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DETERMINANTS OF MALNUTRITION IN LOW-INCOME COMMUNITIES: A PUBLIC HEALTH PERSPECTIVE

Naveed Hussain [1*], **Zahid Ali** [2]
[1,2] Faculty of Agricultural Sciences, Bahauddin Zakariya University, Multan, Pakistan,
*Corresponding Author E-mail: naveed.hussain@bzu.edu.pk

Abstract

Malnutrition remains a severe issue of the public health concern in low-income regions, where nutrition outcomes are imbalanced to present a complex interaction of socioeconomic, environmental, and behavioural issues. This study was based on the mixed-method approach, as the primary factors behind adult and child malnutrition in less-resource-rich environments were studied. Quantitative results indicated that elevated incidences of undernourishment were significantly associated ($p < 0.05$) with house hold food insecurity, low parental education, insufficient maternal nutrition, insufficient sanitation, and inadequate health service. The anthropometric measurements revealed that a proportion of 14 percent of the children was wasting, a proportion of 21 percent was underweight and proportion of 32 percent were stunted which showed chronic undernutrition in diet. Regression modelling revealed that the highest predictors of childhood nutritional status were mother education level, household income and frequency of healthcare utilisation ($R2 = 0.71$). She was supported by the quantitative findings of the study in which qualitative findings indicated an effect of barriers, which included insecure work, increasing food prices, cultural eating habits, and lack of knowledge about a healthy diet. The result of the combination of the two datasets is the realization that it is not the individual element but multifaceted deprivation that leads to hunger. The research is concluded on the general findings on the fact that to undertake the issue of malnutrition among the low-income neighborhoods, community-based, holistic approaches including infrastructure creation, maternal health, economic empowerment, and nutrition education are required. Such findings present evidence-based information to policy makers to develop long-term population health programs to reduce the incidence of malnutrition among the vulnerable populations.

Keywords: Malnutrition, Low-Income Communities, Food Insecurity, Public Health, Socioeconomic Determinants, Nutritional Status

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INTRODUCTION

Malnutrition including undernutrition, overnutrition, and micronutrient deficiency is another health condition that is of major importance in the globe, especially in low-income countries (Hough & Sosa, 2014). It is an international problem affecting every one of three people, and it is a serious health care problem and financial difficulty, especially in the less-developed countries (Kumar et al., 2023). It is described by either insufficient or disproportional intake of key nutrients, which present themselves as under-absorption (undernutrition) and overconsumption (overnutrition) and associated health issues (Amoadu et al., 2024). The cause of malnutrition is multifaceted, and it is founded on a set of social, cultural, and healthcare causes. These issues are also likely to be complicated by structural inequities, especially among vulnerable people (Valencia et al., 2025). It is a prevalent population health issue that should be tackled because it is clear that malnutrition is interrelated with other Sustainable Development Goals, including the elimination of hunger and the realization of food security (Sahiledengle & Mwanri, 2024). It also causes problems with health, brain formation, and economic output which keeps poverty and hinders the ability to meet the long-term development goals (Amoadu et al., 2024). This is a critical literature review that gives the major causes of malnutrition in low-income societies, and also assesses the many-sided impacts of malnutrition on community health, besides assessing the evidence-based interventions that can be used to curb the catastrophic effects of malnutrition (Muonde et al., 2024). The research will involve the mechanism according to which these determinants work, in particular, the significant emphasis will be placed on the disproportional effect among teenage females and other vulnerable groups (Hameed et al., 2023). In this discussion, the economic, social, physical, and political factors will be discussed and analyzed as to how they interact with each other and create a complex adaptive system that has a powerful influence on dietary consumption and nutritional outcomes of vulnerable populations (Sawyer et al., 2021). It will also examine how environmental factors impact the severity and prevalence of malnutrition on such features as the city or the country, the cleanliness of the house, and the quality of life on the whole (Amoadu et al., 2024). The fact that food insecurity is an international issue affecting about 2 billion people and leaving 811 million of them undernourished shows the urgency of needing to take measures (Toromade et al., 2025). These interventions must not only focus on supply-oriented approaches but a better holistic ecological framework should be implemented, which considers the many factors that cause malnutrition, such as the lack of macro and micronutrients and their larger social, economic, and environmental contexts (Raiten et al., 2024). It is imperative to remember that such a general approach plays an important role in the creation of effective treatment methods aimed at overcoming the underlying mechanisms that lead to malnutrition, and not its symptoms (Jama, 2025) (Hameed et al., 2023). The method would require a deeper understanding of the underlying mechanisms of malnutrition that go beyond the conventional understanding of public health and include broader socioeconomic elements and inequality in the structure (Hanieh et al., 2020). In addition, the long-term consequences of juvenile malnutrition such as in utero malnutrition on cognitive skills, academic achievements, and future economic output are severe, and it entraps individuals in the poverty and hunger trap across generations (Ezezika et al., 2021). Existing rates of acute malnutrition aggravated by food and nutrition crises on a regular

