

Article

Investigating the Climate-Induced Livelihood Vulnerability Index in Coastal Areas of Bangladesh

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Supplementary

Table S1. Land use/cover change between 2010 and 2008.

Land use/cover	Area (in acre) and Percentage				Change in Percentage (2010-2008)
	Area in 2008	Area in 2010	Percent in 2008	Percent in 2010	
Vegetation	6619.14	4527.96	16.03	10.97	-5.07
Agriculture	8755.02	0.00	21.21	0.00	-21.21
Gher and waterbodies	21773.36	24676.73	52.74	59.77	7.03
Built up area	4138.77	1179.58	10.02	2.86	-7.17
Unused agricultural land	0.00	10902.02	0.00	26.41	26.41
Total	41286.30	41286.30	100.00	100.00	

Table S2. Variable selection under major component for livelihood vulnerability index (LVI).

Dimensions	Major Components	Sub-Components	Explanation of sub-components	Survey questions	Relationship
		Adaptive Capacity	Socio-Demographic Profile	Dependency [19,20]	the family member younger than 15 or older than 64 - to the working-age population - those ages 15–64
Education of the head of the household [37]	The head of household report that he/she has attended zero years of formal schooling			Information collected from household questionnaire on the level of education of each member, including the head of the household.	Positive (More illiterate head of the household increase vulnerability)
Female-headed household [19,38]	The primary adult is female. If a male head is away from the home >6 months per year the female is counted as the head of the household.			Information collected from household questionnaire on sex of HH	Positive (Female HH increases vulnerability as rural coastal women cannot work or get facilities like men)
Single headed elderly family	HH with minimum 8 persons but has only one earning member			Information collected from household questionnaire on household size and no. of earning members	Positive (Single headed large family has less adaptive capacity and high vulnerability)
HH has female with no functional education [23]	None of the female HH member has minimum education level			Information collected from household	Positive (Such HH, lower the adaptive

			questionnaire on educational status)	capacity and higher the vulnerability)
	HH has girl child aged 10-19 years [23]	This age of girl child is generally more susceptible to abuse	Information collected from household questionnaire on age	Positive (Such HH has girls of this age has lower adaptive capacity and higher the vulnerability)
	Having debt [39]	HH who have debt	Have you any debt? How much?	Positive (High debt increases vulnerability)
	Loan repayment from the income	Loan repayment by the HH from the income	How do you repay the loan from your income? How much per month/year?	Positive (Higher loan repayment has lowered the adaptive capacity and increase vulnerability)
	Disability in the household	Disable person of a HH	Is there any disable person in your family? How many?	Positive (More disable person lower the adaptive capacity)
Livelihood Strategies	Family members working outside the community [40]	Household reported at least one family member worked outside the community to earn a wage	Any member of your family goes to outside to earn? If yes, how much?	Negative (If the Number of members increase the family will be less vulnerable)
	Average agricultural and non-agricultural livelihood diversification index (LDI) [19,23–25]	The inverse of (the total number of non-agri and agricultural livelihood activities + 1) viz. A HH that grow rice, raise cattle, do aquaculture will have a $LDI_a = 1/(3 + 1) = 0.25$	What type of non-agriculture and agricultural activities performed by your household members after cyclone?	Negative (Higher the LDI, higher the adaptive capacity, lower the vulnerabilities)
	Household who has burden of loan [19,40]	Household who took a loan in the past 6 years	Do you loan money from anywhere in the last 6 years? How much?	Positive (Loan increases the burden)
	Household changed sowing and cropping schedule [19,40]	Household who changed sowing and cropping schedule	Have any change occurred in schedule of sowing and cropping?	Negative (Change sowing and schedule reduce the vulnerability)
	Social Network	Help receive: provide ratio [23]	Ratio of (the no. of types of help received by a HH last year +1) to (the no. of types of help given by a HH to someone else last year +1)	How many times did you receive help from others HH, GOs and NGOs (e.g., Get medical care or medicines, sell animal products or other goods produced by

			family, Take care of children) last year? How many times did you give help to someone else last year?		
	Household that did not apply to their local government for assistance in the past 12 months [19,41–42]	HH did not receive any assistance from their local government in the past 12 months	In the past 12 months, have you or someone in your family gone to your community leader for help?	Negative (Higher assistance getting from local govt. reduce vulnerability)	
	Members of Local Committee/ Samiti	Membership of the HH members in local committee or Samiti	Do you or your family members have any membership in locally organized committee or microfinance cooperatives?	Negative (Membership increase the social network indicate adaptive capacity which reduce vulnerability)	
	Membership in the micro-credit organization	HH members have membership in the micro-credit organization	Do you have any membership in the micro-credit organization?	Negative (Members of micro-credit organization are more adaptive than others which reduce vulnerability)	
	Access to micro-finance of NGOs	Financial support obtained through micro-credit institutions, NGOs	Did you or your family members take financial support from NGOs through micro-credit programs last year?	Negative (Micro finance increase the adaptive capacity and reduce vulnerability)	
Sensitivity	Food Security	Struggle to find food [19,41–42]	Average number of months households struggle to obtain food for their family	Does your family have adequate food the whole year, or are there times during the year that your family does not have enough food? How many months a year does your family have trouble getting enough food?	Positive (If the time duration become high it ultimately increases the vulnerability)
		Household with primary irrigation source [43]	Household with primary irrigation source for agriculture (e.g. Electric TW, Diesel TW, Canal, Pumped from surface water)	What percentage can you use as irrigation source easily?	Negative (Higher percentage reduce vulnerability)

