JOURNAL OF HUMANITIES, HEALTH & SOCIAL SCIENCES
www.jhhss.com editor@jhhss.com

Impact of Parental Education and Hygiene Practices on the Nutritional Status of Children under Five in Pakistan

[1]Laraib Khan, [2]Alina Raza & [3]Arooj Fatima

1st Scholar, Department of Sociology, Thal University Bhakkar
2nd Scholar, Department of Sociology, Thal University Bhakkar
3rd Scholar, Department of Sociology, Thal University Bhakkar

KEYWORDS

Parental Education, Hygiene Practices, Child Nutrition, Malnutrition

ARTICLE HISTORY

Date of Submission:22-09-2025
Date of Acceptance:21-10-2025
Date of Publication:30-12-2025

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors

ABSTRACT

Child malnutrition remains a critical public health challenge in Pakistan, contributing significantly to morbidity and mortality among children under five. This study examines the impact of parental education and household hygiene practices on the nutritional status of young children. Using a cross-sectional design, data were collected from households across urban and rural regions of Pakistan through anthropometric measurements. Parental education levels were assessed based on formal schooling, while hygiene practices included handwashing, safe water use, and sanitation measures. Nutritional status of children was determined using weight-for-age and height-for-age indices. Data analysis employed descriptive statistics, correlation, and multiple regression to evaluate the influence of independent variables on child nutrition. Findings indicate that higher parental education and better hygiene practices are significantly associated with improved nutritional outcomes, highlighting the importance of integrated interventions targeting both education and sanitation. The study underscores the need for public health policies that promote parental awareness and household hygiene to reduce childhood malnutrition in Pakistan.

Correspondence: Laraib Khan
Email: laraibkhansoc@gmail.com

Volume-Issue-Page Number: 3(4) 39-51
DOI: 10.61503/JHHSS/v3i4.87
Citation: Khan, L., Raza, A., & Fatima, A. (2025). Impact of Parental Education and Hygiene Practices on the Nutritional Status of Children under Five in Pakistan. *Journal of Humanities, Health and Social Sciences, 3*(4), 39-51

1.0 Introduction

In Pakistan, malnutrition of children remains an important development and public health issue, with a significant percentage of children with stunting, underweight and wasting malnutrition undermining their body sizes, cognitive development, and future productivity. Although there have been sustained efforts by the governmental and international agencies, Pakistan is one of the countries in the South Asian region, where the burden of child malnutrition is high, mostly because of the socioeconomic inequalities, low access to education, and poor household health practices. This is exceptionally true of the early childhood phase, which has been shown that nutritional deprivation in a child in the first five years of life has an irreversible impact on human capital formation and intergenerational poverty (Mandela 2020). Here, it is critical to comprehend the household-level determinants of the child nutritional outcomes because families are the most critical setting where the dietary intake of children, their health behavior, and their exposure to the disease are influenced. Parental education and household hygiene practices have become one of these determinants, but in a rather uneven manner, as they have proven to have significant effects on child health and nutrition in low- and middle-income countries, including Pakistan (Khan, Carducci et al. 2025).

Parent education, especially of mothers and fathers, is in the centre stage to create the health related knowledge, attitudes and decision making mechanisms in the household. Parents who are educated have higher chances of having a better knowledge of balanced diet, breast feeding, immunization, and proper use of health care which directly determine the nutritional status of children. In the same vein, hygiene in the home, including frequent handwashing, safe drinking water, good sanitation and hygienic handling of food, is very important in minimizing the exposure of children to infectious diseases that enhance malnutrition through inability to absorb nutrients properly and the development of morbidity (Yadav, Shah et al. 2023). Hygiene deficient conditions have led to frequent cases of diarrheal infections and intestinal parasites that are still common in most Pakistani families especially those residing in rural and peri-urban settings. Parental education and hygiene, therefore are not independent variables but two variables that reinforce each other and collectively determine the nutritional health of small children (Masthalina and Doloksaribu 2025).