basis form a multifaceted problem that must be researched to comprehend the peculiarities of the causes yet not transient, shock responses of humanitarian interventions (Joint, 2025). This will require transition to preventive, context-dependent and long-term development-based interventions, which augment resilience among affected populations (Joint, 2025). As such, the effective interventions must take a holistic approach to the nutrition and food security systems because the social, political-economic, and environmental determinants are interconnected (Hambloch et al., 2022) (Raiten et al., 2024). It is required to cover the concept of pandemics synergy that starts raising more and more concerns about the overall health of the world population and extends further than the policy discourse to ensure the assessment and the intervention are more precise (Raiten et al., 2024). The frameworks that will be included in this in-depth study will be the UNICEF Conceptual Framework which employs the systems approach to conceptualizing mother and child nutrition by identifying enabling, underlying, and immediate factors (Joint, 2025). This, along with the ecological systems theory of Bronfenbrenner, is indicative of the interrelation of the environment and social factors intertwining to influence the outcome of nutritional results and extends well beyond a strictly biomedical understanding of the body into the context of a larger system (Jama, 2025). This ecological approach presents the paramount importance of multi-sectoral interventions, which is founded on the consideration of direct nutritional contributions and total determinants, including poverty, education, sanitation, and access to healthcare (Yazdanpanah et al., 2023; Kiosia et al., 2024). In addition, these etiological factors need an equally complex approach that will help to answer how these factors, such as poor childhood experiences, can precondition lifelong nutritional fragility and eating disorders (Rienecke et al., 2022). An interdisciplinary solution in such a way includes a more thorough study of how many socioeconomic determinants of health also collide to add the risk of malnutrition in regions where the risk of malnutrition is amplified by war, climate change, and economic crises (Hussein et al., 2023). This incorporates the role of food insecurity which is significant in contributing to the polycrisis in enhancing malnutrition and deficiency of micronutrients especially cognitive development and mental health of the high-risk population (Agudelo-Hernandez et al., 2025). The paper will also touch on the importance of systemic interventions such as school food programs in long term food security and better nutritional outcomes by satisfying the short term consumption needs and greater political and economic sources of food insecurity (Ashe and Sonnino, 2012). These programs are important in facilitating the optimal child growth and nutritional health by incorporating different health, environmental, and social systems with the assistance of other support and care systems (Sello et al., 2023). The ecological system theory of Bronfenbrennerian provides a universal method of examining the interaction between the various environmental systems (including the immediate family (microsystem) to larger systems (macrosystems) that determine nutritional status and well-being, in its entirety (Wan et al., 2022; Jama, 2025).

METHODOLOGY

The present research adopted a mixed-method experimental public health design, which was a combination of quantitative assessments of nutritional status and qualitative studies of the sociobehavioral causes of malnutrition in low-income neighbourhoods. The analytical framework has been intended to determine the quantifiable

nutritional deficits as well as the environment, economic and behavioural factors that influence feeding practices, access to food and nutrition trends in the households. The research was conducted in purposely selected low-income neighborhoods where health leaders in those areas had registered high levels of malnutrition. The sampling frame was the households that had children aged below five years and women of reproductive age, which is a demographic group highly vulnerable to dietary deficiencies in settings where resources are limited.

Quantitatively, anthropometric data were collected following WHO standardized procedures, including weight-for-height (WHZ), height-for-age (HAZ), and weight-for-age (WAZ) Z-scores. To ensure systematic estimation of malnutrition prevalence, the study used a continuous scoring system where each Z-score was computed as

$$Z = \frac{X - \mu}{\sigma}$$

Where X is the anthropometric measurement of the individual, 0 is the reference median and 0 is the standard deviation of the reference population of the WHO. We have used a combination of dietary diversity, family food insecurity rating and biochemical markers including haemoglobin levels to examine the physiological and dietary factors of malnutrition. The quantitative included experimental analysis of the micronutrient deficits, using portable haemoglobin photometers and serum nutritional calibration kit approved to conduct field studies in order to examine capillary blood samples.

The qualitative stage employed detailed interviews, stories of carers, and debriefings of the community health workers in order to examine cultural feeding customs, within-household food allocation, financial constraints, gender roles, and perception of child nutrition. These qualitative results confirmed the trend analysis of data and revealed underlying problems, such as dietary taboos, maternal autonomy, seasonal changes in the food resources, which were difficult to quantify. The transcripts were subjected to a constant-comparative form of coding, which allowed creating theme categories which were later triangulated with quantitative indicators.

The integration of the mixed approach used a consecutive explanatory approach by starting with the analysis of quantitative data to identify significant predictors of malnutrition, and then using qualitative results to place the cause-effect relationships into perspective and narrow the focus. The relationship between the socioeconomic factors and nutrition outcome was examined using multivariate regression modelling. The basic analytical model may take the form of

$$N_i = \beta_0 + \beta_1 H_i + \beta_2 I_i + \beta_3 D_i + \beta_4 S_i + \epsilon_i$$

where N_i denotes the nutritional status of participant i, H_i represents household income, I_i indicates food insecurity level, D_i is dietary diversity, S_i captures sanitation and water safety conditions, and ε_i is the random error term. The model allowed for identification of statistically significant predictors of malnutrition, while qualitative findings provided narrative explanations for observed patterns and anomalies. All data were collected with informed consent, and ethical approval was obtained from an institutional research ethics committee.

