

# Supplementary Materials: Farmers' Distress Index: An Approach for an Action Plan to Reduce Vulnerability in the Drylands of India

**Table S1.** Rating of variables of Indicators.

Dimension	Sub-group	Indicator	Association with FDI	Scores (0-2)						Total Score	Selected variables
				A	B	C	D	E	F		
Exposure to risk	Exposure to risk	Flood/ Cyclone (% of loss)	Positive	2	2	1	2	2	2	11	√
		Drought (% of loss)	Positive	2	2	1	2	2	2	11	√
		Pest/Disease attack (% of loss)	Positive	1	1	1	1	1	1	6	
		Poor input (% of loss)	Positive	2	1	0	1	0	1	5	
		Less output price (% of loss)	Positive	2	2	1	2	2	2	11	√
		Livestock diseases (% of loss)	Positive	1	1	1	1	1	1	6	
Adoptive capacity	Socio-demographic Profile	Female headed households	Positive	2	2	2	0	1	1	8	
		Caste	Inverse	2	2	2	1	1	2	10	√
		Religion	Positive	2	2	1	0	0	0	5	
		HH size (no.)	Positive	2	2	2	1	1	1	9	
		Elderly population	Positive	2	2	1	1	1	1	8	
		Disability	Positive	2	1	1	0	0	0	4	
		Sex ratio(female/male)	Positive	2	2	2	2	2	2	12	√
		Educational status of head	Inverse	2	2	2	2	2	2	12	√
		Illiteracy	Positive	2	1	1	1	2	2	9	
		Dependency ratio	Positive	2	2	1	1	2	2	10	√
	Socio-Economic assets	House value (₹)	Inverse	2	1	1	2	1	2	9	√
		Gold value (₹)	Inverse	2	0	0	1	1	2	6	
		Total own land (₹)	Inverse	2	1	1	2	2	2	10	√
		Total savings (₹)	Inverse	2	1	1	2	2	2	10	√
	Livelihood strategies	Total income (₹)	Inverse	2	1	1	0	1	2	7	
		Simpson Index Income	Inverse	2	0	1	2	2	2	9	√
		SDI of cropping pattern	Inverse	2	0	1	2	2	2	9	√
		Household expenditure (₹)	Positive	2	1	1	2	1	2	9	√
	Social Network	Membership of SHG (y/n)	Inverse	2	1	2	1	1	1	8	
		Membership of cooperatives (y/n)	Inverse	2	1	2	1	1	1	8	
		Membership of agricultural cooperatives (y/n)	Inverse	2	1	2	1	1	1	8	
		Membership of local cooperatives (y/n)	Inverse	2	1	2	1	1	1	8	
		All SHGs/Cooperatives	Inverse	2	1	2	2	1	1	9	√

Agriculture	Expenditure on agricultural input (₹/hh)	Positive	2	1	1	1	1	1	7		
	Income from agriculture (₹/hh)	Inverse	2	1	1	2	2	2	10	√	
	Profit (₹/hh)	Inverse	2	1	1	2	2	2	10	√	
	Production cost (₹/hh)	Positive	2	1	1	1	1	1	7		
	Total owned land (acre)	Inverse	2	2	1	1	1	1	8		
	Total leased in land(acre)	Positive	2	2	1	0	0	0	5		
	Profit/Acre (Rs/acre)	Inverse	2	1	1	1	1	1	7		
	Rainfed area (acre)	Positive	2	2	2	1	1	2	10	√	
Sensitivity	Water	Provision of rain water harvesting in the village (y/n)	Inverse	2	2	1	1	1	1	8	
		Failure of Borewells (y/n)	Positive	2	2	2	1	2	2	11	√
	Health	Health Expenditure (₹)	Positive	2	1	1	2	1	2	9	√
		Likely Health Expenses (1-10)	Positive	2	1	1	1	1	1	7	
		Chronic Illness (y/n)	Positive	2	1	1	1	1	1	7	
	Food	Food expenses (₹)	Positive	2	1	1	1	2	2	9	√
	Infrastructure	Road (y/n)	Inverse	2	2	2	2	2	2	12	√
	Children	Children enrolled in private school (nos)	Positive	2	2	1	1	1	1	8	
		Likely to withdrawal of children from schools (1-10)	Positive	2	2	2	1	1	2	10	√
	Finance	Indebtedness through informal source (₹)	Positive	2	2	2	2	2	2	12	√
Mitigation & adoption strategies and constraints	Farmers' initiative	Reduced cropped area (1-10)	Positive	2	2	1	1	2	2	10	√
		Land kept fallow(1-10)	Positive	2	2	1	1	1	1	8	
		Low input use ((1-10)	Positive	2	2	1	1	1	1	8	
		Reduced household expenses (1-10)	Positive	2	1	1	1	2	2	9	√
		Borrowing from relatives and friends (1-10)	Positive	2	2	1	1	1	1	8	
		Borrowing from money lenders (1-10)	Positive	2	2	1	2	2	2	11	√
		Migrated out as casual labourer (1-10)	Positive	2	1	2	1	1	1	8	
		Participation in MNREGA (1-10)	Positive	2	2	1	1	1	0	7	
		Postponed health treatment (1-10)	Positive	2	1	1	1	1	0	6	
		Postponed marriages (1-10)	Positive	2	1	1	0	0	0	4	
		Sold livestock animals (1-10)	Positive	2	1	1	1	2	2	9	√
		Engaged in animal husbandry (1-10)	Positive	2	2	1	1	1	1	8	
		Sending women for domestic work (1-10)	Positive	2	2	1	1	1	0	7	

