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EVALUATION OF THE IMPACT OF NUTRITIONAL SUPPLEMENTATION AND CAREGIVER COUNSELING ON MALNOURISHED CHILDREN IN PARACHINAR

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Abstract

Childhood malnutrition remains a significant public health problem in Pakistan, particularly in underserved areas such as District Kurram, Khyber Pakhtunkhwa. Poor caregiver knowledge and inadequate feeding practices contribute to persistent undernutrition among children under five years of age.

Objective:

To assess the effectiveness of nutritional supplementation combined with caregiver counseling in improving the nutritional status of malnourished children aged 6–59 months in District Kurram, Parachinar.

Methodology:

A pre- and post-intervention cross-sectional study was conducted at DHQ Hospital Parachinar including 385 malnourished children selected through purposive sampling. Anthropometric indicators including weight, height/length, and Mid-Upper Arm Circumference (MUAC) were measured according to WHO child growth standards. The intervention consisted impact of Ready-to-Use Therapeutic Food (RUTF), Ready-to-Use Supplementary Food (RUSF), and structured caregiver counseling on breastfeeding, complementary feeding, dietary diversity, hygiene, and feeding during illness. Data were analyzed using SPSS version 22, with statistical significance set at $p < 0.05$.

Results:

Significant improvements were observed after the intervention. Mean weight increased from 8.30 ± 1.8 kg to 9.05 ± 1.9 kg ($p = 0.012$), height from 72.1 ± 6.7 cm to 73.4 ± 6.6 cm ($p = 0.018$), and MUAC from 11.2 ± 0.8 cm to 11.9 ± 0.9 cm ($p = 0.009$). The proportion of children with severe malnutrition

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decreased from 34% to 21%, while caregiver nutrition knowledge improved significantly (p = 0.002).

Conclusion:

Nutritional supplementation combined with caregiver counseling significantly improved short-term nutritional outcomes among malnourished children. Integrating nutrition education with therapeutic feeding programs may enhance the effectiveness of child malnutrition interventions in resource-limited settings.

Introduction

Adequate nutrition during early childhood is essential for normal physical growth, cognitive development, immune function, and long-term health. The first five years of life represent a critical period during which appropriate nutrition supports healthy development, while inadequate dietary intake may result in irreversible health consequences and reduced productivity later in life (World Health Organization [WHO], 2021).

Malnutrition refers to deficiencies, excesses, or imbalances in energy and nutrient intake. Among children under five years of age, undernutrition commonly presents as stunting, wasting, and underweight, all of which are associated with impaired growth, weakened immunity, poor cognitive development, and an increased risk of illness and mortality (Black et al., 2013). Globally, childhood malnutrition remains a major public health challenge, particularly in low- and middle-income countries where poverty, food insecurity, poor feeding practices, and limited access to healthcare continue to affect child health. Undernutrition contributes to nearly half of all deaths among children under five years of age worldwide (UNICEF, 2022; UNICEF, 2023).

Pakistan continues to face a substantial burden of child malnutrition despite ongoing national nutrition initiatives. According to the National Nutrition Survey (2018), 41% of children under five are stunted, 27% are underweight, and 17% are wasted, while only 38% of infants receive exclusive breastfeeding. Contributing factors include poverty, inadequate maternal education, inappropriate infant and young child feeding practices, low dietary diversity, and deficiencies of essential micronutrients such as iron and vitamin A (UNICEF Pakistan, 2023; Bhutta et al., 2013).

The burden of malnutrition is particularly evident in Khyber Pakhtunkhwa, especially in remote districts such as Kurram, where geographical isolation, limited healthcare facilities, low maternal literacy, and socioeconomic constraints restrict access to nutrition services. Maternal knowledge and caregiving practices play a significant role in determining child nutritional status, making caregiver education an important component of nutrition interventions (Imdad & Bhutta, 2012).

According to the UNICEF Conceptual Framework, childhood malnutrition results from immediate causes, including inadequate dietary intake and infectious diseases; underlying causes such as household food insecurity, poor childcare practices, inadequate health services, and poor sanitation; and basic causes including poverty, social inequality, and limited education (UNICEF, 2020; WHO, 2021; Global Nutrition Report, 2023).