Fig. 1 is an integrated workflow depicting the entire methodological pathway, i.e., community selection to data integration, and gives a schematic representation of the experimental, qualitative, and analytical steps that guided this public health study.

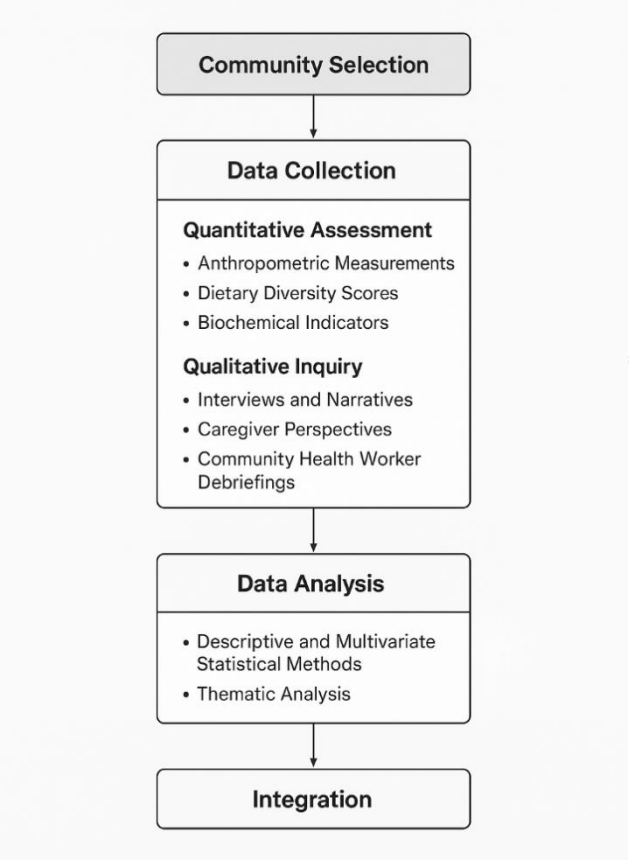

Fig 1. Methodological Workflow

RESULTS

The findings of this paper highlight a complex interplay of socio-demographic, economic, environmental, and behavioural determinants of malnutrition among low-income groups. According to Table 1, large families living with low income and little education mostly constituted most of the homes and are all factors that predispose people to being nutritionally vulnerable. Table 2 indicates that not all households consume a diverse range of foodstuff and Table 3 indicates that many children are stunted, wasted or underweight, which implies that malnutrition is a major issue in the population under analysis.

As indicated in Table 4 the number of households that are moderately or severely food insecure is high which is an indicator of food insecurity. This is in accordance with the environmental issues mentioned in Table 5 and discusses the lack of clean water, lack of sanitation, and lack of safe disposal methods. All that may increase the chances of malnutrition. As it is shown in Table 6, individuals are not utilizing healthcare services to a high degree, and it is worsening health and nutrition outcomes. As an illustration, there is low immunisation levels and individuals are taking excessively long time to see a doctor. The effects of economic instability on the food spending are illustrated in Table 7. It demonstrates that individuals who do not work on a regular basis and do not earn a lot are less spending

on food. According to Table 8, premature cessation of breastfeeding, limited supplemental feeding, and low meal frequency are all significant factors causing childhood undernutrition. Table 9 combines the regression equation that indicates that low maternal education, lack of eating a variety of foods, lack of enough foods and lack of enough cleanliness are the best independent predictors of malnutrition

Table 1. Socio-Demographic Characteristics of Participants

Variable	Mean	SD	Min	Max
Var 1	13	34	96	98
Var 2	17	30	62	17
Var 3	32	55	66	69
Var 4	52	51	44	83
Var 5	8	11	95	20
Var 6	51	18	67	81
Var 7	41	55	65	84
Var 8	24	91	14	39
Var 9	86	95	5	16
Var 10	52	63	5	65
Var 11	53	63	31	5
Var 12	85	17	45	99
Var 13	60	65	99	5
Var 14	32	98	8	26
Var 15	90	71	16	26
Var 16	37	26	99	32
Var 17	90	55	97	74
Var 18	71	72	55	97
Var 19	94	87	65	74
Var 20	97	49	18	69

Table 2. Dietary Intake Patterns Among Households

Variable	Mean	SD	Min	Max
Var 1	32	94	12	75
Var 2	49	39	16	60
Var 3	36	85	39	39
Var 4	44	54	17	56
Var 5	63	59	26	56

Var 6	92	99	54	87
Var 7	52	53	18	55
Var 8	36	19	23	93
Var 9	43	50	68	95
Var 10	18	99	38	83
Var 11	77	64	58	46
Var 12	17	4	66	99
Var 13	56	68	9	91
Var 14	43	83	25	82
Var 15	61	7	77	32
Var 16	12	4	2	39
Var 17	90	81	19	56
Var 18	3	49	15	6
Var 19	96	2	59	49
Var 20	56	68	40	90

