Agriculture and Child Nutrition: An Analysis of Child & District-level Performance in Nepal

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For Collaborative Research on Nutrition

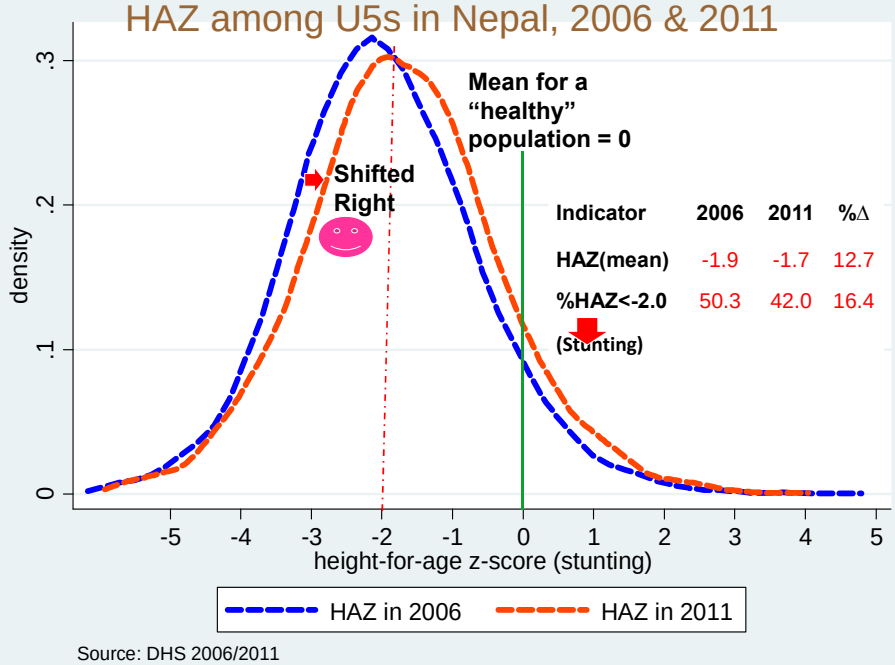
Analysis at Two Levels

Child level:
- n=7,572
- children < 5 years
- DHS 2006 & 2011
- NLSS 2004 & 2010

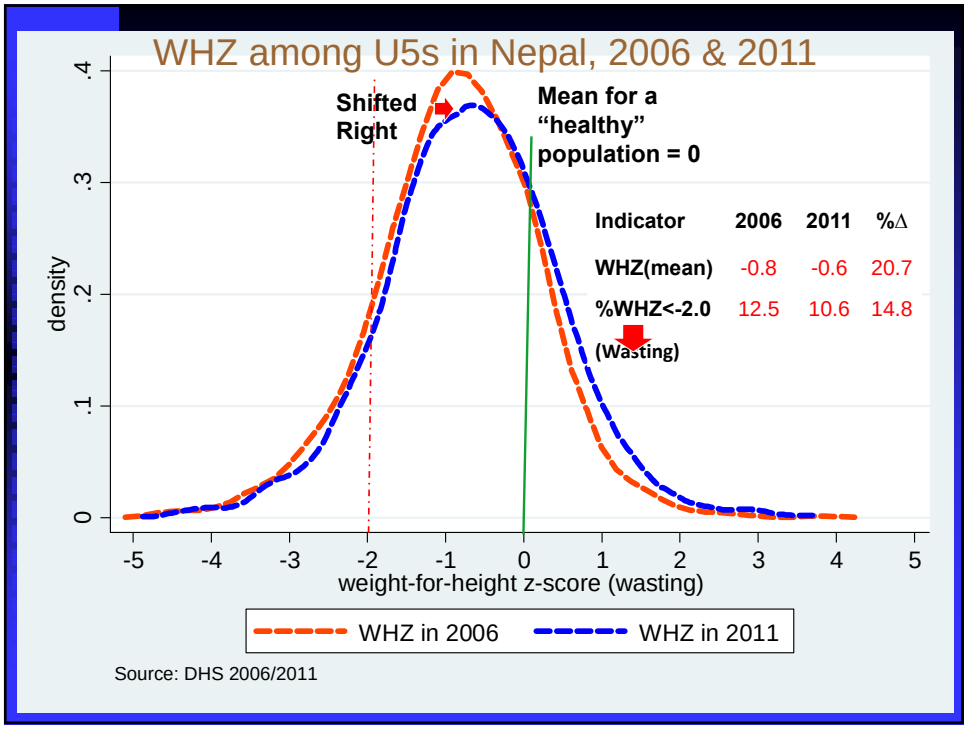
District Level:
- n=75
- collapsed data

Child Level

HAZ among U5s in Nepal, 2006 & 2011



Source: DHS 2006/2011



Objective

Q1: What factors help to explain nutrition outcomes? (WHZ & HAZ)

Q2: What factors are responsible for the shift in Z-scores between 2006 and 2011?

Methodology

Ordinary least squares

dependent variable: HAZ and WHZ, 2006+2011 data

$$Y = f(X1, X2, X3, X4, X5, X6, X7, e)$$

X1:year dummy-Model 1

X2:geographic-Model 2 (X1 to X2)

X3:child-Model 3 (X1 to X3)

X4:mother-Model 4 (X1 to X4)

X5:households-Model 5 (X1 to X5)

X6:agriculture-Model 6 (X1 to X6)

X7:environment-Model 7 (X1 to X7)

HAZ	Base	Geog	Child	Mother	HH	Ag
2011†	0.251***	0.279***	0.263***	0.161***	0.192***	0.2543***
Central†	Geographic variables	-0.239***	-0.237***	-0.121***	-0.140***	-0.157***
Western†		-0.239***	-0.242***	-0.247***	-0.286***	-0.280***
Mid-west†		-0.366***	-0.333***	-0.197***	-0.179***	-0.148***
Far-west†		-0.292***	-0.264***	-0.119**	-0.094*	-0.093*
Hill zone †		0.223***	0.217***	0.164***	0.151***	0.161***
