Comparative Study of the Impact of Flood Relief on Livelihood Outcomes in Gujarat state of India

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Key Words: Livelihood, comparative study, flood, disaster, impact assessment

Abstract

Study Aim: The aim of the study was to assess the impact of the All India Disaster Mitigation Institute (AIDMI) post disaster integrated livelihood program. This was achieved by comparing communities supported through a targeted intervention and communities who received little support after the flood impacts.

Design: Household Socio-economic and demographic variables were surveyed pre and post floods of 2005 and 2006. An exhaustive retrospective survey was used in two slum communities and a random sampling method in four additional communities. The survey was undertaken through face to face interviews with household heads in December 2006.

Study Population: Six flood affected communities comprising of 301 households in Kheda, Vadadora and Naidad cities of Gujarat State in India.

Main Outcomes Measures: Household levels of debt, savings, income and asset.

Findings: Relief was seen to be distributed inequitable in the control communities. Households with higher pre-flood income and assets received relatively higher levels of relief. Households in the intervention communities saw no significant correlation between relief and relative income and asset levels. The effect of distribution of relief from the

various sources present in the communities resulted in a relative difference in debt level between pre and post flood levels against the total sum of relief received. This difference showed that relative debt levels were reduced with more relief received. Relief received had a weak but positive impact on restoration of asset levels.

Conclusion:

In both the intervention and control communities there were multiple sources of relief received. These sources of relief were friends, relatives, government and civil society organisations. In control communities it appeared that the assistance received by households with higher income and asset levels was higher. The impact of support from the AIDMI resulted in a more equitable targeting of relief in intervention communities. Distribution of relief in its various forms produced positive outcomes. This effect appears to be more likely to benefit the whole community where equitable targeting of beneficiaries occurs.

Introduction:

The All India Disaster Mitigation Institute (AIDMI) is a community-based action research, planning and advocacy organization. It works towards bridging the gap between policy, practice and research related to disaster mitigation, in an effort to link the community to humanitarian work at the (inter)national level. Established following the 1987-89 Gujarat droughts, AIDMI primarily focuses on four sectors: livelihoods, food, water, and shelter (AIDMI 2007).

In late June and early July of 2005 the state of Gujarat was hit with sustained heavy rains from the monsoon that resulted in severe flooding. During the floods 150,000 people were temporarily evacuated, over 10,000 villages were affected and over 123 people were killed (Editor 2005). The livelihoods of tens of thousands of people were directly affected. In the monsoon of 2006 most of the same villages in the study were affected by further flooding in July and August. The impact of these floods was smaller than of the 2005 floods. AIDMI supported the same communities with a short term relief package following the floods of 2006.

Oxfam Australia supported AIDMI in both the relief and rehabilitation programs in slum areas of Kheda, Vadadora and Naidad cities in response to the 2005 and 2006 floods. The relief programmes involved distribution to households of basic food and non food items. Rehabilitation programs involved undertaking targeted livelihood support at the household level as well as at the community level. Some

of the programme components included a livelihood relief fund for the replacement of income generating assets, disaster insurance and replacement and repair of houses.

Post disaster support to poor communities is limited in Gujarat from state and non state actors in proportion to the scale of direct and indirect losses to communities(Mahurkay 2005). Communities suffer substantial losses to their livelihoods and asset base from frequent disasters. Many highly vulnerable communities in Gujarat have been impacted by multiple disasters in the last 10 years. The study seeks to investigate the way in which livelihoods are impacted and if targeted livelihood interventions contribute to the recovery of disaster affected communities. The modes of delivery of AIDMI assistance to disaster affected households use accepted interventions for post disaster settings. The use of targeted and conditional cash grants are seen as appropriate and have been widely used in the Indian context (Aheeyar 2006; Gore and Patel 2006). Community projects were undertaken through participatory processes and in consultation with community members and government officials.

Study Aim and Objectives

The aim of the study is to assess the impact of a post disaster integrated livelihood programme (Gore and Patel 2006) by comparing communities supported through a targeted intervention and communities who received little support after the 2005 and 2006 Gujarat Floods. The main objectives of the study

are to determine the pre and post levels of livelihood indicators at the household level and to quantify differences between the control and intervention communities in terms of their livelihood indicators pre and post floods.

