees in 2019-20. The pattern of increase was not uniform as there were ups and downs during the period of 21 years. The highest increase in sum insured was 1434.86 per cent (2001-02) followed by 660.87 per cent (2000-01) and 335.63 per cent (2008-09) while the highest change of 1550 per cent in gross premium was observed in 2001-02 followed by 367.57 per cent (2008-09) and 300 per cent (2000-01). On an average, the amount of gross premium paid for the period was estimated at Rs 35.69 crores/year. In order to examine the overall increase, the compound growth rates for the sum insured and gross premium paid were estimated which were positive and quite high i.e. 46.72 and 87.66 per cent, respectively. The growth rates were statistically significant at 1 per cent level of significance.

As far as scheme wise pattern is concerned, under NAIS, the sum insured ranged from 103.72 crores to 0.23 crores, highest being in 2011-12 and lowest in 1999-2000 (Table 4.65). Similar pattern was found in the gross premium where the corresponding amounts for the premium were 2.08 crores and 0.01 crore rupees. On an average, the scheme insured a sum of 37.06 crore rupees per year with an average gross premium of 0.79crore rupees per year. The sum insured changed with a compound annual growth rate of 43.77 per cent/ annum while the gross premium increased at a small compound annual growth rate of 39.93 per cent/ annum. The growth rates were found to be statistically significant at 1 per cent level of significance.

Under WBCIS, the sum insured and gross premium increased in a same pattern as the sum insured under the scheme was highest (162.79 crore rupees) in 2012-13 and lowest in 2008-09 (0.88 crore rupees) and the corresponding gross premium was 18.72 and 0.11 crore rupees, respectively (Table 4.66). On an average, a sum of 85.08 crore rupees was insured with a gross premium of 9.8 crore rupees/ year. The sum insured and gross premium under the scheme increased at a compound growth rate of 150.65 and 147.50 per cent/ annum. The growth rates were found to be statistically significant at 1 per cent level of significance.

Table 4.65: Pattern of sum insured and gross premium paid for crop insurance in H.P. under NAIS (1999-2000- to 2012-13

NAIS/ Year	SI (Rs. crore)	Premium (Crore)			Share in GP (%)		% age of FP to SI
		Farmer	Subsidy	GP	Farmer	Subsidy	
1999-2000	0.23	0.00	0.01	0.01	0	100	0.00
2000-01	1.75	0.02	0.02	0.04	50	50	1.14
2001-02	26.86	0.49	0.17	0.66	74.24	25.76	1.82
2002-03	4.24	0.06	0.02	0.08	75	25	1.42
2003-04	13.25	0.30	0.03	0.33	90.91	9.09	2.26
2004-05	5.25	0.10	0.01	0.11	90.91	9.09	1.90
2005-06	9.72	0.19	0.02	0.21	90.48	9.52	1.95
2006-07	21.93	0.40	0.04	0.44	90.91	9.09	1.82
2007-08	16.67	0.20	0.17	0.37	54.05	45.95	1.20
2008-09	71.74	0.83	0.79	1.62	51.23	48.77	1.16
2009-10	60.39	0.69	0.65	1.34	51.49	48.51	1.14
2010-11	89.51	0.98	0.94	1.92	51.04	48.96	1.09
2011-12	103.72	1.05	1.03	2.08	50.48	49.52	1.01
2012-13	93.59	0.92	0.91	1.83	50.27	49.73	0.98
Total	518.85	6.23	4.81	11.04	-	-	-
Mean	37.06	0.45	0.34	0.79	-	-	-
Std Dev.	36.21	1.52	0.4	0.76	-	-	-
CV	0.98	3.38	1.18	0.96	-	-	-
CGR	43.77*	17.59*	26.63*	39.93*	-	-	-
Std Error	4.15	3.87	6.28	3.78	-	-	-
t cal	10.55	6.23	4.24	10.57	-	-	-

SI: Sum Insured,
GP: Gross Premium,
FP: Farmers Premium
*significant at 1 per cent level of significance
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

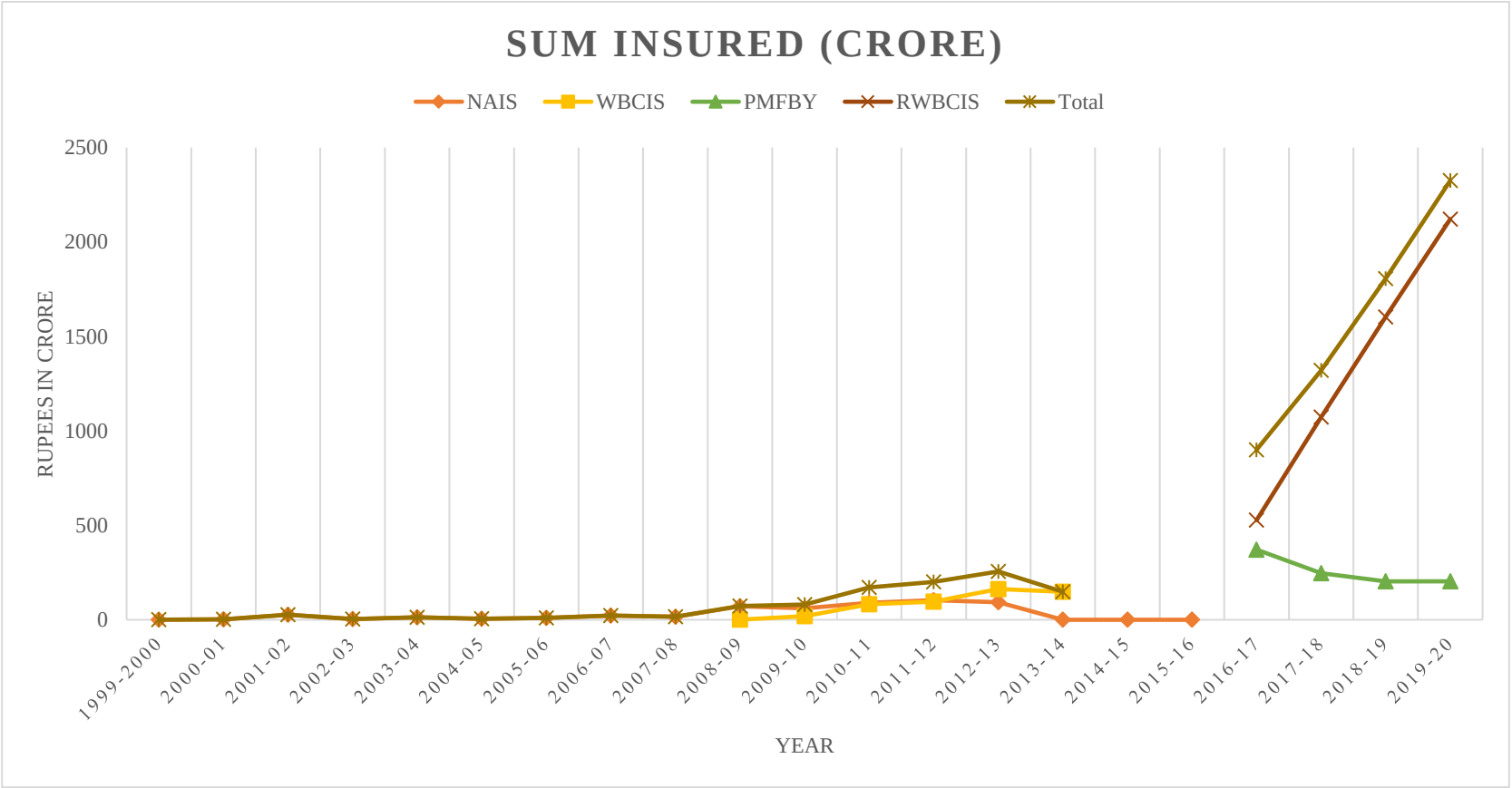

Figure 4.9: Sum Insured under different crop insurance schemes in Himachal Pradesh (1999-2000 to 2019-20)

In 2016-16, PMFBY *and* RWBCIS were launched and a significant increase was seen in sum insured and gross premium (Table 4.67-4.68). Under PMFBY, an amount of insured was 256.41 crore rupees was insured per year and the gross premium was 12.70 crore rupees/ annum while in RWBCIS, the corresponding values were found to be 1331.21 and 157.24 crore rupees, respectively. The sum insured and gross premium in the state under PMFBY decreased at a simple growth rate of 11.28 and 2.59 per cent per annum while under RWBCIS, they increased by 75.52 and 89.87 per cent, respectively.

Table 4.66: Pattern of sum insured and gross premium paid for crop insurance in H.P. under WBCIS (2008-09- to 2013-14)

WBCIS/ Year	SI (Rs. crore)	Premium (Crore)			Share in GP (%)		% age of FP to SI
		Farmer	Subsidy	GP	Farmer	Subsidy	
2008-09	0.88	0.06	0.05	0.11	54.55	45.45	6.82
2009-10	19.64	1.14	1.14	2.28	50	50	5.80
2010-11	81.84	4.71	4.72	9.43	49.95	50.05	5.76
2011-12	96.55	5.56	5.55	11.11	50.05	49.95	5.76
2012-13	162.79	9.36	9.36	18.72	50	50	5.75
2013-14	148.77	8.56	8.56	17.12	50	50	5.75
Total	510.47	29.39	29.38	58.77	-	-	-
Mean	85.08	4.90	4.90	9.80	-	-	-
Std Dev.	60.01	0.42	3.45	6.90	-	-	-
CV	0.71	0.09	0.70	0.70	-	-	-
CGR	150.65*	144.45*	150.88*	147.50*	-	-	-
Std Error	30.178	28.06	30.36	29.15	-	-	-
t cal	4.99	5.15	4.97	5.06	-	-	-

SI: Sum Insured,
GP: Gross Premium,
FP: Farmers Premium
*significant at 1 per cent level of significance
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

4.4.2.3 Farmers share in gross premium under different crop insurance schemes

As per the guidelines of crop insurance schemes, the gross premium paid to the crop insurance companies is not totally borne by the farmers. The farmers are provided subsidy in payment of premiums i.e. the premium is shared between government and farmers (Table 4.69). The table reveals that the farmers' premium varied between 0.02 crore rupees in 2000-01 to 301.09 crores in 2016-17. The annual compound growth rate of the premium paid by the farmers was estimated at 65.54 per cent, which was

statistically significant at 1 per cent level of significance. The table further indicates that the farmers' share in gross premium ranged from 40.24 to 90.91 per cent. As discussed, the gross premium is shared by farmers and the government and during the period of 1999-2000 to 2019-2020, the subsidy paid to the farmers varied from 0.01 and 162.56 crore rupees. The highest jump (750 per cent) in subsidy provided by the government was seen in 2001-02 (Table 4.69). The government's aid to the farmers has increased at a compound growth rate of 79.13 per cent/ annum.