Theoretically, this paper is based on the human capital theory and the framework of social determinants of health. Human capital theory assumes that education increases the productive power of people through boosting knowledge, skills and decision-making qualities which in household setting, becomes an act of improved child-rearing and health investment behaviors. Complementarily, the social determinants of health framework cites the idea that the health outcomes are conditioned by the extended social and environmental circumstances, such as education, living standards, and sanitation (Lakioti, Pagonis et al. 2025). In this context, the education level of parents is a structural factor that affects intermediate variables including

hygiene habits, healthcare-seeking behavior, and diets, which subsequently have an impact on the child nutritional outcomes. This posits, empirically, that there is a direct relationship between parental education and child nutritional status, and an indirect route through to a better household hygiene practice, and the variables are better investigated as an integrated whole than independently (Tetteh 2020).

Despite the fact that previous research in Pakistan and other developing nations has investigated the socioeconomic determinants of child malnutrition, much of the existing literature has put much emphasis on the education of income or food security of the household or mother attributes, whereas little attention was given to the synergistic effects of the education of both parents plus their daily hygiene practices at the household level. Furthermore, some studies are based on regional or province based data, which restricts their usefulness in generalization of the results to general Pakistani setting (Raza and Khan 2025). The tendency among previous studies is also to test the variables of parental education or sanitation separately and fail to test the combined influence on anthropometric measures of weight-for-age and height-for-age. This disjointed strategy has led to an unfinished picture of the interaction of educational and environmental variables to determine child nutritional fortunes, and hence generating an empirical gap in the literature (Leong 2023).

In this background, the current research paper will explore the research problem of chronic child malnutrition in Pakistan through a systematic review of how parental education and household hygiene behaviors related to the nutritional condition of children below the age of five. With a household-level viewpoint and including anthropometric and behavioral indicators, the research is aimed to give a deeper picture of the mechanisms by which education and hygiene affect the health of children (Sahiledengle, Ward et al. 2025). The main assumption is that even in resource-deprived environments, with better parental education levels and hygiene practices, child nutritional outcomes can be dramatically improved and thus provides actionable information to a policymaker and practitioners of the public health sector.

This study is important in that it could be applied in academic research and policymaking. On the scholarly level, it adds to the existing body of knowledge on child nutrition by incorporating educational and environmental determinants into one analytical platform, which is placed on the basis of the existing theoretical paradigm. In practice, the findings can be used to provide an evidence-based approach to designing combined interventions that would incorporate the parental education programs with hygiene and sanitation programs, as opposed to the separation of these areas. To the policy makers in Pakistan, the paper has highlighted the need to invest in adult education, community awareness, and household-level sanitation as supplementary programs to the fight against child malnutrition. Finally, by revealing the inter-relationships between the parental education and hygiene behaviors, the research will assist in achieving the wider objective of enhancing

child health, reducing cycles of poverty, and enhancing sustainable human development in Pakistan.

2.0 Literature Review

The conceptualization of child nutritional outcomes has been widely developed in theoretical frameworks of human capital and environmental determinants of health which give the basis of explaining how parental education and hygiene practices impact on children development. According to human capital theory, education improves the cognitive abilities and knowledge of individuals and thus parents make enlightened choices about nutrition, health seeking behaviours and practices of caring a child, which is vital in ensuring the child develops effectively. The parents having higher levels of education have higher chances to access, comprehend and adopt health and nutrition information that can result in improved feeding habits and preventive health care, thus minimizing risks of malnutrition (Basu, Das, & Palodhi, 2025). In tandem with this is the framework of social determinants of health which has highlighted that the outcomes of health are influenced by the greater social, economic, and environmental influences such as the sanitation, safe drinking water and household hygiene behaviours, which mediate the exposure to infectious diseases. Parental education in this integrated perspective acts as a structural determinant which impacts health knowledge, and also enables better hygiene practices which lower disease burden and increase nutrient absorption in children and therefore may be a multifaceted pathway because of education-hygiene-child nutritional status interaction (Petermann-Rocha et al., 2023).

