

REFERENCES

1. Children's development – The Whole Child [Internet]. Best start Meilleur depart. [Cited on 11.01.2022]. Available from: https://www.beststart.org/OnTrack_English/3-childrensdevelopment.html# nutrition.
2. Education Encyclopedia. Stages of growth in child development [Internet]. [Cited on 11.01.2022]. Available from: <http://education.stateuniversity.com/pages/1826/Child-developmentStages Growth.htm#ixzz0j0jMHgRB>.
3. Irwin LG, Siddiqui A, Hertzman C. Early Child Development-A Powerful Equalizer. WHO.2007:15.
4. Karlberg J.A biologically-oriented mathematically model (ICP) for human growth. Acta Paediatrica Scandinavica Supplement. 1989; 350:70-94.
5. Karger AG. Basel. Pediatric Nutrition in Practice. World review of Nutrition and Diets. 2015; 113: 1-5.
6. Vaid S, Vaid N. Nutritional Status of ICDS and Non ICDS Children. Journal of Human Ecology. 2005; 18(3): 20.
7. Gopalan C. The Changing nutrition scenario. The Indian Journal of Medical Research. 2013;138(3):392-397.
8. Emmett PM. Assessing diet in birth cohort studies. Pediatric Perinatal Epidemiology. 2009;23(1):154-173.
9. Ferreria. HDS. Anthropometric Assessment for children's nutritional status: A new approach based on adaptation of Waterlow's Classification. BMC Pediatrics.2020;20(65):1-11.
10. Centers for disease Control and Prevention. National centers for Health Statistics [Internet].2009 [cited 2022 May 19th]. Available from: <https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5909a1.htm>.
11. FMOH. Ethiopia National Nutrition Strategy [Internet]. Addis Ababa, Ethiopia; 2008.
12. WHO. Infant and young child feeding [Internet]; 2021 [cited 2022 Jan 13th]. Available from: <https://www.who.int/newsroom/fact-sheets/detail/infant-and-young-child-feeding>.

13. WHO. World Health Statistics. Geneva. Switzerland: World Health Organization; 2005.
14. Vazir S. Textbook of Human Nutrition: Malnutrition and psychological development. 2nd Edition. New Delhi: Oxford & IBH Publishing Company; 2003.
15. Muller O, Krawinkel M. Malnutrition and Health in developing countries. Canadian Medical Association Journal. 2005;173:279-286.
16. Akinlolu A, Adepoju, Allen S. Malnutrition in developing countries: Nutrition disorders- A leading cause of ill Health in the world today. Pediatrics and Child Health. 2019;29(9):394-400.
17. Height for age standard deviations (new WHO) (members under age 5) (H_HWCHAZWHO). National Family Health Survey (NFHS) 2016-15-IPUMS Subset-India [Internet]. 2018 [cited 2020 May 14]. Available from: <https://who.int/tools/child-growth-standards/standards/length-height-for-age>.
18. The State of World's Children. A UNICEF report: Children under threat; 2005
19. Black RE, Morris SS, Bryce J. Where and why are 10 million children dying every year. Lancet. 2003;361(9376):2226-34.
20. Walson JL, Berkley JA. The impact of malnutrition on childhood infections. Current Opiniiion in Infections Diseases. 2018;31(3):231-236.
21. Lazzaroni S, Wagne N. Misfortunes never come singly: structural change, multiple shocks and child malnutrition in rural Senegal. Economics & Human Biology. 2016;23:246-262.
22. Trehan I, Goldbsch HS, LaGrone LN, Meuli GJ, Wang RJ, Maleta KM, et al. Antibiotics as part of the management of severe acute malnutrition. New England Journal of Medicine. 2013;368(5):425-35.
23. Isanaka S, Langendorf C, Berthe F, Gnegne S, Li N, Ousmane N. Routine Amoxicillin for Uncomplicated Severe Acute Malnutrition in Children. New England Journal of Medicine. 2016;374(5):444-53.
24. Caulfield LE, De Onis M, Blossner M, Black RE. Undernutrition as an underlying cause of child deaths associated with diarrhea, pneumonia,

- malaria and measles. *American Journal of Clinical Nutrition*. 2004; 80:193-198.
25. Peng W, Mu Y, Hu Y, Li B, Raman J, Sui Z. Double Burden of Malnutrition in the Asia-Pacific Region-A Systematic Review and Meta-analysis. *Journal of Epidemiology and Global Health*. 2020;10(1):16-27.
 26. World Health Organization (WHO). The double burden of malnutrition [Internet].2019 [cited 2022 May 27th]. Available from: <http://www.who.int/nutrition/double-burden-malnutrition/en/>
 27. Nguyen PH, Scott S, Headey D, Singh N, Tran LM, Menon P, et al. The double burden of malnutrition in India: Trends and inequalities (2006-2016). *PLoS ONE*. 2021;16(2):1-14
 28. Torlesse H, Le MT. South Asia and Child Wasting – Unravelling the Conundrum. *Field Exchange Issue*. 2020;63:7-12
 29. Imran M. Global Prevalence of Malnutrition: Evidence from Literature [Internet]. *Malnutrition*. London: IntechOpen;2020 [cited 2022 May 27th].122p. Available from: <https://www.intechopen.com/books/8030>
 30. Haddad L, Cameron L, Barnett I. The double burden of malnutrition in SE Asia and the Pacific: Priorities, policies and politics. *Health Policy and Planning*. 2015;30(9):1193-1206
 31. De Onis M, Frongillo EA, Blossner M. Is malnutrition declining? An analysis of changes in levels of child malnutrition since 1980. *World Health Organization*. 2000;78:1222-1233.
 32. Principles of Parenting: Meeting children’s needs [Internet]; 1995 [cited 2021 Nov15th]. Available from: <https://www.aces.edu/pubs/docs/H/He-0685>.
 33. Pathak G. Every 3rd Child in India continues to be undernourished. *Northlines*.2022 March 2[cited 2022 May 28th]. Available from: <https://thenorthlines.com/every-3rd-child-in-india-continues-to-be-undernourished/>.
 34. UNICEF. Malnutrition [Internet]. 2021 [cited 2022 Jan 11th]. Available from https://www.unicef.org/infobycountry/india_statistics.html.
 35. Narayan J, John D, Ramdas N. Malnutrition in India: status and government initiatives. *Journal of Public Health Policy*. 2019; 40:9859.

36. Malnutrition is rising across India-Why? [Internet]. BBC News. 2021[cited 2020 May 14]. Available from: www.bbc.com/news/world-asia-india-56080313.
37. Singh J, Pandey K. Why India remains Malnourished [Internet]. Health.2013 November 30 [cited 2022 May 29]. Available from: <https://downtoearth.org.in/coverage/health/why-india-remains-malnourished-42697>.
38. Suri S. What NFHS-5 Data shows: 1 in 3 children below 5 years of Age are stunted, underweight [Internet]. National Family Health survey. 2021 [cited 2022 Jan 13th]. Available on <https://www.news18.com/news/opinion/what-nfhs-5-data-shows-1-in-3-children-below-5-years-of-age-are-stunted-under-weight-4492604.html>.
39. Kramer CV, Allen S. Malnutrition in developing countries. *Pediatrics and Child Health*. 2015;25(9):422.
40. Gudu E, Obonyo M, Omballa V, Oyugi E, Kiilu C, Githuku J. et al. Factors associated with Malnutrition in children <5 Years in western Kenya: A hospital-based unmatched case control study. *BMC Nutrition*.2020;6:33.
41. Partha D, Chattopadhyay N. Effects of Malnutrition on Child Development: Evidence from a backward district of India. 2019;7(3):439-445.
42. H Darlene Marin. Extension nutrition specialist northeast research. Available from: <https://www.nnncc.org/nutrition/nutrition.pres.html.April-1997>.
43. Nmer FE, Salama AA, Elhawary D. Nutritional knowledge, attitude, and practice of parents and its impact on growth of their children. *Menoufia Medical Journal*. 2014;27(3):612-616.
44. Padmini AK, Viswanathan. Child Rearing Beliefs and Practices among Mothers in South Kerela. *World Wide Journal of Multidisciplinary Research and Development*. 2021;7(6):12-14.
45. Hasibuan Y, Batubara A, Suryani S. Mother's role and Knowledge in Yong children Feeding Practices on the Nutritional Stats of Infant and Toddler. *Global Journal of health Sciences*.2019; 11(6):158.
46. Pathak S, Yadav T, Joshi C, Sharma N, Gulbani S, Gandhi D. Study of Nutritional assessment of children between 6 months to 5 years. *International Archives of Integrated Medicine*.2017;4(2):42-52.

47. United Nations. Second report on the world nutrition situation [Internet]. Volume 1: Global and regional results. Geneva: Administrative Committee on Coordination/Subcommittee on Nutrition, 1992:1-112. Available from: <https://www.unsystem.org/scn/archives/rwns02vol1/index.html>.
48. Galgamuwa LS, Iddawe D, Dharmaratne SD, Galgamuwa GLS. Nutritional Status and correlated socio-economic factors among preschool and school children in plantation communities, Sri Lanka. BMC Public Health. 2017;17:377
49. Babar N, Mazaffar R, Khan MA, Imdad S. Impact of socioeconomic factors on Nutritional Status in primary School Children IN Lahore. Journal of Ayub Medical College. 2010;22(4):15-18
50. World Health Organization. ICN plan of action for nutrition. The 1992 International Conference on Nutrition: Rome. World Health Organization. 1992 [cited on 2022 Jan 14]. Available from: https://www.unscn.org/files/Annual_Sessions/UNSCN_Meetings_2013/nishida_Mom_1992ICN.pdf.
51. United Nations Children’s Fund, World Health Organization, The World Bank, and UNICEF WHO – World Bank Joint Child Malnutrition Estimates, Levels and Trends in Child Malnutrition Estimates: Geneva. World Health Organization. 2012 [cited on 2022 Jan 10th]. Available from: <https://who.int/data/gho/data/themes/topics/joint-child-malnutrition-estimates-unicef-who-wb>.
52. Prado EL, Dewey KG. Nutrition and brain development in early life. Nutrition Reviews. 2014;72(4):267-284
53. Singh M. Role of micronutrients for Physical growth and Mental development/ Indian Journal of Pediatrics.2004;71(1):59-62
54. Humanium. Child Malnutrition in India – An issue in need of eradication [Internet].2021[cited on 2022 Jan 14th]. Available from: <https://www.humanium.org/en/child-malnutrition-in-india-an-issue-in-need-of-eradication>

55. Bhutta ZA, Das JK, Rizvi A, Gaffey MF, Walker N, Horton S et al. Evidence based interventions for improvement of maternal and child nutrition: what can be and what cost. *Lancet*.2013;382:452-477
56. Black RE, Victoria CG, Walker SP, Bhutta ZA, Christian P, Onis MD et al. Maternal and child undernutrition and overweight in low-income and middle-income countries. *Lancet*. 2013;382:427-451.
57. Matanda DJ, Mittelmark MB, Kigaru DM. Child undernutrition in Kenya: trends analyses from 1993 to 2008-09. *BMC Pediatrics*. 2014; 14:5.
58. Global Hunger Index. 2016. Retrieved from <https://www.ifpri.org/topic/global-hunger-in-access>.
59. Akombi BJ, Agho KE, Merom D, Renzaho AM, Hall JJ. Child Malnutrition in sub-Saharan Africa: A meta-analysis of demographic and health surveys (2006-2016). *PLoSOne*. 2017;12(5): e0177338.
60. Tran M. Malnutrition identifies a root cause of 3.1 million deaths among children [Internet]. *The Guardian*.2013 [cited 2022 May 29th]. Available from: the-guardian.com/global-development/2013/jun/06/malnutrition-3-million-deaths-children.
61. Latham MC, Coobs F. The effects of malnutrition on intellectual development and learning. *American Journal of public health*. 1971;61(7):1307-1324.
62. Duran P, Caballero B, Onis DM. The association between stunting and overweight in Latin American and Caribbean preschool children. *Food Nutrition Bulletin*. 2006; 27:300-305.
63. UNICEF, WHO, World Bank Levels and Trends in Child Malnutrition. Joint Child Malnutrition Estimates [Internet]. New York: United Nations International Children's Fund; Geneva: WHO; Washington, DC: World Bank,2012. Available from: <http://www.who.int/nutgrothdb/estimates/en/>.
64. UNICEF. Early childhood development- For every child, early moment matter [Internet]. 20152022. Available from <https://www.unicef.org/early-childhood-development>.

65. Esimai OA, Ojofeitimi EO, Oyebowale OM. Sociocultural practices influencing under-five nutritional status in an urban community of Osun state, Nigeria. *Nutrition and Health*. 2001;15(1):41-46.
66. Edris M. Assessment of nutritional status of preschool children of Gumbrit, Ethiopia *Journal of Health Deviation*. 2006;21:125-129.
67. Kwena AM, Terlouw DJ, De Vlas SJ, Howard PA, Hawley WA, Friedman JF et al. Prevalence and severity of malnutrition in preschool children in rural area of Western Kenya. *American Journal of tropical medicine and hygiene*. 2003; 68:94-99.
68. International Institute for Population Sciences (IIPS) and Macro International. 2007. National Family Health Survey (NFHS-3).2005-06: India: vol I. Mumbai: IIPS. Available from: <https://dhsprogram.com/pubs/pdf/frind3/frind3vol1>.
69. Gragnolati M, Shekar M, Gupta MD, Bredenkamp C, Lee YK. India's undernourished children: A call for reform and action. 2021 [cited 2022 Jan 14th]. Available from: <https://www.worldbank.org/hnppublications>.
70. Sapkota VP, Gurung CK. Prevalence and predictors of underweight, stunting and wasting in under-five children. *Nepal Health Research Council*. 2009; 7:120-126.
71. Ahmed OE, Elkhalfifa MY, Elnasikh M. Nutritional status of the children under age of five in a desertification area of Sudan-Alrawakeeb valley. *International Journal of Current Research*. 2011;2:103-108.
72. Akhade KS, Sankhe LR, Akarte SV. Magnitude of malnutrition among under-five children in urban slums of commercial capital of India and its multifactorial causation. A community-based study. *Journal of Family Medicine and Primary Care*. 2019; 8:3865-3870.
73. Dabar D, Yadav Y, Goel AD, Mangal A, Prasad P, Singh M. Risk factors for malnutrition in under-five children living in a migrant populated area of South Delhi. *Journal of Family Medicine and Primary Care*. 2020;9:2022-2027.
74. World Health Organization. (2011). Complementary feeding. doi: www.who.int/nutrition/topics/complementary_feeding/en/index.html

75. Shi L, Zhang J. Recent evidence of effectiveness of educational interventions for improving complementary feeding practices in developing in countries. *Journal of Tropical Pediatrics*. 2010;57(2),91-98.
76. Penny ME, Kanashiro HMC, Robert RC, Narro MR, Caulfield LE, Black RE. Effectiveness of an educational intervention delivered through the health services to improve nutrition in young children: A cluster randomized controlled trial. *Lancet*.2005;365(9474), 1863-1872.
77. Vyas S, Kandpal SD, Semwal J, Deepshikha. *International Journal Community Medicine and Public Health*. A study on undernutrition and its socioeconomic correlates among toddlers in a rural area of Uttarakhand, India. 2016; 3(5),1043-1048.
78. Rehan A, Kishore S, Singh M, Jain B, Parveen R. Factors associated with malnutrition among 6-59 months old children in Rishikesh, Uttarakhand, India. *National Journal of Community Medicine*. 2020;11(3):122-127.
79. Anwar F, Gupta MK, Prabha C, Srivastava RK. Malnutrition among rural Indian Children: An assessment using web of indices. *International Journal of Public Health Epidemiology*. 2013;2:78-84.
80. WHO. Child growth standards [internet]. WHO Anthro Survey Analyzer and other tools. [cited 2022 June 3rd]. Available from: <https://who.int/tools/child-growth-standards/software>.
81. UNICEF. Specification for child MUAC Tape [Internet]. 2020 [cited 2022 June 3rd]. Available from: <https://www.unicef.org/supply/media/4001/file/%20MUAC-tape-child-specification-May2020.pdf>.
82. Miles M.B, Huberman AM. *Qualitative data analysis: An expanded source book*.2nd edition. Newbury Park, CA: Sage.1994.
83. Weidenbach, E. *Clinical nursing: A helping art*. New York: Springer. 1964.
84. Alligood MR. *Nursing theories and their work*. 10th Edition. India; Elsevier, 2022. 16-18.
85. Nickel S, Gesse T, MacLaren A. Ernestine Wiedenbach her Professional legacy. *Journal of Nurse Midwifery*.1992;37(3):161-167.
86. Lloyd-Still JD, Hurwitz I, Wolff PH, Scwachman H. Intellectual development after malnutrition in infancy. *Pediatrics*. 1974; 54:306.

87. Infant and Child Feeding: Model Chapter for Textbooks for Medical Students and Allied Health Professionals. Geneva: World Health Organization; 2009. Session 1, the importance of infant and young child feeding and recommended practices. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK148967/>.
88. Beach PS, Revai K. Nutrition in Infancy, Childhood and Youth: Foundations for Life. A chapter in Core Concepts of Pediatrics. 2nd Edition. US. Available from: utmb.edu/Pedi_Ed/CoreV2/Nutrition/Nutrition_print.html.
89. Rytter MJH, Kolte L, Briend A, Friis H, Christensen VB. The immune System in Children with malnutrition- A systematic Review. PLoS One. 2014;9(8):105017.
90. Pai U, Chandrasekhar P, Carvalho RS, Kumar S. The role of nutrition in immunity in infants and toddlers: An expert panel opinion. Clinical Epidemiology and Global Health. 2017;6(4):155-159.
91. Katona P, Apte JK. The interaction between Nutrition and Infection. Clinical Infectious Diseases. 2008;46(10):582-1588.
92. UNICEF [Internet]. India: Malnutrition 2021 [cited 2022 Jan 2]. Available from: <https://data.unicef.org/topic/nutrition/malnutrition/>.
93. UNICEF [Internet]. India: Global Nutrition report 2020. Action on equity to end malnutrition; 2020 [cited 2022 Jan 2]. Available from: [https:// data.unicef.org/resources/global-nutrition-report-2020](https://data.unicef.org/resources/global-nutrition-report-2020).
94. Global Nutrition report – Australia [Internet]. The burden at a glance; 2021 [cited 2022 March 29]. Available from: <https://globalnutritionreport.org/resources/nutrition-profiles/oceania/australia-and-Newzealand/australia>.
95. UNICEF [Internet] Latin America and Caribbean – 1 in 5 children under-five are not going well due to malnutrition in Latin America and Caribbean, warns UNICEF. 2019 [cited 2022 March 31st.] Available from: [https:// www.UNICEF.org/lac/en/press-release//1-in-5-children-under-five-are-not-growing-well-due-to-malnutrition-in-LAC](https://www.UNICEF.org/lac/en/press-release//1-in-5-children-under-five-are-not-growing-well-due-to-malnutrition-in-LAC).
96. Ijarotimi OS. Determinants of Childhood Malnutrition and Consequences in developing Countries. 2013; 2:129-133.

97. Food and Agriculture Organization of the United Nations. Undernourishment around the world. In: The state of food insecurity in the world. Rome: The Organization;2004.
98. Kramer CV, Allen S. Malnutrition in developing countries. *Pediatrics and Child Health*.2015;25(9)421-427.
99. Joint Malnutrition Estimated. [Internet]. Levels and trends in child malnutrition.2021 [cited 2022 March 31st]. Available from: www.who.int/news/item/06-05-2021-the-unicef-who-wb-joint-child-malnutrition-estimates-group-released-new-data-for-2021.
100. Mengistu K, Alemu K, Destaw B. Prevalence of malnutrition and associated factors among children aged 6 to 59 months at Hidabu abote district, North Shewa, Oromia regional state. *Journal of Nutrition disorders and therapy*. 2013; T1: 001.
101. Rollet SR, Gray ES, Previl H and Foresster JE. Prevalence of malnutrition in children under-five and school aged children in Millot valley, Haiti. *Public Health*. 2014;128:1094-1098.
102. Global Nutrition Report – India [Internet]. Countries nutrition profile – The burden of malnutrition at a glance. 2020 [cited 2022 Jan 2]. Available from: <https://globalnutritionreport.org/resources/nutrition-profiles/asia/southern-asia/india>.
103. Karpagam S. NFHS 5 has much to say about India’s Nutrition. Who’s listening? [Internet]. *Health*. 2021[cited 2022 March 31st]. Available from: <https://science.thewire.in/health/nfhs-5-nutrition-data-underweight-stunting-bmi-nutrient-deficiencies/>.
104. Suri S. What NFHS-5 Data shows: 1 in 3 children below 5 years of Age are stunted, underweight [Internet]. *News 18*.2021 [cited 2022 Jan 3]. Available from: <https://www.news18.com/news/opinion/what-nfhs-5-data-shows-1-in-3-children-below-5-years-of-age-are-stunted-underweight-4492604.html>.
105. Priyanka R, Vincent V, Jini MP, Saju CR. An assessment of the nutritional status of under-five children in a rural area of Thrissur district, Kerala, India. *International Journal of Community Medicine and Public Health*, 2016; 3:3479-86.