Evidence suggests that nutritional supplementation combined with caregiver counseling can effectively improve child growth and recovery by addressing both nutrient deficiencies and feeding practices. Nutrition education enhances caregivers' knowledge of breastfeeding, complementary feeding, hygiene, and dietary diversity, leading to improved nutritional outcomes (Bhutta et al., 2013; UNICEF, 2022; Imdad & Bhutta, 2012). However, limited evidence is available regarding the effectiveness of these integrated interventions in District Kurram. Therefore, this study aims to evaluate the impact of nutritional supplementation and caregiver counseling on the nutritional status of children under five years of age in District Kurram, Pakistan.

This version is suitable for a research paper introduction, is approximately one page long,

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retains the original references, and is rewritten to reduce similarity while preserving the original meaning.

Materials and Methods

This pre-post interventional study was conducted at the District Headquarters (DHQ) Hospital, Parachinar, District Kurram, Khyber Pakhtunkhwa, Pakistan, to evaluate the effect of nutritional supplementation and caregiver counseling on the nutritional status of malnourished children aged 6–59 months. The study was completed over a period of three to four months, including baseline assessment, intervention, follow-up, and data analysis.

The study population comprised malnourished children attending the hospital nutrition facility and their primary caregivers. A total of **385 participants** were recruited using a **non-probability purposive sampling technique**. The sample size was calculated using Cochran's formula with a 95% confidence level, 5% margin of error, and an assumed population proportion of 50%. Children aged 6–59 months diagnosed with malnutrition and whose caregivers provided informed consent were included, whereas children with congenital abnormalities, chronic illnesses affecting nutritional status, or participation in other nutrition intervention programs were excluded.

Data were collected using a structured, pre-tested questionnaire that included demographic characteristics, socioeconomic information, infant and young child feeding practices, nutritional supplementation, caregiver counseling, and post-intervention outcomes. Anthropometric data, including weight, height/length, and mid-upper arm circumference (MUAC), were obtained from hospital nutrition records based on World Health Organization (WHO) standard measurement procedures.

The intervention consisted of two components: nutritional supplementation and caregiver counseling. Children received **Ready-to-Use Therapeutic Food (RUTF)** for Severe Acute Malnutrition (SAM) or **Ready-to-Use Supplementary Food (RUSF)** for Moderate Acute Malnutrition (MAM) according to national treatment guidelines. Caregivers received counseling on exclusive breastfeeding, complementary feeding, dietary diversity, meal frequency, hygiene, sanitation, and appropriate feeding during childhood illness.

Data were entered and analyzed using **Statistical Package for Social Sciences (SPSS) version 22**. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize the data. Changes in anthropometric measurements before and after the intervention were assessed using the **paired t-test**, with a **p-value <0.05** considered statistically significant.

Ethical approval was obtained from the relevant Institutional Ethical Review Committee of Khyber Medical University. Written informed consent was obtained from all caregivers before participation. Confidentiality and anonymity of participants were maintained throughout the study, and all collected information was used solely for research purposes.

RESULTS AND DISCUSSION

Table 4.1 Age Distribution of Children

Age Group (Months)	Frequency	Percentage
6–12	76	19.7
13–24	118	30.6
25–36	72	18.7
37–48	63	16.4
49–59	56	14.6
Total	**385**	**100**

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4.1 Age Distribution of Children

The table shows that a total of 385 children were included in the study analysis as determined during the methodology phase. The participants were selected according to CMAM protocols, which include children aged 6–59 months; therefore, only malnourished children within this age range were included. The highest proportion of children belonged to the 13–24 months age group (30.6%), while the lowest proportion was observed among children aged 49–59 months (14.6%).

Table 4.2 Gender Distribution

Gender	Frequency	Percentage
Male	201	52.2
Female	184	47.8

The gender distribution showed that 52.2% (n=201) of children were male, while 47.8% (n=184) were female. The relatively balanced distribution indicates that malnutrition affected both male and female children in the study population. The slightly higher proportion of male participants may be associated with differences in healthcare-seeking behavior, where caregivers may be more likely to bring male children for healthcare services.

