

Is Diversity in Agricultural Production Linked to Dietary Diversity Among Nepalese Women? Findings from the PoSHAN Community Studies

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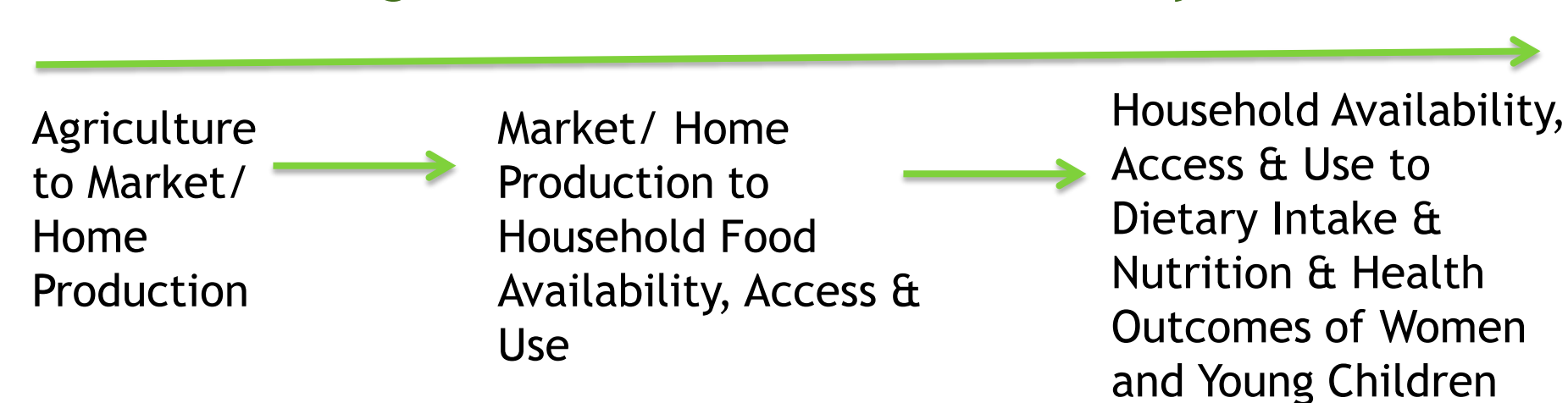
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Introduction

- Over 80% of Nepal's labor force works in the agricultural sector¹
- Small landholders and female farmers comprise over 60% of the agricultural labor force¹
- About 75% of Nepal's poor live in food-producing households²
- Chronic malnutrition, poverty, and food insecurity persist among rural Nepali populations²--23% of households face moderate and 16% face severe food insecurity³
- Critical to understand the pathways between household agricultural production and household food consumption and the nutritional and economic effects of production practices in order to improve the nutritional status and food security of rural households

Agriculture to Nutrition Pathway



Identifying, Defining, Measuring Linkages and Evidence Groups

- Household agricultural production affects the dietary patterns and economic status of a household⁴
- Dietary diversity (defined here as the number of unique food groups consumed over the past 7 days) is recognized as an indicator of food security and a predictor of women's nutritional status^{2,5} (dietary diversity is essential to ensure adequate intakes of vitamins, minerals, and other micronutrients⁶)
- Evidence linking agricultural production diversity (APD) to women's dietary diversity is scarce, but constitutes a potentially important contributor to improving dietary adequacy among women in low resource settings

Objective

This analysis aims to assess the extent to which high and low APD were associated with adequate women's dietary diversity scores in order to further clarify the agriculture-nutrition pathway and inform nutrition-sensitive agricultural interventions in Nepal.