Terai zone†		0.346***	0.306***	0.253***	0.230***	0.224***
Urban†		0.401***	0.365***	0.132***	0.039	0.083**
Lo						

†-Dummy variable,*** p<0.01, ** p<0.05, * p<0.1

HAZ	Child	Mother	HH	Ag
Dpt 3† → child	0.240***	0.142**	0.126**	0.122*
Bcg†	0.449***	0.281***	0.272***	0.277***
Education(Yrs)		0.071***	0.050***	0.048***
Smokes†		-0.287***	-0.273***	-0.276***
Mother's Job†		0.190***	0.095	0.103*
# children → Mother		-0.056***	-0.047***	-0.046***
Mother pregnant†		-0.232***	-0.226***	-0.223***
Husband home†		-0.078**	-0.062**	-0.063**
Brahmin†		-0.096**	-0.099**	-0.110**
Dalit†		-0.130***	-0.071	-0.074

†-**Dummy variable,***** p<0.01, ** p<0.05, * p<0.1

HAZ	HH	Ag
Radio	0.083***	0.076**
Television → Household	0.099**	0.085**
Open defecation	-0.084**	-0.078**
Wealth index	0.0014***	0.002***
HH using irrigation		0.123**
HH w/credit		0.236***
HH producing milk		0.101*

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

WHZ	Base	Geog	Child	Mother	HH	Ag
2011†	0.1783***	0.169***	0.176***	0.146***	0.187***	0.178***
Mid-west†		-0.133***	-0.137***	-0.0848**	-0.062	-0.060
Far-west†		-0.256***	-0.251***	-0.182***	-0.152***	-0.146***
Hills †		0.223***	0.217***	0.164***	0.151***	0.161***
Terai†		-0.321***	-0.329***	-0.198***	-0.192***	-0.218***
Urban†		0.202***	0.200***	0.1196***	0.057*	0.060*
Low yield district†		-0.042	-0.046*	-0.0371	-0.017	-0.004