Methods

Setting and Study population

The study was undertaken in Gujarat State, India. The study population came from urban slum or peri-urban slums in Kheda, Vadadora and Naidad cities. All the communities are considered poor in the Indian context with median household incomes of Rs 2000 pre 2005 flood. The communities included in the study were from Kheda, Naidad and Vadadora cities in Southern Gujarat. Six communities were included in the study. In total 301 households were surveyed. The survey was undertaken at the household level. A household was defined as a social and economic unit housed in a single dwelling.

The average and median household size was 5. A high proportion of the men were employed as small vendors, rickshaw drivers, transporters of goods by cart and day labourers. Women typically gave there employment status as housewives as well as employed as domestic servants, involved in cottage industries in the home or employed as small scale vendors. The median age of the study population was 19 years and average age 22.4. 87.7 percent of household heads were Hindu and 12.3 Muslim. Household heads were predominately from the scheduled (41.4%) and other backward casts (31.6%).

The median pre flood incomes were Rs 2000 and Rs 1750 post floods. The median asset level of households before the floods was Rs 60,000. The median losses in the 2005 and 2006 floods were Rs 4400 and Rs 775 respectively. The median sum of relief by households was Rs 1775 for the 2005 floods and Rs 1622.5 for the 2006 floods. Prior to the 2005 floods 36.5% of households had experienced a disaster either an earthquake, flood, communal violence, hurricane, industrial accident, fire or other disaster.

Study Design

The study undertaken was a quasi-experimental comparative study (Field and Kremer 2006). The intervention communities were chosen by AIDMI. They were supported through the relief and recovery phase and were targeted on the basis of need. A wider and more expansive programme was not possible due to the limited resources for disaster response. Other communities with a similar level of vulnerability and similarly impacted by the floods were sought out as comparators for the study. Control communities were selected post disaster and at the end of the livelihoods intervention in the AIDMI supported communities.

The criteria for selection of comparator communities were on the basis of similar socioeconomic indicators and likely similar flood impact to the intervention communities involved in the AIDMI programme.

In two of the communities all households (n=156) were surveyed. In the remaining four communities a quasi random selection was undertaken where by every 4th house was selected (n=145). Staff and volunteers from AIDMI were trained in data collection methods. The survey was conducted through face to face interviews with the household head. The survey was tested on six households: four households from the intervention group and two from control communities. The full survey was then undertaken. The survey questionnaire covered six areas; support received and sources, demographic profile of household, income sources, savings levels, debt levels and asset levels. The main outcome measures were self-reported income, savings, debt and assets levels. The retrospective survey covered three time periods; immediately before the flood (July 05), immediately after the flood (July 05) and at the time of the survey was undertaken (December 06).

Statistical Analysis

Two linear regression models were used to test the hypothesis that relief given would have a significant impact on livelihood indicators at the household level and to test if targeting of aid had been equitable. All forms of relief such as food, non food and cash were summed based on their monetary value in Indian Rupees. The relief came from multiple sources such as government, relatives, neighbours and civil society organizations. Similarly livelihood indicators were measured in Indian Rupees.

Variables were grouped in two linear regression models. The first model looked at the 2005 pre flood livelihood indicators and immediately post 2005 flood to assess if targeting had been equitable in the control and intervention groups. All variables were transformed into quintiles to test the models. This was done due to the majority of the variables being heavily skewed.

To test the linear regression model for the outcome measures, both control and intervention communities were grouped together for the analysis. All communities had received some form of relief and it was only possible to differentiate on the level of relief received by households. The sample size and variable distributions did not allow further stratification that could have allowed further comparison between the control and intervention groups.

Limitations

The study looks at the intervention in totality of AIDMI and other support provided post disaster to communities. Attribution of specific components of AIDMI programme to specific outcomes was not possible. The limited sample size meant that further stratification of exposure and outcome measures was unlikely to produce effects that could be statistically significant(Kerr, Taylor et al. 1998; Bland 2000). The impact of the intervention on different livelihood groups, gender differences was not further analysed similarly due to the limited sample size.

The study was originally designed to look at the 2005 flood event only. The floods of 2006 complicated the design of the study. Additional questions were included and required respondents to recall details over two flood events. This may have reduced the significance of the results.

Bias

Random selection of programme participants would not have been unethical, communities to receive support were selected on the basis of need. The control and intervention groups have been selected in different time periods. Detailed knowledge of pre flood livelihood indicators and flood impacts was not possible in the control groups chosen and this may have led to a selection bias.