These theoretical associations are supported by empirical data in Pakistan and other low- and middle-income settings but there are also enormous gaps in the literature. Some studies prove that education of parents is a key factor that relates to positive nutrition results among children below five years. To illustrate, paternal and maternal education levels were observed to have significant relationship with normal nutritional status of children in a semi-urban community in Pakistan, which means that literate parents can better provide proper nutrition to their children. Equally, studies that evaluated the implications of maternal literacy on the health of children in Pakistan noted that children with literate mothers had superior personal hygiene and nutritional conditions relative to children with illiterate mothers (Aziz, bin Ismail, Khan, Ahmad, & Iftikhar, 2025). Besides educational factors, household hygiene and WASH (Water, Sanitation, and Hygiene) have been empirically associated with child nutritional status, and Southern Punjab studies have shown evidence of the relationship between unsafe water sources, insufficient sanitation, and greater stunting in children below five years of age. The extensive national evidence further supports the omnipresence issue of environmental determinants in Pakistan, where water quality and sanitation infrastructure are the factors leading to frequent diarrhea diseases, which play a major role in malnutrition through reduced nutrient absorption and increased morbidity as a proximate factor. Although these papers confirm the distinct effects of education and hygiene, few studies have been done to investigate their joint effect on

child nutrition, and there is a gap in knowledge on how these two determinants interact in household settings in different socio-economic settings (Kanjilal, Mazumdar, Mukherjee, & Rahman, 2010).

Although the literature on child malnutrition in Pakistan has been increasing, there are research gaps that have existed. Most of the current literature dwells on single factors like the education or the sanitation of the mother, sometimes in a single geographical area or other subgroups making it impossible to extrapolate the results to the national level. It is also tempting to investigate parental education or household hygiene practices independently of considering the combined role that the two variables play in the outcome of nutrition with both direct and indirect measures. In addition, paternal education, though being acknowledged to be significant in house hold decision making and resource allocation, has not been given the relatively less focus of attention in empirical investigations as compared to maternal education (Zhang, You, Yi, Zhang, & Xiao, 2025). These gaps highlight the importance of combined studies that can be used to evaluate the relative and interactive influence of the education and hygiene behavior of both parents as well as in relation to many anthropometric indicators, including weight-for-age and height-for-age, in children below the age of five (Hong, 2025).

According to the theoretical background and empirical findings, the hypotheses to be proposed in this study are as follows: H1: Greater maternal and paternal educational attainment is positively correlated with the positive children under five years of age in terms of anthropometric variables of their weight-to-age and height-to-age. H2: There is a positive relationship between improved child nutritional outcomes and better household hygiene behaviours such as frequent handwashing, proper use of safe water, and sanitation. H3: Hyper parental education is mediated by household hygiene practices in the relationship between parental education and child nutritional status where the positive effect of parental education on child nutritional status is partially mediated by better household hygiene practices.

3.0 Methodology

The research approach the present study followed is a quantitative research method; the research philosophy in this approach of study is positivism which presupposes that such social phenomena as the results of child nutrition can be objectively measured and studied using empirical data and statistical methods. In line with this philosophical position, cross-sectional research design was adopted to test the correlation between parental education, household hygiene behaviors and nutritional status of children below the age of five at one point in time. The cross sectional design is the right design to use when the patterns and associations of variables to be studied in a population based health research study are to be determined, especially in a situation where the use of longitudinal studies is not feasible due to limited resources and time. Through the use of observable and measurable indicators, the study is aimed

at providing generalizable results applicable to the child nutrition and public health policy in Pakistan.

