
IMPACT OF FLOODS ON FOOD SECURITY AND LIVELIHOODS OF IDP TRIBAL HOUSEHOLDS: THE CASE OF KHAMMAM REGION OF INDIA

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ABSTRACT: *Similar to several agricultural economies, India is prone to erratic rainfall in some of its regions. Apart from scanty rainfall; heavy rains leading to unexpected floods is common in this country. These unexpected floods can create devastating impacts on food security of the people and their livelihoods. These impacts would be severe on the internally displaced people staying particularly in the tribal regions. The present paper is an attempt to study the impact of unexpected floods on food security and livelihoods of internally displaced people (IDPs) of Khammam region of Andhra Pradesh in India. A simple descriptive methodology including a binary logit model has been used to verify the impact on food security and livelihoods of IDP households in the study area, Bhadrachalam. The study reveals that the impact of floods could be seen across all the variables affecting livelihoods in all the families living in 21 settlements. Floods have caused extensive damage on the roads and bridges in the Bhadrachalam region virtually delinking the areas and rendering them impassable. The damaged infrastructure impacted negatively on the delivery of services such as health, agriculture and education in the area. The binary logit model estimated on the basis of survey data of 124 IDP households indicates that floods had a negative impact on food security by reducing the purchasing power, wage income, resulting in food shortages, increasing borrowing and altering the food habits and resulting in sickness among households. In view of these findings some policy interventions have been suggested.*

KEYWORDS: Floods, IDPs, food insecurity, livelihoods, logit model and India.

INTRODUCTION

In rain dependent agricultural economies, erratic rainfall causing unexpected floods can create devastating impacts on food security of the people and their livelihoods. Floods are the most common natural disaster causing loss of life and economic damage in various parts across the globe. They result in loss of property, destruction of the environment and many times lead to loss of life. The internally displaced people (IDP) are more vulnerable to such disasters as they live in hazardous areas in absolute poverty and with little or no knowledge of disaster management. Floods in India particularly, on Godavari belt are not a new phenomenon and whenever heavy floods hit, the Khammam district would be one of the severely affected regions owing to its

geographical location with respect to the topography of the Godavari River. Floods impact on both individuals and communities, and have social, economic, and environmental consequences. The consequences of floods, both negative and positive, vary greatly depending on the location and extent of flooding, and the vulnerability and value of the natural and constructed environments they affect. In this paper an attempt is made to study the impact of floods on the livelihoods and food security of the internally displaced people of Khammam region of Andhra Pradesh state in India. Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life (FAO, 2002). We have studied the food security of the the internally displaced people (IDP households) using this concept at the family level with individuals within these households as the focus of concern. The internally displaced people are those persons or groups of persons who have been forced or obliged to flee or to leave their homes or places of habitual residence, in particular as a result of or in order to avoid the effects of armed conflict, situations of generalized violence, violations of human rights or natural or human-made disasters, and who have not crossed an internationally recognized State border (UNHCR 2011).

As per the estimates of various Civil Society Organizations (CSOs) and human rights organizations about 50,000 tribal people have migrated to the border areas of Andhra Pradesh to escape the violence in Chhattisgarh and settled in 203 settlements. The situation of these people, especially children and women, is very pathetic. They have built temporary shelters in forest areas of Khammam district, especially in Bhadrachalam division and living there. The local people consider them as cheap labor and also see them as a threat to their livelihood. In some areas, the displaced people have cleared off the forest and started cultivating some crops such as ragi, jowar, paddy and other vegetables. The forest officials are merciless and use several measures to get evicted of them.

The heavy late monsoon associated with a low pressure in Bay of Bengal led to a heavy rainfall in some parts of Andhra Pradesh in India during July- Aug 2013. Heavy rains caused massive flooding and inundation of land, widespread damage and loss of homes and livelihoods, destruction of standing crops, and damage to infrastructure across in and around the study area, Bhadrachalam of Khammam region. The second spell of heavy rains during August in the same region resulted in flash floods causing massive devastation in 30 villages and thousands of acres along the course of the Godavari River. The water levels in the river began to rise rapidly from 43 ft, the first warning mark, at 9 am on Thursday 8th August to 59.3 feet to 60.5 ft at 8 pm on Friday and on Saturday morning 10th August, 2013 the water level as touched 61 feet. Flood water has risen as inflow into the river increased. The overflowing streams cut the road connectivity to several villages in and around the study area. A Continuous downpour and Heavy rainfall ranging from 4 to 8 centimeters has been recorded across the district and the officials in the districts were kept on high alert to shift the people to safer places as the flood waters entered homes in Bhurgampadu Mandal, and around 35 houses were submerged in floods; around 200 houses on the shores of Shabari in chintur Mandal fell in danger. People were shifted to the nearby safe places. The National Disaster Management Authority has responded and sent three teams to Khammam district to rescue people.

