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Impact of Drought on the Livelihoods of Farmers in Western Odisha: A Comparison Between Drought and Non-Drought Years

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The agriculture of our country is increasingly affected due to the irregular climatic variations like drought, flood, etc. which is causing great distress to agriculture farmers financially, socially and emotionally during the period. The present study was undertaken to assess the impact of drought on livelihood of agriculture farmers in drought versus non-drought years in drought prone western Odisha. 194 respondents engaged in agriculture farming as their primary occupation were selected randomly from 3 districts of Western Odisha by stratified random sampling. Ten pertinent questions were selected after due consultation with different stakeholders of the agricultural sector, Govt. officials, University faculties and experts of the field to study the impact of drought. The questions were designed to be answered either in yes or no, which were related to the social, economic, food security and family responsibilities of the agricultural farmer and his family. It was found that the respondents were not able to meet the basic requirements in drought years which could be achieved in non-drought years through agricultural operations. This study also indicated that the basic needs like food, medicine and social needs are severely affected in the drought hit years as compared to the non-drought years. The famers were not even able to purchase medicines in drought hit years. The farmers showed their inability to take care of the basic needs of family during drought. The Government of Odisha may promote secondary sources of livelihood generating options like dairy farming, poultry farming, beekeeping, goat farming, etc., in the drought affected districts of Odisha along with agriculture for meeting basic needs of life during drought period.

Keywords: Agriculture; distress; drought; food security; Odisha.

1. INTRODUCTION

Droughts is a geo-hazard, which results in severe impact on socio-economic aspects of farming community [1]. It is a natural disaster of below-average rainfall in a specific region accounting for shortage in the water supply [2], whereas, agricultural drought refers to declined vegetation growth over a period of time due to shortage of rainfall in that area, high surface temperature and deficit in soil moisture [3]. According to NRC [4], drought is one of the most crucial climatic hazards affecting a large number of people worldwide. The drought affects the social, economic, political characteristics of an individual due to its bad consequences [5]. More than 50% of the region of India is reported to be exposed to severe drought [6] and farmers are confronting problems associated with unreliable rainfall and soils of low fertility [5] which are associated with drought. Droughts can have severe concerns for water use in agriculture and impacts on ecosystem adversely [7].

In India, Bihar, Uttar Pradesh, Karnataka, Kerala, Maharashtra and Odisha encounters drought more often in than other Indian states [8]. The Government of Odisha in 2018 declared drought in the state affecting total of 2,33,173 hectares of crop land in the nine districts such as Kalahandi, Nuapada, Bolangir, Baragadh, Deogarh, Jharsuguda, Sambalpur, Nabarangpur, Sundargarh, where farmers small and marginal farmers suffered from crop loss of 33% and above due to moisture stress in these districts [8].

In Odisha, failure of crops due to drought and growing indebtedness are the main reasons for farmer distress which sometimes insist the farmers to commit suicide. Unlike suicides in other states of India like Karnataka, Andhra Pradesh, Telangana and Maharashtra that are known to be related to cash crops such as sugarcane and cotton, Odisha farmers mainly grow paddy and the suicides have been by paddy cultivators. Most of them used to take loans from private and non-government agencies due to lack of access of these poor farmers to bank or cooperative institutions.

The agriculture sector in Odisha provides employment and sustenance to more than 60 per cent of the population. Cereals constitute more than 90 per cent of total production of food grains and paddy continues to be the dominant crop. However, it is observed that, there has been a gradual shift from paddy to cash crops and from local variety of paddy to High Yielding Variety (HYV) paddy in the state of Odisha. The agriculture sector in Odisha is susceptible to natural calamities like cyclones, droughts and flash floods which results in wide annual fluctuations in the agricultural production. The share of agricultural economy to Gross State Domestic Product (GSDP) has been going down

over the years. Moreover, there are fluctuations in agricultural income in the state over the years, triggered by environmental factors. In recent decade, the state economy of Odisha has witnessed a sectorial shift from agriculture to towards industry and services sectors. Besides these shifts, agriculture is still being considered as a priority sector for the State. Erratic *monsoon* in the state used to destroy the crop leaving the farmer with nothing for sustenance and unable to repay the loan. Suicides and migration of farmers have been reported from across the state, but a very large percentage (70%) found in the western Odisha districts of Bolangir, Nuapada and Sambalpur and Bargarh. The sharecroppers don't get any benefits such as compensation or relief announced for farmers by the Government of Odisha, rather it goes directly to the landlords. Tenants cultivating the agricultural land on lease cannot access loans through credit institutions or insurance and other support services provided by the Government. They are not assured of the Minimum Support Price (MSP) without the farmer's Identity card and remain at the mercy of middlemen and the corrupt procurement agencies. Fearing inability to repay private moneylenders after deficit rainfall, farmers of rainfed and drought areas of western Odisha were reportedly falling into the clutches of labour agents and are forced to migrate from Kalahandi, Nuapada and Bolangir districts to neighbouring states as labourers to work in brick kilns. The present study was conducted to know the impact of drought on livelihood of agriculture farmers in drought versus non-drought years.