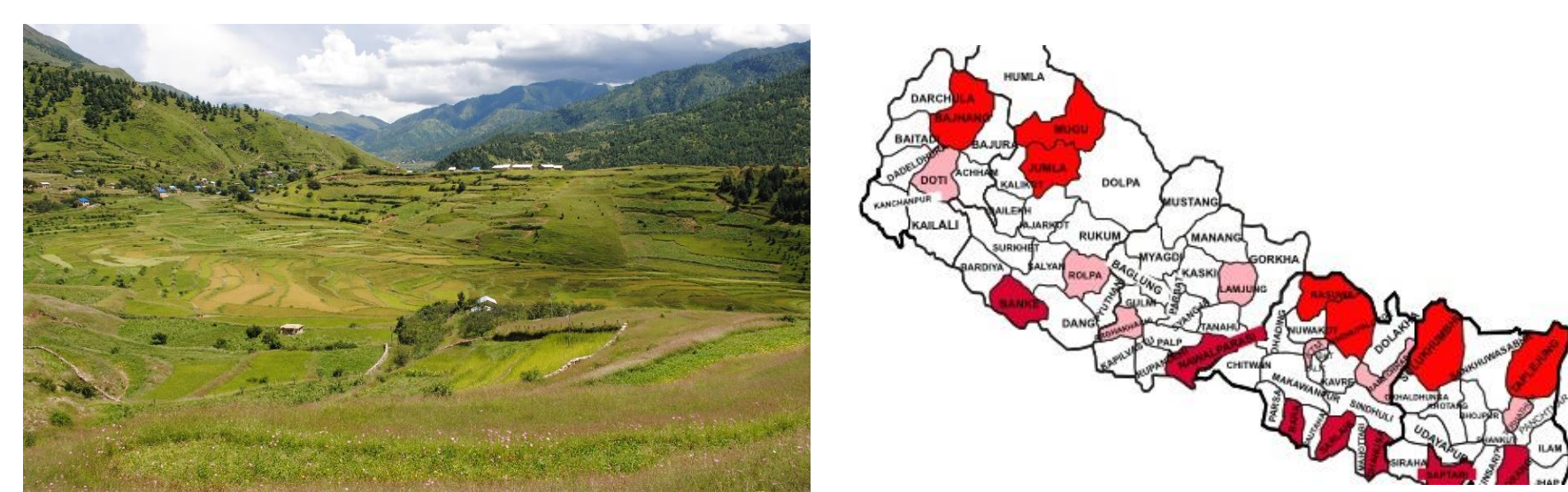


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Methods

- Used baseline (2013) data from the Policy for Science, Health, Agriculture, and Nutrition (PoSHAN) Community Studies—a three-year survey of nationally representative community and sentinel sites in 21 districts across 3 agro-ecological zones of rural Nepal



- Included 4,508 married women in the mountain, hill, and terai zones of Nepal
- WDDS were derived from the 7-day women's food frequency questionnaire → the 49 foods in the questionnaire divided into the following 10 food groups (following guidelines recommended by the FAO and FANTA⁷):

Food Group	Food Items
Starchy Staples	Rice, Corn, Wheat, Buckwheat, Millet and Potato
Dark green leafy vegetables (DGLV)	Dark green leafy vegetables (DGLV)
Other Vitamin A rich fruits and vegetables	DGLV, Carrots, Ripe Pumpkin, Drumstick, Ripe Mango, Ripe Jackfruit and Ripe Papaya
Other vegetables	Green beans, Gundruk ² , Green peas, Gourd, Okra/Ladies finger/Bhindi, Eggplant, Tomato, Cauliflower, Cabbage
Other fruits	Green Jackfruit, Guava, Orange/Tangerine, Apple, Pineapple and Banana
Flesh Foods (meat, fish, poultry)	Chicken/duck, Goat, Buff, Pork, fresh fish, dried fish and snail
Eggs	Any eggs
Dairy (milk and milk products)	Milk and Curd/Whey
Beans and peas	Lentils (any), Maseura, Other legumes (chickpeas, dried peas, lima beans and soy beans)
Nuts and seeds	Peanuts

- Food frequencies of each of the 10 food groups were combined to generate a WDDS ranging from 1-10, representing how many unique food groups a woman consumed over the past week.

Following FAO and FANTA guidelines, the minimally adequate WDDS was determined to be 5 (out of 10).⁷

- An APD score was created to mirror the WDDS, categorizing agricultural production into 10 food groups and assigning all households an APD score from 0 (non-agricultural households) to 10
- Cut-off points for low and high APD were selected based on frequency distributions and changes in associations with WDD:

- No APD = 0 food groups produced
- Low APD = 1 - 4 food groups produced
- High APD = 5 - 10 food groups produced

- Multivariate logistic regression was used to examine the association between level of household APD and the odds of adequate WDDS

- Results were stratified by agro-ecological zone and adjusted for household food insecurity, socioeconomic status (using wealth quintiles), education level, and total household monthly food expenditure