Table 4.67: Pattern of sum insured and gross premium paid for crop insurance in H.P. under PMFBY (2016-17- to 2019-20)

PMFBY/ Year	SI (Rs. crore)	Premium (Crore)			Share in GP (%)		% age of FP to SI
		Farmer	Subsidy	GP	Farmer	Subsidy	
2016-17	371.36	4.82	10.62	15.44	31.22	68.78	1.30
2017-18	247.29	4.43	8.56	12.99	34.1	65.9	1.79
2018-19	203.24	2.09	6.42	8.51	24.56	75.44	1.03
2019-20	203.73	3.56	10.28	13.84	25.72	74.28	1.75
Total	1025.62	14.9	35.88	50.78	-	-	-
Mean	256.41	3.73	8.97	12.70	-	-	-
Std Dev.	68.74	9.15	1.67	2.57	-	-	-
CV	0.27	2.45	0.19	0.20	-	-	-
SGR	-11.28*	-6.54*	-0.80*	-2.59*	-	-	-

SI: Sum Insured,
GP: Gross Premium,
FP: Farmers Premium
*significant at 1 per cent level of significance
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

NAIS, in the year 2000-01, costed farmers a premium of 0.02 crore rupees. The premium amount paid by the farmers of the state under NAIS was highest in the year 2011-12 and a similar trend was seen in case of subsidy paid to the farmers (Table 4.65). On an average, under NAIS, farmers paid a premium of 0.45 crore rupees/ year and the subsidy provided was 0.34 crore rupees/year. On an average, the premium paid by the farmers who insured their crops varied at a compound growth rate of 17.59 per cent/ annum. The support of the government to the farmers under the scheme in the form of subsidy increased at a rate of 26.63 per cent/ annum.

Table 4.68: Pattern of sum insured and gross premium paid for crop insurance in H.P. under RWBCIS (2016-17 to 2019-20)

RWBCIS/ Year	SI (Rs. crore)	Premium (Crore)			Share in GP (%)		% age of FP to SI
		Farmer	Subsidy	GP	Farmer	Subsidy	
2016-17	527.58	26.27	29.92	56.19	46.75	53.25	4.98
2017-18	1073.23	53.53	69.36	122.89	43.56	56.44	4.99
2018-19	1602.64	79.99	111.68	191.67	41.73	58.27	4.99
2019-20	2121.37	105.91	152.28	258.19	41.02	58.98	4.99
Total	5324.82	265.7	363.24	628.94	-	-	-
Mean	1331.21	66.43	90.81	157.24	-	-	-
Std Dev.	593.8	0.39	45.78	75.44	-	-	-
CV	0.45	0.01	0.5	0.48	-	-	-
SGR	75.52*	75.79*	102.24*	89.87*	-	-	-

SI: Sum Insured,
GP: Gross Premium,
FP: Farmers Premium
*significant at 1 per cent level of significance
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

Under WBCIS, the premium paid by the farmers decreased over the years as the support provided by the government increased (Table 4.66). The support of the government to the farmers increased at a compound growth rate of 150.88 per cent/ annum and the premium paid by the farmers over the years increased at 144.45 per cent/ annum which was comparatively lower.

With advent of PMFBY *and* RWBCIS, the share of the farmer's premium in gross premium has declined substantially as the support provided by the government in the form of subsidy increased (Table 4.67-4.68). During the inception of the schemes in 2016-17, the farmers paid a premium amount of 31.09 crore rupees and a support of about 40.54 crore rupees was provided under both the schemes. During the period of four years, the subsidy provided by the government under PMFBY changed at a simple growth rate of - 0.8 per cent but it increased under WBCIS by 102.24 per cent/ annum. Both the growth rates were found to be significant at 1 level of significance.

Table 4.69: Pattern of sum insured and gross premium paid for crop insurance in H.P. under different crop insurance schemes (1999-2000 to 2019-20)

Total/ Year	SI (Rs. crore)	Premium (Crore)			Share in GP (%)		% age of FP to SI
		Farmer	Subsidy	GP	Farmer	Subsidy	
1999-2000	0.23	0.00	0.01	0.01	0	100	0.00
2000-01	1.75	0.02	0.02	0.04	50	50	66.29
2001-02	26.86	0.49	0.17	0.66	74.24	25.76	8.60
2002-03	4.24	0.06	0.02	0.08	75	25	34.91
2003-04	13.25	0.30	0.03	0.33	90.91	9.09	19.32
2004-05	5.25	0.10	0.01	0.11	90.91	9.09	38.10
2005-06	9.72	0.19	0.02	0.21	90.48	9.52	22.02
2006-07	21.93	0.40	0.04	0.44	90.91	9.09	10.12
2007-08	16.67	0.20	0.17	0.37	54.05	45.95	8.40
2008-09	72.62	0.89	0.84	1.73	51.45	48.55	12.21
2009-10	80.03	1.83	1.79	3.62	50.55	49.45	10.96
2010-11	171.35	5.69	5.66	11.35	50.13	49.87	7.32
2011-12	200.27	6.61	6.58	13.19	50.11	49.89	6.68
2012-13	256.38	10.28	10.27	20.55	50.02	49.98	6.63
2013-14	148.77	8.56	8.56	17.12	50	50	9.62
2014-15	-	-	-	-	-	-	-
2015-16	-	-	-	-	-	-	-
2016-17	898.94	301.09	40.54	71.63	43.4	56.6	3.60
2017-18	1320.52	57.96	77.92	135.88	42.66	57.34	4.52
2018-19	1805.88	82.08	118.10	200.18	41	59	4.60
2019-20	2325.10	109.47	162.56	272.03	40.24	59.76	4.78
Total	7379.76	316.22	433.31	749.53	-	-	-
Mean	351.42	15.06	20.63	35.69	-	-	-
Std Dev.	669.78	4.57	43.32	73.01	-	-	-
CV	1.91	0.3	2.1	2.05	-	-	-
CGR	46.72*	65.54*	79.13*	87.66*	-	-	-
Std Error	5.99	0.91	5.69	2.40	-	-	-
t cal	7.80	71.73	13.91	10.57	-	-	-

SI: Sum Insured,
GP: Gross Premium,
FP: Farmers Premium
*significant at 1 per cent level of significance
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

4.4.2.3 Farmers benefitted and claims paid under different crop insurance schemes

The number of farmers benefitted and amount of claims paid to the farmers under different crop insurance schemes, its percentage distribution among schemes has been presented in Table 4.74. In 2000-01, 0.86 thousand farmers were paid a claim of 0.43 crore rupees which was increased to 4.43 crore rupees in 2001-02. The data indicates up

to 2003-14, the amount of claims paid were relatively low and did not followed a specific trend (Figure 4.11). It may be due to the lack awareness among farmers with respect to reporting and other codal formalities for processing claims. However, from 2016-17 onwards, the amount of claims was quite high. It was 43.67 crore rupees and further increased to 91.63, 102.83, 152.50 and 456.75 in 2017-18, 2018-19 and 2019-20, respectively. Till 2007-08, cent per cent claims were paid under NAIS and after the introduction of WBCIS in 2008-09, the claims paid under NAIS decreased and increased continuously under WBCIS. In 2015-16, the NAIS scheme was closed and WBCIS was restructured as a result of which PMFBY and RWBCIS were introduced. In the period of four years, the claims paid were shared by both the schemes. The share of RWBCIS was comparatively more than PMFBY. The number of farmers benefitted under the crop insurance varied from 0.01 to 160.21 thousand, highest being in 2019-20 and lowest in 2006-07. The largest portion of farmers covered was benefitted in 2001-02 (94.47 per cent) and it was found lowest in 2006-07 (0.05 per cent). The farmers benefitted under the crop insurance programme changed at a compound annual growth rate of 45.32 per cent. Annually, the claims paid increased at a growth rate of 45.37 per cent compound growth which was found to be significant at 1 per cent level of significance.

As far as NAIS is concerned, it was the only scheme till 2007-08 and thus during that period, the claims paid increased from 0.01 crore rupees (1999-2000) to 0.05 (2007-08) (Table 4.70). During this period, the number of farmers benefitted ranged from 0.05 to 94.47 per cent of the total farmers covered. It can be clearly seen from the table and figure 4.10 that in 2008-09 (8.32 crore rupees), there was a sharp increase in the claims paid which decreased continuously in 2009-10 (2.35 crore rupees), 2010-11 (0.03 crore rupees) and 2011-12 (0.02 crore rupees). On an average, the scheme paid 17.12 crore rupees/ year to the farmers of the state which changed at a compound growth rate of 3.69 per cent/annum which was found to be significant at 1 per cent level of significance. The number of farmers benefitted under the scheme changed at a compound growth rate of -1.31 per cent/ annum. It was found to be statistically significant at 1 per cent level of significance.

In WBCIS (Table 4.71), the schemes paid 0.13 crore rupees in 2008-09 which increased in 2009-10 (4.48 crore rupees), 2010-11 (8.27 crore rupees) and 2011-12 (22.15 crore rupees) but for the next two years *viz.,* 2012-13 and 2013-14, the claims paid were

recorded at 5.79 crore rupees and 8.18 crore rupees. The farmers benefitted under the scheme varied from 0.63 to 25.45 thousand which were cent and 81.62 per cent of the total farmers covered. The claims paid under the scheme increased at a compound growth rate of 90 per cent/ annum while the farmers benefitted under the scheme increased at a compound growth rate of 89.40 per cent /annum. It was found to be significant at 1 per cent level of significance.

Table 4.70: Pattern of farmers benefitted and claims paid under crop insurance under NAIS in H.P. (1999-2000 to 2012-13)

NAIS/ Year	FB ('000)	% FB to FC	CP (crore)	% coverage across schemes	% in SI
1999-2000	0.00	0.00	0.01	100.00	4.35
2000-01	0.86	36.44	0.43	100.00	24.57
2001-02	63.07	94.47	4.43	100.00	16.49
2002-03	0.15	2.12	0.03	100.00	0.71
2003-04	1.26	5.06	0.03	100.00	0.23
2004-05	2.56	35.85	0.40	100.00	7.62
2005-06	2.15	20.91	0.64	100.00	6.58
2006-07	0.01	0.05	0.01	100.00	0.05
2007-08	0.60	4.45	0.05	100.00	0.30
2008-09	27.11	54.09	8.32	98.46	11.6
2009-10	5.75	17.44	2.35	34.41	3.89
2010-11	0.52	1.08	0.03	0.36	0.03
2011-12	0.00	0.00	0.02	0.09	0.02
2012-13	1.40	2.85	0.37	6.01	0.40
Total	105.44	-	17.12	-	-
Mean	7.53	-	1.22	-	-
Std Dev.	16.84	-	2.3	-	-
CV	2.24	-	1.89	-	-
CGR	-1.31*	-	3.69*	-	-
Std Error	6.76	-	7.71	-	-
t cal	-0.19	-	0.48	-	-

FB: Farmers Benefitted,
FC: Farmers Covered,
SI: Sum Insured,
CP: Claims Paid
*significant at 1 per cent level of significance
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

Table 4.71: Pattern of farmers benefitted and claims paid under crop insurance under WBCIS in H.P. (2008-09 to 2013-14)

WBCIS /Year	FB (000)	% FB to FC	CP (crore)	% coverage across schemes	% in SI
2008-09	0.63	100.00	0.13	1.54	14.77
2009-10	3.68	74.65	4.48	65.59	22.81
2010-11	14.77	87.66	8.27	99.64	10.11
2011-12	18.92	98.85	22.15	99.91	22.94
2012-13	12.27	47.25	5.79	93.99	3.56
2013-14	25.45	81.62	8.18	100.00	5.50
Total	75.72	-	49.00	-	-
Mean	12.62	-	8.17	-	-
Std Dev.	8.49	-	6.82	-	-
CV	0.67	-	0.83	-	-
CGR	89.40	-	90.00	-	-
Std Error	15.86	-	29.29	-	-
t cal	5.64	-	3.07	-	-

FB: Farmers Benefitted,
FC: Farmers Covered,
SI: Sum Insured,
CP: Claims Paid
*significant at 1 per cent level of significance
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

About 6 crores of the claims were paid in the first year of inception (2016-17) of PMFBY which by the next year increased to 11.47 crore rupees. However, in 2018-19, the claims paid fell to 8.40 crore rupees and in 2019-20, they were recorded at 10.33 crore rupees (Table 4.72). Under the scheme, the farmers benefitted increased continuously and changed at a simple growth rate of 51.24 per cent/ annum. In the period of four years, the claims paid increased at a rate of 20.31 per cent/ annum. In RWBCIS, the claims paid increased continuously during the four years of its operation. The claims paid in 2016-17, 2017-18, 2018-19 and 2019-20 were 37.97, 80.16, 94.43 and 142.17 crore rupees which grew at a rate of 68.61 per cent per annum (Table 4.73)**.** The scheme marvelously benefitted 93.49 per cent of the farmers covered in 2019-20 and the beneficiaries fell by a simple growth rate of 0.04 per cent/ annum.

