

## **Household food insecurity and women's health in Nepal**

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### **Abstract (150 words)**

Households in Nepal experience high levels of food insecurity. Past research has suggested that food insecurity impacts women's health and reproductive health behaviors, perhaps due to high levels of gender inequality in South Asia. Using data from the 2011 Nepal DHS, we explore the relationship between household food insecurity and women's BMI, number of living children and family planning use. We also explore how food insecurity affects children's BMI. We find that women who live in severely food insecure households have lower BMIs, more living children, and are less likely to use a modern method of contraceptives. Food insecurity is not associated with the most recent child's BMI however. This suggests that women are especially at risk of suffering adverse health outcomes from household level food insecurity, and that this is also associated with other reproductive health outcomes and. Policies and programs should focus on women's specific vulnerability to food insecurity.

**Introduction:**

More than half of districts in Nepal are considered to be food insecure (limited or uncertain availability of nutritionally safe and adequate food) [1]. Throughout their life course, Nepali women are often the last to eat in the household and are given less food, and therefore are at risk of receiving inadequate food and nutrition [2]. In South Asia, including Nepal, women have been found to receive less iron in their diets than men [3]. Pregnant women are especially at risk, with one study finding that 96% of pregnant women sampled had at least one micronutrient deficiency, and about 18% were deficient in 5 or more micronutrients [4]. Food insecurity does not only impact health outcomes, but it can change health-seeking behaviors as well. For example, a survey in Myanmar found that in households with food insecurity, women were less likely to seek antenatal care [5]. Food insecurity has also been found to be associated with increased sexual risk-taking behavior (for example, inconsistent condom use and sex exchange) and with sexual violence among women in sub-Saharan Africa [6]. Food insecurity has also been found to be associated with lower rates of exclusive breastfeeding in South Asia and elsewhere [7, 8].

Food insecurity also affects child health outcomes, both directly and through its impact on maternal health. Maternal malnutrition has been associated with adverse maternal and child health outcomes [9, 10]. Low dietary diversity, a measure of food insecurity, is also associated with child stunting, and poorer growth of infants and young children in South Asia [7, 11]. Childhood anemia, developmental delays and behavioral problems are also associated with food insecurity [12-14]. Childhood malnutrition has long-term impacts on cognitive development, and an individual's economic and social capacity to contribute to society [15]. More than two-thirds of children in Nepal are severely or moderately malnourished, and about half are stunted [16].

Despite the fact that women in Nepal experience food insecurity and have poor reproductive health outcomes, the nature of the relationship between these factors has not yet been explored in detail. The goal of this analysis is to explore how food insecurity at the household level is associated with a) maternal and child malnutrition and b) reproductive health outcomes.

**Methods:**

We used all women's data from the 2011 Nepal Demographic and Health Survey (DHS) for this analysis. Food insecurity was measured using the household food insecurity access scale, which has been extensively validated in many settings including South East Asia [17]. Questions were answered by the head of the household and asked about four domains related to food insecurity: anxiety and uncertainty about food supply, insufficient quality, and insufficient food intake and its physical consequences. A four-group categorical score was created ranging from "food secure" to "severe food insecurity."

We used multivariate linear and logistic regressions to assess for associations between food insecurity and the following outcomes: women's BMI, children's BMI, total number of living children, and current use of a modern method of family planning (compared to no method). The analysis was restricted to all women of reproductive age. We also look at the relationship between household food insecurity and the BMI of the most recent child. We controlled for household level factors including wealth quintile and urban/rural status, and demographic factors including women's age, education, ethnicity, marital status, profession, whether she is the household head, and if she lives with her partner. Data were analyzed using STATA12.

**Results:***Description of population:*

Fifty percent of households reported being food secure, 14% mildly food insecure, 23% moderately food insecure and 14% severely food insecure. Almost 17% of women had a BMI under 18.5 (classified as underweight), and 14% of women had BMI's over 25 (classified as overweight). The mean age was 28.7, 70% of women lived in rural areas, the largest percent (41%) was of the Brahmin/Chhetri ethnic group, followed by Janajati, Dalit, Other and Newar. Seventy-five percent of respondents were married, 83% were not the household head, and 52% resided with their partner. Thirty-nine percent of respondents had no schooling, 17% primary, 36% secondary, and 8% higher education. Five percent of respondents had professional occupations. Women had, a median of 2 children (IQR 0-3) and 33.1% were using a modern method of family planning.

*Food insecurity and Maternal Health Outcomes: BMI (Table 1, column 1 and 4)*

The adjusted analyses show that severe household food insecurity was associated with having a lower BMI by -0.653 among women ( $p=0.013$ ), controlling for the factors described above. Being younger, having no education (compared to primary or secondary), being Brahmin/Chhetri or from an "other" ethnic group (compared to Newar or Janajati), not being married, not having a professional occupation and not being in the highest or second highest wealth quintile (compared to lowest) were all significantly ( $p<0.05$ ) associated with lower BMI.