106. Senthilkumar SK, Chacko TV, Suvetha K. Nutritional status assessment of children aged 0-5 years and its determinants in a tribal community of Coimbatore district. *International Journal of Community Medicine and Public Health*. 2018; 5:2835-45.
107. Bhadoria AS, Kapil U, Bansal R, Pandey RM, Pant B, Mohan A. Prevalence of severe acute malnutrition and associated sociodemographic factors among children aged 6 months – 5 years in rural population in northern India: A population-based survey. *Journal of Family Medicine and Primary Care*. 2017; 6: 380-5.
108. Ansuya, Nayak BS, Unnikrishnan B, Ravishankar N, Shetty A, Mundkur SC. Malnutrition among children in Karnataka; A systematic review and meta-analysis. *Journal of Clinical and Diagnostic Research*. 2018;12(11): LC30-LC35.
109. Dutta A. Environmental degradation and nutritional status of hill people, some reflection. In: Singh V, Sharma ML, eds. *Mountain ecosystems: A scenario of unsustainability*. New Delhi: Indus Publishing company, 1997: 199-202.
110. Dutta A, Pant K, Sah A. Prevalence of Undernutrition among Children in Garhwal Himalayas. *Food and Nutrition Bulletin*. 2009;30(1):77-81.
111. Evaluation of Nutrition Program run through Anganwadi Centers. Uttarakhand planning Commission-Center for Research, Planning and Action; 2012. Pg 14. Report 1. Available from: www.spc.uk.gov.in/department1library_file/file-09-11-2021-05-19-05.pdf.
112. Human Development Report of the State of Uttarakhand. Institute for Human Development; 2018. Pg. 81-86.
113. International Institute for Population Sciences (IIPS) and ICF. National Family Health Survey (NFHS-4), India 2015-2016: Uttarakhand [Internet]. Mumbai: IIPS. 2017 [Cited 25th March 2022]. Available from: <http://www.rchiips.org/nfhs>.
114. Rudra S, Elections 2017: Uttarakhand has rich-people and children with poor health [Internet]. 2017 [cited 2022 Jan 5]. Available from:

<https://www.orfonline.org/research/elections2017-uttarakhand-has-rich-people-and-children-with-poor-health>.

115. Deepshikha, Rai AK, Gupta U and Garg GP. An epidemiological study of nutritional status among children in Haridwar, Uttarakhand, India. *International Journal of Ayurveda and Pharmaceutical Chemistry*. 2018;8(2):95-103.
116. Fanzo J, Hawkes C, Udomkesmalee E, Afshin A, Allemandi L, Assery O, Baker P et al. Global Nutrition report [Internet]. [cited 2022 Jan 23rd]. Available from: <https://openaccess.city.ac.uk/id/eprint/22797>.
117. Sharma NC. Malnutrition leading cause for death among children under five [Internet]. Mint. 2019 [cited 2022 May 29th]. Available from: www.livemint.com/science/health/malnutrition-leading-risk-factor-for-death-in-under-5-children-icmr-1568792189508.html.
118. Sadhika T. Malnutrition causes 68% of under-5 deaths in India. *India Spend*. 2020 [cited 2022 May 29th]. Available from: www.indiaspend.com/malnutrition-causes-68-of-under-5-death-in-india.
119. Tette EM, Sifah EK, Nartey ET. Factors affecting malnutrition in children and the uptake of interventions to prevent the condition. *BMC Pediatrics*. 2015; 15:189.
120. Bhutia DT. Protein Energy Malnutrition in India: The plight of our under five children. *Journal of Family Medicine and Primary Care*. 2014;3(1):63-67.
121. Saha S, Singh R. Child Malnutrition in India: A systemic Failure. *Health*. 2021 [cited 2022 May 29th]. Available from: www.downtoearth.org.in/blog/health/child-malnutrition-in-india-a-systemic-failure-76507.
122. Bain LE, Awah PK, Geraldine N, Kindong NP, Sigal Y, Bernard N et al. Malnutrition in Sub-Saharan Africa: burden, causes and prospects. *Pan Africa Medical Journal*. 2013;15:120.
123. Rodriguez L, Cervantes E, Ortiz R. Malnutrition and gastrointestinal and respiratory infections in children: a public health problem. *International Journal of Environmental Reservoir and Public Health*. 2011;8:174-205.
124. Levels & Trends in Child Mortality Report [Internet]. Estimates developed by the UN Inter-agency Group for Child Mortality Estimation. 2011 [Cited 2022

April 28th]. Available from: <http://www.who.int/maternalchildadolescent/documents/childmortalitybooklet2011.pdf>.

125. Pedraza DF, Gama JS. Food and nutrition security in families with children under five years old in the city of Campina Grande, Paraiba. *Revista Brasileira Epidemiology*. 2015;18:906-17.
126. Mutsiya M, Kandala MB, Ngware MW, Kabiru CW. Household food insecurity and nutritional status of urban poor children aged 6 to 23 months in Kenya. *BMC Public Health*. 2015;15:1052.
127. Chirande L, Charwe D, Mbwana H, Victor R, Kimboka S, Issaka AI et al. Determinants of stunting and severe stunting among under five in Tanzania: evidence from the 2010 cross-sectional household survey. *BMC Pediatrics*. 2015; 15:165.
128. Meshram II, Arlappa N, Balakirshna N, Mallikharjuna R, Laxmaiah A, Brahmam GNV et al. Trends in the prevalence of undernutrition, nutrient and food intake and predictors of undernutrition among under-five year tribal children in India. *Asia Pacific Journal of Clinical Nutrition*. 2012;21:568-576.
129. Hendricks MK, Goeiman H, Dhansay A. Food-based dietary guidelines and nutrition interventions for children at primary healthcare facilities in South Africa. *Maternal child nutrition*. 2007;3:251-258.
130. Sondai A, Muffuh PM, Sesay MB, Brima A. Factors influencing malnutrition in under-five years children in Yemoh town Community; Bo city, Southern Sierra Leone. *International Journal of Medical and Health Research*. 2017; 3(4):76-84.
131. Humbvali JB, Giugliani C, Nurses LN, Dalcastagne SV, Duncan BB. Malnutrition and its associated factors: a cross-sectional study with children under 2 years in suburban area in Angola. *BMC Public Health*. 2019; 19:220.
132. Gudu E, Obonoyo M, Omballa V, Oyugi E, Kiilu C Githuku J et al. Factors associated with malnutrition in children under-five years in western Kenya: A hospital-based unmatched case control study. *BMC Public Health*. 2020; 6:33.
133. Stalin P, Bazroy J, Dimri D, Singh Z, Senthil V, Sathyanarayanan S. Prevalence of underweight and its risk factors among under-five children in a

- rural area of Kancheepuram district of Tamil Nadu, India. *Journal of Dental and Medical Sciences*. 2013;3(6):71-74.
134. Ansuya, Nayak BS, Unikishnan B, George A, Shashidhara YN, Mundkur SC et al. Risk factors for malnutrition among preschool children in rural Karnataka: A case-control study. *BMC Public Health*.2018; 18:283.
 135. Huey et al. Prevalence and correlates of undernutrition in young children living in the urban slums of Mumbai: A cross-sectional study. *Frontiers in Public health*. 2019; 7(191):1-13.
 136. Dey U, Bisai S. The prevalence of under-nutrition among the tribal children in India: a systematic review. *Anthropological review*. 2019; 82(2):203-217.
 137. Eneli IU, Tylka TL, Watowicz, Lumeng JC. Maternal and Child roles in the feeding relationship: What are mothers doing. *Clinical Pediatrics*. 2015;54(2):179-182
 138. Eneli IU, Crum PA, Tylka TL. The trust model: a different feeding paradigm for managing childhood obesity. *Obesity*.2008;16:2197-2204
 139. Kaori S, Joshua R, Korzenika James F, Jekel & Sara B. A case control study of maternal knowledge of malnutrition and health care seeking attitudes in rural South India. *Yake Journal of Biology and Medicine*. 1997;70:149-160.
 140. Saaka M. Relationship between mother's nutrition knowledge in childcare practices and the growth of children living in Impoverished rural communities. *Journal of Health and Population Nutrition*. 2014;32(2): 237-248.
 141. Sukandara D, Khomsanb A, Anwarc F, Riyadid H, Mudjajantoe H. Nutrition knowledge, attitude and practices of mothers and children nutritional status improved after five months nutrition education intervention. *International Journal of Sciences: Basic and applied research*. 2015;23(2):424-442.
 142. Agize A, Jara D & Dejen G. Level of knowledge and practice of Mothers on minimum dietary diversity practices and associated factors for 6-23 months old children in Adea Woreda, Oromia, Ethiopia. *Biomed Research International*. 2019;1:19

143. Edith M, Priya L. Knowledge, attitude and practice (KAP) survey on dietary practices on prevention of malnutrition among mothers of under-five children. *Manipal Journal of Nursing and Health Sciences*. 2016;2(2):19-24.
144. Nath LR, Kanniammal C. Knowledge and practice of mothers regarding the prevention and management of malnutrition among preschool children. A cross-sectional survey. *International Journal of Pharmaceutical and Clinical Research*. 2017;9(5):410-412.
145. Manohar B, Reddy NS, Vyshnavi P, Sruthi PS. Assessment of knowledge, attitude and practice of mothers with severe acute malnutrition children regarding child feeding. *International Journal of Pharmaceutical and Clinical Research*. 2018;10(5):150-154.
146. Bagauli D, Chhavi A. Analyzing the status of nutritional awareness among mountainous women of district Nainital, Uttarakhand. *International Journal of Applied Home Sciences*. 2017; 4(3):152-156.
147. Saha KK, Frongilo EA, Alam DS, Arifeen SE, Persson LA, Rasmussen KM. Appropriate infant feeding practices result in better growth of infants and young children in rural Bangladesh. *American Journal of Clinical Nutrition*. 2008;87:1852-9.
148. Kumar D, Goel NK, Mittal PC, Misra P. Influence of infant-feeding practices on nutritional status of under-five children. *Indian Journal of Pediatrics*. 2006; 73:417-421.
149. Walsh CM, Dannhauser A, Joubert G. Impact of nutrition education program on nutrition knowledge and dietary practices of lower socioeconomic communities in the free state and northern Cape. *South Africa Journal of Clinical Nutrition*. 2003;16:89-95.
150. Bhandari N, Mazumdar S, Bahl R, Martines J, Black RE, Bhan MK. An educational intervention to promote appropriate complementary feeding practices and physical growth in infants and young children in rural Haryana, India. *Journal of Nutrition*. 2004;134:2342-2348.
151. Shi L, Zhang J. Recent evidence of the effectiveness of educational interventions for improving complementary feeding practices in developing countries. *Journal of Tropical Pediatrics*. 2010;57:1-8.

152. Everette MA. A review of nutrition education: before, between and beyond pregnancy. *Current Women's Health Reviews*. 2009;5:193-200.
153. Palwala M, Sharma S, Udipi SA, Ghugre PS, Kothari G, Sawardekar P. Nutritional quality of diets fed to young children in urban slums can be improved by intensive nutrition education. *Food Nutrition Bulletin*. 2009;30:317-326.
154. Nutrition education in primary schools. Vol 1: the reader nutrition division. Food and agriculture organization of united nations. Rome, Italy.2006 [cited 2022 Jan 25th] Available from: <https://www.fao.org/publications/card/en/c/9f41f45e-9c03-5d77-8945-a9e9894840ab>.
155. Khan AZ, Rafique G, Qureshi H, Badruddin SH. A nutrition education intervention to combat undernutrition: experience from a developing country. *ISRN Nutrition*. 2013; 1:1-7.
156. Majamanda J, Maureen D, Munkhondia TM, Carrier J. The effectiveness of community-based nutrition education on the nutritional status of under-five children in developing countries – A systematic review. *Malawai Medical Journal*. 2014;26(4):115-118.
157. Saragih B, Sitohang A, Naibaho NM, Purba NS. Nutrition status of under-five years children Pre and Post intervention feeding parenting in the village Sangkima Kutai National Park East Kalimantan. *Journal of Nursing and Health Sciences*. 2017;6(2):60-65.
158. Gupta S & Kumar D. An intervention study in malnutrition among under five children in a rural and area of Jammu & Kashmir. *JK Sciences*. 2013;15(2).
159. Khanna P, Singh TP, Kaur R, Miller J, Mejie T, Minhas S et al. Impact of health promoting nutrition intervention package on severe malnutrition among under-five children in rural northern India. *Current Research in Nutrition and Food Science*. 2020;8(1):238-244.
160. Kureishy S. A mixed method study to assess the effectiveness of food-based interventions to prevent stunting among children under-five years in district Thatta and Sujawal, Sindh province, Pakistan: study protocol. *BMC Public Health*. 2017;17:24.

161. Bhandari N, Mohan SB, Bose A, Iyengar AD, Tanega S, Mazumder S et al. Efficacy of three feeding regimens for home-based management of children with uncomplicated severe acute malnutrition: A randomized trial in India. *BMJ Global Health*. 2016;1:000144.
162. Chawla N, Panza A, Sirikulchayanonta C, Kumar R, Taneepanichskul S. Effectiveness of a school based multicomponent intervention on nutritional status among primary school children in Bangkok, Thailand. *Journal of Ayub Medical College Abbottabad*. 2017;29(1):13-20.
163. Bhimani NR, Vachhani PV, Kartha GP. A study to evaluate the effects of nutritional intervention measures on children admitted in the nutritional rehabilitation center (Bal Sanjeevani kendra) of Surendranagar district. *International Journal of Research in Medical Sciences*. 2015;3(8):1989-1993.
164. Pavithra G, Kumar SG, Roy G. Effectiveness of a community-based Intervention on nutrition education of mothers of malnourished children in a rural coastal area of South India. *Indian Journal of Public Health*. 2020;63:4-9.
165. Mathur R B. "Uttarakhand". *Encyclopedia Britannica*. 2018 [cited 2022 March 23rd]. Available from: <https://www.britannica.com/place/uttarakhand>.
166. Wikipedia contributors. "Administrative divisions of Uttarakhand." *Wikipedia, The Free encyclopedia*, 2021 [cited 2021 November 15th]. Available from: https://www.en.wikipedia.org/wiki/Administrative_divisions_of_Uttarakhand.com
167. Uttarakhand biodiversity board (An autonomous statutory board constituted under biological diversity act 2002),2020 [cited 2021 October 25th]. Available from: <https://www.sbb.uk.gov.in>
168. Government of Uttarakhand. Nainital. National Informatics Centre, Ministry of Electronics & Information Technology, Government of India. 2021 [2022 April 27th]. Available from: <https://nainital.nic.in/>
169. Jeyakumar A, Nikam S, Nayak S. Prevalence and risk factors of undernutrition among children less than 2 years in urban slums of Pune, Maharashtra, India. *Ecology of Food and Nutrition*. 2019. 58(3):1-14.

170. Kaushal P, Chaudhary A, Girdhar S, Bansal P, Sharma S, Sajita M. Prevalence and risk factors of under nutrition among under-three children in an urban community in Ludhiana city. *International Journal of Community Medicine and Public Health* 2019;6: 113-8.
171. Kumari D, Gupta A, Alisha. Prevalence of Malnutrition among Children (aged 1-6) years in Prayagraj district. *The Pharma Innovation*.2019;8(9):507-510.
172. Anwar F, Gupta MK, Prabha C, Srivastava R K. Malnutrition among rural Indian children: An assessment using web of indices. *International Journal of Public Health and Epidemiology*. 2013;2(4):78-84.
173. Sarkar S. Cross sectional Study of child malnutrition and associated risk factors among children aged under-five in West Bengal, India. *International Journal of Population Studies*. 2016;2(1):89-102.
174. Murarkar S, Gothankar J, Doke P, Pore P, Lalwani S, Dhumale G et al. Prevalence and determinants of undernutrition among under-five children residing in urban slums and rural area, Maharashtra, India: A community-based cross-sectional study. *BMC Public Health*.2020;20:1559.
175. Shukla Y, Tiwari R, Kasar PK, Tomar SP. Risk factors for severe malnutrition in under-five children admitted to nutritional rehabilitation center: a case-control study from central India. *International Journal of Community Medicine and Public Health*.2016;3:121-7.
176. Muluye SD, Lemma T B, Diddana T Z. Effects of nutrition education on improving knowledge and practice of complementary feeding of mothers with 6- to 23-month-old children in daycare centers in Hawassa Town, Southern Ethiopia: An institution-based randomized control trial. *Journal of Nutrition and Metabolism*. 2020;1: 1-20
177. Akinrinmade R, Njogu E, Ogada IA, Keshinro O. Effectiveness of nutrition education in improving maternal knowledge and attitude towards complementary feeding practices: A cluster-randomized controlled trial in Ondo State, Nigeria. *Korean Journal of Food and Health Convergence*. 2019;5(4):1-11.

178. Kajjura RB, Veldman FJ, Kassier SM. Effect of nutrition education on knowledge, complementary feeding, and hygiene practices of mothers with moderate acutely malnourished children in Uganda. *Food and Nutrition Bulletin*. 2019;40(2): 221-230.
179. Harishankar M, Chaudhary NS, Chaturvedi D. Effectiveness of structured teaching program on knowledge regarding malnutrition and its prevention among mothers of under-five children. *International Journal Pediatric Nursing*. 2020;6(1):71-76.
180. Patel N. A study to assess the effectiveness of planned teaching programme on the knowledge regarding prevention of malnutrition among the mothers of under-five children in selected urban area at Visnagar. *Asian Journal of Nursing Education and Research*. 2020.10(4);529-531.
181. Shailendra M, Meena P. Effect of nutrition education intervention on undernutrition among under-five children in urban and rural areas of Bhopal district, Madhya Pradesh. *International Journal of Community Medicine and Public Health*.2018;5:4536-42
182. Malik S, Mittal M, Kushwaha KP. WHO/UNICEF recommended therapeutic food versus home based therapeutic food in the management of severe acute malnutrition: A randomized controlled trial. *Sudan Journal of Pediatrics*. 2016; 16(2):21-27.
183. Maheswari K. Effectiveness of home-based diet therapy for malnourished children in the age group of 2-5 years in rural Salem, Tamil Nadu, India. *International Journal of Nursing Education*. 2012;4(2):163-166.

APPENDICES

APPENDIX I

TOOL 1 SOCIO - DEMOGRAPHIC PROFORMA

Instructions: Please read every statement carefully and indicate the response by placing a tick (✓) mark in the appropriate space given. Please note it is important to respond to all questions. There is no correct / incorrect answer.

1. Date of birth _____ (Calculate the exact age of the child in months for birth date)
 - a) 12 – 18 months
 - b) 19 – 24 months
 - c) 25 – 30 months
 - d) 31 – 36 months

2. Gender of the child:
 - a) Male
 - b) Female
 - c) Others

3. Age of the mother (in years):
 - a) Less than 20
 - b) 21 – 25
 - c) 26 – 30
 - d) 31 – 35
 - e) Above 35

4. Marital Status
 - a) Married
 - b) Divorced
 - c) Separated
 - d) Widow

5. Education of Mother:
 - a) Non-Formal
 - b) Primary
 - c) Junior High School
 - d) Intermediate
 - e) Diploma
 - f) Graduate
 - g) Post Graduate

6. Education of Mother:
 - a) Non-Formal
 - b) Primary
 - c) Junior High School

- d) Intermediate
- e) Diploma
- f) Graduate
- g) Post Graduate

7. Occupation of Mother:

- a) Employed: *Specify*
- b) Unemployed
- c) Homemaker

8. Occupation of Father:

- a) Employed: *Specify*
- b) Unemployed

9. Family Income (monthly):

- a) Rs 7008 and above
- b) Rs 3504-7007
- c) Rs 2102-3503
- d) Rs 1051-2101
- e) Below Rs 1050

10. Religion:

- a) Hindu
- b) Muslim
- c) Christian
- d) Others

11. Type of family:

- a) Joint
- b) Nuclear

12. Number of Children

- a) 1
- b) 2
- c) 3
- d) ≥ 4

13. Type of diet:

- a) Vegetarian
- b) Non vegetarian

14. Place of delivery:

- a) Government facility
- b) Private facility
- c) Home

Kindly specify the name of the institution:

15. Do you have access to health facility whenever child gets ill?

- a) Yes: specify
 - a. *Hospital*
 - b. *Health centre*
 - c. *Self-care*
 - d. *Other system of medicine*
- b) No

16. Do you receive any Aganwadi services by ASHA worker:

- a) Yes: specify
 - a. *Health monitoring*
 - b. *Nutrition services*
 - c. *Health education*
 - d. *Any others*
- b) No

APPENDIX – II

TOOL 2

TOOLS FOR ASSESSMENT OF NUTRITIONAL STATUS

PART A: PROFORMA TO RECORD NUTRITIONAL STATUS

Instructions:

1. Measure the height, weight and mid arm circumference of the child based on the instructions given below and record in the space provided
2. Interpret the level of malnutrition based on the WHO growth chart attached as per the instruction given below and record in the space provided.