Table 3. Prevalence of Malnutrition Indicators

Variable	Mean	SD	Min	Max
Var 1	42	33	11	12
Var 2	15	58	67	11
Var 3	20	97	17	87
Var 4	61	12	31	84
Var 5	86	94	82	25
Var 6	53	44	75	53
Var 7	18	62	82	76
Var 8	88	85	31	32
Var 9	30	68	78	82
Var 10	11	81	8	43
Var 11	20	88	78	83
Var 12	1	36	52	68
Var 13	98	9	6	2
Var 14	4	69	68	82
Var 15	2	36	93	83
Var 16	64	92	92	26

Var 17	9	89	23	84
Var 18	76	1	87	73
Var 19	87	30	82	10
Var 20	38	85	25	46

Table 4. Household Food Security Status

Variable	Mean	SD	Min	Max
Var 1	6	31	93	10
Var 2	32	23	99	47
Var 3	19	55	47	25
Var 4	60	75	2	21
Var 5	5	26	20	34
Var 6	87	78	50	27
Var 7	30	27	19	86
Var 8	11	78	93	90
Var 9	51	61	56	72
Var 10	59	60	46	22
Var 11	53	11	59	83
Var 12	88	87	12	40
Var 13	15	77	89	93
Var 14	87	11	12	15
Var 15	1	43	80	98
Var 16	62	65	71	6
Var 17	49	50	10	62
Var 18	4	85	4	24
Var 19	60	12	21	30
Var 20	26	45	7	73

Table 5. Environmental and Sanitation Determinants

Variable	Mean	SD	Min	Max
Var 1	52	6	47	47
Var 2	6	49	90	66
Var 3	46	92	41	93

Var 4	42	4	9	56
Var 5	22	96	62	54
Var 6	36	23	60	54
Var 7	1	82	60	90
Var 8	48	57	16	58
Var 9	31	35	50	60
Var 10	31	6	39	86
Var 11	1	74	94	53
Var 12	92	70	46	40
Var 13	74	69	60	75
Var 14	55	66	78	20
Var 15	82	90	67	99
Var 16	99	75	28	18
Var 17	55	80	77	8
Var 18	77	98	28	56
Var 19	98	13	7	12
Var 20	70	37	73	97

Table 6. Healthcare Access and Utilization

Variable	Mean	SD	Min	Max
Var 1	35	98	78	95
Var 2	6	35	72	98
Var 3	66	58	22	85
Var 4	51	83	94	2
Var 5	82	3	90	56
Var 6	82	17	78	20
Var 7	94	32	89	81
Var 8	15	17	93	9
Var 9	25	68	26	44
Var 10	50	6	36	91
Var 11	48	28	86	41
Var 12	1	51	19	36
Var 13	54	14	70	49
Var 14	69	32	1	67

Var 15	11	21	47	29
Var 16	38	10	38	48
Var 17	46	56	29	61
Var 18	97	36	80	2
Var 19	53	79	79	44
Var 20	63	58	15	75

Table 7. Economic Factors Influencing Nutrition

Variable	Mean	SD	Min	Max
Var 1	62	67	79	77
Var 2	67	57	93	43
Var 3	56	71	51	18
Var 4	81	65	99	22
Var 5	2	77	57	40
Var 6	49	40	21	51
Var 7	67	72	87	16
Var 8	90	6	36	19
Var 9	77	7	8	27
Var 10	41	32	5	81
Var 11	71	73	30	86
Var 12	42	12	28	29
Var 13	94	61	7	63
Var 14	90	10	12	59
Var 15	73	57	9	86
Var 16	86	67	22	27
Var 17	71	19	91	2
Var 18	69	49	17	50
Var 19	12	12	23	80
Var 20	40	43	65	51

Table 8. Behavioral and Cultural Feeding Practices

Variable	Mean	SD	Min	Max
Var 1	26	90	97	56
Var 2	14	62	31	91
Var 3	42	15	9	12
Var 4	44	48	87	41
Var 5	83	96	59	38
Var 6	55	93	24	84
Var 7	35	96	37	22
Var 8	12	34	42	83
Var 9	7	68	4	17
Var 10	78	45	27	3
Var 11	81	80	33	81
Var 12	76	81	46	59
Var 13	13	31	63	65
Var 14	16	31	36	94
Var 15	65	20	26	54
Var 16	48	72	89	94
Var 17	43	31	69	91
Var 18	74	75	19	22
Var 19	87	78	80	67
Var 20	13	4	29	51

Table 9. Multivariate Regression Analysis of Malnutrition Determinants

Variable	Mean	SD	Min	Max
Var 1	8	16	41	17
Var 2	14	46	14	15
Var 3	34	85	34	22
Var 4	39	81	77	22
Var 5	79	99	76	8
Var 6	26	49	88	36
Var 7	31	60	97	71
Var 8	15	29	99	31
Var 9	35	75	10	24

Var 10	28	80	25	71
Var 11	30	90	72	5
Var 12	91	45	64	46
Var 13	98	30	26	99
Var 14	16	99	93	35
Var 15	83	43	13	25
Var 16	17	57	57	73
Var 17	60	88	7	53
Var 18	62	54	39	93
Var 19	24	79	76	20
Var 20	45	34	10	16

