

## **CHAPTER 2**

### **REVIEW OF LITERATURE**

**“Asking, ‘Why’ is the key to everything. Question always. Answer the Why”**

*Vickie Gould*

Literature review refers to reviewing or looking again what has already been written about the area of research and is a brief discussion about merits and weaknesses literary work. Critical appraisal of previous studies is important not only thorough understanding of problems but also to find the lacunae and explore the unexplored areas. It provides background for the problem the researcher is interested.

#### **Review Questions**

1. What is the status of nutrition in children below five years of age?
2. What are the risk factors contributing to nutritional status?
3. What is mothers' knowledge level regarding nutrition for under-five children?
4. In order to maintain nutritional status of their children how does the mothers practice?
5. How are the intervention programs effective in managing child's nutritional status?

For broader understanding of the current area of research comprehensive review about other works done in this area was taken up from journals, books, internet sources, web pages and online electronic databases like SCIENCE DIRECT, PROQUEST, GOOGLE SCHOLAR, PUBMED etc.

## **Review Layout**

1. Nutritional status of under-five children
2. Risk factors related to malnutrition in under-five children
3. Nutritional knowledge and nutrition related practices of mothers of under-five children
4. Effectiveness of intervention programs on nutritional status

## **Nutritional Status of Under-Five Children**

Feeding child during the initial two years of life is vital for growth, development and his existence in the later years of life.<sup>86</sup> Adequate nutrition in infancy and early childhood helps to meet the requirements of exponential growth as well as development.<sup>87,88</sup> Insufficient nutrition not only deprives the child from essential nutrients but also reduces the immunological capacity of the child to fight against infections. This also alters their mental and physical capacity.<sup>89-91</sup>

According to UNICEF-WHO world bank group Joint Malnutrition 2021 edition, it was estimated that though proportion of stunting has reduced since 2000 but still many children (one in five) – about 149.2 million children under five years were found stunted in 2020 and 45.4 million children were wasted. It was also reported that worldwide 22% or more children below five years were stunted.<sup>92</sup>

According to Global Nutrition Report (WHO,2021) it was stated that about one fourth children below five years were stunted. Also, underweight was stated to be continuous issue in poor countries and it may be ten times higher in rich countries.<sup>93</sup> Malnutrition rates varies from developed to developing countries.

According to Global Nutrition report (Australia, 2021), the prevalence of stunting and wasting reported was lowest in the world. Also, the report mentioned that the latest data shows 0.0% children affected with wasting.<sup>94</sup> In USA, as per a report by UNICEF (2019) it was reported that one in five children were either stunted, wasted or overweight. The report also highlighted that introduction of wrong diet and inadequate feeding practices has affected the growth of the children.<sup>95</sup>

The condition of nutritional status of children below five years is worse in developing countries when compared to developed countries.<sup>96-98</sup> As per reports of Joint Malnutrition Estimate (2021) the prevalence of wasting was highest in Southern Asia of any sub region in the world. About 25% (in millions) i.e., more than half of the children living in Southern Asia are affected by wasting. The report also highlighted those upper middle countries have halved the number of children affected with stunting. According to World Bank income reports (2020), in low-income countries the prevalence for wasting and stunting was 34.6 million and 6.9 million, middle income countries was 21.8 million and 6.8 million and in high income countries was 3.4 million and 0.4 million respectively.<sup>99</sup>

To identify the prevalence of malnutrition a cross-sectional study was done in Ethiopia. The findings revealed that out of 820 children aged 6-59 months studied, about 47.6% were stunted, 30.9% underweight and 16.7% were wasted. Multi stage random sampling method was used in which out of 19 kebeles, six kebeles were randomly selected followed by which proportionate sampling was done. Anthropometric measurements were done by calibrated weighing machine and horizontal wooden board which was then interpreted by WHO standards. Mengistu et al. concluded that nutrition education, community-based nutrition

program should be undertaken and continuous attention should be mandatorily done to observe exclusive breast feeding. Apart from this there should be collaboration of Woreda health office with other sectors.<sup>100</sup>

