



Food, Diets and Nutrition: 25 years of progress for Nepal

*6<sup>th</sup> Annual Scientific Symposium on Agriculture-Nutrition  
Pathways and 25 Years of Nepal's progress in Nutrition*

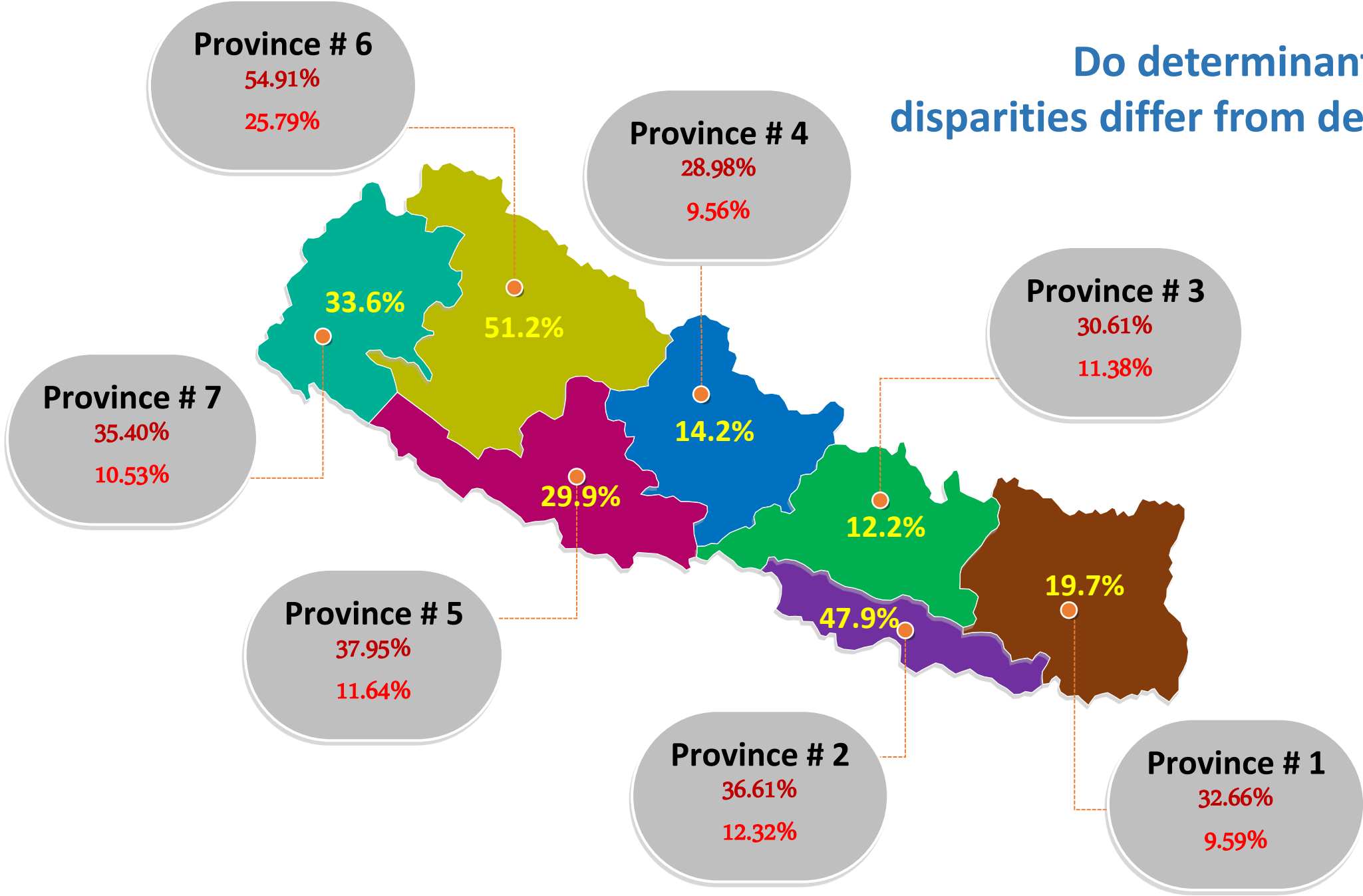
27-29 November, 2018