Table 4.72: Pattern of farmers benefitted and claims paid under crop insurance under PMFBY in H.P. (2016-17 to 2019-20)

PMFBY /Year	FB (000)	% FB to FC	CP (crore)	% coverage across schemes	% in SI
2016-17	23.05	8.85	5.70	13.05	1.53
2017-18	63.39	27.46	11.47	12.52	1.85
2018-19	36.36	23.15	8.40	8.17	1.02
2019-20	70.29	38.22	10.33	6.77	1.01
Total	193.09	-	35.9	-	-
Mean	48.27	-	8.98	-	-
Std Dev.	19.31	-	2.19	-	-
CV	0.40	-	0.24	-	-
SGR	51.24*	-	20.31*	-	-

FB: Farmers Benefitted,
FC: Farmers Covered,
SI: Sum Insured,
CP: Claims Paid
*significant at 1 per cent level of significance
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

Table 4.73: Pattern of farmers benefitted and claims paid under crop insurance under RWBCIS in H.P. (2016-17 to 2019-20)

RWBCIS/ Year	FB (000)	% FB to FC	CP (crore)	% coverage across schemes	% in SI
2016-17	90.08	75.47	37.97	86.95	16.50
2017-18	70.82	42.07	80.16	87.48	15.69
2018-19	27.67	29.8	94.43	91.83	27.15
2019-20	89.92	93.49	142.17	93.23	-
Total	278.49	-	354.73	-	-
Mean	69.62	-	88.68	-	-
Std Dev.	25.46	-	37.21	-	-
CV	0.37	-	0.42	-	-
SGR	-0.04	-	68.61	-	-

FB: Farmers Benefitted,
FC: Farmers Covered,
SI: Sum Insured,
CP: Claims Paid
*significant at 1 per cent level of significance
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

Table 4.74: Pattern of farmers benefitted and claims paid under crop insurance under different crop insurance schemes in H.P (1999-2000 to 2019-20)

Total/Year	FB (000)	% FB to FC	CP (crore)	% in SI
1999-2000	-	-	0.01	4.35
2000-01	0.86	36.44	0.43	24.57
2001-02	63.07	94.47	4.43	16.49
2002-03	0.15	2.12	0.03	0.71
2003-04	1.26	5.06	0.03	0.23
2004-05	2.56	35.85	0.40	7.62
2005-06	2.15	20.91	0.64	6.58
2006-07	0.01	0.05	0.01	0.05
2007-08	0.60	4.45	0.05	0.30
2008-09	27.74	55.35	8.45	11.64
2009-10	9.43	28.6	6.83	8.53
2010-11	15.29	31.84	8.30	4.84
2011-12	18.92	39.57	22.17	11.07
2012-13	13.67	27.81	6.16	2.40
2013-14	25.45	81.62	8.18	5.50
2014-15	0.00	-	-	-
2015-16	0.00	-	-	-
2016-17	113.13	29.78	43.67	11.76
2017-18	134.21	33.62	91.63	14.81
2018-19	64.03	25.62	102.83	12.51
2019-20	160.21	57.2	152.50	14.87
Total	652.74	-	456.75	-
Mean	31.08	-	21.75	-
Std Dev.	47.09	-	40.83	-
CV	1.52	-	1.88	-
CGR	45.32	-	45.37	-
Std Error	5.1592	-	5.1083	-
t cal	8.78	-	8.88	-

FB: Farmers Benefitted,
FC: Farmers Covered,
SI: Sum Insured,
CP: Claims Paid
*significant at 1 per cent level of significance
Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard and Agriculture Insurance Company

The proportion of amount of claims to the sum insured for a period of 21 years (1999-2020) was worked out and is presented in Table 4.74. The table indicates that amount received by farmers to the sum insured was found to be highest in 2000-01 i.e. 24.57 per cent and minimum of 0.05 per cent in 2006-07. The results further revealed that from 1999-2000 to 2015-16, there was no specific trend in the proportion of claims received to sum insured. However, during the last 4 years (2016-17 to 20019-20), this

exhibited an increasing trend, except during 2018-19, i.e. 11.76, 14.81, 12.51 and 14.87 per cent, respectively. It is clarified that the claims paid to the farmers are directly linked losses in yield and their reporting and not to the sum insured. The years where the proportion of claims paid to sum insured is low indicates that in those years either yields obtained by the farmers were equal or greater than the threshold yields of the respective notified areas or otherwise farmers have not reported the losses.

Table 4.75: Pattern of claims paid/ rupee of premium paid under different crop insurance schemes (2000-01 to 2019-20) in H.P. (Rs.)

Year	NAIS	WBCIS	PMFBY	WBCIS	Total
1999-2000	-	-	-	-	-
2000-01	21.5	-	-	-	21.5
2001-02	9.04	-	-	-	9.04
2002-03	0.5	-	-	-	0.5
2003-04	0.1	-	-	-	0.1
2004-05	4	-	-	-	4
2005-06	3.37	-	-	-	3.37
2006-07	0.03	-	-	-	0.03
2007-08	0.25	-	-	-	0.25
2008-09	10.02	2.17	-	-	9.49
2009-10	3.41	3.93	-	-	3.73
2010-11	0.03	1.76	-	-	1.46
2011-12	0.02	3.98	-	-	3.35
2012-13	0.4	0.62	-	-	0.6
2013-14	-	0.96	-	-	0.96
2014-15	-	-	-	-	-
2015-16	-	-	-	-	-
2016-17	-	-	0.85	1.45	1.4
2017-18	-	-	0.39	1.5	1.58
2018-19	-	-	0.25	1.18	1.25
2019-20	-	-	0.34	1.34	1.39

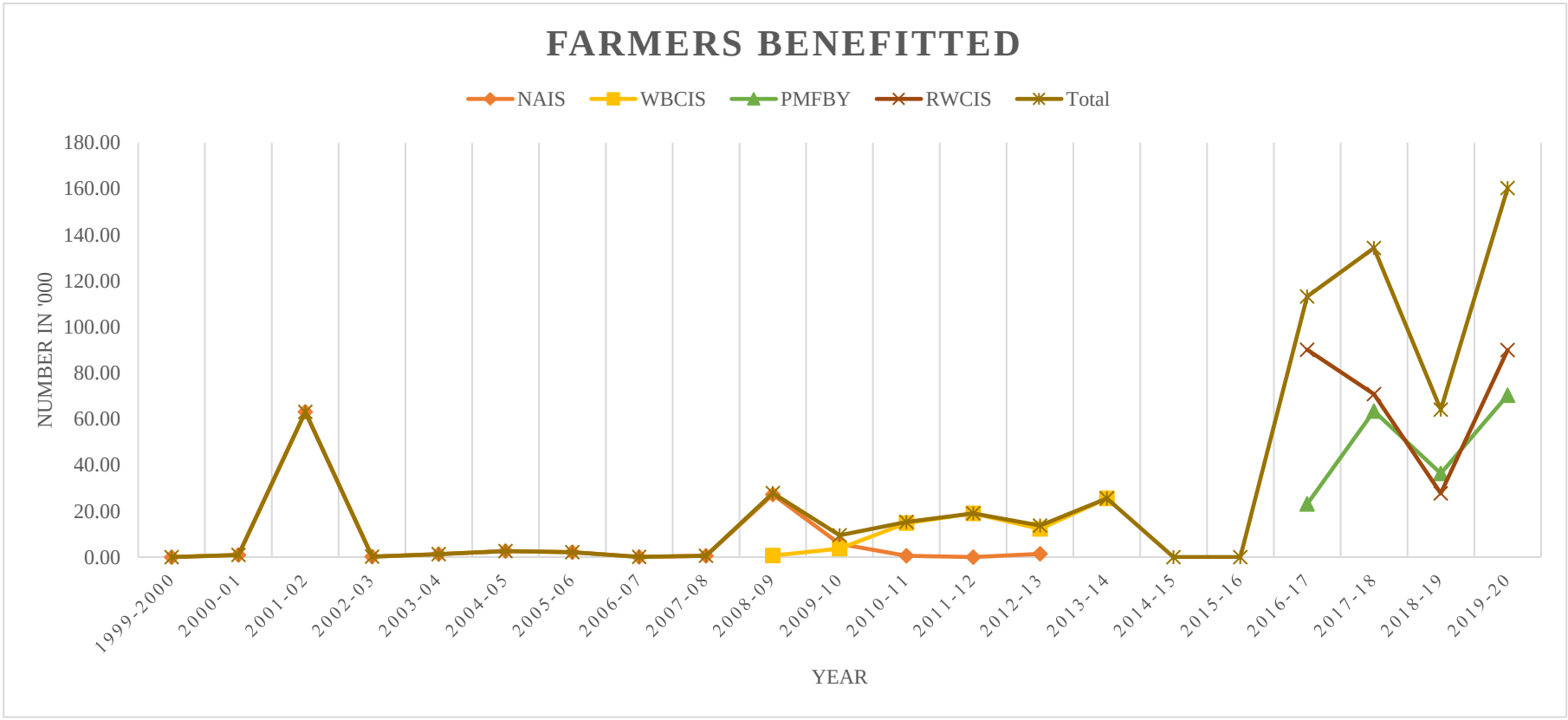

Figure 4.10: Farmers benefitted under different crop insurance schemes in Himachal Pradesh (1999-2000 to 2019-20)