Geographic variables

†-Dummy variable,*** p<0.01, ** p<0.05, * p<0.1

WHZ	Child	Mother	HH	Ag
Diarrhea†	-0.188***	-0.198***	-0.190***	-0.191***
Fever†	-0.155***	-0.168***	-0.172***	-0.169***
Education (yrs)		0.017***	0.001	0.001
Mother not wking†		0.077**	0.033	0.033
Mother's Job†		0.165***	0.099**	0.101**
# children		-0.015*	-0.008	-0.008
Husband at home†		0.087***	0.098***	0.094***
Brahmin†		-0.127***	-0.127***	-0.122***
Mongolian†		0.151***	0.164***	0.171***
Madheshi†		-0.127***	-0.127***	-0.122***
Dalit†		-0.130***	-0.071	-0.074

child

Mother

†-Dummy variable,*** p<0.01, ** p<0.05, * p<0.1

WHZ		HH	Ag
Radio		0.0638**	0.0629**
Open defecation		-0.0745**	-0.0707**
Water Boiled	➡ Household	0.1539***	0.1561***
Wealth index		0.0012***	0.0012***
Mean share of fruit in crops			0.5512**
Ratio of sold/harvest			0.2902**

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

Conclusions at child level

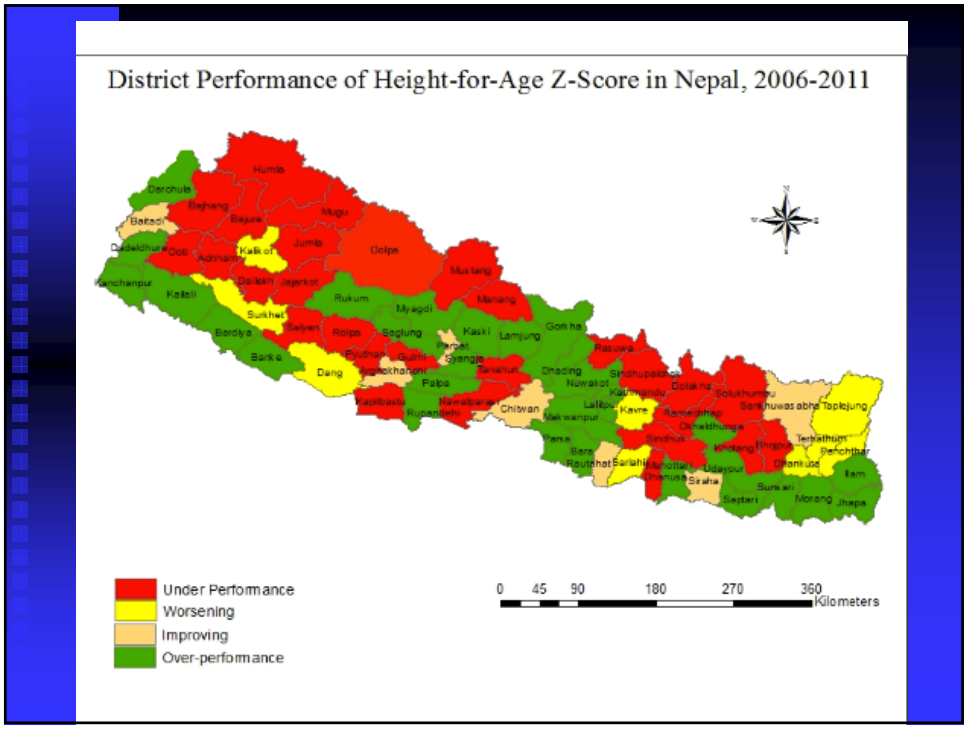
- Rural/Mountainous region/Low yield districts
- Vaccinations/Diarrhea
- Mothers education/Good quality job /Smoking /Small size family with low number of kids/ethnicity
- Household: Open defecations/Boiled water /TV /Radio
- Agriculture: Irrigation / Fruits share/ Milk production / Agricultural loans/ Agriculture commercialization

