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Research Article

PREVALENCE AND DETERMINANTS OF MALNUTRITION AMONG UNDER-FIVE CHILDREN OF HOUSEHOLD IN SLUM AREAS OF DISTRICT FAISALABAD

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Abstract

Malnutrition refers to a pathological condition characterized by a lack of nutrients necessary for healthy body function. Malnutrition is one of the most common causes of death and disease among children under the age of five. About 96% percent of children in Pakistan do not receive adequate nutrition during childhood, such as soft food, milk, fruit, and vegetables. Food insecurity is a serious problem in Pakistan as a significant portion of the rural population is food insecure. A staggering 36.9% of households in the country are 'food insecure' and 18.3% are 'severely' food insecure. Pakistan is self-sufficient in basic food items, but only 63.1% of households have food security. Food insecurity is common, leaving women and children at greater risk of malnutrition. Drought-affected communities have exceptionally high rates of malnutrition. According to statistics in Pakistan, about 40, 29%, and 18% of children under the age of five are a stunt, underweight, and wasted, respectively. Therefore, this study aims to investigate the prevalence and determinants of malnutrition status in children under 5 years of age in the slums of Faisalabad District, Punjab, Pakistan. The data is based on household demographic and socioeconomic factors, including anthropometric information on children under the age of five living in a slum in Faisalabad. Anthropometric data were obtained from 150 randomly selected children from three slum areas of Faisalabad. Socioeconomic and behavioural data were collected from each mother. Three indicators were used to measure the nutritional status of children: (i) stunting, height–for– age, (ii) wasting¸ weight–for–height, and (iii) under-weight¸ weight–for–age. These values were transformed into z-scores to classify the child's nutritional status. Descriptive and logistic regression techniques were used to identify factors associated with children's nutritional status. According to this study, the prevalence of stunting, being underweight, and wasting among children under five years of age in Faisalabad District, Pakistan were 28%, 22.6%, and 18% respectively. Testing with logistic regression techniques revealed that demographic, socio-economic, and behavioural factors were significant predictors of all three indicators of child nutritional status. These main factors were household calorie intake and maternal education, father education, access to clean water, and maternal access to health facilities.

Keywords: *Malnutrition, Anthropometric, stunting, under-weight, wasting*
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1. INTRODUCTION

Malnutrition is a pathological condition characterized by severe deficiency of essential nutrients. Theoretically, both undernutrition and overnutrition are called malnutrition (Narayan & Khan, 2007). People are malnourished when the diet does not contain enough calories and protein for growth, they cannot fully utilize the food they eat (malnutrition), or they have too many calories consumption (more nutrients) (park, 2000). People around the world are grappling with rising rates of overweight and obesity and an epidemic of malnutrition. The effects of undernutrition or overnutrition early in life can last a lifetime. Malnutrition is a leading cause of morbidity and mortality in children worldwide, affecting the entire life cycle in

a vicious cycle (WHO, 2016; WHO, 2009; Moench et al., 2016).

The most common forms of malnutrition among children are stunting, wasting, underweight, and overweight and obesity. Childhood malnutrition can undermine children's physical and/or mental development, increase their chances of dying from infections, and impose a greater economic burden on society (Bardosono et al., 2007). In 2020, 149 million children under the age of five are estimated to be stunted (too tiny for their age), 45 million wasted (too thin for their height), and 38.9 million overweight or obese. Malnutrition is responsible for roughly 45% of her under-five death rates. Low and middle-income countries have been hurt the hardest. Meanwhile, the proportion of overweight and obese children in these countries is increasing. The growing global burden of malnutrition and the economic, social, and medical consequences are severe and lasting for individuals and their families, communities, and countries (WHO, 2021).

According to the 2018 National Nutrition Survey by the Ministry of Health and UNICEF, Pakistan is the 6th most populous country in the world. It ranks 8th in wheat production, 10th in rice production, 5th in sugarcane production, and 4th in milk production. However, food insecurity is a serious problem in Pakistan as a significant portion of Pakistan's rural population is food insecure and the undernourished people are forced to eat less nutritious foods as a coping strategy.