Results

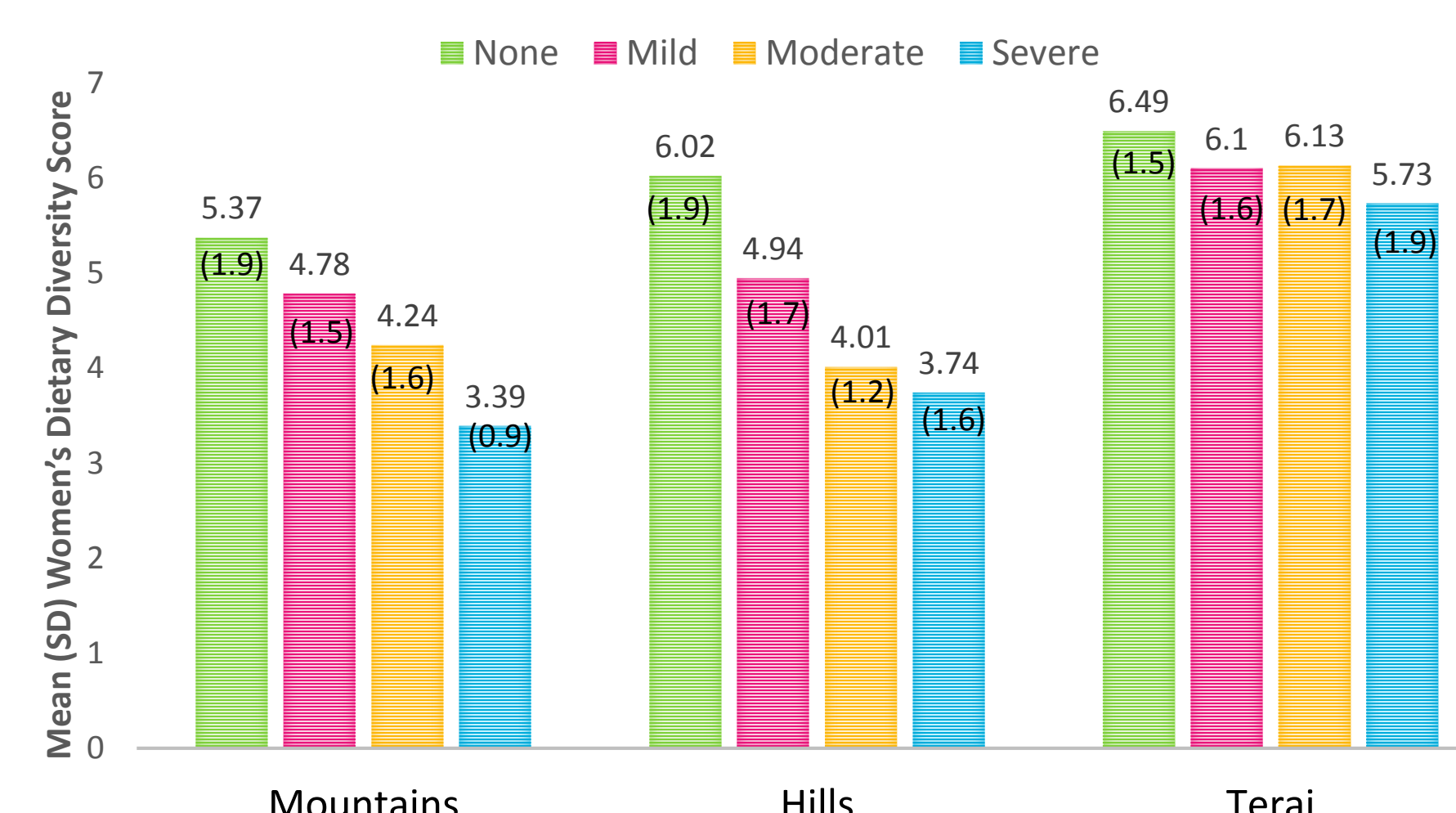
Characteristics of women with low and adequate WDDS in the PoSHAN Community Studies, by agro-ecological zone