# Provincial *Disparities* in Child Undernutrition in Nepal

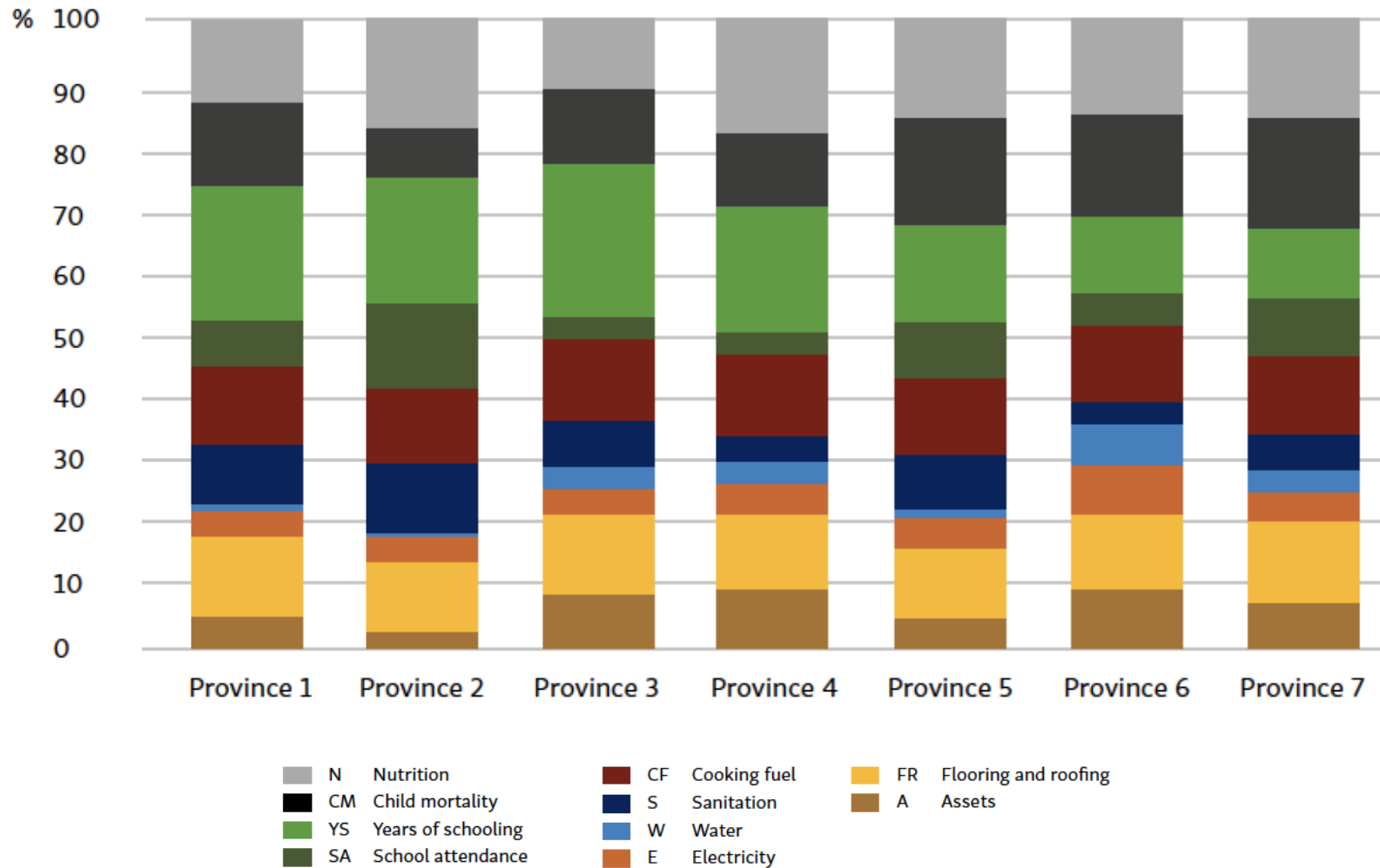
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# Do determinants of nutrition disparities differ from determinants of nutrition?