We next explored whether food insecurity was associated with children's BMI. The BMI of the youngest child in the household, controlling for sex and age of that child, as well as the household level variables discussed above, was not significantly associated with household food insecurity (results not shown).

*Food insecurity and Reproductive Health Outcomes: Number of living children and family planning use (Table 1, columns 2 and 3)*

Women living in severely food insecure households had more living children, as measured by the number of living children, with on average 0.228 more children ( $p<0.05$ ), adjusting for demographic and household variables. Women's age, being the household head, being married and living with a partner were significantly associated with having more children. Having higher education and being in a higher wealth quintile were associated with having fewer children. Women living in severely food insecure households had lower odds (0.688) of using a modern method of family planning, compared to no method ( $p<0.05$ ), adjusting for demographic and household variables and total number of living children.

**Conclusions:**

These data suggest that the majority of households in Nepal experience some level of food insecurity, with 1 in 7 reporting severe food insecurity. Malnutrition (indicated by  $BMI<18.5$ ) among women was also common, with almost a fifth of women being underweight. Additionally, we found that food insecurity was associated with worse nutritional status and number of living children and contraceptive use. Specifically, we found that women living in more food insecure households were more likely to have a lower BMI, even after controlling for other household level factors such as the wealth quintile.

Food insecurity was also associated with women's reproductive outcomes, with women living in food insecure households having more living children. Finally, in households with more food insecurity, women were less likely to report using a modern form of contraceptives. This supports past findings that food insecurity is associated with poor health care seeking behaviors for women. Having more children and not using family planning put

both the mother and child at risk of suffering adverse health and longer-term social/developmental outcomes.

This study has several important limitations. We are unable to assess direction of causality due to the cross-sectional nature of the survey data. Longitudinal research on the relationship between food insecurity and BMI and also reproductive outcomes over time would help better understand the direction of this relationship. Furthermore, the survey measured food insecurity at the household level, not at the individual level, so we are unable to know the situation for individual household members.

This analysis sheds light on the role that food insecurity plays on women's health, highlighting that women are especially vulnerable to experiencing adverse health outcomes when they live in households with food insecurity. This has important program and policy implications, suggesting that targeting the household dynamics of food distribution, not just household level food insecurity, is important for improving maternal health.

Table 1: Multi-level regression of the relationship between food insecurity and (1) women's BMI; (2) total number of living children; (3) use of modern family planning <sup>a</sup> and (4) Youngest Child's BMI <sup>b</sup>

	Women's BMI (beta coefficient)	Total number of living children (beta coefficient)	Use of modern family planning method (Logistic regression OR)	BMI of youngest child (beta coefficient)
<b>Household Food Insecurity (FI) (compared to food secure)</b>				
Mild FI				
Moderate FI	0.0706	-0.0116	0.990	0.034
Severe FI	-0.145	0.0527	0.764*	0.033
	-0.653***	0.228***	0.688**	0.0571
<b>Women's Age</b>	0.0916***	0.108***	1.027***	0.0123*
<b>Urban (vs. rural)</b>	0.213	0.00459	1.258	-0.073
<b>Ethic Group (compared to Brahmin/Chhetri)</b>				
Newar	1.241***	-0.0689	0.908	0.44*
Dalit	0.129	0.117	1.000	-0.14
Janajati	0.621***	0.00795	0.926	0.11
Other	-0.459**	0.442***	0.606**	-0.32*
<b>Head</b>	0.165	0.238***	1.581**	-0.002
<b>Currently Married</b>	0.909***	0.567***		0.012
<b>Lives with Partner</b>	0.0592	0.289***	4.952***	-0.094
<b>Education (compared to none)</b>				
Primary	0.958***	-0.168*	0.847	0.162
Secondary	0.731***	-0.347***	0.883	0.028***
Higher	0.126	-0.637***	0.521*	-0.009
<b>Professional Occupation</b>	0.949***	-0.129*	0.980	0.72***

<b>Wealth Index (compared to poorest)</b>	<b>Poorer</b>	-0.0141	-0.213***	2.014***	-0.18*
	<b>Middle</b>	0.0773	-0.361***	2.131***	-0.12
	<b>Richer</b>	0.655**	-0.398***	2.404***	0.02
	<b>Richest</b>	1.891***	-0.607***	3.574***	0.14
<b>Total number of living children</b>		-0.190***		1.273***	-0.039
<b>Sex of child</b>					0.003
<b>Age of child</b>					0.008***

\*p<.01; \*\*p<0.05, \*\*\*p<0.01

<sup>a</sup> Only married women

<sup>b</sup> Only households with at least one child

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