



Impact of Malnutrition on Children's Health and Development in Haryana: A Spatial study

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Abstract

India is the world's second most populous country, after China, with a population of 1.21 billion people. India comprises almost 13.1 per cent of child population aged 0-6 years. Childhood is a significant stage of life and deprivation during this period can have a long-term adverse impact on the wellbeing of children. Child mortality is an important indicator of children's health and general development. Since 1990, the global mortality rate for children under the age of five has decreased by 53%, from 91 deaths per 1000 live births in 1990 to 43 in 2015. The world as a whole has been making rapid progress in lowering the mortality rate among children under the age of five. The best global indicator of children's well-being is growth, because infections and poor feeding practices are key variables impacting children's physical growth and mental development. Up to half of all deaths among children under the age of five are due to malnutrition. Worldwide, malnutrition causes long-term poor health and disability accounting for 11% of all disorders (World Health Organization, 2011). The nutritional level of children is a major element of their mental and physical development. In this paper, health status of children is analysed using some important indicators of nutrition. The primary goal of this research is to investigate the child mortality and child nutritional conditions of Haryana. The analysis is based on secondary data from the government of India's NFHS (2019-21) report. Malnutrition and denutrition have risen to the forefront of national and international attention due to their relevance as a barrier to social and economic growth.

Key words: Stunted, Underweight, Overweight, Malnourished Children.

1.1 Introduction

Health is a basic component of human development, and hence determines society's well-being. It is a means to empower the deprived sections of society and thus an important element in the strategy for poverty alleviation. Thus, in recent years there has been an increased focus on issues that affect children and their improving health. Optimal child growth requires adequate energy and nutrient intake, absence of disease and appropriate care. Poor living conditions, including household food insecurity, low parental education, lack of access to quality health care and an unhealthy living environment are among the main determinants of stunted growth. Poverty has a more detrimental effect on linear growth than on body weight (Carlos Augusto Monteiro, 2009). Malnutrition directly and indirectly implicated in more than half of all children's deaths all over the world. Children in preschool stage require more attention, as this is the period of rapid growth and development, which makes them highly vulnerable. Malnutrition in this stage has far reaching consequences on child's future by severely affecting child's physical and mental development (WHO, 2005). The level of child denutrition remains unacceptably high throughout the world, with 90 percent of the developing world's chronically undernourished children living in Asia and Africa. Denutrition among children under-five years is a chronic problem in developing countries and there are vast differences in the prevalence of under nutrition among the children of developed and developing countries. The projected decline of underweight among under five years children in developed countries are higher when compared to developing countries, even though they have a lesser proportion of underweight (WHO-nutrition-2011). Moreover, the concept of Child health can be taken as a multi-dimensional concept. Therefore, in this paper Health status of children is analyzed using several dimensions and indicators. In the end, to investigate the inequality of health status of child across districts in Haryana, I have considered two indicators of health status of child.

Child Mortality

- i. Neo-natal mortality rate (NMR)
- ii. Infant mortality rate (IMR)
- iii. Under-five mortality rate (U5MR)

Child Malnutrition Impact

- i. Percentage of Children under 5 years who are stunted (height-for-age)
- ii. Percentage of Children under 5 years who are wasted (weight-for-height)
- iii. Percentage of Children under 5 years who are underweight (weight-for-age)

1.2 Objectives

- i. To analyze the status of child mortality in Haryana.
- ii. To assess the impact of malnutrition of children below 5 years in Haryana.

1.3 Database and Methodology

The present study is mainly based on the secondary data. Data has been collected from the National Family and Health Survey i.e. NFHS-4 (2015-16) & NFHS-5 (2019-21). And have also used district fact sheet reports of NFHS-4 & NFHS-5 of all districts of this two round survey. To assess the nutritional status of children below 5 years in Haryana, some important measures have been taken into account. To fulfil the objective of this study, the data have been analyse by using statistical techniques like, mean, standard deviation and Z score. +Composite index has been prepared with the help of ARC GIS software version 10.0, to examine the overall nutritional status of children in Haryana.

1.4 Status of Child Health in Haryana

The status of child health in Haryana is analyzed on the basis of infant mortality rate (IMR), neo-natal mortality rate (NMR), under-five mortality rate (U5MR), stunting, wasted and underweight children.

1.5 Child mortality rate

The mortality rate among children under the age of five, which includes neonatal, postneonatal, and infant mortality rates, is a key indicator of a country's overall well-being. Infant mortality is 33 per 1,000 live births, and neonatal mortality rate is 22 per 1,000 live births. The U5MR is the probability of dying, birth and exactly five year of age, expressed by 1,000 live births, between. Table 1.1 shows three different indicators of child mortality like; Neonatal mortality rate (NMR), Infant mortality rate (IMR) and Under-five mortality rate (U5MR). The U5MR is estimated to be 39 deaths before the age of five per 1,000 live births, a 2 percent decrease since the NFHS-4 (41 per 1,000).