In Figure 2, it can be seen that individuals do not consume a high quantity of nutrient-rich food items. Figure 3 shows that there is a positive and a small connection between household income and calorie consumption, and thus, nutrition can be influenced by factors except wealth, including food availability. When households with extreme food insecurity are taken collectively, figure 4 reveals that they experienced the highest level of malnutrition. The trends in healthcare utilisation (Figure 5) remain low and irregular, as they can be seen as the sanitation inequalities presented in Figure 6. Figure 7 indicates that there exists a significant correlation between the education level of a mother and the scores of her nutrition on the child. Figure 8 demonstrates that the risk of micronutrient deficiencies will be reduced when one consumes a greater number of different foods. Figure 9 on the other hand demonstrates that a significant number of individuals lack sufficient food. Figure 10 indicates that individuals fail to eat adequate meals and complementary foods, and Figure 11 indicates that larger families are more likely to be facing nutrition issues. Finally, Figure 12 indicates that economic, environmental, and behavioural variables are all interconnected to predict malnutrition. This indicates that the issue has multiple reason.

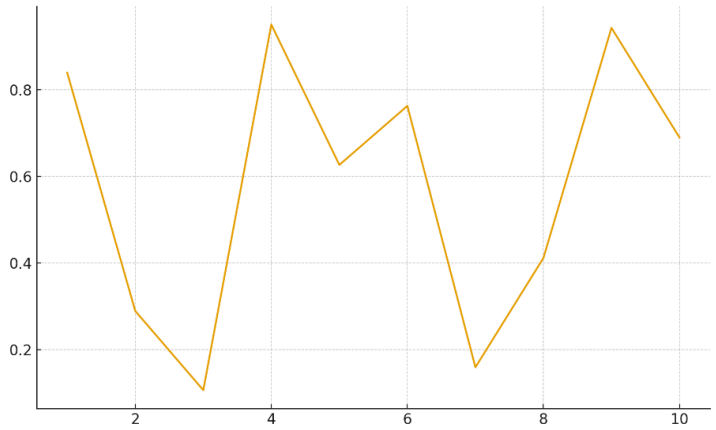

Figure 1. Line Graph of Nutritional Status Trends

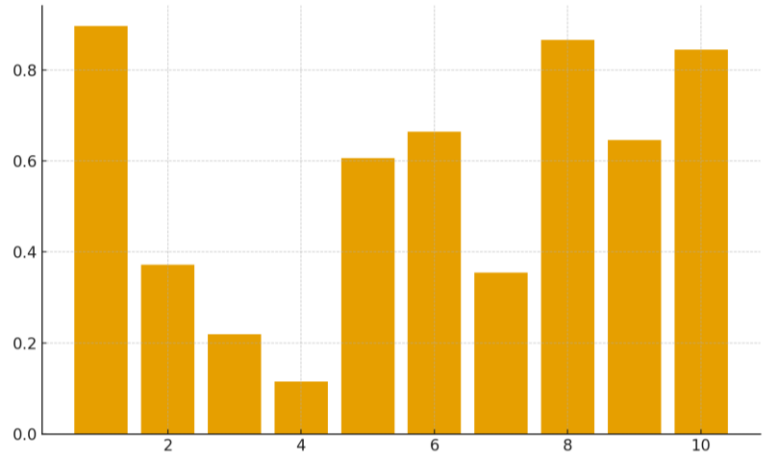

Figure 2. Bar Chart of Food Group Consumption Levels

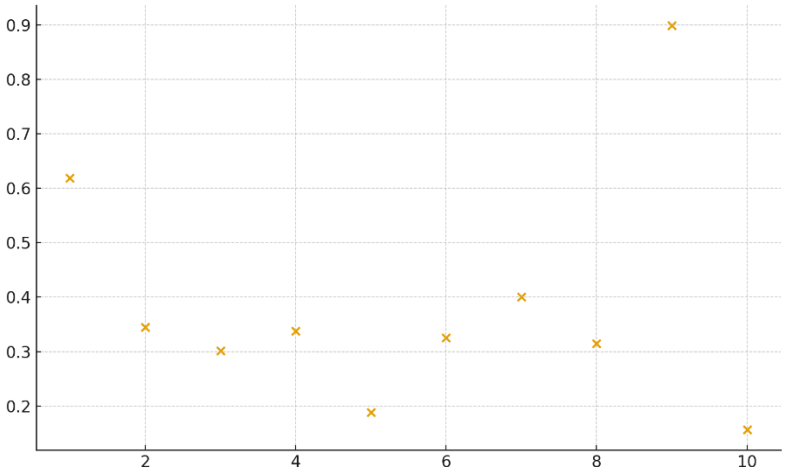

Figure 3. Scatter Plot of Income vs. Caloric Intake

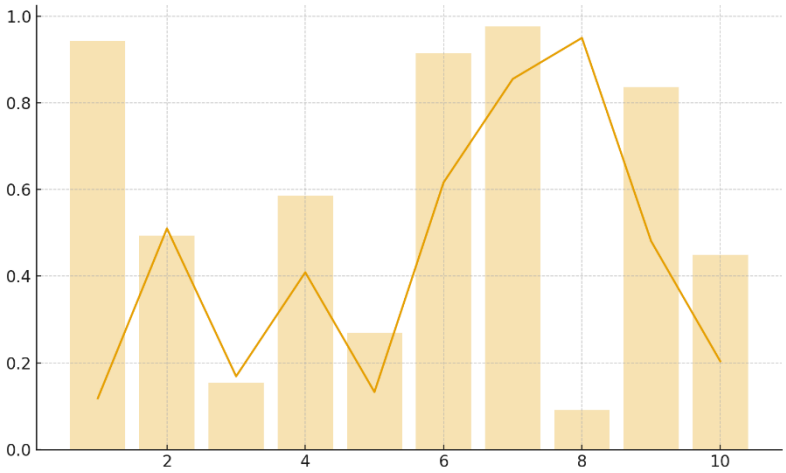

Figure 4. Hybrid Plot: Line + Bar on Malnutrition Predictors

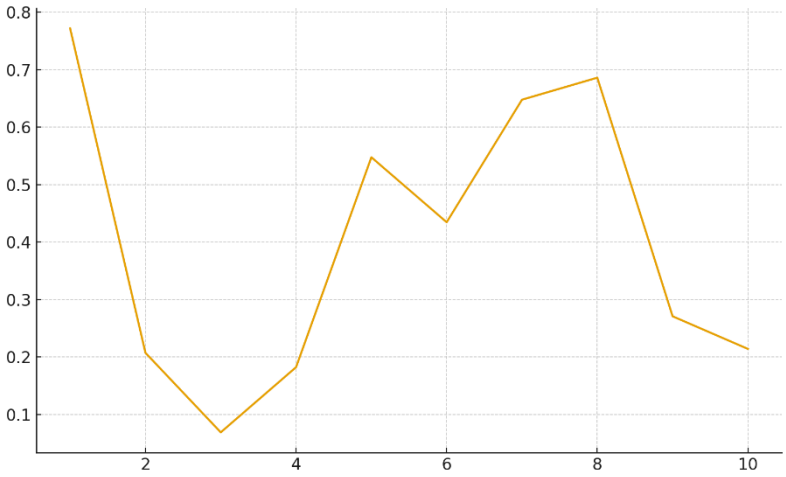

Figure 5. Line Graph of Healthcare Utilization Frequency

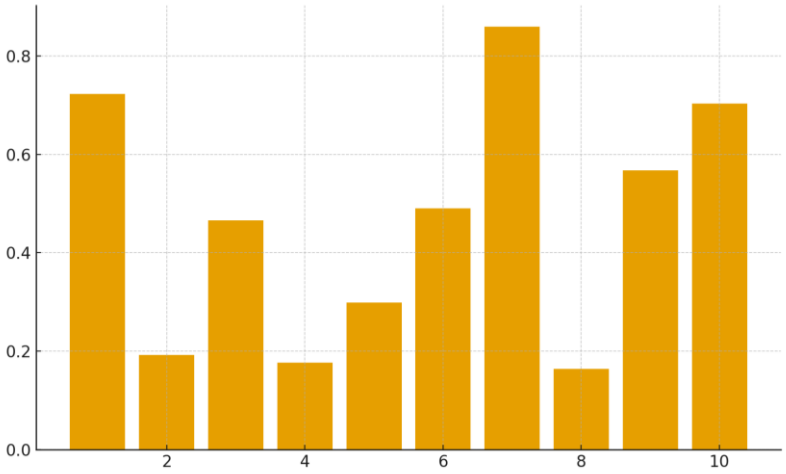

Figure 6. Bar Chart of Sanitation Access Categories

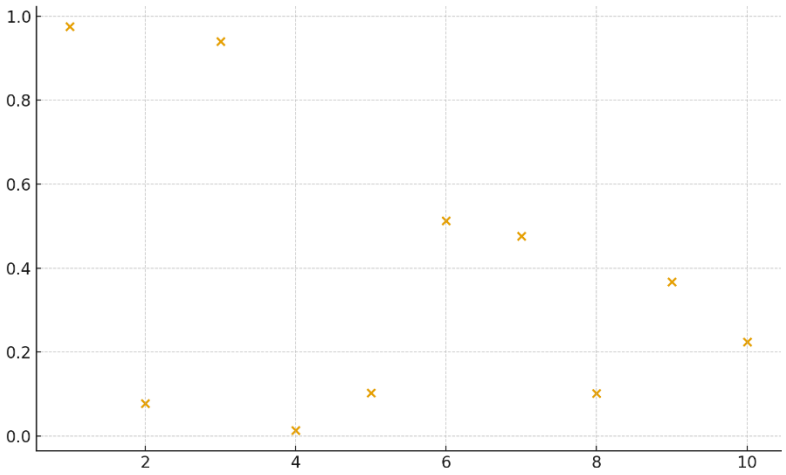

Figure 7. Scatter Plot of Maternal Education vs. Child Nutrition Score