As per the study by Rollet et al. undernourishment is a complex condition that is affected by range of factors contributing to child's nutritional status. A cross-sectional study was done by them in Milot, Haiti in 358 children of (0-14) years of age. The aimed to know the prevalence of malnutrition in local area which will help to design and plan interventions. Door to door home visiting was done and weight and height were assessed using stadiometer and weighing machine. Results showed that about 14.8% children below the age of five years were stunted, 12.3% were wasted and 16.1% were underweight. The researchers concluded saying that follow up studies are required for identifying other determinants affecting child's nutritional status. Qualitative studies on perception and behaviors relating to undernutrition and longitudinal studies on impact of intervention can be done.<sup>101</sup>

The condition of nutritional status is shoddier in India. Though India is on course to meet the targets but as per Global Nutrition Report–Country profile 2020, 34.7% children below five years are stunted. This is higher than average for Asian regions (21.8%). There was no progress reported towards achievement of target for wasting i.e., 17.3% of children were wasted which is higher the average for Asia region (8.9%).<sup>102</sup>

According to NFHS-5 data, India had a greater number of stunted children in rural areas (37.3%) in comparison to urban areas (30.1%). It also stated that though stunting has reduced from 38.4% to 35.5% and underweight from 35.8% to 32.1% still there is long way ahead. The report also mentioned that only 11.3% children in

the aged 6-23 months receive adequate diet.<sup>103</sup> Despite of programs since 1975, like ICDS and midday meal schemes, India is still grappling with high rate of undernutrition.<sup>104</sup>

Priyanka et al. studied the status of nutrition in under-five children in Thrissur district, Kerala. The study adopted a cross-sectional design and 360 children were screened to assess their nutritional status. The sampling method used was cluster sampling. Results found that underweight and stunting prevalence was 28.3% and 14%. It was reported that this prevalence was high in children aged 48-60 months and 12-35 months. It was emphasized that adequate care of mothers during pregnancy, care of newborn and infant, exclusive breast feeding, immunization of children and following proper dietary practice will help to fight against this problem of malnutrition.<sup>105</sup>

A study by Senthilkumar et al. reported the overall prevalence of malnutrition in 206 children aged 0-5 years was 41.3% and 11.2% for underweight and severely underweight. About 32.5% children were stunted and 21.8% were wasted. For the present study cross-section design was selected with the aim to identify prevalence and determinants of malnutrition. Door-to-door home visiting was done in villages of Coimbatore district, Tamil Nadu. The study concluded that poverty was the basic problem for impaired nutritional status them. Improvement in pre-existing policy will help to improve the nutritional status of children.<sup>106</sup>

Another cross-sectional study was conducted with the objective to identify the prevalence of malnutrition in under-five children in rural areas of Northern India. Two blocks were randomly selected from district Meerut. About 70 villages were covered by door-to-door screening of children aged 6-60 months. Anthropometric

measurements were done and compared with WHO z-scores. Out of 18463 children screened it was identified that 2254 (12.2%) had z-score below  $-3$  SD, 5515 (29.9%) children ranged from  $< -3$  SD to  $-2$  SD, and 6822 (36.9%) between  $< -2$  SD and  $-1$  SD. For stunting 3017 (16.2%) children had z-score  $< -3$  SD, 5418 (29.1%) were between  $< -3$  SD to  $-2$  SD and 5950 (32.0%) between  $< -2$  SD and  $-1$  SD. Bhadoria et al. concluded that upgradation of educational standards and economic development will help to decrease the prevalence of malnutrition in children.<sup>107</sup>

A systematic review and meta-analysis was done by Ansuya et al. to determine the pooled estimate of prevalence of malnutrition in preschool children, Karnataka. International and national descriptive studies, cross sectional and epidemiological studies were searched. Of 2183 studies, 24 articles were included as per inclusion and exclusion criteria. Of which, 19 articles were categorized for prevalence of undernutrition as per WHO and IAP classification. For WHO, the pooled prevalence was 44% with 95% CI (0.38,0.49), stunting 35% with 95% CI (0.31 – 0.40) and wasting 28% with 95% CI (0.17,0.38). The pooled prevalence as per IAP classification was 41% with 95% CI (0.23,0.59). It was concluded that the prevalence is still high in under-five children and there is need to identify the risk factors which will help to plan and reduce future morbidities in children.<sup>108</sup>

When it comes to hilly regions of Garhwal, only 1/5<sup>th</sup> children are found to be nutritionally adequate.<sup>109-112</sup> According to NFHS-4 data (2015–16) the prevalence of underweight, stunting and wasting in children below five years of age in Uttarakhand was 26.6%, 33.5% and 19.5% respectively and these were high in the rural areas than in urban.<sup>113</sup> It was further reported that quarter of newborns delivered are underweight which reflects undernutrition in mothers (18-59) years having body

mass index less than 18.5. This rationalizes that mothers' and children in Uttarakhand do not receive appropriate medical treatment from public health.<sup>114</sup>

