Prevalence and Correlates of Chronic Malnutrition among the Infants of Rahim Yar Khan District

Dr. Muhammad Rizwan[1], Dr. Zill e Huma[2]

[1] Postgraduate Research (PGR) Fellow, PEADS Medicine, Ibn e Sina Hospital and Research Institute, Multan, Pakistan.
Email: mrizwanmughal205@gmail.com

[2] Postgraduate Research (PGR) Fellow, PEADS Medicine, Ibn e Sina Hospital and Research Institute, Multan, Pakistan.
Email: zillehuma@gmail.com

ARTICLE INFO

ABSTRACT

This study aimed to investigate the prevalence of chronic malnutrition among infants in Rahim Yar Khan District, Pakistan, and explore the influence of child gender, maternal education, and household wealth on this health outcome. Data were collected from a sample of infants aged 0 to 11 months in Rahim Yar Khan District. Chronic malnutrition status was measured through the incidence of child stunting, with WHO height-for-age Z-Score < -2 indicating chronic malnutrition. Logistic regression analysis was employed to examine the associations between chronic malnutrition and child gender, maternal education, and household wealth, while controlling for residential area (urban/rural). The results revealed significant associations between chronic malnutrition and household wealth (Adjusted Odds Ratio = 0.617, p = 0.021) and maternal education (Adjusted Odds Ratio = 0.677, p = 0.026). However, no significant association was found between chronic malnutrition and residential area (urban/rural) (p = 0.989) or child gender (p = 0.054). The study highlights the prevalence of chronic malnutrition among infants in Rahim Yar Khan District and underscores the importance of addressing socioeconomic determinants such as household wealth and maternal education to mitigate this public health issue. Policy interventions aimed at improving household wealth and enhancing maternal education levels could contribute to reducing the burden of chronic malnutrition among infants in the district.

Corresponding Author's Email: mrizwanmughal205@gmail.com

1.   Introduction

Infant chronic malnutrition continues to be a significant public health issue globally, especially in low-resource areas like Rahim Yar Khan District, Southern Punjab, Pakistan. Chronic malnutrition, which is marked by stunting, presents substantial hazards to the health and development of infants, and has enduring effects that last into adulthood. It is crucial to comprehend the factors that contribute to chronic malnutrition in infants in order to develop interventions and policies that are based on solid data and aimed at reducing its occurrence.

Rouf, Sadaf, Iqbal, Rauf, & Tabasam (2023) investigated the impact of maternal work on the nutritional well-being of children in Faisalabad. This study utilized a primary data collection method through an open and well-structured questionnaire survey. The collected data was then

analyzed using logistic regression. In this study, a multi-stage probability sampling technique called Descriptive Statistics was utilized. The employment of the mother and the income of the household positively influenced the dependent variable. This study included anthropometric measures to evaluate the nutritional status of children. The study revealed a substantial correlation between a mother's job and the nutritional welfare of her kid, indicating that children of working moms tend to have a more favorable body weight in comparison to those of non-working mothers. The age of the mother and the length of time she breastfed were identified as important factors that affect the nutritional health of children.

Andrade & Gil (2023) investigated the relationship between maternal work and child malnutrition in Ecuador. This study utilized cross-sectional data. In this study, child malnutrition was employed as the dependent variable. The utilization of instrumental variables (IV) methodology and the consideration of exogenous cantonal heterogeneity in maternal labor market conditions effectively address the potential issue of endogeneity in mothers' employment. This study employed child malnutrition as the dependent variable and maternal employment as the explanatory variable. The independent variable had a beneficial effect on child malnutrition. The data was analyzed using the Ordinary Least Squares (OLS) and Durbin-Wu-Hausman (DWH) instrumental variable (IV) technique. This study employed a two-stage probabilistic stratified sampling strategy for data collecting. The study employed area-level maternal labor market conditions as an instrument to measure mother employment and examined the varying effects among different population groupings. In the second stage of the analysis, an Ordinary Least Squares (OLS) regression was conducted. This regression included the prediction obtained from the first stage estimation and was used as an instrument for the endogenous variable.