	Ability to save harvested crops to eat during a different time of year [19]	Household that do not save crops from each harvest	Does your family save some of the crops you harvest to eat during a different time of year?	Negative (More save reduce vulnerability)
	Ability to save seeds to grow the next year [19,41–42]	Household that do not have seeds from year to year	Does your family save seeds to grow the next year?	Negative (More save reduce vulnerability)
	Access to free seeds and fertilizer	Getting free seeds or fertilizer from anywhere since last year	Did your family get free seeds and fertilizer from any source?	Negative (Only seeds or fertilizer or nothing received HH is more sensitive to risk than those who get both or one)
	Land Productivity [39]	Loss of land productivity after Aila	Have any change occurred in number of harvested crops?	Positive (Loss of productivity will increase vulnerability)
Water Scarcity	Decreased quality of fresh water	Self-Explanatory	What do you think about the quality of drinking water? Safe, medium, or Unsafe?	Positive (Decrease quality of water will increase vulnerability)
	Distance to source of natural water [37]	Self-Explanatory	What is the distance (in km) of source of drinking water from your home?	Positive (Longer the distance, the higher is the vulnerability)
	Whether experienced scarcity of water [37]	Self-Explanatory	Is the water supply from the source you use adequate?	Negative (More adequate source of water supply reduces vulnerability)
	Whether the household spent money to get water [37]	Amount of money spent on getting water	Did you spend any money on drinking water in the last 12 months? If Yes, how much?	Positive (Higher the amount of money spent on getting water, higher is the vulnerability)
	Whether household that store water [19]	Store water for household activities and drinking	What containers do you usually store water in? How many? How many litres are they?	Negative (More stored water reduces vulnerability)
Income	Loss of income of HH [19]	Loss of income due to cyclone	Have you or your other family members loss income due to cyclone Aila	Positive (Higher loss of income increase vulnerability)
	Without income during and after cyclone <i>Aila</i>	Months stopped from income due to cyclone <i>Aila</i>	What time (in month) had you to stop work?	Positive (Higher stopped months)

				increase the vulnerability)
	Income loss for Robbery	Every time loss of income of Sundarbans' dependent HHs due to robbery	Are you attacked by robbers in the forest during resource collection in Sundarbans? How much money have you to pay as ransom for emancipating?	Positive (Higher ransom and frequent attacked by the robbers increase vulnerability)
Physical Facilities: Electricity	Not having solar plant	Solar plant ensures the electricity for all time though having electricity or not	Have any solar plant in your house?	Negative (Solar plant decreases the vulnerability)
Physical Facilities: School	Average time to reach nearest primary school [39]	Average time needed to go to the nearest primary school of the children	What average time your children need to go to the nearest primary school?	Positive (High average time increases the vulnerability)
Physical Facilities: Transportation	Average time to reach nearest vehicle station [39]	Average time needed to go to the nearest vehicle station	What average time you need to go to the nearest vehicle station?	Positive (High average time increases the vulnerability)
	No Access to available transport	Availability of transport vehicle in number	How many vehicles you get to move from one place to another?	Negative (Higher number of available transports decrease the vulnerability)
Physical Facilities: Hospital	Good hospital services received by the HH	Nearest hospital with better facilities and services	Can you get good hospital facilities by you and your family members?	Negative (Better hospital services reduce the sensitivity to risk as well as the vulnerability)
Health Services	Getting illness due to disaster	Family member(s) become ill due to disaster	Is there any member of your family getting illness due to disaster?	Positive (If the number become high it will indicate that they become vulnerable due to the disaster)
	Affected season	Family member(s) mainly affected by Sidr and Aila	Did your family members or you affected by Sidr and Aila?	Positive (Who are affected by both Sidr and Aila specially they are more vulnerable than those who are affected by only one)
	Chronically ill member [39]	Number of people reporting at least one chronically ill member	Is there any member of your family chronically ill?	Positive (If the number become high it will indicate

				that they become vulnerable)	
	Time to health facility (minutes) [19]	Time that takes the household to get to the nearest health facility	How long does it take you to get to a Health care centre?	Positive (More times needed to go to hospital lead more vulnerable they are)	
	Average cost of reaching health facilities [23]	Average cost of reaching the health facilities from HH	How much cost you must pay to reach Health care facilities?	Positive (Higher cost of reaching health facilities greater the sensitivity, Vulnerability)	
	HH did not receive training on primary health care [23]	Any sort of training on health and hygiene management	Did you receive any sort of training on health and hygiene management?	Negative (Better training HH received lower the sensitivity to risks, vulnerability)	
	HH did not immunize their children [23]	Immunization can save children from some deadly diseases	Could you immunize your children?	Negative (HH immunized their children lower the sensitivity to risk, vulnerability)	
	HH has no member can prepare homemade oral rehydration salts (ORS) [23]	Oral saline (or-saline) can save lives from diarrhoea diseases	Can you or your family members prepare or-saline?	Negative (HH able to prepare or-saline lower the sensitivity to risks, vulnerability)	
Exposure to Shocks	Natural disaster and their impact	Number of natural disasters during the last 10 years [19,37]	Natural disasters include, among others, cyclone, flood, drought, cyclone, surge, etc.	How many natural disasters occurred in your village during 2007–2016?	Positive (Occurring many disasters increase vulnerability)
		Household that did not receive a warning about the pending natural disasters [19]	Household that did not receive a warning about the most severe flood, drought, and cyclone event in the past 10 years.	Did you receive a warning about the flood/cyclone/drought before it happened?	Negative (Efficient warning system reduce vulnerability)
		Lost or damaged crops, <i>Golpata</i> , Honey etc. [37]	Value of the crops, <i>Golpata</i> , Honey damaged due to natural disaster	Was any crop, collection of <i>Golpata</i> , honey etc. damaged due to natural disasters?	Positive (Higher the value of crops, <i>Golpata</i> , honey etc. damaged, more vulnerable is the household)
		Damaged or Loss of fish in ponds/gher [37]	Value of the fishes in pond or Gher damaged due to natural disaster	Was there any damage of pond or Gher fishes due to natural disasters?	Positive (Higher the value of fishes damaged, more vulnerable is the household)
		Livestock damaged [37]	Value of the livestock damaged due to natural disaster	Was there any damage to livestock due to natural disasters?	Positive (Higher the value of livestock damaged, more

			vulnerable is the household)
House affected by cyclone	Houses were affected and destroyed due to Aila partially, moderately, fully, or none	Did your house destroy by Aila? Yes/No. If Yes, then how much? Partially, moderately, or fully)	Positive (Higher affection and destroyed level increase the vulnerability)
Value for damaged household items [37]	Value of the household items damaged due to natural disaster	Were any household items damaged due to natural disasters? Amount of damage in numbers?	Positive (Higher the value of household items damaged, more vulnerable is the household)
Change in occupation	Occupation is changed due to natural disaster	Was there any change in the occupation of your family members due to natural disaster?	Positive (Higher number of occupational changes indicates vulnerability)
Average months/days homesteads remained inundated due to cyclone <i>Aila</i>	Number of months or days the homestead of the HH remained inundated due to cyclone <i>Aila</i>	How many days/months your homestead was inundated due to cyclone <i>Aila</i> ?	Positive (More days created a severe impact on the HH indicate more vulnerable situation)

Source: Authors' own draft, based on secondary literature survey.