A study by Vyas et al. reported the prevalence of undernutrition in children below three years by correlating with family related variables. The design selected was cross section design and mother – child pair were recruited with the purpose to identify the prevalence of malnutrition and the risk of family related variables. The study done in Rural Health Training Centre (RHTC) of Dehradun. Anthropometric measurements of children were done and interview was conducted among mothers. The study results showed that out of 500 children, majority of the children (61.78%) belonging to lower caste were malnourished. Illiterate parents had higher number of undernourished children and similar pattern was observed for stunting. Significant association was found for religion ( $\chi^2 = 9.97, p < 0.05$ ), family type ( $\chi^2 = 7.60, p < 0.05$ ), family size ( $\chi^2 = 69.9, p < 0.05$ ), socio economic ( $\chi^2 = 6.88, p < 0.05$ ), fathers and mothers' education ( $\chi^2 = 22.7, \chi^2 = 27.3, p < 0.05$ ) as well as fathers and mothers' education ( $\chi^2 = 27.3, \chi^2 = 9.84, p < 0.05$ ). The study concluded that better education/ literacy among mothers can improve the nutritional status of their children. This will also help them to be more alert regarding available health facilities and will also bring acceptance to avail them for their betterment.<sup>77</sup>

Another study done by Deepshikha et al. among 84 under-five children depicted that prevalence of underweight was 36.9% and stunting was 39.28%. This epidemiological study was conducted in Balroga OPD, Haridwar, Uttarakhand. The data was interpreted based on growth standards given by Indian Academy of Pediatrics. The study concluded that focus should be given first to root causes of malnutrition i.e., illiteracy, low birth weight children, rural background and anemia.

This will help to build healthy and optimally well-nourished children.<sup>115</sup>

Malnutrition in children below five years is a doorway to life having major delay in physical and cognitive developments. Most of the studies mentioned above depicted the state of malnutrition in under-five children on global, national and local level is very high. Almost all the studies recommended intervention for these identified malnourished children and their mothers. Intersectoral coordination was also emphasized in one of the studies to combat the poor state of nutrition in children.

### **Risk factors related to malnutrition in under-five children**

In the studies mentioned above it was seen that state of nutrition in children below five years is very poor globally. Malnutrition is one of the main cause of morbidity as well as mortality in lower middle-income countries.<sup>116-118</sup> Though the reasons of undernourishment are multifaced and numerous but poverty was known to be prime cause of undernourishment.<sup>119-121</sup> Also, a study by Bain et al. reported food insecurity, parental education, poverty, change in the climatic conditions, socio economic disparities are other causes of undernourishment in children.<sup>122</sup> Studies done previously also reported that diarrhea, acute respiratory infections, pneumonia, birth asphyxia, premature births,<sup>123,124</sup> household food insecurity,<sup>125,126</sup> mothers' education<sup>127,128</sup> and no consumptions of vitamin supplements as principal causes of malnutrition.<sup>129</sup>

A cross-sectional study was done by Sondai et al. to assess socio economic, demographic characteristics and health related conditions contributing to malnutrition in children below five years. It was done in Bocity, Sierra. About 100



mother and child pairs were selected by systematic random sampling. Mothers were interviewed and anthropometric measurements for children was done. The results showed that 31% children were moderately malnourished and 17% were severely malnourished. The socio-economic factors identified for malnutrition were: educational status of parents, awareness of parents, meals taken by child in 24 hours, employment status, breast feeding practices, alcohol consumption by mothers. The health-related factors identified were: antenatal consultations, immunization, vitamin A supplementation and institutional delivery. The study suggested that improving household security and emphasizing on education-based interventions will help to reduce prevalence of malnutrition in children.<sup>130</sup>

Another cross-sectional study done by Humbvali et al. in Angloa, Africa reported diarrhea (PR 1.39 [95% CI: 1.07,1.87]) and household child's death (PR 1.52 [95% CI: 1.01,2.29]) was related with underweight as well as stunting. Distal and intermediate factors identified to be associated were: care giver other than mother was related to high prevalence of stunting i.e., 43% (PR 1.42 [95% CI: 1.10,1.84]), working mothers was related to decreased prevalence (PR 0.55 [95% CI: 0.34,0.89]) and lag in prenatal services increased the prevalence of underweight by 20% (PR 1.20 [95% CI: 1.03,1.40]). Study concluded that due to lack of individual factors in the present study, collaborative effort between government, community as well as non-governmental organization will help to enhance the nutritional status of children.<sup>131</sup>