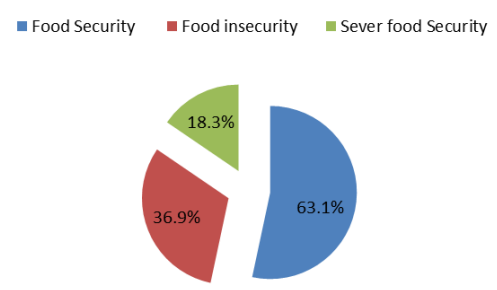

Figure 1. Food security status in Pakistan

Surprisingly, 36.9% of households in the country are 'food insecure' and 18.3% are 'severely' food insecure. Pakistan is self-sufficient in basic food items, but only 63.1% of households have food security (Dawn 2019).

Food insecurity is widespread, putting women and children at risk of malnutrition. According to Pakistani statistics, about 40.1%, 28.9%, and 17.7% of children under the age of five are stunted, underweight, and wasted respectively (UNICEF, 2020).

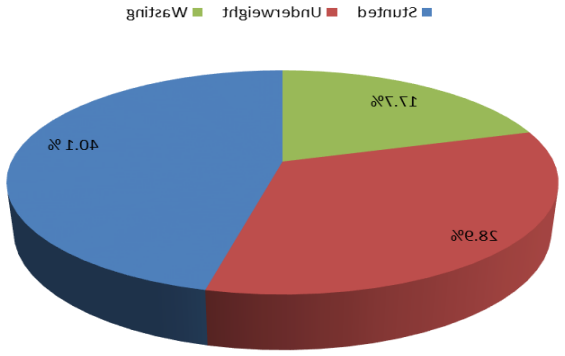

Figure 1. Nutritional Status. **Source:** (UNICEF, 2020)

Minister of National Food Security and Research Syed Fakhar Imam highlighted the critical issue of micronutrient deficiency during his speech at the workshop titled 'Addressing Zinc Deficiency through Biofortification of Zinc Wheat' on December 15, 2021. He emphasized that micronutrient deficiencies are prevalent in Pakistan, severely affecting children's immunity, growth, and mental development. An estimated 177,000 Pakistani children die each year from malnutrition before reaching the age of five (Dawn 2021). Children's nutritional status is frequently measured using metrics such as weight for age, height for age, or weight for height. Malnutrition in children is caused by a variety of circumstances, including inadequate food consumption, low-quality nutrition, and recurrent serious illnesses (Chowdhury et al., 2016; Alemayehu et al., 2015). Pakistan spends 0.7 percent of its total government spending on food interventions, which is low compared to other countries in the region, such as Nepal and Bangladesh, which spend

3.1 percent and 2.1 percent, respectively (Balogun et al., 2021).

Although the problem of undernutrition in Pakistan has been widely documented, there is a lack of understanding of its specific factors. However, the literature on the prevalence and determinants of malnutrition in Faisalabad is limited. There are some empirical studies on the food security situation of households in rural, peri-urban, and slum areas (Bashir et al., 2012; Farkhanda et al., 2009). The objective of this study is to provide empirical evidence of disparities related to the prevalence and factors of malnutrition in Faisalabad. The objective of this study is to assess and determine the prevalence of malnutrition among children under five years of age in the neighbourhood of Faisalabad. To achieve the objectives of this study, three main indicators of malnutrition in children were used: stunting, wasting, and being underweight. This study uses anthropometric measurements including gender, age, height, and weight to calculate a Z-score, which aims to predict stunting, and underweight among children under five years of age in a specific slum area, and estimate the spread of spoilage. Regression analyses are conducted to explore the relationship between the three nutritional indices and various child-specific, household, and socioeconomic factors.

2. Materials and Methods

A research methodology is a process used to collect information and analyze data for a specific purpose. Research methodology guides researchers in applying precise techniques to achieve desired results. The city selected for this study, Faisalabad, has the distinction of being the third-largest city in Pakistan and the second-largest city in Punjab. Its estimated population in 2021 was 3,542,000. This study focuses on primary data collected from three slum areas in the Faisalabad District: Islam Nagar, Allama Iqbal Colony, and Nawaban Wala, which were chosen for their accessibility. All children under the age of five were considered for height and weight measurement. UNICEF-approved lightweight SECA scales with digital screens were used to determine weight. Similarly, an elevation board was used to determine altitude. Field surveys were used to collect socioeconomic, socio-demographic, and behavioural data as well as anthropometric measurements of children under five years of age. Anthropometric data were obtained from 150 randomly selected children in three slums of areas of Faisalabad and the data were collected from mothers of selected children through a questionnaire.