Table S3. A big table of major components, variables (sub-components), and average index values of four Union and their LVI values.

Sub-Component	Munshiganj	Ishwaripur	Gabura	Buri Gualini	Major Component	Munshiganj	Ishwaripur	Gabura	Buri Gualini	Test Statistics (<i>p</i> -value)
Dependency	0.538462	0.454212	0.545788	0.501832	Socio-Demographic Profile	0.309164	0.315638	0.310834	0.323642	F = 0.319 <i>p</i> ≥ 0.05
Education of the head of the household	0.760684	0.722222	0.636752	0.769231						
Female-headed household	0.153846	0.128205	0.230769	0.282051						
Single headed elderly family	0.153846	0.128205	0.230769	0.076923						
HH has female with no functional education	0.333333	0.512821	0.461538	0.435897						
HH has girl child aged 10-19 years	0.239316	0.128205	0.282051	0.119658						
Having debt	0.098718	0.030609	0.036218	0.05625						
Loan repayment from the income	0.222222	0.428571	0.142857	0.388889						
Disability in the household	0.282051	0.307692	0.230769	0.282051						
Family members working outside the community	0.812566	0.932204	0.433099	0.805128						
Average agricultural and non-agricultural livelihood diversification index (LDI)	0.512991	0.62547	0.374359	0.688889	Livelihood Strategies	0.378077	0.452986	0.259022	0.389957	F = 18.973 <i>p</i> ≤ 0.05
Household who has burden of loan	0.058547	0.100427	0.100427	0.065812						
Household changed sowing and cropping schedule	0.128205	0.153846	0.128205	0						
Help receive: provide ratio	0.3125	0.353419	0.282585	0.323718	Social Network	0.508654	0.532222	0.553953	0.444231	F = 1.236 <i>p</i> ≥ 0.05
Household that did not apply to their local	0.538462	0.461538	0.692308	0.333333						

government for assistance in the past 12 months										
Members of Local Committee/ Samiti	0.435897	0.564103	0.461538	0.487179						
Membership in the micro-credit organization	0.435897	0.564103	0.461538	0.487179						
Access to micro-finance of NGOs	0.820513	0.717949	0.871795	0.589744						
Struggle to find food	0.115385	0.108974	0.166667	0.115385						
Household with primary irrigation source	0.292969	0.472039	0.35	0.3125						
Ability to save harvested crops to eat during a different time of year	0.880513	0.925641	0.928718	0.953333	Food Security	0.544441	0.571622	0.345064	0.480203	F = 1.185 $p \geq 0.05$
Ability to save seeds to grow the next year	0.777778	0.564103	0	0.625						
Access to free seeds and fertilizer	0.7	0.74359	0.625	0.875						
Land Productivity	0.5	0.615385	0	0						
Decreased quality of fresh water	0.346154	0.628205	0.320513	0.307692						
Distance to source of natural water	0.323077	0.411282	0.152094	0.152991						
Whether experienced scarcity of water	0.25641	0.282051	0.589744	0.358974	Water Scarcity	0.375906	0.469293	0.409035	0.360482	F = 5.337 $p \leq 0.05$
Whether the household spent money to get water	0.024103	0.04188	0.046667	0.01106						
Whether household that store water	0.929788	0.983049	0.936156	0.971692						
Loss of income of HH	0.333333	0.589744	0.487179	0.512821						
Without income during and after cyclone Aila	0.564103	0.192308	0.305556	0.373932	Income	0.564103	0.294872	0.289886	0.569089	F = 20.047 $p \leq 0.05$
Income loss for Robbery	0.794872	0.102564	0.076923	0.820513						
Not having solar plant	0.102564	0.102564	0	0.564103		0.378032	0.483757	0.291802	0.434611	F = 12.543

Average time to reach nearest primary school	0.314857	0.332579	0.18816	0.242459							$p \leq 0.05$
Average time to reach nearest vehicle station	0.495726	0.769231	0.42735	0.538462	Physical Facilities						
No Access to available transport	0.43855	0.470822	0.099912	0.238285							
Good hospital services received by the HH	0.538462	0.74359	0.74359	0.589744							
Getting illness due to disaster	0.10989	0.032967	0.227106	0.106227							
Affected season	0.897436	0.794872	1	1							
Chronically ill member	0.119658	0.136752	0.213675	0.094017							
Time to health facility (minutes)	0.338803	0.393162	0.558974	0.33265							
Average cost of reaching health facilities	0.358974	0.25812	0.553846	0.276068	Health Services	0.321044	0.346215	0.415354	0.370351	F = 4.611	$p \leq 0.05$
HH did not receive training on primary health care	0.307692	0.589744	0.461538	0.512821							
HH did not immunize their children	0.153846	0.102564	0.102564	0.307692							
HH has no member can prepare homemade oral rehydration salts (ORS)	0.282051	0.461538	0.205128	0.333333							
Number of natural disasters during the last 10 years	0.551282	0.641026	0.467949	0.544872							
Household that did not receive a warning about the pending natural disasters	0.102564	0.410256	0	0.358974	Natural disaster and their impact	0.543199	0.494719	0.603144	0.551541	F = 6.031	$p \leq 0.05$
Lost or damaged crops, <i>Golpata</i> , Honey etc.	0.948718	0.948718	1	0.897436							
Damaged or Loss of fish in ponds/ <i>gher</i>	0.948718	1	0.923077	0.897436							
Livestock damaged	0.564103	0.564103	0.846154	0.589744							