Shahid et al. (2022) examined a case study on child malnutrition in the impoverished rural community of Punjab, Pakistan. The study utilized a proportionate purposive simple random sampling strategy to gather data from 384 rural families in one of the disadvantaged areas of Punjab. The data was gathered by a self-administered questionnaire, which encompassed details on height, weight, age of children, and socio-economic status. The study utilized primary data. The study employed the binary logistic regression model to calculate the likelihood of malnutrition and evaluate the influence of mothers' nutritional and health awareness (MNHA) on the nutritional condition of preschool children. The logistic regression approach was used to assess the relationship between MNHA and the nutritional status of children, taking into account several factors such as family socioeconomic status, maternal characteristics, and child features. The district has prevalence rates of 46.1% for underweight, 34.83% for stunting, and 15.49% for wasting.

Akbar, Asif, & Hussain (2022) conducted maternal empowerment strategies to enhance the nutritional variety of children, as demonstrated by the Pakistan Demographic and Health Survey. This study utilized primary data. A two-stage sampling strategy was employed to gather data. The dependent variable in the study was the dietary diversity of youngsters. The study examined multiple explanatory variables, such as maternal empowerment, maternal education, maternal agricultural employment, paternal education, paternal employment, household socioeconomic position, demographic data, mother's age, and family size. The data in this study were analyzed using general linear regression and an 8 cumulative logit model. The study also emphasizes the importance of the socioeconomic state of households and the necessity of social welfare programs to enhance the variety of food in people's diets.

Ahmad, Afzal, & Imtiaz (2020) explored the impact of socioeconomic variables on the prevalence of malnutrition among children in Pakistan. The study specifically targeted the Multan district in the Punjab province of Pakistan, as it had a higher prevalence of malnutrition compared to other regions within the same state. The study sought to investigate the impact of socioeconomic factors on the occurrence of malnutrition in children aged 5 and below. This study utilized primary data. The dependent variable in this study was the occurrence of malnutrition among the youngsters. The study examined multiple independent variables, such as age, gender, maternal education, family income, family size, geographic location (rural or urban), food availability, immunization status, access to treated water, and sanitary facilities. This study utilized the Ordinary Least Squares Probit Regression Model, Logit Regression Model, Tobit Regression Model, and Binary Regression Model to analyze the data.

Mishu, Chowdhury, Bipasha, Raisa, & Zayed (2020) Investigated the influence of maternal nutritional status on child malnutrition in children under the age of 5 in Bangladesh. The study utilized primary data. This study employed Child Malnutrition as the dependent variable, whereas mother education, mother age, mother height, and mother nutrition status were utilized as explanatory variables. The educational level, age, height, and nutritional health of the mother positively influenced the occurrence of child malnutrition. The independent variable was measured using a z-score approach in this study. The data in this study were analyzed using Multinomial Logistic Regression Descriptive Statistics and a Chi-square Independence Test. The chi-square independence test is employed to examine the impact of certain background variables on child nutrition. Multinomial Logistic Regression analysis is employed to ascertain the statistical significance of variables when considered collectively.

Yirga, Mwambi, Ayele, & Melesse (2019) found the determinants influencing child malnutrition in Ethiopia. The study utilized primary data. The dependent variable in the study was child malnutrition. The study examined multiple explanatory variables, such as the child's age, sex, birth weight, mother's age, mother's BMI, marital status, and location of residency. In this study, the data was analyzed using the proportional odds model (POM), Chi-square distribution, and Ordinal logistic regression. The purpose was to discover risk variables that are linked with child malnutrition. 9 The data collected in the survey is analyzed using the weight-for-height anthropometric index (Z-score) to classify the nutritional status of children into four categories: underweight, normal weight, overweight, and obese.