2. MATERIALS AND METHODS

The western part of Odisha comprises of districts of Sambalpur, Bargarh, Kalahandi, Nuapada, Balangir, Sonepur, Deogarh, Jharsuguda and Sundargarh. Out of these districts, Balangir, Kalahandi and Nuapada face frequent droughts, and small and medium farmers don't have much options of secondary source of income during the period of drought [9]. Considering these facts, the above three districts were selected purposively for the study. The data were collected from one block from each district namely Bangomunda block of Balangir, Golamunda block of Kalahandi and Boden block of Nuapada district. These three blocks were proposed as these blocks face severe drought and there is no other source of alternative livelihood for the farmers during the period of drought. These blocks lack any major irrigation project or any industry to provide livelihood to the farmers during drought. Moreover, these blocks are adjacent to each other in a patch which will make the data collection more relevant and easier. For the study, 194 respondents with agriculture as the primary occupation were selected in a stratified random sampling method. A pilot study was conducted, and a relevant questionnaire was finalized after being consulted, discussed, cross checked, and verified with experts, stake holders related to agriculture after judging each item with possible linkage as per the objective set forth in the study. Repeated verifications and proper measures were taken to avoid vague and ambiguous responses that may distort the information flow. Close ended questions were put in the schedule to get appropriate response. For collection of data with respect to the situation, 10 statements were selected and validated by highly experienced professors and exports of Veterinary and Animal Husbandry Extension Education Departments of College of Veterinary Science and Animal Husbandry, OUAT and West Bengal as well as Animal Husbandry Department, Government of Odisha. The responses of the respondents were recorded in the form of dichotomous scale and data mentioning "Yes or No". Scoring was done as follows.

Sl. No	Response	Score
1	Yes	2
2	No	1

Mean Score is calculated to know the shift of the response towards yes and no as well as this would give an indication on opinion of the majority.

$$\text{Mean Score} = \frac{\text{Total score obtained}}{\text{Total No. of respondents}}$$

Percentage was used in descriptive analysis for making simple comparisons between two responses. For calculating percentage, the frequency of a particular cell was multiplied by 100 and divided by the total number of respondents in the particular category to which the cell belonged.

$$\text{Percentage } (\%) = \frac{\text{No of respondent s}}{\text{Total No. of respondent s}} \times 100$$

3. RESULTS AND DISCUSSION

Drought has both direct and indirect impacts. Drought directly affects production, health, livelihoods, assets and infrastructure that

contribute to poverty and subsequently food insecurity [2,9]. However, the indirect effects of drought on environmental degradation and reduced household welfare through its impact on crop and livestock prices could be larger than its direct effects [10]. In the selected villages, 194 respondents with Agriculture as their primary livelihood generating option were selected and asked 10 questions related to both drought as well as in non-drought situations and the responses were compared. Drought affects the complete lifestyle and livelihood of agricultural farmers. In this study it was found that 93.81 % of farmers reported that the total need of the staple food for one year of my family was not possible to meet during the drought year whereas 20.62 % farmers reported the same for non-drought period. Even though it is obvious that Agriculture is dependent on the rain fall, but provision of irrigation facilities may help reduce the effect of drought on agricultural farmers [8]. This study again gives an idea that farmers of western Odisha are completely dependent on the rainfall for their agricultural practices. Nevertheless, provision of secondary irrigation channels and/or community water sources for agriculture may also reduce the distress of farmers in drought as well as in low rainfall years. 93.81% of farmers reported that they don't get food items for their family members by selling paddy, rice, grams and other agricultural products they produce during drought period whereas 20.62 % farmers reported the same during the non-drought period. The mean score in drought and non-drought years for statements 1 and 2 were 1.06 and 1.79 respectively which signifies that in drought year more respondents went against the statement whereas in non-drought years they mostly agreed to the statement i.e. they get their food from their own agriculture productions.