2.1. Anthropometric analysis

Anthropometry is the art of inferring the nutritional status of an individual or population using measurements of the human body. Anthropometry is more commonly used in preschoolers under the age of five. Anthropometric measures were utilised to assess the nutritional condition of children under the age of five years, as identified in earlier research (Imdad & Bhutta, 2011; Kpurkpu et al., 2017). Anthropometric analysis uses a variety of data, including the child's age, gender, height, and weight. These measures are used to create indices such as height-for-age, weight-for-age, and height-for-weight. Z-scores are then calculated by comparing these measures to specific reference values from the National Center for Health Statistics (NCHS). The height-for-age Z-score (Z) is determined using the formula: $Z = (X - \mu) / \sigma$. X denotes the child's height for their age, μ is the median height of the reference population of children in the same age and gender group, and σ is the standard deviation of the reference population. Children's nutritional status was determined using the Z-score. In this study, three indicators of nutritional status were assessed by anthropometric measurements of all selected children: stunting, underweight, and wasting.

Stunted means less height for age. It is a measure of acute or chronic malnutrition in children and a good indicator of general

stunting. Children whose height for age is Z minus two standard deviations below the median of the reference population are classified as stunted.

Underweight refers to low weight for age and is a measure of a combination of chronic and acute malnutrition. Children who have a Z-score minus 2 standard deviations below the ratio for age are considered underweight.

Wasting is a sign of acute malnutrition, suggesting a low weight for height and a short-term variation in nutritional status. It is widely used to determine nutrition in crises where the child's age is unknown, and youngsters whose Z-scores for weight are less than minus 2 standard deviations below the reference population wasted (UNICEF, 2018; WHO, 2020). Anthropometric analysis was performed using the NutriSurvey Emergency Nutritional Assessment software.

2.2. Descriptive statistics

The data is analyzed using descriptive statistical techniques. It aids in the review, definition, and presentation of data in a meaningful way. One of the most important phases in the statistical analysis procedure is this one. It helps you explore links between variables, uncover mistakes and outliers, and summarise data distribution—all of which will help you be ready for more statistical analysis.

2.3. Logistic regression Analysis

Logistic regression analysis is the preferred method when the dependent variable is binary, as shown by several studies (Kebede et al., 2021; Black et al., 2013; Smith et al., 2005; Balogun et al., 2021; Tariq et al, 2018)). For example, if the outcome variable represents a binary state such as whether the child's nutritional status is malnourished (coded as 1) or not (coded as 0), using logistic regression is a suitable model.

The following variables were hypothesized to influence child nutritional status, from an empirical literature review: household economic status, Maternal education employment status of the mother, employment status of the father, Access to water supply and toilet facilities, child morbidity, child age, birth order, delivery period, maternal nutritional status and access to hospitals.

The logistic model is depicted in the equation:

$$\textbf{Logit } (p) = \left[\frac{p_i}{1-p_i}\right]$$

Where $=\left[\frac{p}{1-p}\right]$ is the odd ratio

The nonlinear representation of the binary logistic model equation can become linear after taking the natural logarithm.

$$\textbf{Logit } (p) = L1 = L_n \left[\frac{p_i}{1-p_i}\right] = \beta_o+\beta_1X_1+\beta_2X_2+\ldots\ldots. \beta iXi+$$

The model specification is given by the formula

$$Y=\beta_o+\beta_1X_1+\beta_2X_2+\beta3X3+\beta4X4+\beta5X5+\beta6X6+\beta7X7\ \beta8X8+ui$$

The dependent variable in this study depicts the nutritional status of the respondents' children, with a binary value of 1 indicating malnutrition and 0 otherwise. The research investigates a variety of independent variables, including socioeconomic and demographic characteristics about the child's parents, as well as the child's anthropometric measures. Specifically, the presumed independent variables include the child's age in years (X1), the child's gender (with male coded as 1 and female as 0) (X2), household size (X3), the educational attainment of the child's mother in terms of schooling years (X4), household calorie intake measured in kcal/AE/day (X5), access to clean water (coded as 1 for yes and 0 for no) (X6), and availability of toilet facilities (coded as 1 for yes and 0 for no) (X7), access to health care (coded as 1 for yes and 0 for no) (X8), and the head of the household's employment status (coded as 2 for employed, 1 for small-scale enterprise, and 0 for unemployed) (X9).