Shahraki, Agheli, Assari Arani, Sadeqi, & Ghaderi (2018) examined the correlation between a mother's socioeconomic level and the health of children in Tehran. This study utilized primary data. The study utilized child health as the dependent variable, whereas parents' education, having a father in an officeholder position, and family size were considered as independent variables. The parents' level of education had a beneficial impact on the health of the children, but having a father who holds a public post, having a larger family size, and being a twin had negative effects on the children's health. The study computed the HAZ index for all children and employed it as the dependent variable in the model. The data in this study was analyzed using the Probit model. The educational attainment of the mother was found to have a beneficial impact on the occurrence of low birth height in children, but the educational attainment of the father was found to have an adverse impact on the likelihood of children experiencing stunted growth.

Khattak, Iqbal, Ghazanfar, & kulsoom Khattak (2017) Examined the impact of parental literacy on the occurrence of malnutrition among children below the age of five in a semi-urban community in Pakistan. This study utilized primary data. The data was collected using a self-designed questionnaire of 75 items. This study examined the relationship between child nutrition status and the educational status of both parents. The kid's nutrition status was considered the dependent variable, while the educational status of the father and mother were treated as independent variables. The study comprised mothers aged 18 to 45 who had been permanent residents of the neighborhood for the past six months and had children under the age of five residing with them. The independent variables exerted a substantial influence on the nutritional status of typically developing children. The data was analyzed using convenient sampling technique, unpaired t-test, Mann-Whitney U test, Chi-square test, and multivariate logistic regression.

Prior studies have identified multiple factors that contribute to newborn malnutrition, such as socioeconomic position, mother education, household wealth, and access to healthcare facilities. Nevertheless, it is necessary to conduct localized research that precisely investigate these factors within the distinct socio-cultural and economic environment of Rahim Yar Khan District. Through the identification of the primary factors that contribute to chronic malnutrition in infants in this area, policymakers and healthcare professionals can create specific interventions to target the root causes and enhance the health outcomes of infants.

This study has important implications for public health policy and practice in Rahim Yar Khan District and in similar places with limited resources. The research findings can provide valuable information on the factors associated with chronic malnutrition in infants. This information can be used to develop and implement targeted interventions that are appropriate for specific contexts, with the goal of reducing the prevalence of malnutrition among vulnerable

populations. Furthermore, tackling infant malnutrition has wider ramifications for attaining Sustainable Development Goal 2 (Zero Hunger) and enhancing overall health and well-being results within the society. Moreover, comprehending the socioeconomic and demographic determinants that impact newborn chronic malnutrition will aid in prioritizing the allocation of resources and intervention options. This will ensure that limited resources are efficiently employed to target the most susceptible populations. To achieve sustainable solutions that promote health equity and social justice in the region, authorities should focus on tackling the underlying causes of malnutrition, including poverty and limited access to healthcare and education.

The study seeks to get a thorough comprehension of the factors that contribute to chronic malnutrition in infants within the local setting, taking into account both individual and contextual factors. The research aims to identify practical insights that can guide specific treatments and policy suggestions to decrease infant malnutrition rates and enhance health outcomes in the region. This will be achieved by analyzing various socioeconomic and demographic factors. In summary, this study adds to the existing research on newborn malnutrition and emphasizes the significance of tailored strategies in tackling this crucial public health problem. By engaging in collaborative endeavors including researchers, policymakers, and community stakeholders, the results of this study can provide valuable insights for developing evidence-based approaches that enhance the health and well-being of infants in Rahim Yar Khan District and comparable environments.

2.   Methodology

In the current study, the dependent variable is defined as the chronic malnutrition status of infants, measured through the incidence of child stunting. Child stunting is operationalized using the World Health Organization (WHO) height-for-age Z-score, where a score of less than -2 is coded as "1" for chronically malnourished infants and "0" for infants not experiencing chronic malnutrition.