House affected by cyclone	0.632479	0.307692	0.683761	0.598291
Value for damaged household items	0.366987	0.144231	0.342949	0.419872
Change in occupation	0.410256	0.410256	0.564103	0.307692
Average months/days homesteads remained inundated due to cyclone <i>Aila</i>	0.363688	0.026188	0.600302	0.349548
Overall LVI				
			LVI: Munshiganj	0.426367
			LVI: Ishwaripur	0.437326
			LVI: Gabura	0.403680
			LVI: Buri Gualini	0.429341

Table S4. Livelihood Vulnerability Index (LVI) sub-component values and minimum and maximum sub-component values for Four Union.

Dimension	Major Components	Sub-Components	Unit	Munshiganj	Ishwaripur	Gabura	Buri Gualini	Max	Min
Adaptive Capacity	Socio-Demographic Profile	Avg. no. of Dependent people	Persons	3.769	3.179	3.821	3.513	7	0
		% of no Primary Education of the head of the household	Percent	69.2	66.7	48.7	74.4	100	0
		% of Female-headed household	Percent	15.4	12.8	48.7	28.2	100	0
		% of Single headed elderly family	Percent	15.4	12.8	23.1	7.7	100	0
		% of HH has female with no functional education	Percent	33.3	51.3	46.2	43.6	100	0
		% HH has girl child aged 10-19 years	Percent	53.8	33.3	56.4	33.3	100	0
		% of HH having debt	Percent	46.2	17.9	17.9	46.2	100	0
		% of Non-capability to Loan repayment from the income	Percent	22.2	42.9	14.3	38.9	100	0
		% of households have disable person(s)	Percent	28.2	28.2	23.1	28.2	100	0
		Livelihood Strategies		Avg. family members of the community working outside (1-Ratio: Working outside: HH members)	Persons	0.813	0.932	0.433	0.805
Avg. agricultural and non-agricultural livelihood diversification index (LDI)	1/# livelihoods			0.326	0.366	0.277	0.389	0.5	0.14286

Sensitivity	Social Network	% of Household who have burden of loan	Percent	38.5	59	30.8	25.6	100	0
		% of Household changed sowing and cropping schedule	Percent	12.8	15.4	12.8	0	100	0
		Help receive: provide ratio	Ratio	1.25	1.414	1.130	1.295	4	0
		% of Household that did not apply to their local government for assistance in the past 12 months	Percent	53.8	69.2	69.2	33.3	100	0
		% of HH having no membership in Local Committee/ Samiti	Percent	43.6	46.2	46.2	48.7	100	0
		% of HH having no membership in the micro-credit organization	Percent	43.6	46.2	46.2	48.7	100	0
		% of HH having no access to micro-finance of NGOs	Percent	82.1	87.2	87.2	59	100	0
	Food Security	Avg. no. of months households struggle to find food	Months	0.462	0.436	0.667	0.462	4	0
		Household with primary irrigation source	Percent	76.56	62.24	72	75	20	100
		% of the HH's non-ability to save harvested crops to eat during a different time of year	Percent	66.7	56.4	82.1	79.5	100	0
		% of HH having no ability to save seeds to grow the next year	Percent	77.8	56.4	0	62.5	100	0
		% of HH having no access to free seeds and fertilizer	Percent	70	74.4	62.5	87.5	100	0
		% of HH having loss of land Productivity	Percent	50	61.5	0	0	100	0
	Water Scarcity	% of HH having no access of safe drinking water	Percent	53.8	74.4	43.6	46.2	100	0
		Avg. distance to source of natural water	Kilometer	0.969	1.23	0.456	0.459	3	0
		% of HH experienced scarcity of water	Percent	25.6	28.2	59	35.9	100	0
		Households' avg. spent money to get water	BDT	30.8	15.4	23.1	25.6	100	0
		Avg. number of liters of stored water per HH	Liters	229.23	70.51	210.26	104.36	20	3000
	Income	% of HH members have lost of income	Percent	33.3	59	48.7	51.3	100	0
		Avg. Months without income during Aila	Months	3.385	1.154	1.833	2.244	6	0
% of HH loss Income loss for Robbery		Percent	79.5	10.3	7.7	82.1	100	0	
Physical Facilities	% of HH having no Solar energy as a source of electricity	Percent	10.3	10.3	0	56.4	100	0	
	Avg. time to reach nearest primary school	Minutes	23.41	24.62	14.79	18.49	70	2	
	Avg. number of available transport (Considered as Negative)	Vehicles	2.487	3.308	2.282	2.615	4	1	
	Avg. time to reach nearest vehicle station	Minutes	27.44	29.31	7.79	15.82	60	2	

		% of HH not received Good hospital services	Percent	53.8	74.4	74.4	59	100	0
		Avg. no. of HH members getting illness due to disaster	Persons	0.769	0.231	1.590	0.744	7	0
		% of household member(s) affected by Sidr and Aila	Percent	89.7	79.5	100	100	100	0
		Avg. no. of chronically ill member	Persons	0.359	0.410	0.641	0.282	3	0
	Health Services	Avg. time to reach health facility	Minutes	30.41	34.49	46.92	29.95	80	5
		Avg. cost of reaching health facilities	BDT	53.85	38.72	83.08	41.41	150	0
		% HH did not receive training on primary health care	Percent	30.8	59	46.2	51.3	100	0
		% of HH did not immunize their children	Percent	15.4	10.3	10.3	30.8	100	0
		% HH having no member who can prepare or-saline	Percent	28.2	46.2	20.5	33.3	100	0
Exposure to Shocks		Avg. no. of natural disasters during the last 10 years	Count	3.205	3.564	2.872	3.179	5	1
		% HH that did not receive a warning about the pending natural disasters	Percent	10.3	41	0	35.9	100	0
		% of HH respond against lost or damaged crops, Golpata, Honey etc.	Percent	94.9	94.9	100	89.7	100	0
		% of HH respond against damaged or Loss of fish in ponds/gher	Percent	94.9	100	92.3	89.7	100	0
		% HHs' livestock damaged	Percent	56.4	56.4	84.6	59	100	0
		% of House affected by cyclone	Percent	97.4	69.2	100	92.3	100	0
		Avg. no. of HH items damaged	Count	5.872	2.308	5.487	6.718	16	0
		% of HH change in occupation	Percent	41	41	56.4	30.8	100	0
		Avg. months homesteads remained inundated due to cyclone Aila	Months	5.346	0.756	8.564	5.154	14	0.4

Table S5. Distribution of the households' LVI within the lowly (or less) vulnerable category.