# Contribution of different factors for multi-dimensional poverty in provinces of Nepal



Nutrition is a pre-condition for sustainable development

Nutritional well-being of a population is a reflection of the performance of its social and economic sectors

If Nepal to be sustainably developed, majority of the population should be able to participate in the process

One pre-requisite would be to have well-nourished human workforce

# Aims

- To examine the socio-demographic and socio-economic variables that account for the provincial disparities in child undernutrition

**Height-for-Age  
(HAZ)**

Age of child

Sex of child

Age of woman

Woman education

Wealth Index

BMI of woman

Women Dietary Diversity

MIYCN Counseling

Ethnicity

Handwashing

ODF

Treatment of water

HH Food Security

# Study design and methodology

- Ordinary Least Square Regression
- **Blinder-Oaxaca decomposition** was used to decompose the provincial differences in HAZ score
  - Explains the gap in the means of HAZ between two provinces
    - Province 6 (*highest prevalence*) and Province 4 (*lowest prevalence*) as reference
  - Gap is decomposed into that part that is due to
    - Group differences in the **magnitudes of the determinants (Co-variate)**
    - Group differences in the **effects of the determinants (Coefficient)**

$$y^{\text{provinceA}} - y^{\text{provinceB}} = \Delta X \beta^{\text{provinceA}} + \Delta X \beta^{\text{provinceA}} + \Delta X \Delta \beta$$

or

$$y^{\text{provinceA}} - y^{\text{provinceB}} = \text{Endowments} + \text{Coefficients} + \text{CE}$$