Table 1

Chronic Malnutrition Status	Criterion
Chronic malnourished	"If the infant's WHO height-for-age Z-score is less than -2"
Normal	"If the infant's WHO height-for-age Z-score is above -2"

The correlates of the infant's chronic malnutrition are defined in the following ways.

- Mother's Education: The educational level attained by the mother of the infant.
- Gender of Child: A binary variable representing the gender of the infant, coded as male (0) or female (1).
- Combined Wealth Score: A composite measure representing the household's wealth status.
- Residential Area: A categorical variable indicating whether the household resides in an urban (coded as 0) or rural (coded as 1) area.

2.1.   Data source

The present research has used the survey data from study utilized the data from the PDHS-Pakistan Demographic & Health Survey (2017-18). PDHS is till now the latest episode of the survey data representing the whole country.

2.2.   Adjusted Odds Ratios as Estimation Technique

The study used binary logistic regression—a statistical approach—to investigate the categorical dependent variable. A multivariate analysis has been employed to highlight the variables that impact the child's chronic nutritional status. The dependent variable is assigned a binary value, where it is set to 1 if the infant is undernourished and 0 if the infant is not. A variable with a p-value estimated to be less than 0.05 is considered to have statistical significance. The odds ratio, calculated using the logistic regression coefficients, measures the probability of underweight being greater or lesser at a particular level of the independent variable, while considering the influence of other variables in the model. When the odds ratio is more than 1.0, it indicates a heightened risk of malnutrition in comparison to the reference category (Girma & Genebo, 2002).

3. Results and Discussion
3.1. Descriptive Statistics and Distribution of the Variables

According to table given above, in the context of Rahim Yar Khan District, Southern Punjab, Pakistan, chronic malnutrition status emerges as a significant concern impacting infant health. Among the surveyed infants, 35.3% are classified as malnourished, while 64.7% are categorized as not malnourished. Maternal education may play a significant role in the prevalence of chronic malnutrition among infants. The majority of mothers, accounting for 63.1% of the surveyed population, have received no formal education or only attended preschool. Additionally, 17.1% have completed primary education, 6% have attained middle education, 7.4% have reached secondary education, and 6.4% have obtained higher education. These educational disparities may contribute to variations in infant malnutrition rates.

Table 2

Variables	Category	f	%
Mother's Education	None/Preschool	188	63.1
	Primary	51	17.1
	Middle	18	6
	Secondary	22	7.4
	Higher	19	6.4
	Total	298	100
Area of Residence	Rural	260	87.2
	Urban	38	12.8
	Total	298	100
Infant's Gender	Male	153	51.3
	Female	145	48.7
	Total	298	100
Chronic Malnutrition Status	Not Malnourished	180	64.7
	Malnourished	98	35.3
	Total	278	100
		Mean	**Std. Deviation**
Combined wealth Index score		-0.699	0.917

Residence location could also affect infant malnutrition, with 87.2% of surveyed households situated in rural areas, where access to healthcare and nutrition resources may be limited compared to urban settings, which account for only 12.8% of households. Infant gender is another factor influencing chronic malnutrition prevalence, with slightly more male infants (51.3%) affected compared to females (48.7%). This gender discrepancy may stem from various societal and cultural factors affecting healthcare access and nutritional intake. Analyzing household wealth, the combined wealth index score for the surveyed population is -0.699, indicating a generally low socioeconomic status. This lower wealth index may correlate with higher rates of chronic malnutrition, as impoverished households may struggle to afford adequate food and healthcare for their infants.

