

# Effect of Food Insecurity on Nutritional Status of Reproductive Age Women of Squatter Settlement of Pokhara Metropolitan, Kaski, Nepal

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## ABSTRACT

**Background:** Food insecurity is the situation that exists when all people, at all times, didn't have secure access to enough amounts of safe and nutritious food that meets their dietary needs for an active and healthy life. However, the nutritional status of women can be determined by family care and household food security as they are keepers of family health. So, this study was conducted to assess the effect of food insecurity on the nutritional status of reproductive-age women and its determinants in squatter settlement.

**Methods:** A cross-sectional study was carried out in the squatter settlement of Pokhara Metropolitan. A multistage sampling procedure was used to get the required sample size i.e., 426. Reproductive age group women (15-49 years) were selected because of their central role in food preparation and distribution. Household Food Insecurity Access Scale was used to collect information based on a 30-day recall period. Body mass index (BMI) was calculated based on height and weight measurement. Face-to-face interviews were conducted to collect data. Descriptive and inferential statistics were applied using SPSS.

**Results:** Nearly two-thirds (65%) of household food insecurity was found in the squatter settlement of Pokhara Metropolitan. While assessing the nutritional status of reproductive-age women it was found that 38.1% were overweight and 13.6% were underweight women. Factors such as age, dependent members in a family, educational status, occupational status, age during the marriage, age during the first pregnancy, parity, the number of children, and household food insecurity were associated with the BMI of respondents at a 95% confidence level. We found a strong direct effect on respondent's education (OR=2.036, CI: 1.321-3.136), occupation (OR=2.014, CI: 1.295-3.132), and household food insecurity (OR=1.629, CI: 1.088-2.439). The occupation of respondents and household food insecurity status also had a mediation effect on BMI through their education.

**Conclusion:** Nearly two-thirds of the respondents had household food insecurity and most of them in those households were likely to be overweight or underweight. The study highlights a need for nutrition and food security programs. Improving the educational status of women will help them to get financially independent which can improve household food security and maintain the healthy weight of women in slums.

**Keywords:** Food insecurity, Food security, Reproductive age women, Nutritional status, Squatter Settlement

## INTRODUCTION

Food security is defined as the situation when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.<sup>1</sup> When there is a limitation or lack of secure access to sufficient amounts of safe and nutritious food for an active and

healthy life is known as food insecurity.<sup>2</sup> This may be due to unavailability of food, inadequate purchasing power, inappropriate utilization and stability in the household.<sup>3</sup> In Nepal, 4.6 million people are food-insecure, with 20 percent of households mildly food-insecure, 22 percent moderately food-insecure, and 10 percent severely food-insecure.<sup>4</sup> Globally, one billion women experience at least one

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form of malnutrition including undernutrition, overweight, obesity and micronutrient deficiencies. The prevalence of underweight in women of reproductive age declined from 14.6% in 1975 to 9.5% in 2014, but the substantial burden reached 24% in South Asia.<sup>5</sup> NDHS 2016 found that 18% of women of reproductive age (15 to 49 years) were malnourished, and 35% were anemic (29% mildly anemic and 6% moderately anemic).<sup>6</sup>

Undernutrition is interrelated with household food insecurity, poor household care for women, and poor access to health and sanitation services.<sup>6</sup> Women in food-insecure households were more likely to be underweight when compared with food-secure women.<sup>7</sup> Research conducted in Nepal resulted in acute malnutrition (BMI < 18.5 kg/m<sup>2</sup>) among women in severely food-insecure households than in food-secure households.<sup>8</sup> Research has also shown that one-fourth of reproductive-age women living in the slums suffer from severe malnutrition.<sup>9</sup> So, this study was conducted to assess the effect of food insecurity on the nutritional status of reproductive-age women and its determinants in squatter settlement.

## METHODS

### Study setting and population

The cross-sectional study was conducted among 426 reproductive-age women (15-49 years) in the squatter settlement of Pokhara Metropolitan. According to the information obtained from Pokhara metropolitan office, there were a total of 3,746 households located in small, space overcrowded and poor housing. The sample size was calculated using the formula  $n = z^2 p(1-q)/d^2$ . The prevalence of food insecurity in the study area was assumed to be (p) 50%. At 95% confidence interval, margin of error (d) was 5%. The sample size was (n)=426 with a 10% of non-response rate. From 33 wards of Pokhara Metropolitan, one-fourth of the wards were selected based on the maximum number of households. From 33 wards of Pokhara Metropolitan, one-fourth of the wards were selected based on the maximum number of households. Proportionate sampling was used to determine the required number of households. Using systematic sampling every fourth household was selected as a sample unit to collect data. In each selected area reproductive-age women (15-49 years) responsible for food preparation and distribution were interviewed.