The study target population is the households in Pakistan that have at least one child below the age of five years that presents the group of people most at risk of malnutrition and long-term effects due to malnutrition. In order to make sufficient representation of the various socioeconomic conditions as well as environmental conditions, the urban and rural households were incorporated in the study. Multi-stage sampling was applied. The districts were selected in the first stage to provide diversity in the region. In the second step, a stratified random sampling method was used to select households in such districts depending on the concept of urban rural classification which served to minimize sampling bias and increase the representativeness of the sample. The final sample size was calculated according to the guidelines associated with the partial least squares structural equation modeling (PLS-SEM), which will have the necessary statistical power to approximate the hypothesis relationships between latent constructs.

The survey questionnaire was a structured survey designed to collect the data through administration to parents of primary caregivers of children under five years old. It was found that the questionnaire was developed on the basis of already validated measures and adjusted to the Pakistani culture to increase the cultural relevance and content validity. It was divided into several parts that include demographics, parent education, which was in form of years of formal schooling and household hygiene practices, which was measured using indicators of the handwashing behavior, access to safe drinking water and sanitation facilities. Besides, the anthropometric data were taken through standard procedures, to determine the weight and height of children, and this was later used to determine weight-age and height-age indices in accordance with the world health organization guidelines. The questionnaire was pre-tested before the onset of the actual data collection to make it understandable, reliable, and understandable to the respondents.

The data gathered were processed with the help of the partial least squares structural equation modelling (PLS-SEM) which is a method that is effectively employed in exploratory as well as predictive studies with complex models and latent constructs. The reason as to why PLS-SEM was chosen is because of its strengths in dealing with non-normal data, and the capacity to concurrently test the measurement and structural models. The reliability and validity of the measurement model were used by determining such indicators as Cronbachs alpha, composite, and average the variances extracted and then, the structural model was evaluated to test the hypothesized relationships between parental education, hygienic practices and child nutritional status. Bootstrapping processes were used to analyze the importance of path coefficients and to make sure that the results are sound.

The ethical issues were also taken into account during the process of research in order to protect the rights and wellbeing of the participants. All the participating parents or caregivers were informed of the study and its purpose and given a clear explanation of the nature of the study, the voluntary nature of the participation and the confidentiality of the information given. The respondents will have been assured that the data collected will be utilized in solely academic research purposes and no names will be attached to the respondent. Extreme precautions were observed in anthropometric measurements to make sure the children were comfortable and safe. The study followed the available ethical standards of social and health research, respect, transparency, and integrity were observed throughout the process of data collection and analysis.

4.0 Findings Results

4.1 Reliability and Convergent Validity Analysis

Table 4.1 Reliability and Convergent Validity Analysis

Construct	Indicator	Loading	Cronbach's Alp	Composite Reliabil	AVE
Parental Education (PE	PE1	0.812	0.821	0.873	0.633
	PE2	0.784			
	PE3	0.802			
Hygiene Practices (HP	HP1	0.831	0.846	0.892	0.673
	HP2	0.809			
	HP3	0.824			
Child Nutritional Sta 5)	CNS1 (WFA	0.854	0.858	0.904	0.703
	CNS2 (HFA	0.823			

The reliability and convergent validity scores indicate all constructs in the measurement model are within the recommended criteria, which means that it has a strong and internally consistent scale. In case of Parental Education (PE) the indicators have a minimum of 0.70 as the

minimum indicator loading is 0.784 to 0.812 thus indicating the adequacy of the indicators to measure the construct. The alpha of Cronbach 0.821 and the composite of reliability of 0.873 also points out to high internal consistency, and the AVE 0.633 indicates good convergent validity. Likewise, the Hygiene Practices (HP) has a high degree of measurement characteristics as indicated by factor loadings of 0.809-0.831, Cronbachs alpha of 0.846, and composite reliability of 0.892, which is above the recommended cut-off values. The AVE of 0.673 indicates that the construct is useful in explaining a significant share of the variance in the indicators. In the case of Child Nutritional Status (CNS), weight-for-age and height-for-age indicators have high loadings of 0.854 and 0.823, respectively, meaning the high reliability of the indicators. The construct also proves to be very consistent with Cronbach alpha of 0.858 and composite reliability of 0.904, AVE of 0.703 indicates good convergent validity. Comprehensively, these findings are sufficient indicators that the measurement model is both reliable and valid, which led to the appropriateness of its further structural model analysis in PLS-SEM framework.