	Munshiganj										Ishwaripur					
	0.287	0.308	0.335	0.339	0.354	0.358	0.361	0.367	0.373	0.374	0.377	0.345	0.355	0.371	0.377	0.378
SDP	0.393	0.314	0.265	0.238	0.154	0.147	0.309	0.234	0.252	0.187	0.168	0.109	0.091	0.421	0.415	0.353
LS	0.292	0.198	0.383	0.383	0.675	0.225	0.271	0.350	0.508	0.242	0.392	0.500	0.517	0.329	0.383	0.417
SN	0.038	0.033	0.838	0.425	0.275	0.500	0.275	0.233	0.075	0.233	0.500	0.500	0.033	0.438	0.838	0.233
FS	0.500	0.479	0.100	0.500	0.200	0.479	0.667	0.333	0.313	0.500	0.480	0.560	0.600	0.512	0.333	0.577
WS	0.365	0.289	0.391	0.397	0.027	0.498	0.364	0.364	0.215	0.462	0.321	0.232	0.465	0.529	0.297	0.466

I	0.444	0.222	0.556	0.833	0.500	0.500	0.556	0.222	0.500	0.833	0.611	0.389	0.000	0.056	0.056	0.500
PF	0.379	0.231	0.118	0.364	0.584	0.431	0.550	0.518	0.571	0.350	0.364	0.441	0.608	0.245	0.367	0.352
HS	0.092	0.335	0.233	0.075	0.285	0.201	0.333	0.385	0.361	0.463	0.260	0.267	0.350	0.242	0.243	0.167
NDI	0.422	0.503	0.333	0.350	0.606	0.461	0.254	0.545	0.571	0.402	0.494	0.320	0.455	0.419	0.390	0.442
	Gabura								Buri Gualini							
	0.319	0.337	0.338	0.346	0.361	0.362	0.364	0.370	0.373	0.375	0.349	0.353	0.359	0.362	0.363	0.370
SDP	0.060	0.318	0.186	0.119	0.241	0.210	0.073	0.156	0.441	0.293	0.380	0.411	0.415	0.167	0.326	0.291
LS	0.075	0.483	0.242	0.150	0.536	0.183	0.075	0.225	0.297	0.225	0.375	0.342	0.258	0.383	0.275	0.375
SN	0.413	0.350	0.450	0.300	0.450	0.050	0.850	0.450	0.550	0.450	0.475	0.100	0.225	0.050	0.025	0.450
FS	0.360	0.500	0.354	0.875	0.500	0.500	0.300	0.417	0.080	0.500	0.625	0.500	0.500	0.410	0.560	0.500
WS	0.389	0.258	0.378	0.390	0.221	0.335	0.389	0.515	0.404	0.355	0.320	0.455	0.200	0.359	0.398	0.201
I	0.389	0.111	0.111	0.444	0.833	0.611	0.444	0.111	0.111	0.056	0.389	0.444	0.056	0.778	0.444	0.389
PF	0.301	0.112	0.362	0.049	0.111	0.341	0.286	0.333	0.382	0.367	0.304	0.034	0.544	0.455	0.199	0.298
HS	0.275	0.343	0.301	0.285	0.276	0.479	0.408	0.419	0.251	0.408	0.201	0.176	0.602	0.277	0.318	0.267
NDI	0.568	0.485	0.519	0.706	0.459	0.559	0.510	0.570	0.534	0.538	0.336	0.653	0.269	0.583	0.603	0.592

Table S6. Distribution of the households' LVI within the moderately vulnerable category.