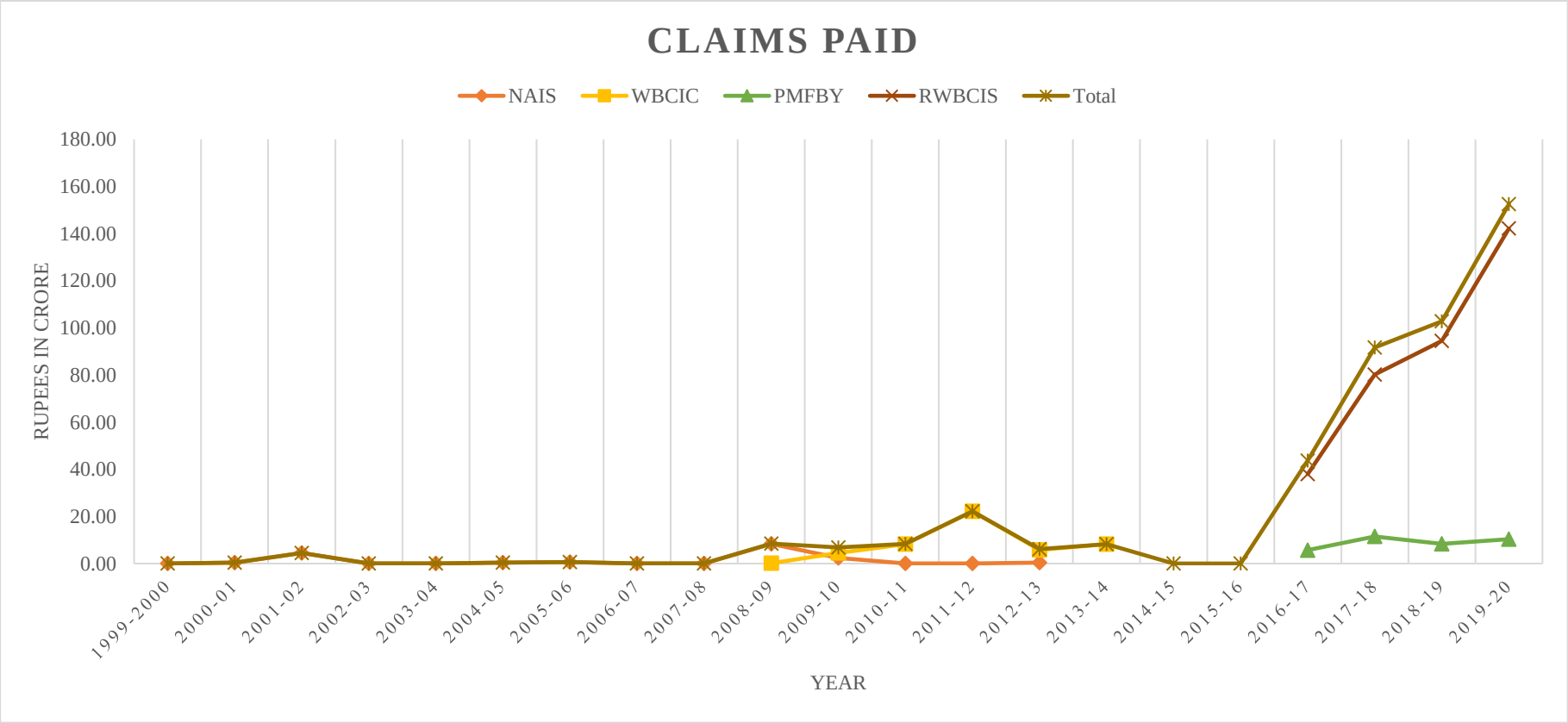

Figure 4.11: Claims paid under different crop insurance schemes in Himachal Pradesh (1999-2000 to 2019-20)

4.4.2.4 Output-input pattern in crop insurance

When the farmer faces the production risk some part of his produce is lost. The loss is either reported by the farmer or the yield obtained is less than the threshold yield of notified area; in both cases the farmer is paid compensation in form of claim. The output-input ratio for insurance indicates that the claim received per rupee of premium paid has been calculated and presented in Table 4.75. The cursory glance at the table reveals that under different crop insurance schemes, the output-input ratio was highest in the year 2000-01 (21.50 rupees) while, it was lowest in the year 2003-04 (0.10 rupees). The low amount of returns can be attributed to the fact that not every farmer received the compensation for their paid premium. As far as the scheme-wise pattern is concerned, under NAIS, the farmers received highest amount of compensation on per rupee premium in the year 2000-01. The overall compensation received on per rupee premium paid varied between 0.02 (2011-12) to 21.50 rupees (2000-01). In the year 2008-09, WBCIS was implemented and the output-input ratio under the scheme ranged from 0.62 (2012-13) to 3.98 (2009-10). Both the above mentioned schemes were closed in 2015-16. The introduction of PMFBY in 2016-17 supplanted all the previous schemes and in the same year WBCIS was also restructured. The output-input ratio ranged between 0.25 to 0.85 rupees and 1.18 to 1.45 rupees in PMFBY and RWBCIS, respectively during 2016-17 to 2019-20.

4.4.3 Coverage, cost and compensation in Kangra

The schemes which had been implemented in the state since 1999-2000 were also implemented in the study area i.e. district Kangra of Himachal Pradesh. The secondary data collected for the state was available on the website of Agriculture Insurance Company but for the district, it was available only available for three years (2017-18 to 2019-20) and only for two schemes (PMFBY& RWBCIS).

4.4.3.1 Coverage, cost and compensation of different crop insurance schemes

As stated above, during the period of 2017-18 to 2019-20, two schemes were in operation in the district i.e. PMFBY *and* RWBCIS. The cost, coverage and compensation for PMFBY and WBCIS have been presented in Table 4.76 and discussed as under:

Overall, the schemes covered 1,91,044 farmers who insured 75.30thousand hectares of area in three years (2018-19). During this period, both the area insured and the farmers covered increased by about 8 per cent each. On an average, an area of 0.39 hectare/ farmer was insured during the period of three years of 2017-18 to 2019-2020. The overall

cost of the premium was about 414 lakh out of which cost borne by the farmers was about 376.13 lakh rupees and about 414 crores was paid by the state and the central government each. Farmers paid 31.24 per cent of the total premium and rest was paid by the government in form of subsidy. The claim amount of 594.98 lakh rupees was paid to 82,347 farmers during this period. On per rupee of the premium paid by the farmer, the claim of 1.58 rupees were paid to the farmer. The claims paid to the farmers changed by -0.05 per cent of the simple growth rate while the farmers benefitted changed by -3.42 per cent.

4.4.3.2 Coverage, cost and compensation under PMFBY

The PMFBY covered 59,570 farmers insuring an area of about 22 thousand ha in 2017-18 which increased to 66,525 farmers insuring 25.65 thousand ha area in 2018-19 but the number of farmers declined to 64,540 farmers insuring 23.93 thousand ha in 2019-20. Under the scheme, holding per farmer did not vary much and ranged between 0.37 and 0.39 ha. The area insured increased at a rate of 7.84 per cent per annum while the farmers covered grew at a rate of 8.34 per cent per annum.

The table shows that under PMFBY, the sum insured in 2017-18 was 6,653.84 lakh rupees which increased to 7,695.20 lakh rupees in 2019-20 but decreased to 7,178.44 lakh rupees in 2019-20. The sum insured grew at a rate of 7.88 per cent/ annum of simple growth rate. The premium paid by the farmers showed the same pattern and was 112.86, 133.85 and 125.81 lakh rupees in 2017-18, 2018-19 and 2019-20, respectively. The share of the farmer in the gross premium under the scheme varied from about 23 to 55 per cent. The premium paid by the farmers increased at a growth rate of 11.47 per cent per annum. The subsidy to be provided to the farmers was equally divided between state and central government and increased continuously in 2017-18 (90.56 lakh rupees), 2018-19 (321.68 lakh rupees) and 2019-20 (408.93 lakh rupees). Over the period of three years, the state and central government premiums have increased at a rate of 347.90 per cent per annum while the gross premium increased at a rate of 161.25 per cent per annum.

In the year 2017-18, 27,481 farmers were paid 196.14 lakh rupees as claim and in 2018-19, 28,251 were benefitted with a claim amount of 199.19 lakh rupees which decreased to 26,490 farmers with claims paid of 195.05 lakh rupees. On per rupee of the premium paid by the farmer, the farmer received 1.74, 1.49 and 1.55 rupees as claim in 2017-18, 2018-19 and 2019-20. The data revealed that both, the farmers benefitted and claims paid have decreased over the years by 3.61 and 0.56 per cent, respectively.

Table 4.76: Pattern of cost, coverage and compensation under PMFBY and RWBCIS in district Kangra (Rs. in lakh)

Scheme	Year	Cost					Coverage		Compensation	
		Sum Insured	Farmer premium	State premium	GOI Premium	Gross Premium	Area Insured ('000 ha)	Farmers covered	Farmers benefitted	Claim paid
PMFBY	2017-18	6653.84	112.86	45.28	45.28	203.42	22.19	59570	27481	196.14
	2018-19	7695.2	133.85	160.84	160.84	455.53	25.65	66525	28251	199.19
	2019-20	7178.44	125.81	202.81	202.81	531.43	23.93	64540	26490	195.05
RWBCIS	2017-18	11.23	0.5616	0.6252	0.6252	1.81	1.12	46	11	1.1
	2018-19	30.75	1.3	0.173	0.173	1.646	1.15	184	53	1.4
	2019-20	34.94	1.75	4.18	4.18	10.11	1.26	179	61	2.1
Total		21604.4	376.13	413.91	413.91	1203.95	75.3	191044	82347	594.98
SGR	PMFBY	7.88*	11.47*	347.90*	347.90*	161.25*	7.84*	8.34*	-3.61*	-0.56*
	RWBCIS	211.13*	211.61*	568.59*	568.59*	458.56*	12.50*	289.13*	454.55*	90.91*
	Total	8.23*	12.47*	350.91*	350.91*	163.87*	8.07*	8.56*	-3.42*	-0.05*

*significant at 1 per cent level of significance

Source: Department of Agriculture & Farmers' Welfare, *Pradhan Mantri Fasal Bima Yojana* website's dashboard, Agriculture Insurance Company and Agriculture department Kangra

On the sample farm, the awareness about the various crop insurance schemes has been presented in Table 4.77. Among the various schemes, farmers were not aware of the National Agriculture Insurance Scheme and Modified Agriculture Insurance Scheme. The farmers aware of the Weather Based Crop Insurance Scheme and *Pradhan Mantri Fasal Bima Yojana* were about 79 and 74 per cent. The farmers who grow the notified crops in the notified areas were eligible for coverage and the scheme compulsorily covers the loanee farmers availing Seasonal Agricultural Loans (SAO) loans from financial institutions like commercial banks, regional rural banks, and primary agricultural cooperatives for the insured crops. The Table 4.78 presents the mode of insurance on sample farms. It can be clearly seen from the table that only about four per cent of the farmers have insured their crops voluntarily and the rest were taken under the insurance cover mandatorily.

Table 4.77: Awareness of different crop insurance schemes on sample households

Sr. No.	Particulars	Number	Per cent
1	NAIS	0	0
2	MNAIS	0	0
3	PMFBY	63	78.75
4	WBCIS	59	73.75

Table 4.78: Mode of insurance adopted by farmers on sample farms

Sr. No.	Particulars	Number	Per cent
1	Voluntary to cover losses	3	3.75
2	Mandatory with loan	77	96.25
3	Mandatory with govt. scheme	0	0
4	Others	0	0

4.4.3.3 Coverage, cost and compensation under PMFBY

The scheme covered 46 farmers in the district insuring an area of about 1.12 thousand ha in 2017-18 which increased to 184 farmers insuring 1.15 thousand ha area but the number of farmers declined in 2018-19 to 179 insuring 1.26 thousand ha in 2020. On an average, a single farmer insured an area of 24.35, 6.25 and 7.04 ha area in 2017-18, 2018-19 and 2019-2020, respectively. The area insured increased at a rate of 12.5 per cent per annum while the farmers covered grew at a rate of 289.13 per cent per annum.

Under WBCIS, the table clearly shows that the sum insured in 2017-18 was 11.23 lakh rupees which increased to 30.75 lakh rupees in 2019-20 and 34.94 lakh rupees in

2019-20. The sum insured grew at a rate of 211.13 per cent per annum. The premium paid by the farmers showed the same pattern and was 0.56 lakh rupees, 1.3 lakh rupees and 1.75 lakh rupees in 2017-18, 2018-19 and 2019-20. The premium paid by the farmers increased at a growth rate of 211.61 per cent per annum. The subsidy provided to the farmers was equally divided between state and central government and was 0.63 lakh rupees (2017-18), 0.17 lakh rupees (2018-19) and 4.18 lakh rupees (2019-20). The share of the farmer in gross premium varied from about 17 to 78 per cent and rest was paid by the government. Over the period of three years, the state and central government premiums have increased at a rate of 568.59 per cent per annum while the gross premium increased at a rate of 458.56 per cent per annum.