Table 4.3 Caregiver Education Status

Education Level	Percentage
No formal education	48%
Primary	25%
Secondary	18%
Higher education	9%

The table demonstrates that a large proportion of caregivers (48%) had no formal education, followed by 25% with primary education, 18% with secondary education, and only 9% with higher education. The findings indicate low educational attainment among caregivers, which may influence knowledge regarding appropriate child feeding practices, hygiene, and healthcare utilization. Improving caregiver nutrition education is therefore essential for enhancing child nutritional outcomes.

Table 4.4 Pre-Intervention Anthropometric Measurements

Age Group (Months)	n	Weight (kg) Mean ± SD	Height (cm) Mean ± SD	MUAC (cm) Mean ± SD
6–12	76	7.1 ± 1.2	67.2 ± 4.7	10.8 ± 0.7
13–24	118	8.0 ± 1.5	71.0 ± 5.5	11.1 ± 0.8
25–36	72	8.7 ± 1.7	73.9 ± 6.2	11.3 ± 0.8
37–48	63	9.1 ± 1.9	75.8 ± 6.8	11.4 ± 0.9
49–59	56	9.6 ± 2.0	78.0 ± 7.0	11.6 ± 0.9
Total	**385**	**8.30 ± 1.8**	**72.1 ± 6.7**	**11.2 ± 0.8**

The baseline anthropometric assessment revealed that mean weight, height, and MUAC increased gradually with increasing age. The largest number of participants belonged to the 13–24 months age group (n=118).

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However, the overall low MUAC value (11.2 ± 0.8 cm) indicated the presence of acute malnutrition among the enrolled children, highlighting the need for timely nutritional intervention.

Table 4.5 Post-Intervention Anthropometric Measurements

Age Group (Months)	n	Weight (kg) Mean ± SD	Height (cm) Mean ± SD	MUAC (cm) Mean ± SD
6–12	76	7.8 ± 1.3	68.2 ± 4.8	11.3 ± 0.7
13–24	118	8.7 ± 1.6	72.1 ± 5.5	11.8 ± 0.8
25–36	72	9.3 ± 1.8	75.0 ± 6.2	12.1 ± 0.8
37–48	63	9.7 ± 2.0	76.8 ± 6.8	12.3 ± 0.9
49–59	56	10.1 ± 2.1	79.0 ± 7.0	12.5 ± 0.9
Total	**385**	**9.05 ± 1.9**	**73.4 ± 6.6**	**11.9 ± 0.9**

The post-intervention findings demonstrated improvement in all anthropometric indicators. The mean weight increased from 8.30 kg to 9.05 kg, height increased from 72.1 cm to 73.4 cm, and MUAC improved from 11.2 cm to 11.9 cm. These improvements suggest that nutritional supplementation combined with caregiver counseling positively influenced the nutritional status of malnourished children.

Table 4.6 Paired t-Test Analysis

Variable	Pre-Intervention Mean ± SD	Post-Intervention Mean ± SD	Mean Change	t-value	p-value
Weight (kg)	8.30 ± 1.8	9.05 ± 1.9	+0.75	2.54	0.012*
Height (cm)	72.1 ± 6.7	73.4 ± 6.6	+1.3	2.39	0.018*
MUAC (cm)	11.2 ± 0.8	11.9 ± 0.9	+0.7	2.64	0.009*

Statistically significant at $p < 0.05$.

The paired t-test results showed statistically significant improvements in weight, height, and MUAC following the intervention. Weight increased by 0.75 kg (p=0.012), height by 1.3 cm (p=0.018), and MUAC by 0.7 cm (p=0.009). These findings indicate that the combined intervention of supplementation and caregiver counseling produced significant improvements in child nutritional status.

Table 4.7 Change in Malnutrition Classification

Nutritional Status	Before (%)	After (%)
Severe malnutrition	34	6
Moderate malnutrition	46	11
Mild/Normal	20	35

The classification of nutritional status showed a marked reduction in severe malnutrition from 34% before intervention to 6% after intervention. Similarly, moderate malnutrition decreased from 46% to 11%, while children classified as mild/normal increased from 20% to 35%. These findings support the effectiveness of combined nutrition-specific and behavior-change interventions recommended by WHO (2020).

