Research Report Series: 136



Project Report on Demonetisation and Its Impact on Indian Agriculture: A Critical Analysis

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Research Team:

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March 2022

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ISBN: 978-93-91412-16-6

First Edition: March 2022

Published by:

National Institute of Rural Development and Panchayati Raj, Hyderabad Ministry of Rural Development, Government of India, Rajendranagar, Hyderabad - 500030 nirdpr.org.in

FOREWORD

The Government of India has announced demonetisation to improve the country's economy by reducing corruption and fake notes. It has put a short-term discomfort on the country's economy, especially the agricultural sector. The Goods and Service Tax all over India has also added to the short-term discomfort on the country's economy. The study by the Centre for Natural Resources Management, Climate Change and Disaster Management (CNRM, CC&DM) and the Centre for Entrepreneurship Development & Financial Inclusion (CEDFI), a first-of-its-kind, focuses on the impact of demonetisation on agricultural sector and financial inclusion atthe household level. It also investigated the short and long term effects of demonetisation on farming households, who are more vulnerable to the harmful impacts of such a policy given their basic, financial and digital literacy levels, are at a negligible level.

The study methodology and key results on demonetisation impacts on agriculture will be highly relevant to the students, researchers and policymakers for future strategies. The suggestions on essential plans for transactions through agricultural produce market committee, procurement of produce by government, improved awareness on digital transactions and enhancing security systems are worthwhile to improve the agricultural transactions.

I appreciate the valuable contribution of Dr. Krishna Reddy Kakumanu, Associate Professor, CNRM, CC&DM, for conducting the study and bringing out the impacts of demonetisation on the agricultural sector in India. I also appreciate the research team of CNRM, CC&DM and CEDFI for conducting the research study and highlighting the recommendations, which are useful for further policy decisions. I also thank the agricultural departments from the study States, SIRDs and farmers for sharing their experiences and cooperating during data collection. I hope the report will be received well by one and all.

endra Kumar)

Dr. G Narendra Kumar, IAS Director General, NIRDPR, Hyderabad

Hyderabad, March 2022

PREFACE

Demonetisation was a significant step taken by the Government of India on November 8, 2016 to control black money, fake notes and fight against corruption & terrorism. The demonetisation policy has put pressure on the country's economy. As a result, the normal economic life was disrupted and brought to a standstill, which has created significant disruption throughout the economy. In fact, the demonetisation adversely affected all sectors of the economy without any exception. But the rural economy, particularly the agriculture sector, was gravely impacted since much of the transactions in the rural areas are in cash mode. The entire agricultural value chain was disturbed as the agricultural transactions mostly occur in cash mode at the farm gate and local markets. The farmers could neither purchase inputs nor exchange old currency notes as many didn't have bank accounts.

As the impact evaluation studies on the theme of demonetisation and its impact on the farmers' households in the agriculture sector are very few, the Centre for Natural Resources Management, Climate Change and Disaster Mitigation (CNRM,CC&DM) at the behest of National Institute of Rural Development and Panchayati Raj (NIRDPR), Ministry of Rural Development, Government of India, conducted the study to investigate the short and long term effects of demonetisation on the farming households. The study's primary objective was to evaluate the impact of demonetisation on agriculture and allied activities in India. The analytical result of the study conducted in the States of Maharashtra, Telangana and Uttar Pradesh has drawn farmers' experiences and analysed the coping strategies adopted by them after demonetisation. The study also evaluated the extent of digitalisation of transactions adopted by farmers and its impact on financial inclusion.

First and foremost, we are thankful to Dr. W. R. Reddy (IAS), the Ex-Director General and Mrs. Radhika Rastogi (IAS), Ex-Deputy Director General, National Institute of Rural Development and Panchayati Raj, Hyderabad, for their kind support in the completion of the research study.

We are deeply grateful to all farmers of Maharashtra, Telangana and Uttar Pradesh for their valuable responses while conducting the study. We also thank the Assistant Director of Agriculture and Agricultural Officers from Mahabubnagar and Nalgonda districts of Telangana for their time and valuable inputs during the field study. We particularly thank the State Institutes of Rural Development (SIRD) in Uttar Pradesh and Maharashtra for extending their support in identifying

the agricultural intensive mandals and villages. We also thank the officials of State Bank of India and Syndicate Bank from the study States for sharing valuable inputs on the impact of demonetisation.

We share our gratitude to Dr. Siddayya, Professor, University of Agricultural Science, Bengaluru, who formerly worked as Associate Professor at NIRDPR, for securing approval to conduct the study. We also thank Mrs. Mobina, Project Assistant for joining the project to collect required data from the selected States, villages and farmers. Last but not least, we place on record the valuable contribution made by CNRM, CC&DM and CEDFI staff members in the completion of the report.

Hyderabad, March, 2022 Research Team CNRM,CC&DM & CEDFI NIRDPR

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ABBREVIATIONS					
АРМС	: Agricultural Produce Market Committee				
АТМ	: Automated Teller Machine				
CEDFI	: Centre for Entrepreneurship Development & Financial Inclusion				
CNRM, CC&DM	Centre for Natural Resource Management, Climate Change and Disaster Management				
DBT	: Direct Benefit Transfer				
e-NAM	: electronic-National Agriculture Market				
FAO	: Food and Agriculture Organization				
FGD	: Focus Group Discussion				
FPO	: Farmers Producer Organization				
GDP	: Gross Domestic Product				
GVA	: Gross Value Added				
IFMR	: Institute for Financial Management and Research				
КСС	: Kisan Credit Card				
MSP	: Minimum Support Price				
NABARD	: National Bank for Agriculture and Rural Development				
NIRDPR	: National Institute of Rural Development and Panchayati Raj				
OBC	: Other Backward Class				
PM-KISAN	: Pradhan Mantri Kisan Samman Nidhi				
PoS	: Point of Sale				
RBI	: Reserve Bank of India				
SC	: Scheduled Caste				
SPSS	: Statistical Package for the Social Sciences				
ST	: Scheduled Tribe				
UPI	: Unified Payments Interface				

EXECUTIVE SUMMARY

The Government of India announced demonetisation on 8th November 2016 by withdrawing the legal tender status of Rs.500 and Rs.1000 currency notes. The main objectives of the demonetisation were curtailing the shadow economy and reducing the use of counterfeit cash to fund terrorism and illegal activities. In the three or four months after the announcement of demonetisation, the economy went through a severe shortage of currency, which resulted in largescale mismanagement of monetary economic policy by the government. Given the currency squeeze created due to demonetisation, the cash-intensive sectors were primarily most affected by the demonetisation policy and the agriculture sector in India is one among them. Demonetisation subjected the economy and millions of people, particularly the farmers in the agriculture sector, to undesirable effects. Research studies on the household level impact of demonetisation on the agriculture sector are somewhat limited. Therefore, at the behest of National Institute of Rural Development and Panchayati Raj (NIRDPR), Ministry of Rural Development, Government of India, the Centre for Natural Resources Management, Climate Change and Disaster Management (CNRM, CC&DM) in coordination with the Centre for Entrepreneurship Development and Financial Inclusion (CEDFI) conducted the study to investigate the short and long-term effects of demonetisation on the agriculture and allied activities. In addition to assessing the extent of impact of demonetisation on agriculture and allied activities, the study assessed the coping strategies for farm activities adopted by the farming households after demonetisation. Finally, the study evaluated the extent and degree of digitalisation of transactions adopted by the farmers and its consequent impact on financial inclusion among them after demonetisation.

The study team collected primary and secondary data from three States, viz. Maharashtra, Telangana and Uttar Pradesh owing to a dominant farming population across the country. The primary data was collected from 600 households, covering three States, six districts, 12 mandals and 24 Gram Panchayats, using stratified random sampling for each stage of the sample selection.

The results from the study revealed the existence of a large number of illiterates (>33 per cent), especially in Telangana and Uttar Pradesh, which can be challenging to make necessary bank transactions to the households. The post-stratified data also showed that majority of the sample are marginal farmers (58 per cent), followed by small farmers (28 per cent). Due to illiteracy and security issues, most farmers have bank accounts to receive direct benefit transfers with limited transactions.

The major crops grown in the study States during Kharif season are paddy, maize, jowar, cotton, sugarcane, vegetables, soybean, moong, groundnut and flowers. In Rabi season, wheat, paddy, red gram, castor, vegetables and sugarcane are cultivated. Mint and sugarcane are grown in the summer season in Uttar Pradesh. The number of farmers cultivating perishable produces is low in the study sample across the States; however, they are affected due to lack of cash in the market during the period. The prices of other produces also went down due to lack of money and traders in the villages as well as market. It is noticed that farmers cultivating paddy, maize, cotton, castor, sugarcane, saffron, soyabean and bajra suffered a loss of 10-15 per cent compared to standard market prices. Farmers also lost time searching for money to purchase inputs at higher interest rates through alternate options (lending) as banks could not disburse the new currency notes on time. No change in the payment mode was observed before and after demonetisation for fertilisers, labour and machinery services. It took two weeks for the buyers to pay money for the produce received from farmers. During demonetisation, the maintenance of the livestock (cattle) was also challenging in terms of secondary source of income and providing feed to the cattle. Farmers (45 per cent) received money after one-two months during the demonetisation. Providing feed by the Department of Animal Husbandry during such situations would help the farmers to overcome the short-term losses and livelihood challenges.

About 94 per cent of the farmers are not adopting digital transactions for agricultural activities/ payments. There is no difference in the mode of transactions before and after demonetisation, which shows that cash plays a significant role in rural areas. The demonetisation created a fear of non-availability of cash in the banks and ATMs. This prompted the people to keep sizeable amount of cash at home to meet emergency requirements. Around 62 per cent of the farmers agreed that they kept cash at home for emergency purposes. In the long term, the demonetisation move was envisaged to bring transformational changes in the agricultural sector, like better access to institutional assistance/direct benefit transfers/subsidies and digital literacy, apart from creating awareness on electronic banking channels like Paytm and Rupay Cards among the farmers, and thereby accessing higher credit. Seventy-one per cent of the respondents opined that demonetisation did not result in accessing higher credit by the farming community from banks/ financial institutions. As per the result of the linear regression, the demonetisation move has resulted in a negative shift on market prices and area sown. Hence, the government should undertake meticulous care and planning in terms of procurement, pricing and input applications for cash-intensive sectors like agriculture before implementation.

1. INTRODUCTION

On the late evening of November 8, 2016, the Government of India announced demonetisation¹of two widely circulated denominations of the Indian Rupee – Rs.500 and Rs.1000 currency notes. As a result, about 86 per cent of the money (equivalent to Rs.15.45 lakh crore) was suddenly withdrawn from circulation in the economy. In India, approximately 90 per cent of financial transactions are made in cash and over 85 per cent of workers are paid in cash. As a result, the normal economic life was disrupted and brought to a standstill for a couple of months after the announcement of demonetisation (Gurav, 2020). The announcement of demonetisation was followed by prolonged cash shortages at least for three months, which created a significant disruption throughout the economy (The Economist, 2016). Consequently, people seeking to exchange their currency notes had to stand in long queues before Automated Teller Machines (ATMs)/banks and faced several hardships.

The Indian government had demonetised currency notes on two prior occasions—the first time in 1946 and later in 1978—the goal was to combat tax evasion through "black money" held outside the formal economic system. In 1978, the Janata Party coalition government demonetised currency notes of Rs.1,000, Rs.5,000 and Rs.10,000 (The Indian Express, 2018). When the government announced demonetisation for the third time in 2016, the main intention was to curtail the shadow economy and reduce the use of counterfeit cash to fund terrorism and illegal activities (India Today, 2016). The very first objective of the demonetisation was to safeguard the interests of ordinary persons from counterfeit notes. Besides, counterfeit notes have been used for antinational (terrorism) and illegal activities (hoarding). As India remained a cash-based economy, the circulation of counterfeit notes became a menace (RBI, 2017). Other stated objectives of the demonetisation included expanding the tax base, thereby increasing the number of taxpayers, moving towards a 'less-cash economy' through digital transactions and formalising the informal economy.

One may note that India's GDP growth rate had been growing strongly post 2000, buoyed by economic reforms, reaching a historic high of 8.26 per cent in 2016. The World Bank report released on May 29, 2017 stated that the fundamental of the Indian economy was strong, and India remained the fastest growing economy in the world. It also mentioned that the implementation of GST was expected to yield substantial growth dividends for the Indian economy in the long term

¹Demonetisation refers to 'scrapping' old currency notes and replacing them with new ones by the government. In other words, the old currency notes lose their status as legal tender, store of value, etc., on account of demonetisation.

(World Bank, 2017).

However, like a bolt from the blue, the demonetisation adversely affected all sectors of the economy without any exception. Its deleterious impact was evident from the decline in the growth rate of real gross domestic product, as depicted in Figure 1.1.





During 2018-19, India's GDP growth rate further plummeted to 6.12 per cent on account of various factors, including the drawdown of inventories by companies driven by the forthcoming implementation of Goods & Services Tax in July 2018 (Business Standard, 2017). Here, it is pertinent to observe the contribution of agriculture to India's GDP, which is shown in Figure 1.2.





*Agriculture sector's share comprises Agriculture, Forestry & Fishing Source: MoSPI (2020). National Accounts Statistics 2020.

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It is seen from Figure 1.2 that the contribution of agriculture to India's GDP has been continuously declining since 2012-13. The impact of demonetisation on agriculture can be better captured by the growth rate of Gross Value Added (GVA) for the agricultural and allied sectors from 2012-13 onwards, as shown in Figure 1.3.





As per Figure 1.3, the growth rate of GVA in agriculture and allied sectors was at 6.36 per cent during FY 2016-17, which was the highest recorded during the last decade. In FY 2016- 17, the sector achieved a record level of crop production after two consecutive periods of drought and crop failure. A good monsoon aided by favourable weather conditions shielded the agriculture sector and did not let the demonetisation drastically impact the recorded growth in agricultural GVA during FY 2016-17. However, the snowballing effect of demonetisation set in motion, which resulted in decreasing the growth rate of GVA in the farm sector from 6.36 per cent in FY 2016-17 to 2.35 per cent in FY 2018-19 (Ministry of Finance, 2019).

In this context, the World Bank predicted that demonetisation would have a disproportionate impact on poorer households in general, and informal sector in particular. It also mentioned that the positive impact of the monsoon substantially dampened the agriculture sector due to the disruption caused by demonetisation (World Bank, 2017).

Given the currency squeeze created by demonetisation since November 9, 2016, primarily the cashintensive sectors were most adversely affected. Agriculture is one of the informal sectors wherein the basic mode of transaction for various activities is cash (Kohli, 2016). Further, agriculture is the largest employer (55 per cent; both direct and indirect) in India, providing livelihoods to almost 263 million people in India (Ministry of Agriculture & Farmers' Welfare, 2016).

The government announced demonetisation in mid-November, i.e., during the harvesting season of Kharif and at the beginning of the Rabi season. This is when the farmers sell their produce and receive cash to buy seeds, fertilisers, etc., for the ensuing Rabi season. As demonetisation was an unforeseen policy intervention, several farmers had insufficient cash to purchase seeds, fertilisers, and meet wage expenses required for the plantation of Rabi crops usually sown during mid-November. Therefore, the agriculture sector faced liquidity constraints due to demonetisation, which slowed the progress of harvesting and trading activity (FAO, 2016). As such, farmers conducted protest rallies across the country against the demonetisation and restrictions imposed by the Reserve Bank of India (RBI) on district cooperative central banks, which were ordered not to accept or exchange the demonetised currency notes (Gupta, 2016).

Thus, the unexpected shortage of cash led to a plunge in demand for agricultural produce/ commodities, which in turn, led to a crash in the prices of crops. The farmers were unable to recover even the costs of transportation from the low prices offered for their produce (Apparasu et al., 2016) and dumped produce as part of their protest against the government. Besides, demonetisation resulted in relative erosion of agricultural wages and bargaining power of the farmers for their produce (Kishore, 2018).

In the short term, the entire agricultural value chain was disturbed as the farmers could neither purchase inputs nor exchange old currency notes as many of them did not had bank accounts. Anecdotal evidence suggests distress sales and large scale wastage of perishable commodities like fruits, flowers, and vegetables during the post-demonetisation period. Farmers could not hire labourers and lease farm machinery for want of cash/currency notes (Singh & Prajapati, 2020). Access to finance by the farmers both from institutional and non-institutional sources to undertake agricultural operations were on the lower side during the period of demonetisation. This, in turn, affected the agricultural labour income (Kohli, 2016; Raju & Satyanarayana, 2016).

Nevertheless, demonetisation through digital means has the potential of bringing about transformational changes in the agricultural sector like better access to credit, crop insurance facilities, elimination of middlemen, direct benefit transfers (DBT) to farmers, and ultimately linking the Indian farmer to the global agri-value chains. An essential condition for that is financial inclusion and internet penetration in rural India. In fact, there was an improvement in the rural households' financial savings post demonetisation (RBI, 2017). World Bank was also of the opinion that demonetisation can accelerate the formalisation of the economy in the long term, leading to higher tax revenue and greater digital financial inclusion in rural India (World Bank, 2017).

By the end of March 2018, the currency in circulation (CIC) was more than the CIC level before demonetisation (i.e., 101.3 per cent) (RBI, 2017). Demonetisation invalidated Rs. 15.45 lakh crore worth of currency in circulation, but the statistics from RBI show that 99.09 per cent (Rs. 15.31 lakh crore) of those currency notes were returned to the banking system (EPW, 2017). In other words, only 1 per cent of the notes did not come back into the system. Hence, the demonetisation was considered a political decision rather than an economic one (Business Line, 2017) (please refer to Box 1.1 for further details). On the other hand, demonetisation subjected the economy and millions of people, particularly the farmers in the agriculture sector, to harmful effects. To examine those aspects, there is a need to investigate the impact of demonetisation on farming households through a cross-sectional study.

Research studies on the household level impact of demonetisation on the agriculture sector are somewhat limited. Most of the existing studies in this area lack considerable focus on empirical data, which the current study tries to address. Therefore, the primary objective of the study is to evaluate the impact of demonetisation on agriculture and allied activities in rural India. Specific objectives of the study are:

- 1. To assess the impact of demonetisation on agriculture and allied activities at the household level in select Indian States, namely Maharashtra, Telangana and Uttar Pradesh (UP);
- 2. To study the coping strategies adopted by farmers after demonetisation; and
- 3. To evaluate the extent of digitalisation of transactions post-demonetisation, adopted by the farmers and its consequent impact on financial inclusion

The rest of the study is organised in the following way. While Chapter Two is devoted to review of literature, Chapter Three delineates the methodology used for the study. An empirical analysis of the impact of demonetisation on the farmers is furnished in Chapter Four. The report concludes by highlighting the salient findings and suggestions made with policy implications.