In the year 2018-19, 11 farmers were paid 1.1 lakh rupees as claim and in 2018-19, 53 were benefitted with a claim amount of 1.4 lakh rupees which further increased to 61 farmers with claims paid of 2.1 lakh rupees. For per rupee of the claim paid by the farmer, a premium of 1.96, 1.08 and 1.58 rupees was paid back as claim in 2017-18, 2018-19 and 2019-20, respectively. The data showed that both the farmers benefitted and claims have increased over the years by 454.55 and 90.91 per cent, respectively.

4.4.4.1 Coverage of crop insurance schemes on sample farms

The Table 4.79 shows the area covered and the type of farmers covered on the sample farm. The cursory glance at the table reveals that 9.96, 26.66 and 38.76 per cent of the total cropped area was insured under maize, paddy and wheat crop. In *kharif* season 36.62 per cent of the total cropped area was insured and it was 38.76 per cent in the *rabi* season.

Table 4.79: Pattern of coverage under PMFBY & RWBCIS on sample farm (2019-20)

Sr. No.	Particulars	Unit	Quantity	Percentage
1	Area			
i.	Total cropped area	**ha.**	60.84	
ii.	Maize	**ha.**	6.06	9.96
iii.	Paddy	**ha.**	16.22	26.66
iv.	Wheat	**ha.**	23.58	38.76
	Total	**ha.**	45.86	75.38

4.4.4.2 Cost of crop insurance schemes on sample farms

The Table 4.80 shows the cost of insuring crops on the sample households. The table clearly shows that insurance costed highest for the wheat crop as among the cultivated crops it was being grown in the highest area. The farmers on sample households paid a premium of 3636, 9730.8 and 10610.1 rupees for insuring maize, paddy and wheat crop, respectively for the state and central government, each paid a premium of 4908.6, 6325.02 and 24756.9 rupees, respectively.

Table 4.80: Pattern of cost under PMFBY & RWBCIS on sample farm (2019-20)

S. N.	Particulars	Maize		Paddy		Wheat	
		Value	Per cent	Value	Per cent	Value	Per cent
1	Area under crop	6.06		16.22		23.58	
2	Farmer's Premium	3636.00	27.03	9730.80	43.48	10610.10	17.65
3	State Govt. Premium	4908.60	36.49	6325.02	28.26	24756.90	41.18
4	Central Govt. Premium	4908.60	36.49	6325.02	28.26	24756.90	41.18
	Total Premium	13453.20	100.00	22380.84	100.00	60123.90	100.00

4.4.4.2 Compensation under crop insurance schemes on sample farms

The Table 4.81 presents the threshold and obtained yield in the Nagrota Bagwan and Panchrukhi regions of the district. The threshold yield is decided by the insurance companies based on their crop cutting experiments. In Nagrota Bagwan the threshold yield for paddy, maize and wheat was 16.47, 24.47 and 18.27 q/ ha while the obtained yield was 38.79 q/ha, 29.57 and 25.84 q/ha, respectively. In Panchrukhi on the other h and, the threshold yield for paddy, maize and wheat was 15.53, 22.78 and 17.57 q/ ha while the obtained yield was 36.86, 29.27 and 27.40 q/ha, respectively. In both the blocks, the obtained yield was more than the threshold yield in 201920 and thus no compensation was paid to the farmers.

Table 4.81: Pattern of coverage of PMFBY & RWBCIS on sample farm (2019-20)

Sr. No.	Particulars	Nagrota Bagwan		Panchrukhi	
		Threshold yield (q/ha)	Obtained yield (q/ha)	Threshold yield (q/ha)	Obtained yield (q/ha)
1	Paddy	16.47	38.79	15.53	36.86
2	Maize	24.47	29.57	22.78	29.27
3	Wheat	18.27	25.84	17.57	27.40

4.5 Problems and perceptions of the farmers and the stakeholders

For the successful implementation of any scheme, it takes collective efforts of various stakeholders and the feedbacks of the implementing agencies and the targeted group of people play an important role. The Table 4.82 summarises the perceptions and the problems of the farmers regarding crop insurance schemes. The analysis of the data revealed that 98.75 per cent of the respondents lacked the awareness of crop insurance in one way or another. Some respondents were not aware of their crops being insured as they were covered automatically as loanee farmers. About 59 per cent of the farmers believed that the programme has procedural complexities which also become a reason for farmers either not insuring the crop or not reporting the loss on time. 66 per cent of the farmers were of the view that the premium rates of the insurance were quite high and 82 to 87 percent of farmers believed that the risks covered under the insurance programme are either not of interest or the programme does not address the practical problems. The loss assessment and the settlement of the claims were also not considered flawless. 41.25 per cent of the total respondents believed that there is a wide difference between the actual yields and the threshold yields. About 26 per cent of the farmers believed that the loss assessment under the program is not proper and 21 per cent believed that the claims are not settled timely. The problems in one way or the other lead to either creating a disinterest among the farmers about the insurance or farmers opting out of the insurance. When the problems were ranked according to the Garrett score, the lack of awareness (avg. score of 80) was found to be the major problem whereas, the timely settlement of the claims was found to be least concerning problem for the farmers (avg. score of 20). The problems like disinterest in risks covered, absence of practical problems, high premium rates, procedural complexities, wide difference between actual and threshold

yields and improper lost assessment were ranked from two to eight in sequence of their relevance.

Table 4.82: Problems faced by the farmers

Sr. No.	Particulars	Number	Per cent	Average total score	Rank
1	Lack of technical awareness	79	98.75	80	I
2	Risks covered are not of interest	69	86.25	68	II
3	Provisions do not address practical problems	66	82.5	60	III
4	High premium rate	53	66.25	53	IV
5	Procedural complexities	47	58.75	47	V
6	Wide difference btw actual and threshold yields	33	41.25	41	VI
7	Improper loss assessment	21	26.25	33	VII
8	Delayed settlement of insurance claims	17	21.25	20	VIII

The other stakeholders of the insurance programme are the insurance companies and the state and the central government who pay the part of the premium. The only insurance company which works in the district is Agriculture Insurance Company and after the interaction with the regional dealer of the company, several apparent revelations were made. The insurance company plays a role in increasing the awareness among the farmers and yet the major issue raised was the awareness of the farmers and the willingness of the farmers to insure their crops. Further, the respondent stated that sometimes the farmers which are included compulsorily under the insurance cover may or may not require the assistance. The loanee farmers may not use the loan for crop production but may utilize it for non-farm activities and thus their coverage under the insurance may be unproductive. The farmers practice crop diversification and also get involved in other allied activities to supplement their income, thus crop insurance may not be the first strategy of the farmer for risk management. The insurance is not free from fraudulent practices either. Sound federalism is important for the successful implementation of the scheme but it has not been hidden that there has been a wide difference between the opinions of the state and central government on the matter of insurance. Many states *viz.*, Gujarat, Andhra Pradesh, Telangana, Jharkhand, West Bengal and Bihar exited the *Pradhan Mantri Fasal Bima Yojana* scheme reason being the high premium rates quoted by insurance companies. Gujarat is implementing its own state-run crop insurance scheme called *Mukhya Mantri*

Kisan Sahay Yojana. The government of Andhra Pradesh also decided to implement both a yield-based crop insurance scheme and a weather-based (parametric) crop insurance scheme. Along with these states Bihar, West Bengal and Madhya Pradesh also implemented their own insurance models namely, Bihar state crop insurance assistance scheme, *Bangla Shasya Bima* scheme and Beed surplus sharing model, respectively. But the exit of this scheme was not completely fruitful as the Telangana state did not opt for any insurance scheme and the rains of October 2020 damaged around 81000 hectares of crop area in the state which is approximately 15 per cent of the total cropped area.

5. SUMMARY AND CONCLUSIONS

Agriculture has been and still is the major source of livelihood for more than 50 per cent of the total population of India and it contributes to about 20 per cent of the country's GDP. Since independence, it has been among the top priorities of the government and over the period of time, many initiatives have been taken for its overall development. Through the concerted efforts of the planners, researchers, extension workers and farmers there has been a significant increase in the production as well as yield levels of different agricultural commodities. The country has not only achieved self-sufficiency in food production but has also emerged as a major exporter of many agricultural commodities. The production of food grains in India has been increasing every year and India is among the top producers of several crops such as wheat, rice, pulses, sugarcane and cotton. It is the highest producer of milk and second highest producer of fruits and vegetables. In 2013, India contributed 25 per cent to the world's pulses production, the highest for any one country, 22 per cent to rice production and 13per cent to wheat production. It also accounted for about 25 per cent of the total quantity of cotton produced, besides being the second-highest exporter of cotton for the past several years. The agricultural production process being biological in nature witnesses a high degree of risk and uncertainty. The Indian agricultural sector is still dependent on the monsoon. The erratic and uneven distribution of monsoon rains continued unpredictability and hence farmers' exposure to risk and uncertainty. In this scenario of high risk and uncertainty of rain-fed agriculture, allocating risk is an important aspect of decision-making to farmers. It leads to operating risk in the cultivation of different crops. The farmers are confronted with the problems like unforeseen natural calamities (droughts, floods, wind/hail storms), outbreaks of insect pests & diseases, scarcity of labour, fluctuating market prices, non-availability of critical inputs in time, etc. responsible for crop losses. In lieu of all these uncertainties, there has been a low level of capital investment at the farmer's level for the adoption of modern agriculture production technologies, especially for irrigation infrastructure, farm mechanization, etc. Almost 7,000 natural disasters had occurred during 1995- 2015 worldwide, affecting 4.2 billion people and estimated damages were US $ 2.2 trillion.

Himachal Pradesh has a varied type of agro-climatic conditions ranging from Sub Mountain, Low Hills, Subtropical Zone (300- 650 m above mean sea level) to High Hills Temperate Dry Zone (2200 m above mean sea level) which are congenial for the cultivation of a wide range of crops like cereals, pulses, oilseeds, fodder, vegetables, flowers, herbs, medicinal crops, etc. in different parts of the state. The Department of Agriculture is promoting the cultivation of high-value crops like vegetables and flowers for the diversification of cropping systems of the state for increasing the income of the farmers. Given the domestic and market needs, the majority of the existing cropping systems in the state are mixed comprising cereals, pulses, oilseeds, fodder, vegetables and flower crops. In order to compensate the losses of the field crops, the various crop insurance schemes as per the guidelines of central government are being implemented in the state from last 20 years which might have provided relief to crop insurers. Thus, there is need for examining the farmers perceptions to various types of risks associated with crop production, which has not been done in the state so far. Therefore, the present endeavour has been planned to study the status of crop insurance schemes, assessment of coverage, cost, compensation in the Kangra district of Himachal Pradesh as among the different districts of the state, Kangra district has the highest number of cultivators and diversified cropping systems. The objectives of the study were:

5.2 Objectives

1. To study the status of crop insurance in Kangra district and to measure the risk in crop production.

2. To examine the cost, coverage and compensation of crop insurance and to study the perceptions and problems faced by farmers and stakeholders.

5.3 Material and Methods

The present investigation was undertaken in the Kangra district of Himachal Pradesh. The district was selected purposively because it has the highest number of cultivators and total cropped area among the different districts of the state and also represents three agro-climatic zones of the state.