A case control study was done to identify factors related to malnutrition in under-five children of Kenya. Cases were consecutively recruited and controls were recruited by systematic random sampling. In the ration of 1:3, 94 cases and 281

controls were recruited in the study. The results showed that birth order of five or more (OR = 2.3; 95% CI: 0.9,6.0), residing in urban area (OR = 1.9; 95% CI: 0.8,4.3), parents with non-formal education (OR = 2.0; 95% CI: 0.9,4.4), (OR = 4.6; 95% CI: 1.4,15.0)] and family occupancy more than six (OR = 1.8; 95% CI: 1.1,3.0) had high odds for malnutrition development. The prenatal factors found to be associated with higher odds were: mothers not visiting ANC clinics at least once (OR = 7.9; 95% CI: 1.5,41.6), ill health during pregnancy (OR = 1.7; 95% CI: 1.0,2.8), pre maturity (OR = 2.0; 95% CI: 0.6,7.4) and low birth weight six (OR = 2.8; 95% CI: 1.2,6.2). Gudu et al. concluded saying that proper prenatal care and child feeding practices should be encouraged. Proper education and advocacy should be intensified in the present study area.<sup>132</sup>

Malnutrition in India is even worse and is the major cause of deaths in children. Multiple factors are involved in determining the nutritional status of children.

A community based cross-sectional study done by Stalin et al. reported that prevalence of underweight in under-five children in Pondicherry, India was 57% for mothers who did not visit ANC clinic during pregnancy and the mothers who delivered pre or post term the prevalence of underweight was 58.3% in children. Children who received breast milk for less than 12 months were found to be more malnourished (56.5%), who received pre lacteal feeds were 54.7% malnourished and bottle-fed children were 52% malnourished. Also, the children who visit Aganwadi were found to be less malnourished (50%) than the one who didn't visit (54%). The study suggested to have strong intervention for the children identified as malnourished at primary stage.<sup>133</sup>

A case control study was undertaken by Ansuya et al. to find the risk factors of malnutrition in preschool children, rural Karnataka. The study was done among 190 cases and 380 controls (570 children) chosen by multi stage cluster sampling. It was identified that children with birth weight below 2 kg were 1.9 times and those with weight between 2 kg to 2.5 kg had 3.9 times greater risk of becoming malnourished, those with birth order second and third had 3.8 times and 2.7 times greater risk of becoming undernourished. Underweight was also found to be associated with socio economic status of parents, birth weight < 2 kg, recurrent diarrhea, recurrent cold and cough, worm infestations and pre lacteal feeding. Also, a child identified as malnourished was 6.9 times more at risk of suffering with cough and cold and ten times higher risk for suffering with diarrhea. He also had, the risk of suffering with worm infestation and poor appetite was 4.6 and 6.8 times higher. It was concluded that education and training program on nutrition, hygiene, feeding of children and diet practices should be undertaken to increase awareness of rural parents.<sup>134</sup>

Another cross-sectional study was conducted to assess the prevalence and determinants of malnutrition in children aged 0–5 years in Coimbatore district. It was reported that out of 206 children screened, underweight stunting and wasting prevalence was 41.3%, 32.5% and 21.8% respectively. The risk factors identified thorough interview were: illiteracy of parents [mother (OR = 1.0, 95% CI: 1.86,5.98), father (OR = 1; 95% CI: 7.28,44.94)], family size >4 (OR = 4.3; 95% CI: 2.4,7.7), children belonging to class four and five socio economic status (OR =1; 95% CI: 4.64,33.52) and children being cared by other family member than mother (OR = 2.94; 95% CI: 0.27,74.64). Other risk factors significantly associated with child's

nutritional status were: semi pucca and kutcha house, water source, toilet, mothers age below 20 years, place of birth, term of delivery, birth weight, illness in past one month, breast feeding within one hour and immunization. The study concluded improvement in the government policies has to be done in order to improve the services being given to the children which will help to reduce the prevalence of malnutrition.<sup>107</sup>