	Munshiganj																						
	0.386	0.388	0.400	0.402	0.407	0.414	0.421	0.428	0.428	0.429	0.430	0.432	0.435	0.441	0.444	0.449	0.450	0.464	0.467	0.470			
SDP	0.367	0.212	0.179	0.263	0.136	0.225	0.363	0.448	0.058	0.109	0.370	0.416	0.409	0.320	0.464	0.429	0.478	0.190	0.388	0.446			
LS	0.400	0.408	0.500	0.439	0.525	0.512	0.383	0.300	0.179	0.190	0.342	0.283	0.383	0.429	0.358	0.425	0.367	0.290	0.567	0.262			
SN	0.267	0.433	0.438	0.633	0.750	0.850	0.838	0.275	0.475	0.475	0.850	0.850	0.633	0.475	0.100	0.100	0.038	0.700	0.475	0.425			
FS	0.660	0.458	0.710	0.542	0.552	0.500	0.300	0.729	0.540	0.500	0.875	0.500	0.583	0.760	0.625	0.625	0.780	0.375	0.333	0.850			
WS	0.358	0.428	0.201	0.455	0.235	0.325	0.297	0.401	0.668	0.588	0.551	0.388	0.341	0.428	0.308	0.528	0.528	0.341	0.188	0.421			
I	0.111	0.833	0.833	0.556	0.611	0.222	0.444	0.444	0.167	0.611	0.444	0.611	0.556	0.556	0.278	0.778	0.889	0.944	0.889	0.500			
PF	0.199	0.115	0.268	0.396	0.283	0.584	0.500	0.068	0.564	0.497	0.352	0.266	0.416	0.100	0.643	0.515	0.216	0.559	0.498	0.231			
HS	0.180	0.233	0.317	0.242	0.267	0.176	0.243	0.282	0.568	0.283	0.175	0.233	0.286	0.386	0.535	0.274	0.269	0.443	0.479	0.344			
NDI	0.674	0.627	0.439	0.398	0.577	0.505	0.501	0.686	0.576	0.723	0.394	0.501	0.425	0.577	0.558	0.559	0.604	0.590	0.521	0.660			
	Ishwaripur																						
	0.383	0.385	0.387	0.388	0.395	0.396	0.398	0.405	0.412	0.417	0.418	0.419	0.421	0.425	0.428	0.430	0.442	0.446	0.447	0.458	0.461	0.464	0.470
SDP	0.129	0.417	0.418	0.168	0.263	0.186	0.299	0.342	0.485	0.176	0.379	0.329	0.372	0.259	0.109	0.182	0.497	0.204	0.113	0.234	0.488	0.275	0.357
LS	0.473	0.383	0.375	0.383	0.550	0.400	0.333	0.500	0.383	0.500	0.500	0.383	0.467	0.433	0.775	0.325	0.408	0.383	0.417	0.392	0.517	0.417	0.545
SN	0.450	0.100	0.033	0.550	0.238	0.875	0.433	0.950	0.233	0.500	0.900	0.350	0.600	0.440	0.050	0.830	0.275	0.700	0.950	0.838	0.430	0.250	1.000
FS	0.615	0.529	0.533	0.600	0.604	0.375	0.413	0.406	0.563	0.529	0.438	0.643	0.293	0.448	0.813	0.646	0.404	0.515	0.615	0.615	0.563	0.535	0.333
WS	0.758	0.538	0.472	0.500	0.365	0.438	0.565	0.335	0.496	0.267	0.201	0.552	0.208	0.532	0.333	0.466	0.533	0.465	0.551	0.433	0.432	0.729	0.208
I	0.361	0.167	0.056	0.056	0.000	0.222	0.056	0.056	0.056	0.389	0.056	0.222	0.500	0.389	0.361	0.361	0.389	0.556	0.500	0.389	0.333	0.333	0.833
PF	0.167	0.242	0.466	0.534	0.638	0.466	0.364	0.481	0.297	0.555	0.511	0.384	0.666	0.692	0.717	0.184	0.498	0.453	0.498	0.443	0.643	0.564	0.466
HS	0.300	0.408	0.417	0.179	0.489	0.258	0.192	0.350	0.445	0.485	0.468	0.442	0.192	0.350	0.283	0.338	0.333	0.330	0.333	0.283	0.317	0.350	0.493

NDI	0.371	0.468	0.454	0.528	0.321	0.448	0.711	0.280	0.455	0.430	0.280	0.397	0.597	0.436	0.552	0.556	0.558	0.556	0.362	0.574	0.442	0.667	0.338
	Gabura																						
	0.380	0.385	0.400	0.407	0.407	0.410	0.413	0.414	0.420	0.420	0.426	0.427	0.427	0.428	0.434	0.436	0.440	0.443	0.447	0.452	0.453	0.457	0.472
SDP	0.308	0.228	0.234	0.397	0.345	0.286	0.332	0.393	0.418	0.443	0.505	0.488	0.381	0.185	0.423	0.387	0.186	0.279	0.470	0.173	0.543	0.479	0.408
LS	0.276	0.283	0.137	0.137	0.125	0.227	0.225	0.242	0.333	0.667	0.217	0.140	0.146	0.158	0.134	0.200	0.558	0.400	0.075	0.276	0.233	0.311	0.225
SN	0.450	0.825	0.450	0.850	0.425	0.850	0.450	0.850	0.817	0.250	0.450	0.450	0.425	0.450	0.850	0.450	0.700	0.500	0.825	0.825	0.450	0.250	0.850
FS	0.375	0.500	0.340	0.500	0.667	0.750	0.625	0.080	0.167	0.500	0.500	0.750	0.625	0.625	0.458	0.500	0.333	0.750	0.500	0.750	0.417	0.530	0.625
WS	0.395	0.396	0.408	0.221	0.501	0.221	0.361	0.208	0.395	0.398	0.628	0.432	0.403	0.548	0.648	0.661	0.258	0.448	0.548	0.321	0.588	0.251	0.548
I	0.444	0.056	0.500	0.056	0.389	0.028	0.056	0.500	0.167	0.056	0.389	0.389	0.389	0.556	0.167	0.167	0.111	0.056	0.056	0.389	0.500	0.667	0.056
PF	0.359	0.101	0.234	0.305	0.228	0.159	0.297	0.367	0.347	0.066	0.225	0.187	0.373	0.332	0.167	0.249	0.303	0.367	0.320	0.367	0.244	0.263	0.320
HS	0.276	0.443	0.623	0.418	0.318	0.402	0.513	0.436	0.436	0.361	0.406	0.283	0.461	0.508	0.267	0.367	0.611	0.444	0.250	0.501	0.301	0.495	0.250
NDI	0.526	0.509	0.525	0.538	0.626	0.621	0.626	0.542	0.532	0.751	0.442	0.685	0.575	0.582	0.606	0.692	0.641	0.693	0.686	0.604	0.643	0.693	0.772
	Buri Gualini																						
	0.389	0.390	0.392	0.394	0.395	0.400	0.404	0.406	0.408	0.410	0.412	0.413	0.416	0.417	0.419	0.421	0.433	0.435	0.444	0.446	0.448	0.464	
SDP	0.361	0.088	0.398	0.179	0.293	0.222	0.418	0.253	0.301	0.168	0.307	0.335	0.351	0.371	0.446	0.233	0.480	0.256	0.339	0.238	0.355	0.216	
LS	0.328	0.417	0.312	0.438	0.371	0.475	0.417	0.472	0.342	0.342	0.283	0.333	0.450	0.439	0.450	0.300	0.542	0.333	0.383	0.371	0.240	0.600	
SN	0.500	0.650	0.050	0.100	0.475	0.825	0.100	0.050	0.275	0.250	0.500	0.833	0.500	0.300	0.675	0.633	0.433	0.750	0.450	0.450	0.050	0.650	
FS	0.500	0.500	0.875	0.500	0.320	0.368	0.500	0.500	0.500	0.372	0.500	0.460	0.563	0.750	0.500	0.458	0.750	0.500	0.563	0.500	0.564	0.542	
WS	0.457	0.455	0.213	0.308	0.335	0.432	0.201	0.355	0.365	0.523	0.405	0.455	0.301	0.306	0.211	0.200	0.231	0.355	0.205	0.415	0.532	0.468	
I	0.444	0.722	0.722	0.611	0.944	0.444	0.500	0.722	0.222	0.389	0.667	0.722	0.444	0.722	0.222	0.722	0.722	0.833	0.556	0.778	0.722	0.056	
PF	0.138	0.493	0.461	0.459	0.429	0.243	0.332	0.561	0.564	0.661	0.451	0.344	0.364	0.263	0.429	0.268	0.103	0.332	0.486	0.562	0.426	0.458	
HS	0.160	0.267	0.169	0.511	0.175	0.364	0.369	0.361	0.333	0.375	0.442	0.258	0.325	0.435	0.292	0.658	0.285	0.342	0.350	0.425	0.471	0.475	
NDI	0.646	0.381	0.652	0.541	0.519	0.394	0.685	0.565	0.650	0.600	0.377	0.304	0.533	0.467	0.512	0.429	0.600	0.523	0.688	0.536	0.644	0.621	