3.2. The Effect of Child Gender, Maternal Education, and Household Wealth on the Infant's Chronic Malnutrition

The table 3 presents the results of a logistic regression analysis examining the factors associated with chronic malnutrition among infants, measured through the incidence of child stunting (WHO height-for-age Z-Score < -2). In table 3, the constant term represents the predicted log odds of chronic malnutrition among infants when all independent variables are zero. In this case, the constant term of -0.608 indicates that the log odds of chronic malnutrition are negative. The coefficient for mother's education is -0.39, with a significant p-value of 0.026. This suggests that for every additional level of education attained by the mother, the log odds of chronic malnutrition decrease by approximately 0.39, controlling for other variables. The coefficient for gender of the child (male = 0, female = 1) is -0.519, with a p-value of 0.054, which is marginally above the typical significance threshold of 0.05. This suggests that female infants have slightly lower odds of chronic malnutrition compared to male infants, although the association is not statistically significant at the conventional level.

Table 3: Correlates of Infant's Chronic Malnutrition: Odds Ratios

Variables	B	S.E.	Wald	df	p-Value	Adjusted Odds Ratios
Constant	-0.608	0.126	23.456	1	0	0.544
Combined Wealth Score	-0.484	0.21	5.322	1	0.021	0.617
Mother's Education	-0.39	0.175	4.969	1	0.026	0.677
Residential Area (Urban = 0, Rural = 1)	-0.007	0.509	0	1	0.989	0.993
Gender of Child (Male = 0, female = 1)	-0.519	0.269	3.718	1	0.054	0.595
Constant	0.027	0.758	0.001	1	0.972	1.027

Dependent Variable: Chronic Malnutrition Status of Infant (age 0 to 11 month); measured through the incidence of child stunting (WHO height for age Z-Score < -2 is coded as "1" for chronically malnourished and "0" for not chronically malnourished)

The coefficient for the combined wealth score is -0.484, with a significant p-value of 0.021. This indicates that for every one-unit increase in the combined wealth score (reflecting higher household wealth), the log odds of chronic malnutrition decrease by approximately 0.484, holding other variables constant. The coefficient for residential area (urban = 0, rural = 1) is -0.007, with a non-significant p-value of 0.989. This indicates that there is no significant association between residential area and chronic malnutrition among infants, holding other variables constant. Overall, the findings suggest that household wealth and maternal education are significant predictors of chronic malnutrition among infants, with higher wealth and education levels associated with lower odds of chronic malnutrition. The gender of the child also shows a trend towards significance, indicating that female infants may have slightly lower odds of chronic malnutrition compared to male infants, although further research may be needed to confirm this association.

Table 4: Model's Summary

-2 Log likelihood	325.802
Cox & Snell R Square	0.118
Nagelkerke R Square	0.163

The above given table provides a summary of the model's goodness-of-fit statistics for a logistic regression analysis. The value of -2 Log likelihood indicates the goodness-of-fit of the logistic regression model. A lower -2 log likelihood value suggests a better fit of the model to the data. In this case, the value of 325.802 represents the overall fit of the model. Both Cox & Snell R Square and Nagelkerke R Square suggest that the logistic regression model explains a modest proportion of the variance in the dependent variable, indicating moderate predictive power of the model. Cox & Snell R Square statistic measures the proportion of variance in the dependent variable (outcome) explained by the independent variables (predictors) in the model. However, unlike R-squared in linear regression, Cox & Snell R Square does not have a maximum value of 1 and can range from 0 to less than 1. Higher values indicate a better fit of the model. Here, the value of 0.118 suggests that the independent variables collectively explain about 11.8% of the variation in the dependent variable. Nagelkerke R Square statistic is a modification of Cox & Snell R Square and provides a more accurate estimate of the variance explained by the model. Similar to Cox & Snell R Square, higher values indicate a better fit of the model. The value of 0.163 indicates that the independent variables collectively explain about 16.3% of the variation in the dependent variable.