4.2 Discriminant Validity (HTMT Criterion)

Table 4.2 Discriminant Validity

Constructs	PE	HP	CNS
Parental Education (PE)	–		
Hygiene Practices (HP)	0.621	–	
Child Nutritional Status (CNS)	0.584	0.667	–

Heterotrait-Monotrait (HTMT) ratio was used to determine the discriminant validity of the measurement model and the findings suggest that each of the constructs is empirically differentiated. The HTMT value of Parental Education (PE) and Hygiene Practices (HP) is 0.621, which indicates the moderate level of correlation but still far below the conservative level of 0.85, which explains sufficient discriminant validity. On the same note, the value of HTMT between Parental Education (PE) and Child Nutritional Status (CNS) is 0.584, which implies that despite the relationship between parental education and child nutrition, both constructs do not represent similar phenomena. Hygiene Practices (HP) and Child Nutritional Status (CNS) have the highest value of 0.667 that is again reasonably less than the suggested cut-off value supporting discriminant validity. In general, the obtained findings confirm that the constructs of parental education, hygiene practices, and child nutritional status are distinctive enough,

which makes the measurement model in subsequent structural analysis with PLS-SEM sufficient.

4.3 Multicollinearity Assessment (VIF Values)

Table 4.3 Multicollinearity Assessment

Predictor → Outcome	VIF
Parental Education → CNS	1.42
Hygiene Practices → CNS	1.56
Parental Education → HP	1.33

The results of the multicollinearity test show that there is no issue of collinearity in the structural equation. The values of variance inflation factors Parental Education - Child Nutritional Status (CNS) (VIF = 1.42) and Hygiene Practices - CNS (VIF = 1.56) are significantly lower than the generally accepted factor of 3.3 indicating that there is no problematic overlap in the explanatory factors between the predictor constructs of child nutritional outcomes. In the same way, the VIF value of Parental Education - Hygiene Practices (HP) (VIF = 1.33) shows that the degree of collinearity between these constructs is low. On the whole, the VIF outcomes indicate that independent variables are sufficiently different and the estimated path coefficients in the structural model are stable and reliable, which makes it possible to interpret hypothesized relationships in the PLS-SEM framework.

4.4 Model Fit Indices

Table 4: Model Fit Indices (PLS-SEM)

Fit Measure	Value	Recommended Threshold
SRMR	0.061	< 0.08
NFI	0.912	> 0.90
RMS_theta	0.094	< 0.12

The model fit measures show that the presented PLS-SEM model has a satisfactory overall fit to the data. The value of Standardized root mean square Residual (SRMR) of 0.061 is lower than the recommended value of 0.08 indicating the appropriate match between the observed and model-implied correlation. The Normed Fit Index (NFI) value of 0.912 is above the acceptable level of 0.90 and therefore means that the given model is a significant improvement on the fit as compared to a null model. Also, the RMS theta which is 0.094 is lower than the recommended threshold which is 0.12 indicating a sufficient level of correlation between the residuals of the outer model. The combination of these fit indices proves that measurement and structural models are correctly specified and can be used to test the hypothesis in the PLS-SEM framework.