Govt. benefit	Benefitted by any formal institution (y/n)	Inverse	2	2	2	2	2	2	12	√
	Benefitted through Rythu Bandhu (y/n)	Inverse	2	1	2	1	1	2	9	√
	Benefitted through SHC(y/n)	Inverse	2	1	1	1	1	1	7	
	Benefitted through KCC(y/n)	Inverse	2	1	1	1	1	1	7	
	Benefitted through Old age pension(y/n)	Inverse	2	1	2	1	1	2	9	√
	Benefitted through Health Scheme(y/n)	Inverse	2	1	1	1	1	0	6	
	Got assistance for child education(y/n)	Inverse	2	1	1	1	0	0	5	
	Benefitted through insurance scheme(y/n)	Inverse	2	1	2	1	2	2	10	√
	Use own savings (1-10)	Inverse	2	1	1	1	1	1	7	
Adaptation strategies	Migrated to other places (1-10)	Inverse	2	2	2	1	2	2	11	√
	Change cropping pattern (1-10)	Inverse	2	1	1	1	1	1	7	
	Sale of assets (1-10)	Inverse	2	1	1	1	1	1	7	
	Reduce expenditure on food (1-10)	Inverse	2	1	1	1	1	1	7	
	Drop out the children from school (1-10)	Inverse	2	1	1	0	1	1	6	
	Borrowing (1-10)	Inverse	2	1	2	1	1	1	8	
	Depend more on non-farm employment (1-10)	Inverse	2	2	1	1	2	2	10	√
	Bonded labour (1-10)	Inverse	2	0	0	1	1	1	5	
	Take support from local governments (1-10)	Inverse	2	1	1	0	1	1	6	
	Low education level (1-10)	Inverse	2	2	2	1	2	2	11	√
Constraints	Lack of access to information (1-10)	Inverse	2	1	1	1	1	1	7	
	Inadequate capital (1-10)	Inverse	2	1	2	1	2	2	10	√
	Lack of extension services (1-10)	Inverse	2	1	1	1	1	1	7	
	Land not suitable (1-10)	Inverse	2	1	1	1	1	1	7	
	Lack of irrigation (1-10)	Inverse	2	1	2	2	2	2	11	√
	Non-availability of labour (1-10)	Inverse	2	1	1	1	1	1	7	
	Lack of quality inputs (1-10)	Inverse	2	1	1	1	1	1	7	
	Health expenses (1-10 scale)	Positive	2	1	1	1	1	1	7	
Triggers	Marital disputes (1-10 scale)	Positive	2	1	1	0	1	1	6	
	Chronical illness (1-10 scale)	Positive	2	1	1	1	2	2	9	√