Table S7. Distribution of the households' LVI within highly vulnerable category.

	Munshiganj											Ishwaripur										
	0.473	0.488	0.491	0.494	0.497	0.511	0.540	0.553	0.480	0.481	0.484	0.487	0.490	0.495	0.497	0.505	0.520	0.530	0.565			
SDP	0.417	0.329	0.210	0.548	0.388	0.519	0.522	0.448	0.226	0.229	0.418	0.418	0.446	0.369	0.179	0.438	0.339	0.418	0.245			
LS	0.333	0.312	0.512	0.348	0.494	0.333	0.450	0.500	0.325	0.342	0.387	0.442	0.350	0.750	0.458	0.383	0.469	0.758	0.612			
SN	0.833	0.850	0.875	0.900	0.700	0.475	0.850	0.850	0.660	0.400	0.883	0.230	0.875	0.617	0.475	0.450	0.850	0.450	0.850			
FS	0.500	0.500	0.550	0.540	0.500	0.719	0.398	0.529	0.750	0.583	0.802	0.563	0.640	0.627	0.886	0.771	0.792	0.729	0.563			
WS	0.255	0.461	0.426	0.329	0.405	0.205	0.528	0.381	0.499	0.599	0.432	0.805	0.528	0.532	0.429	0.565	0.530	0.418	0.599			
I	0.500	0.111	0.500	0.444	0.778	0.889	0.778	0.944	0.333	0.389	0.389	0.333	0.333	0.000	0.694	0.333	0.000	0.667	0.389			
PF	0.408	0.320	0.367	0.132	0.231	0.500	0.446	0.611	0.483	0.611	0.483	0.384	0.416	0.628	0.413	0.529	0.697	0.698	0.584			
HS	0.292	0.610	0.342	0.344	0.411	0.410	0.545	0.333	0.408	0.550	0.226	0.326	0.350	0.303	0.402	0.250	0.483	0.317	0.585			
NDI	0.689	0.630	0.711	0.702	0.662	0.606	0.499	0.651	0.597	0.574	0.445	0.737	0.475	0.580	0.650	0.716	0.441	0.553	0.721			
	Gabura											Buri Gualini										

	0.473	0.477	0.501	0.508	0.512	0.518	0.473	0.477	0.477	0.477	0.479	0.482	0.483	0.497	0.513	0.514	0.522
SDP	0.524	0.185	0.405	0.530	0.323	0.458	0.376	0.336	0.272	0.430	0.372	0.304	0.429	0.274	0.327	0.353	0.369
LS	0.496	0.158	0.175	0.554	0.179	0.321	0.383	0.500	0.500	0.500	0.383	0.333	0.500	0.500	0.308	0.321	0.333
SN	0.300	0.850	0.450	0.300	0.850	0.850	0.450	0.875	0.500	0.425	0.450	0.500	0.250	0.450	0.850	0.900	0.850
FS	0.500	0.500	0.667	0.583	0.625	0.750	0.500	0.458	0.500	0.417	0.500	0.625	0.750	0.750	0.540	0.500	0.500
WS	0.255	0.478	0.528	0.391	0.408	0.475	0.261	0.267	0.595	0.525	0.228	0.618	0.608	0.615	0.265	0.228	0.191
I	0.333	0.389	0.389	0.389	0.389	0.056	0.556	0.389	0.611	0.694	0.778	0.944	0.361	0.500	0.361	0.778	0.833
PF	0.448	0.434	0.429	0.431	0.382	0.434	0.584	0.680	0.602	0.357	0.498	0.621	0.564	0.686	0.468	0.530	0.700
HS	0.620	0.567	0.525	0.508	0.587	0.577	0.325	0.235	0.360	0.340	0.468	0.486	0.480	0.502	0.510	0.542	0.517
NDI	0.560	0.642	0.744	0.706	0.722	0.594	0.778	0.628	0.558	0.650	0.679	0.356	0.525	0.511	0.785	0.571	0.568

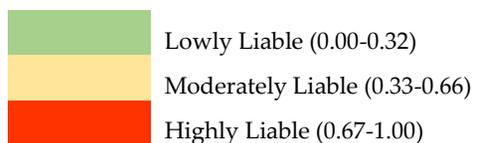


Table S8. Dimensions and variables and their unit of measurement for constructing asset deprivation index.