	Nepal		Province 1		Province 2		Province 3		Province 4		Province 5		Province 6		Province 7	
	Full Sample	SE	Full Sample	SE	Full Sample	SE	Full Sample	SE	Full Sample	SE	Full Sample	SE	Full Sample	SE	Full Sample	SE
<b>Age of child</b>																
<6 months																
6-8 months	-0.210413	0.172409	-0.043218	0.395246	-0.342516	0.324571	1.066161	0.607568	0.087428	0.441978	-0.598874	0.306005	-0.834324	0.562380	-0.577910	0.434532
9-11 months	-0.343208	0.176192	-0.435957	0.524015	-0.573237	0.298799	0.125967	0.369369	-0.090817	0.685246	-0.184430	0.390450	-0.843159	0.474309	-0.887498	0.487850
12-17 months	-0.7808052	0.137466	-1.080623	0.347816	-0.869994	0.271249	-0.522493	0.392513	-0.873625	0.435389	-0.553941	0.333747	-0.9263985	0.369893	-1.139537	0.383153
18-23 months	-1.149516	0.130593	-1.465953	0.321398	-1.068216	0.247787	-1.041608	0.393523	-1.671752	0.392611	-0.900266	0.278667	-1.546011	0.349488	-0.736301	0.447663
24-35 months	-1.266964	0.116977	-1.295264	0.347555	-1.402824	0.231797	-1.306117	0.318623	-1.440116	0.405562	-1.112579	0.224646	-1.440658	0.356901	-1.443019	0.379083
36-47 months	-1.145324	0.121856	-1.383977	0.320578	-1.197806	0.245068	-1.061467	0.338056	-1.256578	0.409153	-0.9830766	0.265562	-1.277764	0.373857	-1.262871	0.371497
48-59 months	-1.180101	0.124065	-1.508604	0.342967	-1.156835	0.245644	-1.103162	0.344302	-1.28788	0.393161	-0.8189011	0.224694	-1.496682	0.363631	-1.244774	0.373117
<b>Sex of child</b>																
Male																
Female	0.040350	0.057207	0.271132	0.143314	-0.122128	0.109453	0.015942	0.173479	0.222802	0.178577	-0.058645	0.128573	0.227734	0.149750	-0.016490	0.143575
<b>Age of woman</b>																
15-24 years																
25-34 years	-0.095494	0.061158	0.236909	0.174757	0.036914	0.126120	-0.3757117	0.174269			-0.096709	0.134905	-0.148018	0.170788	-0.284400	0.169125
35-49 years	-0.218716	0.129645	0.218669	0.250260	-0.378690	0.254952	-0.717161	0.376700					-0.168976	0.327547	-0.7264995	0.319768
<b>Woman education</b>																
No education																
Primary	0.045159	0.087715	-0.104233	0.253990	0.203162	0.152285	-0.057227	0.280054								
Some/Secondary	0.113826	0.086568	0.045397	0.276896	0.161700	0.184018	0.283898	0.273426								
SLC or higher	0.184523	0.099431	0.088833	0.316312	0.229153	0.182321	0.271147	0.325422								
<b>Wealth index</b>																
Poorest																
Poorer	0.4185217	0.094350	-0.007006	0.249327	0.515815	0.364669	0.207096	0.254548	0.290525	0.245701						
Middle	0.5095234	0.094660	0.259343	0.258759	0.231012	0.353060	1.090165	0.303566	0.365838	0.269975	0.170365	0.216092				
Richer	0.5159732	0.109876	0.445467	0.286243	0.313332	0.371758	0.215096	0.340237	0.506782	0.271722	0.337303	0.239369	0.557860	0.299394	0.386422	0.261966
Richest	0.860742	0.132723	0.416529	0.349010	0.482927	0.422178	1.075565	0.318631	0.514629	0.345450	0.8102797	0.277333	0.9690785**	0.370812	0.681746	0.448456
<b>BMI of woman</b>																
Thin																
Normal	0.101209	0.079031	-0.5524281	0.265321	0.205148	0.122774	0.660462	0.381675	0.290841	0.462909	-0.079875	0.161880	0.061085	0.197542	0.070618	0.166574
Over-weight	0.3719985	0.107951	-0.184477	0.324403	0.5242	0.235550	0.605028	0.431870	0.585270	0.470374	0.302543	0.219097	0.088837	0.333320	-0.218811	0.388362
<b>Woman Dietary Diversity</b>																
No																
Yes	0.034540	0.067093	-0.028886	0.189427	-0.138667	0.154111	0.049963	0.212005	0.309525	0.193368	0.098419	0.159630	0.263556	0.175778	-0.210481	0.165857
<b>MIYCN Counseling</b>																
No																
Yes	0.036422	0.075390	-0.168027	0.195424	0.107395	0.287142	0.355850	0.207918	-0.150614	0.178758	0.129985	0.161282	-0.052366	0.157938	-0.053364	0.180229
<b>Ethnicity</b>																
Bahun/Chhetri																
Terai Other Caste	-0.058298	0.106484	-0.398989	0.356093	-0.040389	0.256790	0.143732	1.600209			-0.245792	0.232252	1.167435	0.455953	0.830758	0.761013
Dalit	0.126039	0.098989	-0.310065	0.382147	0.081707	0.293497	0.731148	0.392483	0.267312	0.276006	0.091140	0.204508	0.101153	0.195836	-0.252374	0.210330
Newar	0.170381	0.220297	-0.440938	0.316536	-0.417600	0.337316	-0.075790	0.411595	1.495999	1.059704	2.001522	0.400141	-3.447797	0.385555	0.280789	0.200285
Janajati	0.166492	0.075713	-0.144474	0.197296	0.155147	0.264718	-0.073314	0.215168	0.282475	0.227238	0.4723134	0.195688	0.347111	0.177476	0.581479	0.343806
Muslim	-0.005263	0.129813	-0.016498	0.307918	0.157293	0.281705					-0.6972174	0.289449				
<b>Handwashing</b>																
No																
Yes	-0.140271	0.073221	0.299171	0.204548	-0.179367	0.129011	-0.6013681	0.250250	0.211248	0.324588	-0.102935	0.160272	-0.248575	0.170348	-0.024401	0.210018
<b>ODF</b>																
No																
Yes	-0.3458247	0.090508	-0.9217597	0.301236	-0.3481426	0.152134	-0.302277	0.304668	-0.292054	0.441615	-0.5341241	0.205859	0.242868	0.440962	-0.117597	0.324483
<b>Treatment of water</b>																
No																
Yes	0.004626	0.094531	-0.114806	0.194510	0.593854	0.613518	-0.050957	0.245125	0.056222	0.174974	0.225899	0.251850	-0.085497	0.197635	0.98912	0.380094
<b>HH Food Security</b>																
Food Secure																
Mild Food Insecurity	0.064677	0.071707	0.061118	0.161415	-0.129776	0.146629	0.123592	0.202596	0.158356	0.208384	0.231125	0.179737	-0.393792	0.264563	-0.334851	0.200923
Moderate Food Insecurity	0.007920	0.081182	-0.090175	0.233905	-0.098051	0.179841	0.136826	0.210318	0.269784	0.245562	0.124822	0.186568	-0.274566	0.231409	-0.002166	0.201914
Severe Food Insecurity	-0.061179	0.114123	0.025975	0.327425	-0.448486	0.259327	-0.059973	0.313470	-0.609686	0.353879	-0.009563	0.262515	-0.046513	0.264271	-0.016164	0.242760
<b>Constant</b>	-1.05	0.18	-0.24	0.57	-0.638961	0.5299598	-1.15	0.62	-1.815711	0.84	-1.0569	0.36	-1.122026	0.49	-0.27	0.45
<b>Observation</b>	2349		370		640		361		180		443		150		205	
<b>R<sup>2</sup></b>	0.19		0.25		0.18		0.45		0.32		0.25		0.25		0.24	

