

Drought-Induced Food Insecurity in Nepal: The Role of 'Emergency Loan' as an Adaptation Strategy

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Section 1: Rationale

Previously

- Nutrition in South Asia (different countries)
- Malnutrition results from a complex interplay of factors incorporating **household and individual decision-making**, agriculture and food systems, healthcare services, education, and socio-ecological systems that determine **access to services and resources**, and related policy processes. (IFPRI, 2024)

Themes

- Agricultural production
- Markets, food environment, and value chains
- Digital innovations
- Behavior change communication (BCC), including nutrition education
- Health systems
- Diets and drivers of food choices
- Water, sanitation, and hygiene (WASH) and water systems
- Social protection, including social safety nets
- Equity and social inclusion
- Climate action
- Policy and governance
- **Strengthening the capacity of individuals and institutions**

Climate change and food systems

“South Asia is a region at high **climate sensitivity** and communities are **vulnerable** to the effects of rising temperatures, erratic rainfall patterns, and **increased frequency of extreme events** that impact **crop yields, contribute to loss of nutritional diversity**, and affect agricultural incomes and livelihoods, thereby **increasing food insecurity.**”

(IFPRI, 2024)

Climate change and shocks

- **'Almost 90% of households reported at least one shock during 2016-18.** Each year, on average, 1 in 3 households was affected by a shock.'
- **Poorer** households more likely to report them, especially **drought**.
- Which was widespread in 2015-16 in Nepal, significantly in the western regions. (Walker et al., 2019) (Household Risk and Vulnerability Survey (HRVS 2016-2018))

Coping strategies

- Used a range of coping strategies to manage shocks
- Most common: dissaving and borrowing
- Savings: relied more frequently by wealthier and those with bank accounts; borrowing by poorer households.

(Walker et al.,2019) (Household Risk and Vulnerability Survey (HRVS 2016-2018))