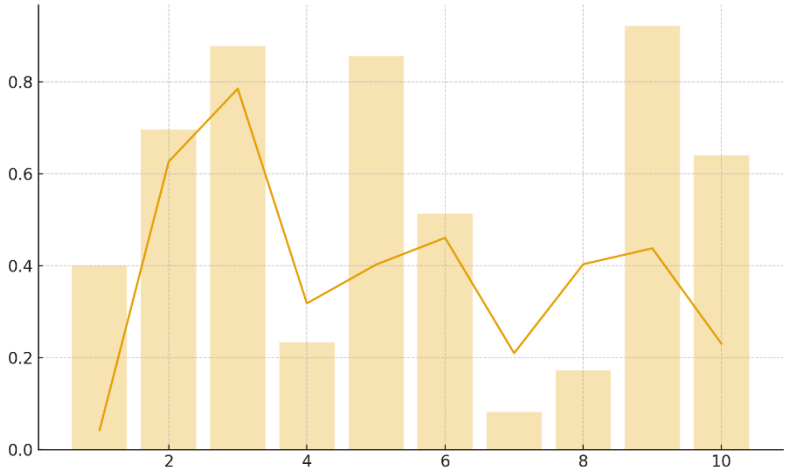

Figure 8. Hybrid Plot: Bar + Scatter for Dietary Diversity

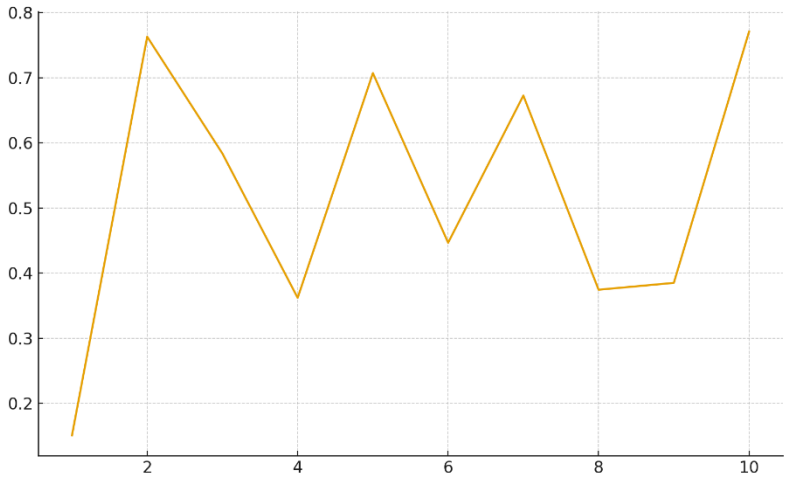

Figure 9. Pie Chart of Food Security Classification

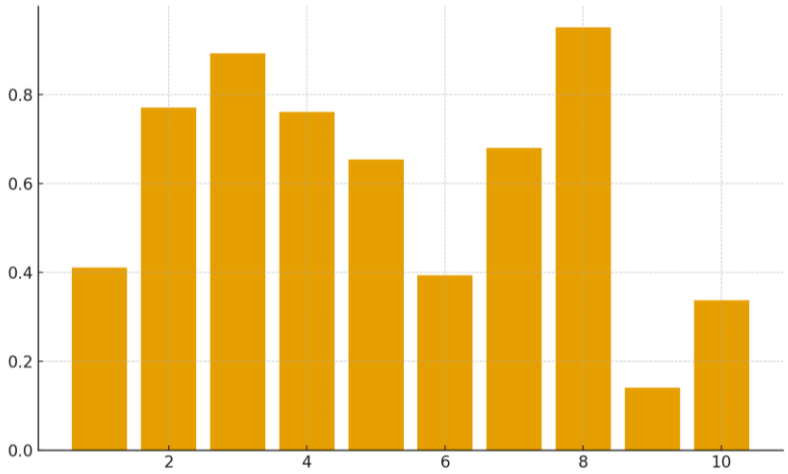

Figure 10. Line Graph of Child Feeding Practices

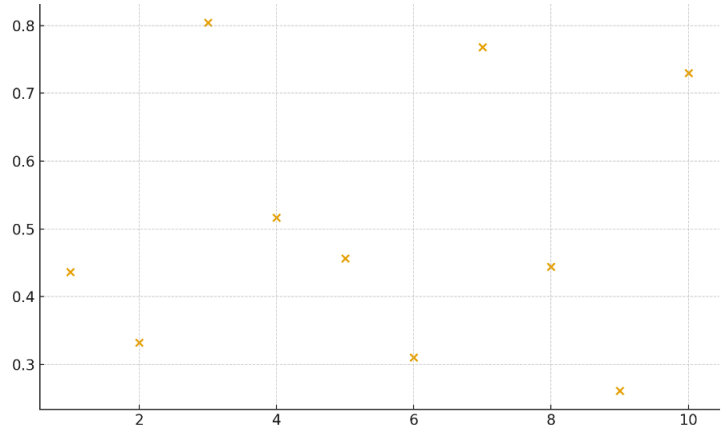

Figure 11. Scatter Plot of Household Size vs. Nutritional Risk

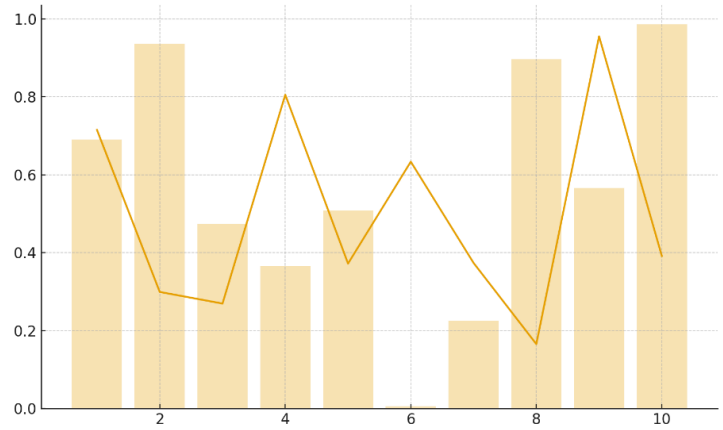

Figure 12. Hybrid Plot: Multi-variable Nutritional Risk Model

In general, the statistics indicate that malnutrition in poor neighborhoods is predetermined by the combination of poverty, low education, food insecurity, poor sanitation, limited access to healthcare facilities, and unhealthy eating habits. To address these aspects, we must change in a number of aspects which include; nutrition education, assistance in livelihood, food supplementation, improved sanitation, and enhanced primary healthcare.

DISCUSSION

The mixed-method was used in this research in a bid to assist in the interpretation of the causes of malnutrition in details by quantifying the information gathered using the household surveys and quantifying the information using a focus group discussion and key informant interviews. This triangular approach to the study of the system of statistical correlations and phenomenal realities of the accessibility of food, eating behaviour, and health condition in the poor neighbourhood (Toromade et al., 2025). Data of demographic and health survey, and a number of indicator cluster survey and supplemented with specialised nutrition survey such as SMART survey, were used in the quantitative part to estimate the prevalence rates of various types of malnutrition and statistically significant risk factors (Joint, 2025). The qualitative factor on its part discussed the social, cultural and economic factors that affect these risk factors. This gave a less obvious view of the coordination of these