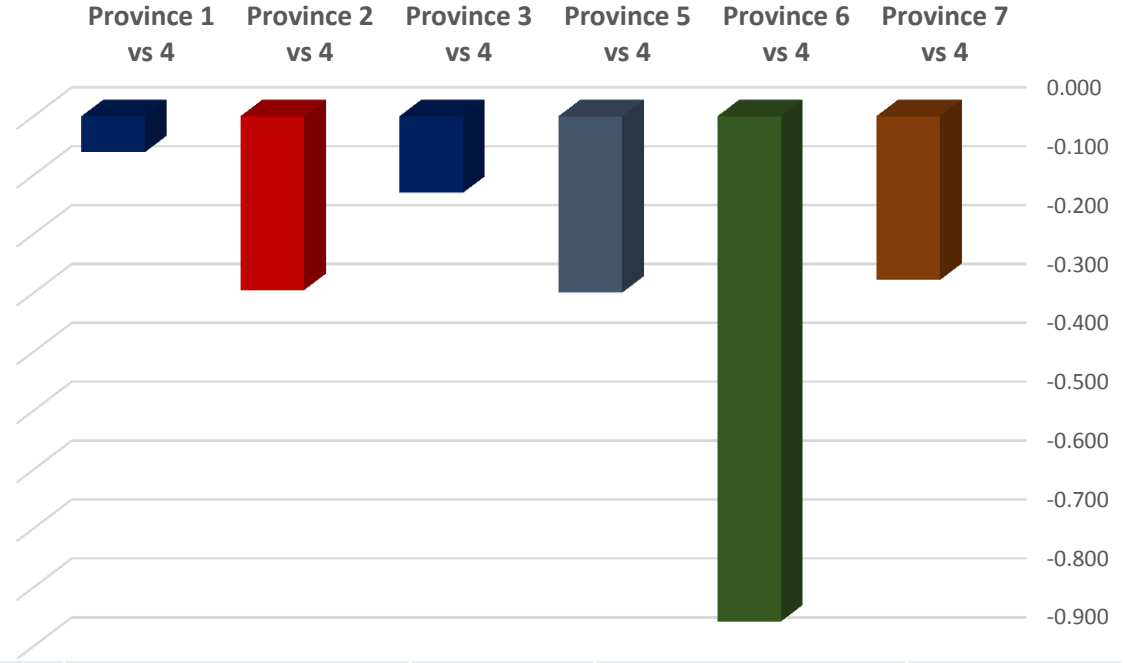
# Different province in Nepal exhibited different association between HAZ and covariates

- *Age of child* – a key factor at national as well as provincial level
- *Age of woman* (province 3 & province 7)
- *Wealth index* (national, province 3, province 5)
- *BMI of woman* (national, province 1, province 2)
- *Ethnicity* (province 5, province 6)
- *Handwashing* (province 3)
- *ODF* (national, province 1, province 2, province 5)
- *Treatment of water* (province 7)

Co-variate effects dominant for the difference

For ex: Province 1's mean HAZ outcome, if Province 1 had Province 6's predictor levels

Predicted difference in mean HAZ between 2 provinces given the covariates specified in the model