MEASUREMENTS	IN CHILD
WEIGHT (in kg)	
HEIGHT (in cm)	
MUAC (in cm)	

Underweight (Low weight for age)	Normal	+ 2 to – 2	
	Mild to moderate	Below – 2	
	Severe	Below – 3	
Wasting (Low weight for height)	Normal	+ 2 to – 2	
	Moderate	Below – 2	
	Severe	Below – 3	
Stunting (Low height for age)	Normal	+ 2 to – 2	
	Moderate	Below – 2	
	Severe	Below – 3	

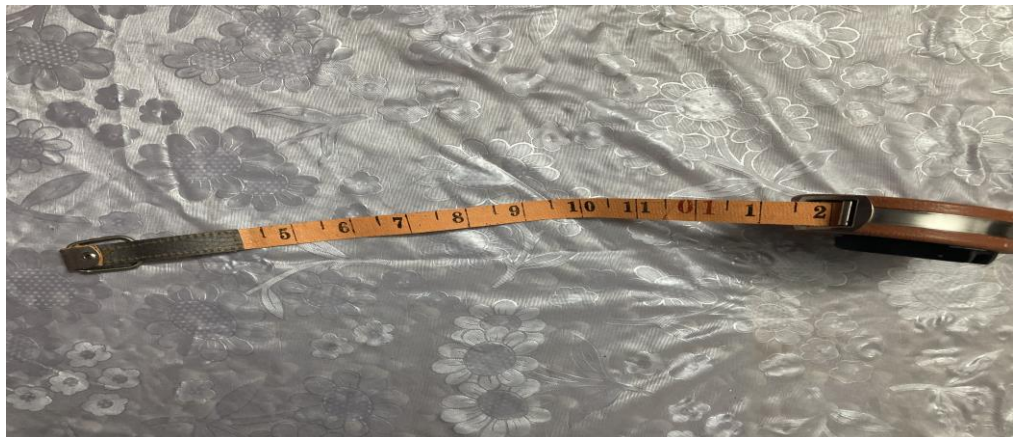
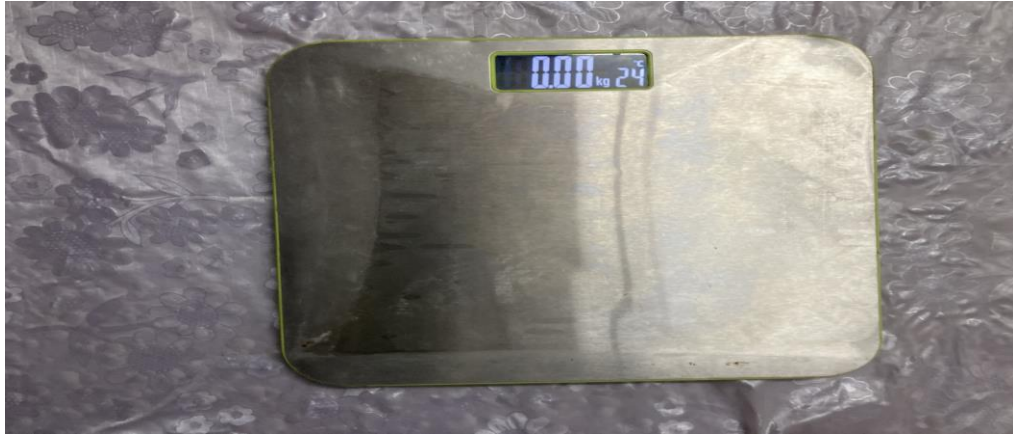
PART B: POST INTERVENTION NUTRITIONAL STATUS MONITORING SHEET

Interpretation: Placing a tick (√) mark in the appropriate space given whichever is identified

Sl. No.	Child Parameters		Pretest	Post test			
			Screening	1 Month	3 Month	6 Month	9 Month
1	WEIGHT (in kg)	Mild					
		Moderate					
		Severe					
2	MUAC (in cm)	Mild					
		Moderate					
		Severe					

APPENDIX-III

INSTRUMENTS USED FOR ANTHROPOMETRIC MEASUREMENTS



APPENDIX – IV

TOOL – 3

SEMI STRUCTURED QUESTIONNAIRE TO ASSESS RISK FACTORS RELATED TO MALNUTRITION IN CHILDREN

Instructions:

Following items are meant for obtaining information from you. Your information will be used for research purpose only. Respond by placing a tick (√) mark against the most appropriate answer according to you. Please note it is important to respond to all questions. There is no correct / incorrect answer.

Sl. No.	Factors	Yes	No	Remarks
III. Birth related Factors				
30.	Did you visit hospital/health center clinics during pregnancy?			If yes, how many times:
31.	Did you take Iron and folic acid supplementation during pregnancy?			From which month:
32.	Did you suffer from anemia during your pregnancy?			Hb level:
33.	Did you receive two doses of Tetanus toxoid during your pregnancy?			
34.	Did you gain weight during pregnancy			How much:
35.	Were there any complications during pregnancy?			What was complication:
36.	Was the duration of pregnancy 9 months?			If no, which month delivered:
37.	Was the weight of child above 2.5 kg?			If Yes/No, specify exact weight:
38.	Is your child first born in the family?			If no, identify ordinal position: Years of Gap between children:
IV. Breast Feeding Practices:				
39.	Was the breast feeding initiated immediately within one hour of birth:			If No, after how many hours initiated:
40.	Did you breast feed your child with milk only for first six months?			How many months/ years:
41.	Did you experience any of the problems relating to breast feeding? a. Breast swelling and pain			If any other, kindly specify:

	b. Flat nipples c. Cracks and sore on nipples d. Any other			
42.	Was weaning initiated after six months?			If no, then when:
43.	Did you bottle fed your child?			
III.	<i>Childhood Illness:</i>			
44.	Have you given any medication for preventing worm infestations in the child?			If yes, from where:
45.	How many times in the last one year your child has experienced the following illness? (Specify the number of episodes) a) Diarrhea b) Cough and cold c) Stomach Ache d) Lack of appetite e) Urinary infection f) Respiratory illness like pneumonia g) Fever h) Perianal Itching			If any other specify:
IV.	<i>Dietary Characteristics</i>			
46.	Does your child skip meals?			If yes, how often in a week?
47.	Does your child have poor appetite?			
48.	Does your child enjoys eating everything you cook?			
49.	Is your child choosy for food selection?			
50.	Do you always supervise your child while eating?			If no, who does?
V.	<i>Environmental Characteristics</i>			
51.	Is the house pucca?			
52.	Is the flooring of house cemented?			
53.	Do you have toilet in your house?			
54.	Do you have open drainage system?			
55.	What type of water source is used by you for cooking and drinking? a. Tap water b. Boiled Water c. Water Purifier			
56.	Do you sow your own vegetables?			
VI.	<i>Health Seeking Behavior:</i>			
57.	Is the child immunized up to age:			

	(verify information with immunization chart)			
58.	<p>Which of the following health facility you visit when your child gets sick?</p> <p>a) Sub center</p> <p>b) Hospital/ Clinics</p> <p>c) Ayurveda</p> <p>d) Homeopathy</p> <p>Home remedies (specify: _ ____)</p>			

APPENDIX – V

TOOL 4

STRUCTURED KNOWLEDGE QUESTIONNAIRE ON NUTRITION OF CHILDREN

Instructions: You can respond by placing a tick (✓) mark against the most appropriate answer according to you. Please note it is important to respond to all questions. There is only one correct answer.

1. The term Malnutrition refers to the deficiency of:
 - a) Fats
 - b) Nutrients
 - c) Minerals
 - d) Fats and minerals
2. Malnutrition can be caused by:
 - a) Inadequate feeding practices
 - b) Poor sanitation
 - c) Lack public health services
 - d) All of the above
3. Malnutrition is most commonly found in children aged:
 - a) Birth – 1 years
 - b) 5 – 10 years
 - c) 1 – 5 years
 - d) 10 – 15 years
4. Protein-energy malnutrition is caused by deficiency of:
 - a) Carbohydrates and Minerals
 - b) Proteins and carbohydrates
 - c) Carbohydrates and vitamins
 - d) Proteins and minerals
5. A balanced diet refers to
 - a) Diet rich in some nutrients
 - b) Diet rich in specific nutrients
 - c) Diet rich in all nutrients
 - d) None of the above
6. The best method to get all the nutrients is to
 - a) Drink juice daily
 - b) Eat the same foods over and over again
 - c) Eat a combination of foods
 - d) None of the above
7. Inadequate intake of nutrients by child for long time can lead to:
 - a) Decreased growth
 - b) Growth retardation
 - c) Decreased development
 - d) Decreased growth and development
8. Malnutrition can cause permanent problems in child's:
 - a) Moral and Mental development
 - b) Physical and Spiritual development
 - c) Physical and mental development
 - d) Spiritual and moral development
9. The most obvious sign of malnutrition is:
 - a) Diarrhea
 - c) Weight gain

- b) Weight loss
- d) Cough and cold
10. Which among the following is NOT a symptom of malnutrition?
- a) Lethargy
- b) Weight Loss
- c) Hair loss
- d) Wrinkled skin
11. Deficiency of iron leads to:
- a) Anaemia
- b) Muscle weakness
- c) Jaundice
- d) Pneumonia
12. The main function of dairy products is to
- a) Build strong teeth and bones
- b) Build muscles
- c) Provide energy
- d) None of the above
13. Weaning food should be introduced by which age?
- a) 4 months
- b) 8 months
- c) 6 months
- d) 10 months
14. Child should be given only breastfeeding till:
- a) 4 months
- b) 8 months
- c) 6 months
- d) 10 months
15. The first breast milk which is yellow in color is useful for babies?
- a) Yes
- b) Sometimes
- c) No
- d) Never
16. Breastfeeding should be continued with complementary feeding till:
- a) One year
- b) Two years
- c) One and half years
- d) Two years and beyond
17. Fruits are good source of following nutrients except?
- a) Proteins
- b) Vitamins
- c) Minerals
- d) Fiber
18. The diet rich in reduces constipation in children.
- a) Fiber
- b) Calcium
- c) Vitamins
- d) Minerals
19. The food rich in iron is
- a) Egg white
- b) Pulses
- c) Green leafy vegetables
- d) Rice
20. Good source of energy is:
- a) Egg
- b) Spinach
- c) Fruits
- d) Sweet potato

21. Milk, cheese and eggs are the sources of
 a) Vitamin C
 b) Vitamin E
 c) Vitamin A
 d) Vitamin B
22. Which of the following food items is rich in iron?
 a) Rice
 b) Pulses
 c) Apple
 d) Orange
23. Pulses are a good source of -
 a) Carbohydrates
 b) Fats
 c) Proteins
 d) Vitamins
24. The best food for babies after birth is -
 a) Breast milk
 b) Formula Milk
 c) Cow's milk
 d) Water
25. Soon after birth which vaccine is given?
 a) DPT
 b) BCG
 c) MMR
 d) Tetanus
26. To prevent malnourishment which of the following measures should be taken?
 a) Providing protein rich diet
 b) Regular de-worming
 c) Providing carbohydrate rich diet
 d) All the above
27. The best way to prevent malnutrition is:
 a) Eating a healthy and a balanced diet
 b) Taking medicines
 c) Taking supplements
 d) None of the above
28. What benefits do you get from health center?
 a) Supplementary nutrition
 b) Referral services and non-formal education
 c) Health check-up and immunization
 d) All the above

ANSWER KEY FOR KNOWLEDGE QUESTIONNAIRE

QUESTION NO.	ANSWER	QUESTION NO.	ANSWER
1.	C	16.	D
2.	D	17.	A
3.	B	18.	A
4.	C	19.	B
5.	B	20.	D
6.	B	21.	B
7.	C	22.	C
8.	B	23.	B
9.	C	24.	A
10.	B	25.	C
11.	A	26.	D
12.	A	27.	A
13.	C	28.	D
14.	C		
15.	A		

INTERPRETATION:

	Score
Good	19 – 28
Average	10 – 18
Poor	< 9

APPENDIX – VI

TOOL 5

STRUCTURED QUESTIONNAIRE ON NUTRITION RELATED PRACTICES ADOPTED BY MOTHERS

Instructions: Kindly read the following questions and put a tick mark (✓) against the most appropriate answer from the five options given against question. Please note it is important to respond to all questions. There is no correct / wrong answer.

Sl. No.	Variables	Daily	Four to five times	Two to three times	Once	Never
Feeding & Eating Practices:						
<i>How often in a week you give following items to your child?</i>						
1.	Commercial food items as complementary feeds					
2.	Cereals like rice, maize, barley, wheat					
3.	At least one 'katori' dal					
4.	Pumpkin, carrot, sweet potato					
5.	Green leafy vegetables like spinach, cabbage, beans, peas					
6.	Nuts like peanuts, walnuts to your child					
7.	At least one glass (200 ml) of milk					
8.	Egg to your child					
9.	Non-vegetarian food to your child					
10.	Snacks in between the meals					
11.	Fruits					
12.	Home prepared fruit juices					
13.	Cold drink					
14.	Noodles, commercial soups, other snacks like chips, Kurkure over food offered					
15.	At least 3 meals in a day					
16.	Finishes the meal served in a day					
17.	Supplement with milk when your child doesn't finish meal					
18.	Add extra oil butter or ghee in your child's diet					

Cooking and Hygienic Practices		Al-ways	Often	Some-times	Sel-dom	Never
<i>How often you</i>						
19.	Use iodized salt for cooking					
20.	Wash vegetables before chopping					
21.	Prepare food on a clean surface					
22.	Wash your utensils before cooking					
23.	Cover the cooked food after preparation					
24.	Wash your hands before food preparation					
25.	Make your child wash hands before lunch					
26.	Make your child wash hands after use of toilet					

INTERPRETATION:

Feeding and Eating practices:

Total Score = 130

Interpretation	Score
Good Practice	130- 65
Poor Practice	< 65

APPENDIX VII

LIST OF EXPERTS FOR TOOL VALIDATION

1. Dr. Sanchita Pugazhendi
Dept. of Community Health Nursing
Himalayan College of Nursing,
Dehradun
2. Dr. Mini George
Dept. of Pediatric Nursing
Institute of Liver & Biliary Sciences,
3. Dr. Poonam Joshi
Dept. of Pediatric Nursing
College of Nursing,
AIIMS, New Delhi
4. Dr. Vinitha Ravindran
Dept. of Pediatric Nursing,
College of Nursing,
Christian Medical College, Vellore
5. Dr. Ruma Nayak
Dept. of Pediatric Nursing,
College of Nursing,
Christian Medical College, Vellore
6. Dr. Renu Geethalayam
Dept. of Pediatric Nursing,
Pushpagiri College of Nursing,
Thiruvalla, Kerala
7. Dr. Ruchi Juyal
Dept. of Community Medicine
Himalayan Institute of Medical
Sciences, SRHU, Dehradun
8. Dr. Rakesh Kumar
Dept. of Pediatric Medicine,
Himalayan Hospital,
SRHU, Dehradun
9. Dr. Ravi Adlakha
Dept. of Pediatric Medicine
BLHRC, Hospital, Delhi
Haldwani

APPENDIX VIII

CALIBRATION CERTIFICATES

एक माह पूर्व शुल्क जमा करें अथवा स्थित करें अन्यथा उत्तराखण्ड विधिक माप (प्रवर्तन) निपमावली 2012 के नियम 15 (1) का उल्लंघन होगा।

अनुसूची- आठ (नियम 16(3) देखिए)
विधिक माप विज्ञान नियन्त्रक का कार्यालय
सत्यापन प्रमाण-पत्र

5/402
M/s- Parvati Hurdar
Kannuwalas Sum.

5102 A.K. Singh
निरीक्षक का नाम

मैं एतद्वारा प्रमाणित करता हूँ कि मैंने आज 15/10/2021 स्थान के निवासी 35 संख्या

के, जिसकी चपयुक्त अधिनियम के अधीन उपभोक्ता के रूप में रजिस्ट्रीकरण संख्या है, नीचे उल्लिखित बाटो, मापो आदि को सत्यापित और स्टाम्पित/अस्वीकार कर दिया है।

परिणाम	अंकित मान		तौल के उपकरण		माप के उपकरण		सत्यापन फीस		वहन, प्रवहन, समजन प्रभार आदि	
	बाट	माप क्षमता	वर्ग	विनिर्माता	किस्म	रु०	पै०	रु०	पै०	
1	2	3	4	5	6	7	8	9	10	
Personal Weighing Machine Lab- 150kg - Make - VIGO									215=10	
Fabric Rlastic (Coat) Measuring Tap - 7.5 Meters. (Make - Freeman). Make side verify function only									215=10	

ररमत की गई 15/10/2021 कोषागार की रसीद संख्या 15/10/2021 दिनांक 15/10/2021 के अनुसार कुल रूप से जमा किया गया।

प्रगले सत्यापन का शोध्य दिनांक 15/10/2021 (Max - 14/10/2021)

पी०एस०यू० (आर०ई०) 01 वि०भा०वि०/50-10-05-2019-1, पुस्तिकाएं (कम्प्यूटर/ऑफसेट)।

विधिक विज्ञान
विधिक माप विज्ञान
8-A, बंगाली लाइवेरी रोड
देहरादून M:8859773399

Scientific Temper Honesty, Humility

NORTHLAB (INDIA) PVT. LTD.
Laboratory : Plot No. 1, S.V Nagar, Perumalpattu, Thiruvallur - 602 024.
Ph.: +91 89399 23940 / 89399 40050 E-mail: sales@northlab.in

Calibration Certificate
CERT No. CC-2457

Cert. No. : 1630921-V29	ULR NO : CC245721200002175F
Date of Issue : 25-Sep-2021	Page : 1 of 2
Customer : QVC LABS	Date Received : 22-Sep-2021
Address : Plot 89/A, Jeetpur Negi, Rampur Road, Haldwani, Nainital, Uttarakhand - 263 139.	Date Calibrated : 23-Sep-2021
Instrument : SS WEIGHT SET (23 Nos.)	Due Date : 22-Sep-2024
Manufacturer : WENSAR	Ambient Temp. : 25±1°C
Model No. : ---	Relative Humidity : 55±5% R.H
Part No. : ---	Atm Pressure : 1004 mbar
Location : ---	Serial No. : 21233
	Instrument ID. : ---
	Range (Res.) : 1mg-200 g
	Accuracy / MPE : E2 CLASS
	Test Results : As Found

METHOD OF CALIBRATION
The instrument was calibrated as per method no. MSW (Based on OIML R-111-1:2004) at Northlab in accordance with ISO/IEC 17025:2017(E).

Master Instrument Used	Cert. No.	Cal. Date	Validity	Traceability
E1 Class Weight	TC/6063/2020	19-Feb-2020	18-Feb-2023	LCGC

RESULTS OF CALIBRATION
1. The results of calibration are given on the attached sheet(s).

REMARKS / DEVIATIONS IF ANY (SEE BACK OF THIS PAGE)
1. " * " Indicates Second weight value of same denomination.
2. Statement of conformance was made by taking uncertainty of measurement into account.
3. The instrument is within the Maximum Permissible Error..

QVC LABS
83/A, JEETPUR NEGI, RAMPUR ROAD
HALDWANI, NAINITAL
Uttarakhand / INDIA

R. Varshney
R. Varshney
Calibration Officer

A. Murugappan / L. Muthuraman / M. Shanmugasami
Authorised Signatory
Northlab (I) Pvt. Ltd

"Those who desire honour and glory
Shall desist from detrimental wrong doings"

APPENDIX IX

CALIBRATION CERTIFICATES

GSTIN No.- 05AOPP9723C1Z4

Mo. No.- 7500755559



BHAGWATI ENTERPRISES

Sales & Service Essae, Teroka, Electronic Weighing Machine & Others

Opp. Abdulla Petrol Pump, Kohali Colony, Kusumkhara, Haldwani, Nainital-263139

Ref. No.

Date : / /2020

CERTIFICATE

To Whom It May Concern

Date: 15th October,2020

This is to certify that the following items brought for calibration by **Ms. Pratiti Haldar, Ph.D. Scholar**, Swami Rama Himalyan University, were calibrated in Bhagwati Enterprises, Haldwani.

The results are as following:

1. Steel measuring Bowls – Error is within 2%
2. Plastic measuring Bowls – Error within 2%
3. Plastic measuring Jar – (250ml) –Error within 1%
4. Plastic measuring Spoons – Error is within 2%

They are found to be appropriate and can be used for practical purpose.

For BHAGWATI ENTERPRISES

Proprietor

@ bhagwatienterprises.ntl@gmail.com

7500755559

APPENDIX X

LIST OF EXPERTS FOR TOOL TRANSLATION IN HINDI

1. Dr. G.C. Pant
Associate Professor,
PNG Government P.G. College
Ramnagar

2. Dr. Jagdish Soban
Head of the Department,
Soban Singh Jeena College,
Almora

3. Dr. Tanuja Joshi
Professor (Hindi),
M Square Public School,
Pithoragarh

APPENDIX-XI

INTERVENTION – FBIP

FAMILY BASED INTERVENTION PROGRAM

Introduction:

Family based intervention program (FBIP) refers to multi- component training program which was prepared by the researcher. It was designed to provide information to the mothers and family members in a group of (10 – 20) regarding malnutrition and its prevention in children (1-3) years by them.

Purpose of FBIP:

The main purpose of this program was improvement of nutritional status of the children 1-3 years and enhancing knowledge and nutrition related practices of their mothers.