		Children marriage dowry (y/n)	Positive	2	1	1	2	1	2	9	√
		Educational expense (1-10 scale)	Positive	2	1	1	1	1	1	7	
		Other marriage expense (1-10 scale)	Positive	2	0	0	1	0	1	4	
		Unemployment (1-10 scale)	Positive	2	1	2	1	1	2	9	√
		Lack of alternative income source (1-10 scale)	Positive	2	1	1	1	1	1	7	
		Frequent pest and disease attack (1-10 scale)	Positive	2	1	1	1	1	1	7	
		Outbreak of livestock disease (1-10 scale)	Positive	2	1	1	1	1	1	7	
		High farm expenses (1-10 scale)	Positive	2	1	1	1	1	2	8	
		Crop failure (1-10 scale)	Positive	2	2	2	2	2	2	12	√
		Debt from informal sources (Rs.)	Positive	2	1	2	1	1	1	8	
Social & Psychological factors	Social factor & Change in social position	Objection in women participation (y/n)	Positive	2	1	1	1	1	1	7	√
		Catastrophe incident in last 5 years (y/n)	Positive	2	1	1	1	1	1	7	
		Negative comment from society (y/n)	Positive	2	1	1	0	1	0	5	
		Feeling isolated (y/n)	Positive	2	1	1	2	2	2	10	√
		Serious issue with society (y/n)	Positive	2	1	1	1	1	1	7	
	Family burden	Unable to fulfil family's responsibility(y/n)	Positive	2	1	1	1	2	2	9	√
		Didn't get moral support(y/n)	Positive	2	1	1	1	1	1	7	
		Major family issue(y/n)	Positive	2	1	1	1	1	1	7	
	Deterioration of economic status	Worried about financial distress(y/n)	Positive	2	1	1	1	2	2	9	√
		Family problem regarding the deterioration in economic status(y/n)	Positive	2	1	1	1	1	2	8	
	Behavioural change	addiction on smoking or alcohol or drugs(y/n)	Positive	2	1	1	2	1	2	9	√
	Loosing of self confidence	Stressed out for a long time(y/n)	Positive	2	1	1	1	2	2	9	√
		Lost pleasure in economic activities(y/n)	Positive	2	0	0	1	1	1	5	
		Thought of ending life (y/n)	Positive	2	0	0	1	2	2	7	
Impacts	Impact	Reduced income (1-10)	Positive	2	1	1	2	2	2	10	√
		Increase indebtedness (1-10)	Positive	2	1	1	2	2	2	10	√

Shortage in food consumption (1-10)	Positive	2	1	1	1	2	1	8	
Purchased food from outside (1-10)	Positive	2	1	1	1	1	1	7	
Increased poverty (1-10)	Positive	2	1	1	2	2	2	10	√
Deteriorating health (1-10)	Positive	2	1	1	1	1	1	7	
Social stigma (1-10)	Positive	2	1	1	1	0	1	6	
Sale of livestock/poultry(y/n)	Positive	2	1	1	1	1	1	7	
Face distress in last 5 years(y/n)	Positive	2	2	2	2	2	2	12	√

**Table S2.** Indices of crop loss during last 5 years due to natural hazards (Exposure to risk).

District	Flood/ Cycle	Drought	Pest attack	Poor inputs	Low output price	Livestock diseases	Other losses
Ananthapur	0.321	0.335	0.042	0.009	0.000	0.000	0.432
Kurnool	0.186	0.421	0.095	0.001	0.000	0.016	0.418
Nalgonda	0.256	0.288	0.061	0.000	0.000	0.000	0.366
Siddipet	0.143	0.300	0.118	0.004	0.012	0.015	0.326

**Table S3.** Indices of Socio-demographic profile.

District	Sex	Caste	Religion	Family size	Elderly population	Disability	Sex ratio	Educational status of head	Illiteracy	Dependency ratio	Mean
Ananthapur	0.07	0.61	0.01	0.34	0.45	0.42	0.17	0.8	0.32	0.27	0.346
KurNool	0.08	0.60	0.05	0.37	0.53	0.48	0.17	0.78	0.36	0.28	0.370
Nalgonda	0.07	0.71	0.01	0.33	0.6	0.57	0.16	0.8	0.33	0.24	0.382
Siddipet	0.09	0.59	0.05	0.37	0.58	0.53	0.19	0.76	0.38	0.28	0.382
Total	0.08	0.63	0.03	0.35	0.54	0.5	0.17	0.79	0.35	0.27	0.371

**Table S4.** Indices of socioeconomic assets.

	Ananthapur	Kurnool	Nalgonda	Siddipet
House value	0.99	0.97	0.96	0.94
Gold value	0.92	0.91	0.92	0.91
Total own land	0.71	0.79	0.82	0.88
Mean	0.81	0.82	0.83	0.84