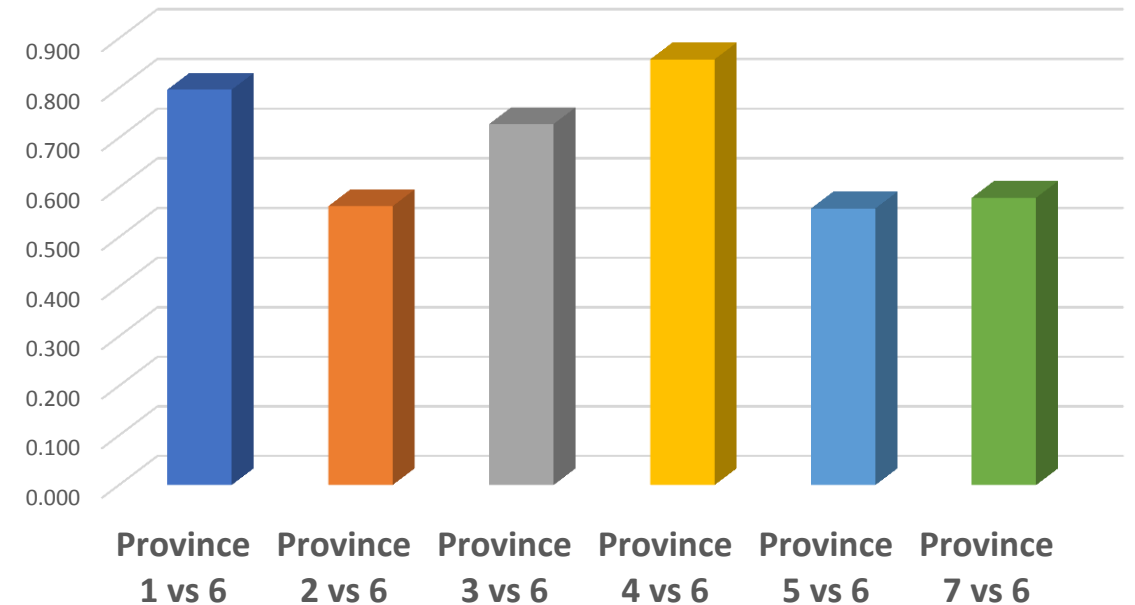


	Difference	SE	Endowments	SE	Coefficients	SE	Interaction	SE
<b>Province 1</b>	0.061	0.128	0.051	0.097	-0.100	0.145	0.111	0.123
<b>Province 2</b>	0.296	0.117	0.635	0.232	-0.340	0.334	0.001	0.388
<b>Province 3</b>	0.130	0.150	0.208	0.126	0.107	0.198	-0.184	0.172
<b>Province 4</b>								
<b>Province 5</b>	0.300	0.124	0.352	0.088	0.003	0.170	-0.055	0.151
<b>Province 6</b>	0.858	0.130	0.479	0.119	0.247	0.216	0.132	0.214
<b>Province 7</b>	0.279	0.129	0.360	0.132	-0.262	0.189	0.180	0.199

	Difference	SE	Endowments	SE	Coefficients	SE	Interaction	SE
Province 1	-0.797	0.114	-0.148	0.186	-0.459	0.153	-0.189	0.224
Province 2	-0.562	0.102	0.172	0.314	0.440	0.342	-1.174	0.465
Province 3	-0.728	0.138	-0.114	0.180	-0.620	0.180	0.006	0.225
Province 4	-0.858	0.130	-0.611	0.193	-0.379	0.146	0.132	0.214
Province 5	-0.558	0.109	-0.096	0.119	0.159	0.175	-0.621	0.200
Province 6								
Province 7	-0.579	0.115	0.093	0.105	-0.422	0.117	-0.251	0.125

Coefficient effects dominant for the difference

*For ex:* Expected change in Province 1's mean HAZ score if Province 1 had Province 6's coefficients



**Predicted difference in mean HAZ between 2 provinces given the covariates specified in the model**



# Which covariates explain most of the provincial disparities?

Explanatory variables	Province 1 vs 6	Province 2 vs 6	Province 3 vs 6	Province 4 vs 6	Province 5 vs 6	Province 7 vs 6
Age of child (6-8 m)						
Age of child (9-11 m)						
Age of child (12-17 m)						
Age of child (18-23 m)						
Age of child (24-35 m)						
Age of child (36-47 m)						
Age of child (48-59 m)						
Female						
Age of woman (25-34 y)						
Age of woman (35-49 y)						
Women with primary education						
Women with some secondary						
Women with SLC or higher						
Poorer wealth index						
Middle wealth index						
Richer wealth index						
Richest wealth index			C		C	
Normal BMI						
Obese						
5 or more wdds						
MIYCN counseling YES						
Terai Other Caste	C; I	C; I			C; I	
Dalit	C; I					
Newar			C; I			
Janajati						
Muslim					E; C; I	
Handwash YES	C		C			
ODF Yes	E; C	E			E	
Treat water YES						E; C; I
Mild Food Secure						
Moderate Food Secure						
Severe Food Secure						

- «Blanket» *versus* «tailored» approach !
- **Multi-sector approach** – not only reduce «average» but also the «disparities»
- Targeting «all» the determinants will result into indistinct effects

**Do provinces differ in how well they could integrate context-specific planning and actions or do we see more centralized prescriptions for nutrition?**

Please wait for the paper ....  
for detailed analysis, interpretation and conclusion