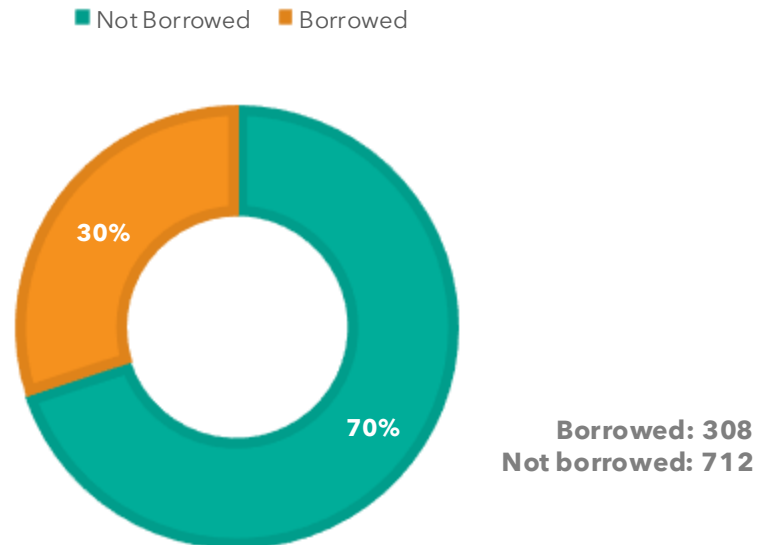


Figure 1

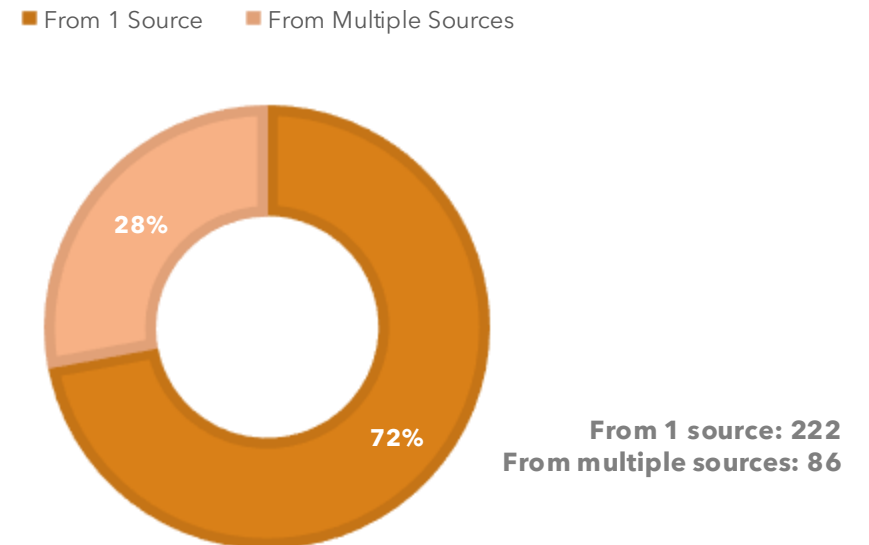
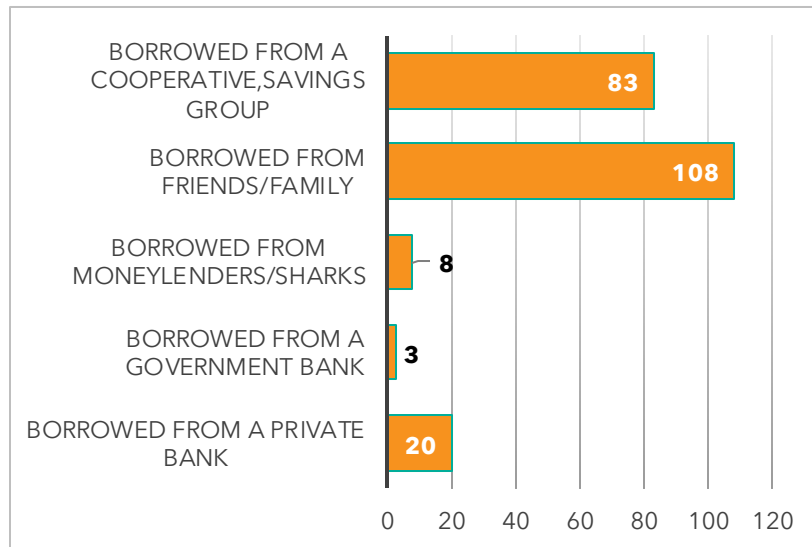


Figure 2

Coping strategies

Figure 3



Source: Household Risk and Vulnerability Survey (HRVS 2016-2018)

Source:

Borrowed from a private bank: 20	9%	
Borrowed from a Government bank: 3	1%	
Borrowed from a Moneylenders/ Sharks: 8	4%	
Borrowed from a Friends/family: 108		49%
Borrowed from a Cooperative, savings group: 83	37%	

Rationale

That's why it becomes important to examine the impact of coping strategies like 'borrowing' in helping to reduce the effect of shocks like food insecurity.

Research Question

Does 'Strengthening the capacity of individuals and institutions' help in reducing the climate caused **nutritional deficiency** overtime?

Does 'Emergency Loan' help in reducing the **Drought-induced food insecurity** overtime?

Section 2: Methods

Data

- Household Risk and Vulnerability Survey 2016-2018 (HRVS 16-18) ([The World Bank](#))
- 6000 households in non-metropolitan areas (2010 Census definition)
- **Drought** affected households in 2016. (Drought yes)

- Post-Drought Treatment Effect of **borrowing** as a coping strategy on drought induced **food insecurity**. (Borrowing yes/no)

Data

Food insecurity

Using the USAID’s Household Food Insecurity Access (HFIA) Scale questionnaire, the following questions were asked: (Coates et al., 2007)

1.	In the past four weeks, did you worry that your household would not have enough food?
2.	In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?
3.	In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?
4.	In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?
5.	In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?
6.	In the past four weeks, did you or any household member have to eat fewer meals in a day because there was not enough food?
7.	In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?
8.	In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?
9.	In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?