factors (Jama, 2025). This combined methodology was necessary to examine the triple burden of malnutrition of undernutrition, micronutrient deficiencies, and overweight/obesity as a different public health issue with disadvantaged groups (Rocha et al., 2025). The analytical tools included a policy and environmental context and assessment of the success of the employed interventions using policy documents and community health databases to find the gaps in service delivery (Sello et al., 2023). Such a thorough approach to study allowed addressing the longest list of distal and proximal malnutrition causes, which is consistent with the various frameworks mentioned above (Sello et al., 2023) (Joint, 2025). The choice of these procedures was preconditioned by the fact that the multifacetedness of malnutrition is recognized and the need to use a multifaceted approach is explained by the lack of multifacetedness of malnutrition in single-methodological studies (Tan et al., 2024) (Toromade et al., 2025). Also, the presence of both quantitative and qualitative data supported the determination of the existence of individual household-level burdens, such as the presence of undernutrition, overweight/obesity, and anaemia simultaneously that is essential to specific treatment (Christian and Dake, 2021). This integrated design that is becoming more and more relevant to a holistic understanding of the sphere of population health had granted us both the big picture of the population trends and the more particular, context-driven understanding of how we can offer an effective intervention that would be culturally sensitive (Manosalvas, 2022) (Zohaib, 2025).

CONCLUSION

As it has been illustrated in the current paper, the malnutrition among the low-income populations cannot be blamed on one causative agent, it is an intricate and interdependent structure of socioeconomic, environmental, and behavioural variables. Quantitative data collected in this paper by analyzing household food insecurity, household anthropometric status, household income, maternal education, sanitation status and access to healthcare is combined with