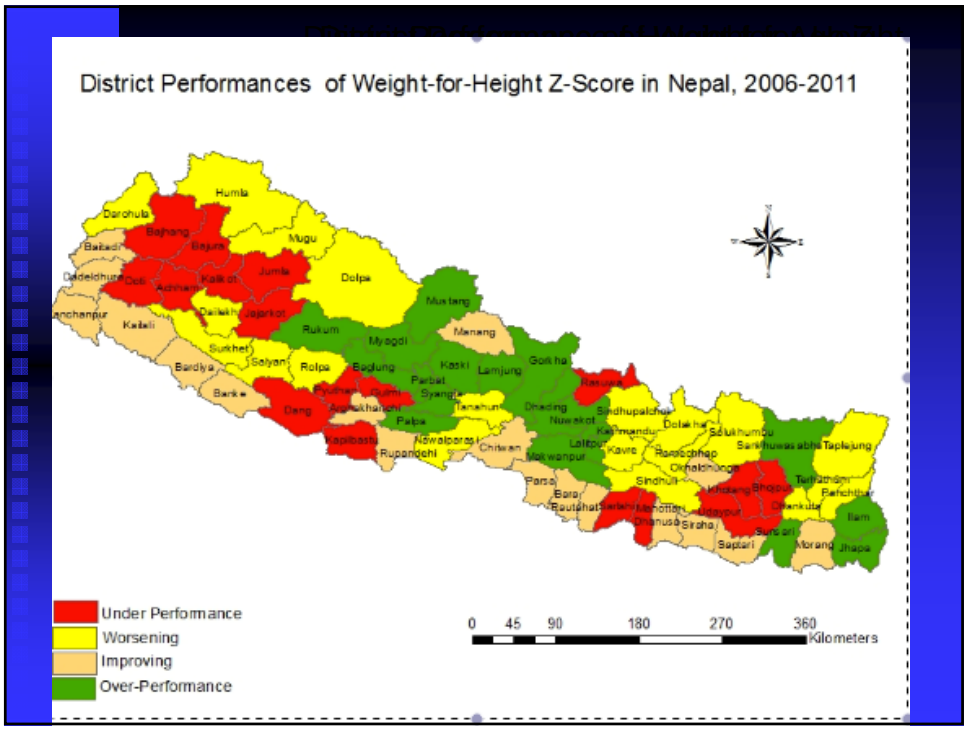
District Level

Background

District above or below average HAZ (2006)	District above/below average HAZ (2011)	
	Above	Below
Above	Over-perform (N=31)	Worsening (N=9)
Below	Improving (N=7)	Under-perform (N=28)
Total	38 Doing GOOD	37 Doing POORLY

District above or below average WHZ (2006)	District above/below average WHZ (2011)	
	Above	Below
Above	Over-perform (N=29)	Worsening (N=11)
Below	Improving (N=9)	Under-perform (N=26)
Total	38 Doing GOOD	37-Doing POORLY


District Performance of Height-for-Age Z-Score in Nepal, 2006-2011
Under Performance
Worsening
Improving
Over-performance
0 45 90 180 270 360
Kilometers


District Performances of Weight-for-Height Z-Score in Nepal, 2006-2011
Under Performance
Worsening
Improving
Over-Performance
0 45 90 180 270 360
Kilometers

Objective

What factors are influencing the performance of these districts (Doing Good and Doing Poorly)?

Methodology

- Merged: Doing Good (Over performed/Improved districts)
- Merged: Doing Bad (Under performed/Worsening districts)
- Binary logistic Regression (1 if Doing Good, 0 otherwise)

$$\log P_i/(1-P_i) = \alpha_i + \sum_{k=1} \beta_k X_{ki} + \sum_{l=1} \gamma_l Y_{li} + \lambda_m Z_{mi} + \mu$$

X_k's → Agriculture variables

Y_l's → Dietary variables

Z → Preservation variables

	HAZ		WHZ	
VARIABLES	Coef	Marginal	Coef	Marginal
Fertilizer	2.91**	0.72**	3.51***	0.87***
Irrigation	-3.15**	-0.78**	-4.17**	-1.04**
Fridge	18.96*	4.73*	12.86	3.21
Milk	3.75*	0.93*	2.72	0.68
Eggs	-1.24	-0.31	-3.31**	-0.82**
Vegetable	4.54	1.13	10.58**	2.64**
Constant	-3.76		-2.65	
Pseudo R^2	0.19		0.26	

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

Conclusion at district level

- Fertilizers
- Milk
- Vegetables
- Fridge