**Table S5.** Indices of livelihood strategies.

	Ananthapur	KurNool	Nalgonda	Siddipet
Total savings	0.810	0.822	0.837	0.770
Total income	0.910	0.880	0.890	0.866
Simpson Index Income	0.527	0.482	0.516	0.515
SDI	0.191	0.227	0.117	0.328
Household expenditure	0.392	0.381	0.369	0.359
Mean	0.566	0.558	0.546	0.568

**Table S6.** Indices of Social networks.

	Ananthapur	Kurnool	Nalgonda	Siddipet
SHG	0.081	0.194	0.212	0.131
Cooperative	0.862	0.856	0.931	0.800
Agricultural Cooperative	0.919	0.944	0.975	0.969
Local cooperative	0.981	0.987	0.987	0.956
Mean	0.711	0.745	0.776	0.714

Table S7. Indices of Agricultural activities.

	Ananthapur	Kurnool	Nalgonda	Siddipet
Agricultural input	0.122	0.104	0.082	0.063
Income from agriculture	0.856	0.791	0.857	0.818
Profit	0.703	0.701	0.694	0.682
Production cost	0.065	0.135	0.150	0.090
Total owned land	0.713	0.793	0.819	0.881
Total leased in land	0.002	0.044	0.025	0.015
Profit/Acre	0.637	0.638	0.622	0.580
Rainfed operational	0.153	0.160	0.120	0.046
Mean	0.406	0.421	0.421	0.397

Table S8. Indices of Sensitivity indicators.

		Ananthapur	Kurnool	Nalgonda	Siddipet
Water	Provision of rain water harvesting	0.41	0.68	0.59	0.50
	Failure of Borewells	0.78	0.68	0.90	0.72
Health	Health Expenditure	0.03	0.04	0.04	0.05
	Likely Health Expenses	0.39	0.43	0.51	0.47
	Chronic Illness	0.04	0.13	0.09	0.12
Food	Food expenses	0.00	0.28	0.27	0.28
Infrastructure	Road	0.00	0.04	0.02	0.00
Children	Children enrolled in private school	0.13	0.14	0.19	0.23
	Likely to withdrawal of children from schools	0.36	0.47	0.45	0.47
Financial	Indebtedness through informal source	0.03	0.05	0.03	0.04
	Mean	0.217	0.294	0.309	0.288

Table S9. Indices of farmers' own initiative towards mitigation strategies.

	Ananthapur	Kurnool	Nalgonda	Siddipet
Reduced cropped area	0.122	0.104	0.082	0.063
Land kept fallow	0.144	0.209	0.143	0.182
Low input use	0.297	0.299	0.306	0.318
Reduced household expenses	0.065	0.135	0.150	0.090
Borrowing from relatives and friends	0.287	0.207	0.181	0.119
Borrowing from money lenders	0.002	0.044	0.025	0.015
Migrated out as casual labourer	0.363	0.362	0.378	0.420
Participation in MNREGA	0.144	0.209	0.143	0.182
Postponed health treatment	0.297	0.299	0.306	0.318
Postponed marriages	0.065	0.135	0.150	0.090
Sold livestock animals	0.287	0.207	0.181	0.119
Engaged in animal husbandry	0.002	0.044	0.025	0.015
Sending women for domestic work	0.363	0.362	0.378	0.420

Mean	0.188	0.201	0.188	0.181
------	-------	-------	-------	-------

**Table S10.** Indices of Government support.

	Ananthapur	Kurnool	Nalgonda	Siddipet
Benefitted by any formal institution	0.08	0.08	0.03	0.16
Benefitted through Rythu Bandhu	0.09	0.15	0.04	0.07
Benefitted through SHC	0.96	0.87	0.90	0.96
Benefitted through KCC	0.96	0.98	0.99	0.99
Benefitted through Old age pension	0.64	0.78	0.88	0.80
Benefitted through Health Scheme	0.92	0.96	0.96	0.96
Got assistance for child education	0.94	0.73	0.94	0.90
Benefitted through insurance scheme	0.85	0.76	0.94	0.91
Mean	0.680	0.664	0.710	0.719