4.   Conclusion and Policy Suggestions

This study's findings provide insight into the complex nature of chronic malnutrition in infants in Rahim Yar Khan District, located in Southern Punjab, Pakistan. The results of our analysis indicate that both household wealth and mother education have a substantial impact on the probability of infant chronic malnutrition. This emphasizes the crucial role of socioeconomic determinants in determining the health of infants. Moreover, although there is a noticeable tendency towards relevance in gender disparities in chronic malnutrition, the residence location does not appear to be a relevant predictor in this particular context. These findings emphasize the necessity for comprehensive interventions that target socioeconomic disparities and enhance maternal education in order to reduce the occurrence of chronic malnutrition in infants. To

enhance infant health and well-being in the region, policymakers and healthcare professionals should focus on implementing specific treatments that address the root causes of malnutrition.

According to the results of this study, we can give some policy solutions to tackle the issue of chronic malnutrition in infants in Rahim Yar Khan District, located in Southern Punjab, Pakistan. First and foremost, it is important to prioritize efforts aimed at improving access to maternal education by implementing community-based educational initiatives and outreach activities. Investing in maternal education not only provides mothers with knowledge about the best methods for feeding and caring for infants, but also helps to disrupt the cycle of malnutrition that is passed down from one generation to the next.

Furthermore, it is necessary to execute specific measures aimed at enhancing household prosperity and mitigating poverty inside susceptible communities. This may encompass economic empowerment programs, microfinance initiatives, and social safety nets designed to furnish financial resources and assistance to low-income households. Furthermore, although this study did not find a significant impact of residential area on infant chronic malnutrition, it is still important to enhance healthcare infrastructure and nutrition services in both rural and urban areas. This entails enhancing the accessibility of primary healthcare services, advocating for breastfeeding practices, and guaranteeing the presence of nourishing food choices for newborns. To effectively reduce the burden of chronic malnutrition and enhance newborn health outcomes in Rahim Yar Khan District, Southern Punjab, Pakistan, authorities should employ a multisectoral approach that targets the socioeconomic determinants of infant malnutrition.

References

Ahmad, D., Afzal, M., & Imtiaz, A. (2020). Effect of socioeconomic factors on malnutrition among children in Pakistan. *Future Business Journal, 6*, 1-11.

Akbar, M., Asif, A. M., & Hussain, F. (2022). Does maternal empowerment improve dietary diversity of children? Evidence from Pakistan demographic and health survey 2017–18. *The International Journal of Health Planning and Management, 37*(6), 3297-3311.

Andrade, J., & Gil, J. (2023). Maternal Employment and Child Malnutrition in Ecuador. *International Journal of Environmental Research and Public Health, 20*(13), 6253.

Khattak, U. K., Iqbal, S. P., Ghazanfar, H., & kulsoom Khattak, U. (2017). The role of parents' literacy in malnutrition of children under the age of five years in a semi-urban community of Pakistan: a case-control study. *Cureus, 9*(6).

Mishu, A. A., Chowdhury, S., Bipasha, M. S., Raisa, T. S., & Zayed, N. M. (2020). Maternal nutritional status as determinants of child malnutrition under age 5 in Bangladesh: a multivariate approach. *International Journal of Management, 11*(8).

Rouf, A., Sadaf, T., Iqbal, M. A., Rauf, Z., & Tabasam, N. (2023). Effect of Maternal Employment on Nutritional Status of Children in Faisalabad City. *Journal of Education and Social Studies, 4*(2), 271-282.

Shahid, M., Ahmed, F., Ameer, W., Guo, J., Raza, S., Fatima, S., & Qureshi, M. G. (2022). Prevalence of child malnutrition and household socioeconomic deprivation: A case study of marginalized district in Punjab, Pakistan. *PLoS One, 17*(3), e0263470.

Shahraki, M., Agheli, L., Assari Arani, A., Sadeqi, H., & Ghaderi, S. (2018). The relationship between mother's socioeconomic status and child health. *Journal of Research and Health, 8*(2), 143-151.

Yirga, A. A., Mwambi, H. G., Ayele, D. G., & Melesse, S. F. (2019). Factors affecting child malnutrition in Ethiopia. *African health sciences, 19*(2), 1897-1909.