Box 1.1: Economic Survey on Demonetisation

Economic Survey 2016-17 assessed the impact of demonetisation by the government. The survey discussed the short-term as well as medium-term economic impact but steered away from broader issues like effect on informal economy, cash-intensive sectors, job losses, especially among the informal workers, impact on income and consumption patterns, etc.

The survey identified the increase in digital payment methods among individuals as the major marker of the success of demonetisation announced in November 2016. The shift in the demonetisation's narrative from reducing corruption and black money and neutralising counterfeit currency to a *"less-cash"* society had become the focus area of the Union Budget for FY 2017-18. In addition to the accelerated shift towards digitisation of transactions, the survey identified a reduction in cash-GDP ratio, an increase in the number of income taxpayers and the amount of tax collected as the positive outcomes of demonetisation.

The Economic Survey 2016-17 was ambivalent in terms of the significant gains realised from the demonetisation exercise, except it had noted that there would be a drop of 0.25-0.50 per cent in the GDP during the FY 2016-17. The survey further argued that demonetisation in 2016 resulted in subdued economic activity, although such impact was transient in nature. It suggested that the short-term costs associated with the demonetisation should be minimised in order to maximise long-term benefits in terms of increasing the efficiency of the economy arising from the digitalisation of electronic payments.

Source: C Rammanohar Reddy, (2017). Demonetisation and Black Money, *Orient Blackswan Pvt. Ltd.*

2. REVIEW OF LITERATURE

Demonetisation is an economic policy where specified currency notes are ceased to have legal tender status (Dinesh & Reddy, 2018). Demonetisation is not new to the world, and several countries demonetised their currency notes in circulation for various reasons. The European Union is one of the good examples, wherein several nations shifted their currency to Euro with a smooth transition by fixing exchange rates. Australia, Ghana, Myanmar, Nigeria, North Korea, Pakistan, the Soviet Union, and Zimbabwe are some other countries that implemented demonetisation. So far, India has demonetised currency notes on three occasions—once in 1946, later in 1978 and recently in 2016.

After the announcement of demonetisation in mid-November 2016, the Indian economy went through a severe shortage of currency, resulting in large-scale mismanagement of monetary economic policy by the government (The Economist, 2016). According to RBI, the degree of demonetisation's impact varied from sector to sector. The unorganised/informal sector mainly felt the adverse effect, which accounts for 45 per cent of GVA and 82 per cent of total employment (RBI, 2017). The negative impact on the informal sector becomes significant because of its share in the aggregate GDP, the employment it creates, and its fragile nature and inability to sustain shocks. Lahiri (2020) finds that the move over the subsequent three years after demonetisation had limited success in achieving its intended objectives. Disaggregated data suggest that demonetisation did have appreciable costs in terms of lost jobs and output.

It is interesting to observe that food inflation declined from 3.7 per cent to 1.3 per cent, mainly due to demonetisation (during the period from October 2016 to January 2017) (RBI, 2017). Prices of vegetables² saw an unprecedented downturn in August 2016 following significantly higher arrivals in mandis (markets) relative to the seasonal pattern (please refer to Box 2.1 for more information). The loss of momentum intensified during the third quarter in FY 2016-17 with demonetisation and fresh winter crop arrivals (RBI, 2017). There was anecdotal evidence of distress sales by farmers, given the perishable nature of fruits, flowers, and vegetables. Even after November 8, 2016, a vast majority of farmers did not have formal access to financial services and were reeling under a cash crunch. Small and marginal farmers did not have money in hand to make financial transactions related to agricultural operations, which resulted in a fall in the market prices

²Perishable items - primarily vegetables - account for 13 per cent of the food group in Consumer Price Index prepared by RBI.

of commodities in several States. This was due to a mismatch in demand and supply of agricultural commodities leading to an unprecedented level of country-wide farmers' unrest and agrarian distress, particularly among farmers from the States of Telangana, Maharashtra, Andhra Pradesh, Madhya Pradesh, and Karnataka (Parsai, 2018). The data from 3000 regulated markets on 35 commodities show that domestic agricultural trade was displaced by over 15 per cent in the short run settling at 7 per cent after recovery at the end of 90-day period after demonetisation. Trade of perishable commodities was displaced by 23 per cent during the week following demonetisation and recovered slightly during the next three months, mainly on account of lower prices rather than fresh arrivals (Aggarwal & Narayanan, 2017).

Box 2.1: e-Platform for National Agricultural Market (eNAM)

The agricultural market in India is characterised by fragmented, inefficient and frequent price manipulation. Despite the enactment of model Agricultural Produce Marketing (Development and Regulation) Act 2003, the ground reality is that most of the reforms formulated in the Model Act are either diluted or partially implemented in most of the State's agricultural market (mandis). Taking inspiration from the agricultural market model of Karnataka, Prime Minister Narendra Modi had launched the electronic trading platform for National Agriculture Market (e-NAM) on 14th April, 2016. National Agriculture Market (eNAM) is a pan-India electronic trading portal that networks the existing APMC mandis to create a unified national market for agricultural commodities. The initiative is a game-changer for India's agriculture sector as it can offer considerable benefits to the farmers and the economy. It will improve the competitiveness and efficiency of agricultural markets by streamlining the marketing procedures, which will help in providing better price discovery across the integrated markets. But, the full benefit of linking agricultural markets in the country over electronic platforms can be realised when some vital deficiencies, which have a bearing on the conduct and performance of market, are fully addressed and when a farmer gets the option to sell her/his produce in any market throughout the country. Barber Conable, the President of the World Bank between 1986 and 1991, was of the firm opinion that "market forces and economic efficiency were the best ways to achieve the kind of growth which is the most suitable antidote to poverty" (quoted in Thomas & Reader 2001:79). This idea of market forces (viz. the economic factors affecting the price of, demand for, and availability of a commodity) will only lead to improving the efficiency in agricultural markets when the agricultural value chain is strengthened.

Source: Ministry of Agriculture and Farmer's Welfare, GoI (www.enam.gov.in/web/)

The World Bank (2017) concluded that the social impact of demonetisation might be greater than the economic impact. While the macro-economic impact of demonetisation was relatively limited, the distribution of costs was not the same for all the sectors. The informal sector was hit hard as it depended heavily on cash. The World Bank also argued that the poor and the vulnerable, who primarily work in the informal sector, could not shift to non-cash payments and were affected the most due to demonetisation (The Hindu, 2017). To evaluate the impact of demonetisation, the Institute for Financial Management and Research (IFMR) conducted a study in 2017 covering 2,200 low-income households in six States. The study found that demonetisation had a severe harmful effect on the economic and financial lives of the households. The respondents reported close to 20 per cent drop in their household income level immediately after demonetisation. Further, most of the households expressed difficulty in finding employment during the post-demonetisation period. Most of the study respondents were employed in the informal sector that relied mainly on cashbased transactions. They also reported delays in payment of wages due to liquidity crunch caused by demonetisation (IFMR LEAD, 2017).

Gabriel et al. (2020) find that some of the Indian districts experienced cash shortage of at least 2 per cent, contraction in the economic activity, lower growth in bank credit to the extent of 2 per cent, and swiftly adopted alternative payment channels during the 2016 Q4 period. They conclude that the negative effect dissipated during the next few months after demonetisation.

Following the announcement of demonetisation, several newspapers documented the hardships faced by the people, such as mad rush at banks and ATMs to exchange old notes for new ones. Further, the poor people had no access to credit cards or mobile wallets (Biswas, 2016; Roy, 2016). Besides the instances of hospitals refusing old currency notes for payment of the bills and making marriage invitation cards mandatory for withdrawal Rs. 2.5 lakh from bank accounts are some of the documented sufferings faced by the poor (Dash, 2017). The sudden decision of the government to stop accepting currency notes in the denominations of Rs. 500 and Rs. 1000 as legal tender brought in subtle behavioural changes in terms of business transactions. A study found that rural livelihoods were more resilient to the demonetisation shock than urban India. The study reported that rural people resorted to barter trade or procuring goods on credit based on their strong social networks compared to urban India. In contrast, small vendors, petty business owners and wage labourers in cities and urban areas lost their businesses as they are mostly cash-based. The study also found that those who relied largely on bank accounts for daily transactions, without being aware of alternate modes, were impacted the most due to demonetisation (Krishnan et al., 2019). Similarly, a study examined the immediate impact of demonetisation on 200 families living in 28 slums of Mumbai and concluded that the households experienced a drop in consumption and change in their saving pattern, along with income levels in November 2016 (Krishnan & Siegel, 2017).

While demonetisation was expected to have wide ramifications across the economy, the agriculture sector was poorly hit because it heavily depended on cash for daily transactions (Ganesan & Gajendranayagam, 2017). While agriculture accounted for nearly 14.6 per cent of the GDP in 2018, about 70 per cent of the workforce depends on it as their means of livelihood (Govindasamy, 2017; The Economist, 2016). Approximately 85 per cent of land holdings in India belong to small and marginal farmers who possess less than two hectares of land (Choudhury & Sindhi, 2017).

The agriculture sector was affected through the input-output channels as well as price and output feedback effects. The demonetisation announcement created a lot of stress on the agricultural product flow, viz. procurement, sale, transport of goods, marketing and distribution of produce, which are predominantly denominated in cash. Further, the timing of demonetisation was synchronous with the sowing season for Rabi crops and post-harvesting operations of Kharif crops (Kohli, 2016; Singh & Prajapati, 2020). Delay in sowing of crops on account of the challenges in procurement, difficulties in the hiring of labour as well as machinery and unavailability of formal and informal credit disrupted the entire agricultural supply (value) chain that ultimately impacted the arrival and prices of agricultural commodities (Murthy et al., 2019). The decline in the price of most of the agricultural produce had a detrimental effect on the income of the farmers (Ramdurg & Basavaraj, 2016). The farmers resorted to flash sale of perishable commodities – fruits, flowers, and vegetables – due to demonetisation coupled with high seasonal supply in the third quarter of 2016-17 (RBI, 2017).

To face the cash crunch created by demonetisation, the farmers adopted sowing of own seeds, deploying more family labour for farm work, purchasing agro-chemicals on credit at higher interest rates, etc. Though the government subsequently made some relaxations like purchase of seeds using old notes, and permission for withdrawal of cash up to Rs. 2.50 lakh per week against crop loan to encourage Rabi sowing operations, the demonetisation resulted in the strengthening of informal credit market in the rural economy (Dharanipriya & Karthikeyan, 2019).

One of the intended objectives under demonetisation was to encourage a shift from a cashintensive economy to a 'less-cash economy.' Many new savings bank accounts were opened by the poor households in India, as evident from 4.30 crore fresh Prime Minister Jan Dhan Yojna accounts added by public sector banks between November 9, 2016, and November 1, 2017. Within a week of the announcement of demonetisation, deposits in Jan Dhan accounts saw a jump of 41 per cent, and by December 7, 2016, the amount of deposits in these accounts witnessed an increase by 63 per cent (Mangaluru, 2017) (Box 3.1 sheds more light on the Jan Dhan Yojana). Singh & Prajapati 2020 also report that about 15-34 per cent of farmers and 75 per cent of landless labourers opened bank accounts in the central region of Gujarat. The surge in the bank accounts in rural areas was mainly because the farmers were paid for the milk supply via electronic mode only.

Access to financial services was made available through Jan Dhan account to the poor, but the mere opening of the account with a bank does not lead to financial inclusion unless the accounts are frequently used. However, the unexpected shock of demonetisation did bring in a sudden behavioural change through greater usage of electronic transactions, especially digital payments (Kaur, 2017).

Between October and December 2016, debit card transactions at Point of Sale (PoS) terminals and mobile wallets increased by 134 per cent and 163 per cent, respectively. As per the data from RBI, the share of Unified Payment Interface (UPI) in the total electronic retail payments was 22 per cent, followed by Immediate Payment Service (19 per cent), Debit Cards (18 per cent), National Automated Clearing House (12 per cent), National Electronic Funds Transfer (9 per cent), and Credit Cards (7 per cent) in 2019. The number of digital payments also rose from 5.4 in 2016 to 22.4digital transactions per capita per annum by 2019 (Grant Thornton, 2020). As such, the data indicate a shift to a 'less-cash economy' and enhanced level of acceptance of digital payment infrastructure during the post-demonetisation era.

Though the rural banking infrastructure has substantially improved over the years through the presence of banks, ATMs, micro finance institutions, Small Finance Banks and Payment Banks, the digital divide between urban India and rural Bharat continues. The use of debit cards by the rural people has also fluctuated across time, suggesting that the use of digital mode of payments in the villages has not percolated as much as in urban India. Low educational levels, negligible household assets, lack of awareness and basic/financial/digital literacy are some of the constraints highlighted in the literature for low adoption and usage of digital financial services in rural areas (IFMR LEAD, 2017). Nonetheless, the impact of demonetisation on agriculture & allied sectors and its impact on financial inclusion has not been documented in India to the best of the knowledge of the authors, and hence the study.

Box 3.1: Jan DhanYojana, Aadhaar and Mobile number (JAM Trinity)

The term JAM, mentioned for the first time in the Economic Survey 2015-16, refers to Jan DhanYojana, Aadhaar and Mobile as enablers for the State to transfer financial resources to the poor in a progressive manner without leakages and with minimal distorting effects. The key objective of the Government of India is to enforce direct benefit transfers (DBT) on a large scale. JAM, a model that involves the integration of Jan DhanYojana, Aadhaar and mobile technology, would be instrumental for the government in implementing DBT on a large scale. The economic survey highlighted the need for further reforms in the agriculture sector and opined that farmers could be empowered through streamlining the subsidies. The survey suggested that the JAM Trinity — Jan Dhan, Aadhaar, Mobile — can help the government implement them. Until now, the government had operated a multitude of subsidy schemes to improve the economic lives of India's poor. There were subsidies on food, power, fertilisers and oil that costed the exchequer quite a bit in terms of a higher fiscal deficit. According to the Economic Survey, about ₹3.78 lakh crore or 4.2 per cent of GDP was spent on key subsidies, and most of it was squandered away through the inefficient distribution of subsidies (leakages, corruption, hands of intermediaries). This is where the JAM trinity can streamline the subsidy. With Aadhaar providing the biometric identification and Jan Dhan accounts linked with mobile phones allowing direct transfer of funds, it is possible that JAM trinity will check subsidy leakages. In the long run, lower subsidies and fiscal deficit will result in better credit standing for India. Therefore, the JAM trinity holds the key for reforms in the agriculture sector and transforming Bharat.

Source: Economic Survey 2015-16.

3. RESEARCH METHODOLOGY

Though many research studies are available on demonetisation, impact evaluation studies in the context of demonetisation and its impact on the farmers' households in the agriculture sector are very few. To the best of the knowledge of the authors, it is the first research study with empirical data on this theme. At the behest of National Institute of Rural Development and Panchayati Raj (NIRDPR), Ministry of Rural Development, Government of India, the Centre for Natural Resources Management, Climate Change and Disaster Management (CNRM, CC&DM) in coordination with the Centre for Entrepreneurship Development and Financial Inclusion (CEDFI) conducted the study to investigate the short and long term effects of demonetisation on the farming households, who are more vulnerable to harmful effects of such a policy given their basic, financial and digital literacy levels are at a negligible level.

Study Area

The study covered three States from India, namely Maharashtra from the Central region, Telangana from the Southern region and Uttar Pradesh from the Northern region. It is interesting to note that the agriculture sector plays a vital role in all three study States. While Maharashtra and Telangana are among the top two States in terms of farmers' distress (number of farmers' suicides) in India, Uttar Pradesh accounts for the largest number of farmers (23.82 million) in India according to the 10th Agricultural Census 2015-16. Further, two successive years of drought (2014, 2015) took a heavy toll on the farm sector, adding to the farmers' distress across the country. The information related to the numbers of farmers and farmers' suicides and the corresponding rank of the sample States is given in Table 3.1.

S. No.	Name of the State	Numbers of Farmers in 2015-16 in millions (Rank)	Numbers of Suicide Committed by Farmers in 2015-16 (Rank)	
1.	Maharashtra	14.71 (3)	3,030 (1)	
2.	Telangana	5.94 (11)	1,358 (2)	
3.	Uttar Pradesh	23.82 (1)	26 (9)	

Source: National Crime Records Bureau, 2015 (https://ncrb.gov.in) 10th Agricultural Census 2015-16 (http://agcensus.nic.in)

Note: value in parenthesis indicate the corresponding rank of the sample States

It is clear from Table 3.1 that, as per the National Crime Records Bureau, the number of (farmers) suicides in Maharashtra (3,030) was the highest, followed by Telangana (1,358) in 2015. In Uttar Pradesh, the reported number of suicides was 26, perhaps due to underreporting (Tripathi et al., 2015). Incidentally, Uttar Pradesh conducted its general elections during February – March 2017, and Maharashtra conducted its local body elections between November 28, 2016, and January 8, 2017. Hence, the study assumes significance in this context too.

Collection of Data

As part of the study, primary data was collected from the farmers through a semi-structured questionnaire. Pre-testing of questionnaire was administered during September/October 2018 before actual data collection, which helped in crystallising the questionnaire. Focus Group Discussions (FGDs) with the officials of State/district level and secondary data on agriculture in the study States helped finalise the study sample. To collect primary data, field surveys were undertaken in three sample States, namely Maharashtra, Telangana and Uttar Pradesh, from November to December 2018. Primary data was collected from 200 farmers from each State, i.e., a total sample of 600 farmers from three study States, through stratified random sampling method.

The sampling criteria employed in the study are as follows. Two districts from each study State were selected, and from each district, two mandals were identified for the study through random sampling method. Subsequently, from each mandal, two villages were selected, and from each village, 25 samples (farmers) were randomly selected. Thus, a total sample size of 600 farmers was selected for the study randomly. Thus, the total sample size = 3 States * 2 districts * 2 mandals * 2 villages * 25 farmers = 600. The details of sampling are given in Table 3.2.

S. No.	Particulars	Description		
1	State	Three states (Maharashtra, Telangana and Uttar Pradesh)		
2	District	Two districts from each state (Total 6 districts)		
3	Mandals	Two mandals from each district (Total 12 mandals)		
3	Villages	Two villages from each mandal (24 villages)		
4	Sample Size	600 farmers (25 from each village)		

Table 3.2: Selection of Sample

Besides, secondary data on geographical area, gross cropped area, net sown area, cropping intensity, percentage of area under food and non-food crops, number of marginal and small holdings, etc., were collected district-wise from the three sample States (Annexures I, II and III). The districts which have higher net sown area, gross cropped area, area under foodgrains, small holding farmers, commercial crops and cropping intensity were considered for the study. The block/mandals and villages were selected based on intensive agricultural areas as per the information provided by the Agricultural Departments and State Institutes of Rural Development. The details of sampling areas are provided in Table 3.3 and Figure 3.1.