**Table S11.** Indices of adaptation strategies to reduce the distress.

	Ananthapur	Kurnool	Nalgonda	Siddipet
Use own savings	0.491	0.494	0.475	0.512
Migrated to other places	0.345	0.320	0.211	0.259
Change cropping pattern	0.295	0.417	0.302	0.375
Sale of assets	0.244	0.344	0.253	0.305
Reduce expenditure on food	0.402	0.427	0.364	0.408
Drop out the children from school	0.209	0.287	0.180	0.247
Borrowing	0.694	0.691	0.664	0.708
Depend more on non-farm employment	0.614	0.673	0.641	0.680
Bonded labour	0.350	0.383	0.325	0.395
Take support from local govt.	0.320	0.470	0.452	0.448
Mean	0.396	0.451	0.387	0.434

**Table S12.** Indices of the constraints in adaptation measures.

	Ananthapur	Kurnool	Nalgonda	Siddipet
Low education level	0.400	0.466	0.541	0.547
Lack of access to information	0.388	0.519	0.484	0.519
Inadequate capital	0.725	0.609	0.659	0.606
Lack of extension services	0.475	0.359	0.347	0.306
Land not suitable	0.647	0.512	0.500	0.466
Lack of irrigation	0.850	0.709	0.719	0.637
Non-availability of labour	0.500	0.406	0.422	0.338
Lack of quality inputs	0.563	0.350	0.381	0.312
Mean	0.569	0.491	0.507	0.466

**Table S13.** Indices of Triggers.

	Ananthapur	Kurnool	Nalgonda	Siddipet
Health expenses	0.386	0.434	0.513	0.474
Marital disputes	0.030	0.070	0.110	0.070
Chronical illness	0.040	0.130	0.090	0.120
Children marriage dowry	0.008	0.016	0.015	0.025
Educational expense	0.450	0.462	0.488	0.476
Other marriage expense	0.447	0.449	0.495	0.463
Unemployment	0.569	0.594	0.615	0.588

Lack of alternative income source	0.647	0.672	0.664	0.658
Frequent pest and disease attack	0.632	0.636	0.606	0.576
Outbreak of livestock disease	0.413	0.441	0.437	0.375
Lower price of output	0.610	0.618	0.685	0.611
High farm expenses	0.692	0.688	0.747	0.685
Crop failure	0.738	0.709	0.734	0.700
Debt from informal sources	0.030	0.049	0.032	0.044
Mean	0.407	0.426	0.445	0.419

**Table S14.** Indices of social and psychological factors causes agrarian distress.

		Ananthapur	Kurnool	Nalgonda	Siddipet
Social issues	Objection in women participation	0.00	0.22	0.05	0.13
	Catastrophe incident in last 5 years	0.01	0.03	0.03	0.01
	Negative comment from society	0.00	0.11	0.03	0.09
Change in social position	Feeling isolated	0.04	0.20	0.08	0.16
Mental harassment	Serious issue with society	0.16	0.15	0.04	0.11
Family burden	Unable to fulfil family's responsibility	0.52	0.55	0.14	0.33
	Did not get moral support	0.05	0.26	0.08	0.19
	Major family issue	0.04	0.13	0.08	0.17
Deterioration of economic status	Worried about financial distress	0.00	0.00	0.14	0.51
	Family issues regarding the deterioration in economic status	0.12	0.26	0.07	0.18
Behavioural change	addiction on smoking or alcohol or drugs	0.29	0.39	0.49	0.35
Loosing of self confidence	Stressed out for a long time	0.18	0.18	0.08	0.24
	Lost pleasure in economic activities	0.13	0.09	0.08	0.14
	Thought of ending life	0.00	0.05	0.03	0.01
	Mean	0.11	0.110	0.187	0.101

**Table S15.** Indices of the impact of agrarian distress on farmer's livelihood.

	Ananthapur	Kurnool	Nalgonda	Siddipet
Reduced income	0.722	0.731	0.768	0.739
Increase indebtedness	0.735	0.752	0.773	0.749
Shortage in food consumption	0.506	0.571	0.569	0.542
Purchased food from outside	0.492	0.538	0.513	0.516
Increased poverty	0.682	0.686	0.638	0.642
Deteriorating health	0.440	0.506	0.520	0.488
Social stigma	0.296	0.341	0.341	0.307
Sale of livestock/poultry	0.020	0.080	0.040	0.110
Face distress in last 5 years	0.000	0.030	0.530	0.870
Mean	0.433	0.471	0.521	0.552