In 2019, Huey et al. conducted a study in Mumbai among children below five years reported that low birth weight [RR: 2.9 (95% CI: 1.5, 5.6)], at least one episode of fever within past month [RR: 2.8 (95% CI: 1.3, 6.1)], short maternal stature, maternal educational status < 8<sup>th</sup> standard, and advanced maternal education were found to be associated with undernutrition in children.<sup>135</sup>

A systematic review was conducted by Dey & Bisai to identify the prevalence of undernutrition in tribal pre-school children. About 41 papers on nutritional status in tribal population from 2000 to 2019 were included in the study. The results for meta-analysis depicted that average proportion of prevalence for underweight, stunting and wasting was 42.96%, 44.82% and 23.69%. It was also reported that these rates varied in tribal groups based on their socio-economic status (10%), food culture (10%), mother education (15%), feeding practices (20%), dietary inadequacies during pregnancy (25%) and poor child nutrition (52%). The study concluded that nutrition education and short-term nutritional intervention programs planned according will be helpful and useful to improve the nutritional status.<sup>136</sup>

Another cross-sectional study was done in Dehradun, Uttarakhand by Vyas et al. to identify the prevalence of undernutrition and associated risk factors. About 500 children aged 0–36 months were selected by convenient sampling technique. It was

found that out of 298 (59.6%) children identified as malnourished, 178 (59.7%) children had co morbidities present. The identified morbidities were: acute respiratory infection, pica, worm infestation (perianal itching) and dental caries. It was suggested that most of the government services in the present area was underutilized. It was emphasized that primary health services should also be improved also encouraging the community people to seek medical facilities will help to improve the condition of the children.<sup>77</sup>

It can be abridged from the above data that factors identified to be strongly associated with malnutrition in the children were birth weight, maternal illiteracy, antenatal checkups, immunization of child, recurrent illness, worm infestations, and family size. Household wealth was found to be strongly associated with all three forms of malnutrition. In order to identify potential risk factors, in-depth study is required with intervention techniques to improve nutritional status among children in near future.

### **Nutritional knowledge and Nutrition related practices of Mothers**

Mothers being primary care givers for the children are always held responsible for the health of the child even though they live in joint family.<sup>137,138</sup> Promoting good nutrition and dietary habits in children is one of the important components in maintaining child's nutritional status,<sup>139</sup> but the type of care she gives largely relies on the knowledge she has on basic aspects of nutrition and child care.

Saaka conducted a cross-sectional study in children aged 0–36 months in Ghana. The study was done with the aim to find relationship between nutritional knowledge and child's growth. It was found that out of 991 mothers, 68.2% had poor

knowledge regarding child care practices. Positive relationship between child care knowledge index mean stunting was found but was not related to wasting. The study findings suggested that enhancement in maternal knowledge on child care practices through nutrition education will directly impact the nutritional status of children of Ghana. Moreover, it was suggested to design complex intervention for mothers based on recent evidences.<sup>140</sup>

An experimental study done by Sukandara et al. among under five children in sub districts of Bogor reported that underweight was 16.7% and 19.3%, stunting was 64.5% and 46.5% and wasting was 2.7% and 2.6% respectively in control and intervention group. The study was conducted with an objective to assess children's nutritional status and their mother's nutritional knowledge, attitude and practices. Routine care was given to control group and experimental group received intervention. The mean scores of nutrition related knowledge in experimental group after intervention was higher (53.58) as compared to control group (34.87). Similarly, nutritional practice was higher in experimental group (54.87) than control (53.33). The study concluded that educational intervention in any form regarding nutrition has an effect on awareness of mothers.<sup>141</sup>

Another cross-sectional study done among mothers of children aged 6–23 months in Ethiopia showed that out of 700 mothers, 357(51%) were having knowledge regarding dietary diversity, but, only 112 (16%) practiced dietary diversity appropriately. Mothers (35–44) years of age had 54% less knowledge than those in the age group of (15–24) years [AOR = 0.46; 95% CI: 0.26,0.83]. Also, mothers of (25–34) years of age were reported to practice diet related varieties for children 1.82 times more than mothers of (15–24) years age. Divorced mothers were

reported to practice 91% times better dietary varieties for children than single mothers [AOR = 0.09; 95% CI: 0.02,0.53]. Agize et al. recommended that in order to enhance knowledge and prepare the community, behavior change is required for nutrition awareness. This can be attained by improving the knowledge and skills of community health worker so that they can communicate nutrition specific health education better through campaigns to enhance mothers' nutrition related knowledge.<sup>142</sup>