Objectives of FBIP: The objectives of the training program for mothers were to:

1. To enhance knowledge of mothers regarding malnutrition and its prevention.
2. To develop competency among mothers on the assessment of dietary pattern, selection of food items and improving nutritional intake.
3. To create understanding among mothers in methods of assessing nutritional status of children.
4. Demonstrate skill in preparation of healthy diets

The **key features of FBIP** were:

- Enhancing the knowledge and competency of mothers regarding identifying, selecting and using locally available food items for their children.
- Monitoring the nutritional status by the mothers
- Dietary Recall and Diet Analysis (Diet-Cal Software)
- Nutritional Poster for children and Nutritional Calendar for mothers
- Information booklet
- Recipe booklet

Venue: Sub center/Aganwadi/Houses of study participants in community

Method of teaching: Lecture cum discussion, Demonstration, Case study discussion through video

AV Aids: PowerPoint, Chart, Flip Chart, weight and height monitoring chart, diet record sheet, Nutritional Poster and Information brochure

Duration of teaching: 2 weeks (14 days)

Group: Mothers of under five children and their family

Medium of teaching: Hindi

Intervention Schedule

Sl.No.	Features	Sessions	Duration	AV Aids
1.	Enhancing the knowledge and competency	Session I: Nutrition at a Glance- Overview of Nutrition and its Need Session II: Nutrition and malnutrition related Awareness	15-20 min 15-20 min	Power point, Chart, Flip Chart,
2.	Monitoring the nutritional status by the mothers	Session III: Nutritional Preparedness <ul style="list-style-type: none"> • Growth Monitoring • Diet Record Sheet–Distribution 	20-25 min	Weight and height monitoring chart,
3.	Dietary Recall and Diet Analysis	Session IV Nutrition Counseling: 3 days Diet Record- Discussion <ul style="list-style-type: none"> • Nutrition recipes demonstration • Discussion • Nutrition recipes demonstration 	20-25 min 20-25 min	Diet record sheet
4.	Nutritional Poster/ Chart Information booklet	Session V <ul style="list-style-type: none"> • Re- briefing • Distribution of calendar for mother • Distribution of poster for toddlers • Food recipe guide Booklet Session VI: Follow up visits and reinforcement		

Session I: Nutrition at a glance

Duration of Session: 15 – 20 minutes

Overview of Nutrition and its Need in childhood:

This session involved development of rapport with the mothers participating in the group and also involved briefing them regarding maintenance of nutrition diary for their child. This diary was used in the upcoming sessions to know the dietary habits. Three-day dietary recall chart was also given to the mothers to record dietary intake of child. This will help in providing them counselling regarding selection of food items for their child.

Case Discussion

Mr. X is 4 years old and is frequently getting ill due to which he skips going to Aganwadi. When enquired from mother she said that my child does not completely finishes meal but then mother gives breast feed.

Does this supplementation is enough for child?

What will happen if this is continued even if child becomes 5 years?

Discussion: between group

Nutrition:

- The food we eat is made up of vital components called nutrients.
- Our food is made up of essential natural substances called nutrients.
- Nutrition refers to: "The study of what happens to food once it enters the mouth and thereafter".
- Nutrients are classified into seven vital components: carbohydrates, fats, vitamins, minerals, proteins, water and fiber. They are further categorized into micro and macronutrients.
- There are seven major classes of nutrients: carbohydrates, fats, fiber, minerals, proteins, vitamins and water. These nutrients can be grouped into macronutrients and micronutrients.
- Macronutrients are required in relatively large amounts: carbohydrates, fats, fiber, proteins and water. Micronutrients are required in smaller quantities: vitamins and minerals.

- Every child attains growth at his/her own pace and time by reaching various developmental milestones.
- Child's growth and development does not occur at linear pattern, but is influenced by each and every child's environment, nutrition and parental care. These factors play significant role in a child making him/her reach their full potential.
- Inadequate nutrition increases the risk of childhood illness, and is also directly/indirectly responsible for 1/3rd of the estimated 9.5 million deaths worldwide.
- Nutrition is a process by which food is taken in and is utilized by the body and nutrients are the chemical substances present in food and are responsible for nourishing the body.

Functions of Food:

- | | | | |
|---|---|---------------|--|
| <ul style="list-style-type: none"> • Body building • Protection • Regulation | } | Physiological | <ul style="list-style-type: none"> • Energy Giving • Psychological • Social |
|---|---|---------------|--|

Nutritional Status:

Nutritional status is the state of health of individual that is influenced by utilization of nutrients. Malnutrition is impairment in health that results from deficiency, excess or nutritional imbalance.

Action of Nutrients:

- Supply of energy
- Maintenance of growth
- Regulation of body processes
- Protection against diseases

Macronutrients:

Sl.No.	Nutrient	Function	Sources
1.	<i>Carbohydrates:</i> Carbohydrates are present in large quantity such as starch in cereals, legumes, pulses and potatoes. They are present as simple carbohydrates in sugar, jaggery, fruits, honey and milk.	Energy – giving function: Carbohydrates provides energy.	<ul style="list-style-type: none"> • Cereals: wheat, rice, bajra, maize, etc. • Pulses: Rajma, Channa, all dals • Roots and Tubers: Potatoes, sweet potatoes, beetroot and tapioca • Sugar, Jaggery
2.	<i>Proteins:</i> They are needed for body building	<ul style="list-style-type: none"> • For Growth, maintenance, repair of tissues • Blood clotting • Energy 	Meat, poultry, fish eggs, milk cheese, paneer, curd, soybeans, peas, pulses – cereals, nuts and oil seeds like til, groundnuts etc.
3.	<i>Fats and Oils:</i> They are concentrated sources of energy in our diet.	<ul style="list-style-type: none"> • Energy giving • Maintains body temperature • Growth of tissues 	Cooking oils, ghee, butter, oilseeds, nuts, meat, poultry, fish, egg, while milk, cheese.

Micronutrients:

Sl.No.	Nutrient	Function	Sources
1.	Minerals: Calcium, Iron, Iodine		
a)	<i>Calcium</i>	<ul style="list-style-type: none"> • Calcium helps in development of strong bones and teeth. It also aids in blood clotting and contraction of muscles. • Deficiency of it leads to osteoporosis and rickets. 	Milk is richest source of calcium and phosphorus. The other good sources are curd, green leafy vegetables, ragi and oil seeds.
b)	<i>Iron</i>	<ul style="list-style-type: none"> • It is required in trace amounts. 	Whole grain cereals and pulses.

		<p>It helps in development of hemoglobin that is present in red blood cells.</p> <ul style="list-style-type: none"> • Its deficiency causes anemia. 	<p>Green leafy vegetables, egg yolk, liver and meat are other sources.</p>
c)	<i>Iodin</i>	<ul style="list-style-type: none"> • It is necessary for growth and development. • Its deficiency causes goiter or enlargement of neck area and also mental retardation. Hence, iodized salt should be consumed. 	<p>Food grown in iodine rich soil are good sources. All sea foods items are rich in iodine.</p>
2.	Vitamins		
a)	<i>Vitamin A</i>	<ul style="list-style-type: none"> • It is important for eyes functioning. 	<p>Milk and its products, liver, eggs, fish liver oils, yellow or orange fruits and vegetables such as pumpkin, carrot, papaya, mango etc.</p>
b)	<i>Vitamin D</i>	<ul style="list-style-type: none"> • Necessary for formation and maintenance of strong healthy teeth and bones 	<p>Exposure to sunlight, eggs liver, fish liver oils, milk, butter refined oils and ghee.</p>
c)	<i>Vitamin E</i>	<ul style="list-style-type: none"> • Prevents destruction of cells against damage 	<p>All cereals, pulses, vegetable oils</p>

Session II: Nutrition and malnutrition related awareness

Duration of Session: 15 – 20 minutes

Review of previous session

<i>Sl.No.</i>	<i>Nutrient</i>	<i>Function</i>	<i>Sources</i>
2.	Vitamins		
a)	<i>Vitamin K:</i>	<ul style="list-style-type: none"> Necessary for clotting of blood 	Green leafy vegetables, Egg, liver
b)	<i>Vitamin B</i>	<ul style="list-style-type: none"> Essential for proper growth, needed for formation of red blood cells and helps in digestion and improves appetite 	Fish, eggs, Liver, poultry, meat, Green leafy vegetables
c)	<i>Vitamin C</i>	<ul style="list-style-type: none"> Helps in fighting the germs causing diseases 	Citrus fruits like amla, orange, lemon, guava, etc.; Sprouted pulses such as grams, green leafy vegetables
d)	<i>Water</i>	<ul style="list-style-type: none"> Regulatory and excretory function 	

Balanced Diet: A diet which contains different types of food possessing the nutrients- Carbohydrate, protein, fats, vitamins, minerals and water to meet the requirement of the body.

Functions:

- Good physical and a good mental health.
- It helps in proper growth of the body.
- Balanced diet increases the ability to fight or resist diseases.

Deficiency of any of these nutrients in child's body causes Malnutrition.

According to WHO, malnutrition refers to: “deficiencies, excesses, or imbalances in a person’s intake of energy and/or nutrients and have 3 types: under nutrition, stunting and underweight”.

Causes:

- Unsatisfactory food intake,
- Severe and repeated infections

Other factors include:

- Mother’s nutrition
- Antenatal care service during pregnancy
- Birth interval of children
- Breast feeding,
- Socioeconomically factors and
- Environmental factors such as infection diseases, sanitation and hygiene.

Signs and Symptoms of Malnutrition:

How to identify a child suffering from Marasmus

- Thinness of the body
- Very weak even cry cannot be heard
- Growth failure
- *How to identify a child suffering from Kwashiorkor:*
- *Swelling*
- *Hair changes; easy breakage*
- *Growth failure*
- *Skin condition poor*

Session III: Nutritional preparedness

Duration of Session: 20-25 min minutes

Plan:

1. Diet cards for 3-day diet record will be collected from mothers.
2. Then demonstration on road to health chart as per the card given to them during registration will be done. After demonstration mothers of children identified as

malnourished will be asked to sit in a group of two and be asked to work in pairs thereby plotting their own child's weight and height and any two groups will be asked to re-demonstrate back.

Plotting of weight for age:

After knowing the weight of the child, following steps are to be followed:

1. Look for your child's age in the growth chart (horizontal axis).
2. Then fill the birth month of the child in the given box (e.g., June) and in the following boxes fill the subsequent months.
3. Next, look for the measured weight (in kg) of the child in the vertical axis (left hand side).
4. According to the weight and age of the child put a dot mark in the middle of the column on the graph.
5. Repeat the same in the subsequent months and then join the dots using a line, the pattern formed will indicate the growth of the child.

Plotting of height for age:

After knowing the height (in cm) of the child, following steps are to be followed:

1. Look for your child's age in the growth chart (horizontal axis).
2. Then fill the birth month of the child in the given box (e.g., June) and in the following boxes fill the subsequent months.
3. Next, look for the measured height (in cm) of the child in the vertical axis (left hand side).
4. According to the height and age of the child put a dot mark in the middle of the column on the graph.
5. Repeat the same in the subsequent months and then join the dots using a line, the pattern formed will indicate the growth of the child.

Interpretation of Growth Curve:

1. Gain in weight of the child is said to be good if the curve or dots points in an upward direction or fall in the green color zone on the graph.
2. If the growth curve or dot points come in yellow and red zone of the graph, it

indicates to moderate and severe level of under growth and this refers to undernutrition in children.

Diet Record Sheet was distributed for dietary recall.

Session IV: Dietary Recall and Diet Analysis

Duration of Session: 20 – 30 minutes

This component involves following aspects:

- Re- briefing
- Nutrition Counselling based on 3 days Diet Record- Discussion
- Nutritious recipe demonstration

Nutrition Counselling

This session involved thorough discussion with mothers and family either in group or one to one basis regarding the dietary inadequacies identified through dietary recall via dietcal software. The mothers were counselled regarding type of diet to given to maintain adequate nutritional status.

Nutrition Recipe Demonstration: Introduction to the concept of nutrition for their child by relating to the dietary recall data gathered from mothers in first session. Demonstration regarding nutritious recipes was done in the houses of the mothers. Following recipes were demonstrated.

1. WHEAT GRAM PORRIDGE

Roasted wheat flour	25 g (1 ½ table spoon)
Powdered, roasted Bengal gram	15 g (1 tablespoon)
Powdered roasted ground nut	10 g (2 teaspoon)
Sugar/Jaggery	30 g (2 tablespoon)
Spinach (or any leafy vegetable)	30 g

Method of Preparation:

1. Powder the roasted groundnut, wheat and Bengal gram.
2. Prepare batter with powdered ingredient and jaggery syrup.
3. Place spinach in a pan, add water (1 cup = 150ml), boil till the volume becomes half and strain it.
4. Add the stained spinach water to the batter and cook for 1-2 mins with continuous stirring till it becomes semi-solid.

2. NUTRITIONAL LADDOS

Ragi Flour/Mandwave ka atta	50 g
Oil	5 ml
Groundnut Seeds	15 g
Jaggery	50 g

Method of Preparation:

1. Steam cook ragi flour for 20 mins
2. Roast groundnut, remove the outer skin and powder coarsely.
3. Prepare jaggery syrup.
4. Add steam cooked ragi flour, groundnut powder and oil.
5. Mix all the ingredients thoroughly and make laddus.

Nutritive Value per 100 grams:

Calories: 406

Protein: 6 gm

Iron: 3.14 mg

Carotene: 22.08 microgram

3. MOONG DAL/ BLACK CHANNA CHAT

Black Channa	25g
Oil	1-2 tsp
Roasted groundnut powder	2 tsp
Roasted Channa dal	2 tsp
Tomato	½
Potato boiled	1 g
Salt	To taste

Method of preparation:

1. Soak the pulse overnight
2. Next day remove from water and tie in wet muslin cloth and leave for 12-24 hours till sprouts appear
3. Pressure cook or boil the sprouted pulse for 5 mins to soften
4. Fry the vegetables lightly and add boiled potatoes later
5. Add steamed pulse along with salt and spices and serve

4. UPMA

Method of preparation:

1. Fry suji in oil till brown and keep aside.
2. In a kadai heat oil and fry mustard seeds till they sprout. Then add the vegetables and groundnut.
3. Add to above thrice the amount of water as suji and boil adding salt.
4. Once the mixture boils well add the fried suji gradually, stirring simultaneously till the whole mixture forms into a smooth “halwa” like consistency.
5. Serve with chutney or pickle or sauce.

The ingredients are given below:

Suji	½ cup
Groundnuts	10 g
Carrots sliced	½
Potato sliced	½
Tomato	1
Onion sliced	1
Mustard seeds	¼ tsp
Oil	3 – 4 tsp
Water	3-4 tsp
Salt	To taste

Session V: Re-Briefing

Re- briefing: The mothers were re- briefed regarding the previous session undertaken. The mothers were re-equipped regarding preparation for managing malnutrition in their children by distribution of nutritional calendar and Food recipe guide Booklet on nutritious recipes. They were also be given poster for their children on healthy eating and hygienic practices.

- Distribution of calendar for mother
- Distribution of poster for toddlers
- Food recipe guide Booklet
- Information Booklet

Session VI: Follow Up and Reinforcement

Follow up visits and reinforcement

Follow up and reinforcement: Follow up was made during the first month and third month and mothers were reinforced to follow the nutritional advice given.

Nutritional Assessment of children: Nutritional assessment for children was done at 3rd month, 6th month and 9th month.

APPENDIX-XII

DIET RECORD SHEET

७२ घंटे (तीन दिन) का आहार सम्बंधित जानकारी

निर्देश: आपसे निवेदन है की आप अपने बच्चे की दिन भर (तीन दिन: सुबह 7:00 बजे से अगले दिन सुबह 7:00 बजे) का भोजन और तरल पदार्थ का सेवन निचे दिए गए तालिका में भरें (कटोरियों का विवरण निचे दिया गया है)

दिन	पहर	समय	खाद्य सामग्री	कोई और खाद्य सामग्री
			आकार: चावल, दाल, किचरी, दलिया, हलवा और सब्जी जैसे खाद्य पदार्थों को पसंद करने के लिए कटोरियों में सर्विंग का मूल्यांकन किया जाएगा। चाय, जूस, दूध जैसे पेय पदार्थों के लिए गिलास में सर्विंग का मूल्यांकन किया गया जाएगा।	
1	प्रातः सवेरे			
	सवेरे			
	दोपहर			
	शाम			
	रात्रि			
2	प्रातः सवेरे			
	सवेरे			
	दोपहर			
	शाम			
	रात्रि			
3	प्रातः सवेरे			
	सवेरे			
	दोपहर			
	शाम			
	रात्रि			

APPENDIX-XIII

INSTRUMENTS USED FOR DIETARY RECALL



APPENDIX XIV

PERMISSION TO USE DIET CAL SOFTWARE

12/6/21, 11:32 AM

Gmail - Dietcal Software



pratiti haldar <beliealwz@gmail.com>

Dietcal Software

Profound Tech solutions <info.dietcal@gmail.com>
To: pratiti haldar <beliealwz@gmail.com>

Thu, Oct 8, 2020 at 9:30 PM

Dear Ms Pratiti

Kindly note that one license is for one computer only as clearly mentioned in the license agreement

Kindly find enclosed attachment with the license key.

Download it on your desktop.

Double click on your DietCal icon and click on the button "Register your license"

Now select the license key you have saved on your desktop and click on open.

This will successfully license your software.

The password to open the software is dietcal always.

Enjoy using the software. Pl go through the user guide and the data credential file in the utility section which you should read to guide you completely before you start using the software.

Also learn to take backups regularly through the backup button in the utility section of the software.

Pl give call to Md Gurdeep at 9911184904 before you add your data

Also sending you an Introduction of the software so that you can share it with your friends


Pl note that your registration with us is incomplete without the form


Regards
T KAUR

[Quoted text hidden]

3 attachments

 **License.cal**
3K

 **1-Salient features and list of users of DietCal.pdf**
989K

 **Unique features of DietCal recipes.pdf**
1387K

APPENDIX-XV

NUTRITION CALENDARS AND POSTER

2021 संतुलित आहार

ध्यान रहे पहले १००० दिन बच्चे के लिए है महत्वपूर्ण

विभिन्न खाद्य पदार्थों में उचित मात्रा व समतुल्यता में विद्यमान सभी अतिव्यर्थ पोषक तत्व संतुलित आहार बनाते हैं

रखे बच्चे को स्वस्थ और आपको खुशहाल

विटामिन ए

अँधों की देखने की क्षमता बढ़ाये, मासपेशिया मजबूत रखे, त्वचा को स्वस्थ रखे

घाव भरने में सहायक, लोहा तत्व के अवशोषण में सहायक, घोट, संक्रमण और तनावपूर्ण स्थितियों को नियंत्रित करता तथा भोजन व शरीर के कुछ पदार्थ को नष्ट होने से रोकता

विटामिन बी युक्त आहार

आयुर्वन (लोहा तत्व) युक्त आहार

आयुर्वन की आवश्यकता शरीर को हीमोग्लोबिन बनाने के लिए होती है।

2021 JANUARY

Su	Mo	Tu	We	Th	Fr	Sa
						1
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

FEBRUARY

Su	Mo	Tu	We	Th	Fr	Sa
						1
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

MARCH

Su	Mo	Tu	We	Th	Fr	Sa
						1
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

APRIL

Su	Mo	Tu	We	Th	Fr	Sa
						1
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

MAY

Su	Mo	Tu	We	Th	Fr	Sa
						1
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

JUNE

Su	Mo	Tu	We	Th	Fr	Sa
						1
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

2021 प्रोटीन युक्त आहार

शरीर का निर्माण तथा वृद्धि

कुछ रासायनिक बनाते, जो शरीर को नियंत्रित करने में महत्वपूर्ण होते हैं

कुछ प्रोटीन पदार्थों को शरीर में एक स्थान से दूसरे स्थान में ले जाने में सहायता करते हैं

ऊर्जा प्रदान करते हैं

प्रोटीन के कार्य

ऊर्जा प्रदान करते हैं

प्रोटीन को अन्य कार्य के लिए मुक्त करना

वासा के उपयोग में सहायता करना

कार्बोहाइड्रेट्स के कार्य

ऊर्जा प्रदान करते हैं

प्रोटीन को अन्य कार्य के लिए मुक्त करना

वासा के उपयोग में सहायता करना

कार्बोहाइड्रेट्स युक्त आहार

आयुर्वन (लोहा तत्व) युक्त आहार

आयुर्वन की आवश्यकता शरीर को हीमोग्लोबिन बनाने के लिए होती है।

2021 JULY

Su	Mo	Tu	We	Th	Fr	Sa
						1
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

AUGUST

Su	Mo	Tu	We	Th	Fr	Sa
						1
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

SEPTEMBER

Su	Mo	Tu	We	Th	Fr	Sa
						1
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

OCTOBER

Su	Mo	Tu	We	Th	Fr	Sa
						1
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

DECEMBER

Su	Mo	Tu	We	Th	Fr	Sa
						1
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

वसा युक्त आहार

- ऊर्जा प्रदान करना
- भूक से संतुष्टि
- वासा विटामिन को महत्वपूर्ण कार्यों में सहायता करता है
- शारीरिक अंगों की रक्षा

2021 JANUARY

Su	Mo	Tu	We	Th	Fr	Sa
						1
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

FEBRUARY

Su	Mo	Tu	We	Th	Fr	Sa
						1
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

2022 संतुलित आहार

ध्यान रहे पहले १००० दिन बच्चे के लिए है महत्वपूर्ण

विभिन्न खाद्य पदार्थों में उचित मात्रा व समतुल्यता में विद्यमान सभी अतिव्यर्थ पोषक तत्व संतुलित आहार बनाते हैं

रखे बच्चे को स्वस्थ और आपको खुशहाल

विटामिन ए

अँधों की देखने की क्षमता बढ़ाये, मासपेशिया मजबूत रखे, त्वचा को स्वस्थ रखे

घाव भरने में सहायक, लोहा तत्व के अवशोषण में सहायक, घोट, संक्रमण और तनावपूर्ण स्थितियों को नियंत्रित करता तथा भोजन व शरीर के कुछ पदार्थ को नष्ट होने से रोकता

विटामिन बी युक्त आहार

आयुर्वन (लोहा तत्व) युक्त आहार

आयुर्वन की आवश्यकता शरीर को हीमोग्लोबिन बनाने के लिए होती है।

2022 JANUARY

Su	Mo	Tu	We	Th	Fr	Sa
						1
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

FEBRUARY

Su	Mo	Tu	We	Th	Fr	Sa
						1
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

MARCH

Su	Mo	Tu	We	Th	Fr	Sa
						1
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

APRIL

Su	Mo	Tu	We	Th	Fr	Sa
						1
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

MAY

Su	Mo	Tu	We	Th	Fr	Sa
						1
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