### Data collection tools and techniques

Households' food insecurity was assessed using 18 items structured and validated Household Food Insecurity Access Scale.<sup>10</sup> The face-to-face interview was conducted among the women of reproductive age who prepared, managed, and distributed food, based on a 30 days recall period from each household residing in the area for 12 months. Height and weight measurement were taken for assessing BMI<sup>11</sup> and the Demographic health survey<sup>12</sup> (DHS) wealth index for the developing country was used for assessing the economic status of households. Socio-demographic and reproductive questionnaires were developed to obtain additional information. The university provided data collection equipment.

Pokhara University Institutional Review Committee (PU-IRC) reviewed and approved the research proposal (Ref. no.08/078/079). Permission was taken from the Pokhara Metropolitan office. Similarly, prior to data col-

lection research participants were informed about the objectives of the study, and written informed consent was obtained from participants. Informed assent was obtained for the participants below 18 years. Confidentiality and privacy of the participants were ensured during the study.

The information given by the participants was closely examined and recorded into the tool. Data was entered in Epi Data software and analyzed with the help of Statistical Package for Social Science (SPSS). Frequency distribution was done to summarize background information and cross tabulation was used to find the associated factors of nutritional status. Quantification of the association between independent variables and BMI was carried out using logistic regression models.

## RESULTS

The information given by the participants was closely examined and recorded into the tool. Frequency distribution was done to summarize background information and cross tabulation was used to find the associated factors of nutritional status.

More than half (51.2%) of the respondents were of the age group 32-49 years. Disadvantage Janajati were dominant (28.6%) over the other ethnic group whereas more than half (66.2%) followed the Hindu religion. Most (68.8%) of the respondents were married and nearly three-fourths (67.1%) of them lived in a nuclear family. More than two-thirds (68.3%) of the respondents married at the age of 18 years and above and the age of first pregnancy for more than half (59.1%) of the participants was 20 years and above. More than half of the respondent's parity was 3 and more and had two or below children (table 1).

More than one-third (33.1%) of the respondents had basic-level education whereas most of the spouses had secondary-level education. More than one-fourth (27%) of the respondents had their own business and nearly half (46.1%) of their spouse was engaged in foreign employment. Similarly, nearly half (47.4%) of the households had middle wealth quantile (table 2).

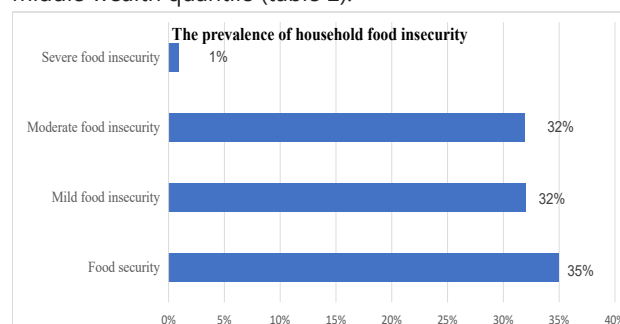


Figure 1: Prevalence of household food insecurity

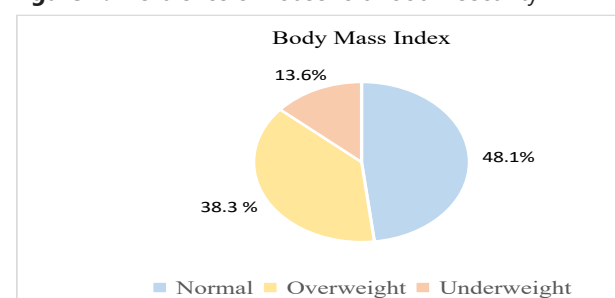


Figure 2: The body mass index of respondents

**Table 1:** Demographic characteristics of respondents

Demographic characteristics		Number	Percent
Age; Mean+S.D (31.938.22) (Median 32)	<32	208	48.8
	>32	218	51.2
Ethnicity	Dalit	91	21.4
	Disadvantage Janajati	122	28.6
	Disadvantage Non-Dalit Terai caste group	18	4.2
	Religious Minorities	14	3.3
	Relatively Advantaged Janajati	84	19.7
	Upper caste	97	22.8
Religion	Hindu	282	66.2
	Buddhist	73	17.1
	Christian	55	12.9
	Muslim	16	3.8
Marital status	Unmarried	51	12.0
	Married	293	68.8
	Divorce/Separated	40	9.4
	Widow	42	9.9
Type of family	Nuclear	311	73.0
	Joint/Extended	115	27.0
Number of family members			
Mean+S.D (4.581.11) (Median=5) (min, max: 1,7)	Less than 5	190	44.6
	More than or equal than 5	236	55.4
Dependent members	Yes	310	72.8
	No	116	27.2
Number of dependent members (n=310)			
Mean+S.D (1.980.849) (Median=2) (min, max: 1,4)	Less than 2	102	32.9
	More than or equal than 2	208	67.1
	More than or equal than 18	119	31.7
Age of marriage (n=375) Mean+S.D (18.432.49) (Median=18) (min, max: 12,30)	More than or equal than 18	256	68.3
	More than or equal than 20	138	40.9
Age at first pregnancy (n=337) Mean+S.D (20.182.5) (Median=20) (min, max: 15,33)	More than or equal than 20	199	59.1
	More than or equal than 3	150	44.5
Parity Mean+S.D (2.91.42) (Median=3) (min, max) (1,8)	More than or equal than 3	187	55.5
Number of children Mean+S.D (2.561.31) (Median=2) (min, max: 1,7)	More than or equal than 2	193	57.3
	More than or equal than 2	144	42.7