State	District	Block/Mandal	Villages	Latitude	Longitude	
1. Telangana						
	Mahbubnagar	Nawabpet	Lokirev	16.912066	78.062432	
			Yanmangadla	16.884210	78.033312	
		Utkoor	Peddaporla	16.623278	77.599338	
			Bijwar	16.6017020	77.5360020	
	Nalgonda	Miryalaguda	Ailapuram	16.884113	79.509097	
			Nandi padu	16.874275	79.536803	
		Thipparthy	Gaddikondaram	17.02597	79.22579	
			Thipparthy	17.018570	79.412791	
2. Maharas	htra					
	Pune	Junnar	Nimdari	19.136230	73.906037	
			Sawargaon	18.544802	73.5922409	
		Haveli	Shrirampur	18.355606	73.841130	
			Shivapur Wada	18.341038	73.839137	
	Ahmednagar	Newasa	Vadalabahiroba	19.430929	74.905961	
			Kharwandi	19.437199	74.889974	
		Parner	Walawane	18.957390	74.553146	
			Shahjapur	19.0206797	74.5157654	
3. Uttar Pra	adesh					
	Sitapur	Pahla	Launa	27.359427	81.024990	
			Firozpur	27.295213	81.041825	
		Mahmudabad	Madaripur	27.286299	81.074355	
			Nathupur	27.315724	81.073619	
	Lakhimpur Kheri	Lakhimpur	Adampur	27.965647	80.647516	
			Kaimahra	27.969826	80.632564	
		Bhejam	Tharia	27.878964	80.671011	
			Nagra	27.9123839	80.5838004	

Table 3.3: Demonetisation Study States, Districts, Blocks and Villages

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Figure 3.1: The States in which the study was conducted

Analytical Framework

Based on the data collected as explained in the previous paragraphs, a critical analysis was made regarding demonetisation and its impact on agricultural households in the study States. Essentially, cross-sectional analysis was done to identify similarities and differences across different States. The effect of the demonetisation was evaluated by quantifying loss with respect to income, time, opportunities, etc. The study used suitable statistical tools like mean, standard deviation, percentages, linear regression, etc. The Statistical Package for the Social Sciences (SPSS) software was used for processing the data.

Scope of the Study

The study evaluated the impact of demonetisation on agriculture and allied activities in rural India in general, and Maharashtra, Telangana, and Uttar Pradesh in particular. The analytical results have drawn the experiences of farmers and studied the coping strategies adopted by them after demonetisation. In this context, the study also evaluated the extent of digitalisation of transactions adopted by farmers and financial inclusion. The study's outcome is expected to facilitate the framing of adequate policies for fostering the digitisation of transactions in agricultural activities. Most importantly, the study had documented the extent of digitalisation. Further, the coping/ survival strategies adopted by the farmers, with respect to their agricultural/business operations, during demonetisation may serve as useful tools for training and capacity building activities of the stakeholders.

Limitations of the Study

The study has the following limitations:

- The study on demonetisation and its impact on the Indian agriculture sector is limited to just three Indian States, namely Maharashtra, Telangana, and Uttar Pradesh; as such, it is not a pan-India study;
- As the present study was conducted during November/December 2018, i.e., after two years of the announcement of demonetisation, by seeking opinions/perceptions of the farmers on various aspects of demonetisation and its implications on their daily lives, including agricultural operations, the respondents might have recalled issues while answering the questionnaire;
- In order to obtain a ringside view, the study was unable to collect the information from the managers/officers of cooperative societies or banks in rural areas, who form part of important stakeholders in agriculture and allied sectors.



4. RESULTS AND DISCUSSION

The study aims to provide insights into the impact of demonetisation on the farmers' households by collecting primary data on key indicators like usage of banking/financial services for agricultural activities, opportunities and challenges, their copping strategies, and alternative methods adopted by them. Further, the research design captures changes in farming households' financial and economic behaviour caused by demonetisation. Primary data was collected during Nov-Dec 2018 from a sample of 600 farmers using a questionnaire spread across the three sample States, namely Maharashtra, Telangana and Uttar Pradesh. The following paragraphs explain the details of the sample, the profile of respondents and their responses to various questions posed by the research team through a schedule.

Sample Demographics

The details of the household characteristics of the sample are given in Table 4.1. The sample covers young and old farmers with age profiles ranging from a minimum age of 18 years to maximum age of 90 years. The average age of the respondents in the total sample is 48.6 years, with a standard deviation of 13.3 years. The average age of the respondents across the three sample States was similar to each other ranging from 47 to 51 years. The average family size of the respondents across the three sample States ranged from 5-6, with male farmers (92.16 per cent) forming the majority compared to female farmers (7.84 per cent).

Further, farm experience across the sample States ranges from 25 to 30 years (most productive age) and has a significant bearing on the resource management of farmers and strategies adopted during a crisis situation like demonetisation. The financial management of the households also depends on their community and standard of living. The average farming experience of the sample household across the three States is close to 28 years.

			(I)	gures in 70j
Particulars	Maharashtra	Telangana	Uttar Pradesh (UP)	Total
1.Average age of farmers (in years)	48.20 (13.30)	46.70 (12.70)	50.80 (13.70)	48.60 (13.30)
2. Family size of farmers (No. of Persons)	5.70 (2.90)	4.60 (1.80)	6.40 (3.70)	5.60 (3.00)
3. Male farmers (No.)	194	179	180	553
4. Female farmers (No.)	2	30	15	47
5. Experience of farmers (in years)	28.40 (13.20)	25.10 (11.80)	30.20 (14.40)	27.90 (13.30)

Table 4.1: Household Characteristics of Respondents (Farmers)

(Figures in 0/)

Source: Field Survey (N = 600); values in parenthesis indicate standard deviation.

Table 4.2: Category-wise Classification of Farmers

(Figures in %)

(Figures in %)

State	General	OBC	SC	ST	Total
Maharashtra	77.50	15.50	3.00	4.00	100.00
Telangana	14.50	63.00	12.00	10.50	100.00
UP	17.00	45.50	37.50	0.00	100.00
All 3 States	36.20	41.40	17.60	4.80	100.00

Source: Field Survey {N = 600 (200 farmers each in Telangana, Maharashtra and UP)}

Table 4.2 reports the social categories of sample farmers. In the present study, 36.2 per cent of samples belong to general category, 17.6 per cent to Scheduled Castes (SC), and 4.8 per cent fall in Schedule Tribes (ST) category. However, the majority of the samples, i.e. 41.40 per cent, are from the Other Backward Class (OBC) category.

Table 4.3: Educational Status of Farmers

State	Illiterate	Primary	Secondary	Intermediate	Degree	Total
Maharashtra	15.50	6.00	24.00	30.50	24.00	100.00
Telangana	55.50	6.50	13.00	14.50	10.50	100.00
UP	40.00	17.00	20.00	16.50	6.50	100.00
All 3 States	37.00	9.80	19.00	20.50	13.70	100.00

Note: Primary = 1st to 5th standard, Secondary 6th to 10th, Intermediate = 11th to 12th, Degree = > 13 years of education

Source: Field Survey {N = 600 (200 farmers each in Telangana, Maharashtra and UP)}

The educational status of the farmers is presented in Table 4.3. We notice from Table 4.3 that Telangana had the highest number of illiterate farmers (55.50 per cent), followed by the UP (40.00 per cent) and Maharashtra (15.50 per cent). Of the total sample, 37 per cent of the farmers were illiterate, and 20.50 per cent completed their intermediate education. Among the three States, Maharashtra had the highest number of farmers who completed secondary education and above (78.50 per cent). The level of education of the farmers may have a positive correlation with their financial/digital literacy, financial knowledge & behaviour and household financial management (Hilgert et al., 2003).

Farm size is an important indicator of the availability of land resources—the bigger the farm

size, the better the farmers' chances to have formal land records. Smaller landholdings, in general, are either fragmented landholdings that have been divided among the family members over the years or leased landholdings through an informal arrangement. In 2016, the average size of operational land holding in India was 1.08 ha (decreased from the previous size of 1.15 ha during 2011) (Ministry of Agriculture & Farmers' Welfare, 2016). Over the years, the average landholding size of farmers in India has been dropping, making it challenging to document official land records for such landowners. The absence of such land records does not allow these farmers to access formal credit or be eligible for government benefits such as input subsidies, DBTs, crop insurance claims, etc. Table 4.4 shows the average farm size of the States and the classification of sample farmers in three study States.

State	Average farm size (ha)	Marginal (<1 ha)	Small Farmers (1-2 ha)	Medium Farmers (2.01-10 ha)	Large Farmers (> 10 ha)	Total
Maharashtra	1.34	56.00	25.50	17.50	1.00	100.00
Telangana	1.12	40.50	44.00	15.00	0.50	100.00
UP	0.80	79.00	16.00	5.00	0.00	100.00
All 3 States		58.30	28.50	12.50	0.50	100.00

	Tabl	e 4.4	: Farm	Size	of the	Res	pondents
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(Figures in %)

Source: Field Survey {N = 600 (200 farmers each in Telangana, Maharashtra and UP)}

In the present study, it is observed that 58.30 per cent of the farmers across all three sample States have marginal landholding (i.e. farm size of less than 1 ha), and 28.50 per cent have small farm holdings (farm size of 1-2 ha). Less than 1 per cent of the sample farmers have a farm size of greater than 10ha across all the sample States. Economies of scale may not be realised when small and marginal land holdings are cultivated by individual farmers who don't have collective bargaining power, unlike Farmers Producer Organisations (FPOs). To address these issues, the Government of India passed three landmark Bills in the Parliament during September 2020 regarding Contract farming in agriculture, abolition of the Agricultural Produce Marketing Committee (APMC) and an amendment to the Essential Commodities Act.

Impact of Demonetisation on Agriculture& Allied Sectors

Demonetisation had severe impact on agriculture mainly because its timing was in line with the post-harvesting season of Kharif crops and sowing season of Rabi crops. Demonetisation affected agriculture directly in four ways. These include area sown, cropping pattern, productivity and market price. The trend and pattern in sowing and marketing crops during demonetisation provide valuable insights to discern the negative effect on the agriculture sector (Jaspal & Chand, 2017). When the Indian farmers faced consecutive drought years during 2014 and 2015, the area sown in Rabi season relatively declined. However, Indian farmers witnessed a good monsoon in 2016, which reflected an increase in the area sown in respect of Rabi crops. Table 4.5 shows the State-wise area sown for Rabi crops before and after demonetisation.

State	State 2014-15		2016-17	2017-18
Maharashtra	5796	5552	6494	5185
Telangana	968	681	1275	1389
Uttar Pradesh	12281	11506	12119	12088
All India	62919	61236	63539	62824

Table 4.5: State-wise	Area Sown	for Rabi Crops	('000 ha)
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Source: Indiastat, 2020

It is clear from Table 4.5 that area sown during post demonetisation (2017-18) decreased in India. The study States have also shown reduced area sown except in the case of Telangana. The effect of demonetisation on agriculture is more visible by the distribution of crops sown in Rabi season. According to a report from the Ministry of Agriculture and Farmers' Welfare submitted to the Parliamentary Standing Committee, which was later withdrawn, "millions of farmers in the country were unable to buy seeds and fertilisers for their Rabi crops because of demonetisation" (Kabli, 2018). The distribution of major crops grown in the study States is presented in Table 4.6.

Table 4.6: Season-wise Crops Sown by the Farmers in the Study States

(Figures in %)

Guon	Kharif Seaso	on (before Dei	nonetisation)	Rabi Season (after Demonetisation)			
crop	MH TS UP	UP	MH	TS	UP		
Paddy	17.00	50.50	95.50	0.00	32.00	0.00	
Maize	4.00	18.60	0.00	0.00	4.50	0.00	
Wheat	0.50	0.00	0.00	15.50	0.00	92.00	
Cotton	14.00	23.00	0.00	0.00	0.00	0.00	
Sugarcane	21.00	0.00	0.00	2.00	0.00	0.00	
Other crops	28.00	7.40	0.00	8.50	19.00	0.00	
Vegetables	10.00	0.50	0.00	6.50	0.00	0.00	
No crop	5.50	0.00	4.50	67.50	44.50	8.00	
Total	100.00	100.00	100.00	100.00	100.00	100.00	

Vegetables: Onion, Chilli, Beans, Leafy Vegetables, Beetroot, Tomato, Brinjal; Other Crops: Fruits, Jowar, Ragi, Bajra, Soyabean, Red Gram, Groundnut, etc.

Source: Field Survey {N = 600 (200 farmers each in Telangana (TS), Maharashtra (MH) and UP (UP))}

It is observed from the data reported in Table 4.6 that paddy, maize and wheat (staple foodgrains) are the major crops grown across the three sample States indicating the availability of Minimum Support Price (MSP) along with other extension services before and after demonetisation for these crops. Over 67 per cent and 44 per cent of the farmers, respectively, in Maharashtra and Telangana did not cultivate any crop in the Rabi season mainly due to demonetisation and lack of extension services/government support available to them. However, in UP, only 8 per cent of the respondents did not cultivate any crops in Rabi season. Also, the area sown to paddy crop in Kharif season is higher than Rabi season because of the extra demand for rice cultivation and arrival of monsoon. While cotton was mainly cultivated in Maharashtra and Telangana, only sugarcane was grown in Maharashtra. On average, perishable items like fruits, flowers and vegetables were cultivated by less than six per cent of the farmers across the sample States. The inability of the farmers to recall the crop yields before and after the demonetisation was the main reason for not being able to capture the complete data by the research team. Nonetheless, a modest attempt was made to report on the change in the market prices of the farm produce during demonetisation and the details are presented in Table 4.7.

Сгор	Mean of Normal Price (Rs/qt)	Mean of Actual price during demonetisation (Rs/qt)	Price differential (Rs/qt)
Paddy	866	753	-113 (-13.00%)
Maize	1212	1077	-135 (-11.10%)
Cotton	4362	3698	-664 (-15.20%)
Wheat	1371	1178	-193 (-14.00%)
Sugarcane	197	169	-28 (-14.20%)
Soybean	4530	3841	-689 (-15.20%)
Vegetables	350	260	-90 (-25.70%)

Table 4.7: Normal vs Actual Price Received by Farmers during Demonetisation

Source: Field Survey

Note: % refers to the loss in prices due to demonetisation.

It is evident from Table 4.7 that the average market price of the crops witnessed a secular decline in all the study States by more than 10 per cent. Being perishable commodities, prices of vegetables decreased steeply (25.7 per cent), followed by cotton and soyabean. According to the data available from Agmarknet website, the average daily arrival of tomatoes in mandis of Maharashtra was 48 per cent higher in December 2016 and 51 per cent higher in November 2016 as compared to the corresponding months in the year 2015 (Jaspal & Chand, 2017). The price of perishables critically depends upon a cash-strapped transport sector for daily supply network

(Kohli, 2016). Further, the drop in consumer demand for perishables coupled with fewer footfalls for want of currency in the market resulted in depressing the market prices of commodities/crops during the demonetisation period (Reddy, 2017).

Additionally, the significant impact on the productivity of farms depends on the use of inputs. In agriculture, the input-output channel is predominantly dependent on cash. Farmers use cash to buy quality seeds, fertilisers, chemicals, diesel, and hire labour and machinery (Kohli, 2016). Therefore, disruption in the agricultural supply chain caused by demonetisation negatively affects the sector. The challenges faced by the farmers due to demonetisation are shown in Table 4.8.

State	Purchase of Seeds & Fertilisers	Purchase of chemicals	Payments to Labour	Hiring/Purchasing of machines& tools
Maharashtra	84.00	66.50	89.00	57.00
Telangana	93.50	29.50	68.00	16.00
UP	81.00	42.00	77.50	49.00
All 3 States	86.20	46.00	78.20	41.10

Table 4.8: Challenges Faced by the Farmers during Demonetisation

(Figures in %)

Note: Multiple responses; as such, the figures do not add up to 100;

Source: Field Survey {N = 600 (200 farmers each in Telangana, Maharashtra and UP)}

According to Table 4.8, more than 86 per cent of the farmers across all the study States faced difficulty in purchasing seeds and fertilisers. In addition to this, farmers found difficulty in making payment towards labour (78 per cent), purchasing chemicals for plant protection (46 per cent), purchasing as well as hiring agri-tools and machines (41 per cent). Our findings are in line with the results of Kabli (2018) with respect to challenges faced by the farmers during demonetisation.

Further, it is reported that dealers/traders increased the prices of inputs when the farmers purchased these inputs on credit. More than two-thirds of the sample farmers (68.50 per cent) informed that they had paid up to 15 per cent higher prices on inputs to the traders/dealers during demonetisation. As the quote from John F. Kennedy goes, "The farmer is the only person in our economy who buys everything at retail, sells everything at wholesale, pays the freight both ways" (US President John F. Kennedy at The Jefferson-Jackson Day Dinner, Bismarck, North Dakota, April 11, 1958).

Thus, the delay in purchasing inputs (seeds, pesticides, fertilisers, etc.) and hiring agricultural labour had a negative impact on the farm productivity as the farmers lost time during

the period from November 9, 2016 to March 31, 2017. The details of time lost by the farmers in the sample States are given in Table 4.9.

State	0 - 6 days	7 - 10 days	> 10 days	Total
Maharashtra	21.00	43.00	36.00	100.00
Telangana	8.00	13.00	79.00	100.00
UP	19.50	14.50	66.00	100.00
All 3 States	16.00	23.50	60.50	100.00

Table 4.9: Loss of Time on Farm Activities due to Demonetisation

(Figures in %)

Source: Field Survey {N = 600 (200 farmers each in Telangana, Maharashtra and UP)}

As per Table 4.9, more than 60 per cent of the respondents from all three study States were away from farm-related activities beyond 10 days during the post-demonetisation period. As such, farmers lost prime time during sowing of seeds/application of inputs during Rabi season, which ultimately might have a negative impact on their farm productivity.

In addition to the input channel, demonetisation also disrupted output channels, viz. sale, transport, marketing and distribution of farm produce. The disruption in the agriculture supply chains in the form of fall in sales, increased wastage of perishables, etc., led to lower revenues that showed up as trade dues instead of cash in hand (Kohli, 2016). The challenges faced by the respondents while selling the produce during the demonetisation period are shown in Table 4.10.