More Severe

Question	Frequency		
	Rarely 1	Sometimes 2	Often 3
1a			
2a			
3a			
4a			
5a			
6a			
7a			
8a			
9a			

Where the response options include:

1 = **Rarely** (once or twice in the past four weeks) 2 = **Sometimes** (three to ten times in the past four weeks) 3 = **Often** (more than ten times in the past four weeks)

1	food secure
2	mildly food secure
3	moderately food insecure
4	severely food insecure

Econometric Model 1

$$y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + \varepsilon$$

y = Food Insecurity (HFIA Score:1,2,3,4)

X_1 = Drought

Controls:

Household controls

- *Demographic controls: Household head's age, ethnicity, religion, health, education*
- *Household head Self-employed in agriculture (Dummy)*
- *No. of hours worked by household head*
- *Access to Information*
- *Current value of assets*
- *Remittance amount*
- *Other shocks faced*
- *Household's employment ratio*

Geographical controls

- *Average distance in km: Daily market, Motorable road, Black topped road, Primary/ Secondary school, Health post*

1) Effect of Drought on Food Insecurity

Variable	Obs	Mean	Std. Dev.	Min	Max
assetcv	5365	8.161	3.657	0	14.736
ethnicity	5365	.337	.473	0	1
religion	5365	.859	.348	0	1
age	5365	48.829	13.645	17	98
fem	5365	1	0	1	1
remitamt	5365	.064	.831	0	12.766
profit	5165	1.141	3.459	0	15.874
seano	5365	.662	.473	0	1
hrsworked	5365	6.144	3.048	0	24
employed	5365	2.214	1.079	1	9
hhsz	5365	4.953	1.977	1	22
empratio	5365	.482	.222	.091	1
dailymarket	5365	6.056	17.288	0	800
blacktoprd	5365	15.533	34.523	0	800
motorableroad	5365	3.03	16.393	0	800
primsch	5365	1.392	9.949	0	600
secsch	5365	2.414	7.162	0	400
healthpost	5365	3.037	7.256	0	500
infoaccess	5365	.35	.477	0	1
seracavgdist	5365	5.243	8.649	.042	270
daysaffected	5365	3.67	19.724	0	390
education	5365	.593	.491	0	1
hfa1	5365	1.484	.954	1	4
drought	5365	.195	.396	0	1
othershocks	5365	.622	.485	0	1

1) Effect of Drought on Food Insecurity

VARIABLES	(1) Food Insecurity	(2) Food Insecurity
Drought	0.26*** (0.03)	0.18*** (0.06)
Constant	1.43 (0.01)	1.91 (0.21)
Observations	5,365	5,165
R-squared	0.01	0.13
Household Characteristics	NO	YES
Geographical controls	NO	YES
Errors clustered	NO	YES

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Econometric Model 2

$$\tau^{ATT|PSM} = E_{P(X)|D=1}\{E[Y(1)|D = 1, P(X)] - E[Y(0)|D = 0, P(X)]\}$$

$\tau^{ATT|PSM}$: Average Treatment Effect on the Treated (ATT) estimated through Propensity Score Matching (PSM).

$E_{P(X)|D=1}$: Expectation over the distribution of propensity scores $P(X)$ for the treated group (where $D=1$)

$E[Y(1)|D = 1, P(X)]$: Expected outcome for the treated group conditional on p score

$E[Y(0)|D = 0, P(X)]$: Expected outcome for the control group conditional on p score