The intervention community prior to survey has had a substantial interaction with AIDMI with the majority of households contributing data to AIDMI particularly for its disaster insurance programme. There may have been differences in the way that households in the two groups responded to the survey questions. This could have led to a response bias(Kerr, Taylor et al. 1998).

Conflict of interest

Oxfam Australia funded the post flood rehabilitation programme as well as the study, with AIDMI as the implementing partner.

Findings

Flood Impact

The impact of the 2005 and 2006 floods resulted in substantial losses in assets and income levels. The floods also increased debt levels and reduced the level of savings. Table 1 gives an overview of the median levels of the main indicators. It can be seen that the impact of the 2005 floods was much more severe on these communities and that incomes were still to recover by December 2006.

Table1. Asset and Income levels pre and post flood 2005 and 2006, in Indian Rupees

		Assets pre flood 2005	**Asset Loss from 2005 floods**	**Asset Loss from 2006 floods**	**Household Income Pre flood 2005**	**Household Income Dec 2006**
	Valid records	301	301	254	301	301
	Median	47300	4400	775	2000	1750
Percentiles	20	27740	1020	0	1200	1000
	40	39220	3090	300	1800	1500
	60	54420	7060	1500	2460	2000
	80	81680	16760	5000	3300	3000
	Maximum	563800	62900	76750	13500	13500

Targeting

The first model looked at the targeting of aid against the livelihood indicators. The variables included in the model were the pre flood household, savings, income, assets, debt and immediately post flood, asset loss and additional debt incurred. The dependent variable in the model was the sum of relief. The model only looked at targeting with respect to the 2005 flood event where the majority of losses occurred. The following results were obtained from the regression model.

Table 2. Linear regression model of beneficiary targeting in control communities.

	Unstandardised Coefficients		t	Sig.
	B	Std. Error	B	Std. Error
(Constant)	.849	.367	2.315	.022
Assets Lost	.185	.056	3.323	.001
Asset Post Flood	.162	.059	2.757	.007
Income Pre Flood	.169	.057	2.975	.003
Debt Level Pre Flood 2005	.001	.064	.021	.983
Debt Level Post Flood 2005	-.022	.065	-.333	.740
Savings Level Pre Flood	-.001	.074	-.015	.988

Dependent variable: sum of relief 2005

The results indicate that in the non AIDMI supported communities the relief provided to households was associated with high levels of income and assets immediately post flood. It also indicates that households with greater levels of

asset losses received more aid. Other variables that were not significantly associated with the relief were debt levels and savings levels.

Table 3. Linear regression model of beneficiary targeting in intervention communities.

	Unstandardized Coefficients			Sig.
	B	Std. Error	B	Std. Error
(Constant)	3.273	.557	5.880	.000
Assets Lost	.106	.088	1.203	.231
Asset Post Flood	.031	.084	.370	.712
Income Pre Flood	-.043	.083	-.519	.604
Debt Level Pre Flood	.040	.096	.416	.678
Debt Level Post Flood	-.105	.089	-1.185	.238
Savings Level Pre Flood	.146	.087	1.686	.094

Dependent variable: sum of relief 2005

In the AIDMI supported communities and intervention communities the results show that there are no significant associations with variables dependent on relief.

Table 4. Linear regression model of beneficiary targeting in intervention communities to AIDMI relief provision.

	Unstandardized Coefficients		t	Sig.
	B	Std. Error	B	Std. Error
(Constant)	4.454	.570	7.819	.000
Assets Lost	-.058	.090	-.646	.519
Asset Post Flood	-.115	.086	-1.335	.184
Income Pre Flood	-.052	.085	-.614	.540
Debt Level Pre Flood	-.076	.099	-.771	.442
Debt Level Post Flood	-.139	.091	-1.524	.130
Savings Level Pre Flood	.174	.089	1.962	.052

Dependent variable: Livelihood relief fund

Looking at more closely at the main relief component that being the lib=veilihood relief fund of AIDMI in Table 4. It appears to show that poorer income households and those with fewer assets were more frequently targeted for support; however the results were not significant.

Table 5. Linear regression model of asset post flood 2005 against livelihood indicators.

	Unstandardized Coefficients		t	Sig.
	B	Std. Error	B	Std. Error
(Constant)	1.205	.366	3.297	.001
Assets Lost	.140	.057	2.453	.015
Income Pre Flood	.147	.056	2.608	.010
Debt Level Pre Flood	.254	.063	4.009	.000
Debt Level Post Flood	-.017	.063	-.264	.792
Savings Level Pre Flood	.085	.066	1.287	.199

Dependent variable: Asset post flood

Table 5 shows that higher asset levels before and after the floods were associated with higher levels of income, asset loss and higher levels of debt.