3. Results:

3.1. Socio-demographic attributes of children under five years of age and their nutrition status

Table 1 presents an overview of the socioeconomic characteristics and nutritional status of the household's children. The investigation revealed that 56.6% of the sampled children were male,

Table 1: Socio-demographic characteristics of children under five years of age and nutrition status

Parameter/ Categories	Frequency	Percentage (%)	Stunted (%)	Wasted (%)	Under-weight (%)
Sex of child					
Male	85	56.6%	2.3%	1.1%	2.3%
Female	65	43.3%	2.0%	3.0%	1.5%
Age of child					
0-6 months	30	20%	0.0%	3.3%	0.0%
7-24 months	55	36.6%	2.8%	0.0%	2.8%
25-36 months	37	24.6%	2.7%	2.7%	0.0%
37-59 months	28	18.6%	7.1	3.5%	7.1%
Household size					
3 to 5	57	38%	3.5%	0.0%	1.7%
6 to 10	50	33.3%	2.0%	4.0%	4.0%
11 and above	43	28.6%	5.4%	2.3%	4.6%
Fathers' education level					
No formal schooling	65	43.3%	4.0%	3.0%	3.0%
Up to 5 years of schooling	45	30.0%	2.2%	2.2%	2.2%
Up to 10 years of schooling	40	26.6%	2.5%	0.0%	2.5%
Mother's education level					
No formal schooling	63	42%	3.1%	1.6%	1.6%
Up to 5 years of schooling	65	43.3%	1.5%	1.5%	0.0%
Up to 10 years of schooling	22	14.6%	0.0%	0.0%	0.0%
Monthly income (Rs.)					
≤15000	58	38.7%	5.7%	3.4%	5.7%
15001 – 20000	40	26.7%	2.5%	2.5%	2.5%
>20000	52	34.6%	0.0%	1.9%	1.9%
Household daily calorie intake (Kcal/day)					
≤2000	58	38.6%%	2.5%	2.2%	2.2%
2001 – 5000	45	30%	2.2%	2.2%	0.0%
5001 – 8000	45	30%	2.2%	0.0%	2.2%
>8000	2	13.3%	0.0%	0.0%	0.0%
Household head occupation					
Farming	30	20.0%	6.6%	3.3%	3.3%
Employed with salary	70	46.6%	1.4%	2.8%	2.8%
Small scale trading	29	19.3%	0.0%	3.4%	3.4%
Others (artisan/apprenticeship)	21	14.0%	0.0%	0.0%	0.0%
Ground (another area)	113	75.3%	2.6%	1.7%	2.6%
Ground (home)	22	14.6%	4.5%	4.5%	9.0%
Filtered	15	10.0%	0.0%	0.0%	0.0%
Household access to a toilet facility					
Yes	92	61.3%	1.0%	0.0%	1.0%
No	58	38.7%	5.1%	1.7%	6.8%
Maternal access to a healthcare facility					
Yes	62	44.3%	1.6%	0.0%	1.6%
No	88	55.7%	2.2%	1.1%	3.4%

while 43.3% were female. Among them, 2.3% of male children are stunted, 1.1% are wasted, 2.3% are underweight, and 2.0% of females are stunted, 3.0% are wasted,1.5% are underweight.

0.0% of children aged 0-6 months are stunted, 3.3% are wasted and 0.0% are underweight. 2.8% of children aged 7 to 24 months are stunted, 0.0% are wasted and 2.8% are underweight. 0.0% of children aged 25-36 months are underweight, 2.7% are wasted and 2.7% are stunted. 7.1% of children between the ages of 37 and 59 are underdeveloped, 3.5% are wasted and 7.1% are underweight. Studies show that children between the ages of 37 and 59 months are more likely to be malnourished.

3.5% of children are stunted, 0.0% are wasted, 1.7% are underweight, and household sizes range from 3 to 5. 2.0% of children are stunted, 4.0% are wasted, 4.0% are underweight, and household size is 6-10. 5.4% of children are stunted, 2.3% are wasted, 4.6% are underweight, and household size is 11 and above.

4.0% of children are stunted, 3.0% are wasted, 3.0% are underweight and their fathers have no formal education. 2.2% of children are stunted, 2.2% are wasted, 2.2% are underweight and their fathers have been in school for up to 5 years. 2.5% of children are stunted, 0.0% are wasted, 2.5% are underweight and their fathers have been in school for up to 10 years. 3.1% of children are stunted, 1.6% are wasted, 1.6% are underweight and their mothers have no formal education. 1.5% of children are stunted, 1.5% are wasted, 0.0% are underweight and their mothers have been in school for up to 5 years. 0.0% of children are stunted, 0.0% are wasted, 0.0% are underweight and their mothers have been in school for up to 10 years.