Section 3: Results

Treatment Effect

Variable	Obs	Mean	Std. Dev.	Min	Max
hfa1	1020	1.68	1.053	1	4
hfa2	1020	1.341	.767	1	4
bankdist	1020	11.473	11.422	.02	80
avgdist	1020	7.411	10.68	.202	134.102
beforeloan	1020	.776	.737	0	9
loss	1020	10.093	1.434	5.72	14.756
pubassiscash	1020	3182.451	6629.255	0	65000
cashfrngo	1020	892.01	5951.334	0	96200
edugrade	1020	4.41	4.612	0	16
bankacs	1020	.368	.482	0	1
borrowed	1020	.18	.385	0	1
assetcv	1020	7.92	3.654	0	14.157
ethnicity	1020	.439	.497	0	1
religion	1020	.922	.269	0	1
age	1020	49.907	13.972	19	98
empratio	1020	.493	.214	.1	1
infoaccess	1020	.254	.435	0	1
daysaffected	1020	5.264	25.857	0	390
othershocks	1020	.604	.489	0	1

Probit regression**To estimate the propensity score.**

Number of obs = 1,020

Log likelihood = -420.67943

LR chi2(17) = 121.50

Prob > chi2 = 0.0000

Pseudo R2 = 0.1262

borrowed	Coefficient	Std. err.	z	P>z	[95% conf. interval]	
hfia1	0.223	0.049	4.56	0	0.127	0.319
infoaccess	0.314	0.127	2.48	0.013	0.066	0.562
bankdist	-0.005	0.005	-1	0.318	-0.014	0.004
avgdist	0.019	0.004	4.55	0	0.011	0.027
loss	-0.047	0.046	-1.02	0.307	-0.138	0.043
othershocks	0.36	0.132	2.74	0.006	0.102	0.618
pubassiscash	0	0	1.11	0.266	0	0
cashfrngo	0	0	-1.92	0.055	0	0
edugrade	-0.018	0.012	-1.43	0.154	-0.042	0.007
daysaffected	-0.001	0.002	-0.39	0.696	-0.004	0.003
bankacs	0.068	0.135	0.51	0.612	-0.195	0.332
empratio	-0.185	0.245	-0.75	0.451	-0.666	0.296
assetcv	-0.011	0.019	-0.61	0.54	-0.048	0.025
age	0.006	0.004	1.43	0.152	-0.002	0.014
ethnicity	0.044	0.104	0.43	0.668	-0.159	0.248
religion	-0.037	0.192	-0.19	0.846	-0.414	0.339
beforeloan	-0.193	0.077	-2.5	0.012	-0.344	-0.042
_cons	-1.177	0.533	-2.21	0.027	-2.221	-0.133