JUNE

Su	Mo	Tu	We	Th	Fr	Sa
						1
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

2022 प्रोटीन युक्त आहार

शरीर का निर्माण तथा वृद्धि

कुछ रासायनिक बनाते, जो शरीर को नियंत्रित करने में महत्वपूर्ण होते हैं

कुछ प्रोटीन पदार्थों को शरीर में एक स्थान से दूसरे स्थान में ले जाने में सहायता करते हैं

ऊर्जा प्रदान करते हैं

प्रोटीन के कार्य

ऊर्जा प्रदान करते हैं

प्रोटीन को अन्य कार्य के लिए मुक्त करना

वासा के उपयोग में सहायता करना

कार्बोहाइड्रेट्स के कार्य

ऊर्जा प्रदान करते हैं

प्रोटीन को अन्य कार्य के लिए मुक्त करना

वासा के उपयोग में सहायता करना

कार्बोहाइड्रेट्स युक्त आहार

आयुर्वन (लोहा तत्व) युक्त आहार

आयुर्वन की आवश्यकता शरीर को हीमोग्लोबिन बनाने के लिए होती है।

2022 JULY

Su	Mo	Tu	We	Th	Fr	Sa
						1
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

AUGUST

Su	Mo	Tu	We	Th	Fr	Sa
						1
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

SEPTEMBER

Su	Mo	Tu	We	Th	Fr	Sa
						1
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

OCTOBER

Su	Mo	Tu	We	Th	Fr	Sa
						1
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

DECEMBER

Su	Mo	Tu	We	Th	Fr	Sa
						1
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

वसा युक्त आहार

- ऊर्जा प्रदान करना
- भूक से संतुष्टि
- वासा विटामिन को महत्वपूर्ण कार्यों में सहायता करता है
- शारीरिक अंगों की रक्षा

2022 JANUARY

Su	Mo	Tu	We	Th	Fr	Sa
						1
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

FEBRUARY

Su	Mo	Tu	We	Th	Fr	Sa
						1
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

स्वस्थ आहार खाओगे तो तंदरुस्त बनोगे

और अच्छी आदतें बनाये सबको सिखाएं

6-8 गिलास पानी पिएं

दिन में दो बार ब्रश करे सुबह और रात को

हाथ धोएं: खाने से पहले

हाथ धोएं: टॉयलेट के बाद

खासते और छीकते वक़्त मुँह को रुमाल से ढकें

APPENDIX-XVI

DIET RECIPE GUIDE BOOKLET

आहार विधि मार्गदर्शक पुस्तिका



प्रतीति हलदर
पीएच.डी. छात्रा

परिचय:

निम्नलिखित आहार मार्गदर्शक पुस्तिका को तैयार करने के लिए कुछ आसान तरीकों के साथ संकलित किया गया है, जो बच्चों लोगों के लिए अत्यधिक पौष्टिक आहार है। ये आहार विभिन्न पोषक मूल्यों से भरपूर होते हैं।

उद्देश्य:

- माताओं को अपने बच्चों के लिए आसान और त्वरित पौष्टिक भोजन तैयार करने के लिए

1. उपमा



सामग्री	मात्रा
सूजी	½ कप
मूंगफली	10 ग्रा
गाजर, कटा हुआ	½
आलू कटा हुआ	½
टमाटर	1
कटा हुआ प्याज	1
सरसों के बीज	¼ छोटा चम्मच
तेल	3 - 4 छोटा चम्मच
पानी	3-4 छोटा चम्मच
नमक	स्वादानुसार

बनाने की विधि:

- सूजी को तेल में भूरा होने तक भून लें और एक तरफ रख दें।
- एक कड़ाही में तेल गरम करें और सरसों के दाने भूनें, फिर सब्जियों और मूंगफली डालें

- उसमे तीन गुना सूजी के बराबर पानी की मात्रा डालें और नमक डालकर उबालें।
- एक बार जब मिश्रण में उबाल आ जाए तो भुना हुए सूजी को धीरे-धीरे मिलाएं, साथ ही पूरे मिश्रण को एक साथ "हलवे" में मिलाते हुए इसे चलाएँ।
- चटनी अचार या सॉस के साथ परोसें।

2. मूंग दाल / काला चना चाट

सामग्री	मात्रा
काला चना	25 ग्रा.
तेल	1-2 बडा चम्मच
भुना हुआ	2 बडा चम्मच
भुना चना दाल	2 बडा चम्मच
टमाटर	½
आलू उबला हुआ	1 ग्रा.
नमक	स्वादानुसार



बनाने की विधि:

- दाल को रात भर भिगो दें
- अगले दिन पानी से निकालें और गीले मलमल/ सूती के कपड़े में बाँधें और अंकुरित दिखने तक 12-24 घंटे के लिए छोड़ दें
- पांच मिनट के लिए अंकुरित दाल को नरम करने के लिए उबालें
- सब्जियों/ टमाटर को हल्के से भूनें और बाद में उबले हुए आलू डालें।
- नमक और मसाले के साथ उबली हुई दाल डालें और परोसें।

3. लड्डू

सामग्री	मात्रा
रागी आटा / मंडुवे	50 ग्रा.
तेल	5 एमएल
मूंगफली के दाने	15 ग्रा.
गुड़	50 ग्रा.



बनाने की विधि:

- 20 मिनट के लिए रागी / मंडुवे के आटे को भाप में पकाएं।
- मूंगफली भूनें, बाहरी छिलके को हटा दें और इसका पाउडर बना दें।
- गुड़ की चाशनी तैयार करें।
- भाप में पका हुआ रागी का आटा, मूंगफली पाउडर और तेल डालें।
- सभी सामग्री को अच्छी तरह मिलाएं और लड्डू बनाएं

प्रति से 100 ग्राम वारत पोषक तत्व

पोषक तत्व	पोषक मूल्य
ऊर्जा / कैलोरी	406 कैलोरी
प्रोटीन	6 ग्राम
लोहा	3.14 मिग्रा
कैरोटीन	22 .08 माइक्रोग्राम

4. गेहूँ या बेसन का हलवा

सामग्री	मात्रा
भुना हुआ गेहूँ का आटा	25 ग्राम (1 1/2 बड़ा चम्मच)
भुना हुआ बेसन	15 ग्राम। (1 बड़ा चम्मच)
भूनी और पिसी हुई	10 ग्राम। (2 चम्मच)
चीनी या गुड़ 30 ग्रा।	(2 बड़ा चम्मच)
पालक (या कोई भी)	30 ग्रा

बनाने की विधि:

1. मूंगफली, गेहूँ/बंगाल ग्राम चना (बेसन) को भून कर पाउडर बना लें।
2. गेहूँ, बंगाल ग्राम चना और मूंगफली के पाउडर को मिलाएं और उसमें गुड़ की चाशनी डालें। इसमें उपयुक्त मात्रा में पानी भी मिलाएं ताकी पतली चाशनी बन सके – एक घोल की तरह ।
3. दूसरी तरफ पालक को नरम, मेश होने तक पानी में उबालें और साफ कपड़े से छान लें।
4. घोल में छाना हुआ पालक का पानी (सूप) डालें और अर्ध ठोस होने तक लगातार चलाते हुए कुछ मिनट पकाएं।



5. नमकीन दलिया हलवा

सामग्री	मात्रा
प्याज	2 मध्यम कटे हुए
रिफाइंड तेल	1 बड़ा चम्मच
अदरक का पेस्ट	1 चम्मच
गरम मसाला	1 चम्मच
गाजर	1 कप कटी हुई
गेहूँ	1 कप कूटा हुआ
लहसुन का पेस्ट	1 चम्मच
नमक	स्वादानुसार
मटर	1 कप हरे



बनाने की विधि:

1. यह नुस्खा बनाने के लिए, एक पैन लें और तीन कप पानी में, कूटा हुए गेहूँ, कटे हुए गाजर और मटर डालें। इसे उबालें और एक तरफ रख दें।
2. इसके बाद, एक नॉनस्टिक पैन लें और उसमें तेल गरम करें। कटा हुआ प्याज डालें और इसे पारदर्शी होने तक भूनें।
3. फिर, इसमें अदरक लहसुन का पेस्ट डालकर एक मिनट के लिए भूनें।
4. अब, नमक के साथ उबली हुई सब्जियां और कूटे हुए गेहूँ का मिश्रण डालें।
5. इसे अच्छे से मिलाएं।
6. जब यह तैयार हो जाए, तो इसे एक प्लेट में रखें और इसे कटा हुआ धनियापत्ती, के साथ परोसें।

6. गाजर और चुकंदर का रायता

तैयारी का समय: १०मिनट

सामग्री:



सामग्री	मात्रा
भिगोया हुआ और उबला हुआ	¾ कप
कटा हुआ खीरा	¼ कप
बारीक कटा हुआ टमाटर	¼ कप
नींबू का रस	1 चम्मच
भुना जीरा पाउडर	¼ चम्मच
नमक	स्वादनुसार

बनाने की विधि:

एक कटोरे में सभी सामग्री को मिलाएं और तुरंत गाजर चुकंदर का रायता बच्चों के लिए परोसें।

प्रति सेवारत पोषक तत्व:

पोषक तत्व	पोषक मूल्य
ऊर्जा	94 कैलोरी
प्रोटीन	3.4 ग्राम
कार्बोहाइड्रेट	6.7 ग्राम
फाइबर	1.4 ग्राम
वसा	4.4 ग्राम
कोलेस्ट्रॉल	10.7 मिलीग्राम

7. राजमा सलाद

तैयारी का समय: १०मिनट

सामग्री

सामग्री	मात्रा
ताजा दही	1 कप
कद्दू कस किया हुआ गाजर	½ कप
उबले, छिलके और कसे हुए	½ कप
कटा हरा धनिया	1 बड़ा चम्मच
जीरा पाउडर	½ छोटा चम्मच
नमक	स्वादनुसार

बनाने की विधि:

1. एक बड़ी कटोरी में सभी सामग्री को मिलाएं और अच्छी तरह से मिला लें।
2. आप चाहें तो बच्चे को खाने में आसान बनाने के लिए राजमा को थोड़ा मसल भी सकते हैं।
3. राजमा सलाद को तुरंत परोसें।

प्रति कप पोषक मूल्य:

पोषक तत्व	पोषक मूल्य
ऊर्जा	142 कैलोरी
प्रोटीन	8.8 ग्राम
कार्बोहाइड्रेट	25.1 ग्राम
फाइबर	3.4 ग्राम
वसा	0.7 ग्राम



8. अंकुरित दाल की खिचड़ी

सामग्री:



सामग्री	मात्रा
हरी मूंग दाल (धूली और सूखी)	1 बड़ा चम्मच
कटा टमाटर	¼ कप
बारीक कटी हुई गोभी	½ कप
बारीक कटा हुआ पालक	1 बड़ा चम्मच
नमक	स्वादानुसार

बनाने की विधि:

1. बच्चों के लिए अंकुरित दाल खिचड़ी बनाने के लिए, प्रेशर कुकर में घी गर्म करें और जीरा डालें।
2. जब जीरा चटकने लगे, हींग और लहसुन का पेस्ट डालें और मध्यम आँच पर कुछ सेकंड के लिए भूनें।
3. 30 सेकंड के लिए मध्यम आँच पर प्याज और सॉस डालें।
4. चावल और मिश्रित अंकुरित दाल डालें और एक और 30 सेकंड के लिए मध्यम आँच पर सॉस डालें और एक कप पानी और नमक डालें, अच्छी तरह मिलाएँ और 3 सीटी के लिए प्रेशर कुक करें।
5. ढक्कन खोलने से पहले भाप को निकलने दें।
6. चम्मच के पिछले भाग का प्रयोग करके खिचड़ी को अच्छी तरह मिला लें।
7. अंकुरित खिचड़ी गुनगुना ताजा दही के साथ परोसें।

मूल्य प्रति कप पोषक

पोषक तत्व	पोषक मूल्य
ऊर्जा	134 कैलोरी
प्रोटीन	3.4 ग्राम
कार्बोहाइड्रेट	24.9 ग्राम
फाइबर	2.3 ग्राम

9. दाल और सब्जी का सूप

तैयारी का समय: ५ मिनट

सामग्री:



सामग्री	मात्रा
चावल (15 मिनट के लिए भिगोए हुए)	2 बड़े चम्मच
हरी मूंग दाल	2 बड़े चम्मच
घी	½ चम्मच
जीरा	¼ छोटा चम्मच
बारीक कटा हुआ प्याज	1 चम्मच
नमक	स्वादानुसार
हींग	एक चुटकी

बनाने की विधि:

1. शिशुओं और बच्चों के लिए दाल और सब्जी का सूप बनाने के लिए, पहले हरी मूंग दाल को साफ पानी से धो लें।
2. एक छलनी का उपयोग करके अतिरिक्त पानी को बहार निकालें। धुली हुई मूंग दाल को अलग रख दें।
3. इस बीच, टमाटर को धोकर साफ कर लें। मूंग दाल मिश्रित सब्जी का सूप बनाने के लिए लाल, ठोस टमाटर का उपयोग करें।
4. टमाटर को मध्यम आकार के टुकड़ों में काट लें।
5. किसी भी गंदगी से मुक्त करने के लिए साफ पानी से गोभी को अच्छी तरह से धोएं। किसी भी प्रकार के संदूषण को रोकने के लिए इसे बहते पानी के नीचे धोएं।
6. चाकू का उपयोग करके गोभी को बहुत बारीक काट लें। कटी हुई गोभी को अलग रख दें।
7. फिर पालक के पत्तों को भी पानी से धोकर काट लें और एक तरफ रख दें।

8. जब सभी सामग्री तयार हो जाये तब उन्हें प्रेशर कुकर में दाल लें। सबसे पहले धुली और सूखी मूंग दाल डालें।
9. फिर कटे टमाटर और गोभी डालें।
10. पालक भी डालें और स्वादानुसार नमक भी।
13. खाना बनाने के लिए 1 कप पानी डालें।
14. प्रेशर कुकर का ढक्कन बंद करें और 2 से 3 सीटी के लिए दाल और सब्जी का सूप पकाएं।
15. मूंग दाल के मिश्रित वेजिटेबल सूप को मिक्सर जार में डालें करें और इसे स्मूद प्युरी में पीसें।
16. एक पैन में प्युरी को स्थानांतरित करें।
17. नमक डालें और अच्छी तरह मिलाएँ और उबाल लें।
18. इसे थोड़ा ठंडा होने पर परोसें।

प्रति कप पोषक मूल्य:

पोषक तत्व	पोषक मूल्य
ऊर्जा	72 कैलोरी
प्रोटीन	4.8 ग्राम
कार्बोहाइड्रेट	12.2 ग्राम
वसा	0.4 ग्राम
फाइबर	3.4 ग्राम
कोलेस्ट्रॉल	0 मिग्रा

10. मूंग अंकुरित डोसा

भिगोने का समय: १५ मिनट
सामग्री:



सामग्री	मात्रा
अंकुरित मूंग दाल	1 कप
गेहूँ का आटा	4 चम्मच
नमक	स्वादानुसार
भराई के लिए	
तेल	1 चम्मच
सरसों के दाने	¼ चम्मच
करी पत्ते	2
हल्दी पाउडर	एक चुटकी
हींग	एक चुटकी
उबले, छिलके वाले और मसले हुए आलू	¼ कप
कद्दूकस की हुई गाजर	2 बड़े चम्मच
बारीक कटे टमाटर	1 कप
कसा हुआ चुकंदर	बड़े चम्मच
कद्दूकस की हुई गोभी	1 चम्मच
बारीक कटा प्याज	2 बड़े चम्मच
बारीक कसा हुआ नारियल	1 बड़ा चम्मच
कटा हरा धनिया	1 बड़ा चम्मच
चाट मसाला	बड़ा चम्मच
नमक	स्वादानुसार

अन्य सामग्री

- खाना पकाने और चिकनाई के लिए 2 बड़े चम्मच तेल

बनाने की विधि: मूंग दाल अंकुरित डोसा के लिए

1. अंकुरित मूंग को 1 कप पानी के साथ मिलाएँ और मिक्सर में एक चिकना पेस्ट बनाएं।
2. पेस्ट को एक बड़े कटोरे में स्थानांतरित करें, गेहूँ का आटा और नमक डालें और अच्छी तरह मिलाएं।
3. एक ढक्कन के साथ ढकें और 15 मिनट के लिए अलग रखें।

भरने के लिए

4. एक चौड़े नॉन-स्टिक पैन में तेल गरम करें और उसमें राई, करी पत्ता और हल्दी पाउडर डालें।
5. जब सरसों के दाने चटकने लगे, हींग डालें और बची हुई सारी सामग्री डालकर अच्छी तरह मिलाएँ और मध्यम आँच पर 1 से 2 मिनट तक पकाएँ।
6. स्टफिंग मिश्रण को 4 बराबर भागों में विभाजित करें और अलग रखें।

तैयार कैसे करें:

7. बच्चों के लिए मूंग अंकुरित डोसा बनाने के लिए, एक नॉन-स्टिक तवा (ग्रिल्ड) गरम करें और इसे तेल का उपयोग करके चिकना करें।
8. तवा पर एक चम्मच का घोल डालें और इसे समान रूप से गोलाकार आकार में फैलाते हुए 150 मिमी बनाएं। (6") व्यास गोल डोसा।
9. किनारों के चारों ओर 3 छोटे चम्मच तेल डालते हुए फैलाएं और डोसे को हल्का भूरा होने तक मध्यम आँच पर पकाएं।
10. भराई के एक हिस्से को डोसा के ऊपर समान रूप से फैलाएं।
11. जब डोसे का निचला हिस्सा हल्का भूरा हो जाए, तो इसे मोड़ दें।
12. 3 और डोसे बनाने के लिए चरण 2 से 5 दोहराएं।
13. मूंग अंकुरित डोसा को बच्चों को गुनगुने नारियल चटनी और सांबर के साथ परोसें।

प्रति डोसा पोषक तत्व:

पोषक तत्व	पोषक मूल्य
ऊर्जा	146 कैलोरी
प्रोटीन	4.9 ग्राम
कार्बोहाइड्रेट	19.9 ग्राम
फाइबर	3.9 ग्राम
वसा	5.1 ग्राम

11. मिनी मूंग दाल चीला

तैयारी का समय: 14 मिनट कुल समय:
सामग्री:



सामग्री	मात्रा
सुखी पीली मूंग की दाल (1 घंटे के लिए भिगो कर और सूखा लें)	2 बड़े चम्मच
हरी मूंग की दाल (1 घंटे के लिए भिगो कर और सूखा लें)	2 बड़े चम्मच
हींग	एक चुटकी
तेल	1½ चम्मच
नमक	स्वादानुसार

तैयारी

1. मिनी मिश्रित मूंग दाल चीला बनाने के लिए, लगभग पीले मूंग दाल, हरी मूंग दाल को मिलाएं। एक मिक्सर में 3 बड़े चम्मच पानी डालें और चिकना होने तक मिलाएँ।
2. मिश्रण को एक कटोरे में स्थानांतरित करें, नमक और हींग डालें और अच्छी तरह मिलाएं।
3. एक पैन गरम करें और एक छोटा चम्मच तेल का उपयोग करके चिकना करें।
4. 75 मिमी मिनी उत्तपम बनाने के लिए प्रत्येक उत्तपम साँचा में एक चम्मच घोल डालें। (3 ") व्यास का गोल।
5. सभी चीज़ों को 1 छोटा चम्मच तेल का इस्तेमाल करके, दोनों तरफ से सुनहरा भूरा होने तक पकाएं।
6. मिनी मिक्स मूंग दाल चीला को तुरंत परोसें।

प्रति कप पोषक मूल्य:

पोषक तत्व	पोषक मूल्य
ऊर्जा	36 कैलोरी
प्रोटीन	2 ग्राम
कार्बोहाइड्रेट	4.8 ग्राम
फाइबर	0.7 ग्राम
वसा	1 ग्राम

APPENDIX-XVII
INFORMATION BOOKLET

कुपोषण सम्बंधित जानकारी एवं बचाव



प्रतीति हलदर
पीएच.डी. छात्रा

पोषण:

- हमारा भोजन आवश्यक पोषक तत्वों से निर्मित है ।
- पोषण से तात्पर्य है: " पोषण का अर्थ है - " यह अध्यन भोजन हमारे मुख से प्रवेश करता है, तब और उसके पश्चात क्या होता है?
- पोषक तत्वों के ७ मुख्य वर्ग हैं : कार्बोहायड्रेट, वासा, खनिज, प्रोटीन,विटामिन्स, रेशे एवं जल । यह पोषक तत्व वृहद एवं सूक्ष्म पोषक तत्वों में वर्गीकृत किये जा सकते हैं ।
- वृहद पोषक तत्वों की अपेक्षित अधिक मात्रा में आवश्यकता होती है: कार्बोहाइड्रेट्स, वासा, प्रोटीन, रेशे एवं जल ।
- सूक्ष्म पोषक तत्वों की आवश्यकता कम मात्रा में होती है : विटामिन्स एवं खनिज
- प्रत्येक बच्चा अपनी गति से एवं अपने समय के अनुसार विकास की विभिन्न अवस्थाओं तक पहुँचते हुए विकसित होता है एवं वृद्धि को प्राप्त होता है ।
- बच्चों की वृद्धि एवं विकास रैखिक नहीं होता अपितु प्रत्येक बच्चे का वातावरण, पोषण एवं अभिभावकों की देखभाल के द्वारा प्रभावित होता है । यह तथ्य बच्चे के पूर्ण विकास में महत्वपूर्ण भूमिका निभाते हैं ।
- कम पोषण बिमारियों के खतरे को बढ़ता है तथा प्रत्यक्ष या अप्रत्यक्ष रूप में उन ९. ५ मिलियन बाल मृत्यु के एक तिहाई का ज़िम्मेदार है जो की पांच वर्ष से काम आयु के बालकों की २००६ में हुई ।
- पोषण वह प्रक्रिया है जिसके द्वारा शरीर भोजन को लेता है तथा उसका उपयोग करता है और पोषक तत्व वे रासायनिक तत्व हैं

जो की भोजन में मौजूद रहते हैं तथा शरीर के पोषण हेतु ज़िम्मेदार हैं ।

कारण:

- असंतोषजनक आहार
- गंभीर एवं बार बार होने वाला संक्रमण

अन्य कारण हैं:

- माता का पोसहन स्तर
- गर्भवस्था के दौरान की गई देखभाल
- बच्चों के बीच का अंतर
- सिर्फ माता के दूध का स्तनपान
- सामाजिक आर्थिक कारण
- पर्यावरणीय कारक जैसे की संक्रमण व बीमारियां, अस्वच्छता

कुपोषण के लक्षण व पहचान

मैरेस्मस रोग से ग्रस्त बालक की पहचान किस प्रकार करें?