In order to meet out the requirements of specific objectives of the study, primary as well as secondary data were collected. The secondary time series data were collected from the various reports/website of department of agriculture, banks and insurance companies. The respondents for the collection of primary data were selected by using a two-stage random sampling design. At the 1st stage out of the 15 development blocks of district Kangra, a sample of two blocks i.e. Nagrota Bagwan and Panchrukhi was selected randomly. At the 2nd stage of sampling, the list of farmers who have insured their crop during the agricultural year 2019-20 was prepared in consultation with the officials of the department of agriculture and lead bank/insurance companies for the selected blocks. From the list so prepared a sample of 80 (63 from Nagrota Bagwan and 17 from Panchrukhi) farmers was selected randomly through proportional allocation method from the selected blocks.

5.4 Major findings

1. The average size of family of the respondents was found to be at 5.41 members in which the proportion of males was relatively higher with the sex ratio of about 986.
2. The age wise distribution of the sample population indicated that the majority of the population i.e. about 30 per cent belonged to the age group of 40-60 years. As far as the heads of the families were concerned, the majority (57.50 per cent) was also in the age group of 40-60 years followed by the age group >60 years accounting for 35 per cent heads of the families.
3. The educational status of the heads of the families revealed that the fraction of the heads of the families studied up to secondary was highest (36.25 per cent) followed by middle standard (30.00 per cent)while in case of sample population, 21.48 per cent of the total population had studied up to the secondary level which was highest as compared to other level of education.
4. The overall literacy rate of the sample population was quite good as 92.02 per cent of the total population which was 96.06 and 87.88per cent in case of male and female, respectively.
5. The majority of the sample population (63per cent) was involved in agricultural activities followed by in government service/ pension (11.18 per cent).

6. Farm machinery plays an important role in reducing the drudgery of the farmers. On an average a household in absolute numbers has 6.93 machinery/tools/ implements on the farm. In contrast to the major implements, minor implements were quite high i.e. 6.175 which accounted for 89.17 per cent of the total implements. The total value of these tools/implements was estimated at Rs 29,370/farm
7. The inventory of buildings was found to be 1.76/farm comprising 1.06 residential and 0.70 cattle shed. The total investment on buildings was Rs 734414/farm in which the share of residential buildings was about 92 per cent.
8. The size of the livestock unit on sample households was quite small. It was estimated at 1.76, in which the population of cattle was highest i.e. 1.17 accounting for 66.48 per cent of the total livestock. Other than cattle, buffaloes, bullocks, sheep, goat and poultry were also reared but their proportions in total livestock were quite low.
9. The average size of land holding on the sample farms was low i.e. 0.5330 ha, out of which 0.2773 ha (52.02 per cent) was irrigated. The available land was being put under cultivation, forest, pasture& grasslands, orchards, etc.
10. Among the different land uses highest area was allocated for cultivation of crops i.e. 0.3741 ha accounting for about 70 per cent of total land holding. The cropping intensity on sample household was about 204 per cent which indicates that cultivated land is use more than once in a year.
11. As far as the productivity of crops was concerned, it was estimated at 28.93, 38.03 and 28.27 q/ha in case of maize, paddy and wheat, respectively. Among the productivity was highest in cucurbits (163.21 q/ha) followed by cabbage and cauliflower.
12. The respondents were enquired about the agriculture related general changes like the improvement in farm technology, crop varieties, livestock breeds, change in climate, insect pest infestation, bullock population, etc. Among these more than 80 per cent of the respondents were of the view that over the time drastic changes have been experienced in case of crop varieties, farm implements & machinery and bullock population.

13. In addition to these about 67.50, 46.25 and 43.75 per cent of the respondents also reported the increase in area under vegetables, susceptibility of crops to diseases and input requirements in crops, respectively.
14. The risk in crop production is a common phenomenon and the major source of risks includes production, price, financial, institutional and human risks. The majority of the respondents i.e. 60, 46.25, 47.5, 43.75 and 41.25 per cent farmers were of the view that the production risks i.e. risks associated with rainfall, insect-pest infestation, plant diseases and irrigation have started to occur more frequently since past five to ten years. However, a few farmers were of the opinion that rainfalls, stray animals, plant diseases, inadequacy of irrigation risks have their origin since 10-15 years.
15. The examination of perceptions of the respondents about the different sources of risks in crop production indicated that among different sources of risks, the production was found to be major concern by around 84 per cent of respondents. Next to production risk, price risk was attributed as a risk of major concern by 11.25 per cent of the respondents followed by 7.5 per cent who believed that human risk was the risk of major concern to crop production.
16. The production is usually concerned with uncertainty of weather, incidence of insect pests, and irrigation. Among the major crops weather risk was reported to high degree in case wheat, paddy and vegetables by majority of respondents i.e. about 73, 50 and 43 per cent, respectively. It was reported to of low degree in case maize by about 31 per cent of the respondents.
17. The risks associated with insect pest infestation was reported to be of low degree in case of wheat and paddy, medium degree in case of maize and high degree in case vegetable crops. As far as diseases associated risks were concerned, highest proportion of farmers indicate it as high degree risk in vegetables, medium degree in case of wheat and paddy, while of low degree in maize.
18. The majority of the farmers believed that risk associated with the availability of irrigation is of high degree in wheat and vegetables, medium degree in case of paddy and low in maize.
19. The opinions of the majority of the farmers regarding the extent of output price risk were found to be skewed towards none and low degree in case all the major

crops. Whereas in case of input prices the extent of risk was of medium degree in case of wheat and vegetables while low in case of maize and paddy.

20. As far as financial risk was concerned, it was least importance to the farmers, reason being the contribution of income from crops was low as compared to the other sources of household income.
21. The perceptions of the farmers regarding institutional risk reflected that the wheat crop is highly associated with the institutional risk as 33.75 and 46.25 per cent of farmers attributed the risk to be of high and very high degree. Further in the case of paddy the majority of the farmers i.e. 51.25 per cent believed that the crop is highly associated with institutional risk.
22. The production risks associated with human were ranked as of the lowest degree by the maximum number of farmers (26.25 per cent) in the case of maize while it was reported as of the very high degree by 13.75 per cent farmers each in case of vegetables and paddy. In the case of wheat, the maximum number of farmers (26.25 per cent) was of the view that the risk is of low degree.
23. The value of Mean relevance score (MRS) were estimated for the different elements of the major for of risks for maize paddy and wheat. In case of wheat weather, institutional risk, government policies and irrigation related risks were of extreme relevance with MRS of 3.96, 4.15, 4.15 and 4.16, respectively. In case of paddy MRS for the extreme forms of risks i.e. institutional risk and government policies, was calculated at 3.53 each, however no extreme form of risk was found.
24. The data analysis reveals that the insect pest, weather, diseases, demand of output, family problems and price of input were the highly relevant risks in case of maize; MRSs of which were at 2.95, 2.98, 3.04, 2.65, 2.64 and 2.5 while no form of risk was found to be extreme.
25. In the case of wheat, among the highly relevant risks, the disease associated risk has the highest mean relevance score (3.45) followed by weeds (3.03) and the forms of human risk *viz.* personal problems and family problems had the lowest relevance score of 2.56 and 2.5 respectively.
26. Price of output, insect-pests, weeds, price of the input, irrigation, supply of input, diseases, personal problems and weather were the risks of high relevance in paddy and the relevance percentage for each of these forms of risks ranged between 60 to

78 per cent while the mean relevance score was highest for weather i.e. 3.44 and lowest for insect pest and price of output i.e. 2.5.

27. The forms of risks *viz*, loans due, repayment issues, the risk from line departments and socio-cultural issues have been ranked lowest in terms of relevance. The Relevance percentage (RP), Mean relevance (MR) and MRS for all these aforementioned forms of risks were zero in case of maize, for wheat and paddy line departments have 0.01 MRS each with zero RP and MR whereas the RP for repayment issues was found to be 1 per cent for both paddy and wheat and the MRS was found to be 0.03 each.
28. The pattern of monthly rainfall for 5 years in the study area i.e. Kangra district revealed that it was concentrated in the *kharif* season and the mean rainfall for *kharif* and*rabi* season was found to be 1596.86 and 33.08 mm, respectively. The coefficient of variation in rainfall for *Rabi* season was higher as compared to *Kharif* season.
29. The crop losses on account of rainfall were highest in the case of wheat, the losses of 7.17, 0.08, 0.87 and 0.04 q/ha were reported due to rainfall, scarcity of irrigation water and plant diseases each, stray animals and personal problems. In paddy, the losses (0.68 q) were highest because of the risk associated with irrigation, followed by the stay animals, personal problems, rainfall, plant diseases and failure of technology which accounted for 0.55, 0.43, 0.31, 0.25 and 0.18 quintal, respectively in case of paddy.
30. To prevent the losses various risk management strategies were adopted by the farmers and among those cent per cent farmers were insured and 83.75 per cent have adopted inter-cropping.
31. On an average the coverage of area as well as number of farmers under crop insurance in the country has registered an increasing trend during the period of 2000-01 to 2019-20. The annual compound growth rate of area insured and number of farmers who have insured their crops were estimated at 10.38 and 6.67 per cent, respectively. Similarly, the gross premium paid for crop insurance registered an increase of 13.94 per cent/ annum, while the increase in premium paid by the farmers was comparatively higher i.e. 19.33 per cent/ annum during the same period.

32. In the event of crop losses, the farmers were paid compensation by insurance companies, over the period (2000-01 to 2019-20), the total compensation paid to the farmers and number of farmers benefitted from the same increased at an annual compound growth rate of 20.81 and 5.40 per cent / annum, respectively.
33. During the period of last twenty years various schemes like NAIS, MNAIS, WBCIS, PMFBY, etc. were implemented in the country. Among these NAIS was in operation from 2000-01 to 2015-16 and during this period the number of farmers who insured their crops and the area covered increased at a compound annual growth rate of 4.15 and 2.30 per cent, respectively. The cost of insurance borne by the farmers under the scheme increased at a compound growth rate of 19.94 per cent/annum and claims paid to them grew at a compound annual growth rate of 15.18 per cent/annum.
34. Further, from 2007-08, WBCIS was also implemented along with NAIS. The scheme on an average covered the farmers at a rate of 50.48 per year and the area insured increased at a rate of 94.99 per cent/ annum. The farmers' premium under the scheme increased at a rate of 56.68 per cent/ annum while the compound annual growth rate of gross premium was found to be at 87.35 per cent/ annum.
35. Along-with NAIS and WBCIS, in 2010-11, MNAIS was also implemented in few states of the country and the coverage under the scheme increased at a compound annual growth rate of 44.19 and 89.95 per cent /annum in terms of area insured and farmers covered, respectively. The cost of insurance for the farmers under the scheme increased at a rate of 88.09 per cent and the gross premium increased at a rate a compound annual growth rate of 47.84 per cent/ annum. The claims paid to the farmers under the scheme increased at a rate of 58.78 per cent/ annum.
36. The area insured under both, the PMFBY and RWBCIS, decreased at simple growth rates of 3.43 and 2.20 per cent/ annum, respectively but the farmers covered increased at a rate of 1.01 and 0.63 per cent under PMFBY and RWBCIS, respectively. The cost of insurance on the farmers' level under the scheme increased at a rate of 1.22 per cent each and the gross premium increased at rate of 10.38 and 21.63 per cent, respectively. The farmers benefitted under the scheme increased at a rate of 10.48 and 3.29 per cent /annum, respectively while the claims paid to the farmers under the scheme changed at a rate of 10.62 and 34.40 per cent respectively.