Balance Test

- Moderately balanced covariates

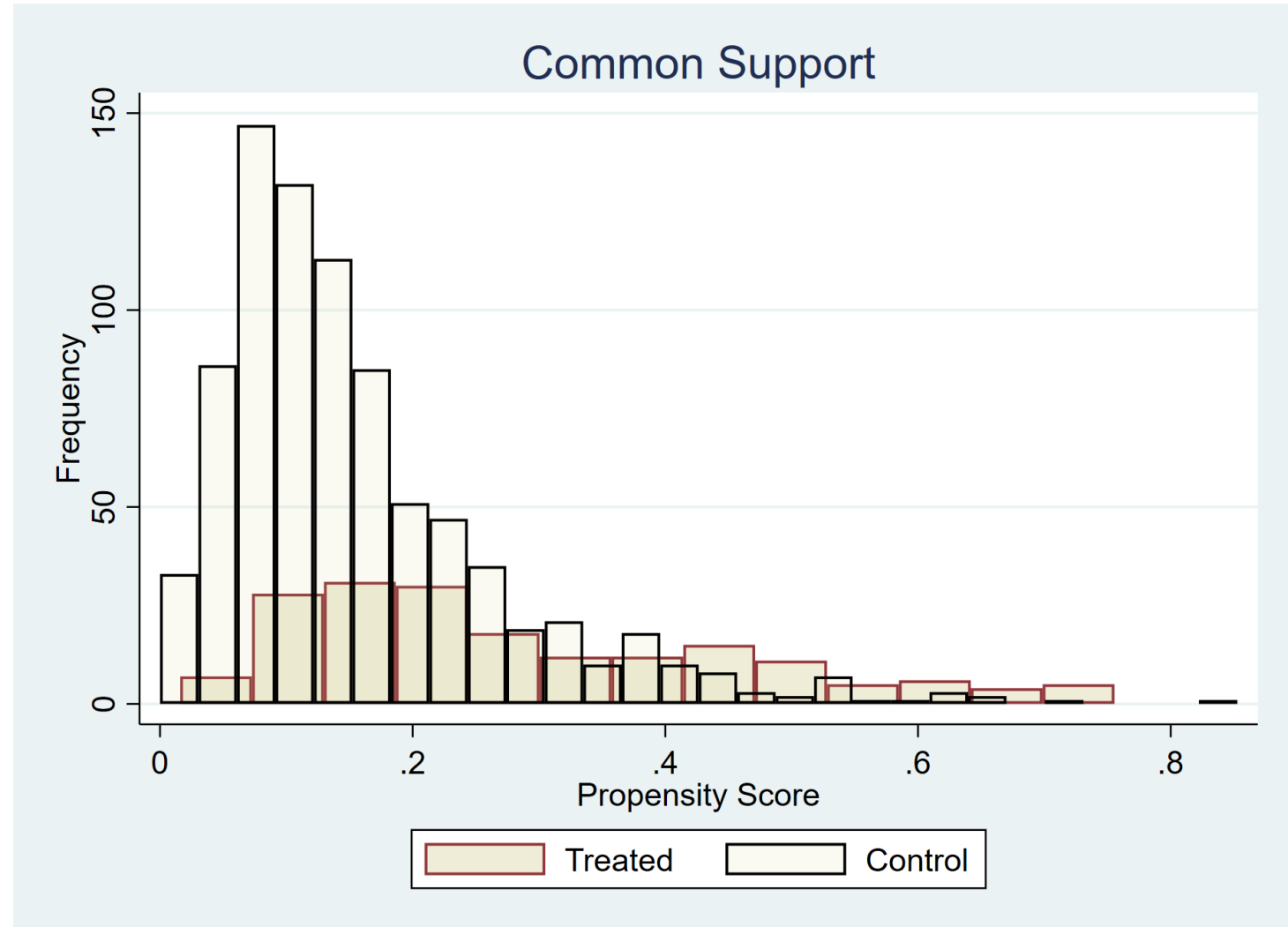
Ps R2	LR chi2	p>chi2	MeanBias
0.015	7.67	0.97	4.70

MedBias	B	R	%Var
3.30	23.60	1.11	42

Variable	Mean					
	Treated	Control	%bias	t	p>t	V(T)/ V(C)
hfa1	2.19	2.32	-11.50	-1.00	0.32	1.10
infoaccess	0.32	0.25	14.60	1.39	0.17	0.87
bankdist	10.85	11.30	-4.00	-0.36	0.72	1.29
avgdist	12.31	12.22	0.70	0.05	0.96	0.79
loss	10.20	10.12	5.80	0.58	0.56	1.25
othershocks	0.75	0.75	1.20	0.12	0.91	1.28
pubassiscash	3555.40	3340.80	3.30	0.34	0.74	0.97
cashfrngo	80.44	123.37	-0.90	-0.63	0.53	1.10
edugrade	3.93	3.88	1.10	0.11	0.91	1.04
daysaffected	6.24	5.78	1.70	0.15	0.88	1.22
bankacs	0.36	0.37	-1.10	-0.11	0.91	0.97
empratio	0.46	0.45	4.50	0.45	0.65	0.91
assetcv	8.02	7.87	4.30	0.40	0.69	1.19
age	52.54	51.40	8.10	0.74	0.46	0.85
ethnicity	0.45	0.51	-12.00	-1.15	0.25	1.05
religion	0.92	0.93	-2.00	-0.20	0.84	1.20
beforeloan	0.56	0.58	-2.30	-0.24	0.81	0.99