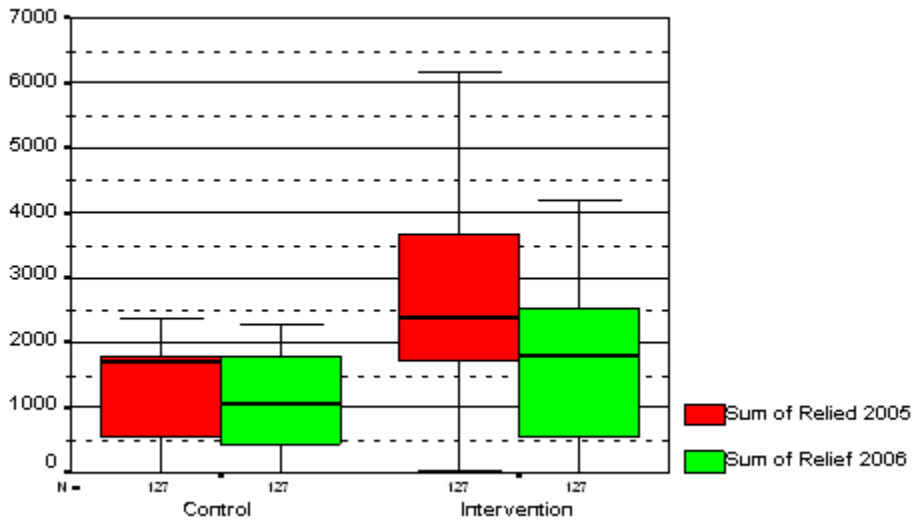
Between the two groups there is a distinct difference in targeting. Households that are most likely to have greater coping capacity based on their level of assets and income were receiving higher relative levels of relief in their community. There is a more equitable distribution of relief by AIDMI seen in the intervention communities and this appears to have targeted the poorest in the community based on income and pre flood asset levels although the results were not statistically significant in the model.

Livelihood Outcomes

A linear regression model was used comprising composite variables derived from either immediately pre or post flood livelihood variables. The variables were derived by subtracting the pre flood 2005 levels of income, savings, debt and assets levels from the post 2006 flood levels at the time of the survey (December 06). The change in livelihoods outcomes was used as the outcome measures for the survey.

There were multiple sources of relief distributed between in the control and intervention groups. Figure 1 shows the distribution of relief after the two flood events.

Figure1. Post flood 2005 & 2006 relief (Rs) in control and intervention communities



It can be seen that the level of relief is substantially higher for both flood events in the intervention communities. In both sets of communities relief came from multiple sources. For the analysis of outcome variables the communities were combined to run the analysis. The linear regression model was used to determine the response of the main livelihood indicators with changes in relief provided.

Table 6. Linear regression model of livelihood outcome measures against total relief provided.

	Unstandardized Coefficients		t	Sig.
	B	Std. Error		
(Constant)	4.154	.446	9.314	.000
Income Difference	-.090	.066	-1.349	.179
Asset Difference	-.101	.062	-1.612	.108
Savings Difference	-.050	.082	-.605	.545
Debt Difference	-.151	.065	-2.327	.021

Dependent variable: Total sum of relief provided 2005 and 2006

The results from Table 6 show that higher relative levels of relief result in lower relative levels of debt. That is if two households received more relief with similar pre flood livelihood indicators levels then the household that received more relief will have a lower relative level of debt. The same trends were seen in the other livelihood indicators. The direction of the results appears to show that relief will

reduce the negative impact of the flood on the level of assets and income. The results for savings difference, income difference and asset differences against the total relief received were not significant.

Conclusions

The provision of relief post flood has an apparent positive impact on the level of debt and may reduce the adverse impacts on household income and asset levels. The study showed that in the absence of interventions that explicitly target the poorest, households with higher income and asset levels received higher levels of support post flood. It appears that the influence of AIDMI has counteracted this effect and delivered relief to the poorest members of the community. Further investigation of the impact of different types of relief would assist in the design of future programmes of this type. Investigation of the impact of different forms of relief and the impact of relief on different livelihood groups, household demographics and by gender would be valuable to further build an evidence base on post disaster interventions.

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