The Khammam district, which is a part of Telangana region of Andhra Pradesh state in Southern India, is situated between 16 45` and 18 35` of Northern Latitude and 79 47` and 80 47` of the Eastern Longitude. The district is bounded on the North by Chattishghar and Orissa states, on the East by East Godavari and West Godavari, on the South by Krishna and on the West by Nalgonda and Warangal districts. The initial provisional data released by census India 2011, shows that density of Khammam district for 2011 is 175 people per sq. km. The Khammam district has a tribal population of 5, 58,958 people, which is about 13.29% of the total tribal population of the state, Andhra Pradesh. The tribal population of Khammam consists of Koya, Konda Reddis and Lambadas. Administratively, Khammam District has been divided in to four Revenue Divisions viz. Khammam, Kothagudem, Palwancha and Bhadrachlam. The climate in the district is generally dry and is very hot in May with mercury rising up to 52 C. Normally the temperature varies from 41 C in summer to 16 C in winter due to lack of either land for cultivation or wage labor work. The study is pursued with the following objectives:

The main objective of the study has been to determine the impact of the floods on IDP households in terms of food security and livelihoods in all the 21 settlements in Bhadrachalam division of Khammam district. More specifically the study is pursued with the following objectives:

1. To assess the impact of floods on IDP households in terms of socio- economic lively hoods.
2. To assess the food security situation and to study the impact of floods on food security along with other socio economic variables.
3. To assess the need for emergency assistance of food, water, shelter, medicine, and medical care.
4. To access the need for restoration of critical facilities, basic utilities and services for IDP settlements and households directly/indirectly affected by floods.
5. To make some policy suggestions.

The paper is structured as follows: A brief review of the empirical literature available on the subject is presented in next section. The third section is on data, sample selection and size and the methods used in estimating food security causation. Data analysis and findings are presented in section four. The conclusions and policy suggestions are presented in the final section.

BRIEF REVIEW OF EMPIRICAL LITERATURE

Climate change affects countries' economies and food security through a variety of channels. Rising temperatures and changes in rainfall patterns affect agricultural yields of both rains fed and irrigated crops. The unchecked rise of sea levels leads to loss of land, landscape, and infrastructure. Mohapatra and Singh (2003) claim that, among all natural disasters, floods are the most frequent to be faced in India. On an average, floods have affected about 33 million persons between 1953 and 2000. Based on Sen's "entitlement approach," Devereux (2007) applies a framework to the recent food crises in Malawi and concludes that policy responses can compensate for the failures of production-based, labor-based, trade-based and transfer-based entitlements. A higher frequency of droughts may impair hydropower production and an increase in floods can significantly raise public investment requirements for physical infrastructure (Stern 2006; World Bank 2007; Garnaut 2008; Yu, Thurlow, et al. 2010; Yu, Zhu, et al. 2010). Such

sector-level impacts will have knock-on effects on other sectors and thus influence economic growth, food security, and household incomes. Studying 20 African countries Theron (2007) concluded that floods had several socio economic and political implications and some of these included the displacement of people. Sinclair and Pengram (2003) have stated that floods cannot be prevented but their devastating effects can be minimized if the advanced warnings are available. Rashid (2000) concludes that women and children are the most vulnerable during the occurrence of floods. Ninno, et al (2003) studied the floods in Bangladesh and concluded that the floods have affected food security of millions of households. Mitiku et al (2012) have computed food security index using FGT model and revealed that about 36 per cent of Shashemene district in Ethiopia are food insecure. In a similar study in North Wello region of Ethiopia Ramakrishna et al (2002) found that 37 per cent households are food insecure.

