

Heath & Sanitation As Predictors for Malnutrition in Nepal

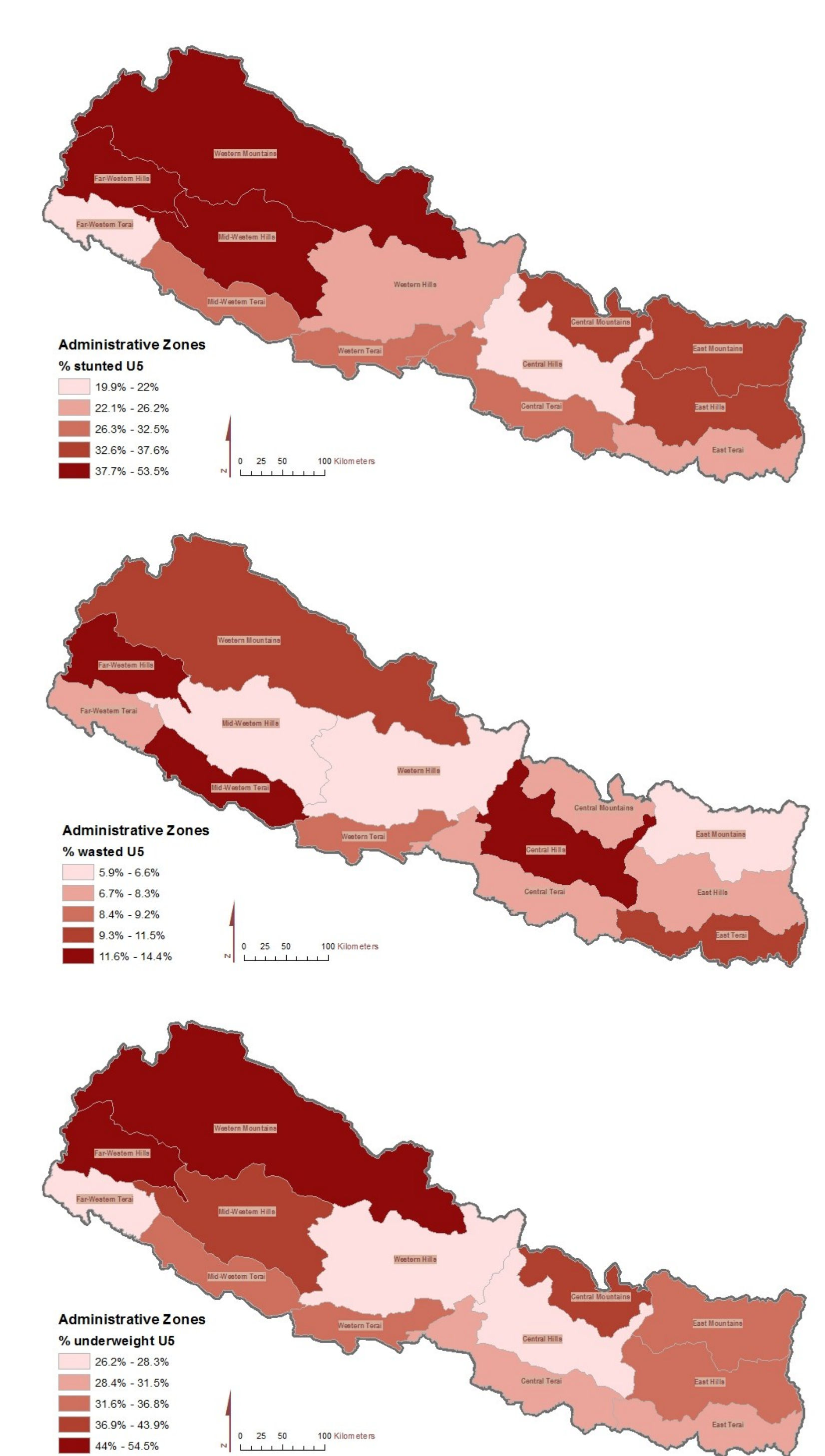
Nepal Health & Nutrition Introduction

Mountainous Nepal is one of the poorest countries in South Asia, notoriously food insecure, with very high rates of malnutrition which have hovered near emergency levels for the last 15 years. According to UNICEF, malnutrition plays a role in 60 percent of deaths of children under 5 years of age (U5). High rates of poverty, food insecurity, poor health, sanitation and early childcare practices all contribute to these high rates of malnutrition. The country is divided into three ecological zones stretching diagonally across the country by increasing elevation, with terai at the lowest, then hills and mountains. This research looks at the relationship between the sub regions (Administrative Zones) in each ecological zone by key health and sanitation indicators to determine their relationship to malnutrition rates.