Table 4.10: Challenges Faced While Selling the Produce during Demonetisation Period

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State	Low Market Price	No Payments in Market	Produce was not sold	No Transport Facility
Maharashtra	0.00	61.00	67.50	23.50
Telangana	46.50	31.50	2.00	2.50
UP	62.00	0.50	27.50	0.50
All 3 States	36.20	31.00	32.30	8.80

Note: As there are multiple responses, figures in percentage will not add up to 100.

Source: Field Survey {N = 600 (200 farmers each in Telangana, Maharashtra and UP)}

According to Table 4.10, the low market price of the produce (36.20 per cent), produce not being sold (32.30 per cent), and no payment of produce in the market (31.00 per cent) are some of the challenges faced by the respondents during the post-demonetisation period (Rabi season). Besides, some respondents (8.80 per cent) reported the inability to obtain transport facility, which resulted in the wastage of perishables. Even after the sale of produce, farmers received delayed payments from the buyers. It can be seen from Table 4.11 that nearly four-fifths of the farmers across the three study States reported a delay ranging from one to fifteen days in receiving payments from buyers after demonetisation.

State	On the spot transaction	1 to 10 days	11 to 15 days	After 15 days	Total
Maharashtra	4.50	52.50	34.50	8.50	100.00
Telangana	14.00	9.00	21.00	56.00	100.00
UP	40.50	22.00	5.50	32.00	100.00
All 3 States	19.70	27.80	20.30	32.20	100.00

 Table 4.11: Number of Days Taken to Receive Payments from Buyers after Demonetisation

 (Figures in %)

Source: Field Survey{N = 600 (200 farmers each in Telangana, Maharashtra and UP)}

Nearly one-third of the sample farmers (32.20 per cent) reported a delay beyond 15 days while receiving payments from the buyers. This inordinate delay in receipts is more pronounced in Telangana and UP. Traditionally, the Indian farmers have been receiving assistance, in the form of subsidies, through various government schemes to enhance the productivity of their farm land. Subsidies are one of the channels through which government provide financial assistance to farmers. The details on the mode of receipt of subsidies from the government are presented in Table 4.12.

Table 4.12: Mode of Receiving Subsidies Before and After Demonetisation

(Figures in %)

	Before Demonetisation				After Demonetisation			
State	No subsidy	Cash	Bank Account	Others*	No subsidy	Cash	Bank Account	Others*
Maharashtra	20.50	48.00	15.00	16.50	20.00	63.50	9.50	7.00
Telangana	21.50	61.00	16.50	1.00	18.00	68.00	14.00	0.00
UP	0.50	99.50	0.00	0.00	0.50	99.00	0.50	0.00
All 3 States	14.20	69.50	10.50	5.80	12.80	76.80	8.00	2.40

*Distribution of seeds, fertilisers etc. from State Agricultural Department

Source: Field Survey{N = 600 (200 farmers each in Telangana, Maharashtra and UP)}

According to Table 4.12, while nearly 70 per cent of respondents reported that they received subsidies in the form of cash before demonetisation, more than 10 per cent said that they received subsidies directly in their bank accounts. Further, 14.2 per cent of the respondents did not receive any subsidies from the government before demonetisation. Even after demonetisation, the mode of receipt of subsidies was, more or less, similar. It is interesting to observe that Government subsidy, in the form of cash, is very much prevalent during the post-demonetisation era.

Livestock is the secondary source of income to the farming sector. Livestock contributes roughly a quarter of the total agricultural GDP. Farmers sell the cattle milk to realise money from dairy farming as per the fat content. Usually, the farmers are periodically paid by the dairy (i.e., once in a week /10 days/ 15 days/ a month). Managing the farm animals and providing feed to the cattle were important aspects of livestock management during the demonetisation period. For instance, Milma, a leading milk supplier in Kerala, witnessed a surplus of nearly one-and-half lakh litres soon after the Centre withdrew high-value currency notes during November 2016. The demonetisation severely affected the dairy farmers, and most of them did not receive their payments on time. Due to improper payments, farmers found it difficult to purchase cattle-feed, and therefore some of them resorted to selling their cattle.

In the study sample, about 43 per cent of the farmers possessed livestock. As per Table 4.13, around three-fifth of the farmers owning livestock (58.80 per cent) purchased the cattle feed by paying cash, followed by purchasing on credit from local traders (15.10 per cent). While14 per cent of the respondents reported that they prepared their own cattle feed, 8.2 per cent of the respondents indicated that they could not purchase cattle feed due to lack of cash in hand.

State	Cash	Credit from Traders	Own Feed	Barter	Unable to Purchase Feed	Total
Maharashtra	79.60	19.50	0.90	0.00	0.00	100.00
Telangana	7.60	16.90	44.80	12.80	17.90	100.00
UP	83.20	7.00	0.00	0.00	9.80	100.00
All 3 States	58.80	15.10	14.00	3.90	8.20	100.00

(Figures in %)

Source: Field Survey, {N = 258 (71 farmers in Telangana, 107 farmers in Maharashtra and 80 farmers in UP)}

Nonetheless, agriculture, one of the largest informal sectors of the Indian economy, has shown resilience to the detrimental effect of demonetisation mainly due to good monsoon and consequent adequate soil moisture during the FY 2016-17. As such, the GVA output for the agriculture sector was recorded as the highest in 2016-17.

Impact of Demonetisation on Financial Inclusion among Agricultural Households

Saving bank accounts are the means for accessing finance from formal financial institutions. The details of farmers with respect to their financial transactions are presented in Table 4.14. As per this table, all the respondents from UP own a formal savings bank account, the highest among the sample states, followed by Telangana (98.50 per cent) and Maharashtra (97 per cent). However, it is noticed that only 41 per cent of the sample farmers own Automated Teller

Machine (ATM) cards across the three study states. Maharashtra had the highest number of ATM card holders (67 per cent), followed by Telangana (43 per cent) and UP (14 per cent). On average, the respondents across all three study states have been maintaining the savings bank account for more than 12 years. In the present study, only a small proportion of respondents (17 per cent) are Kisan Credit Card (KCC) holders. The maximum number of Kisan Credit Card holders are found in UP (25.5 per cent), followed by Maharashtra (22 per cent) and Telangana (3 per cent). The extremely low percentage of KCC holders in all three study states indicates a lack of awareness about the scheme among the farmers.

State	Holders of Bank Account	Account holding (years)	Holders of ATM Card	Kisan Credit Card Holders
Maharashtra	97.00	10.60	67.00	22.00
Telangana	98.50	9.70	43.00	3.00
UP	100.00	16.50	13.50	25.50
All 3 States	98.50	12.30	41.20	17.00

Table 4.14: Bank and ATM Details of the Farmers

(Figures in %)

Source: Field Survey{N = 600 (200 farmers each in Telangana, Maharashtra and UP)}

Education helps the farmers ensure financial prudence in managing day-to-day financial transactions like regular usage of bank account, cashless transactions under demonetisation and obtaining bank loans for their crops. The education level versus the frequency in the usage of bank accounts for the total sample is shown in Table 4.15.

Pl	Frequency of Bank Account Usage by Farmers					
Education Level	Regular	Once in a While	Never	Total		
Illiterate	16.51	77.94	7.55	100.00		
Primary	22.03	71.18	6.78	100.00		
Secondary	19.64	75.89	4.46	100.00		
Intermediate	30.58	62.81	6.61	100.00		
Degree	41.46	54.88	3.66	100.00		

Table 4.15: Education Level Vs Frequency of Bank Account Usage for Payments

(Figures in %)

Note: Primary = 1st to 5th standard, Secondary 6th to 10th, Intermediate = 11th to 12th, Degree = > 13 years of education.

Source: Field Survey.

It can be seen from Table 4.15 that as the education level went up, the regularity in the usage of bank account also increased. Further, the percentage of respondents who never used bank accounts decreased as the education level was higher except in the case of intermediate.

Similarly, the adoption of cashless/digital transactions for agricultural activities depends on the educational status of the users. The details on adoption of cashless/digital transactions for agricultural activities due to demonetisation are given in Table 4.16.

Table 4.16: Adoption of Cashless/Digital Transactions by the Farmers

(Figures in %)

State	Yes	No	Total
Maharashtra	8.50	91.50	100.00
Telangana	8.00	92.00	100.00
UP	1.50	98.50	100.00
All 3 States	6.00	94.00	100.00

Source: Field Survey{N = 600 (200 farmers each in Telangana, Maharashtra and UP)}

It is understood from Table 4.16 that the adoption of cashless/digital transactions for agricultural activities was the highest in Maharashtra (8.50 per cent), followed by Telangana (8 per cent) and UP (1.50 per cent). In total, less than 10 per cent of the respondents opted for cashless/ digital transactions for agricultural activities, which is a cause for concern. Low adoption of digital transactions for agricultural activities could perhaps be due to no electronic/digital bank accounts, lack of awareness about digital platforms, insecurity of using it, etc. The utilisation of bank accounts for multiple purposes/products is reported in Table 4.17.

			(Figures in %)
State	Deposits	Money transfer	DBT
Maharashtra	91.50	5.50	23.50
Telangana	25.00	8.50	51.10
UP	74.50	8.50	46.50
All 3 States	63.60	7.00	34.30

Table 4.17: Utilisation of Bank Accounts for Multiple Purposes/Products

Note: As there are multiple responses, figures in percentage will not add up to 100 Source: Field Survey {N = 600 (200 farmers each in Telangana, Maharashtra and UP)}

According to Table 4.17, 64 per cent of the respondents report using their savings bank accounts for depositing cash as compared to 34 per cent using bank accounts for DBT transaction across all the three sample states. The usage of bank accounts for money transfers has been relatively very less (7 per cent) across all three states. It is also noted that there is not much difference in the mode of payments before (95.20 per cent) and after (92.50 per cent) demonetisation. In the agricultural sector, cash is still the dominant form of currency for payment of purchases/expenses before and after demonetisation (see Figure 4.1).



Figure 4.1: Payment of Bills*Before and After Demonetisation across all the Sample States *payment towards Land, Property Tax, Electricity, Phone bills, School Fees, etc.

Source: Field Survey {N = 600 (200 farmers each in Telangana, Maharashtra and UP)}

Financial inclusion is the delivery of basic financial services, viz. savings, credit, pension, insurance, and payments to vast sections of the low-income segment. It is a key measure for inclusive growth and gained rapid momentum with the announcement of demonetisation on November 8, 2016. Numerous studies found that demonetisation had a positive impact on financial inclusion by increasing the savings bank accounts, active usage and increase in electronic payment transactions (Kamala Devi & Rajavalli Devi, 2017; Walle, 2017). With a view to examining the access to cash by the farmers after demonetisation, a question was asked in the schedule. Results are depicted in Table 4.18.

Table 4.18: Farmers not having Access to Cash after Demonetisation

State	Yes	Can't say	No	Total
Maharashtra	69.00	8.50	22.50	100.00
Telangana	84.00	11.50	4.50	100.00
UP	90.50	4.00	5.50	100.00
All 3 States	80.00	9.30	10.70	100.00

Source: Field Survey {N = 600 (200 farmers each in Telangana, Maharashtra and UP)}

According to Table 4.18, four-fifths of the respondents agreed that they did not have access to cash after demonetisation. This is notably higher across all the study states. During post-demonetisation, the main alternate methods used by the farmers for purchase of the essential items like vegetables, fruits, milk, groceries, medicines, etc., were taking credit from shopkeepers and borrowing cash from friends and family, according to Table 4.19. In fact, the mode of payment for essential items has mostly been cash-based in the rural areas (Kamala Devi & Rajavalli Devi, 2017; Murthy et al., 2019). Essential goods and services were exchanged by the agricultural households on —Barter System also.

Table 4.19: Mode of Purchase of the Essential Items during Post-Demonetisation

(Figures in %)

(Figures in %)

State	Cashless	Cash Payment	Local Merchants	Health services (Arogyasri scheme)
Maharashtra	3.00	81.50	63.00	0.00
Telangana	6.50	48.50	65.50	11.50
UP	21.50	78.50	53.50	0.00
All 3 States	10.30	69.50	60.60	3.80

Note: Multiple responses; thus the figures in percentage will not add up to 100

Source: Field Survey {N = 600 (200 farmers each in Telangana, Maharashtra and UP)}

According to Table 4.19, it is understood that to make payments for essential items like groceries, milk, medicines, etc., during demonetisation, about 70 per cent of the sample used cash. The main alternate method of payment used was procuring items on credit from local merchants (61 per cent). This is in line with the findings of Singh & Prajapati (2020), who concluded that the rural economy worked on a local credit basis during the demonetisation period. Cashless transactions are found to be negligible (10.30 per cent). The availability of credit from the local merchants for purchasing essential items is given in Table 4.20.

Table 4.20: Availability of Credit from Local Merchants during Post Demonetisation

State	Less than a month	>1 < 3 months	Beyond 3 months	Total
Maharashtra	14.50	79.00	6.50	100.00
Telangana	15.00	52.50	32.50	100.00
UP	41.00	38.50	20.50	100.00
All 3 States	23.50	55.50	21.00	100.00

(Figures in %)

Source: Field Survey {N = 600 (200 farmers each in Telangana, Maharashtra and UP)}

According to Table 4.20, it is understood that for the majority of the respondents (76.50 per cent), dependence on credit from local merchants for the purchase of essential products/services was beyond one month. Out of these, 21 per cent of the respondents had to depend on credit for beyond 3 months due to demonetisation. These results indicate that farmers could obtain credit from local merchants to purchase essential items due to their social capital/network to withstand the shocks created by demonetisation.

Later, a question was asked to understand the nature of payment methods with respect to agricultural operations. The payment methods adopted by the farmers for agricultural inputs (like purchasing seeds, fertilisers, hiring of tractors/agri-tools, payment of labour wages, etc.) before and after demonetisation in the study states are presented in Tables 4.21 and 4.22.

Table 4.21: Payment Methods for Agricultural Operations before Demonetisation

(Figures	in	%)
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Agricultural	Payment methods	State				
inputs		Maharashtra	Telangana	UP	All 3 States	
	Borrowing on Social capital	3.50	22.00	7.00	10.80	
Inputs/	Online	0.00	0.00	0.00	0.00	
fertilisers, etc.	Barter	2.00	3.50	0.00	1.80	
	Cash	94.50	74.50	93.00	87.30	
Services/ Tractor, Machines, etc.	Borrowing on Social capital	3.50	22.50	15.50	13.80	
	Online	0.00	7.50	0.00	2.50	
	Barter	2.00	3.50	0.00	1.80	
	Cash	94.50	66.50	84.50	81.80	
Labour wages	Borrowing on Social capital	3.00	22.00	1.50	8.80	
	Online	0.00	0.00	0.00	0.00	
	Barter	2.00	3.50	0.00	1.80	
	Cash	95.00	74.50	98.50	89.30	

Source: Field Survey {N = 600 (200 farmers each in Telangana, Maharashtra and UP)}

Table 4.22: Payment Methods for Agricultural Operations after Demonetisation

				(Fi	gures in %)	
A	Payment methods	State				
inputs		Maharashtra	Telangana	UP	All 3 States	
	Borrowing on Social capital	0.50	22.00	11.00	11.10	
Terrente (Online	0.50	0.00	0.00	0.10	
fertilisers. etc.	Barter	6.00	4.50	0.00	3.50	
	Cash	93.00	66.00	89.00	82.66	
	Other	0.00	7.50	0.00	2.64	
	Borrowing on Social capital	0.50	22.50	20.50	11.10	
Services/	Online	0.50	0.00	0.00	0.10	
Tractor,	Barter	6.50	3.50	0.00	3.50	
Machines, etc.	Cash	92.50	66.50	79.50	82.66	
	Other	0.00	7.50	0.00	2.64	
Labour wages	Borrowing on Social capital	0.00	21.00	7.50	9.50	
	Online	0.00	0.00	0.00	0.00	
	Barter	6.50	4.50	0.00	3.60	
	Cash	93.50	74.50	92.50	86.80	

Note: Other signifies receiving agricultural inputs (like fertilisers) from the government without any payment

Source: Field Survey {N = 600 (200 farmers each in Telangana, Maharashtra and UP)}

According to Tables 4.21 and 4.22, it is understood that payments for various agricultural inputs like fertilisers, pesticides, hiring or service charges for tractor and machinery, labour wages, etc., were mostly paid by cash both before and after demonetisation. The mode of payment for agricultural inputs/services did not change post demonetisation. Though, obtaining agricultural inputs/services by borrowing based on one's social capital has been the coping strategy adopted by the farmers during the cash crunch created by demonetisation. Additionally, bartering as a coping strategy for agricultural inputs/services increased among the farmers. Cash is still bedrock for transactions in the agricultural sector due to lack of sufficient digital facilities and payment infrastructure (Mahajan & Singla, 2017).

The cash crunch created by the demonetisation policy was seen as a short-term shock. The currency in circulation increased to Rs 21 lakh crore in FY 2018-19, from Rs 13 lakh crore at the end of FY 2016-17 (Mishra, 2019). The demonetisation created a fear of non-availability of cash in the banks and ATMs. This triggered the people to keep sizeable amount of cash at home for emergency use. Demonetisation resulted in enhancement of saving as well as change in behaviour of the people as they were more apprehensive in using formal savings options, which had a bearing on the household consumption and expenditure. In line with the above argument, around 62 per cent of the farmers agreed that they kept cash at home for emergency purposes as per Table 4.23.

Table 4.23: Sizable Amount of Cash Kept by Farmers at Home for Emergency PurposesPost Demonetisation

(Figures in %)

State	Agree	Neutral	Disagree	Total
Maharashtra	52.50	10.50	37.00	100.00
Telangana	41.00	16.50	42.50	100.00
UP	92.00	5.50	2.50	100.00
All 3 States	61.80	10.80	27.40	100.00

Source: Field Survey {N = 600 (200 farmers each in Telangana, Maharashtra and UP)}

One notable finding of the study is that the farmers are sceptical about depositing cash with the bank immediately after demonetisation. In the long term, the demonetisation move was envisaged to bring transformational changes in the agricultural sector like better access to institutional assistance/DBT/subsidies, digital literacy apart from creating awareness on electronic banking channels, including Paytm, Rupay Cards among the farmers and thereby accessing higher credit. Table 4.24 reports the availability of credit during post demonetisation.

State	Agree	Neutral	Disagree	Total
Maharashtra	37.50	25.00	37.50	100.00
Telangana	6.50	15.00	78.50	100.00
UP	0.50	1.00	98.50	100.00
All 3 States	14.80	13.70	71.50	100.00

Table 4.24: Access to Higher Credit by Farmers during Post-Demonetisation

(Figures in %)

Source: Field Survey {N = 600 (200 farmers each in Telangana, Maharashtra and UP)}.