37. The cost, coverage and compensation of different crop insurance schemes in Himachal Pradesh was studied and it was found that overall the coverage of the crop insurance programme w.r.t. farmers covered increased at a compound growth rate of 24.35 per cent and w.r.t. area insured, it increased at a rate of 35.36 per cent/ annum. The insurance cost to the farmers increased at a rate of 65.54 per cent per annum and the subsidy paid to the farmers increased at a compound growth rate of 79.13 per cent/ annum. The compensation paid to the farmers of the state increased at a rate of compound growth rate of 45.37 per cent/annum.
38. As per the scheme wise pattern is concerned, the NAIS (1999-2000 to 2015-16) insured farmers at a compound annual growth rate of 20.92 per cent with area insured over the years at a compound annual growth rate of 24.12 per cent. The cost of insurance borne by the farmers under the scheme increased at a compound growth rate of 17.59 per cent/annum and claims paid to them grew at a compound annual growth rate of 3.69 per cent/annum.
39. Further from 2007-08, WBCIS was also implemented along with NAIS. The scheme on an average covered the farmers at a rate of 102.08 per cent per year and the area insured increased at a rate of 143.44 per cent/ annum. The farmers' premium under the scheme increased at a rate of 144.45 per cent/ annum while the compound annual growth rate of gross premium was found to be at 147.50 per cent/ annum. The claims paid to the farmers increased at a compound rate of 90 per cent/ annum.
40. The area insured under both, the PMFBY and WBCIS, decreased at a simple growth rate of 5.12 and 9.86 per cent/ annum, respectively but the farmers covered increased at a rate of 6.54 per cent under PMFBY but decreased at 4.86 per cent under RWBCIS. The cost of insurance on the farmers' level under the scheme decreased at a rate of 6.54 per cent under PMFBY but increased at 75.59 per cent under RWBCIS and the gross premium decreased at rate of 2.59 under PMFBY and increased at 89.87 per cent under RWBCIS, respectively. The farmers benefitted under the scheme increased at a rate of 51.24 per cent under PMFBY and decreased at a rate of 0.04 per cent under RWBCIS while the claims paid to the farmers under the scheme changed at a rate of 20.31 and 68.61 per cent /annum, respectively.

41. In the district Kangra, over the years, the state and central government premiums under PMFBY have increased at a rate of 347.9 per cent per annum while the gross premium increased at a rate of 161.25 per cent per annum. The area insured increased at a rate of 7.84 per cent per annum while the farmers covered grew at a rate of 8.34 per cent per annum. The data revealed that both the farmers benefitted and claims have decreased over the years by 3.61 and 0.56 per cent, respectively.
42. Under RWBCIS, the state and central government premiums have increased at a rate of 568.59 per cent per annum while the gross premium increased at a rate of 458.56 per cent per annum in the district. The area insured increased at a rate of 12.5 per cent per annum while the farmers covered grew at a rate of 289.13 per cent per annum. Both, the farmers benefitted and the claims have increased over the years by 454.55 and 90.91 per cent, respectively.
43. On the sample farms, the premium paid by the farmers, state and central government was 13453.5, 22380.84 and 60123.9 rupees for insuring maize, paddy and wheat, respectively. About 75 per cent of the total cropped area was insured and no compensation was paid to the farmers in 2019-20 as the yield obtained on the sample farms was greater than the threshold yield.
44. The majority of the farmers i.e. 98.75 per cent lacked awareness about crop insurance schemes. The procedural complexities and impractical risk coverage were also cited as the flaws in the scheme. The improper loss assessment and the delayed settlement of claims were also highlighted as major issues by the respondents.
45. According to Garrett scoring, the lack of awareness among farmers was found to be the major problem whereas, the timely settlement of the claims was found to be least concerning problem for the farmers.
46. The miscommunication among the stakeholders has also been a major cause of non-successful implementation of the scheme.

Recommendations:

1. Lack of awareness regarding the crop insurance was reported as the major problem by the sample respondents, therefore, improving the awareness of the farmers is the first and foremost requirement for the successful implementation of crop insurance schemes. This can be done by organising awareness camps and campaigns by the department of Agriculture/Horticulture, SAUs, KVKs, crop insurance companies.

These departments are also imparting the routine trainings to the farmers on different aspects of farming, the aspect of crop insurance may also be included in different training modules.

2. Although, efforts are being made by government to publicise the crop insurance schemes through different mass media (radio, television, newspapers, etc.) but in these advertisements the messages are too short. Therefore, printed material in national and local languages indicating various terms and conditions of crops insurance may be developed and provided to the farmers. In addition to this, the achievements regarding crop insurance should be published each year in the form of small booklets which should also be distributed to the farmers so that they are well aware about every aspect of the crop insurance.

3. At present, there are two ongoing crop insurance schemes in the country but the farmers were only aware about *Pradhan Mantri Fasal Bima Yojana* which does not cover vegetables and fruits crops. The farmers of state are also producing vegetables and fruits like apple, mango, litchi, etc. as cash crops which are covered under Restructured Weather Based Crop Insurance Scheme (RWBCIS). Therefore, steps should also be taken to advertise the RWBCIS on the same scale so as to provide insurance cover to the cash crops grown in Himachal Pradesh.

4. The extent of crop losses on account of animal menace (stray/wild animals) is continuously increasing from last 10-15 years, which are not covered under the crop insurance. Thus, the production risk on account of animals' menace may also be covered under crop insurance.

5. The farmers also mentioned that with the improvement in crop varieties, the input requirement has also increased, thus has increased cost of production. It becomes important that farmers get the inputs on time and at affordable prices which can help to reduce the market risk.

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APPENDICES

Appendix-I
FARMER' SURVEY SCHEDULE

Code No:.....

Department of Agricultural Economics, Extension Education & Rural Sociology
CSK HP Krishi Vishvavidyalaya, Palampur (H.P.) – 176062

Farmer's Survey Schedule

Research problem: Economic assessment of crop insurance scheme in Kangra district of Himachal Pradesh

Objectives:

3. To study the status of crop insurance in Kangra district and to measure the risk in crop production.
4. To examine cost, coverage and compensation of crop insurance and to study the perceptions and problems faced by farmers and stakeholders.

1) Basic information of the respondent

Name & Address

Name of the respondent:……S/o,W/o:……Age:…….

Villlage:……..Panchayat……Block…….. Tehsil……

Main Occupation…….. Subsidiary Occupation……..…… Contact No……

Family Status: APL/BPL

Type of family: Nuclear/Joint

Educational/ Occupational pattern of family members

S. No	Relation with respondent	Age(years)	Sex (M/F)	Education (I/P/M/H/ S/D/G/PG /SG/NS)	Occupation			
					Main		Subsidiary	
					Particulars	Annual Income (Rs)	Particulars	Annual Income (Rs)
1								
2								
3								
4								
5								
6								
7								
8								

Note: I- Illiterate, P-Primary, M- Middle, H- high, S- Senior Secondary, D- Diploma, G- Graduation and PG- Post Graduation, SG-School Going and NS- Non School Going

2) L and inventory *(bigha/kanal)*

Sr. No.	Particulars	Irrigated	Rainfed	Source of Irrigation	Total	Remarks
1.	Owned					
2.	Leased in					
3.	Leased out					
4.	Size of l andholding (i+ii-iii)					

3) L and utilization

S. N.	Particulars	Irrigated	Rainfed	Total	Remarks
i.	Cultivated l and				
ii.	Forest				
iii.	Pasture				
iv.	Orchard				
v.	Wastel and (Fallow)				
vi.	Misc. (Forest, Grasses,Trees)				
vii.	Area under buildings				
viii.	Others				
5.	Approx. value of l and (Rs.)				
6.	L and revenue paid(Rs./year)				

4) Inventory of residential and farm buildings

Sr.No.	Particulars	Number	Year of Construction	Present Value (Rs.)	Annual Repairs (Rs.)	Source of funds (P/L/R)	Remarks
1.	Residential						
i.	*Kuccha*						
ii.	*Pucca*						
iii.	Mixed						
2.	Cattle shed						
i.	*Kuccha*						
ii.	*Pucca*						
iii.	Mixed						
3.	Store house						
4.	Poultry shed						
5.	Any other						

Note: P-Personal savings L-Loan from bank, R- Loan from relatives

5) Basic facilities

Sr. No.	Particulars	Distance from Home (Km)	Sr. No.	Particulars	Distance from Home (Km)
1.	Access to clear drinking water		2.	Office of HDO	
3.	Sanitation (toilet)		4.	Bank	
5.	Road connectivity		6.	Health Centre	
7.	Electricity		8.	Veterinary Hospital	
9.	School		10.	Market	
11.	College		12.		
13.	Office of SMS		14.		

6) Inventory of farm machinery and implements on the farm

Sr.No.	Particulars	Number	Year of purchase	Present value (Rs.)	Annual Repair (Rs.)	Source of fund (P/L/R)
A.	**Major Implements**					
1.	Tractor					
2.	Power tiller					
3.	Thresher					
4.	Chaff-cutter					
5.	Sprayer					
6.	Sprinklers					
B.	**Minor implements**					
1.	Wooden plough					
2.	M.B. plough					
3.	Spade					
4.	Hoe					
5.	Rake					
6.	Sickle					
7.	Axe					
8.	Others					

7) Livestock inventory and management

Sr. No.	Animals	No.	Lactation No.	Value (Rs)	Status insurance (Y/S)	Remarks
1.	**Cattle**					
A.	**In milk**					
i)	Local					
ii)	Improved					
B.	**Dry**					
i)	Local					
ii)	Improved					
2.	Buffalo					
A.	In milk					
B.	Dry					
3.	Bullocks					
4.	Heifers					
5.	Calves					
6.	Sheep& Goat					
7.	Poultry					
8.	Others (Specify)					
i)						
ii)						

8) Production of Animal Product

Sr. No.	Product	Cow	Buffalo	Poultry	Sheep	Goat	Total	Qty. Sold	Rate (Rs/unit)
1.	Milk								
2.	Curd								
3.	Butter								
4.	Ghee								
5.	Egg								
6.	Meat								
7.	Stock								
8.	Wool								
9.	FYM								
10.	Others								

9) Sources agricultural information

Sr. No.	Particulars	Progressive farmer	Neighbours/ friend/relatives	KVK/ SAU	TV/Radio/ Newspaper	Dept. of Agri	Others
1.	Govt. schemes for agri.						
2.	Agriculture information						
3.	Market information						
4.	Others						

10) Cropping pattern

Sr. No.	Crops	Variety (Hybrid/Local)	Area (*kanals*)	Prodn (q)	Quantity Sold (q)	Average Price (Rs./q)
A.	***Kharif Season***					
1.	**Cereal crops**					
i.	Maize					
ii.	Paddy					
2.	**Pulses**					
i.	Rajmash					
ii.	Black gram					
3.	**Oilseeds**					
i.	Sesamum					
ii.	Soybean					
4.	**Vegetables & Spice Groups**					
i.	Potato					
ii.	Squash					
iii.						
5.	**Fodder crops**					
i.	**Sorghum**					
ii.						
	Rabi Season					
1.	**Cereal crops**					
i.	Wheat					
ii.	Barley					
2.	**Pulses**					
i.	Lentil					
ii.						
3.	**Oilseeds**					
i.	Toria					
ii.	Mustard					
4.	**Vegetables & Spice Crops**					
i.	Garlic					
ii.	Pea					
iii.						
iv.						
v.						
5.	**Fodder crops**					
i.	Berseem					
ii.	Oats					
6.	**Other crops**					