- शरीर का दुबलापन
- अत्यंत कमजोर यहाँ तक की रोने की आवाज़ भी नै पड़ती
- विकास में असफलता



काशीओरकर रोग से ग्रस्त बालक की पहचान किस प्रकार करें?

- सूजन
- बालों का आसानी से टूटना
- विकास में असफलता
- तवचा की खराब स्थिति



विटामिन के: रक्त का थक्का बनाने के लिए आवश्यक

स्रोत: हरी पत्तेदार सब्जियां, अंडा, लिवर

विटामिन बी: समुचित वृद्धि हेतु आवश्यक, लाल रक्त कोशिकाओं के निर्माण के लिए आवश्यक, पाचन में मदद करता है तथा भूक में सुधार करता है

स्रोत: मछली, अंडे, लिवर, मांस, मुर्गा, हरी पत्तेदार सब्जियां

विटामिन सी: बीमारियां पैदा करने वाले कीटाणुओं से लड़ने में मदद करता है

स्रोत: खट्टे फल जैसे आवँला, निम्बू, संतरा, अमरूद इत्यादि अंकुरित दालें, हरी पत्तेदार सब्जियां

जल: नियामक एवं विसर्जक का कार्य

संतुलित आहार

संतुलित आहार: वह आहार जिसमें की विभिन्न प्रकार के भोज्य पदार्त होते हैं जिनमें शरीर की अवशक्ताओ की पूर्ति के लिए विभिन्न पोषक तत्व:कार्बोहाइड्रेट्स, प्रोटीन, वासा, विटामिन, खनिज व जल होते हैं

कार्य:

- अच्छा शारीरक व मानसिक स्वस्थ
- यह शरीर की संतुलित वृद्धि में सहायक है
- संतुलित आहार बिमारियों से लड़ने की क्षमता बढ़ाता है

बच्चों के शरीर में इनमें से किसी भी पोषक तत्व की कमी कुपोषण का कारक बनती है

WHO के अनुसार "कुपोषण का अर्थ है, किसी व्यक्ति के आहार में पोसाहक तत्वों की कमी, अधिकता अथवा असंतुलन और यह तीन प्रकार का होता है - अल्पपोषण, वृद्धि अवरोध तथा अल्पभार यानि सामान्य से कम वज़न होना।

भोजन के कार्य:

- शिरीर निर्माण
- रक्षा
- नियमतिकरण
- शक्ति प्रदान करना
- शारीरक विकास
- मानसिक विकास



पोषण स्तर

पोषण स्तर की व्यक्ति के स्वास्थ्य की वृद्धि स्थिति है जो की शरीर द्वारा पोषक तत्वों के उपयोग से प्रभावित होती है एवं कुपोषण सवास्थ्य की वह अति अध्वा दुर्बलता है जो की पोषक तत्वों की कमी,अधिकता या असंतलन के परिणामस्वरूप उत्पन होती है ।



पोषक तत्वों के कार्य:

- ऊर्जा प्रदान करना
- वृद्धि बनाये रखना
- शारीरिक क्रियाओ को नियमित रखना
- बिमारियों के खिलाफ सुरक्षा प्रदान करना

वृहद पोषक तत्व

1. कार्बोहायड्रेट: कार्बोहायड्रेट बड़ी मात्रा में स्टार्च के रूप में अनाज, फलियों, दाल और आलू में उपस्थित होता है । साधारण कारभोहयद्राते के रूप में यह चीनी, गुड़, फल, शहद व दूध में पाया जाता है

कार्य: ऊर्जा दायक- ऊर्जा प्रदान करता है

कार्बोहाइड्रेट्स के भोजन स्रोत:

अनाज: गेहूँ, चावल, बाजरा, मक्का, आदि ।

दाल: राजमा, चना और सभी दाल

जेड व कन्ध: आलू, शकरकंद, चुकुंदर व साबूदाना गुर व चीनी

2. प्रोटीन: प्रोटीन की आवश्यकता शरीर निर्माण के लिए होती है ।

कार्य: वृद्धि एवं रखरखाव व तंतुओं का पुनर्निर्माण, रक्त का थका बनाने में मदद करता है , ऊर्जा प्रदान करता है ।

स्रोत : मांस, अंडे , मछली , दूध , दही, चीज़, पनीर,सोयाबीन,मटर , दाल, अनाज,मेवे तथा तेल युक्त बीज जैसे टिल,मुमफली आदि ।

3. वासा व तेल: वासा व तेल हमारे भोजन में ऊर्जा का केन्द्रियभूत स्रोत्र है ।
कार्य : ऊर्जा प्रदान करना, शरीर के तापमान को नियंत्रित करना, तंतुओ की वृद्धि में सहायता ।

स्रोत: वनस्पति तेल, घी, मक्खन, तेल युक्त बीज, मेवे, मांस, अंडे,मछली , दूध, चीज़

सूक्ष्म पोषक तत्व

खनिज : कैल्शियम,लोहा तत्व, आयोडीन

कैल्शियम: क्लीयम व फॉस्फोरस पर्याप्त मात्रा में दूध, दही, हरी पत्तेदार सब्जियों, रागी, व तेल युक्त बीजों में पाये जाते हैं । अन्य भोजन पदार्थ भी उचित मात्रा में कलियम प्रदान करते हैं । कैल्शियम का मुख्य कार्य हड्डियों व दातों का निर्माण व विकास करना है । कैल्शियम रक्त का थक्का बनाने तथा मांसपेशियों में संकुचन के लिए भी आवश्यक है कैल्शियम की कमी से ऑस्टियोपोरोसिस (अस्थिसुषिरता) नामक रोग होता है ।

लोहा तत्व: शरीर को बहुत कम मात्रा में लोहा - तत्व की आवश्यकता होती है । यह हीमोग्लोबिन में उपस्थित एक महत्वपूर्ण तत्व है जो की लाल रक्त कोशिकाओं का हिस्सा है। पुरे अनाज तथा दालें हमारे आहार में लोहा तत्व का मुख्या स्रोत्र है लोहा के अन्य सत्र हरी पत्तेदार सब्जियाँ, अंडे की जर्दी, लिवर व मांस है इसकी कमी से शरीर में रक्ताल्पता यानि एनीमिया का रोग होता है ।

आयोडीन: आयोडीन वृद्धि व विकास के लिए आवश्यक है, जो भोज्य पदार्थ आयोडीन युक्त मिटटी में उगते हैं वे हमें आयोडीन प्रदान करते है समुद्री भोजन आयोडीन से भरपूर होते है । आयोडीन की कमी से घेंगा रोग होता हैं जिसमे गर्दन के क्षेत्र बढ़ जाता है । बच्चों में आयोडीन की कमी मानसिक विकास को अवरुद्ध करती है । आयोडीन युक्त नमक आयोडीन का एक अच्छा स्रोत्र है तथा हमें आयोडीन रहित नमक का पप्रयोग करना चाहिए ।

विटामिन्स

विटामिन ए: आँखों की उचित कार्य क्षमता के लिए आवश्यक है ।

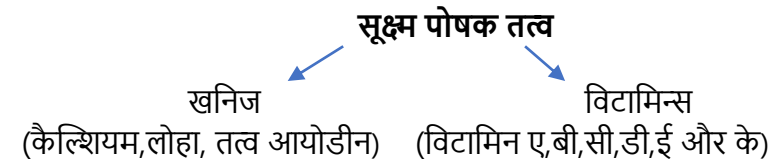
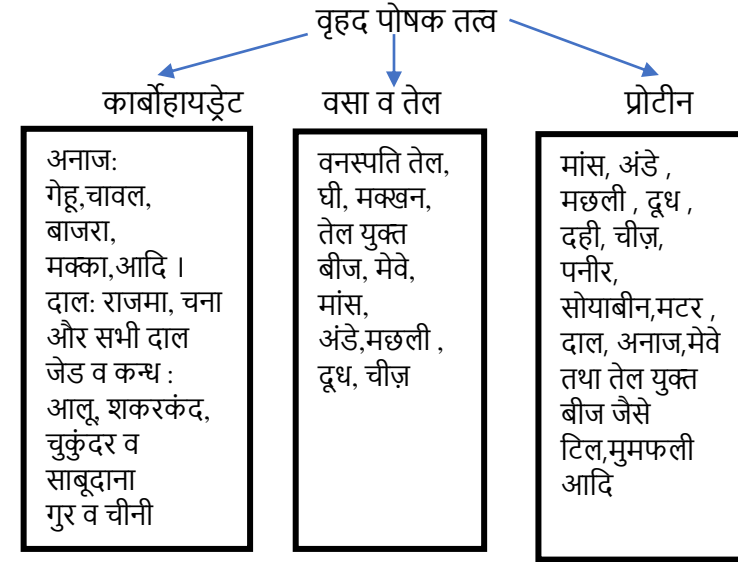
स्रोत: दूध एवं दूध के पदार्थ, लिवर, अंडे, मछली के यकृत का तेल, पीले व नारंगी फल जैसे पपीता, आम आदि एवं सब्जियां जैसे कद्दू , गाजर इत्यादि

विटामिन डी: स्वस्थ व मजबूत हड्डियों व दांतों के निर्माण व रखरखाव के लिए आवश्यक

स्रोत: सूर्य की रौशनी का त्वचा पर पड़ना, अंडे, लिवर, मछी के यकृत का तेल, दूध, मक्खन, रिफाईंड तेल व घी

विटामिन इ: विटामिन सी शरीर की कोशिकाओं को नष्ट होने से बचता है ।

स्रोत: सभी अनाज, दालें, वनपति तेल



APPENDIX XVIII

PICTURES OF FOCUSED GROUP DISCUSSION AND INTERVENTION DELIVERY



APPENDIX XIX

E-CERTIFICATE IN POSHAN ABHIYAN ICMR



POSHAN Abhiyaan
PM's Overarching Scheme for Holistic Nourishment
सब से पहले - सब को



EOU
सर्वोच्च शिक्षा बोर्ड
भारत



icmr
INDIAN COUNCIL OF MEDICAL RESEARCH
NIN
NATIONAL INSTITUTE OF NUTRITION

POSHAN Abhiyaan

E-Learning ICMR-NIN Modules

Ministry of Women and Child Development
Government of India
&
ICMR-National Institute of Nutrition
Department of Health Research, Ministry of Health & Family Welfare
Government of India, Hyderabad, Telangana State



Certificate

This is to certify that

Mr./Ms. *Pratiti Haldar*

has successfully completed the Nutrition Education Programme

on* *Basic Nutrition*"

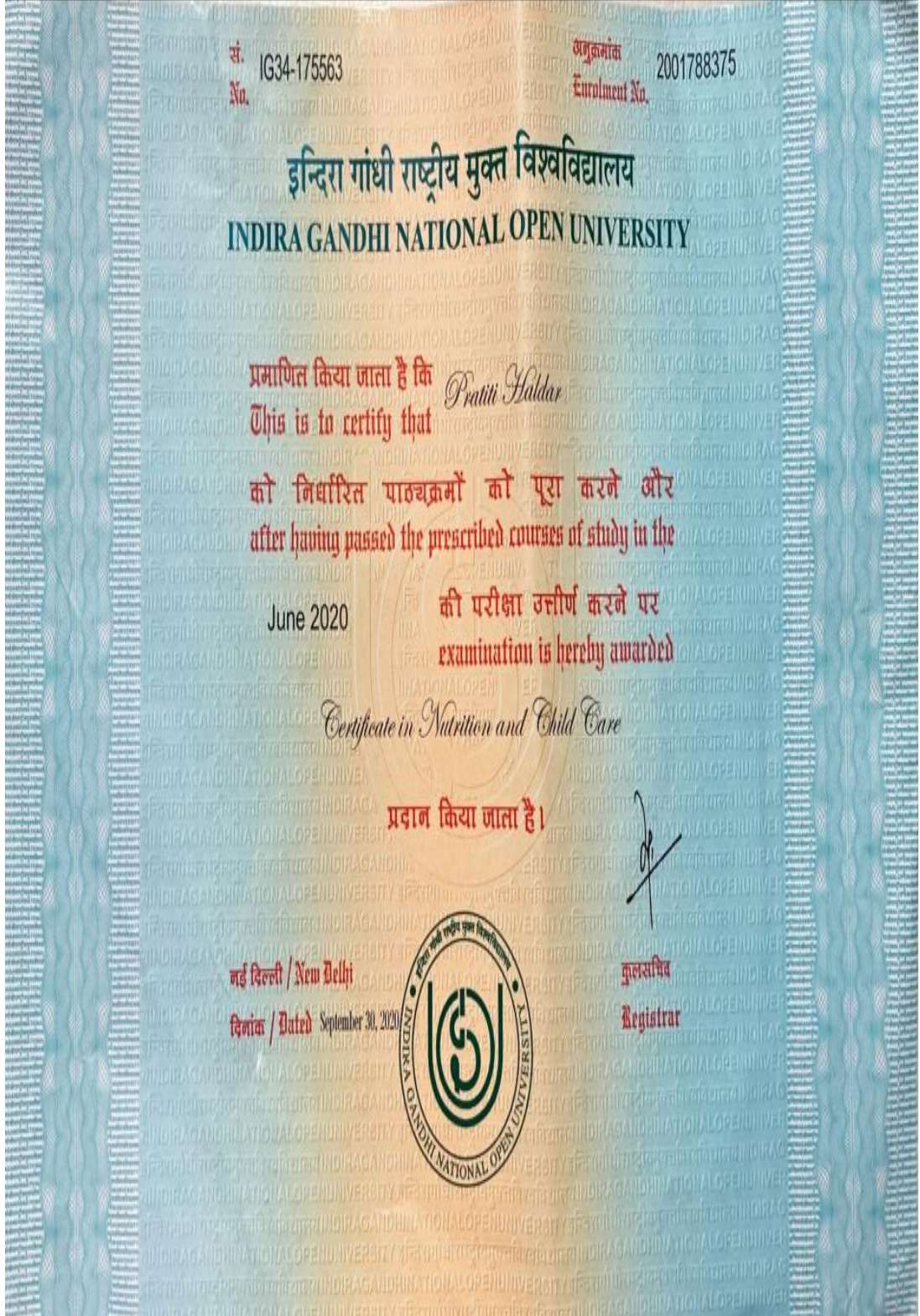
through e-Learning platform.



Director
ICMR-NIN

APPENDIX XX

CHILD NUTRITION CHILD CARE COURSE CERTIFICATE



APPENDIX XXI

LIST OF EXPERTS FOR CONTENT VALIDATION OF INTERVENTION

1. Dr. Sanchita Pugazhendi
Professor cum Dean,
Dept. of Community Health Nursing,
Himalayan College of Nursing,
Dehradun
2. Dr. Renu Geethalayam
Professor cum Principal,
Dept. of Pediatric Nursing,
Pushpagiri College of Nursing,
Thiruvalla, Kerala
3. Dr. Smriti Arora
Professor,
Amity University,
Gurgaon
4. Ms. Vinita Thapliyal
Clinical Dietician
All India Institute of Medical Sciences,
Rishikesh
5. Ms. Preeti Sharma
Clinical Dietician
Himalayan Hospital,
Dehradun

APPENDIX XXII

ETHICS COMMITTEE CLEARANCE CERTIFICATE

Swami Rama Himalayan University

(Act. vide Uttarakhand Act No. 12 of 2013)

Swami Ram Nagar, Jolly Grant, Dehradun- 248016
Uttarakhand, India



स्वामी राम हिमालयन विश्वविद्यालय

(उत्तराखण्ड अधिनियम सं० 12 वर्ष 2013 द्वारा स्थापित)

स्वामी राम नगर, जौलीग्रान्ट, देहरादून 248016
उत्तराखण्ड, भारत

"Ethics Committee"

SRHU/HMS/7-1/2019/92

Date: 3/10/2019

To,
Ms. Praniti Halder,
Ph.D Scholar,
Himalayan College of Nursing,
Swami Rama Himalayan University.

Ref: Ph.D Synopsis, entitled: "A study on risk factors of malnutrition and effectiveness of family based intervention program (FBIP) on nutritional status of children and knowledge and practices and mothers in selected villages of Nainital District, Uttarakhand."
Submitted by Principal investigator, Ms. Praniti Halder, Ph.D Scholar, Under the guidance of Dr. Lekha Viswanath, Prof., Himalayan College of Nursing, Swami Rama Himalayan University.

Dear Ms. Praniti Halder,

With reference to your submission letter, dated 26/08/2019, the Ethics Committee, Swami Rama Himalayan University reviewed and discussed your application for approval of the above referred research protocol on 21/09/2019.

The following members were present in the meeting held on 21/09/2019, at 11:00 AM in the dept of Pharmacology, H.I.M.S., Swami Rama Himalayan University.

Sr. No.	Name of the Member	Designation and Qualification	Representation as per Schedule Y	Gender	Affiliation with the Institution
1.	Prof. K.C. Mishra	Chairman MBBS, MD, MAMS	Ex. Principal	M	No
2.	Mr. G.N.S. Gurudutt	Member M.A., Mphil	Social Scientist	M	No
3.	Mr. Arun Kundra	Member M.A., L.L.B.	Practicing Advocate	M	No
4.	Mr. Sagar Manwal	Member Gram Pradhan, Atharwala	Community Representative	F	No
5.	Prof. Mushtaq Aammed	Member MBBS, MD(Radiotherapy)	Professor, Deptt. of Radiotherapy	M	Yes
6.	Dr. Jaynati Senwal	Member MBBS, MD, (Community Medicine)	Clinician Professor of Paediatrics	M	Yes
7.	Dr. Aksh Dubey	Member MBBS, MD, (Anatomy)	Assoc. Professor, Deptt. of Anatomy	M	Yes
8.	Prof. D.C. Dhasmana	Member Secretary MBBS, MD(Pharmacology)	Pharmacologist	M	Yes

This is to confirm that only members, who were independent of the Investigator of the study, have voted and provided opinion on the study.

The Ethics Committee, Swami Rama Himalayan University, has no objection to the conduct of the study in the present form, as per the submitted protocol, subject to the prior approval of local Ethics Committee empowered to supervise the project at the study site.

Further, the permission is subject to the statutory provisions and permissions, as deemed necessary, to be obtained from concerned authorities.

The Ethics committee, Swami Rama Himalayan University expects to be informed about the progress of the study, any changes in the protocol and asks to be provided a copy of the final report.

The Ethics committee, Swami Rama Himalayan University follows procedures that are in compliance with the requirements of ICH (International Conference on Harmonization) guidelines related to GCP (Good Clinical Practice) and applicable Indian regulations, revised and updated from time to time.


Dr. D.C. Dhasmana,
Member Secretary, Ethics Committee

Tel: 91-135-2471600, 2471611 Fax: 91-135-2471612 email: info@srhu.edu.in www.srhu.edu.in

APPENDIX XXIII

PERMISSION FROM CHILD DEVELOPMENT PROJECT OFFICER (RURAL), HALDWANI

From,
Ms. Pratiti Halder
Ph.D Scholar
Swami Rama Himalayan University,
Swami Ram Nagar, Jolly Grant
Dehradun - 248016, Uttarakhand, India

To,
The Block Development Officer,
Haldwani Block,
Uttarakhand.


Sub: Request to grant permission to conduct main study in Haldwani Block
Respected Sir/ Madam,


I, the undersigned is Ph.D. Nursing Scholar of Himalayan College of Nursing, Swami Rama Himalayan University, Jolly Grant. I have undertaken a research project and have selected the below mentioned topic for the research project.

"A study on risk factors of malnutrition and effectiveness of family based intervention program (FBIP) on nutritional status of children and knowledge and practices of mothers in selected villages of Nainital district, Uttarakhand."

I humbly request you to kindly grant me permission to conduct main study among children and aged (1-3) years and their mothers'.

Thanking you in anticipation,

Yours sincerely,

Ms. Pratiti Halder


बाल विकास परियोजना अधिकारी
हल्द्वानी प्रान्तीय (नैनीताल)

APPENDIX – XXIV

PARTICIPANT INFORMATION SHEET – ENGLISH

Project Title: “A study on risk factors of malnutrition and effectiveness of Family-Based Intervention Program (FBIP) on nutritional status of children and knowledge and practices of mothers in selected villages of Nainital district, Uttarakhand.”

Language: English

Principal Investigator: Ms. Pratiti Haldar

Designation: Ph.D. student

College: Himalayan College of Nursing, Swami Rama Himalayan University, Jolly Grant

Contact number: 8909xxxxxx

1. Introduction for the research study:

Malnutrition is found to be most common problem identified in the children in the age group of one to three years. Mothers play a very important role in maintenance of their nutritional status.