5.7% of children are stunted, 3.4% are wasted, 5.7% are underweight, and household income is less than or equal to 15,000. 2.5% of the children are stunted, 2.5% are wasted, 2.5% are underweight, and have a household income between Rs 15,001 and Rs 20,000. 0.0% of children are stunted, 1.9% are wasted, 1.9% are underweight, and have a household income above Rs 20,000. 2.5% of children are stunted, 2.2% are wasted, 2.2% are underweight, and consume less than 2000 kcal per day at home. Among children, 2.2% are stunted, while 0.0% are wasted, and another 2.2% are considered underweight, maintaining a daily caloric intake of 2001 to 5000 kcal at home. Similarly, 2.2% of children exhibit stunting, 2.2% are wasted, and 0.0% are underweight, consuming 5001 to 8000 kcal per day in their households. No child showed stunting, wasting, or underweight when consuming more than 8,000 kcal per day at home.

In households where the head is engaged in agriculture, 6.6% of children are stunted, 3.3% are wasted, and 3.3% are underweight. For those whose heads are salaried employees, these figures drop to 1.4%, 2.8%, and 2.8%, respectively. In households where the head is involved in small-scale trading, there are no cases of stunting, while 3.4% are wasted and 3.4% are underweight. For households where the head is engaged in other activities such as handicraft work, there are no reported cases of stunting, wasting, or underweight children. Access to clean water sources plays an important role: in areas where water sources are on the ground at home, 4.5% of children are stunted, 4.5% are wasted, and 9.0% are underweight. In contrast, these percentages decrease to 2.6%, 1.7%, and 2.6%, respectively, among households with groundwater sources. Finally, in households with filtered water sources, no cases of stunting, wasting, or low birth weight are reported.

Our survey found that 92 households had adequate toilet facilities. Stunting, wasted, and being underweight are common among these children at 1.6%, 0.0%, and 1.0%, respectively. On the other hand, 58 households do not have adequate toilet facilities. Stunting, wasted and underweight are more common in these children at 5.1%, 1.7%, and 6.8% respectively. Health

facilities were available to 62 women in 150 households. Stunting, wasted, and being underweight are common among these children at 1.0%, 0.0%, and 1.6% respectively. On the other hand, women in 58 households do not have health facilities. Growth retardation, wasting, and being underweight were more common among these children at 2.2%, 1.1%, and 3.4% respectively.

In our study, we observed that 28% of the children in the sample were underweight, 22.6% were underweight, and 18% were wasted. These figures represent Z-scores below minus 2 standard deviations from the reference population mean established by the United States National Center for Health Statistics (NCHS).

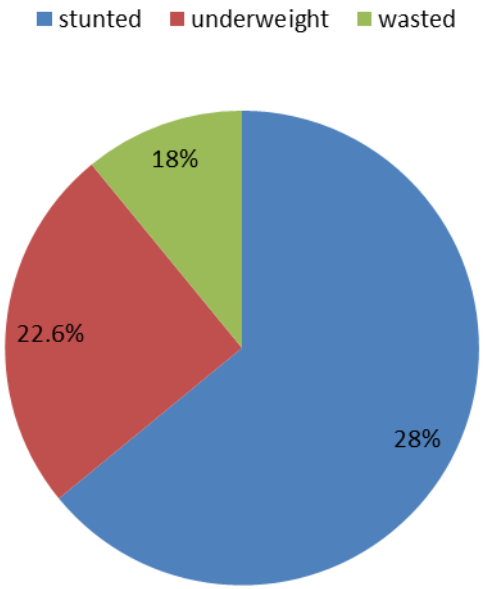

Figure 3. Prevalence of malnutrition

3.2. Determine malnutrition among under-five children

Table 2 shows the results of the investigation of the determinants of malnutrition among children under five years of age. Using a logistic regression approach, the analysis identified underweight, underweight and wasting as the main factors influencing child nutrition. In this context, the dependent variable represents a binary indicator, taking the value 1 if the child is malnourished and 0 otherwise. Through maximum likelihood estimation, the coefficients derived from the logistic model indicate the probability of a child being malnourished. Additionally, the significance of variables is assessed using the likelihood ratio test, with thresholds set at the 1%, 5%, and 10% levels.