Droughts and floods undermine farm yields and the national harvest, reducing household and national food availability, and agricultural income derived from crop sales. Poor harvests threaten food security and livelihoods from household to national level, to varying degrees according to the extent that the family or nation depends on agriculture for its food and income. Households and economies that are more diversified are less vulnerable to these direct impacts of droughts and floods, provided that their alternative income sources are neither correlated with rainfall nor directly or indirectly dependent on agriculture (i.e., vulnerability falls to the extent that complementary sources of income and food are non-covariate. The literature review suggests that there are many studies across several countries on the effects of floods on households in terms of socio economic and political variables. However there are not many studies on internally displaced people in terms of their livelihoods and food security. The present study is an attempt in this direction and verifies the impact of floods on food security and lively hoods of IDP households along with other socio economic variables using appropriate empirical models.

DATA AND EMPIRICAL METHODS

We have collected primary data through field survey during August, 2013 (from 17th to 23rd August) across six revenue mandals in Khammam district of Andhra Pradesh. The data are collected by the well trained field research team. Community-level assessment has been adopted for the study. The survey was based on the key informant interviews. Primary data collection (community level assessment) has been undertaken selecting a sample on random basis. The total sampling frame includes all the 21 flood affected IDP settlements of the study area. These settlements are situated in 5 revenue mandals in Bhadrachalam division of the Khammam district and are chosen for the impact assessment. The total flood affected population was 2268 individuals forming 559 households in the 21 IDP settlements of the area. The required sample size has been estimated as 124 households. The findings are cross verified with the analysis of satellite imageries, local media coverage reports and government data including the information from local authorities. The required data have been collected directly by the field team, a pool of trained assessment enumerators through interviews with the key informants which is supported by the direct observation of the affected settlements. A simple schedule has been designed to verify the objectives and an analysis has been made using descriptive procedures along with a binary logit model to assess the food insecurity and livelihoods impacts.

To examine the factors determining food security a binary logit model has been used. The model uses food insecurity as the dependent variable that is dichotomous taking a value of 1 if the household is food insecure; 0 otherwise. The information, which identifies the food secure from the food insecure, was obtained by comparing the total food calorie available for consumption in the household per Adult Equivalent (AE) to the minimum level of subsistence requirement per AE based on 2100 calories intake. The procedure of Foster *et al.* (1984) was used in the computation of incidence of food insecurity. The Foster-Greer-Thorbecke (FGT) measure is given as:

$$FGT(a) = \frac{1}{n} \sum_{i=0}^q \left[\frac{(c - y_i)}{c} \right]^a$$

Where, n is the number of sample households; y_i is the measure of per adult equivalent food calorie intake of the i th household; c represents the cut off between food security and food insecurity households (expressed here in terms of caloric requirements 2100kcal); q is the number of food-insecure households; and a is the weight attached to the severity of food insecurity. In FGT index, $y_i \geq c$ that the specified household is food secure. Using this method we compute the head count ratio which describes the percentage of sampled households whose per capita income or consumption is below the predetermined subsistence level of energy (2100kcal), means $FGT(a=0) = q/n$. The binary logit model uses various socio economic variables as the factors influencing food insecurity.

$$P_i = E \left(Y = \frac{1}{X_i} \right) = \frac{1}{1 + e^{-\left(\beta_0 + \sum \beta_k X_{ik} \right)}} \quad (1)$$

Let

$$Z_i = \beta_0 + \sum \beta_k X_{ik} \dots \dots (2)$$

Then

$$P_i = \frac{1}{1 + e^{-Z}} \dots \dots (3)$$

As Z_i ranges from $-\infty$ to $+\infty$, P_i ranges from 0 to 1 and P_i is non-linearly related to Z_i .

In estimable form, the model is,

$$L_i = \text{Ln} \left(\frac{P_i}{1 - P_i} \right) = Z_i = \beta_0 + \sum \beta_k X_{ik} \dots (4)$$

Where, L is the logit. It shows how the log odds in favor of food insecurity as the respective independent variable changes.

The estimable form of the model may be presented as: is

$$L_i = \text{Ln} [P_i / (1 - P_i)] = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \varepsilon_i \quad (5)$$

Where:

L_i = log of the odds ratio. It shows how log odds in favor of food insecurity change as the respective independent variable changes by a unit.

P_i = Probability that a household is food insecure

β_0 = constant term

β_k = coefficients

X_k = for $K = 1 \dots 10$, are the independent variables and subscript i denotes i^{th} observation.