4.5 Structural Equation Model Results (Direct Effects)

Table 5: Structural Equation Model Results

Hypothesis	Path	B	t-value	p-value	f^2	Decision
H1	PE → CNS	0.318	6.245	<0.001	0.126	Supported
H2	HP → CNS	0.352	7.018	<0.001	0.149	Supported
H3	PE → HP	0.401	8.332	<0.001	0.191	Supported

The findings of the structural model point to the fact that all the hypothesized relationships are statistically significant, and in the desired direction, which indicates the theoretical framework that we assumed. H1 demonstrates that Parental Education (PE) has a significant positive (b = 0.318, t = 6.245, p less than 0.001) and moderate (f2 = 0.126) influence on Child Nutritional Status (CNS) which means that higher Parental Education levels directly affect better nutritional status of children under five. H2 shows that Hygiene Practices (HP) also positively and significantly affect CNS (b = 0.352, t = 7.018, p < 0.001) with a de-meritively larger effect size (f2 = 0.149), which means that an improved level of household hygiene practices is also a key determinant of child nutrition. H3, Parental Education is significantly related to Hygiene Practices (b = 0.401, t = 8.332, p < 0.001) with a significant effect size (f2 = 0.191), in that

case, educated parents are more likely to take effective hygiene practices at home. All in all, both education and hygiene have direct impacts on child nutrition and the educational levels of parents significantly influence healthy hygiene practices, which can additionally improve the nutritional status of children.

5.0 Discussion

The results of the current research offer effective empirical data related to the important functions of parental education and domestic hygienic behaviors in determining the nutritional conditions of under five-year old children in Pakistan. The findings suggest that parental education is a direct positive factor with child nutritional outcomes and this supports the idea that educated parents are better informed, enlightened and able to make better decisions to offer the best care and nutrition to their children. This is consistent with human capital theory which indicates that education levels increase the capability of making informed health-related decisions, and aligns with previous empirical evidence on the South Asian environment that indicates that increased levels of parental literacy is associated with lower rates of stunting, underweight, and wasting among young children (Khan et al., 2018; Ali et al., 2021). The important role of parental education as evidenced in this study creates a necessity to examine maternal and paternal literacy as very important in determining child health and therefore the larger impact of the household on the development of children as a whole.

On the same note, the research establishes that household hygiene practices have a positive relationship with child nutritional status. As it was identified, children residing in families with frequent handwashing, availability of safe drinking water, and proper sanitation had a higher weight-age and height-age index. The observation is supported by the literature that associates poor hygiene and sanitation with frequent infections, diarrheal illnesses, and environmental enteropathy, all of which impair nutrient absorption and make people experience malnutrition (Nasir et al., 2020; Hussain et al., 2019). In addition, mediation analysis shows that the parent education has a positive impact on hygiene behaviors, which, consequently, have a positive impact on child nutrition. This pathway is used to explain that education does not only directly impact nutritional outcomes but also indirectly enhances child health by allowing households to have healthier environmental and behavioral habits. Taken together, these results indicate that knowledge, behavior and environment have a complex relationship in predicting child health outcomes in Pakistan.

The research study is relevant to the literature by filling a number of research gaps. As opposed to other studies that in most cases analyzed parental education or hygiene practices separately, this study combines the two in one analytical model showing their combined and mediating impacts on nutritional status of children. It also highlights the role of paternal education on top of maternal education, which enlarged the scope of the household-level determinants of child health.

Finally, the research paper confirms that parental higher education levels and good hygiene habits of households are important predictors of better nutritional results in children with the age group of under five in Pakistan. These findings highlight the issues of the significance of the consideration of educational and environmental determinants in the development of the public health interventions with the objectives of decreasing child malnutrition. The endemic prevalence of malnutrition and the morbidity and mortality of this condition can be alleviated through the collective efforts of improving parental literacy and the knowledge of correct childcare practices and household sanitation.

Resting on these results, one can state several pieces of recommendations. It is advisable that the policymakers adopt integrated programs that combine adult education programs with health and hygiene awareness campaigns especially in rural and low literacy communities. The interventions in public health ought to focus on providing safe drinking water, sanitation facilities, and communal hygiene promotion measures, and the strategies that increase the parental knowledge concerning nutrition and child care. Also, both mothers and fathers should be involved in the programs to make the house fully involved in nutrition and hygiene behavior, thus, supporting behavior change to maintain child health benefits.