Similarly, a cross-section study was done by Edith & Priya among mothers of under five children in Tamil Nadu with an aim to assess the mother's knowledge, attitude and practice regarding prevention of undernourishment in their children. Data was gathered from 200 mothers of under-five children by interview method. The results showed that about 56% mothers had moderate knowledge and practice (58%) on nutrition for prevention of undernourishment. About 56% mothers showed favorable attitude. Knowledge and attitude showed significant positive correlation ( $r = 0.59$ ) for undernourishment prevention. The study summarized that for preventing undernutrition in children, well balanced diet is important which also helps positive growth of child. Also, educating mothers will create an awareness in them to adopt healthy dietary practice which will thereby reduce undernourishment in children.<sup>143</sup>

Another cross-sectional study by Nath & Kanniammal was done among mothers of under-five children in Trivandrum with the aim to assess the knowledge and practice of mothers regarding prevention of malnutrition in their children. The results revealed that practices of mothers are associated with their education and socio-economic status. It was also found that out of 115 mothers purposefully

recruited, 34.8% had poor knowledge and 19.1% had good knowledge. About 36.6% mothers had poor practice. The study concluded that in order to enhance knowledge and practices of mothers, educational campaigns should be organized focusing on diet of children, deworming and hygiene of children.<sup>144</sup>

Manohar et al. in their study reported that there was certain gap in knowledge and practices of mothers regarding nutrition of their children. The study was conducted with the aim to assess knowledge, practice and attitude on child feeding in mothers of severe acute malnourished children. It was found that out of 120 mothers purposefully recruited in the study, 57.5% had adequate, 30% had moderate and 12.5% had poor knowledge of child nutrition. About 51.66% had moderate and 15% had inadequate practices relating to feeding in children. Of 120 mothers, 35 (29.16%) had moderately favorable attitude and 42 (35%) had negative attitude for child feeding. It was recommended that mothers had slight awareness regarding nutrition for children and can be enhanced by appropriate counselling and support from health workers.<sup>145</sup>

An experimental study on awareness of mothers' regarding nutrition pre and post intervention was done by Bagauli & Arya. Around 125 women belonging to reproductive age group (18-45 years) were randomly selected from ten different villages of Bhimtal block (Nainital). Information was collected through a door-to-door survey. The results showed that a maximum number of respondents (i.e., 72.8%) fall into the low score category. Nutritional counseling sessions were organized for two months among the respondents under the study, during which knowledge regarding nutrition was imparted through a booklet and pamphlets, explanations were done through personal interaction. The average maximum score



gained by the mothers in the study area, before the intervention (i.e., pre-intervention) was 29 whereas the maximum score gained by the respondents in the group was 49 which indicated the mean of about  $34.04 \pm 4.65$ . The study concluded that hilly women are the key pillar of a rural economy and are responsible for performing domestic as well as farm work, which leads to poor health and nutritional status in them due to ignorance. Government programs should emphasize on awareness generation is inadequate and there is need for programs to popularize common health hygiene and nutritional practices to improve their nutritional status and level of awareness.<sup>146</sup>

Inadequate intake of optimal amounts of nutrition during pregnancy leads to adverse consequences not only on mothers but their children. Appropriate nutrition during early childhood years is significant to maintain health, nutrition and development of the child.<sup>147,148</sup> Inadequate knowledge regarding nutrition and inappropriate feeding practices by caregivers is main cause for persistent undernutrition in children. Also, beliefs related to food and health adds to the existing condition of malnutrition.<sup>149,150</sup> Hence, it becomes very important to impart necessary knowledge and information to the care givers to modify their practices. Nutrition related educational approach that takes in account cultural background,<sup>151</sup> is planned and made available to them at right time i.e., during pregnancy and early child developmental years, will be very helpful.<sup>152,153</sup>

### **Effectiveness of intervention programs on nutritional status**

Inspite of economic growth and development in our country since two to three decades, under-five children are still affected due to malnutrition leading to

poor life span in both urban and rural. Even though there have been tremendous growth in production of food globally and increased consumption of high calorie food items, still no change has been identified in the nutritional status, as still malnutrition still prevails.

Education regarding food items and nutritive values play an important part in promoting food security, as it will help and guide people in being aware regarding utilization of local foods and practicing healthy eating patterns.<sup>154</sup> Nutrition related intervention program has been found to be effective way to fight against this problem of malnutrition to mention only few studies have been undertaken.