K_1 = Wage decline, declined=1, otherwise=0

K_2 = sickness, sick=1, otherwise=0

K_3 = Public Distribution system proxied as Ration card possession, if household has ration card=1, otherwise=0

K_4 = Floods, impact severe=1, otherwise=0

K_5 = Female household, female=1, male=0

K_6 = Borrowing, increase in borrowing=1, otherwise=0

K_7 = Age of the household

K_8 = Changed food habits, changed to lesser variety=1, otherwise=0

K_9 = Declined purchasing power, declined=1, otherwise=0

K_{10} = Education, number of schooling years

The model is based on the following hypotheses:

1. Decline in wage income of the IDP households had positive impact on their food insecurity.
2. Sickness as a result of sudden floods had increased food insecurity.
3. Public distribution system proxied as the ration card possession had a negative impact on food insecurity.
4. The sudden occurrence of floods had a positive impact on food insecurity.
5. The demographic variables, sex and age had positive impact on food insecurity among the households.
5. Access to adequate credit and market information are institutional factors that have positive influence on food security.
7. Change in food habits to the lower varieties of food and food insecurity are positively associated.
6. Declined purchasing power and food insecurity are positively associated.
9. Level of education and food insecurity are negatively associated.

EMPIRICAL FINDINGS

The present study exclusively concentrated on assessing the impact of damage caused by floods on IDPs in Khammam district of Andhra Pradesh. The recent floods in Godavari affected 559

households consisting of 2668 people in 21 settlements in Bhadrachalam division, the study area. Incessant rain fall and multiple spells of floods, the routine of IDPs households is completely wrecked. As a result of these heavy floods, IDPs have lost wage options for about a month. Impact of floods is seen in the form of loss of wage works in adjacent tribal villages agricultural lands as these lands are filled with flood water that has resulted in household level food insecurity. 559 IDP households of these 21 IDP settlements have lost around 30 days of wage work. A rough estimate indicates that each family has lost about Rs 7200 (computed as $\text{Rs}120 \times 2 \text{ persons} \times 30 \text{ days}$) resulting in reduced purchasing power as well as productivity of IDP households leading to food insecurity. These households cultivate podu lands on the small patches tilled in forest area. In other non-patta lands they cultivate paddy and maize and these crops got washed away due to floods. This problem was severe in “Chalam palem and Kukunoor’. Due to production and the wage loss food insecurity got worsened in these places. At chalam Palem settlements, IDPs are forced to approach the local money lender (often a local farmer) for borrowing a sum of Rs. 3000-5000. The borrowed amount depends on size of the household. The lending mechanism has an obligatory repayment mechanism. Borrowing IDPs family has to work in the fields of money lender at a reduced or perhaps subsidized wage per day. They are paid Rs. 100 per day where the normal wage is above Rs 150 per day. This kind of obligatory lending and repayment mechanism reduced the purchasing and production power of these households. Similarly, some of the livestock including small ruminants died in Chepurucheruvu because of flood borne deceases. The IDP settlements are located in Reserve Forest and do not have proper road facilities. The region is malaria endemic and heavy rainfall and floods caused Health and sanitation problems. As water got logged in many places in IDP settlements, these water bodies can turn into perfect breeding ground for vector borne deceases. .

Wage loss

Most assessed IDP settlements and households are dependent on neighboring revenue, villages for getting daily wages in agricultural fields and allied sectors. As flood waters did not recede for prolonged period, wage options were not available in these areas. When we compared the wage situation before and after, the wages have declined and this decline was found to be statistically significant (at 5% level) as 54.8% of the sample households reported decline in the wages. Second spell of heavy rains in the region resulted in flash floods causing massive devastation in 130 villages and thousands of acres along the course of the Godavari River. The water levels in the river began to rise rapidly from 43 ft, the first warning mark, and in couple of days it reached 61 feet. The overflowing streams cut the road connectivity to several villages in and around Bhadrachalam division. Continuous downpour and Heavy rainfall ranging from 4 cms – 8 cms is recorded across the district during the later four days.

Health

Most of the settlements did not experience immediate adverse impact of the floods on health. In the study area, around 48.4% people have reported health problems cropping up after the flood shock. However, the effects are expected to manifest when the water recede and stagnate. In some settlements such as Jaggaram in Bhadrachalam mandal and regualcheruvu in kuknoor mandal, there was an increase in malarial cases compared to a month before the floods. In view

of the expectation in the increase in disease, there is a need to put in place some epidemic preparedness measures in all the affected IDP settlements.