More than one-fourth (35%) of households were found food secure followed by mild food insecure (32.2%), moderate food insecure (31.9%), and severe food insecure (0.9%) households (Figure 1).

When calculating BMI, it was found that nearly half (48.1%) of the respondents were having normal BMI followed by (38.3%) overweight and (13.6%) underweight status (Figure 2).

The outcome variable BMI is re-categorized as normal. Statistically significant at  $p < 0.05$  and others. The BMI is found to be significantly associated with socioeconomic factors and food insecurity at a 95% confidence interval with a degree of freedom of one and a  $p$ -value  $< 0.05$  (table 3).

ble 3).

The variables are checked for the independent odds ratio (UOR) which showed a strong direct effect on respondents' education (OR=2.036, CI: 1.321-3.136), occupation (OR=2.014, CI: 1.295-3.132), and household food insecurity (OR=1.629, CI: 1.088-2.439) on BMI of respondents. When respondents' education was adjusted with their occupation the odds ratio decreased {from (UOR=2.036, CI: 1.321-3.136) to (AOR=1.936, CI: 1.250-2.998)} and were a mediation effect. In the same way, household food insecurity status also had a mediation effect on BMI through their education (table 4).

**Table 2:** Socio-economic characteristics of respondents

Socio-economic characteristics		Number	Percent
Education of respondents	Illiterate	29	6.8
	Informal Education	94	22.1
	Basic level education	141	33.1
	Secondary level education	139	32.6
	Higher-level education	23	5.4
Education of spouse (n=293)	Illiterate	26	8.9
	Informal	33	11.3
	Basic level	83	28.3
	Secondary level	129	44
	Higher-level	22	7.5
Occupation of respondents	Housewife	96	22.5
	Agriculture	11	2.6
	Government Job	15	3.5
	Private Job	89	20.9
	Labor and Wage	73	17.1
	Own Business	115	27.0
	Students	27	6.3
Occupation of spouse (n=293)	Agriculture	9	3.1
	Government Job	3	1.0
	Private Job	49	16.7
	Labor and wage	43	14.7
	Own Business	53	18.1
	Foreign Employment	135	46.1
	Student	1	0.3
Wealth quantiles	Second	13	3.1
	Middle	202	47.4
	Fourth	165	38.7
	Highest	46	10.8

**Table 4:** Influence of education of respondents, occupation of respondents, and household food insecurity on BMI

Variables	Model I*	Model II**	Model III***						
	UOR	95% C.I	AOR	95% C.I	AOR	95% C.I			
		Lower	Upper		Lower	Upper	Lower	Upper	
Education of respondent									
Illiterate and Informal Education	2.036	1.321	3.136	1.936	1.250	2.998	2.223	1.415	3.494
Literate	Ref	Ref	Ref						
Occupation of respondent									
Own business				1.909	1.220	2.985	1.869	1.190	2.937
Other				Ref	Ref				
HFIS									
Food security							1.885	1.234	2.879
Food insecurity							Ref		

Model I\*: Education of respondents and BMI.

Model II\*\*: Education of respondents, occupation of respondents, and BMI.

Model III\*\*\*: Education of respondents, occupation of respondents, HFIS, and BMI.