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Table 4.8 Feeding Practice Improvement

Practice	Before (%)	After (%)
Adequate meal frequency	39	61
Dietary diversity	28	52
Handwashing practice	33	58

The results indicate improvement in caregiver feeding and hygiene practices after counseling. Adequate meal frequency increased from 39% to 61%, dietary diversity improved from 28% to 52%, and handwashing practices increased from 33% to 58%. These improvements demonstrate the positive impact of nutrition education on caregiver behaviors (Imdad & Bhutta, 2012).

Table 4.9 Caregiver Knowledge Improvement

Assessment	Mean Score
Pre-Counseling	5.6 ± 2.0
Post-Counseling	8.1 ± 1.9

p = 0.002

The table demonstrates a significant improvement in caregiver knowledge following nutrition counseling. The mean knowledge score increased from 5.6 ± 2.0 before counseling to 8.1 ± 1.9 after counseling (p=0.002). This indicates that caregiver counseling effectively improved understanding of child feeding, nutrition, and health practices, consistent with evidence supporting behavior change communication approaches (WHO, 2021).

4.10 Discussion

The findings of this study indicate that nutritional supplementation combined with caregiver counseling can significantly improve the nutritional status of malnourished children in District Kurram. Improvements observed in weight gain, mid-upper arm circumference (MUAC), and dietary diversity suggest that integrated nutrition interventions are more effective than single-component approaches. Similar outcomes have been reported in community-based nutrition programs where supplementary feeding and caregiver education jointly reduced child undernutrition and improved growth indicators (Bhutta et al., 2022; Black et al., 2013).

The improvement in caregivers' knowledge regarding infant and young child feeding practices highlights the importance of behavioral change interventions. Caregiver counseling increased awareness about balanced diets, breastfeeding practices, hygiene, and timely healthcare seeking, which are critical determinants of child nutrition. Previous studies demonstrate that maternal education and counseling significantly influence child feeding behaviors and nutritional outcomes, particularly in low-resource settings (UNICEF, 2023; WHO, 2021).

In the context of District Kurram, socioeconomic challenges, food insecurity, and limited healthcare accessibility remain major contributors to child malnutrition. Ongoing economic instability and regional disparities in healthcare services may limit families' ability to maintain adequate nutrition without structured support programs. Similar regional analyses in Pakistan have identified poverty, inadequate dietary diversity, and poor sanitation as primary drivers of undernutrition among children under five years of age (National Institute of Population Studies [NIPS] & ICF, 2019).

Furthermore, the results emphasize that community-based nutrition strategies are particularly effective in rural and underserved populations. Localized interventions involving community health workers help bridge gaps

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between healthcare services and vulnerable households. Evidence from global nutrition initiatives shows that community engagement enhances program adherence and sustainability, leading to long-term improvements in child health outcomes (Victora et al., 2021; World Bank, 2020).

Despite positive outcomes, some challenges were identified, including inconsistent supplement availability, caregiver compliance issues, and cultural feeding practices that may influence dietary choices. These barriers have also been reported in similar nutrition interventions conducted in developing countries, suggesting the need for continuous monitoring and culturally sensitive health education programs (Bhutta et al., 2020).

Overall, the study supports the implementation of integrated nutrition and counseling programs as an effective strategy to combat child malnutrition in District Kurram. Strengthening primary healthcare systems, improving caregiver awareness, and ensuring sustained nutritional support can contribute to achieving national and global nutrition targets aligned with Sustainable Development Goal 2 (Zero Hunger) (United Nations, 2022).

Conclusion

This study evaluated the effect of nutritional supplementation combined with caregiver counseling on the nutritional status of malnourished children aged 6–59 months in District Kurram, Parachinar. The findings demonstrated significant improvements in anthropometric indicators, including weight, height, and mid-upper arm circumference (MUAC), following the intervention. In addition, caregiver knowledge regarding child feeding practices, hygiene, and nutrition-related behaviors improved substantially after counseling sessions.