Water and Sanitation

Floods posed a high risk of water contamination in the affected areas. The settlements had high risk of water contamination as running springs and streams, which are the major source of drinking water, had the risk of contamination.

Infrastructure and Transport

The effects of floods on infrastructure were severe in the study area as the surroundings of Bhadrachalam are completely marooned and long stretches of roads are damaged in Burghampahad area completely delinking the other side of the world for some period. These two areas were severely got impacted due to the loss of infrastructure, which includes roads and bridges rendering them impassable. The damaged infrastructure impacted negatively the delivery of services such as health, agriculture and education in these areas. Some of the habitations in regular villages in these mandals had collapsed due to the heavy rains and floods though; the situation was exacerbated by the poor standards of the buildings.

Agriculture and livestock

The impact of the floods on agriculture was more felt in Bhadrachalam and Kukunoor mandals as most of the crops in these areas were washed away and/or submerged.

Duration of Floods

Incessant rains and heavy downpour ranging from 4 cms – 8 cms has been recorded across the district. It is also recorded that flood water level has risen by 4 feet and crossed 61 feet mark at Bhadrachalam. It is estimated that around 36000 people (people from revenue villages) were affected in 14 mandals of Khammam district during recent floods. 27,500 acres of standing crops were ruined due to floods. These figures do not reflect IDPs and they were not covered under any kind of Relief activities.

Who suffered most?

Natural disasters like fire, Floods and mudslides in general, impact human beings, live stock infrastructure, and transportation systems, as well as energy, food, and water supplies. The affected people would likely to face greater challenges than others. Our survey reveals that, about 63.5 percent people have been affected among the IDP households. And 18.3 percent respondents have felt that children were more affected and these numbers were 9.5 and 4 for female and male households respectively. We have not carried a statistical analysis to study the impact on children but the cognitive inference indicates that Floods have the potential to impair children's emotional, intellectual and physical development.

How floods impacted the livelihoods?

We have recorded the perceptions of sample households on how the floods impacted the livelihoods of IDP households using an interview method with a structured questionnaire. The responses are presented in the following table:

Table 1: impact of floods on livelihoods of IDPs

Variable	% of households
Wage loss occurred	54.0
Sickness increased	47.0
Food exhausted	47.6
Food habits got altered	31.7
Purchasing power declined	43.5
Not able to feed children sufficiently	42.7
Crops got destroyed	52.4
Seed got destroyed	31.5
Livestock perished	35.5
Borrowing increased	24.2

Source: Survey data

It is apparent from the above chart, that the majority of respondents have felt the impact of the floods terms of wage loss, increasing sickness, reducing food availability, changing food habits, reducing purchasing power, food deficiency for the children, damage to the crops and seeds and the loss of livestock implying the decline in the overall entitlements.

How long food stocks lasted?

IDP households generally do not keep food stocks for a longer period. Most of them buy required groceries on daily basis or at least once in two days from the petty shops while returning to home from wage work. Our analysis reveals that about 40 per cent of the respondents had food stocks which were sufficient for only 2-3 days. The survey also reveals that there is little or no disposable income available with the IDP households to purchase food commodities from the markets or nearby places. About 96 per cent households had any income (money) to buy the food commodities. These households had to borrow money to a varying extent from local sources to buy food items.

Food Intake

The Godavari Floods had badly affected the food intake of IDP households. About 42.7% respondents revealed that they could not feed their children due to the exhaustion of household food stocks. And, 31.7% households have reported that they had to change their food habits by resorting to wild leaves which are seldom consumed otherwise. The average quantity of meals by adults has come down drastically during the prolonged flood period. This drastic reduction in food intake can be attributed to the lack of income to buy food from market.

Role of PDS

Out of 124 respondents, 94 respondents (76%) admitted that they have PDS cards. Out of which, 79 households (84%) have accessed oil and 69 (73%) households have accessed rice. Wheat is

the least accessed food commodity that was accessed by 49 households (52%). However, this refers to the pre flood situation, and during the floods and in the post scenario, there was no support extended by the local authorities.