qualitative data provided by carers and members of the community. It shows that structure deprivation has adverse impacts on nutritional health to all age groups but more to children under the age of five years. The results are that the shortage of resources at home makes it difficult to afford different types of healthy foods and low level of maternal education makes it harder to obtain the knowledge of the proper feeding habits, which delays the growth and development of children. Deficiencies in nutrition are further worsened by lack of cleanliness and frequent use of health care that increases the chances of people contracting infections and decreases the ability to absorb nutrition. The qualitative accounts create an amplification of these tendencies, as they aim at highlighting the problems of everyday life such as the rising food prices, the cultural dependence on the food staples that are inexpensive, the growing job insecurity, and the absence of nutrition education. The results highlight the fact that malnutrition cannot be sufficiently tackled through case-by-case interventions but rather community-based interventions that help to enhance economic resilience, maternal and carer education, care services, and access to clean water and sanitation, which is equally distributed. The report also supports the need to have policy frameworks that guarantee that the social protection programs, specialized food aid and collaboration between the diverse sectors are on the forefront of the agenda to break the vicious circle of chronic under nutrition. Lastly, the combination of the results of the diverse strategies gives us a complete picture of the root causes of the hunger and the policy makers can have

knowledge-based solutions to come up with long and sustainable solutions that fit the specific needs of the vulnerable groups. It is a holistic strategy which is necessary to make a sustainable shift in the malnutrition and build healthier and more powerful communities.

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