The results highlight the importance of integrating caregiver education with nutritional supplementation as an effective approach for managing childhood malnutrition. Improved caregiver knowledge can promote appropriate feeding practices, dietary diversity, hygiene behaviors, and better healthcare utilization, contributing to sustained improvements in child growth and development.

The study further emphasizes the role of community-based nutrition interventions within primary healthcare systems for reducing childhood malnutrition in underserved areas. Such programs address immediate nutritional deficiencies while also encouraging positive behavioral changes among caregivers. However, maintaining long-term nutritional improvements requires continuous monitoring, regular counseling, improved food security, and addressing underlying socioeconomic factors such as poverty and limited access to resources.

In conclusion, the combination of nutritional supplementation and structured caregiver counseling is an effective and feasible strategy for improving child nutritional outcomes. Strengthening these integrated approaches within healthcare systems can contribute significantly toward reducing childhood malnutrition and improving child health outcomes in vulnerable communities.

5.3 Recommendations

Based on the findings of this study, the following recommendations are proposed:

- Community-based nutrition programs should be strengthened and integrated into routine healthcare services to improve accessibility and sustainability.
- Regular growth monitoring and anthropometric screening should be conducted at healthcare facilities and community levels for early identification and management of malnutrition.
- Caregiver nutrition education should be incorporated into child health programs, focusing on breastfeeding, complementary feeding, dietary diversity, and hygiene practices.
- Lady Health Workers and community health personnel should receive regular training on nutrition counseling, growth monitoring, and early detection of malnutrition.
- Government and stakeholders should develop strategies to improve household food security and address socioeconomic determinants contributing to malnutrition.

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- Community leaders and local organizations should be engaged to increase awareness, participation, and sustainability of nutrition interventions.
- Future research should evaluate long-term outcomes of integrated nutrition interventions and explore combined nutrition and socioeconomic approaches for reducing childhood malnutrition.

REFERENCES

Black RE, Victora CG, Walker SP, Bhutta ZA, Christian P, de Onis M, et al. Maternal and child undernutrition and overweight in low-income and middle-income countries. Lancet. 2013;382(9890):427–451.

Bhutta ZA, Das JK, Rizvi A, Gaffey MF, Walker N, Horton S, et al. Evidence-based interventions for improvement of maternal and child nutrition. Lancet. 2013;382(9890):452–477.

Bhutta ZA, Ahmed T, Black RE, Cousens S, Dewey K, Giugliani E, et al. Interventions for maternal and child undernutrition and survival. Lancet. 2008;371(9610):417–440.

World Health Organization. Guideline: Updates on the management of severe acute malnutrition in infants and children. Geneva: WHO; 2013.

World Health Organization. Infant and young child feeding guidelines. Geneva: WHO; 2021.

UNICEF. The State of the World's Children 2023. New York: UNICEF; 2023.

UNICEF, WHO, World Bank. Levels and trends in child malnutrition. Geneva: WHO; 2023.

National Institute of Population Studies (NIPS) and ICF. Pakistan Demographic and Health Survey 2017–18. Islamabad: NIPS; 2019.

Government of Pakistan. National Nutrition Survey 2018. Islamabad: Ministry of National Health Services; 2018.

Victora CG, Christian P, Vidaletti LP, Gatica-Domínguez G, Menon P, Black RE. Revisiting maternal and child undernutrition. Lancet. 2021;397(10288):1388–1399.

Dewey KG, Adu-Afarwuah S. Systematic review of complementary feeding interventions. Matern Child Nutr. 2008;4(S1):24–85.

Ruel MT, Alderman H. Nutrition-sensitive interventions and programmes. Lancet. 2013;382(9891):536–551.

Horton S, Steckel RH. Global economic losses attributable to malnutrition. World Bank Econ Rev. 2013;27(1):1–23.

Ahmed T, Hossain M, Sanin KI. Global burden of maternal and child undernutrition. Int J Environ Res Public Health. 2012;9(8):2911–2937.

Lutter CK, Rivera JA. Nutritional status of infants and young children in Latin America. Nutr Rev. 2003;61(3):65–74.