Column 1 of Table 2 shows the predicted result for the definition of stunting for a child under five. years of age. The values of Nagelkerke $R^2 = 0.821$ and Cox and Snell`s $R^2 = 0.783$ indicate that approximately 82 and 78 of the variations in dependent variables are explained by the independent variable. Results from logistic regression analysis indicate that household caloric intake is negatively associated with stunting potential. This implies that children raised in households with greater access to calories are less prone to experiencing stunted growth. The coefficient value is -0.844, indicating that increasing access to more calories reduces the -0.844 level of stunting in children and is significant at 99%. This finding is consistent with previous literature showing that children's nutritional status is related to general household nutritional status (Babatunde et al., 2011).

Maternal educational status is negatively associated with the probability of stunting. This study identified maternal education as a potential determinant of malnutrition. The value of the coefficient is -0.406, meaning that child stunting rates decreased by -0.406 with an increase in Maternal level of education, which is significant at 99%. Several previous studies have agreed with this finding, supporting the idea that children whose mothers had higher education were less likely to be malnourished than children whose mothers have little or no education, suggesting that a mother's education is an important factor. Educated mothers are more knowledgeable about child health and nutrition, so they are better aware of their children's health and better able to care for them (Mawa & Lawoko, 2018; Kassie & Workie, 2020).

Not only the mother's education but also the father’s education is associated with

childhood malnutrition, and children whose fathers received formal education had a lower risk of malnutrition. The value of the coefficient is -0.273, which means that as the father's level of education increased, the child's stunting rate decreased by -0.273, which is significant at 99%. Other studies have reported similar results. Educated fathers are more knowledgeable about appropriate child nutrition and hygiene practices that contribute positively to the prevention of child malnutrition (Haile et al., 2016; Seboka et al., 2021). Statistically insignificant variables related to child nutrition status were children's age child sex household size and access to a toilet and, in-home medical facilities. which are statistically insignificant at the 99% level.

Column 2 of Table 2 shows the estimated results for the determinants of wasting in children under 5 years of age. Nagelkerke's R2 = 0.723 and Cox and Snell's R2 = 0.701 indicated that the independent variable explained approximately 72 percent and 70 percent of the variation in the dependent variables, respectively. The accuracy of the model is 75.4. Our study result shows that women's education has the greatest impact on reducing child malnutrition. The value of this Coefficient is -0.446, which indicates that there is an inverse relationship between the probability of wasting and the mother's education, which means that improving the mother's education will reduce child malnutrition significantly at a 99% significance level. The result is supported by previous research (Masha et al., 2008; Menalu et al., 2021).

Maternal access to healthcare facilities is negatively associated with potential wasting. This study identified maternal access to health facilities as a potential determinant of malnutrition. The coefficient value is -0.538, which means that child-wasting rates decreased by -0.538 with increasing maternal access to health facilities, which is significant at 99%. This is consistent with other studies that have found that expanding health infrastructure significantly reduces the risk of child malnutrition (Oyekale & Oyekale, 2009). The variables are statistically insignificant related to the wasting status of the children are the age of the children, sex of the child, household size, household head occupation, household calorie intake (kcal/day), access to clean water, access to a sanitary toilet, and the father's education, which are statistically insignificant at a 99% level of significance.

Column 3 in Table 2 shows the estimated result for the determinants of under-weight among children under five Nagelkerke R2 = 0.733 and Cox and Snell`s R2 = 0.754 values indicated that the independent variable explained approximately 73 percent and 75 percent of the variation in the dependent variables, respectively. The accuracy of the model is 76.6. The Results of the logistic regression analysis showed that household caloric consumption was negatively associated with being under-weight in children under five years of age. This suggests that children from households with greater access to calories are less likely to be underweight. The coefficient is -0.435, indicating that increasing access to more calories reduces the level of underweight in children and it is significant at 99%. This finding is consistent with previous literature showing that children's nutritional status is related to general household nutritional status (Perez-Escamilla et al.,2018; Nasreddine et al.,2018).