Dimensions	Variables	Unit of measurement
Human capital	No vocational training	Count
	No training on disaster management	Count
	No knowledge about modern, intensive farming techniques	Count
	Non-earning members' ratio in comparison to household members	Count
	Non-Skilled labour ratio in comparison to household members	Count
Natural capital	Disability or chronically illness of household head	Yes/No
	Having homestead land (Consider as Negative)	Count
	Having agriculture land (Consider as Negative)	Count
	Access to open-water fishing (no. of months) (Consider as Negative)	Count
	Access to forest-based energy for cooking purpose (Consider as negative)	Count
	Average time to fetch firewood	Count
	Scarcity of firewood	Count
	No Access to <i>khas</i> land	Count
	Frequency of visits in Sundarbans or sea last year (Consider as Negative)	Count
	Having no chicken/ducks	Count
Having no goats	Count	
Having no cattle/ cow	Count	
Social Capital	Any help or assistance received from other households in the community, GOs and NGOs	Yes/No
	Any help or assistance got from local Union/Upazila representatives in the last year	Yes/No
	Having access to old allowances	Yes/No
	Having access to Vulnerable Group Development (VGD)	Yes/No
	Having access to Vulnerable Group Feeding (VGF)	Yes/No
	HH members receive School Stipend	Yes/No
Physical Capital	No membership in local committee or co-operatives	Count
	Not having television or radio	Count
	No access to mobile phone	Count
	Not having own rainwater reservoir	Count
	Decreased quality of drinking water	Yes/No
	No Access to available transport	Count
	HH having bicycle (Consider as Negative)	Yes/No
	Housing condition or Construction materials of the house	Yes/No
	House affected by the storms	Yes/No
	Not having cyclone shelter near to the house	Count
	Unhygienic sanitary latrine	Yes/No
	Not having electricity in the house	Count
	Not having solar energy as a source of electricity	Count
Financial Capital	Having no jewellery	Count
	Amount of cash savings (Consider as Negative)	Count
	No membership in the micro-credit organisations	Count
	Having savings in the bank or NGO (Consider as Negative)	Yes/No
	No Regular inflows of money: Remittance	Count

No access to NGOs' micro-finance projects

Count

Table S9. ANOVA and Chi-squared test to understand significant difference of mean and frequency of different variables between study communities (or four Unions).

Variables	F statistics	Chi-squared statistics	Sig.
Human Capital			
No Vocational Training	--	$\chi^2(3) = 20.558$	0.000***
No training on disaster management	--	$\chi^2(3) = 5.710$	0.127
No Knowledge about modern, intensive farming techniques	F (3,152) = 1	--	0.395
Non-earning members' ratio in comparison to HH members	F (3,152) = .962	--	0.412
Non-Skilled labor ratio in comparison to HH members	F (3,152) = 1.586	--	0.195
Health Status	F (3,152) = 12.44	--	0.000***
Natural or agriculture Capital			
Having homestead land (Consider as Negative)	F (3,152) = .574	--	0.633
Having agriculture land (Consider as Negative)	F (3,152) = 2.957	--	0.034**
No Access to fishing (no. of months)	F (3,152) = 13.026	--	0.000***
Access to forest-based energy for cooking purpose (Consider as negative)	F (3,152) = 4.475	--	0.005**
Average time to fetch firewood	F (3,152) = .195	--	0.824
Scarcity of firewood	--	$\chi^2(3) = 2.772$	0.250
No Access to khas land	--	$\chi^2(3) = 23.833$	0.000***
Frequency of visits in Sundarbans or sea last year (Consider as Negative)	F (3,152) = 23.184	--	0.000***
Having no Chicken/ducks	--	$\chi^2(3) = 6.323$	0.097*
Having no Goats	--	$\chi^2(3) = 15.462$	0.001***
Having no Cattle/ cow	--	$\chi^2(3) = 26.232$	0.000***
Social Capital			
Help receive: provide ratio	F (3,152) = 1.054	--	0.371
Household that did not apply to their local government for assistance in the past 12 months	--	$\chi^2(3) = 10.54$	0.014**
Having access to old allowances	--	$\chi^2(3) = 10.029$	0.018**
Having access to VGD (vulnerable group development) allowances	--	$\chi^2(3) = 1.486$	0.686
Having access to VGF	--	$\chi^2(3) = 1.460$	0.692
HH members receive School Stipend	--	$\chi^2(3) = .610$	0.894
No membership in Local Committee/ Samiti	--	$\chi^2(3) = 1.437$	0.697
Physical Capital			
Not having television or radio	--	$\chi^2(3) = 9.246$	0.026**
No access to mobile phone	--	$\chi^2(3) = 7.892$	0.048**
Not having own rainwater reservoir	--	$\chi^2(3) = 3.567$	0.311

Decreased quality of drinking water	F (3,152) = =5.874	--	0.001***
No Access to available transport	F (3,152) = 8.078	--	0.000***
HH having bicycle (Consider as Negative)	F (3,152) = 4.953	--	0.003**
Housing condition or Construction materials of the house	F (3,152) = 2.009	--	0.115
House affected by cyclone (none to partially to destroyed)	F (3,152) = 17.579	--	0.000***
Not having Cyclone Shelter near to the house	--	$\chi^2(3) = 26.847$	0.000***
Unhygienic sanitary latrine	F (3,152) = .367		0.777
Not having electricity in the house	--	$\chi^2(3) = 4.9514$	0.175
Not having Solar energy as a source of electricity	--	$\chi^2(3) = 48.038$	0.000***
Financial Capital			
No membership in the micro-credit organization	--	$\chi^2(3) = 1.437$	0.697
Access to micro-finance of NGOs	--	$\chi^2(3) = 9.675$	0.022**
Amount of cash savings (Consider as Negative)	F (3,152) = 7.109	--	0.000***
Having savings in the bank (Consider as Negative)	F (3,152) = 11.777	--	0.000***
No Regular inflows of money: Remittance	--	$\chi^2(3) = 6.944$	0.074*

*Significant at $p \leq 0.10$ ** Significant at $p \leq 0.05$ *** Significant at $p \leq .001$.