Forced Borrowing

In case of floods and other natural disasters, victims do not have any option to gather required food items except borrowing money. Though, borrowing money is not a new phenomenon among IDPs, during the recent floods, majority of households had borrowed money from local money lenders (usually farmers). It is found that as many as 69% of households had borrowed money up to a sum of Rs 4000. However, only 10 respondents (8%) have reported that they have borrowed more than Rs 4000. Borrowing money from local farmers is inevitable and obligatory mechanism. The loan compels the borrower to work in the fields of lender at subsidized daily wage which is often decided by the lender alone. This kind of forced borrowing has a negative double impact on the borrowers in the form of limiting their wage seeking options and reducing the payment as wages. On the other hand it benefits the lender in two ways. First, lending ensures the supply of required manpower on one hand and on the other; it reduces the cost of labor since the borrower is obliged to work at a reduced wage rate. It was observed that there was no difficulty in accessing the finances for IDPs as the local farmers were glad to lend money as they view it as a productive investment.

Perceptions of IDPs on the impact floods

Floods are the most common natural disaster in both developed and developing countries, and the incidence of floods is growing steadily across the globe. Floods often show a devastating impact on human life and both physical and natural assets. Through the questionnaire we have tried to understand the impact floods and how it is being perceived by IDPs. To our dismay, the net impact of floods was seen in the form of changes in social systems. 51 respondents (41%) have expressed that the recent floods had resulted in improved social systems as they have impacted both inter and intra relationships among IDP households. Floods have impacted the food habits as they have shifted to the low quality food. 40 respondents (32%) have expressed that due to floods, they have altered the food habits. As a result of floods and non availability of sufficient stocks of groceries at household level, they have shifted to widely available leafy vegetables which were seldom consumed before. On the other hand, 10 respondents (8%) have said they have seen the impact/change due to floods. However they could not attribute the impact to any kind of aspects mentioned above. On the other hand 23 respondents (19%) have expressed that they have not faced any kind of change due to floods. 31 respondents (25%) have realized the impact of floods in the form of change in social forms, whereas for 14 respondents, floods have resulted in compelled borrowing money from the local farmers.

What IDPs want?

We have asked the IDP households about what kind of assistance they need in case authorities or NGOs want to help them. Their responses are presented in Chart 5. Most of them obviously indicated the immediate supply of food grains, followed by seeds and wage work.

Food insecurity among the IDP households

Using IDP household data we have estimated a binary logit model involving various causes of food insecurity among the households. The model includes various socio economic variables including the severity of the floods as the arguments. Food insecurity is measured as the non availability of required amounts 2100k calories of food per day during the period of occurrence of floods. Based on FGT measure of food security incidence, if the households do not have sufficient food it takes a value of 1 otherwise it is equal to zero. Before fitting the binary logit model, multicollinearity among the explanatory variables has been verified using variance inflation factor (VIF) and contingency coefficients. The variables satisfying these measures have been included in the model. The FGT index suggests that 47.5% of the sample IDP households suffer from food insecurity. The results of the binary logit model are presented in the following table:

Table 2: Results of the Binary Logit Model

Variable	B	S.E.	Wald	Sig.	Exp(B)	95% C.I.for EXP(B)	
						Lower	Upper
Wage decline	0.993**	0.490	4.102	0.043	2.698	1.033	7.052
sickness	1.101**	0.551	3.997	0.046	3.006	1.022	8.845
Public Distribution system	-0.720	0.587	1.504	0.220	0.487	0.154	1.538
Floods	2.562*	0.611	17.586	0.000	12.964	3.915	42.936
Female household	-0.020	0.799	0.001	0.980	0.980	0.205	4.692
borrowing	2.523*	0.721	12.246	0.000	12.468	3.034	51.232
Age of household	-0.001	0.015	0.001	0.970	0.999	0.971	1.029
Changed food habits	1.166**	0.605	3.720	0.050	3.210	0.981	10.500
Declined purchasing power	0.177	0.536	0.109	0.742	1.193	0.418	3.409
Education	-0.606	0.528	1.318	0.251	1.834	0.651	5.166
Constant	-3.492**	1.161	9.053	0.003	.030		
-2 Log likelihood 110.20							
Cox & Snell R Square 0.383							
Nagelkerke R Square 0.511							

Note: Estimated using survey data. * indicates significance at 1% and ** indicates significance at 5% level.