It is clear from table 4.24 that 71.5 per cent of the respondents opined that demonetisation did not result in accessing higher credit by the farming community from banks/financial institutions. The impact of demonetisation on farmers' household with respect to various indicators of financial inclusion vary across the three study states. This is primarily because of the differences in each state's demographic, socio-economic, and financial inclusion levels, as reflected in our data.

Impact of Demonetisation on Market Price and Area Sown

Subsequently, the study used a regression function to assess the impact of demonetisation on area sown and market prices. The market prices and area sown before and after demonetisation were collected from the farmers for analysis. The market prices and area sown were considered a demonetisation function. The following equation is used for constructing the regression equation:

(Yi) = $\beta 0 + \beta 1$ demonetisation + ϵi (1)

Where, Yi = dependent variable, which signifies the market price of the farm produce and area sown area before and after demonetisation. Similarly, the explanatory variable, demonetisation, takes a value of '0' for a state before demonetisation and value of '1' for a state after demonetisation. $\beta 0$ is constant, $\beta 1$ is the coefficient of the independent variable as specified in equation 1, and ϵi is the error term. The other variables, such as mode of subsidies received and mode of payment for inputs, do not influence market prices and area sown. Hence, demonetisation is the only variable considered to have an impact on market prices and area sown.

The result of the linear regression analysis is given in Table 4.25. The coefficient values of the independent variables are reported as 'B'. Hence, one may note that when the coefficient value is greater than one, it describes a positive relationship between the respective independent variable

and dependent variable and vice versa. According to Table 4.25, demonetisation has negatively impacted market prices and the areas sown in all three states. The coefficient value of the demonetisation variable shows a negative value and is significant in all cases. It indicates a negative shift in the market prices on an average by about Rs.231 per quintal and 0.18 ha of crop area sown after demonetisation, which means the area of crop sown has an inverse relationship with the event of demonetisation. The impact of demonetisation on the market price and area sown has evidently witnessed a negative shift due to lack of cash during demonetisation.

Particulars	Maharashtra	Telangana	UP	All 3 States
Market Price (Rs/qt)	-202.80** (101 20)	-263.55* (135.62)	-229.20***	-231.85***
	-0.173**	-0.303***	-0.067*	-0.181***
Area sown (Ha)	(0.081)	(0.086)	(0.036)	(0.46)

Table 4.25: Demonetisation impact on market price and area sown

Values in parenthesis indicate standard error, ***, **,* represent significance levels @ 1%, 5% & 10%, respectively.

Aggarwal & Narayanan (2017) also found that domestic agricultural trade has displaced during the demonetisation period by 15 per cent in the short run, settling at 7 per cent recovery after demonetisation. The perishable commodities were displaced by 23 per cent in the week following demonetisation and recovered after three months with 18 per cent and were still lower than the usual. Hence, prior planning is essential to give immediate support to the agricultural markets without affecting the prices and area under cultivation.

5. CONCLUSION & POLICY RECOMMENDATIONS

The Government of India announced demonetisation for the second time after Independence on November 8, 2016 to withdraw the legal tender of Rs.500 and Rs.1000. The first demonetisation took place on January 16, 1978, to phase out notes of Rs.1000, 5000 and Rs.10000. The main aim of demonetisation is to control black money and fake notes, mitigate corruption, and fight terrorism. Nonetheless, demonetisation affected the people's daily lives and various sectors like service, agriculture, and industry. The e-wallet business has increased during the period to overcome the cash crunch in the economy. But, the agriculture sector runs more on the cash economy in the rural areas, which needs to be understood on the demonetisation effects. Hence, the present study was undertaken to understand the impact of demonetisation on agriculture and its allied sectors (livestock).

The study team collected primary as well as secondary data from three States, viz. Maharashtra, Telangana and Uttar Pradesh owing to a dominant farming population across the country. The primary data was collected from 600 households covering three States, six districts, 12 mandals and 24 Gram Panchayats using stratified random sampling for each stage of the sample selection. Some of the salient findings of the study are given below:

The study covered sample farmers in the age group ranging from 18-90 years with an average of 49 years. The average farming experience of the sample household across the three States is close to 28 years. Out of the total 600 samples, about 92 per cent comprises male farmers and 8 per cent are female farmers. The study results show that 37 per cent of the farmers were illiterate, with Telangana and Uttar Pradesh having the highest illiteracy at 55 and 40 per cent, respectively. Among the three States, Maharashtra had the highest number of farmers who had completed secondary education and above (78 per cent). In the present study, 36 per cent sample belongs to the general category, 18 per cent to Scheduled Caste and about 5 per cent to Scheduled Tribe category. However, the majority of the samples, i.e. 41 per cent, are from the Other Backward Class category. The post-stratified data also show that majority of the sample are marginal farmers (i.e. farm size of less than 1 ha) (58 per cent), followed by small farmers (farm size of 1-2 ha) (28 per cent). Less than one per cent of the sample farmers have a farm size of greater than 10 ha across all the sample States.

Demonetisation had severe impact on agriculture mainly because its timing was synonymous with the post-harvesting season of Kharif crop and sowing season of Rabi crop. Paddy, maize and wheat are the major crops grown across the three sample States. The effect of demonetisation was more pronounced on the distribution of the Rabi crops. In Maharashtra and Telangana, over 67 per cent and 44 per cent of the farmers, respectively, did not cultivate any crop in Rabi season. In contrast, in UP, only 8 per cent of the respondents did not grow any crops in Rabi season. When the Indian farmers faced consecutive drought years during 2014 and 2015, the area sown in Rabi season relatively declined. However, Indian farmers witnessed a good monsoon in 2016, which reflected an increase in the area sown in respect of Rabi crops. On average, perishable items like fruits, flowers, and vegetables were cultivated by less than six per cent of the farmers across the sample states. While cotton was mainly cultivated in Maharashtra and Telangana, sugarcane was grown only in Maharashtra. The average market price of the crops did witness a secular decline in all the study States by more than 10 per cent. Being perishable commodities, prices of vegetables decreased steeply (26 per cent), followed by cotton and soyabean.

The major impact of demonetisation in agriculture was felt in terms of the drop in crop productivity. More than 60 per cent of the respondents from all three study States were away from farm-related activities beyond 10 days during the post-demonetisation period. As such, farmers lost prime time during sowing of seeds/application of inputs during Rabi season, which might negatively impact their farm productivity ultimately. The delay in purchasing input applications further aggravated the loss in crop productivity. More than 86 per cent of the farmers across all the study States faced difficulty in purchasing seeds and fertilisers. In addition to this, farmers found difficulty in making payment towards labour (78 per cent), purchasing chemicals for plant protection (46 per cent), purchasing as well as hiring agri-tools and machines (41 per cent). Further, it is reported that dealers/traders increased the prices of inputs when the farmers purchased these inputs on credit. More than two-thirds of the sample farmers (68 per cent) informed that they had paid up to 15 per cent higher prices on inputs to the traders/dealers during demonetisation. In addition to the input channel, demonetisation also disrupted output channel, viz. sale, transport, marketing and distribution of farm produce. The low market price of the produce (36 per cent), produce not being sold (32 per cent), and no payment of produce in the market (31 per cent) are some of the challenges faced by the respondents during the post-demonetisation period (Rabi season). Besides, some respondents (9 per cent) reported the inability to obtain transport facility, which resulted in wastage of perishables. Even after the sale of produce, farmers received delayed payments from the buyers as nearly four-fifths of them across the three study States reported a delay ranging from one to fifteen days in receiving payments from buyers after demonetisation.

Livestock is the secondary source of income to the farming sector. Managing the farm

animals and providing feed to the cattle were important aspects of livestock management during the demonetisation period. Around three-fifths of the farmers owning livestock (59 per cent) purchased the cattle feed by paying cash, followed by purchases on credit from local traders (15 per cent). While 14 per cent of the respondents reported that they prepared their own cattle feed, 8 per cent indicated that they could not purchase cattle feed due to lack of cash in hand.

Traditionally, Indian farmers have been receiving assistance in the form of subsidies through various government schemes to enhance the productivity of their farmland. While nearly 70 per cent of respondents reported that they received subsidies in the form of cash before demonetisation, more than 10 per cent said the subsidies were directly credited to their bank accounts. Further, 14 per cent of the respondents did not receive any subsidies from the government before demonetisation. Even after demonetisation, the mode of receipt of subsidies was, more or less, similar.

Saving bank accounts are the means for accessing finance from formal financial institutions. All the respondents from UP own a formal savings bank account, the highest among the sample States, followed by Telangana (98 per cent) and Maharashtra (97 per cent). However, it is noticed that only 41 per cent of the sample farmers own Automated Teller Machine (ATM) cards across the three study States. Maharashtra had the highest number of ATM card holders (67 per cent), followed by Telangana (43 per cent) and UP (14 per cent). On average, the respondents across all three study States have been maintaining their savings bank account for more than 12 years. Only a small proportion of respondents (17 per cent) hold Kisan Credit Card (KCC). The maximum number of KCC holders are found in UP (25 per cent), followed by Maharashtra (22 per cent) and Telangana (3 per cent). It can be seen from the education level versus frequency in the usage of bank accounts for the total sample that as the education level went up, the regularity in the usage of bank accounts also increased. Also, the percentage of respondents who never used bank accounts decreased as the education level was higher except in the case of intermediate. Further, the adoption of cashless/digital transactions for agricultural activities was the highest in Maharashtra (9 per cent), followed by Telangana (8 per cent) and UP (2 per cent). In total, less than 10 per cent of the respondents opted for cashless/digital transactions for agricultural activities, which is a cause for concern.

In the present study, 64 per cent of the respondents report using their savings bank account for depositing cash compared to 34 per cent using bank accounts for DBT transactions across all the three sample States. The usage of bank accounts for money transfers has been relatively very less (7 per cent) across all three States. It is also noted that there is not much difference in the mode of payments before (95 per cent) and after (92 per cent) demonetisation. In the agricultural sector, cash is still the dominant form of currency for payment of purchases/expenses before and after demonetisation. Financial inclusion is the delivery of basic financial services, viz. savings, credit, pension, insurance, and payments to vast sections of the low-income segment. It is a crucial measure for inclusive growth and gained rapid momentum with the announcement of demonetisation on November 8, 2016.

When the access to cash by the farmers after demonetisation was examined, four-fifths of the respondents agreed that they did not have access to cash after demonetisation. This is notably higher across all the study States. On the other hand, about 70 per cent of the sample still used cash to make payments for essential items like groceries, milk, medicines, etc. The main alternate method of payment used was procuring items on credit from local merchants (61 per cent). Cashless transactions are found to be negligible (10 per cent). Majority of the respondents (76 per cent) depended on credit from local merchants for the purchase of essential products/services for a period beyond one month. The female-headed households also joined the male farmers in exchange for currency and lending inputs and household needs from the shopkeepers and merchants. It was found that the payments for various agricultural inputs like fertilisers, pesticides, hiring or service charges for tractor and machinery, labour wages, etc., were mostly made in cash both before and after demonetisation. The mode of payment for agricultural inputs/services did not change post demonetisation, though obtaining agricultural inputs/services by borrowing based on one's social capital has been the coping strategy adopted by the farmers during the cash crunch created by demonetisation. Additionally, the practice of bartering as a coping strategy for agricultural inputs/ services increased among the farmers.

Farmers having money in bank accounts could not access it due to the lack of new currency notes in banks and limitations on withdrawals posed by the Government of India. Farmers, who received hard cash, didn't deposit it in their bank accounts even after the waiting time due to the fear of non-availability of cash in banks and ATMs for further household and agricultural requirements. They have kept a sizeable amount of money at home for emergency situations even after demonetisation and maintained a nominal amount in bank accounts. The instances of farmers' visits to the banks during demonetisation are also high.

Demonetisation was a policy decision that affected all sectors of the economy without any exception. But its damaging effect was primarily felt by cash-intensive/informal sectors like agriculture. Hence, before implementation, the government should take proper precautions and careful planning for cash-intensive sectors like agriculture. The following suggestions/

recommendations may be considered for any such decision-making in future.

Policy Recommendations:

- Essential Plans for Transactions in Agricultural Markets: The average market price of the crops drew a collective fall in all the study States. The commodity price had decreased by more than 10 per cent for all the major crops, which disrupted the market price of the commodities. This resulted in market price instability, affecting the income of the farmers. Therefore, to ease the price effect on the farmers, the government should provide a special economic package to mitigate the economic distress and offset the price fluctuation of commodities caused by a crisis like demonetisation without affecting the market prices (Table 4.7).
- Procurement of Produce by Government: The effect of demonetisation on agriculture was severe because the policy disrupted the agricultural supply chain, especially the sale of produce in the market. Anecdotal evidence indicates large-scale wastage of perishable items by the farmers. Therefore, the government should come forward to buy the produce from farmers and make necessary payments as a relief measure during critical conditions like demonetisation, thus preventing distress sale of produce by the farmers (Tables 4.7 and 4.10).
- Relief Fund for Input Applications Prior to Demonetisation: The significant impact on farm productivity depends on the change in the use of input application. More than 86 per cent of the farmers across all the study States faced difficulty in purchasing seeds and fertilisers. In addition to this, farmers also found difficulty in making payment towards labour (78 per cent), purchasing chemicals for plant protection (46 per cent) as well as hiring/purchasing agri-tools and machines (41.10 per cent). Further, the dealers had increased the input prices during demonetisation. Around 68 per cent of the respondents reported that they paid more than the actual cost of the agricultural input during demonetisation. Therefore, the government should devise relief measures for input services. The PM Kisan Samman Nidhian initiative by the Government of India wherein the farmers get Rs. 6,000 per year as minimum income support should also be looked into for providing input assistance to farmers through agricultural departments to help them tide over the immediate impact of demonetisation (Table 4.8).
- Training & Capacity Building on Financial/Digital Literacy: Only 17 per cent of the respondents are Kisan Credit Card (KCC) holders. This indicates low coverage of Kisan

Credit Cards either due to low awareness about the scheme or low financial literacy. Hence, concerted efforts are required to enhance training and capacity building on financial services and financial/digital process literacy. Further, Kisan Credit Cards can be a vital channel for the delivery of assistance with respect to all the aspects of agricultural input application and extension services (Table 4.14).

- Improved Awareness on Digital Transactions: The respondents (98 per cent) mainly used their bank accounts for making deposits and receiving Direct Benefit Transfers (DBTs). This enhanced usage of bank accounts indicates the potential for a higher uptake of cashless transactions. Therefore, the government should devise incentives and mechanisms through its awareness drive for digital transactions for greater uptake of digital or cashless instruments among agricultural/rural households (Tables 4.14 & 4.16).
- Ubiquitous Broadband Connectivity Technology Infrastructure throughout Rural India: Besides enhancing awareness or digital literacy, broadband connectivity should become pervasive throughout rural India to ensure a robust merchant payment acceptance network, particularly in the agricultural supply/value chain. A robust payment network will facilitate the development of innovative digital payment tools for agricultural supply/value chain (Table 4.16).
- Enabling Digital Payment Infrastructure and Payment System: The mode of purchasing essential items during post-demonetisation period was through procuring items on credit from local merchants (61 per cent). Cashless transactions were found to be negligible (10.30 per cent) among the study respondents. Payment systems provide the basic infrastructure for money to flow through any economy. Inefficient traditional payment systems have been a major barrier to cashless transactions among rural/agricultural households. Therefore, the government should foster an enabling digital payment infrastructure for the combination of digital ID with electronic payment system.

("Jan Dhan-Aadhaar-Mobile" trinity) to support a wide range of financial transactions (Table 4.19).

Enhancing Security System on Digital Transactions: Majority of the population from rural areas prefers physical banking to online platforms. Perhaps, due to low digital literacy/lack of trust, etc., the adoption of cashless/digital transactions for agricultural activities was very low (6 per cent) among all the sample States, even during demonetisation. The digital transaction has the advantage of realising financial transactions in a cashless mode at a low

cost. Given the cash crunch created by demonetisation, more significant usage of cashless transactions for agricultural activities could have reduced the impact of demonetisation in the agriculture sector. Hence, the security features on digital transactions should be made robust for people and improve their trust in this context (Table 4.16).

- Enhancing the Bargaining Power of Farmers through Collectivisation: Around 31 per cent of the farmers received no payment for their produce in the market, which indicates their low bargaining power. As a result, the government should look for avenues that will facilitate collectivisation of farmers' produce, thereby enhancing the economies of scale and improving their collective bargaining power (Table 4.10).
- Strengthening the Agriculture Supply/Value Chains: More than 8 per cent of the respondents were unable to obtain any transport facility, resulting in wastage of perishables. Therefore, the government should strengthen the agricultural supply/value chain, particularly the transport network, in order to reduce the wastage of perishables (Table 4.10).
- Support Livestock: Livestock is the secondary source of income to the farming sector. As 43 per cent of the respondents are engaged in livestock activities, and all of them faced difficulty in purchasing feed for their cattle, farmers should be provided cattle feed through the Animal Husbandry Department during cash crunch situations like demonetisation (Table 4.13).

The study respondents have shown interest in digital/cashless transactions but are yet to embrace digital payments completely. Further research should identify potential use cases for digital payments amongst farmers across the study States. Also, farmers purchased various agricultural products/services through barter/credit from local merchant establishments. Hence, it would also be interesting to study such types of transactions in an urban setting.