	Mountains		Hills		Terai	
	N = 787	N = 1176	N = 280	N = 896	N = 237	N = 2545
	WDDS < 5	WDDS ≥ 5	WDDS < 5	WDDS ≥ 5	WDDS < 5	WDDS ≥ 5
	N = 218	N = 569	N = 80	N = 200	N = 77	N = 160
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Household Food Insecurity						
None	61 (28)	341 (60)	90 (32)	600 (67)	110 (46)	1535 (67)
Mild	38 (17)	107 (19)	67 (24)	167 (19)	51 (22)	396 (17)
Moderate	68 (31)	94 (17)	96 (34)	113 (13)	40 (17)	263 (11)
Severe	51 (23)	27 (5)	27 (10)	15 (2)	36 (15)	114 (5)
Socioeconomic Status						
1 (Low)	24 (11)	17 (3)	123 (44)	97 (11)	113 (48)	505 (22)
2	77 (35)	87 (15)	80 (29)	143 (16)	55 (22)	466 (20)
3	77 (35)	195 (34)	54 (19)	159 (18)	24 (10)	403 (17)
4	34 (16)	207 (36)	14 (5)	126 (14)	33 (14)	485 (21)
5 (High)	6 (3)	63 (11)	9 (3)	371 (41)	12 (5)	448 (19)
Woman's Education						
None	143 (66)	222 (39)	190 (68)	254 (28)	180 (76)	1316 (57)
Some Primary	17 (8)	55 (10)	23 (8)	86 (10)	13 (5)	152 (7)
Mild	6 (3)	28 (5)	9 (3)	54 (6)	14 (6)	118 (5)
Completed Primary	25 (11)	77 (14)	36 (13)	259 (29)	18 (8)	341 (15)
Some Secondary	8 (4)	29 (5)	10 (4)	104 (12)	9 (4)	192 (8)
Graduate Level	19 (9)	158 (28)	12 (4)	139 (15)	3 (1)	189 (8)
APD Score						
0	29 (13)	125 (22)	15 (5)	237 (26)	77 (32)	593 (26)
1-4	101 (46)	242 (43)	88 (31)	232 (26)	138 (58)	1263 (55)
5-10	88 (41)	202 (36)	177 (63)	427 (48)	22 (9)	452 (20)
Total Food Expenditure						
\$0-\$34.90	80 (37)	65 (11)	133 (48)	144 (16)	123 (52)	579 (25)
\$34.91-\$61.99	38 (18)	108 (19)	81 (29)	239 (27)	65 (27)	600 (26)
\$62-\$106.20	53 (24)	126 (22)	42 (15)	280 (31)	25 (11)	592 (26)
\$106.21-\$1460.30	47 (22)	270 (47)	24 (9)	233 (26)	24 (10)	537 (23)