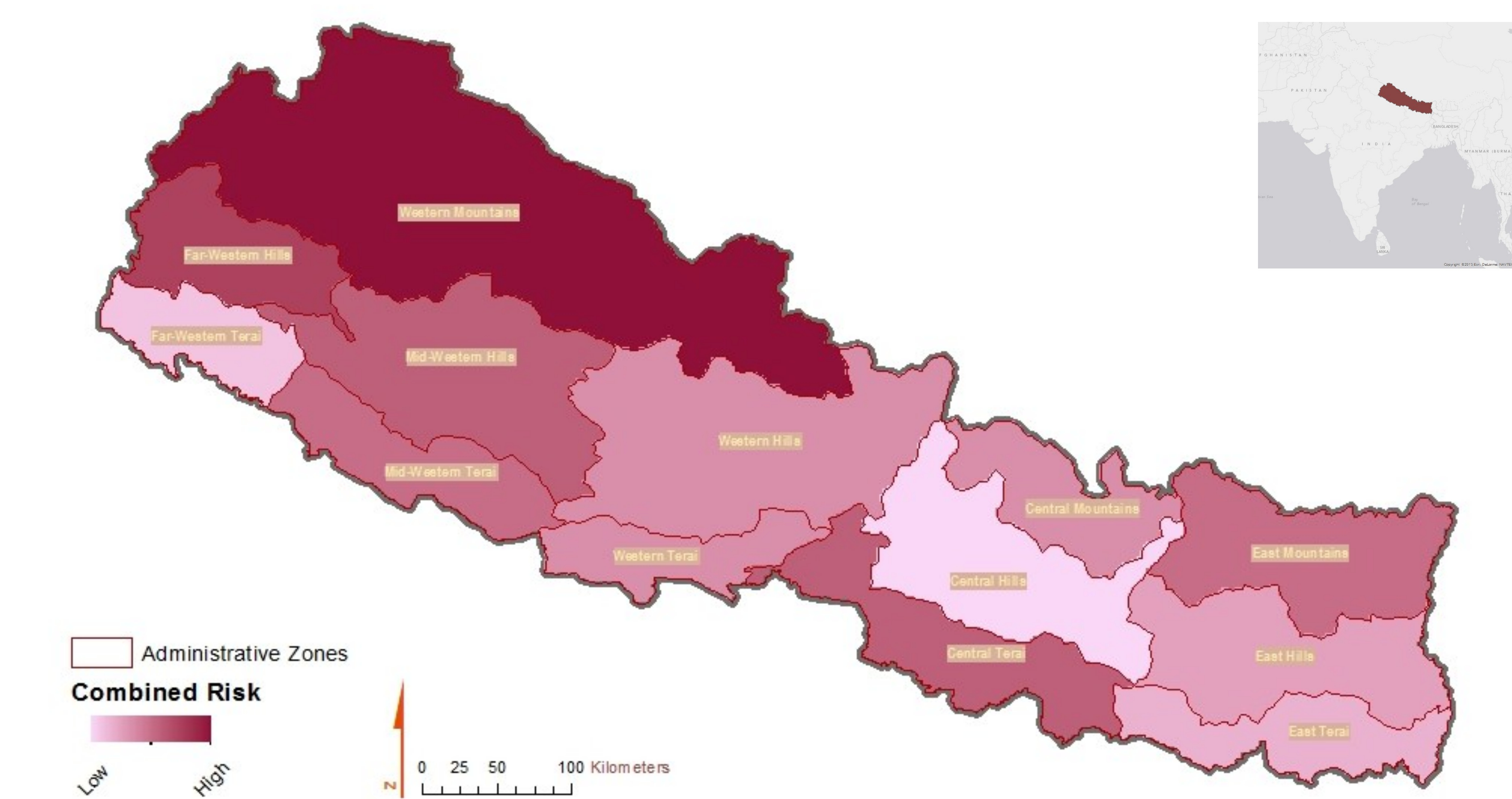
National Malnutrition Rates



Malnutrition Measures by Administrative Region



Combined Malnutrition Risk Scale for Key Health and Sanitation Indicators



Regression Model: Stunting

Stunting	Coef.	Std. Err.	P> t	[95% Conf. Interval]
Child Age	0.007	0.001	0.000	0.006 0.008
Child Sex	0.001	0.020	0.943	-0.037 0.040
Any Anemia	0.089	0.020	0.000	0.050 0.129
Diarrhea	-0.001	0.028	0.977	-0.057 0.055
Modern Toilet	0.056	0.020	0.006	-0.097 -0.016
Time to Water	0.000	0.001	0.563	-0.001 0.002
Improv. Water Source	0.118	0.023	0.000	-0.162 -0.074
Urban	0.131	0.026	0.000	-0.181 -0.081
_cons	0.234	0.043	0.000	0.150 0.318