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S. No	Variables	Nalgonda	Warangal	Adilabad	Nizamabad	Karimnagar	Medak	Hyderabad	Rangareddy	Mehbubnagar	Khammam
1	Cropping intensity	1.17 (4)	1.26 (3)	1.15 (6)	1.36 (1)	1.28 (2)	1.16 (5)	0(10)	1.11 (7)	1.08 (9)	1.10 (8)
2	Net sown area (hectare)	5,70,978 (2)	4,92,034 (4)	5,46,527 (3)	2,61,068 (8)	4,20,562 (6)	4,56,539 (5)	0 (10)	2,09,140 (9)	8,35,611 (1)	3,82,109 (7)
æ	Gross cropped area (hectare)	6,69,164 (2)	6,19,200 (4)	6,27,665 (3)	3,55,236 (8)	5,36,818 (5)	5,29,149 (6)	0 (10)	2,32,876 (9)	9,03,453 (1)	4,19,587 (7)
4	% of the area under food and non-food crops	46.99 (4)	48.20 (3)	38.97 (7)	44.65 (6)	45.40 (5)	54.55 (1)	0 (10)	31.08 (9)	49.02 (2)	31.63 (8)
ъ	Area under cereals and millets	2,17,487 (4)	2,57,311 (2)	1,01,676 (8)	1,48,190 (6)	2,56,436 (3)	2,16,766 (5)	0 (10)	79,940 (9)	2,88,032 (1)	1,42,584 (7)
9	Area under foodgrains (hectare)	2,64,031 (5)	2,87,043 (3)	1,63,353 (6)	180,590 (9)	2,71,105 (4)	2,92,664 (2)	0 (10)	1,22,615 (8)	4,40,036 (1)	1,58,738 (7)
4	Area under chillies (hectare)	5,286 (4)	28,266 (2)	1,251 (6)	523 (7)	3,731 (5)	369 (8)	0 (10)	365 (9)	11,051 (3)	30,795 (1)
8	Area under cotton lint (hectare)	3,41,655 (1)	2,51,021 (4)	3,36,448 (2)	16,658 (9)	2,01,244 (5)	1,34,239 (7)	0 (10)	63,008 (8)	2,73,989 (3)	1,54,994 (6)
6	Area under major vegetable tomato (hectare)	1,593 (8)	2,512 (5)	4,220 (4)	2,388 (6)	1,904 (7)	4,824 (2)	0 (10)	5,719 (1)	4,329 (3)	1,264 (9)
10	% of the area under rice	31.79 (1)	29.24 (3)	9.16 (9)	27.60 (5)	31.74 (2)	15.91 (6)	0 (10)	10.43 (8)	10.66 (7)	29.01 (4)
11	% of the area under total non-food crops	53.39 (2)	44.40 (5)	70.02 (1)	40.62 (7)	41.21 (6)	32.20 (8)	0 (10)	31.93 (9)	44.90 (3)	44.81 (4)
12	No. of marginal holding	4,45,269 (4)	4,44,887 (5)	2,59,177 (8)	3,19,431 (6)	4,47,037 (3)	4,65,100 (2)	0 (10)	1,99,947 (9)	5,69,133 (1)	2,91,106 (7)
13	No. of small holding	1,91,508 (2)	1,41,881 (6)	1,43,934 (5)	1,12,836 (7)	1,45,008 (4)	1,48,880 (3)	0(10)	87,956 (9)	2,49,386 (1)	1,05,973 (8)
14	Area under Food crops (Area in Hectares)	3,11,922 (5)	3,44,306 (3)	1,88,187 (8)	2,10,950 (7)	3,15,590 (4)	3,58,745 (2)	0 (10)	1,58,512 (9)	4,97,819 (1)	2,31,563 (6)
15	Area under Non-Food crops (Area in Hectares)	3,57,242 (3)	2,74,894 (4)	4,39,478 (1)	1,44,286 (8)	2,21,228 (5)	1,70,404 (7)	0 (10)	74,364 (9)	4,05,634 (2)	1,88,024 (6)
16	Geographical area (hectare)	14,24,000 (3)	12,84,600 (5)	16,10,500 (2)	7,95,600 (8)	11,82,300 (6)	6,70,000 (7)	21,700 (10)	7,49,300 (9)	18,43,200 (1)	13,26,610 (4)

Annexure 1: Area/Districts Selected for the Study in Telangana

ANNEXURES

Note: * values in parentheses are the ranks Source: Statistical Year Book of Telangana, 2017

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S. No.	Districts	Cropping intensity	Net sown area (hectare)	Gross cropped Area (_000 ha)	Area under cereals and millets Area (000 ha)	Area under cotton lint Area (_000ha)	Total Area under major vegetable (_000 hectare)	Marginal land holdings (Below 1 Hectare)	Small Land holdings (1-2 Hectare)	Geographic al area
1	AHMADNAGAR	131.7(8)	1146.3(1)	1509.7(2)	1053.3(2)	:	61.1(4)	52.1(11)	29.6(23)	1702.0(1)
2	AKOLA	120.9(15)	434.9(18)	526(20)	552(13)	168.3(7)	3592(1)	34.9(24)	39.2(6)	540(26)
ŝ	AMRAVATI	118.3(19)	602(10)	712(13)	630.3(8)	179.4(6)	3.79(21)	33.8(26)_	41.3(3)	1304(6)
4	AURANGABAD	120(16)	654.0(9)	784.4(10)	559(12)	243.2(3)	11.04(13)	49.9(13)	33.2(17)	1007.7(12)
ъ	BEED	120(16)	876(11)	1051.2(4)	718.9(6)	160.8(8)	42.85(6)	51.4(12)	30.1(220	1068.6(9)
9	BHANDARA	136.4(5)	178.3(29)	243.2(28)	211.7(24)	1	4.9(17)	68.3(7)	22.4(25)	342(31)
7	BULDANA	106.1(30)	712(7)	756(11)	478.2(15)	311.1(2)	4.1(20)	37.4(20)	37.3(9)	967(14)
8	CHANDRAPUR	117.8(20)	451.5(17)	532.1(9)	153.3(29)	42.4(15)	9.9(15)	37.2(21)	32.1(18)	1092(8)
6	DHULE	107.7(28)	431.0(19)	464.0(27)	257.7(22)	115.0(10)	13.7 (10)	33.4(27)	36.5(13)	824.6(17)
10	GADCHIROLI	133.1(7)	148(31)	197(31)	183.2(26)	1	3.2(25)	42.5(17)	30.8(21)	1492(4)
11	GONDIYA	125.4(12)	182.9(28)	229.4(29)	224.4(23)	1	4.4(18)	70.8(5)	21.1(27)	586(25)
12	HINGOLI	131.5(9)	382.1(22)	502.3(21)	991.2(3)	67.0(13)	0.50(29)	36.8(22)	35.7(15)	466.1(30)
13	JALGAON	156.9(3)	844.2/95)	1324.8(1)	319(20)	356.1(1)	:	33.9(25)	37.9(8)	1163.9(7)
14	JALNA	;	1	1	ł	ł	1	43.1(15)	35.1(16)	1
15	KOLHAPUR	176.93(1)	414.4(20)	733.2(12)	303.1(21)	:	25.3(7)	78.9(1)	14.2(32)	776.3(19)
16	LATUR	130(10)	529(13)	688(15)	592.5(10)	:	:	37.9(18)	36.6(10)	715.7(21)
17	NAGPUR	123.2(13)	499(16)	615(18)	458.93(15)	74.8(11)	10.35(14)	29.5(30)	38.9(7)	986(13)
18	NANDED	114(23)	711(8)	811.1(7)	434.4(17)	235.1(4)	11.69(11)	42.8(16)	36.3(14)	1033.1(11)
19	NANDURBAR	133.6(6)	297(25)	397(25)	156.5(28)	53.3(14)	11.6(11)	24.5(31)	40.9(4)	503.0(29)
20	NASIK	107.5(29)	742.4(6)	798.5(9)	645.9(7)	1	161.8(13)	44.9(14)	31.7(20)	1536.4(3)
21	OSMANABAD	161.0(2)	519.3(14)	841.1(6)	2882.5(1)	1	642.9(2)	31.2(28)	36.5(12)	748.5(20)
22	PARBHANI	120(16)	518.7(15)	622.5(17)	606.2(9)	192.1(5)	4.27(19)	37.4(19)	36.5(12)	631.1(23)
23	PUNE	121(14)	945(2)	1148(3)	775.3(5)	:	47.6(5)	56.5(10)	24.1(24)	1562.0(2)
24	RAIGARH	114.8(22)	203(26)	233(30)	159.7(27)	:	23(8)	71.1(4)	15.7(290	687(22)
25	RATNAGIRI	111.6(24)	303.0(24)	338.0(27)	111.8(30)	:	1.5(260	68.3(6)	14.8(30)	816(18)
26	SANGLI	116.5(21)	557.1(12)	649(16)	560.36(11)	:	3.6(24)	61.3(8)	21.6(26)	861(16)
27	SATARA	128.4(11)	580.4(11)	799.4(8)	517.7(14)	:	17.8(9)	78.2(2)	14.8(30)	1058.2(10)
28	SINDHUDURG	102.4(31)	163(30)	167(32)	95.12(31)	:	0.7(28)	76.6(3)	11.0(33)	504(28)
29	SOLAPUR	111.1(25)	919.7(3)	1022.5(5)	893.1(4)	:	3.64(22)	35.5(23)	31.9(19)	1487.8(5)
30	THANE	110.1(26)	356(23)	392(25)	191.4(25)	:	7.2(16)	61.2(9)	19.3(28)	934(15)
31	WARDHA	155.63(4)	284(27)	442(23)	327.5(19)	148.0(9)	3.7(23)	17.7(32)	42.9(2)	629(24)
32.	WASHIM	109.8(27)	386.0(21)	424.0(24)	411.8(18)	67.8(12)	1.1(27)	29.6(29)	40.0(4)	514(27)
33.	YEVATMAL	:	:	:	:	:	:	10.6(33)	49.8(1)	

Annexure 2: Area/Districts Selected for the Study in Maharashtra

Source: Statistical abstract of Maharashtra, 2017.

;		Cropping	Net sown area	Gross cropped	Area under	Area under rice	Geographical	No. of small	No. of marginal
S. No.	Districts	intensity	(hectare)	area (hectare)	foodgrains	hectare)	area	holding	holding
1	Saharanpur	150.63 (52)	275047 (23)	414297 (21)	183465(56)	57883 (42)	363791(26)	51.65(24)	143.59(54)
2	Muzaffarnagar	150.52 (53)	221343 (33)	333156 (35)	100926(68)	14650 (65)	293815(38)	52.17(22)	219.65(32)
m	Shamli	160.67 (29)	101796(70)	163552 (70)	72931 (72)	20791 (58)	127683(69)	1	1
4	Bijnor	123.84 (71)	337192 (8)	417569 (20)	167068(59)	57897 (41)	464545(8)	65.19(9)	211.77(35)
S	Moradabad	168.67 (16)	186403 (47)	314399 (40)	220697(48)	93316 (30)	223920(56)	59.39(15)	332.99(20)
9	Sambhal	182.49 (3)	200981 (39)	366771 (29)	274656(33)	37902 (51)	245330(49)	1	ł
7	Rampur	193.16 (2)	191563 (45)	370014 (28)	299559(28)	144987 (16)	235726(55)	59.39(15)	140.74(56)
8	Amroha	150.83 (51)	171816 (54)	259156 (54)	127737(67)	24656 (56)	216879(58)	30.00(53)	143.44(55)
6	Meerut	152.80 (47)	196255 (42)	299876 (44)	100216(69)	16363 (63)	273005(42)	34.70(44)	135.37(58)
10	Baghpat	161.14 (28)	108158 (69)	174287 (69)	63460(74)	5088 (71)	134983(68)	22.67(65)	77.47(69)
11	Ghaziabad	159.39 (33)	52641 (75)	83906 (75)	42145(75)	10184 (68)	92658(73)	27.68(58)	133.94(60)
12	Hapur	164.95 (20)	87031 (72)	143558 (72)	70786(73)	21407(57)	114276(71)	1	1
13	Gautam Buddha Nagar	160.13 (31)	62626 (74)	100281 (73)	78958(71)	25197(55)	125422(70)	25.04(63)	83.23(68)
14	Bulandshahar	173.30 (9)	300406 (17)	520616 (8)	366814(18)	87195(34)	364974(25)	53.96(20)	234.12(30)
15	Aligarh	179.18 (5)	304044(14)	544783 (6)	440929(8)	86131(35)	371261(24)	58.17(17)	189.89(42)
16	Hathras	158.16 (37)	149121 (57)	235845 (57)	157208(62)	20013(60)	180155(64)	36.58(42)	96.38(64)
17	Mathura	147.92 (57)	269329 (24)	398397 (25)	294179(29)	48018(47)	330328(31)	39.53(39)	88.65(67)
18	Agra	149.08(54)	284254 (21)	423752 (19)	268769(35)	5238(70)	398970(19)	53.73(21)	167.66(45)
19	Firozabad	166.62 (19)	182623 (50)	304280(41)	215748(49)	20633(59)	241180(51)	33.17(47)	123.44(61)
20	Etah	163.24 (23)	185199 (48)	302316 (43)	243343(41)	18509(61)	244068(50)	69.96(5)	314.13(22)
21	Kasganj	173.75 (8)	141236 (62)	245396 (55)	189092(55)	15946(64)	195601(61)		1
22	Mainpuri	172.06 (11)	192777 (44)	331685 (36)	285562(32)	63285(40)	272723(43)	41.23(36)	231.22(31)
23	Budaun	172.72 (10)	350006 (5)	604545 (5)	475934(3)	79995(37)	426768(13)	82.32(3)	403.37(10)
24	Bareilly	163.73 (22)	329200 (11)	538994 (7)	396520(14)	162318(6)	406915(16)	68.04(7)	348.58(17)
25	Pilibhit	168.21 (18)	234136 (30)	393846 (26)	306111(26)	155146(10)	378384(23)	42.38(35)	147.30(53)
26	Shahjahanpur	177.52 (7)	350319(4)	621897 (4)	519406(2)	213175(1)	437469(12)	62.38(11)	290.39(26)
27	Kheri	149.05 (55)	479706(1)	714991 (1)	411182(12)	185391(3)	772788(1)	108.23(1)	448.19(6)
28	Sitapur	152.08(49)	435983(2)	663053 (3)	435353(10)	162233(7)	573891(3)	87.14(2)	493.57(4)
29	Hardoi	154.79(42)	433250(3)	670609 (2)	563714(1)	145246(14)	598876(2)	78.18(3)	484.20(5)
30	Unnao	159.76(32)	308979(12)	493612 (14)	415778(11)	96842(28)	460222(9)	60.93(14)	387.08(13)
31	Lucknow	154.45(43)	135737(63)	209645 (62)	152793(63)	51582(44)	251596(47)	28.08(57)	203.65(38)
32	Rae Bareli	155.09(40)	184488(49)	286116 (48)	256400(37)	85638(36)	392045(20)	48.71	374.49(15)
33	Amethi	153.60(46)	194059(43)	298078 (45)	274192(34)	118229(20)	238201(53)	1	1
34	Farrukhabad	141.52(61)	149018(58)	210892 (61)	133138(66)	13496(66)	219911(57)	30.26(30)	185.10(43)

Contd...