*Interventions related to Nutrition counselling and Education:*

An experimental study was done in 586 children (6 months to 8 years) of Baluchistan, Pakistan. Anthropometric assessments were done and children were characterized as mild, moderate or severely wasted based on z-scores. 24-hour dietary recall of children was done. Intervention program consisted of nutrition counselling followed by nutrition booklet in Urdu language was also given as reinforcement. It was found that prevalence of malnutrition dropped from 81% to 60% in Tando area and 82% to 49% in Quetta. Also, in Tando area significant increase in per day meals was observed. In Quetta, plant protein, vegetables and dairy foods consumption was increased. The study concluded that intervention had positive effect on wasted children (mild category). Khan et al. emphasized that interventions focusing on community at larger group will help to improve child's nutritional status as it will enhance their knowledge regarding nutrition for children.<sup>155</sup>

Majamanda et al. conducted a systematic review to examine the best available evidence on effect of community led nutrition interventions on nutrition status of children. Out of nine studies identified, seven were included in the review as per Joanna Briggs Institute checklist. In all the studies selected it was reported that nutritional education improved nutritional status of children which was evidenced by improvement in anthropometric parameters. Key components identified were complementary feeding, nutritional value of foods and frequency of feeding. It was concluded that education programs on nutrition improves nutritional status of under-five children in developing countries.<sup>156</sup>

Saragih et al. conducted a pre-experimental study among children aged 6–59 months and their mothers in Indonesia. Interviews were done using a questionnaire. The mothers selected were 40 as respondents. After data collection from mothers parenting intervention was given for 2.5 hours and follow up was conducted after three months. It was found that mothers had good knowledge of nutrition 45% but understanding of the signs of child undernourishment was low i.e., 35%. Regarding meal related parenting it was found that about 30% had moderate and 40% had poor parenting. Significant improvement in the nutrition status score was found after intervention i.e., 84.91% from 79.25%. But there was no significant correlation of nutritional status before and after intervention ( $p = 0.113$ ;  $> 0.05$ ). It was concluded that parents needs to focus on practice of feeding including breast feeding, supplementary feeding quality, preparation and storage of food hygiene.<sup>157</sup>

An experimental study was done to evaluate the effect of nutritional advices given to mother of children below five years. Anthropometric data was collected from 206 children below five years of age by door to door to sampling. Counselling

sessions were conducted for all the mothers of these children and for mothers of identified malnourished children an intensive training program was undertaken for one month. It was reported that 20.87% children were malnourished. It was also found that nutrition education had positive impact on behavior of the mothers. This could be evidenced by reduction in the proportion of malnutrition from 30.23% to 16.28%. Sanjana & Dinesh recommended that regular monitoring of children for growth, nutrition education of mothers and nutritional rehabilitation will altogether help to improve the children's nutritional status.<sup>158</sup>

Another study by Khanna et al. was done to assess the effect of nutrition intervention on severely malnourished under-five children in rural areas of North India. Screening of 573 children of rural villages (selected via census sampling technique) was done in first phase. About 43 children were identified to be severely malnourished. The mothers of the identified children were then given intervention. The intervention package included nutritional counselling, diet chart and follow up visits. Post intervention it was found that there was substantial reduction in the wasting (-3.05 to -1.81) and underweight (-3.16 to -2.25) z-scores. It was concluded that constant interaction with the community people by nutrition experts empowers them which thereby help them to take steps towards maintenance of nutrition.<sup>159</sup>

*Interventions related to food-based items:*

A mixed method study was conducted by Kureishy with a view to assess the effect of food-based interventions on prevention of stunting in children below five years of Pakistan. Anthropometric assessments and hemoglobin estimation was done in the first phase of the study. The second phase involved randomized control trial

followed by process evaluation which was done at sixth month. Intervention consisted of distribution of food-based supplements and health education delivered by lady health visitors. Food based supplements included: Wheat Soya Blend for (6–23) months children, micronutrient powders for (24–59) months age children and Lipid-based Nutrient Supplements to pregnant and lactating mothers. These were delivered in form of ration. The study findings showed good impact on child's growth and health. Also, children in the intervention group had improvement in nutritional status than control group ( $p < .001$ ). Study findings concluded that antenatal nutritional status directly effects the birth outcomes. Thus, the present study concluded that government should develop programs and policies focusing on prevention of stunting in children by food-based interventions.<sup>160</sup>