Common Support

- Healthy common support



Matching and ATT

Variable	Treated	Controls	Difference	S.E.	T-stat
Sample					
Unmatched	1.25	1.36	-0.11	0.06	-1.78
ATT	1.25	1.51	-0.26	0.10	-2.53

	Off Support	On Support	Total
Untreated	0	836	836
Treated	0	184	184
Total	0	1,020	1,020

Nearest Neighbour Matching, Common Support

Variable	Treated	Controls	Difference	S.E.	T-stat
Sample					
Unmatched	1.250	1.361	-0.111	0.062	-1.780
ATT	1.250	1.424	-0.174	0.080	-2.180

	Off Support	On Support	Total
Untreated	0	836	836
Treated	0	184	184
Total	0	1,020	1,020

Nearest Neighbour Matching, No replacement

Matching and ATT

Variable	Treated	Controls	Difference	S.E.	T-stat
Sample					
hfa2	1.250	1.361	-0.111	0.062	-1.780
Unmatched					
ATT	1.250	1.408	-0.158	0.075	-2.100

	Off Support	On Support	Total
Untreated	0	836	836
Treated	0	184	184
Total	0	1,020	1,020

Nearest Neighbour Matching, 3 nearest neighbours

Variable	Treated	Controls	Difference	S.E.	T-stat
Sample					
hfa2	1.250	1.361	-0.111	0.062	-1.780
Unmatched					
ATT	1.260	1.396	-0.136	0.068	-1.980

	Off Support	On Support	Total
Untreated	0	836	836
Treated	7	177	184
Total	7	1,013	1,020

Nearest Neighbour Matching, Radius Caliper (.01)

Sensitivity Analysis

- Rosenbaum bounds (rbounds) sensitivity analysis
- Robust at lower gamma levels
- Our analysis claims that households that had: emergency liquidity in form of borrowing at a time of crisis, specifically when faced with drought, were more food secure compared to households in the control group after a year.
- Our claim extends: emergency liquidity/borrowing can prove to an effective coping/adaptation strategy and prevent exposure to food insecurity in the long run.

Gamma	sig+	sig-	t-hat+	t-hat-	CI+	CI-
1.00	0.00	0.00	-0.32	-0.32	-0.36	-0.27
1.50	0.00	0.00	-0.37	-0.26	-0.40	-0.17
2.00	0.00	0.03	-0.39	-0.19	-0.42	0.00
2.50	0.00	0.20	-0.41	-0.14	-0.45	0.13
3.00	0.00	0.53	-0.43	0.01	-0.47	0.28

* gamma - log odds of differential assignment due to unobserved factors

sig+ - upper bound significance level

sig- - lower bound significance level

t-hat+ - upper bound Hodges-Lehmann point estimate

t-hat- - lower bound Hodges-Lehmann point estimate

CI+ - upper bound confidence interval ($\alpha = .95$)

CI- - lower bound confidence interval ($\alpha = .95$)

Section 4: Implications

Conclusion and Policy Implications

- **Strengthening the capacity of individuals** can play a huge role in the **nutrition** of those individuals especially of those belonging to the **climate vulnerable group**.
- **Drought** affects food insecurity severely and **poorer** households are seen to have been facing shocks more often
- As we concluded: Emergency liquidity during those times can help to offset the severe impacts of shocks like food insecurity
- Households can benefit from programs that prioritize affordable credit at times of crisis, especially to poorer households in remote areas.

BROADER CONCLUSION

- ‘To accelerate progress towards mitigating the complex multifactorial nutrition issues present in South Asia, **all relevant sectors need to unite** to create **solutions**. (IFPRI, 2024)
- Thus, further study on the **feasibility of concessional loans** or other types of financing as coping strategies are seen to be of importance.
- And effective systems built on such framework can prove to be vital in offsetting the effects of shocks, like drought, on nutrition and further improve the lives of people.

References

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