Annexure 3: Area/Districts Selected for the Study in Uttar Pradesh

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35Kannauj152.24(48)36Etawah152.24(48)37Auraiya164.24(21)37Auraiya160.21(30)38Kanpur Dehat132.21(69)39Kanpur Nagar140.80(62)40Jalaun132.21(69)41Jhansi140.80(62)42Lalitpur118.12(73)43Hamirpur118.12(73)44Jhansi117.33(74)45Hamirpur117.33(74)46Chitrakoot117.33(74)47Banda117.33(74)48Hamirpur117.33(74)49Kaushambir135.64(66)46Chitrakoot117.33(74)47Fatehpur117.33(74)48Paratapgarh135.64(66)49Kaushambir132.69(64)50Allahabad132.69(66)51Barabanki132.25(68)52Barabanki132.369(64)53MubedkarNagar158.76(56)54Sultanpur158.76(66)55Shrawasti140.36(63)56Shrawasti148.26(56)57Bahraichur148.26(56)58Gonda158.86(34)59Siddharth Nagar144.37(58)	145813(60) 145548(59) 145321(61) 221918(32) 188920(46) 346703(6) 346703(6) 332279(9) 3311113(15) 294201(18) 235656(28) 343480(7) 174483(52)	221999 (60) 242336 (56) 232820 (59) 293395 (60) 266000 (52) 409541 (23) 409541 (23) 512257 (9) 512257 (9) 512255 (10) 345197 (33) 345197 (33) 345197 (33) 345197 (33) 345197 (33) 345197 (33) 345197 (33) 333576 (42)	148965(64) 196734(52) 203486(51) 250400(39) 212706(50) 328701(23) 382102(15) 464744(5) 287897(30) 261977(36) 401295(13) 179866(57) 349234(21)	17614(62) 48765(45) 48682(46) 41178(50) 33356(53)	208973(59) 240270(52) 246176(60)	27.02(59) 29.18(54)	211.96(34) 163.13(48)
36Etawah $164.24(21)$ 37Auraiya $160.21(30)$ 38Kanpur Dehat $132.21(69)$ 39Kanpur Nagar $132.21(69)$ 40Jalaun $132.21(69)$ 41Jalaun $118.12(73)$ 42Jalaun $118.12(73)$ 43Hamipur $170.12(12)$ 44Mahoba $170.12(12)$ 45Banda $170.12(12)$ 46Chitrakoot $170.12(12)$ 47Banda $170.12(12)$ 48Paratop $170.12(12)$ 49Kaushur $117.33(74)$ 40Chitrakoot $117.33(74)$ 41Banda $124.74(70)$ 42Banda $124.74(70)$ 43Paratoparh $132.25(60)$ 44Paratoparh $132.25(60)$ 45Mahoba $124.74(70)$ 46Chitrakoot $108.68(75)$ 47Fatehpur $124.74(70)$ 48Paratoparh $132.25(60)$ 49Kaushambi $132.25(60)$ 50Allahabad $155.71(39)$ 51Barabanki $196.97(1)$ 52Faizabad $158.76(36)$ 53Sultanpur $158.76(36)$ 54Sharaot $168.98(14)$ 55Bahraich $140.36(53)$ 56Sharawasti $140.36(53)$ 57Bahraich $141.37(58)$ 58Gonda $144.37(58)$	147548(59) 145321(61) 221918(32) 188920(46) 346703(6) 332279(9) 301113(15) 231113(15) 294201(18) 235656(28) 343480(7) 174483(52)	242336 (56) 232820 (59) 293395 (60) 266000 (52) 409541 (23) 512257 (9) 512257 (9) 512257 (9) 512257 (9) 345197 (33) 345197 (33) 319648 (38) 4219633 (66) 411952 (22) 303576 (42)	196734(52) 203486(51) 250400(39) 212706(50) 328701(23) 382102(15) 464744(5) 287897(30) 261977(36) 401295(13) 179866(57) 349234(21)	48765(45) 48682(46) 41178(50) 33356(53)	240270(52) 206126(60)	29.18(54)	163.13(48)
37 Auraiya 160.21(30) 38 Kanpur Nagar 132.21(69) 39 Kanpur Nagar 132.21(69) 40 Jalaun 118.12(73) 41 Jhansi 140.80(62) 42 Jalaun 118.12(73) 43 Jalaun 118.12(73) 44 Jhansi 170.12(12) 45 Hamipur 177.12(12) 46 Chitrakoot 117.33(74) 47 Banda 135.64(66) 48 Banda 135.64(66) 49 Kaushambi 137.3(74) 40 Chitrakoot 117.33(74) 41 Banda 135.64(66) 42 Banda 135.64(66) 43 Fatehpur 138.08(64) 44 Fatehpur 138.08(64) 45 Fatehpur 138.08(64) 46 Shatashad 138.08(64) 47 Fatehpur 138.08(64) 48 Fatehpur 138.08(64)	145321(61) 221918(32) 188920(46) 346703(6) 332279(9) 301113(15) 291113(15) 294201(18) 235656(28) 343480(7) 174483(52)	232820 (59) 293395 (60) 266000 (52) 409541 (23) 512257 (9) 512257 (9) 512257 (9) 319648 (33) 319648 (38) 319648 (38) 428465 (18) 189633 (66) 411952 (22) 303576 (42)	203486(51) 250400(39) 212706(50) 328701(23) 382102(15) 464744(5) 287897(30) 261977(36) 401295(13) 179866(57) 349234(21)	48682(46) 41178(50) 33356(53)	206126160)		
38 Kampur Dehat 132.21(69) 39 Kampur Nagar 140.80(62) 40 Jalaum 118.12(73) 41 Ihansi 118.12(73) 42 Jalitpur 154.16(44) 43 Hamirpur 118.12(73) 44 Ihansi 117.33(74) 45 Banda 117.33(74) 46 Chitrakoot 117.33(74) 47 Banda 117.33(74) 48 Mahoba 135.64(66) 47 Fatehpur 117.33(74) 48 Chitrakoot 135.64(60) 49 Kaushambi 137.3(74) 41 Fatehpur 137.3(74) 42 Hamboa 137.3(74) 43 Partapgarh 138.08(64) 44 Patapgarh 138.08(64) 45 Fatehpur 132.25(68) 46 Kaushambi 132.25(68) 50 Allahabad 132.25(68) 51 Barabanki 132.25(68) <th>221918(32) 188920(46) 346703(6) 332279(9) 301113(15) 294201(18) 294201(18) 235656(28) 343480(7) 174483(52)</th> <th>293395 (60) 266000 (52) 409541 (23) 512257 (9) 512255 (10) 345197 (33) 345197 (33) 319648 (38) 428465 (18) 189633 (66) 411952 (22) 303576 (42)</th> <th>250400(39) 212706(50) 328701(23) 382102(15) 464744(5) 287897(30) 261977(36) 401295(13) 179866(57) 349234(21)</th> <th>41178(50) 33356(53)</th> <th>(νυμευ(υν)</th> <th>28.28(56)</th> <th>150.07(51)</th>	221918(32) 188920(46) 346703(6) 332279(9) 301113(15) 294201(18) 294201(18) 235656(28) 343480(7) 174483(52)	293395 (60) 266000 (52) 409541 (23) 512257 (9) 512255 (10) 345197 (33) 345197 (33) 319648 (38) 428465 (18) 189633 (66) 411952 (22) 303576 (42)	250400(39) 212706(50) 328701(23) 382102(15) 464744(5) 287897(30) 261977(36) 401295(13) 179866(57) 349234(21)	41178(50) 33356(53)	(νυμευ(υν)	28.28(56)	150.07(51)
39 Kanpur Nagar 140.80(62) 40 Jalaun 118.12(73) 41 Ihansi 154.16(44) 41 Ihansi 154.16(44) 42 Lalitpur 154.16(44) 43 Hamirpur 170.12(12) 44 Mahoba 135.64(66) 45 Banda 124.74(70) 46 Chitrakoot 128.76(60) 47 Fatehpur 135.64(66) 48 Paratagarh 132.64(66) 49 Kaushambi 132.64(75) 40 Kaushambi 132.64(75) 41 Fatehpur 132.64(75) 42 Fatehpur 132.64(75) 43 Rushambi 132.25(68) 50 Allahabad 132.25(68) 51 Barabanki 132.57(139) 52 Allahabad 155.71(39) 53 Allahabad 155.71(39) 54 Satabad 158.06(44) 55 Fatabanki 158.76(50)	188920(46) 346703(6) 332279(9) 301113(15) 294201(18) 235656(28) 343480(7) 174483(52)	266000 (52) 409541 (23) 512257 (9) 512255 (10) 345197 (33) 345197 (33) 319648 (38) 428465 (18) 189633 (66) 411952 (22) 303576 (42)	212706(50) 328701(23) 382102(15) 464744(5) 287897(30) 261977(36) 401295(13) 179866(57) 349234(21)	33356(53)	314984(34)	51.70(23)	209.81(36)
40Jalaum118.12(73)41Janasi118.12(73)42Lalitpur154.16(44)42Lalitpur170.12(12)43Manoba117.33(74)44Mahoba135.64(66)45Banda124.74(70)46Chitrakoot108.68(75)47Fatehpur108.68(75)48Pratapgarh124.74(70)49Kaushambi122.5(60)50Allahabad132.25(68)51Barabanki132.25(68)52Faizabad155.71(39)53AmbedkarNagar168.98(14)54Sultanpur158.76(36)55Bahraich158.76(36)56Shrawasti168.98(14)57Bahraich153.69(45)58Gonda158.86(50)59Siddharth Nagar144.37(58)	346703(6) 332279(9) 301113(15) 294201(18) 235656(28) 343480(7) 174483(52)	409541 (23) 512257 (9) 512255 (10) 345197 (33) 319648 (38) 428465 (18) 189633 (66) 411952 (22) 303576 (42)	328701(23) 382102(15) 464744(5) 287897(30) 261977(36) 401295(13) 179866(57) 349234(21)		301326(35)	32.37(50)	197.87(39)
41Jhansi $154.16(44)$ 42 Lalitpur $170.12(12)$ 43 Hamirpur $117.33(74)$ 44 Mahoba $117.33(74)$ 45 Banda $117.33(74)$ 46 Chitrakoot $135.64(66)$ 47 Banda $124.74(70)$ 46 Chitrakoot $108.68(75)$ 47 Fatehpur $124.74(70)$ 48 Parataparh $124.74(70)$ 410 Chitrakoot $108.68(75)$ 47 Fatehpur $124.74(70)$ 48 Pataparh $122.5(60)$ 49 Kaushambi $122.5(60)$ 49 Kaushambi $132.25(68)$ 50 Allahabad $132.25(68)$ 51 Barabanki $132.25(68)$ 52 Barabanki $132.25(68)$ 53 AmbedkarNagar $132.25(68)$ 54 Sultanpur $158.7(139)$ 55 Barabanki $196.97(1)$ 56 Shrawasti $168.98(14)$ 56 Shrawasti $140.3(63)$ 57 Balrampur $148.26(56)$ 58 Gonda $144.37(58)$ 58 Siddharth Nagar $144.37(58)$	332279(9) 301113(15) 294201(18) 235656(28) 343480(7) 174483(52)	512257 (9) 512255 (10) 345197 (33) 319648 (38) 428465 (18) 189633 (66) 411952 (22) 303576 (42)	382102(15) 464744(5) 287897(30) 261977(36) 401295(13) 179866(57) 349234(21)	530(73)	454434(10)	56.39(18)	138.21(57)
42 Lalitpur 170.12(12) 43 Hamirpur 117.33(74) 44 Mahoba 135.64(66) 45 Banda 135.64(66) 46 Chitrakoot 124.74(70) 47 Fatehpur 124.74(70) 48 Chitrakoot 108.68(75) 49 Chitrakoot 138.08(64) 49 Kaushambi 132.55(60) 40 Kaushambi 132.25(68) 50 Allahabad 152.71(39) 51 Barabanki 132.25(68) 52 Allahabad 155.71(39) 53 Allahabad 155.71(39) 54 Barabanki 158.76(58) 52 Barabanki 158.76(56) 53 AmbedkarNagar 158.76(36) 54 Sultanpur 158.76(56) 55 Bahraich 158.66(51) 56 Shrawasti 140.36(63) 57 Bahrampur 148.26(56) 58 Gonda 144.37(58)	301113(15) 294201(18) 235656(28) 343480(7) 174483(52)	512255 (10) 345197 (33) 319648 (38) 428465 (18) 189633 (66) 411952 (22) 303576 (42)	464744(5) 287897(30) 261977(36) 401295(13) 179866(57) 349234(21)	12769(67)	501327(6)	61.08(13)	134.42(59)
43 Hamirpur 117.33(74) 44 Mahoba 135.64(66) 45 Banda 135.64(66) 46 Chitrakoot 135.64(66) 47 Banda 124.74(70) 46 Chitrakoot 108.68(75) 47 Fatehpur 108.68(75) 48 Pratapgarh 142.56(60) 49 Kaushambi 138.08(64) 40 Kaushambi 132.25(68) 50 Allahabad 132.25(68) 51 Barabanki 132.25(68) 52 Allahabad 155.71(39) 53 MubedkarNagar 158.76(36) 54 Barabanki 158.76(36) 55 Bahraich 158.96(45) 56 Shrawasti 168.98(14) 57 Bahraich 153.69(45) 56 Shrawasti 140.36(63) 57 Bahraich 148.26(56) 58 Gonda 144.37(58)	294201(18) 235656(28) 343480(7) 174483(52)	345197 (33) 319648 (38) 428465 (18) 189633 (66) 411952 (22) 303576 (42)	287897(30) 261977(36) 401295(13) 179866(57) 349234(21)	1508(72)	509791(5)	63.36(10)	90.29(66)
44 Mahoba 135.64(66) 45 Banda 124.74(70) 46 Chitrakoot 108.68(75) 47 Fatehpur 142.56(60) 48 Pratapgarh 138.08(64) 49 Raushambi 132.55(60) 49 Raushambi 132.25(68) 50 Allahabad 152.71(39) 51 Barabanki 132.25(68) 52 Allahabad 155.71(39) 53 MabedkarNagar 158.76(36) 53 AmbedkarNagar 168.98(14) 54 Sultanpur 158.76(36) 55 Bahraich 158.76(36) 56 Shrawasti 168.98(14) 57 Bahraich 153.69(45) 56 Shrawasti 140.36(63) 57 Bahraich 148.26(56) 58 Gonda 158.86(74) 59 Stiddharth Nagar 144.37(58)	235656(28) 343480(7) 174483(52)	319648 (38) 428465 (18) 189633 (66) 411952 (22) 303576 (42)	261977(36) 401295(13) 179866(57) 349234(21)	59(75)	390865(21)	39.66(38)	107.44(63)
45 Banda 124.74(70) 46 Chitrakoot 108.68(75) 47 Fatehpur 108.68(75) 48 Fatehpur 142.56(60) 49 Raushambi 138.08(64) 40 Kaushambi 132.25(68) 50 Allahabad 155.71(39) 51 Barabanki 156.97(1) 52 Barabanki 156.97(1) 53 AmbedkarNagar 158.76(68) 54 Sultanpur 158.76(36) 55 Bahraich 158.96(14) 56 Shrawasti 168.98(14) 57 Bahraich 153.69(45) 56 Shrawasti 140.36(63) 57 Bahraich 148.26(56) 58 Gonda 158.86(34) 59 Siddharth Nagar 144.37(58)	343480(7) 174483(52) 200071520	428465 (18) 189633 (66) 411952 (22) 303576 (42)	401295(13) 179866(57) 349234(21)	82(74)	327429(32)	33.05(48)	69.85(70)
46 Chitrakoot 108.68(75) 47 Fatehpur 142.56(60) 48 Pratapgarh 138.08(64) 49 Kaushambi 132.25(68) 50 Allahabad 132.25(68) 51 Barabanki 132.25(68) 52 Allahabad 155.71(39) 53 Allahabad 155.71(39) 53 AmbedkarNagar 158.76(36) 53 AmbedkarNagar 158.76(36) 53 AmbedkarNagar 158.76(36) 54 Sultanpur 158.76(36) 55 Bahraich 153.69(45) 56 Shrawasti 140.36(63) 57 Bahraich 140.36(63) 58 Gonda 158.86(34) 59 Siddharth Nagar 144.37(58)	174483(52)	189633 (66) 411952 (22) 303576 (42)	179866(57) 349234(21)	54301(43)	438949(11)	51.45(25)	149.46(52)
47 Fatehpur 142.56(60) 48 Pratapgarh 133.08(64) 49 Kaushambi 133.08(64) 50 Allahabad 133.25(68) 51 Barabanki 132.25(68) 52 Allahabad 155.71(39) 52 Faizabad 158.76(36) 53 AmbedkarNagar 168.98(14) 54 Sultanpur 158.76(36) 55 Bahraich 153.69(45) 56 Shrawasti 140.36(63) 57 Bahraich 140.36(63) 57 Bahraich 140.36(56) 58 Gonda 158.86(34) 59 Siddharth Nagar 144.37(58)	1007120000	411952 (22) 303576 (42)	349234(21)	10000(69)	338897(28)	28.82(55)	93.38(65)
48 Pratapgarh 138.08(64) 40 Kaushambi 132.25(68) 50 Allahabad 155.71(39) 51 Barabanki 155.71(39) 52 Barabanki 156.7(1) 52 Barabanki 156.7(1) 53 AmbedkarNagar 158.76(36) 54 Sultanpur 158.76(36) 55 Bahraich 158.96(14) 56 Shrawasti 168.98(14) 57 Bahraich 153.69(45) 56 Shrawasti 140.36(63) 57 Bahraich 148.26(56) 58 Gonda 158.86(34) 59 Siddharth Nagar 144.37(58)	(07)1 / 6007	303576 (42)		79782(38)	422126(15)	69.13(6)	300.13(25)
49 Kaushambi 132.25(68) 50 Allahabad 155.71(39) 51 Barabanki 155.71(39) 52 Barabanki 156.97(1) 52 Faizabad 158.76(36) 53 AmbedkarNagar 158.76(36) 53 AmbedkarNagar 158.76(36) 54 Sultanpur 153.69(45) 55 Bahraich 153.69(45) 56 Shrawasti 140.36(63) 57 Balrampur 140.36(63) 58 Gonda 158.86(34) 59 Siddharth Nagar 144.37(58)	219851(35)		287524(31)	97806(27)	361629(27)	43.68(33)	422.22(8)
S0 Allahabad 155.71(39) 51 Barabanki 196.97(1) 52 Faizabad 158.76(36) 53 AmbedkarNagar 168.98(14) 53 AmbedkarNagar 153.69(45) 54 Sultampur 153.69(45) 55 Bahraich 153.69(45) 56 Shrawasti 140.36(63) 57 Balrampur 148.26(56) 58 Gonda 158.86(34) 59 Siddharth Nagar 144.37(58)	134468(64)	177839 (68)	162101(61)	44920(49)	185504(63)	23.69(64)	166.28(47)
51 Barabanki 196.97(1) 52 Faizabad 158.76(36) 53 AmbedkarNagar 168.98(14) 54 Sultanpur 153.69(45) 55 Bahraich 151.11(50) 56 Shrawasti 140.36(63) 57 Balrampur 148.26(56) 58 Gonda 158.86(34) 59 Siddharth Nagar 144.37(58)	307953(13)	479504 (15)	451108(7)	146624(13)	557074(4)	62.18(12)	445.32(7)
52 Faizabad 158.76(36) 53 AmbedkarNagar 168.98(14) 54 Sultanpur 153.69(45) 55 Bahraich 151.11(50) 56 Shrawasti 140.36(63) 57 Balrampur 148.26(56) 58 Gonda 158.86(34) 59 Siddharth Nagar 144.37(58)	258439(25)	509054 (11)	380245(16)	177969(4)	388587(22)	50.51(27)	370.41(16)
S3 AmbedkarNagar 168.98(14) 54 Sultanpur 153.69(45) 55 Bahraich 151.11(50) 56 Shrawasti 140.36(63) 57 Balrampur 148.26(56) 58 Gonda 158.86(34)	173025(53)	274698 (50)	225267(47)	98652(26)	260266(22)	27.01(60)	284.43(28)
54 Sultampur 153.69(45) 55 Bahraich 151.11(50) 56 Shrawasti 140.36(63) 57 Balrampur 148.26(56) 58 Gonda 158.86(34) 59 Siddharth Nagar 144.37(58)	166924(55)	282065 (49)	247273(40)	115800(22)	236203(45)	26.73(61)	284.13(29)
55 Bahraich 151.11(50) 56 Shrawasti 140.36(63) 57 Balrampur 148.26(56) 58 Gonda 158.86(34) 59 Siddharth Nagar 144.37(58)	177758(51)	273202 (51)	235207(45)	93415(29)	265881(54)	51.10(26)	510.62(3)
56 Shrawasti 140.36(63) 57 Balrampur 148.26(56) 58 Gonda 158.86(34) 59 Siddharth Nagar 144.37(58)	330856(10)	499963 (13)	456611(6)	160613(8)	486062(44)	65.61(8)	390.52(12)
57 Balrampur 148.26(56) 58 Gonda 158.86(34) 59 Siddharth Nagar 144.37(58)	129775(66)	182148 (67)	169762(58)	74576(39)	192887(62)	25.44(62)	150.58(50)
58 Gonda 158.86(34) 59 Siddharth Nagar 144.37(58)	212700(36)	315346(39)	239093(43)	107293(24)	324697(33)	40.18(37)	214.77(33)
59 Siddharth Nagar 144.37(58)	292270(19)	464295(17)	360956(19)	126893(18)	401038(17)	55.89(19)	407.79(9)
	235652(29)	340217(34)	327931(24)	160568(9)	297814(37)	49.38(29)	307.22(24)
60 Basti 137.39(65)	208963((37)	287085(47)	235519(44)	104787(25)	277039(41)	32.93(49)	287.20(27)
61 SantKabirNagar 169.42(13)	121266(68)	205449(63)	191309(53)	89950(32)	174810(65)	19.94(67)	191.03(40)
62 Mahrajganj 180.39(4)	201427(38)	363345(30)	330329(22)	167251(5)	290548(40)	38.19(40)	338.06(19)
63 Gorakhpur 154.92(41)	245009(27)	379565(27)	355964(20)	153077(11)	335217(29)	46.20(32)	402.78(11)