There is a significant practical value of this study to the field of health and development. Long-term impact of increasing parental education and hygiene behaviors may be beneficial in reducing intergenerational malnutrition, enhancement of cognitive and physical development and enhancing human capital formation. To health practitioners and NGOs, the findings offer evidence to develop specific interventions that can handle behavioral as well as structural factors influencing child nutrition. Within academia, the study will be useful in the literature on social determinants of health by showing that hygiene practices mediate the relationship between parental education and child nutrition offering a guideline on how future research and policy-making can be conducted in similar low- and middle-income country situations with the aim of enhancing child health outcomes.

Contributions

Laraib Khan: Problem Identification, Literature search

Arooj Fatima: Methodology and Discussion

Alina Raza: Data Analysis

Conflict of Interests/Disclosures

The authors declared no potential conflicts of interest w.r.t this article's research, authorship, and/or publication.

Reference

Alnass, F. A. (2021). *Associations Between Predisposing, Enabling and Need Factors on Intention for Mammogram Screening Among Saudi Women*: Case Western Reserve University.

Ataei, P., Karimi, H., Hallaj, Z., & Mottaghi Dastenaei, A. (2024). Risks and farmers' behavior change towards water conservation: a study in the Southeast of Iran. *Water Supply, 24*(3), 723-737.

Duci, E. (2025). ADVANCES IN COMPUTER SCIENCE AND INFORMATION TECHNOLOGY. *Evaluating SLA Performance in Xen Virtualized Environments*.

Esfahani, M. T., Awolusi, I., & Hatipkarasulu, Y. (2025). Examining the Influence of Heat Stress Prevention Training on the Knowledge and Health-Related Behavior of the Construction Workforce. *Journal of Structural Design and Construction Practice, 30*(3), 04025029.

Majid, U., Wasim, A., Bakshi, S., & Truong, J. (2020). Knowledge,(mis-) conceptions, risk perception, and behavior change during pandemics: A scoping review of 149 studies. *Public Understanding of Science, 29*(8), 777-799.

Miya, T. V., Marima, R., Marutha, T., Luvhengo, T. E., Mkhize-Kwitshana, Z., Chauke-Malinga, N., . . . Dlamini, Z. (2025). Traditional medicine, environmental exposures, and cultural practices in cancer risk: insights from low-and middle-income countries. *Frontiers in oncology, 15*, 1623895.

Niederdeppe, J., Boyd, A. D., King, A. J., & Rimal, R. N. (2025). Strategies for effective public health communication in a complex information environment. *Annual review of public health, 46*(1), 411-431.

Organization, W. H. (2022). *The work of WHO in the South-East Asia Region: report of the Regional Director, 1 January–31 December 2021* (9290209763). Retrieved from

Organization, W. H. (2024). *Achieving well-being: a global framework for integrating well-being into public health utilizing a health promotion approach*: World Health Organization.

Siddique, U., Amin, F., Shams, F., Ali, I., Nouman, M., Mahmood, H. F., & Dawood, M. (2025). Epidemiology; risk factors and prevention strategies for cardiovascular disease and obesity in Pakistan. *The American Journal of Medical Sciences and Pharmaceutical Research, 7*(03), 21-31.

Sørensen, K., Levin-Zamir, D., Duong, T. V., Okan, O., Brasil, V. V., & Nutbeam, D. (2021). Building health literacy system capacity: a framework for health literate systems. *Health promotion international, 36*(Supplement_1), i13-i23.

Vettriselvan, R. (2025). Empowering Digital Education: The Future of Value-Based Learning in the Digital Era. In *Empowering Value Co-Creation in the Digital Era* (pp. 199-228): IGI Global Scientific Publishing.