95.88% respondents in drought year were unable to meet their daily requirements of the family from the money they get by selling agricultural products that they produced, signifying their condition during the drought affected years, whereas 69.59% were able to meet the above in non-drought years with a mean score of 1.04 and 1.70 for the above statement. Unfortunately, 95.84% of respondents during drought years were not able to purchase Medicines for any ailment of their family members which were usually purchased from the money raised after selling the agricultural produce, on the contrary 74.74% respondents could afford the medicines during non-drought years with a mean score of 1.05 and 1.75, respectively in drought versus non-drought years. On enquiring whether the respondent go for repair of his house with the money he gets from agricultural products or byproducts like paddy straw, wheat stover etc. in drought year, 95.88% respondents said no, whereas in non-drought year 73.20% respondents said yes, with a mean score in drought and non-drought condition was 1.04 and 1.73, respectively. 5.68% respondents agreed and remaining 94.32% disagreed on being questioned whether his agricultural production provides him a status to be credit-worthy in the village in drought conditions, however in non-drought situations 83.50% agreed and remaining 16.50% said no to the same question. 97.94% of respondents reported that they failed to achieve food security through agricultural production during drought years whereas the same was reported by 20.10 % respondents in the non-drought year. This result again indicated that the agricultural farmers failed to achieve the food security for their family during the drought years. 93.39% of respondents were not able to able to meet the expenses of their family members when they attend social gatherings in the village in drought years whereas 29.90 % of respondents failed to do the same in the same in the non-drought years. Almost all (96.39%) the agriculture farmers interacted showed their incapability to meets the expenses of his social obligations and rituals out of the income they get from agriculture whereas the same in non-drought years was 26.29% with a mean score of 1.04 and 1.74, respectively which again indicated the social condition of the agricultural farmers during drought affected years. The study conducted by Swain et al. also reported that farmers were not able to meet their household food requirement and thus drought affects the agriculture farmers severely [11].

From the above findings presented in Table 1, it is observed that the respondents are not able to meet the basic requirements of life in drought years which they could meet in non-drought years by the agricultural operations. This study also indicated that the basic needs like food, medicine and social needs are severely affected in the drought hit years as compared to the non-drought years. Thus, if facility of water either through borewell or community water provisions can be made by the Government, then the agricultural farmers' distress can be reduced even in drought affected years. In a drought-prone area, animal husbandry alone or in combination with other occupations can provide financial assurance to the farmers [9].

Table 1. Distribution of respondents as per their livelihood from agriculture during drought year and non-drought year in western Odisha

Sl. No	Constraints	Response					
		Drought year			Non-drought year		
		YES Count (%)	NO Count (%)	MEAN SCORE	YES Count (%)	NO Count (%)	MEAN SCORE
1	The total need of the staple food for one year for my family is being met from the production of my agricultural land	12 (6.19)	182 (93.81)	1.06	154 (79.38)	40 (20.62)	1.79
2	I get other food items for my family by selling paddy, rice, grams and other agricultural products of my production	14 (7.22)	180 (92.78)	1.07	143 (73.71)	51 (26.29)	1.74
3	The daily needs requirement of my family is being met from the money I get by selling my agricultural products	8 (4.12)	186 (95.88)	1.04	135 (69.59)	59 (30.41)	1.70
4	I purchase clothes for my family out of sale proceeds of my agricultural products	5 (2.58)	189 (97.42)	1.03	152 (78.35)	42 (21.65)	1.78
5	Medicines for any ailment of my family members are usually purchased from the money I keep after selling of food grains like rice, black gram etc.	10 (5.15)	184 (94.85)	1.05	145 (74.74)	49 (25.26)	1.75
6	I go for repair of my house with the money I get from agricultural products or by products like paddy straw, wheat stover etc.	8 (4.12)	186 (95.88)	1.04	142 (73.20)	52 (26.80)	1.73
7	My agricultural production provides me a status to be credit-worthy in the village	11 (5.68)	183 (94.32)	1.06	162 (83.50)	32 (16.50)	1.84
8	My agricultural production provides me a sense of food security for my family	4 (2.06)	190 (97.94)	1.02	155 (79.90)	39 (20.10)	1.80
9	As my vocation is agriculture, I am able to meet the expenses of my family members when they attend social gatherings in the village	6 (3.09)	188 (96.91)	1.03	136 (70.10)	58 (29.90)	1.70
10	I meet the expenses of my social obligations and rituals out of the income I get from agriculture	7 (3.61)	187 (96.39)	1.04	143 (73.71)	51 (26.29)	1.74
		Total Mean Score in Drought year		10.44	Total Mean Score in Non-drought year		17.56

(The values in yes and no columns represents the number of respondents opined yes or no and corresponding percent is represented in the bracket).

4. CONCLUSION

Western Odisha is frequently affected by drought and affects the agricultural farmer's economic, social and emotional wellbeing to the extent that their food security, social obligations, basic family needs like medicines, house repairs etc. cannot be made during drought years. There is wide scale migration of drought affected small and marginal farmers to neighbouring states for search of livelihood. The Government of Odisha may make irrigation facilities available in the affected districts besides providing secondary sources of income like goat, poultry and dairy farming, etc., to check the distress migration of farmers during drought period.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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