Maternal access to healthcare facilities is negatively associated with potential underweight. This study identified maternal access to health facilities as a potential determinant of malnutrition. The coefficient value is -0.235, meaning that as maternal access to health facilities increased, the prevalence of underweight children decreased by -0.235, which is significant at 99%. This is consistent with other studies that have found that expanding healthcare infrastructure significantly reduces the risk of child malnutrition (Monteiro et al 2009). The variable most closely related to children's

Table 2: Logit model determinants of child malnutrition

variables	Malnutrition Indices		
	Stunting	**Wasting**	**Under-weight**
constant	0.349 (1.837)	-0.537 (1.926)	-0.600 (1.857)
SEX OF CHILD	0.040 (0.357)	-0.051 (0.361)	-0.334 (0.380)
AGE OF CHILD'S	0.048 (0.054)	0.043 (0.054)	0.056 (0.077)
HOUSEHOLD SIZE	0.269 (0.396)	0 .028 (0.377)	-0.126 (0.298)
FATHER'S EDUCATION LEVEL	*-0.273 (0.147)	0.151 (0.249)	0.146 (0.253)
MOTHER'S EDUCATION LEVEL	*-0.406 (0.149)	*-0.446 (0.154)	0.155 (0.355)
HOUSEHOLD HEAD OCCUPATION	-0.001 (0.000)	-0.345 (0.263)	-0.400 (0.154)
HOUSEHOLD CALORIE INTAKE (KCAL/DAY)	*-0.844 (0.387)	-0 .077 (0.328)	-0.435* (0.420)
ACCESS TO CLEAN WATER	*-0.372 (0.002)	-0.051 (0.545)	0.287* (0.006)
Maternal ACCESS TO HEALTHCARE FACILITY	0.048 (0.278)	-0.538* (0.368)	-0.235* (0.078)
ACCESS TO SANITARY TOILET	-0.132 (0.247)	-0.050 (0.394)	0.214 (0.831)
Cox & Snell R^2	0.783	0.701	0.754
Nagelkerke R^2	0.821	0.723	0.733
Log likelihood ratio	168.93	155.53	165.55
Model prediction success	80.4%	75.4%	76.6%

Level of significance $p<0.01$at 1 percent

nutritional status is access to clean water. Our data suggest that safe water sources have a major impact on reducing child malnutrition. The value of this coefficient is -0.287, indicating that access to clean water sources is inversely related to the likelihood of being underweight. This means that improving safe water sources reduces child malnutrition, which is significant at the 99% significance level. Clean water is expected to protect children from water-borne diseases such as diarrhoea that can lead to weight loss. These empirical findings are also consistent with findings from the literature. (Siddiqi et al., 2011; Yeasmin & Islam, 2016).

The variables statistically insignificant related to the under-weight status of the children are the age of the children, sex of the child, household size, household head occupation, mother's education level, father's education level, and access to a sanitary toilet, which are statistically insignificant at the 99% level of significance.

4. Conclusion

This study investigated the prevalence of under-five malnutrition and its influencing factors in the slum areas of Faisalabad, Pakistan. Surprisingly, the survey revealed that the rate of malnutrition among these children is lower than the national average. Analyzing data from 150 children using

descriptive and regression methods, the study found that 24.1%, 21.7%, and 15.3% of children were underweight, and wasted, respectively. These figures, although relatively low, are still in line with Pakistan's national average for malnutrition.

The analysis revealed that household factors such as household caloric intake, maternal education, father's education, access to clean water, and maternal access to health facilities were significant determinants of child malnutrition in the study area. These findings emphasize the importance of increasing household caloric intake and investing in maternal and parental education, as well as improving access to clean water and health facilities to increase child nutrition. The policy implications of this study are profound. First, it highlights the important role of maternal education, suggesting the need for educational programs targeted at women to alleviate malnutrition. Second, the emphasis on caloric intake underscores the importance of ensuring adequate caloric intake, particularly for those living in slums, to effectively address malnutrition in Pakistan.

Therefore, Policymakers should develop viable strategies to address the production, processing, and blending of locally available low-cost indigenous food sources that can improve the nutritional status of slum dwellers. Third, clean water prevents the spread of water-borne diseases that can negatively impact the health and nutrition of young children. The provision of sanitary latrines in slum households should be encouraged. The government may pass laws requiring slum dwellers to maintain a clean and healthy environment. Finally, there is a need to improve women's access to health. Women living in slums do not have access to healthcare facilities. Public health facilities should provide up-to-date contraceptives in slums. Helps reduce child malnutrition. Our dataset lacked child-specific and essential health-related data, such as birth weight, birth order, vaccination date, and breastfeeding duration. These factors are important to assess the nutritional status of the child. Additionally, our sample size of 150 under-five children is relatively limited. Augmenting the data set with additional child-specific and health-related variables, along with increasing the sample size, may lead to more reliable and comprehensive results.

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