Based on food security measure (FGT), our study reveals that 47.5% of the IDP households were not able to meet the daily required average consumption of food in terms of 2100k calories

due to the occurrence of sudden floods and the consequent changes in several socio economic factors. The binary logit model employed by the study indicates that food insecurity among the households is connected to the occurrence of floods in the study area. The major factors that affected food insecurity in the study are wage decline, sickness, borrowing, and changed food habits. The other variables considered in the model had expected signs but were not statistically significant. Based on these findings the following conclusion and policy recommendations may be suggested.

CONCLUSION AND POLICY SUGGESTIONS

1. The effects of floods on infrastructure were severe in the study area as the surroundings were completely marooned and long stretches of roads were damaged completely delinking the other side of the world for some period. The damaged infrastructure impacted negatively the delivery of services such as health, agriculture and education in the study area.
2. Agriculture and live stock got severely affected during floods. Food stocks with the households got dwindled resulting in food shortages. As a result the households were not able to feed themselves and the children sufficiently. Added to this, less responsive public distribution system, declining wages and increasing borrowing by the households has worsened the food security situation. Floods have impacted the social systems and food habits too. In addition, they have posed a high risk of water contamination in the affected areas.
3. The total population of affected by floods stands at 559 households with the size of 2268 people across 5 revenue mandals in the study area. These people have experienced a decline in the wage work, destroyed crops and constrained access to food. This also includes the people who were exposed to the risk of outbreak of water borne diseases.
4. The study based on internally displaced people suggests that these households have become highly food insecure due to the occurrence of sudden floods in the study area. The model suggests that severity of the floods and food insecurity are positively associated. The food security incidence measured on the basis of FGT index suggests that the index is 0.475 indicating that 47.5% of the sample households being food insecure and they were not able to meet the daily recommended caloric requirement.
5. As expected the wage decline and food insecurity are found to be positively associated. This clearly demonstrates the importance of wage employment in addressing the food security issue in the tribal areas involving IDP households. The result shows that the probability that the household becoming food insecure increases by a factor of 2.698 as the household wage declines by one unit.
6. Due to incessant rains and sudden floods, the study area got affected with several health problems including the rise in malarial incidents. The model reveals that sickness among the households led to an increase in food insecurity. As a consequence of sickness, the probability food insecurity has increased by a factor of 3.006.
7. The occurrence of floods resulted in increase in the borrowing. And our estimates suggest that increase in borrowing and food insecurity among the households is positively related and the probability of food insecurity has increased by 12.468.
8. Changed food habits and food insecurity are also positively associated as the households have shifted to lesser quality of food to support their families during the period of floods.

Policy Suggestions

The study revealed that incessant rains and sudden floods had disastrous impacts on the IDP households in the study area. The floods have affected the infrastructure badly by damaging roads and bridges and impacted negatively the delivery of services such as health, agriculture and education in the study area. Agriculture and live stock got severely affected during floods. Food security situation got worsened and the floods have impacted the social systems and food habits of the households. To improve food security and livelihoods status among the households the following initiatives are recommended:

1. Government and nongovernmental organizations should convince the IDP households to move to the nearby safer places and should work relentlessly to provide basic amenities such as schools, hospitals, road transport and safe water. Arrangements should be made to supply chlorine treatment of domestic water in all the IDP settlements on an immediate basis. Scaling up the provision of protected water to all 83 settlements is needed and all bore wells need to be repaired and made perfectly functional.
2. Sickness among the IDP households was one of the reasons affecting food security. To address this emphasizing on community sensitization programs on public health and hygiene are needed. To address the problem of Malaria intensity IRS spray and providing LLN treated mosquito nets are the immediate requirement.
3. Government and other agencies should work on early warning mechanisms and educate the IDP households the possible disastrous impacts of floods and other calamities and make them aware of resilient mechanisms of thwarting food insecurity and also should train them in coping mechanisms in the event of happening of such disasters.
4. Increase in borrowing and working for lower wages are common among the sample households during food insecurity situations particular during the period of floods. To avoid such an eventuality relatively more responsive public distribution system coupled with improved credit facilities from the commercial banks is needed. In addition food for work programs need to be strengthened. As an immediate measure, providing food packs (Dry ration kits) for at least pregnant women, nursing mothers and vulnerable individuals need to be provided.
5. Food security has to be addressed using a multi -sectoral approach to mitigate the disastrous impacts of floods. The inter-linkages between various socio economic factors have to be addressed to assess the impact of floods on food insecurity.

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