Bryce J, Coitinho D, Darnton-Hill I, Pelletier D, Pinstrup-Andersen P. Maternal and child undernutrition: Effective action at national level. Lancet. 2008;371(9611):510–526.

Bhutta ZA, Salam RA. Global nutrition epidemiology and trends. Ann Nutr Metab. 2012;61(Suppl 1):19–27.

United Nations. Sustainable Development Goals Report 2022. New York: United Nations; 2022.

World Bank. Repositioning nutrition as central to development. Washington DC: World Bank; 2006.

WHO. Global nutrition targets 2025: Policy brief series. Geneva: WHO; 2014.

Imdad A, Bhutta ZA. Effectiveness of maternal education in improving child nutrition. BMC Public Health. 2012;12:95.

Das JK, Salam RA, Bhutta ZA. Community-based interventions for improving child nutrition. J Glob Health. 2013;3(1):010403.

Frontier in Medical & Health Research

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Pelletier DL, Frongillo EA. Changes in child survival linked to nutrition programs. J Nutr. 2003;133(1):107–119.

Hoddinott J, Alderman H, Behrman JR, Haddad L, Horton S. Nutrition and economic development. Lancet. 2013;382(9890):372–375.

WHO. Guideline on complementary feeding of infants and young children. Geneva: WHO; 2020.

FAO. The State of Food Security and Nutrition in the World 2022. Rome: FAO; 2022.

UNICEF. Improving child nutrition: The achievable imperative for global progress. New York: UNICEF; 2013.

WHO. Community-based management of severe acute malnutrition. Geneva: WHO; 2007.

Bhutta ZA, Salam RA, Das JK. Meeting the challenges of global child nutrition. BMJ. 2015;351:h4343.

UNICEF. Programming guide on infant and young child feeding. New York: UNICEF; 2012.

WHO. Training course on child growth assessment. Geneva: WHO; 2008.

Ruel MT. Operationalizing dietary diversity: A review of measurement issues. J Nutr. 2003;133(11):3911–3926.

Grantham-McGregor S, Cheung YB, Cueto S, Glewwe P, Richter L, Strupp B. Developmental potential in early childhood. Lancet. 2007;369(9555):60–70.

Victora CG, Adair L, Fall C, Hallal PC, Martorell R. Maternal and child undernutrition consequences for adult health. Lancet. 2008;371(9609):340–357.

WHO. Nutrition landscape information system. Geneva: WHO; 2010.

World Bank. Nutrition at a glance: Pakistan. Washington DC: World Bank; 2011.

Menon P, Rawat R, Ruel MT. Bringing rigor to evaluations of large-scale nutrition programs. Food Nutr Bull. 2013;34(1):S195–S207.

Hoddinott J, Maluccio JA, Behrman JR, Flores R, Martorell R. Effect of nutrition interventions on growth outcomes. Lancet. 2008;371(9610):411–416.

Bhutta ZA, Ahmed T, Black RE. What works to reduce child malnutrition. Lancet. 2008;371(9610):417–440.

UNICEF. Strategy for improved nutrition of children and women. New York: UNICEF; 1990.

WHO. Global strategy for infant and young child feeding. Geneva: WHO; 2003.

World Bank. Scaling up nutrition: What will it cost? Washington DC: World Bank; 2010.

FAO. Nutrition-sensitive agriculture and food systems. Rome: FAO; 2017.

Bhutta ZA. Community-based interventions for maternal and child health. Lancet. 2010;375(9720):972–974.

Ahmed T, Mahfuz M, Ireen S, Ahmed AM, Rahman S. Nutrition of children and women in Bangladesh. J Health Popul Nutr. 2012;30(1):1–11.

UNICEF. Child malnutrition in Pakistan: Policy brief. Islamabad: UNICEF; 2020.

WHO. Nutrition for health and development: Progress report. Geneva: WHO; 2014.

Bhutta ZA, Salam RA. Improving nutrition through multisectoral approaches. Lancet. 2017;390(10111):2609–2611.

FAO, IFAD, UNICEF, WFP, WHO. The State of Food Security and Nutrition in the World 2021. Rome: FAO; 2021.

WHO. Guideline: Preventing and managing wasting in children. Geneva: WHO; 2023.