2. Purpose of the study:

The purpose is to identify nutritional status of children and to improve it in them through family-based intervention program. It also aims to identify its effectiveness on nutritional status in under five children, knowledge and related practices of mothers.

3. Participants:

Children of (1-3) years age and having mild to moderate malnutrition and their mothers.

4. Information about the study:

Study will be conducted in two phases:

Phase I:

This phase involves identification of nutritional status of child by assessing height, weight and mid arm circumference and collection of information from the mothers which includes data on risk factors of nutrition, knowledge and practices relating to nutrition.

Phase II:

This phase involves evaluation of the effectiveness of family-based intervention program on nutritional status of the child and knowledge and nutrition related practices of the mothers. This program consists of following components: teaching, assessment, diet recipe demonstration, nutrition calendar and poster and information booklet.

Followed by reassessment of knowledge and practices relating to nutrition in mothers and assessment of weight and mid arm circumference of child every three months for period of nine months.

5. Your responsibility in the study:

- You are expected to provide accurate information to the questions asked to you.
- As part of intervention, you are requested to attend classes and also make necessary improvements in nutritional practices of the child as suggested.
- You can clarify any doubt after the sessions.
- You can discontinue from the study at any point of time whenever you wish to.

6. Risks and cost of Participation:

There will not be any risk and no expenses to participate in this study.

7. Benefits of participation:

You will get awareness about the importance of nutrition in this age group and its impact on child's health. This will also help you to track your child's nutritional status thereby improving nutritional status of the child and plan meal effectively for your child.

8. Confidentiality of Information:

This information gathered from you i.e., your name, address, study results will be studies only by authorized personnel, ethics committee or regulatory bodies. The information collected will be presented in meetings of published in journals without sharing your personal details.

9. Voluntary Participation:

Entering this research study is voluntary. If you volunteer you have right to withdraw any time and need not give any reason.

10. Whom to contact in case of questions: If you have any questions about this form or any study related issues you may contact below mentioned person:

Name: Ms. Pratiti Haldar

Address: Himalayan College of Nursing, SRHU, Jolly Grant, Dehradun, Uttarakhand,

Contact Number: 8909xxxxxx

For further details, please contact:

Name: Dr. Lekha Vishwanath

Address: Himalayan College of Nursing, SRHU, Jolly Grant, Dehradun, Uttarakhand,

APPENDIX – XXV

INFORMED CONSENT

Participant/ Protocol Number:

Participant Identification Number:

Project title: “A study on risk factors of malnutrition and effectiveness of Family-Based Intervention Program (FBIP) on nutritional status of children and knowledge and practices of mothers in selected villages of Nainital district, Uttarakhand.”

Name and Age of the Research Subject (Mother):

Name and Age of the Research Subject (Child):

I have read the Participant Information Sheet and its contents were explained by the researcher in my own language and I have understood the contents. I had the opportunity to ask questions and received satisfactory answers.

I understand that my and my child’s participation in the study is voluntary and that I have the right to withdraw at any time without giving any reason, without my medical care to legal rights being affected.

I understand that the information collected from me may be presented at meeting or published in journal without my name and personal identifications.

I agree and give consent to take part in the above-mentioned study for me and my child. I also confirm that I have received a copy of the Participant Information Sheet.

Signature of the Research Subject


Date

Name of the person explaining the consent


Date

APPENDIX XXVI


CTRI REGISTRATION



CTRI





CTRI Trial Registration Inbox x




 **adm-ctri@nic.in** via [nic.in](#)
to me

Dear Concerned,
Trial REF/2020/12/038975 has been registered. The registration number for this trial is CTRI/

Regards
CTRI Team

 **adm-ctri@nic.in** via [nic.in](#)
to Array

 Dear Concerned,
Trial REF/2020/12/038975 has been registered. The registration number for this trial is CTRI/

 G

 m

Regards
CTRI Team



Reply Reply all Forward

APPENDIX-XXVII

PAPER PRESENTATION CERTIFICATES

2021

NATIONAL VIRTUAL CONFERENCE



CERTIFICATE OF PRESENTATION

This is to certify that
Pratiti Haldar
Presented a paper titled
“A study to identify mothers perception of factors related to malnutrition in children in selected village of Nainital district Uttarakhand”

At the **National Virtual Conference** Organized by
Shri Guru Ram Rai University, College of Nursing, Patel Nagar, Dehradun, Uttarakhand
In collaboration with The Indian Red Cross Society, Uttarakhand State Branch
Held from 10th June to 11th June, 2021


Devendra Dass
Shri Mahant Devendra Dass Ji Mahara
CHANCELLOR
SGRRU


U.S. Rawat
Prof. U.S. Rawat
VICE CHANCELLOR
SGRRU

G. Ramalakshmi
Prof. G. Ramalakshmi
PRINCIPAL
COLLEGE OF NURSING

APPENDIX-XXVIII

PAPER PRESENTATION CERTIFICATES


 Faculty of Medicine and Health Sciences UMS
Universiti Malaysia Sabah (UMS)
Malaysia


 College of Nursing
Chettinad Academy
of Research and Education
(Deemed to be University)


CERTIFICATE OF APPRECIATION

This certificate is awarded to **Ms. PRATITI HALDAR JAMES** ✓ as a Delegate / Paper Presenter on ✓
"Closing the Gap in Nursing Teaching and Practice" for the International Inter-University Virtual Conference organized by
Chettinad College of Nursing, Chettinad Academy of Research and Education (CARE), INDIA and Department of Nursing,
Universiti Malaysia Sabah (UMS), MALAYSIA on 23rd & 24th, June 2021.

Research paper presented on : **Malnutrition in children and its associated risk factors**
Tamil Nadu Nurses & Midwives Council 7+2 CNE Credit Hour


Prof. Dr. Hamidah Hassan
Head of Nursing Department
FMHS, University Malaysia Sabah (UMS)
MALAYSIA


Prof. Dr. Hepsibah Sharmil S
Principal Chettinad College of Nursing
Chettinad Academy of Research and Education (CARE)
INDIA



e - Certificate

APPENDIX-XXIX

PUBLICATION

ISSN: 2320-5407

Int. J. Adv. Res. 10(02), 1124-1128

 <p>Journal Homepage: www.journalijar.com</p> <p>INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)</p> <p>Article DOI: 10.21474/IJAR01/14320 DOI URL: http://dx.doi.org/10.21474/IJAR01/14320</p> <p>ISSN NO. 2320-5407</p>	
---	---

RESEARCH ARTICLE

NUTRITION: A BOON TO HEALTHY EARLY CHILDHOOD

Pratiti Haldar¹, Dr. Lekha Viswanath² and Dr. Ashok Kumar Srivastava²

1. Ph.D. Research Scholar, Department of Nursing, Himalayan College of Nursing, Swami Rama Himalayan University, Jolly Grant, Dehradun, Uttarakhand.
2. Professor, Department of Obstetrics and Gynecological Nursing, Himalayan College of Nursing, Swami Rama Himalayan University, Jolly Grant, Dehradun, Uttarakhand.
3. Professor, Department of Community Medicine, Swami Rama Himalayan University, Jolly Grant, Dehradun, Uttarakhand.

Manuscript Info

Manuscript History
Received: 21 December 2021
Final Accepted: 24 January 2022
Published: February 2022

Key words: -
Nutrition, Childhood, Health, Mothers

Abstract

Food!! The word food itself holds a very important role in everyone's lives. The food we eat gives us the needed energy to pursue our daily activities and gives us the necessary strength to help boost our immunity. The importance of an adequate nutrition for children below three years cannot be ignored or cut short. The early nutrition practices in a child's life decides, the how; the latter years of life turn out. Therefore, it should be a fundamental right of a child to have good nutritional practices from day one. Exclusive breast feeding; since very long has been emphasized upon by Governments of various countries, medical practitioners and other involved in maternal and child health sector. If a child gets exclusive breast feed for six months, experts believe that it helps a child to grow healthy and also contributes to overall development of the child. Healthy Nutritional practices play a vital role in health of children especially in children below three years. Healthy nutritional practices are like the steps of a ladder, the stronger the steps the better is the climb for the child. Mothers or the primary care givers are like poles of the ladder which holds the steps together. Therefore, educating a mother or primary care giver about healthy nutritional practices becomes utmost necessity for any society.

Copy Right, IJAR, 2022. All rights reserved.

Introduction:-

Nutrition in early childhood days plays a significant role by balancing the holistic aspect of child i.e., physical, mental, social moral and spiritual area. A healthy child is not only a desire of every mother but is also an asset to the country. Inadequate amounts of nutritional intake for longer periods can lead to irreversible damage to child's growth.

During the early years of life children learn how, what and when to eat either through observation or by direct experiences. Thus, eating habits develop in the initial years of life.¹ Due to transition in the eating habits of children in all age groups it is very imperative to understand the factors contributing to this choosing behavior.² This will not only help to shape their eating habits in the early phase but will also make them healthy adults in future.

Corresponding Author:- Pratiti Haldar

Address:- Ph.D. Research Scholar, Department of Nursing, Himalayan College of Nursing, Swami Rama Himalayan University, Jolly Grant, Dehradun, Uttarakhand.

1124

Children's environment includes family and peers, offering them foods which are influenced by beliefs, society and media. This increases in complexity and variety throughout their life.³ Though eating habits and behavior are difficult to change directly but intervention focusing on parental feeding practices can potentially prevent unhealthy eating habits in children.⁴ Family plays a very significant role in maintaining healthy habits in the children from the beginning when the child learns to eat. Studies have shown that positive family system establishes and promotes beneficial healthy behavior in children through role modelling, providing healthy foods and involving children in healthy eating conduct.⁵

Thus, present review paper focuses on significance of nutrition in early years and methods to inculcate healthy eating habits in children.

Significance of Nutrition:

Good nutrition is fundamental to child's physical and mental development.⁶ A child entering into toddler phase (1-3 years) will steadily begin to have transition in eating habits as the demands of the body will increase due to growth and development.

During the early childhood years there is rapid development of the brain and it requires more than 20% of our daily energy intake. Thus, the food consumed by children has a direct impact on learning, memory and attentiveness. Hence, consuming right nutrients in adequate amount is essential for them as they explore the world around them. If the child skips the meals or doesn't take the right amounts of nutrients, it might affect their concentration and memory span in latter years of life.⁷

India stands highest with world's one-third population as Stunted [According to global nutrition report, 2018]. According to Global Hunger index, India has highest level of Wasting and as per Comprehensive Nutrition survey (CNNS) it is reported that 6.4% of children below 2 years have minimum acceptable diet (MAD).⁸ According to WHO MAD is one of the eight measurements for assessing infant and young child feeding (ICYF) practices⁹ and refers to Proportion of children 6–23 months of age who receive a minimum acceptable diet (apart from breast milk) and is calculated from following formula¹⁰.

$$\text{MAD} = \frac{\text{Breastfed children 6–23 months of age who had at least the minimum dietary diversity and the minimum meal frequency during the previous day}}{\text{Breastfed children 6–23 months of age}}$$

And

$$\text{MAD} = \frac{\text{non-breastfed children 6–23 months of age who received at least 2 milk feedings and had at least the minimum dietary diversity not including milk feeds and the minimum meal frequency during the previous day}}{\text{Non-breastfed children 6–23 months of age}}$$

- Indicators for assessing infant and young child feeding practices – Part 1, WHO

The remaining seven measurements includes: Early initiation of breastfeeding, Exclusive breastfeeding, Continuation of breastfeeding for one year, Introduction of complementary feedings, Minimum dietary diversity, Minimum meal frequency and taking iron rich diets.⁹ Inadequate intake of micro and macro nutrients during this phase will affect the growth and development leading to delay in mental and motor development further affecting the advance period of childhood along with recurrent phases of illness.¹⁰ The first five years of child development is considered as most vital phase of growth and development. As in this phase the child is considered to be most vulnerable to various health issues. Therefore, monitoring nutritional status in this age is considered as an important segment to track the health of child.¹¹

Moreover, in this age group i.e., from one to five years child is constantly in motion. The activities related to gross and fine motor area is high in toddler phase as they are experimenting their newly acquired physical strength. This in itself highlights the importance of energy giving and body building foods.

Healthy habits Inception:

Due to slower growth during these years, the appetite also slows. A child develops decreased interest in food and develops food jags i.e., refusing previously accepted food or asking same food at each meal.¹² Though there are various factors which play significant role in child's nutritional status like: maternal demographical factors i.e., age

of the mother¹³, poor nutritional status, duration of pregnancy, improper spacing, no antenatal checkups, complicated pregnancy, maternal height and weight and low Body Mass Index¹⁴ as these factors affect the fetus from the womb itself. Environmental factors^{15,16} like illiteracy in mother and father, low socio-economic status, overcrowded living and family, unemployment, use of addictive substances, working mothers, kucha house, hand pump water drinking, open drainage and open defecation indirectly affects the nutritional status. Birth related factors¹⁷ like Low Birth Weight (less than 2.5kg), certain cultural beliefs and dietary factors^[18-23] also play a significant role in development of malnutrition. Also, hygienic factors which are usually neglected are indirectly responsible for affecting the nutritional status of children.^[18,16,24,25]

Though, the afore mentioned factors affect a child's nutritional status indirectly or directly, the role of parents is still the most important factor responsible for developing healthy nutritional habits. Consequently, it is indeed the parents' fundamental responsibility to make a child eat healthy and nutritious food. And only if the parents remain persistent with a child regarding eating habits, the child will develop impeccable eating choices.

Once the children start developing taste, it becomes the responsibility of the parents to develop nutritionally conducive environment for them. This can be done by having same meal timing with children where the parents can manage child's behavior by interacting with them.²⁶ Studies have reported that this is directly linked to child's weight i.e., frequency of family meals and nutrient intake.²⁷ Diet quality is also linked with breakfast eating habits²⁸ and fast-food consumption²⁹ in children from early age. It is also known that children are good imitators, so it is important for adults also to have healthy eating habits. A study reports that children's intake of fruits, vegetables and milk increased after observing adults consuming the same foods.³⁰ Thus, positive social modeling also plays its own role in helping children develop healthy eating styles. Also, developing structure based or limit setting strategies such as limiting certain foods brought home or serving small portion without forbidding accessibility to these foods develop unhealthy eating habits.³¹

Other strategies include having: covert control i.e., buying only healthy foods and avoiding storing of unhealthy foods, avoiding use of food rewards specifically unhealthy food rewards, promoting self-regulation by recognizing fullness sense and serving moderate portion meals, adopting authoritative parenting style by encouraging them to try new foods and discouraging obesogenic environment (reducing intake of palatable snack foods), parents focused interventions (feeding related education and guidance to parents, social support) and family environment (Early-life experiences with healthy tastes and flavors may promote healthy eating, parental role in food shopping and preparation).³²

Conclusion:-

There are multiple factors which influence eating habits in children. It is the family that plays central figure in developing healthy habits of eating in children. Though, government has initiated various programs to combat undernutrition in children but this all will work for child only when there is collaboration. Parents need to educate and keep themselves update about the right foods for their children. As the times are changing and things are easily available, we need to teach our children to develop right selection of foods and right eating attitude. Intervention programs involving entire family should be focused upon and not just only teaching the mothers who are primary care givers.

Conflict of Interest:

None declared.

References:-

1. Ogden CL, Carroll MD, Curtin LR, McDowell MA, Tabak CJ, Flegal KM. Prevalence of overweight and obesity in the United States, 1999-2004. *Jama*. 2006;295(13):1549-1555
2. Nielsen SJ, Siega-Riz AM, Popkin BM. Trends in energy intake in U.S. between 1977 and 1996: similar shifts seen across age groups. *Obes Res*. 2002;10(5):370-378.
3. Cuellar J, Jones D.J., Sterrett E. Examining Parenting in the Neighbourhood Context: A Review. *J. Child Fam. Stud*. 2015; 24:195-219. doi: 10.1007/s10826-013-9826-y.
4. Finnane J.M., Jansen E., Mallan K.M., Daniels L.A. Mealtime structure and responsive feeding practices are associated with less food fussiness and more food enjoyment in children. *J. Nutr. Educ. Behav*. 2017; 49:11-18. doi: 10.1016/j.jneb.2016.08.007

5. Vandeweghe L., Moens E., Braet C., Van Lippevelde W., Vervoort L., Verbeken S. Perceived effective and feasible strategies to promote healthy eating in young children: Focus groups with parents, family child care providers and daycare assistants. *BMC Public Health*. 2016; 16:1045
6. UNICEF. Early childhood nutrition: Preventing malnutrition in infants and young children. Accessed on 28th Feb 2022. Available from: <https://www.unicef.org/nutrition/early-childhood-nutrition>
7. Kids club early childhood: development of mind, body, spirit. *Healthy Nutrition*. 2020. Available from: <https://www.kidsclubchildcare.com.au/the-importance-of-nutrition-in-early-childhood/>
8. Singh A. Malnutrition, Swasth India [Internet]. How Nutrition During First 1000 Days and Anaemia in Mothers Is Linked to Malnutrition in Children. 2020 Jan 10th [accessed on 6th May 2020]. Available from: <https://swachhIndia.ndtv.com/how-nutrition-during-first-1000-days-and-anaemia-in-mothers-is-linked-to-malnutrition-in-children-40625/>
9. INDDX Project (2018), Data for Diets: Building Blocks for Diet-related Food Security Analysis. Tufts University, Boston, MA. Accessed on 6 May 2020. Available from: <https://inddex.nutrition.tufts.edu/data4diets>.
10. Indicators for assessing infant and young child feeding practices: conclusions of a consensus meeting held 6–8 November 2007 [Internet]. USA: WHO; 2008, P. 1-26. Part – 1
11. WHO. Early child development – Nutrition and the early years [Internet]. Accessed on 6 May 2020. Available from: <https://www.who.int/topics/early-child-development/child-nutrition/en/>
12. L. Kathleen Mahan, Sylvia Escott Stump. *Food Nutrition and Diet Therapy*. Philadelphia. 2004
13. Sarkar S. Cross-sectional study of child malnutrition and associated risk factors among children aged under five in West Bengal, India. *International Journal of Population Studies*. 2016; vol.2(1): 89–102
14. Kaushal P, Chaudhary A, Girdhar S, Bansal P, Sharma S, Satija M. Prevalence and risk factors of under nutrition among under three children in an urban community in Ludhiana city. *Int J Community Med Public Health* 2019; 6:113-8
15. Dabar D, Yadav V, Goel AD, Mangal A, Prasad P, Singh M. Risk factors for undernutrition in under-five children living in a migrant populated area of South Delhi. *Journal of Family Medicine and Primary Care*. 2020;9:2022-7.
16. Ambadekar NN, Zodpey SP. Risk factors for severe acute malnutrition in under five children: a case control study in rural part of India. *Public health*. 2017; 142:136-143
17. Baranwal K, Gupta VM, Mishra RN, Prakash S. *Indian Journal of Community health*. July 2009-June 2010; 21(2), 22(1): p 13-17
18. Prashanth MR, Savitha MR, Prashantha B. Risk factors for severe acute malnutrition in under-five children attending nutritional rehabilitation centre of tertiary teaching hospital in Karnataka: a case control study. *International Journal Contemporary Pediatrics* .2017; 4:1721-6
19. Stalin P, Bazroy J, Dimri D, Singh Z, Senthilvel V, Sathyanarayanan. Prevalence of Underweight and its Risk Factors among Under Five Children in a Rural Area of Kancheepuram District in Tamil Nadu, India. *Journal of Dental and Medical Sciences*. 2013; 3(6): 71-74.
20. Ambadekar NN, Zodpey SP. Risk factors for severe acute malnutrition in under five children: a case control study in rural part of India. *Public health*. 2017; 142:136-143
21. Akhade KS, Sankhe LR, Akarte SV. Magnitude of malnutrition among under-five children in urban slums of commercial capital of India and its multifactorial causation: A community-based study. *Journal of Family Medicine Primary Care*. 2019; 8:3865-70
22. John JM, John JS. Prevalence and risk factors associated with underweight among under-five children in a rural area of Puducherry. *Muller J Med Sci Res* 2018; 9:7-11.
23. Senthilkumar SK, Chacko TV, Suvetha K. Nutritional status assessment of children aged 0-5 years and its determinants in a tribal community of Coimbatore district. *International Journal of Community Medicine and Public Health*. 2018; 5:2835-45
24. Meshram II, Mallikharjun Rao K, Ch Gal Reddy et al. Prevalence of Under Nutrition and its Predictors among Under 5 Year Children in Surat Region, Gujarat, *Indian Journal of Clinical Nutrition and Diet*. 2016 2:1
25. Sethy G, Jena D, Jena P, Pradhan S, Biswas T. Prevalence of malnutrition among under five children of urban slums of Berhampur, Odisha, India: a community based cross-sectional study. *Int J Contemp Pediatr* 2017; 4:2180-6
26. Le Heuzey M.F., Turberg-Romain C. Nutri-Bébé Survey 2013: Behaviour of mothers and young children during feeding. *Arch. Pediatr*. 2015; 22:20–29
27. Fayet-Moore F., Kim J., Sritharan N., Petocz P. Impact of breakfast skipping and breakfast choice on the nutrient intake and body mass index of Australian children. *Nutrients*. 2016; 8:487. doi: 10.3390/nu8080487

APPENDIX-XXX

PUBLICATION

122 *Indian Journal of Forensic Medicine & Toxicology, April-June 2022, Vol. 16, No. 2*

Early Childhood Malnourishment and its Associated Factors - Uttarakhand

Pratiti Haldar¹, Lekha Viswanath², Ashok Kumar Srivastava³

¹Ph.D. Research Scholar, Department of Nursing, ²Professor, Department of Obstetrics & Gynecological Nursing, Himalayan College of Nursing, ³Professor, Department of Community Medicine, Swami Rama Himalayan University, Jolly Grant, Dehradun, Uttarakhand

Abstract

Malnutrition, a word which seems to shake our roots and disturb our future. Today the underdeveloped and many developing countries are battling this threat in many ways. The reason behind malnutrition is the determinants which make it prevail in our neighborhood and our country on the whole. Malnutrition possess a very serious threat to the future of our country especially the children between (1 – 3) years of age. This paper attempts to identify the existing prevalence of malnutrition in Uttarakhand, to explore the predisposing factors contributing to it in under five children and compare the prevalence with the selected neighboring states. An in – depth survey of all the related literatures and published articles in the selected area was made. It has been reported in recent times about the hike in India's hunger problems and the number of reported cases of stunting and wasting has also rocketed though underweight has slightly reduced. The only way to curb malnutrition is by; breaking the shackles of the determinants, thorough regular surveys and screenings, improved and adequate health care services, reaching out to the needy and spreading awareness among the masses.