**Table 3:** Association of socio-demographic factors with BMI

Socio-demographic factors	Normal BMI		$\chi^2$	p-value
Age			25.2	<0.001*
<32	126(60.6)	82 (39.4)	4.577	0.03*
>32	79 (36.2)	139(63.8)		
Dependent members			4.577	0.03*
Yes	159(51.3)	151(48.7)	10.565	<0.001*
No	46(39.7)	70(60.3)		
Education of respondent			10.565	<0.001*
Illiterate and Informal Education	44(35.8)	79(64.2)	9.812	0.002*
Literate	161(53.1)	142(46.9)		
Occupation of respondent			9.812	0.002*
Own business	41(35.7)	74(64.3)	11.838	0.001*
Others	164(52.7)	147(47.3)		
Age of marriage (n=375)			11.838	0.001*
<18	41 (34.5)	78 (65.5)	7.450	0.006*
>18	137 (53.5)	119 (46.5)		
Age at first pregnancy (n=337)			7.450	0.006*
<20	52(37.7)	86 (62.3)	8.309	0.004*
>20	105(52.8)	94 (47.2)		
Parity			8.309	0.004*
<3	83 (55.3)	67(44.7)	12.609	<0.001*
>3	74(39.6)	113(60.4)		
Number of children			12.609	<0.001*
>2	106(54.9)	87(45.1)	5.661	0.017*
>2	51(35.4)	93(64.6)		
HFIS			5.661	0.017*
Food security				
Food insecurity	80(53.7)	69 (46.3)		
	125(45.1)	152 (54.9)		

Statistically significant at  $p < 0.05$

## DISCUSSION

In this study household food insecurity was found to be 65% where 32.2%, 31.9% and 0.9% were mildly, moderately, and severely food insecure. In contrast to these findings, similar findings were seen in the study of Ethiopia.<sup>13</sup> Food secure households were 35% according to the present study, which was almost similar to the other study of India (49%)<sup>14</sup> and Nepal (26%).<sup>15</sup> It can be attributed that similar findings might be due to the study conducted in similar settings. Food insecurity status was much higher in places in North India (77.2%)<sup>16</sup> and West Bengal (80%).<sup>17</sup> The research conducted in Uganda,<sup>18</sup> Malaysia,<sup>19</sup> and Kerman City<sup>20</sup> revealed a higher prevalence of food insecurity. This variation in results can be attributed to the cultural, socioeconomic, geographical, and methodological differences between study settings.

The study revealed the mean height and weight of the respondents to be 152.71 cm and 53.91 kg. It was similar to the findings of Bangladesh.<sup>21</sup> This study also showed

that nearly half (48.1%) of the respondents were having normal BMI followed by (38.1%) overweight and (13.6%) underweight status. The study conducted in the slum of Dhaka<sup>22</sup> revealed that 66.5% had normal BMI whereas underweight was 30.8%. A contradictory finding was obtained where it shows 10% underweight and 15.8% overweight women respondents.<sup>7</sup> It might be due to the difference in the mean BMI value.

Findings from bivariate analysis highlighted that the factors affecting the nutritional status of respondents were age, dependent members in the family, education of respondents, occupation of respondents, age during the marriage, Age during the first pregnancy, parity, and the number of children of respondents. Similar findings were seen in the study conducted in rural Nepal.<sup>23</sup> A woman's age has a significant association with BMI which is like the findings of other studies.<sup>24</sup> Age of marriage determines the age of first pregnancy.<sup>25</sup> The number of children in the family determines the nutritional status of the mother.<sup>7</sup>



More pregnancies have more children, and it can affect the nutritional status of the mother. Education is an important factor to have better living which is found significant with BMI in this study. In contrast, a similar finding was found in other studies.<sup>26</sup> It can be attributed that the women who are educated can be aware of the nutrition and diet that helps to adopt better dietary patterns. It is expected that women with good jobs and socioeconomic status have better expenditure on food that helps to maintain their healthy weight.<sup>26</sup> Similarly, a study shows household food insecurity is a significant factor to affect nutritional status. Similar findings were seen in the study of Nepal where women from food-insecure households were more likely to have a BMI less than 18.5 kg/m<sup>2</sup> than those from food-secure households.<sup>27</sup> Other studies also showed contrast finding.<sup>20,28</sup> This may be attributed to the reason that women from food-insecure households don't have the proper quality and quantity of food which can affect their nutritional status.

This study follows a cross-sectional study and reports only quantitative information. Food insecurity and nutritional assessment might require a qualitative explanation for their precise measurement. The study has been conducted among a large sample using the standard tool but we were able to include only the selected wards in the study.

## CONCLUSION

Nearly two third of the respondents had household food insecurity in the slums of Pokhara. While assessing the nutritional status of reproductive-age women nearly half of them had normal BMI whereas, more than one-third of them were overweight and more than tenth percentile women were underweight. Factors such as age, dependent members in a family, educational status, occupational sta-

tus, age at marriage and age at first pregnancy, parity, and the number of children were associated with the BMI of the respondents. Women in food-insecure households were more likely to have altered BMI than in food-secure households.

The study highlights a need for nutrition and food security programs. Improving the educational status of women will help them to be financially independent which can improve household food security and maintain the healthy weight of women in slums. There should be policy planning and intervention from the province as well as local level for the provision of basic services to women of reproductive age in slums.

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