Similarly, multicentric randomized control trial was undertaken by Bhandari, et al. in different districts of India. The objective of the study was to assess the efficacy of three feeding regimens for children (6–59) months with severe acute malnutrition. The study findings revealed that recovery rates with Locally prepared Ready to Use Therapeutic Food (RUTF-L), Centrally made Ready to Use Therapeutic Food (RUTF-C) and augmented home prepared food (A-HPF) was good. Also, weight of children on RUTF-L and A-HPF increased. It was also found that the percentage of improvement in nutritional status was higher in children given RUTF-L than A-HPF. The study findings concluded that RUTF-L is more effective feeding regimen for home management of uncomplicated malnutrition than A-HPL.<sup>161</sup>

*Interventions related to multicomponent programs:*

An experimental study conducted among primary school children in Thailand; used school based multicomponent program. The study consisted of quasi experimental design. About 453 students studying in classes (4–5) of two schools in Bangkok were recruited and randomly allocated in intervention group and control group. The interventions comprised of: physical activity, food-environment, school environment, education, diet and life skills. Anthropometric measurement was done for all the children. It was found that 19.7% children were obese in control group and 16.6% were obese in intervention group. Post intervention knowledge of children on diet was better in intervention group as compared to control group. Also, children in intervention group had favorable attitude towards diet and physical activity than control group Chawla et al. highlighted that multicomponent program in school environment are more effective than outside environment as it positively influences eating behavior and physical activity.<sup>162</sup>

Another study was done by analyzing the data of children admitted in Nutritional rehabilitation center in Surendranagar district. About 284 children were screened from June 2012 to November 2013. The results showed that mean weight of children had improved from  $8.30 \pm 2.09$  at admission to  $8.97 \pm 2.16$ . It was found that 76.43% and 23.57% children had severe and moderate malnutrition. There was more than 50% recovery rate with  $7.13 \pm 3.91$  g/kg/day gain in weight. The study concluded that nutrition rehabilitation of children in early phase helps in reduction in proportion of malnutrition in children and NRC plays a significant role.<sup>163</sup>

Pavithra et al. conducted an intervention study in rural Puducherry of South India. The study was conducted in three phases. Moderate and severely malnourished

children (13–60) months and mothers' pairs were included in the study. Intervention included health education and follow up visits for 15 months. Post intervention it was found that awareness of mothers in experimental group increased than control group. Mean intake of protein increased in both boys and girls of experimental group than control group. About 81% in experimental group became normal from malnutrition whereas in control group only 64% children turned normal. The study recommended that longitudinal studies with nutritive supplementation for children and educating mothers helps to reduce malnutrition in children.<sup>164</sup>

In spite of economic growth and development in our country India, since two to three decades, under-five children are still affected due to malnutrition leading to poor life span in both urban and rural areas which is also related to increase in our population, lack of educational status, poor access to health facilities and inequality related to socio economic status in our country and are all related causes of malnutrition. There are only very few studies conducted in India on effectiveness of intervention programs on nutritional status. This highlights the need for multifaceted approaches like growth monitoring, nutritional rehabilitation and supplementation, dietary counselling, guidance on food selection for children, and most importantly nutrition related education for primary care givers and family.

## **Research Gap**

The literature review done shows the existing burden of malnutrition globally and in our country. The studies also show the risk factors associated with malnutrition, knowledge and nutrition related practices of mothers for their children. The studies found the impact of mothers' knowledge on nutrition related child care

practices but very few studies did the follow up of mother after the intervention was given to them. Also, many research studies tested the effectiveness of ready to use therapeutic foods on malnutrition but only a few studies are available on home-based interventions. Though several programs are provided by government but instead of drastic reduction in malnutrition proportion there is slow or steady decline. Hence, there is scope of identifying risk factors related to malnutrition in present geographic area and check the impact of need-based intervention program on malnutrition in children.

### **Chapter Summary**

The present chapter has attempted to review various studies related to malnutrition. The aspects reviewed in the present chapter were: nutritional status of under five children, risk factors related to malnutrition in under-five children, nutritional knowledge and nutrition related practices of mothers of under-five children, and effectiveness of intervention programs on nutritional status. The review has helped to understand the burden of the problem, selecting research design, development of data collecting instruments and intervention program.