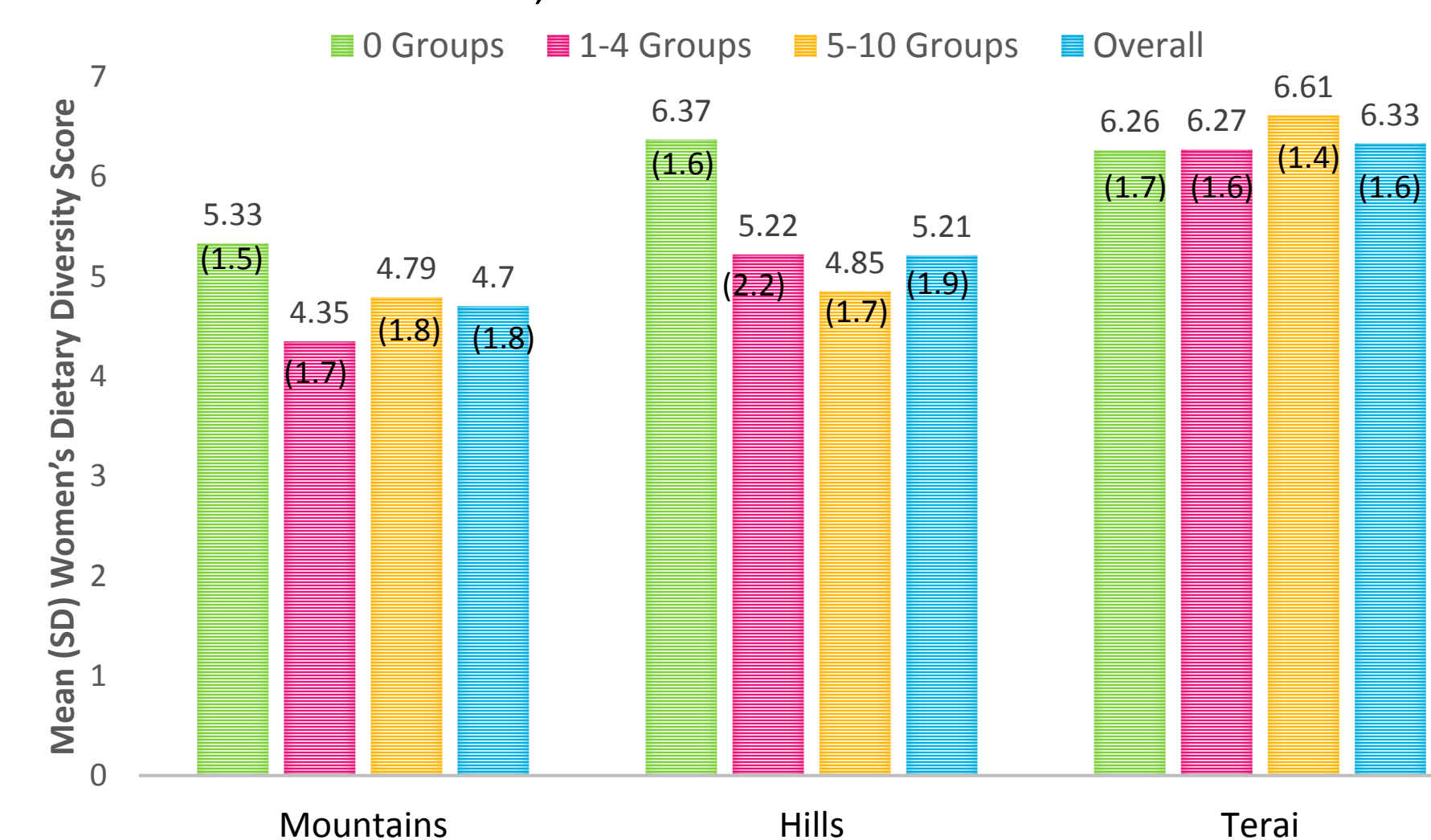
Adjusted changes in women's odds of adequate dietary diversity, by agro-ecological zone

	Mountains		Hills		Terai	
	OR (95% CI)	P-Value	OR (95% CI)	P-Value	OR (95% CI)	P-Value
APD Score						
0	REF		REF		REF	
1-4	0.915 (0.539-1.555)	0.744	0.666 (0.310-1.433)	0.299	1.129 (0.820-1.554)	0.456
5-10	1.479 (0.839-2.609)	0.176	0.952 (0.445-2.037)	0.899	2.049 (1.211-3.468)	0.008
5-10 vs. 1-4	1.616 (1.067-2.448)	0.023	1.429 (0.981-2.082)	0.063	1.815 (1.119-2.944)	0.016

MEAN WDDS BY HOUSEHOLD FOOD INSECURITY, BY AGRO-ECOLOGICAL ZONE



MEAN WDDS BY AGRICULTURAL PRODUCTION DIVERSITY, BY AGRO-ECOLOGICAL ZONE



Key Findings

Comparing levels of APD, this analysis suggests the following conclusions by zone:

All zones: There were no differences in WDDS between women in non-agricultural households vs. women in households with low APD scores (1-4) in any zone

Terai only: Women in households with high APD (5-10 food groups) were twice as likely to have adequate WDDS as women in non-agricultural households (OR: 2.05; 95% CI 1.21 - 3.47, p=0.008)

Mountains and terai: Women from mountain and terai households with high APD were 1.62 (95% CI 1.07 - 2.45, p=0.023) and 1.81 (95% CI 1.12 - 2.94, p=0.016) times more likely, respectively, to have adequate WDDS than women in low APD households

Hills only: Household APD had no significant effect on the likelihood of adequate dietary diversity

Improvements in household food security, socioeconomic status, women's education, and total monthly food expenditure were all correlated with increases in women's likelihood of having adequate dietary diversity across all regions, as would be expected.

Conclusions

- Agricultural production and diversity play different roles in women's food consumption and dietary diversity in each of the three zones
- Zonal differences could be due to differing access to markets and livelihood opportunities among zones
- Type of farming and yield of individuals crops of food groups not considered in this analysis
- APD was positively associated with adequate WDDS in the mountains and terai, supporting a hypothesis that increased agricultural diversity may help improve dietary diversity of women in households
- Following these results, increasing agricultural diversity ought to be an aim of nutrition-sensitive agricultural interventions

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