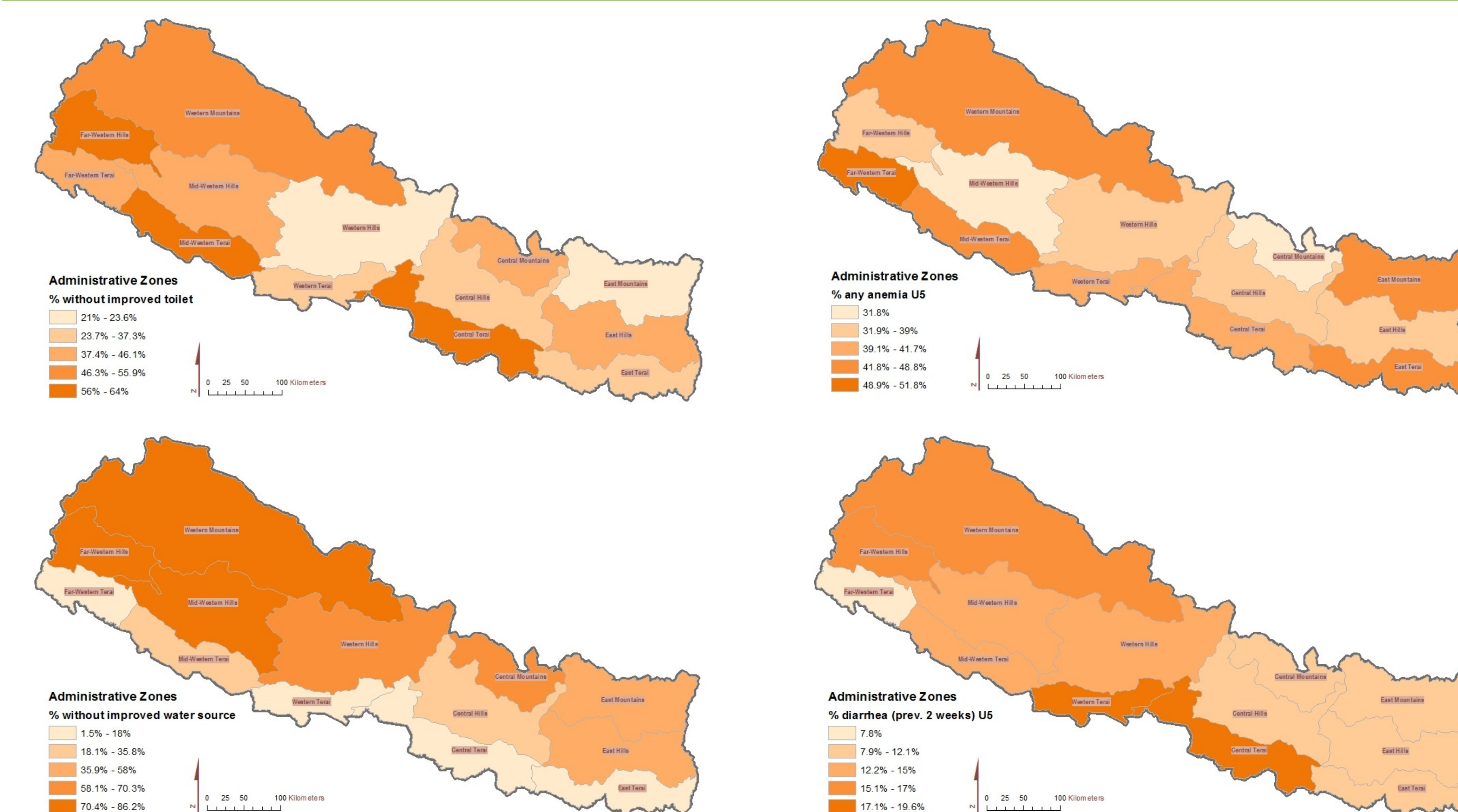
Regression Model: Wasting

Wasting	Coef.	Std. Err.	P> t	[95% Conf. Interval]
Child Age	0.001	0.000	0.002	-0.002 0.000
Child Sex	0.005	0.013	0.672	-0.019 0.030
Any Anemia	0.057	0.013	0.000	0.032 0.083
Diarrhea	0.059	0.018	0.001	0.023 0.095
Modern Toilet	0.035	0.013	0.008	-0.061 -0.009
Time to Water	0.001	0.000	0.072	0.000 0.002
Improv. Water Source	0.008	0.015	0.603	-0.021 0.036
Urban	0.004	0.016	0.807	-0.028 0.036
_cons	0.100	0.028	0.000	0.046 0.154