11) Labour use Pattern in major crops

Sr.No.	Particulars	Name of the crop										Remarks
		Paddy	Wheat	Maize	Barley							
1.	Area											
2.	L and Preparation											
3.	Nursery Raising											
a.	Sowing/Transplantation											
b.	Irrigation											
c.	FYM & Fertilizer application											
d.	Watch & Ward											
4.	Harvesting											
5.	Threshing & Winnowing											
6.	Storage											
7.	Intercultural Operations											

12) Input use Pattern in major crops

Sr. No.	Particulars	Name of the crop										Remarks
		Paddy	Wheat	Maize	Barley							
1.	Seed											
2.	Nursery											
3.	Manure& Fertilizers											
a.	FYM											
b.	Vermicompost											
c.	Urea											
d.	12:32:16											
4.	Herbicides											
5.	Insecticides											
6.	Other expenses											
i.	Electricity											
ii.	Transportation costs											
iii.	Marketing Costs											

13) Status of other/ supplementary farm enterprises:

Sr.No.	Particulars	Year of start	Initial investment (Rs.)	Annual working capital (Rs.)	Annual Gross Returns (Rs.)	Source of fund	Remarks
1.	Bee Keeping						
2.	Mushroom						
3.	Sericulture						
4.	Poultry						
5.	Processing & Value Addition						
6.	Vermi-composting						
7.	Others (Specify)						

14) Information on the risks faced by the farmer

1) How long you have been associated with agriculture?.....years

2) Which are the major farm enterprises you have been associated with?

a) Crops	b) Livestock	c) Fruit crops	d) Farm forestry	e) Processing & value addition	f) Others

3) Over the years what changes you observed in farming?

a) Crop varieties	b) Livestock breeds	c) Farm tools	d) Climate	e) Cropping pattern	f) Insect-pests
g)	h)	i)	j)	k)	l)

Field crops

- Traditional varieties of major crops like maize, paddy, wheat, etc. have extincted
- New varieties are more susceptible to insect-pest and diseases
- Input requirements of new varieties are quite high
- Precipitation pattern have changed, it is not matching with the normal crop production as it was earlier
- The area under oilseed and pulses have decreased considerably on account of low productivities
- The area of oilseed and pulses shifted to other crops mostly vegetable crops

Livestock

- Improved breeds of cattle are susceptible to diseases
- Improved breeds are having the problem of repeat breed and short production period
- The population of bullocks has reduced drastically

Do you think that above mentioned enterprises are associated with risk? Y/N

If Y, what are the major risks you have been confronted with?

Crop Failure	Damage by animals	Untimely rains		

In which category we broadly classify these risks?

a) Production	b) Price/market	c) Financial	d) Institutional	e) Human/personal	f) others

Among these which are of major concern for your farm business

a) Production	b) Price/market	c) Financial	d) Institutional	e) Human/personal

14.1) What is the extent of different components of production and price risk on different crops? (N/L/M/H/VH)

Sr. No.	Particular	Production Risks					Price Risks				
		Weather	Insect-pests	Diseases	Weeds	Irrigation	Price of Output	Price of Input	Supply of input	Dem and of output	Others
1.	**Cereals**										
i.	Maize										
ii.	Paddy										
iii.	Wheat										
iv.	Barley										
v.	Oats										
vi.	Bajra										
2.	**Pulses**										
3.	**Oilseeds**										
i.	Toria										
ii.	Sesame										
iii.	Mustard										
iv.	Linseed										
v.	Soybean										
5.	**Vegetables**										
i.	Potato										
ii.	Tomato										
iii.	Cucurbits										
iv.	Onion										
v.	Cauliflower										
vi.	Other										

Note: N-None,L-Low, M-Medium, H-High, VH-Very High

14.2) What are the important factors associated with Institutional and Personal risk?

Sr.No.	Particular	Institutional Risk			Personal Risk			Others issues
		Line depts.	Govt. policies	Lending institutions	Personal problem	Family problems	Social-cultural	
1.	**Cereals**							
i.	Maize							
ii.	Paddy							
iii.	Wheat							
iv.	Barley							
v.	Oats							
vi.	Bajra							
2.	**Pulses**							
3.	**Oilseeds**							
i.	Toria							
ii.	Sesame							
iii.	Mustard							
iv.	Linseed							
v.	Soybean							
4.	**Vegetables**							
i.	Potato							
Ii.	Tomato							
iii.	Cucurbits							
iv.	Onion							
v.	Okra							
vi.	Cauliflower							
5.	Other vegetables							

Note: N-None, L-Low, M-Medium, H-High, VH-Very High

14.3) What are the important factors associated with financial risk?

Sr. No.	Particular	a) Loans due					b) Lower prices					c) Repayment issues					d) Others issues				
		N	L	M	H	VH	N	L	M	H	VH	N	L	M	H	VH	N	L	M	H	VH
1.	**Cereals**																				
i.	Maize																				
ii.	Paddy																				
iii.	Wheat																				
iv.	Barley																				
v.	Oats																				
vi.	Bajra																				
2.	**Pulses**																				
3.	**Oilseeds**																				
i.	Toria																				
ii.	Sesame																				
iii.	Mustard																				
iv.	Linseed																				
v.	Soybean																				
4.	**Vegetables**																				
i.	Potato																				
ii.	Tomato																				
iii.	Cucurbits																				
iv.	Onion																				
v.	Okra																				
vi.	Cauliflower																				
5.	Other vegetables																				

Note: N-None, L-Low, M-Medium, H-High, VH-Very High

Have you confronted with any of the above mentioned production risks? Y/N

14.4) If Y, mention the period as mentioned below:

Sr. No.	Particulars	<2 yrs		2-5 yrs		5-10 yrs		10-15 yrs		>15yrs		Remarks
		Y/N	F	Y/N	F	Y/N	F	Y/N	F	Y/N	F	
1)	Flood											
2)	Drought											
3)	Fire											
4)	Rainfall											
i.	Early Onset											
ii.	Late Onset											
iii.	Insufficient downpour											

iv.	Heavy downpour											
5)	Insect-Pest											
S. No.	Particulars	<2 yrs		2-5 yrs		5-10 yrs		10-15 yrs		>15yrs		Remarks
		Y/N	F	Y/N	F	Y/N	F	Y/N	F	Y/N	F	
6)	Plant diseases											
7)	Non-availability of irrigation											
8)	Inadequate/surplus irrigation											
9)	Low prices											
10)	Failure of new technology											
11)	Bullocks/tractor											
i.	Availability on time											
ii.	High hiring cost											
12)	Human Risk											
i.	Injury											
ii.	Illness											
iii.	No regular visits to field											
iv.	Migration											
v.	Political &social unrest											
vi.	Other engagements											
13)	Any other											
i.	Human conflict											
ii.	Intentional harm to field											
iii.	Stray animals											
iv.	Equipment failure											

F-Frequency of occurrence

15) Extent of losses in major crops

Sr.No.	Particulars	Name of crops																	
		E	A	E	A	E	A	E	A	E	A	E	A	E	A	E	A	E	A
1.	Flood																		
2.	Drought																		
3.	Low/high rainfall																		
4.	Scarcity of irri. water																		
5.	Insect-Pest																		
6.	Plant diseases																		
7.	Fire																		
8.	Failure of new technology																		
9.	Non-availability of timely inputs																		
10.	Non-availability of labour																		
11.	High cost of input																		
12.	Stray Animals																		
13.	Personal problems																		
14.	Socio-cultural issues																		
15.	Political unrest																		
16.	Low prices																		
17.	Migration																		
18.	Human Injury																		

Note: E-Expected yield and A-Actual yield of crop

16) What measure you have adopted for risk management

- Crop diversification
- Fencing
- Cleaning the surroundings of field for fire protection
- Inter-cropping
- Adoption of allied crop enterprises ……..
- Crop insurance

17) When did you decided to insure your crop? …… (year)

18) Are aware about the crops insurance schemes launched by the government? Y/N

19) If yes, name schemes implanted in HP - ……, ……, ……..,

20) Was it voluntary or m andatory with loan/other govt. scheme?

a) Voluntarily to cover losses	b) M andatory with loan	c) M andatory with govt. scheme	d) others

21) Who motivated you for insuring your crops?

a) self	b) relative/ neighbour	c) bank officials	d) Agril. officers	e) others

22) Details of cost incurred for insuring your crops

Sr. No.	Crops	Year	Time devoted	Transportation Cost (Rs)	Premium Paid (Rs)	Claim settlement expenses (Rs)	Other Procedural Formalities (Rs)
1.	Maize	2014					
		2015					
		2016					
		2017					
		2018					
2.	Paddy	2014					
		2015					
		2016					
		2017					
		2018					
3.	Wheat	2014					
		2015					
		2016					
		2017					
		2018					
4.	Barley	2014					
		2015					
		2016					
		2017					
		2018					

23) Crop compensation received by the farmers for maize

Sr.No.	Particulars	Year	Maize	Paddy	Wheat	Barley	Remarks
1.	Loss in yield	2014					
		2015					
		2016					
		2017					
		2018					
2.	Indemnity level	2014					
		2015					
		2016					
		2017					
		2018					
3.	Compensation received	2014					
		2015					
		2016					
		2017					
		2018					
4.	Difference (3-2)	2014					
		2015					
		2016					
		2017					
		2018					

24) Vigilance for availing

Sr.No.	Particulars	Remarks
1.	Do you enrol timely for crop insurance?	Y/N
2.	Are you aware about the cutoff date of enrollment?	Y/N
3.	Do you report the losses on time?	Y/N
		Within 48 hours
		Within 7 days
		Within 15 days
		Within 1 month
		Within 3 months
4.	Is loss assessment done on time?	Y/N
		Within 48 hours of reporting
		Within 7 days of reporting
		Within 15 days of reporting
		Within 1 month of reporting
5.	Do you pay your part of premium on time?	Y/N/Left

25) Perceptions regarding crop insurance

Sr.No.	Particulars	Remarks
i.	Potent tool to manage risk?	
ii.	Difficulties in applying	
iii.	Particular group benefitted (large/medium/small farmer)	
iv.	Risks covered are not of interest	
v.	Time for claim settlement too long	
vi.		
vii.		
viii.		
ix.		
x.		

26) Problems

Sr. No.	Particulars	Remarks
i.	Lack of awareness	
ii.	Procedural complexities	
iii.	High premium rate	
iv.	Risks covered not of interest	
v.	Provisions do not address practical problems	
vi.	Wide variation between the yields of actual farm and crop cutting experiment	
vii.	Delayed settlement of insurance claims	
viii.		
ix.		
x.		
xi.		

Brief Biodata of the student

Name	**:**	Ms. Sonal Dhiman
Father's Name	**:**	Sh. Surinder Kumar
Mother's Name	**:**	Smt. Kamlesh
Date of Birth	**:**	February 23rd, 1997
Permanent Address	**:**	Vill. Mundla, P.O. Sunehar, Teh Nagrota Bagwan, Distt. Kangra, H.P., 176056

Academic Qualifications:

Examination passed	**Year**	**School/Board/ University**	**Marks (%)**	**Division**	**Major Subjects**
10th	2013	CBSE	95%	First	General
10+2	2015	CBSE	88.47%	First	English, Physics, Chemistry, Biology and Physical Education
B.Sc. (Hons.) Agriculture	2019	CSKHPKV-Palampur	79.4%	First	All Agriculture and allied subjects
M.Sc. (Agricultural Economics)	2021	CSKHPKV-Palampur	86.9%	First	Major: Agricultural Economics Minor: Agronomy