Keywords: Malnutrition, Stunting, Wasting, Underweight, Children

Introduction

Children; the purest souls, are the most vulnerable section of a society. They are considered to be the future of any country and the pillars upon which the country projects its existence. Therefore, it becomes imperative for any country to focus more on this vulnerable section of the society. Only a healthy child can help in building a healthy country of the future.

A person's demands for nutrition varies according to his age.^[1] Nutrition is one important aspect in child's development apart from genetic and environmental factors. It plays a very significant role in early years of child development. It not only prepares the child to combat opportunistic infections and diseases, but lays a strong foundation for a healthy future. Child's development begins from conception itself thereby emphasizing nutrition importance during pregnancy which affects the overall child development too.^[2] In most literature studied, under nutrition is used synonymously with malnutrition.

Malnutrition refers to deficiencies, excesses, or imbalances in a person's intake of energy and/or nutrients. It refers to three broad groups i.e. under

Corresponding author:
Ms. Pratiti Haldar
Ph.D. Research Scholar,
Department of Nursing,
Himalayan College of Nursing, Swami Rama
Himalayan University, Jolly Grant, Dehradun,
Uttarakhand

nutrition (weight for age), stunting (Height for age) and wasting (weight for height).^[3] Malnutrition cause is multifaceted in early childhood and is also related to socioeconomic and sociodemographic factors.^[4] Globally in the year 2020 it was found that 149.2 million children under the age of 5 years of age were stunted, 45.4 million wasted, and 38.9 million overweight.^[5]

According to recent reports, there has been a tremendous surge in levels of hunger and stunting in spite of India's economic growth. In Global Hunger Index 2020, India ranked 94th among 107 countries.^[6] According to NFHS-4, 36% under-five children are underweight, 43.3% are stunted and 24.5% are wasted. In Uttarakhand, the prevalence of underweight, stunting, and wasting as per NFHS-4 is 26.6%, 33.5%, and 19.5%, respectively and is more in rural than in urban areas.^[7] The hilly state Uttarakhand is located in northwestern part of the country. It has varied topography and is divided into two regions i.e. Garhwal and Kumaon. It has total of nine districts^[8] and the population is sparsely distributed, majority being rural.^[9] Subject to the terrain the health services are not as good as other parts of India. Uttarakhand state was found to be ranked 18th among 29 states, an indication of its indifferent health and was found to perform worse in health.^[10] The present review focuses on the prevalence and predisposing factors causing malnutrition in early childhood years specifically in the age group of (1-3) years in Uttarakhand. This review will help to consolidate the available published literature on prevalence and factors contributing to malnutrition which may help

to strengthen the programs and spread awareness to counter the menace of malnutrition in children.

Methodology

The literature regarding prevalence and factors associated to malnutrition was collected from Google search engine, Google Scholar, Pubmed and Published reports and articles. The objectives of the review were: existing prevalence of malnutrition in Uttarakhand, to explore the predisposing factors contributing to it in under five children and compare the prevalence with the selected neighboring hilly states. The neighboring states were Himachal Pradesh and Jammu and Kashmir.

Only open accessed articles were retrieved. The keywords used for search were: "malnutrition", "under nutrition", "under five children", "factors", "Uttarakhand". The literature published from 2011 till date was searched. About 518 articles were shortlisted from the electronic database. After assessment of title and abstract 514 articles were excluded. The reference list also was examined. In addition 4 studies were added from other sources. The relevant studies included for the final review based on inclusion and exclusion criteria were 7 studies. The inclusion criteria for review were: Original research studies published between 2011 to 2021, cross sectional and epidemiological studies, study conducted among children below five years of age in Uttarakhand. All the papers used the height for age, weight for height and height for age criteria for assessment of nutritional status in under five children. The process of study selection is shown in below mentioned Fig.1.

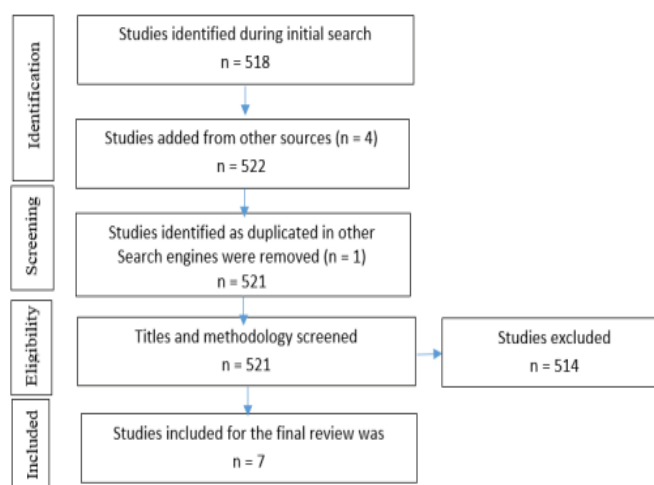


Fig.1. Flow diagram for study selection process

The review is presented in the following headings: prevalence of malnutrition in Uttarakhand, factors predisposing to malnutrition in under-fives and comparison of prevalence with the selected neighboring hilly states.

Prevalence of malnutrition in under-fives of Uttarakhand:

The studies on prevalence of malnutrition in under-five children was evaluated and results found were: in Rishikesh underweight, stunting and wasting was 37.3%, 43.3% and 24.5% respectively^[11], in Haridwar 44.82% stunted and 51.72% were underweight^[12], in Kashipur it was found that about 27.27% and 54.55% children in the age group of (0-5) years were found malnourished in mild to moderate category^[13] and in Dehradun it was found that 200 (52.5%) children having exclusively breast fed were undernourished^[14]. In another study conducted in Dehradun among toddlers regarding socio economic correlates and under nutrition it was found that 61.78% children belonging

to lower socio economic status were undernourished, 75.50% of undernourished children had uneducated fathers and 73.30% had illiterate mothers.^[15] A study of co-morbidities in children conducted in Dehradun found that 298 (59.6%) children with co morbidities were under nourished^[16] and in study conducted in rishikesh it was found 27.38% children were under weight for their age, 52% were stunted and 17.84% were wasted^[17].

As per swasth report of Uttarakhand, it was found that there has been 10.9% drop in cases of stunting in children under 5 years of age. Also there has been 11.9% decline of underweight in children below 5 years. But there has been minor increase of 0.7% in wasting cases of NFHS -4 data when compared with NFHS - 3 data.^[18] It is not only the intake of diet which will help to solve this problem of under nutrition in early years of life but also other contributing factors. Table 1. Summarizes the prevalence of under nutrition in children under 5 years of age.

Table.1. Prevalence of under nutrition in children under five years of age.

Ref. No.	Year	Setting	Sample size	Design	Identified Prevalence
1.	2020	Rishikesh	400	Community-based Cross-sectional	Urban vs rural areas: Underweight (40.5% vs 35.0%) and 46.5% vs 40.0%, respectively. Wasting more in urban (27% V/s 22.0%) than rural areas
2.	2018	Haridwar	85	Epidemiological Study	44.82% stunted and 51.72% were underweight
3.	2016	Kashipur	100 families and 33 children (0-5) years	Cross-sectional	Out of 33 children in 0-5 age group 27.27% and 54.55% were malnourished in mild to moderate category.
4.	2016	Dehradun	381	Cross-sectional	About 47.5 % children exclusively breast fed were well nourished whereas 52.5% were undernourished.
5.	2016	Dehradun	507	Cross-sectional	Children belonging to lower class were undernourished (61.78%), maximum (88.44%) proportions of children living in poor environment were found to be undernourished
6.	2014	Dehradun	500	Cross-sectional	Out of 500 children, 202 (40.4%) were well nourished and 298(59.6%) were under nourished with or without co morbidities
7.	2012	Rishikesh	695	Cross-sectional	About 27.38% children were under weight, 52% were stunted and 17.84% showed wasting

Predisposing factors of Malnutrition:

A varying number of factors lead to malnutrition in children. The studies reviewed in Uttarakhand depicted several factors that affect the nutritional status of children under five years of age. The factors have been categorized into socio demographic factors, child related factors and environmental factors.

Socio demographic factors:

The prevalence of underweight and stunting was found higher in children belonging to families of low socio economic status i.e. 47.50% and 40%.^[12,19] The educational status of parents also had a negative impact on nutritional status of children i.e. illiterate parents had more percentage of malnourished children.^[11, 12,18] Occupation of parents^[11,17,19] and size of family^[19].

Child related factors:

Underweight/low birth weight and prematurely born children were found to be more malnourished^[11,12], exclusive breast feeding, timely

complementary feeding^[14] Anemia^[12,17] and birth order were other significant factors leading to malnourishment in children.^[12] Birth interval between children less than 2 years, not immunized children, inadequate dietary intake and monotonous diet, worm infestations, repeated illness like diarrhea, fever and cough and cold also found to be one of the significant factors leading to malnourished children^[11,17].

Environmental factors:

Poor physical environmental factors like housing, overcrowding, lighting and ventilation have an important effect on the health status of the child.^[19] The present environmental factors identified in Uttarakhand were also found in the neighboring states i.e. A study conducted in Sirmour district HP found that malnutrition was associated with the type of house, number of rooms, unsafe drinking water and lack of transport facilities.^[20] Another study conducted in Jammu and Kashmir in Doda district highlighted the significant environmental factors: nature of house, type of cooking area, cooking fuel and toilet facility at home as significant factors related to malnutrition

in children^[21]

Comparing prevalence with the neighboring hilly states:

The available data regarding prevalence of malnutrition in under-five children of Uttarakhand is very less. Very few studies on malnutrition in children have been undertaken in this area and when it is compared with another hilly state it was found that the status of malnutrition is almost similar when compared with Himachal Pradesh. A study conducted in Sirmour district of Himachal Pradesh found that 40% of under-five children were Stunted, 19.5% were Wasted and 10.48% were Stunted and Wasted.^[20] Another study conducted in Kinnaur district of Himachal Pradesh found that prevalence of Underweight, Stunting and wasting was 21.4%, 27.4% and 11.1% respectively in under-five children.^[22] A study in the state of Jammu and Kashmir found the prevalence of malnutrition 20.87% in under-five children of which 14.56% had Grade I, 5.83% and Grade II malnutrition.^[23] Another study conducted in the Gujars population of Jammu and Kashmir found that 10.75% of children were suffering from Grade I malnutrition, 17.5% with Grade II, 19.91% with Grade III and even 2.21% with Grade IV.^[24] The prevalence reported in these studies when compared with the above mentioned studies in Uttarakhand can be interpreted that in Uttarakhand the percentage of malnutrition in children under-five is higher compared to Himachal Pradesh and Jammu and Kashmir. But according to NFHS - 4 data 2015-16, the prevalence of malnutrition in Uttarakhand for Underweight, Stunting, and Wasting reported was 26.6%, 33.5%, and 19.5%, for Himachal Pradesh it was 36.5%, 38.6% and 19.3%^[25] and for Jammu and Kashmir was 16.6%, 23.2% and 13.7%^[26] respectively. Thus, it can be summed up that the status of malnutrition is more or less in the same alarming and despairing situation.

The data regarding malnutrition in under five children specifically in hilly areas is very less but the data reported by NFHS says a lot. The studies

conducted in Uttarakhand were limited to only prevalence and factors. There are many more hilly terrains that needs to be accessed and the status of child's nutrition needs to be assessed. The factors identified and reported in the above studies conducted in Uttarakhand are the factors which can be modified through various awareness programmes. But along with the awareness programs it also necessary to have in depth identification of other factors grounded in the culture and beliefs which thou cannot be changed easily but through constant visiting and education campaigns can be modified. Also, it should not be the mother who should be involved but the entire family.

Conclusion

The first 1000 days in child's life is considered to be an important phase. In this phase steps can be taken to combat malnutrition thereby preventing harm in near future.^[27] As the child enters the toddler phase the brain development accelerates thereby enabling the child to refine his fine motor skills and perform difficult tasks.^[28] Micronutrients play a very significant role in development of brain in this early phase and iron is one of the most important of them, deficiency of which can cause depression and anxiety in later phases of life.^[29-32] Though poor nutrition is one of the major cause of malnutrition there are various other predisposing factors which directly and indirectly effect the health status of child in first five years of life. The data regarding factors contributing to malnutrition in the toddler age group has not been addressed much and needs to be explored, so that it can be dealt at a very initial stage itself with proper guidance to mothers and other family members. It is very important as some factors are modifiable, which can be modified thereby preventing prevalence in older age. Socio – cultural and behavioral factors also play a significant role in increasing the incidence of malnutrition. It is difficult to change beliefs or practices, as every geographic location in India has their own characteristic which may differ from one place to another, but with a stronger integrated approach it can be dealt effectively in bringing a change. It is therefore important to develop

intervention strategies keeping in view the cultural practice and beliefs of people residing in that area which will help in reducing shackles of malnutrition in near future.

Ethical Clearance: Taken from Ethical committee Swami Rama Himalayan University, Dehradun

Source of Funding: Self

Conflict of Interest: Nil

References

1. Maleta K. Undernutrition. *Malawi Med J.* 2006; 18:189–205. [PMC free article] [PubMed] [Google Scholar]
2. Chulack A. Early childhood development [Internet]. The Importance of Nutrition in Early Childhood Development. 2016 September [accessed on 6th May 2020]. Available from: <https://novakdjokovicfoundation.org/importance-nutrition-early-childhood-development/>
3. WHO. Malnutrition [Internet]. Published on 9th June 2021, Accessed on 15th June 2021. Available from: <https://www.who.int/news-room/fact-sheets/detail/malnutrition>.
4. Ghazi HF, Mustafa J, Aljunid S, Zaleha I, Abdalqader M. Malnutrition among 3 to 5 Years Old Children in Baghdad City, Iraq: A Cross sectional Study. *Journal of Health Population and Nutrition.* 2013;31(3):350-5.
5. WHO. The UNICEF/WHO/WB Joint Child Malnutrition Estimates (JME) group released new data for 2021 [Internet]. Published on 6th May 2021, Accessed on 15th June 2021. Available from: <https://www.who.int/news/item/06-05-2021-the-unicef-who-wb-joint-child-malnutrition-estimates-group-released-new-data-for-2021>
6. Chatterjee P. India's child malnutrition story worsens. *The Lancet Child & Adolescent Health.* 2021;5(5):319-320
7. State Fact Sheet: Uttarakhand. NFHS – 4. [Accessed on 15th June 2021]. Available from: http://rchiips.org/NFHS/factsheet_NFHS-4.shtml.
8. Bisht B. Uttarakhand districts [Internet]. eUttaranchal. Updated 4th March 2021, Accessed on 23rd June 2021. Available from: <https://www.euttaranchal.com/uttarakhand/districts-in-uttarakhand.php>
9. Mathur RB. Uttarakhand [Internet]. *Encyclopedia Britannica.* Published on March 21, 2018, Accessed on 15th June 2021. Available from: <https://www.britannica.com/place/Uttarakhand>.
10. Poll-bound Uttarakhand Has Children with Poor Health [Internet]. New 18. [Published 9th Feb 2017. Accessed on 15th June 2021]. Available from: <https://www.news18.com/news/lifestyle/health-and-fitness-poll-bound-uttarakhand-has-children-with-poor-health-1346970.html>
11. Singh M, Rehan A, Kishore S, Jain B, Reddy NK, Kumar D, et al. A study to assess undernutrition and its sociodemographic correlates in under-five children in urban and rural areas of Rishikesh, Uttarakhand. *Journal of Family Medicine and Primary Care.* 2020;9(9):4980
12. Deepshikha, Rai A K, Gupta G and Garg G P. An Epidemiological Study of Nutritional Status among Children in Haridwar, Uttarakhand, India. *International Journal of Ayurveda and Pharmaceutical Chemistry.* 2018;8(2): 95-102
13. Kulshrestha K, Pandey A, Joshi D. Correlates of childhood malnutrition in rural population of Kashipur, Uttarakhand. *International Journal of Applied Home Science.* 2016; 3(5&6): 184-189
14. Sinha R, Kakkar R, Kandpal SD. A Study on the Feeding Practices among Under-Five Children in Urban Slum dwellers of District Dehradun, India. *Bangladesh Journal of Medical Science.* 2016; 15(1):15-19
15. Vyas S, Kandpal SD, Semwal J, Deepshikha. A study on undernutrition and its socioeconomic correlates among toddlers in a rural area of

- Uttarakhand, India. *Int J Community Med Public Health* 2016;3:1043-8.
16. Vyas S, Kandpal S D, Semwal J, Deepshikha. A Study on Morbidity Profile and Associated Risk Factors in a Rural Area of Dehradun. *Journal of Clinical and Diagnostic Research*. 2014;8(8):1-4
 17. Jain N K, Mangal V, Mishra A, Ritu. Study of protein energy malnutrition cases in slums of Rishikesh. *International Journal of current research*. 2012;4(11):63-66
 18. Global Hunger Index (2019) India [Internet]. Published on October 2019. Accessed on 8th May 2020. Available from: <https://www.globalhungerindex.org/india.html>
 19. Vyas S, Kandpal SD, Semwal J, Deepshikha. A study on undernutrition and its socioeconomic correlates among toddlers in a rural area of Uttarakhand, India. *International Journal of Community Medicine and Public Health*. 2016; 3:1043-8.
 20. Devi P, Kaur S. An exploratory study to assess the prevalence and risk factors of malnutrition among under-five children residing in selected rural areas of district Sirmaur, Himachal Pradesh. *BLDE University Journal of Health Sciences*.2019;4:7-10.
 21. Katoch O M, Sharma A. Socioeconomic Factors, Living Conditions and Child Undernutrition among School going Children in Rural Areas of district Doda, Jammu & Kashmir, India: A Preliminary Study. *Indian Journal of Nutrition*. 2016;3(1):123
 22. Singh H, Gupta A, Sachdeva A, Barall D, Kumar D, Singh S. Nutritional status of 1-5 years children in a hilly tribal district of north India [Internet]. *International Journal of Contemporary Medical Research*. [cited 2021 Jun 18]. Available from: https://www.ijcmr.com/uploads/7/7/4/6/77464738/ijcmr_1076_dec_10.pdf
 23. Gupta S, Dinesh K. An Intervention Study in Malnutrition among Under Five Children in a Rural Area of Jammu. *J K Science*.2013;15(2):73-76
 24. Rather GM, Fayaz S. Malnutrition among school children (0- 14 years) of gujars of great Kashmir Himalayan range (J & K state) [Internet]. *International Journal of Scientific and Research Publications*.2015;5(3):1-12
 25. State Fact Sheet: Himachal Pradesh. NFHS – 4. [Accessed on 18th June 2021]. Available from: http://rchiips.org/nfhs/pdf/NFHS4/HP_FactSheet.pdf
 26. State Fact Sheet: Jammu and Kashmir. NFHS – 4. [Accessed on 18th June 2021]. Available from: http://rchiips.org/nfhs/FCTS/JK/JK_Factsheet_21_Jammu.pdf
 27. Singh A. Malnutrition, Swasth India [Internet]. How Nutrition During First 1000 Days And Anaemia In Mothers Is Linked To Malnutrition In Children. 2020 Jan 10th [accessed on 6th May 2020]. Available from: <https://swachhindia.ndtv.com/how-nutrition-during-first-1000-days-and-anaemia-in-mothers-is-linked-to-malnutrition-in-children-40625/>
 28. Nutrition in the first 1,000 days: A Foundation for Brain Development and Learning[Internet]. Accessed on 8th May 2020. Available from:https://thousanddays.org/wp-content/uploads/1000Days-Nutrition_Brief_Brain-Think_Babies_FINAL.pdf
 29. Hamner, H.C., Perrine, C.G. & Scanlon, K.S. (2016). Usual Intake of Key Minerals among Children in the Second Year of Life, NHANES 2003–2012. *Nutrients*, 8(8):468.
 30. Wachs, T.D., Georgieff, M., Cusick, S. & McEwen, B.S. (2013). Issues in the timing of early interventions: contributions from nutrition, neuroscience, and psychological research, *Annals of the New York Academy of Sciences*, 1308:89-106.
 31. Beard, J.L. & J.R. Connor. (2003). Iron Status and Neural Functioning, *Annual Review of Nutrition*, 23: 41-58.
 32. Lozoff, B. et al. (2006). Long-Lasting Neural and Behavioral Effects of Iron Deficiency in Infancy. *Nutrition Review*, 64(5 Pt 2): S34–S91.