Regression Model: Underweight

Underweight	Coef.	Std. Err.	P> t	[95% Conf. Interval]
Child Age	0.004	0.001	0.000	0.003 0.005
Child Sex	0.001	0.020	0.969	-0.039 0.040
Any Anemia	0.161	0.021	0.000	0.120 0.201
Diarrhea	0.080	0.029	0.006	0.022 0.137
Modern Toilet	0.090	0.021	0.000	-0.131 -0.049
Time to Water	0.001	0.001	0.151	0.000 0.003
Improv. Water Source	0.054	0.023	0.020	-0.099 -0.009
Urban	0.079	0.026	0.003	-0.130 -0.028
_cons	0.256	0.044	0.000	0.170 0.343

Risk Scale Breakdown: Key Indicators by Administrative Zone



Methods

Data for this analysis was obtained from the 2011 Nepal Demographic Household Survey data sets conducted by MEASURE DHS, which collect a representative sample of individual and household indicators including household and respondent characteristics, fertility and family planning, maternal and child health, nutrition, and HIV/AIDS.

Indicators:

Stunting: Classified as < -2 SDs of height-for-age (HAZ), a measure based on comparisons of child's height (cm) and age (months) to WHO standard. Also known as global chronic malnutrition, this variable was used to include both moderate and severe chronic malnutrition.

Wasting: Classified as < -2 SDs of height-for-weight (HWZ), a measure based on comparisons of child's height (cm) and weight (kg) to WHO standard. Also known as global acute malnutrition, this variable was used to include both moderate and severe acute malnutrition.

Underweight: Classified as < -2 SDs of height-for-age (HAZ), a measure based on comparisons of child's height (cm) and age (months) to WHO standard. This variable includes both moderate and severe underweight.

Any Anemia: Children's hemoglobin levels were measured in the survey collection and were coded as "1 - severe," "2 - moderate," "3 - mild," and "4 - not anemic." This was recoded to "0" - "not anemic"(4) and "1" - "any anemia" (1-3).

Modern Toilet: Households were asked the type of toilet the household regularly uses. Responses "No Facility/bush/field" were recoded "0" and all other responses coded "1."

Time to Water: Average number of minutes per household to reach their main water source

Improved Water Source: Type of main household water source. Responses "unprotected well," "surface water," "river/dam/lake/pond/stream," and "rainwater" were recoded "0", all other responses were recoded "1."

The risk scale was created by generating a raster image of the prevalence of the 5 indicators: Diarrhea, Anemia, Modern Toilet, Improved Water Source and Rural Population. The data was then classified into a scale from high to low for each and then combined using overlay analysis.

Linear regression models predicting stunting, wasting and underweight were conducted using STATA IC 12.0. Predictors in the models included child age, sex, any anemia, diarrhea (last two weeks), modern toilet, time to water, improved water source and urban percentage. Since sex and time to water were not significantly associated with the outcome variable they were excluded from the final scale. Age was also excluded.

Conclusions

The final analysis shows that both the individual risk factors and more so, the combined risk factors, are strong predictors of malnutrition within the Administrative Zones in Nepal, as confirmed both in mapping and overlay analysis and regression models. The risk scale analysis mostly closely mirrors the prevalence of stunting, although it is not exact. This is likely due to the fact that not all of the individual risk factors were significant for each model and type of malnutrition and the scale was not weighted but treated each factor equally.

References

- Data Source:** USAID/MEASURE DHS Nepal Demographic Household Survey, 2011 (used with permission)
- GIS Data:**
- USAID/MEASURE DHS Nepal GIS Data Sets, 2011
 - 2013 ESRI Online, GAFSP_Nepal_NASFP, Juan Guzman
 - Coordinate System:** WGS 1984 Web Mercator Auxiliary Sphere
- Other References:**
- Sapkota VP, Gurung CK. Prevalence and Predictors of Underweight, Stunting and Wasting in Under-Five Children. J Nepal Health Res Counc 2011;15:120-126
 - Suwal JV. The main determinants of infant mortality in Nepal. Social Science & Medicine. 2001; 53:1667-1681.
 - UNICEF Nepal, Annual Report 2010, Kathmandu, Nepal

May 2013. Meghan Loraditch



Tufts
UNIVERSITY

Gerald J. and Dorothy R.
Friedman School of
Nutrition Science and Policy