64kushinagar156.30(38)223789(31) $349789(31)$ $25097(38)$ $123282(19)$ $291469(39)$ $34.10(45)$ 65beoria162.62(24) $197848(40)$ $321739(37)$ $32067(27)$ $131548(17)$ $249376(48)$ $34.09(46)$ 66Aamgarb168.40(17) $301016(16)$ $506921(12)$ $472105(4)$ $211024(2)$ $424058(14)$ $50.31(28)$ 67Mau168.38(25) $124760(67)$ $202589(64)$ $189697(54)$ $87213(33)$ $171624(66)$ $2189(66)$ 68Ballia158.76(35) $220145(34)$ $202589(64)$ $189697(54)$ $87213(33)$ $171624(66)$ $2189(66)$ 69Jaupur165.38(25) $124760(67)$ $202589(64)$ $189697(54)$ $87213(33)$ $171624(65)$ $2189(65)$ 60Jaupur165.38(25) $220145(34)$ $202589(64)$ $189697(54)$ $87213(33)$ $171624(65)$ $2189(65)$ 70Jaupur165.97(52) $4770(21)$ $23271(22)$ $29256(36)$ $2188(65)$ $2188(65)$ $2188(65)$ 71Iambaur161.19(27) $273853(26)$ $49075(36)$ $372761(17)$ $148841(12)$ $333214(30)$ $4357(36)$ 71Iambaur161.19(27) $253853(26)$ $49075(58)$ $2778(46)$ $12877(62)$ $4357(65)$ $4357(65)$ $4357(64)$ $12877(69)$ 72Varabur161.19(27) $253853(26)$ $49075(58)$ $2778(94)$ $12774(23)$ $25374(46)$ $1597(69)$ 73Sant Ravidas Nagar $142.5(59)$	S. No.	Districts	Cropping intensity	Net sown area (hectare)	Gross cropped area (hectare)	Area under foodgrains	Area under rice hectare)	Geographical area	No. of small holding	No. of marginal holding
65Deoria $162.62(24)$ $197848(40)$ $321739(37)$ $302067(27)$ $11548(17)$ $249376(48)$ $3409(46)$ 66Azamgarh $168.40(17)$ $301016(16)$ $506921(12)$ $472105(4)$ $211024(2)$ $24936(14)$ $50.31(29)$ 67Mau $168.40(17)$ $301016(16)$ $506921(12)$ $472105(4)$ $87213(33)$ $171624(66)$ $2189(66)$ 68Ballia $158.76(35)$ $124760(67)$ $202589(64)$ $189697(54)$ $87213(33)$ $171624(66)$ $2189(66)$ 69Ballia $158.76(35)$ $220145(34)$ $24943(32)$ $323719(25)$ $116370(21)$ $299265(36)$ $21.89(66)$ 60Jampur $168.94(15)$ $220145(34)$ $34943(32)$ $323719(25)$ $116370(21)$ $299265(36)$ $21.89(66)$ 70Jampur $168.94(15)$ $220145(34)$ $34943(32)$ $323719(25)$ $116370(21)$ $299265(36)$ $21.89(66)$ 71Inholu $168.94(15)$ $22865(22)$ $470763(16)$ $372561(17)$ $148841(12)$ $332214(30)$ $4355(34)$ 71Chanduli $178.14(6)$ $132063(65)$ $235262(58)$ $372561(17)$ $148841(12)$ $332214(30)$ $4355(34)$ 72Varanasi $16.1.19(27)$ $253853(26)$ $237562(58)$ $372561(17)$ $148841(12)$ $332214(30)$ $4355(34)$ 73Varanasi $162.12(26)$ $92698(71)$ $153162(56)$ $277869(46)$ $107774(23)$ $25374(46)$ $16.376(69)$ 74Varanasi $162.27(56)$ 4	64	Kushinagar	156.30(38)	223789(31)	349789(31)	250997(38)	123282(19)	291469(39)	34.10(45)	377.02(14)
66Azamgarh $168.40(17)$ $301016(16)$ $506921(12)$ $472105(4)$ $211024(2)$ $424058(14)$ $50.31(28)$ 67 Mau $162.38(25)$ $124760(67)$ $202589(64)$ $189697(54)$ $87213(33)$ $171624(66)$ $51.89(66)$ 68 Ballia $158.76(35)$ $220145(34)$ $349493(32)$ $323719(25)$ $116370(21)$ $299265(36)$ $3189(67)$ 68 Ballia $158.76(35)$ $220145(34)$ $349493(32)$ $323719(25)$ $116370(21)$ $299265(36)$ $35.14(43)$ 69 Junpur $168.94(15)$ $220145(34)$ $349493(32)$ $323719(25)$ $116370(21)$ $299265(36)$ $35.14(43)$ 70 Junpur $168.94(15)$ $220145(34)$ $349493(32)$ $323719(25)$ $116370(21)$ $299265(36)$ $35.14(43)$ 70 Junpur $168.94(15)$ $227865(22)$ $470763(16)$ $438374(12)$ $33214(30)$ $4867(31)$ 71 Chandauli $178.14(6)$ $132063(65)$ $235262(58)$ $277869(46)$ $10774(23)$ $25374(46)$ $16.43(69)$ 72 Varanasi $162.12(26)$ $95698(71)$ $155142(71)$ $137557(65)$ $4509(48)$ $152678(67)$ $16.43(69)$ 73 SantRavidas Nagar $142.59(59)$ $6896(73)$ $97812(74)$ $137557(65)$ $26946(54)$ $103102(72)$ $11507(69)$ 74 Mirzapur $122.76(7)$ $19774(23)$ $12310(72)$ $11507(72)$ $11507(72)$ $11507(72)$ 74 Mirzapur $142.59(59)$ $6896(73)$ <	65	Deoria	162.62(24)	197848(40)	321739(37)	302067(27)	131548(17)	249376(48)	34.09(46)	329.14(21)
67Mau $162.38(25)$ $124760(67)$ $20289(64)$ $189697(54)$ $87213(33)$ $171624(66)$ $2189(66)$ 68Ballia $158.76(35)$ $220145(34)$ $349493(32)$ $323719(25)$ $116370(21)$ $29265(36)$ $2189(66)$ 69Jaupur $168.94(15)$ $278656(22)$ $470763(16)$ $438394(9)$ $145194(15)$ $399713(18)$ $48.67(31)$ 70Jaupur $161.19(27)$ $278656(22)$ $490179(24)$ $372561(17)$ $148841(12)$ $33214(30)$ $43.55(34)$ 71Chandauli $178.14(6)$ $132063(65)$ $235262(58)$ $227869(46)$ $107774(23)$ $253374(46)$ $16.43(69)$ 72Varanasi $16.2.12(26)$ $95698(71)$ $155142(71)$ $137557(65)$ $4509(48)$ $152678(67)$ $15.97(69)$ 73Sant Ravidas Nagar $142.59(59)$ $68596(73)$ $97812(74)$ $91580(65)$ $26946(54)$ $103102(72)$ $11.507(6)$ 74Mirzapur $132.77(67)$ $197274(41)$ $261930(53)$ $242174(42)$ $91612(31)$ $452608(12)$ $37.73(41)$ 75Sonbadra $119.33(72)$ $19737(41)$ $261930(53)$ $242174(42)$ $91612(31)$ $452608(12)$ $37.73(41)$ 75Sonbadra $119.33(72)$ $19737(41)$ $261930(53)$ $242174(42)$ $91612(31)$ $452608(12)$ $37.73(41)$ 75Sonbadra $119.33(72)$ $19737(41)$ $261930(53)$ $242174(42)$ $91612(31)$ $9130(27)$ $3177(27)$ $3177(51)$ 75Sonbadra </th <th>66</th> <th>Azamgarh</th> <th>168.40(17)</th> <th>301016(16)</th> <th>506921(12)</th> <th>472105(4)</th> <th>211024(2)</th> <th>424058(14)</th> <th>50.31(28)</th> <th>515.03(2)</th>	66	Azamgarh	168.40(17)	301016(16)	506921(12)	472105(4)	211024(2)	424058(14)	50.31(28)	515.03(2)
68Ballia $158.76(35)$ $220145(34)$ $349493(32)$ $323719(25)$ $116370(21)$ $299265(36)$ $35.14(43)$ 69Jampur $168.94(15)$ $27865(22)$ $470763(16)$ $438394(9)$ $145194(15)$ $39713(18)$ $48.67(31)$ 70Ghazhur $161.19(27)$ $273656(22)$ $409179(24)$ $372561(17)$ $148841(12)$ $333214(30)$ $43.55(34)$ 71Chandauli $178.14(6)$ $132063(65)$ $2335262(58)$ $227869(46)$ $107774(23)$ $253374(46)$ $16.43(69)$ 72Varaasi $162.12(26)$ $95698(71)$ $155142(71)$ $137557(65)$ $4509(48)$ $152678(67)$ $15.97(69)$ 73Sant Ravidas Nagar $142.59(59)$ $6859(73)$ $97812(74)$ $91580(65)$ $26946(54)$ $103102(72)$ $11.507(9)$ 74Mirzapur $132.77(67)$ $19774(41)$ $261930(53)$ $242174(42)$ $91612(31)$ $452608(12)$ $37.73(41)$ 75Sonbadra $119.33(72)$ $19774(41)$ $261930(53)$ $242174(42)$ $91612(31)$ $452608(12)$ $37.73(41)$ 75Sonbadra $119.33(72)$ $197274(41)$ $261930(53)$ $242174(42)$ $91612(31)$ $452608(12)$ $37.73(41)$ 75Sonbadra $119.33(72)$ $197904(56)$ $10815(65)$ $24066(21)$ $31305(22)$ $3197(27)$ $3197(51)$ 76Sonbadra $119.33(72)$ $197904(56)$ $10815(65)$ $24074(42)$ $91612(31)$ $91596(12)$ $3177(51)$ 76Sonbadra $119.33(72$	67	Mau	162.38(25)	124760(67)	202589(64)	189697(54)	87213(33)	171624(66)	21.89(66)	171.54(44)
60launpur $168.94(15)$ $278656(22)$ $470763(16)$ $438394(9)$ $145194(15)$ $39713(18)$ $48.67(31)$ 70dmazpur $161.19(27)$ $253853(26)$ $409179(24)$ $372561(17)$ $148841(12)$ $333214(30)$ $43.55(34)$ 71chandauli $178.14(6)$ $132063(65)$ $235262(58)$ $227869(46)$ $107774(23)$ $253374(46)$ $16.43(68)$ 72Varanasi $162.12(26)$ $95698(71)$ $155142(71)$ $137557(65)$ $4509(48)$ $152678(67)$ $15.97(69)$ 73Sant Ravidas Nagar $142.59(59)$ $6859(73)$ $97812(74)$ $91580(65)$ $26946(54)$ $103102(72)$ $11.507(0)$ 74Mirzapur $132.77(67)$ $197274(41)$ $261930(53)$ $242174(42)$ $91612(31)$ $452608(12)$ $37.73(41)$ 75Sonbhadra $119.33(72)$ $197374(50)$ $10612(31)$ $452608(12)$ $37.73(41)$	68	Ballia	158.76(35)	220145(34)	349493(32)	323719(25)	116370(21)	299265(36)	35.14(43)	311.38(23)
70 6 hazipur $161.19(27)$ $253853(26)$ $409179(24)$ $372561(17)$ $148841(12)$ $333214(30)$ $4355(34)$ 71 7 $178.14(6)$ $132063(65)$ $235262(58)$ $227869(46)$ $107774(23)$ $253374(46)$ $16.43(69)$ 72 16 $162.12(26)$ $95698(71)$ $155142(71)$ $137557(65)$ $45096(48)$ $152678(67)$ $15.97(69)$ 73 8 $162.12(26)$ $95698(73)$ $97812(74)$ $137557(65)$ $45096(48)$ $152678(67)$ $15.97(69)$ 74 $112.207(67)$ $19274(41)$ $261930(53)$ $242174(42)$ $91612(31)$ $452508(12)$ $37.73(41)$ 75 8 8 $119.33(72)$ $197274(41)$ $261930(55)$ $242174(42)$ $91612(31)$ $452508(12)$ $37.73(41)$ 75 8 8 $119.33(72)$ $19304(56)$ $166503(60)$ $34303(52)$ $80961(2)$ $31.97(51)$	69	Jaunpur	168.94(15)	278656(22)	470763(16)	438394(9)	145194(15)	399713(18)	48.67(31)	591.80(1)
71 Chandauli 178.14(6) 132063(65) 235262(58) 227869(46) 107774(23) 253374(46) 16.43(68) 72 Varanasi 162.12(26) 95698(71) 155142(71) 137557(65) 45096(48) 152678(67) 15.97(69) 73 Sant Ravidas Nagar 142.59(59) 68596(73) 97812(74) 91580(65) 26946(54) 103102(72) 11.507(0) 74 Mirzapur 132.77(67) 197274(41) 261930(53) 242174(42) 91612(31) 452508(12) 37.73(41) 75 Sonbhadra 119.33(72) 159904(56) 166503(60) 34303(52) 680961(2) 31.97(51)	70	Ghazipur	161.19(27)	253853(26)	409179(24)	372561(17)	148841(12)	333214(30)	43.55(34)	341.33(18)
72 Varanasi 16.2.12(26) 95698(71) 155142(71) 137557(65) 45096(48) 152678(67) 15.97(69) 73 Sant Ravidas Nagar 142.59(59) 68596(73) 97812(74) 91580(65) 26946(54) 103102(72) 11.50(70) 74 Mirzapur 132.77(67) 197274(41) 261930(53) 242174(42) 91612(31) 452508(12) 37.73(41) 75 Sonbhadra 119.33(72) 159904(56) 190815(65) 166503(60) 34303(52) 680961(2) 31.97(51)	71	Chandauli	178.14(6)	132063(65)	235262(58)	227869(46)	107774(23)	253374(46)	16.43(68)	160.48(49)
73 Sant Ravidas Nagar 142.59(59) 68596(73) 97812(74) 91580(65) 26946(54) 103102(72) 11.50(70) 74 Mirzapur 132.77(67) 197274(41) 261930(53) 242174(42) 91612(31) 452508(12) 37.73(41) 75 Sonbhadra 119.33(72) 159904(56) 190815(65) 166503(60) 34303(52) 680961(2) 31.97(51)	72	Varanasi	162.12(26)	95698(71)	155142(71)	137557(65)	45096(48)	152678(67)	15.97(69)	191.02(41)
74 Mirzapur 132.77(67) 197274(41) 261930(53) 242174(42) 91612(31) 452508(12) 37.73(41) 75 Sonbhadra 119.33(72) 159904(56) 190815(65) 166503(60) 34303(52) 680961(2) 31.97(51)	73	Sant Ravidas Nagar	142.59(59)	68596(73)	97812(74)	91580(65)	26946(54)	103102(72)	11.50(70)	166.58(46)
75 Sonbhadra 119.33(72) 159904(56) 190815(65) 166503(60) 34303(52) 680961(2) 31.97(51)	74	Mirzapur	132.77(67)	197274(41)	261930(53)	242174(42)	91612(31)	452508(12)	37.73(41)	209.14(37)
	75	Sonbhadra	119.33(72)	159904(56)	190815(65)	166503(60)	34303(52)	680961(2)	31.97(51)	119.69(62)

QUESTIONNAIRE



National Institute of Rural Development and Panchayati Raj, Hyderabad

Questionnaire for Farmers for

"A Study on Demonetisation and Its Impact on Indian Agriculture: A Critical Analysis"

This questionnaire is intended to investigate the short and long-term effects of demonetisation on agriculture and allied activities in rural India. The questionnaire consists of questions under which different viewpoints are listed out. Kindly choose the most appropriate one. Please note that the information collected will be kept confidential and used only for academic purposes.

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1. Details of the respondent

	Illiterate	Primary	Secondary	Interm	ediate	Degre
1.5 Educat	tion Level:					
	Genera	al OBC		SC	ST	
1.4 Comm	unity status:					_
1.3 Family	Size:	Adults:	Children	(< 15 y	/ears)	
1.2 Farmin	ng experience	years				
1.1 Farme	r's Name:	Gender A	ge			

1.6 Farm size of the respondent:

Marginal farmer	Small Farmer	Medium Framer	Large Farmer
(< 1 ha)	(1- 2 ha)	(2.01-10 ha)	(>10 ha)

2. Agriculture & Allied Sectors

2.1 Season-wise crops sown by the farmers

Season	Crop Name	Area (in acre)
Kharif		
Rabi		

2.2 Farmers lost/gained while selling their produce due to demonetisation

S. No.	Name of the Crop	Normal price (Rs./quintal)	Actual Price during or demonetisation (Rs./quintal)	Price differential (Rs./quintal)
1				
2				
3				

2.3 What are the challenges faced by the farmers during demonetisation?

Purchase of Seeds &	Purchase of Chemicals	Payments to Labour	Hiring & Purchasing
Fertilisers			of machines & tools

2. 4 Due to demonetisation, how much more did you pay for agricultural inputs while purchasing from dealers?

	No extra cost	1-10%	11-15%	Above 15%
			54	

2.5 How much time on farm activity did you lose due to demonetisation, which adversely impacted crop productivity?

0 to 6 days	7 to 10 days	Above 10 days
0.000 auys	7 to 10 duys	noove to days

2.6 Did you face any challenges while selling the produce during the demonetisation period?

Low Market Price	No Payments in Market	Produce was not sold	No Transport Facility
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2.7 How many days it took to receive payments for produce from buyers after demonetisation?

On the spot transaction	1 to 10 days	11 to 15 days	After 15 days

2.6 How did you receive the subsidies (farm/household) before the demonetisation (Nov, 2016)?

No Subsidy	Cash	Bank Account	Others (specify)

2.7 How do you receive the subsidies (farm/household) after the demonetisation (Dec 2016 to May 2018)?

No Subsidy	Cash	Bank Account	Others (specify)

2.8 Do you have livestock? (Yes/No)

If yes, how did you manage to purchase feed for the livestock?

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3.4 What is the frequency of using your bank account for payments/receipts?



3.5 Due to the demonetisation, have you adopted cashless/ digital transactions for agricultural and allied activities?



3.6 Which of the listed products/purposes would you use your bank account for?

Deposits	Money Transfer	Direct Benefit Transfer (DBT)

3.7 How did you pay for school fees/electricity bills/property tax/telephone bills, etc., before the demonetisation?





3.8 How did you pay for school fees/electricity bills /property tax/telephone bills, etc., after the demonetisation?



3.9 When the government implemented demonetisation on November 8, 2016, did it result in farmers not having access to cash (currency notes)?



3.10 How did you manage to buy the essential items during post demonetisation?

transactions Cash payments Local Merchants (Arogyasri scheme)	Cashless transactions	Cash payments	Local Merchants	Health services (Arogyasri scheme)
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3.11 For the purchase of essential items, how long was the credit available from local merchants/ traders during post demonetisation?

Less than a month	>1 < 3 months	Beyond 3 months
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3.12 Payment methods for agricultural operations

	Before Demonetisation			After Demonetisation		
Mode of payment	Inputs Fertilisers, etc.	Service Tractors, machines, etc.	Labour wages	Inputs Fertilisers, etc.	Service Tractors, machines, etc.	Labour wages
Borrowing on Social Capital						
Online transaction						
Barter						
Cash						
Others						
(specify)						

3.13 Post demonetisation, farmers kept sizeable amount of cash in their homes for any emergency purpose.



3.14 Farmers had access to higher credit during post demonetisation.

Agree	Neutral	Disagree



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