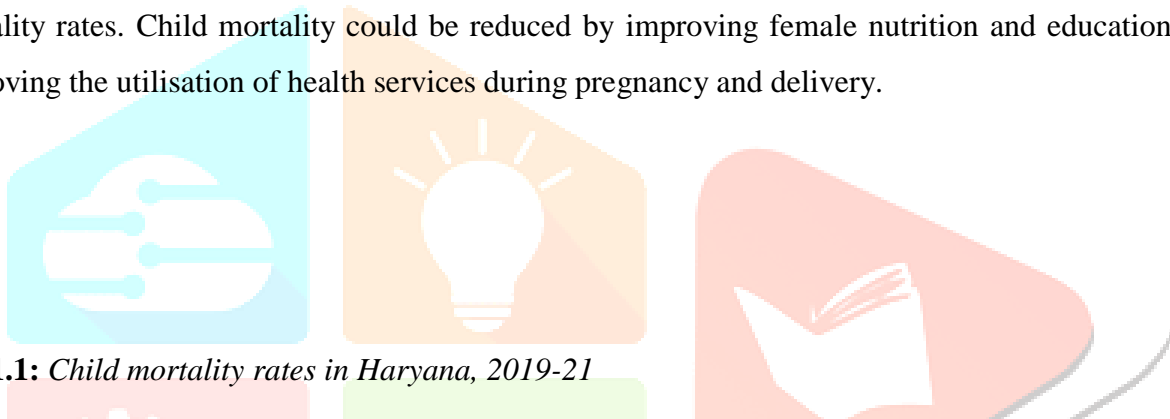
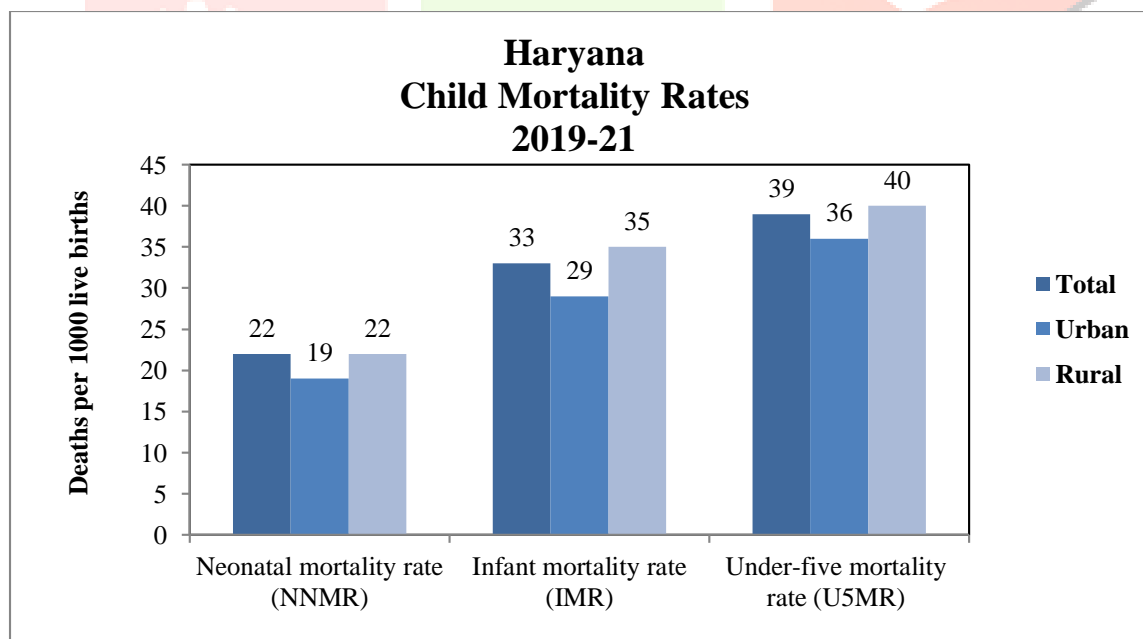
Breastfeeding is a common practice in India, however, appropriate breastfeeding is not done. Yet only 46 percent of infants are breastfed exclusively for the first 6 months. When we look at the IYCF (Infant and Young Child Feeding) indicators as recommended by WHO, only 21 percent of children in the age group of 6-23 months receive all three recommended IYCF practices. This is the most important age group and infant and young child feeding practices are the most important determinant of growth in this age group. Children who falter in their growth during this critical period of growth and development lag behind and don't reach their true intellectual and physical growth potential. Anaemia is another major health problem in Haryana, like other states of India, especially among women and children. Anaemia is particularly high for women who are pregnant or breastfeeding and for women in the lowest wealth quintile. More than half of the pregnant women (59.6 percent) are anaemic, out of which around seven percent suffer from severe anaemia. Anaemia is prevalent in 62.7percent of women in the age group of 15-49 years and 55 percent of pregnant women as per NFHS-4. Children of mothers who have anaemia are much more likely to be anaemic. That's why infant mortality is higher in children whose mothers were anaemic at the time of pregnancy (State Nutrition Policy Haryana, 2016).

Table 1.1: *Child mortality rates in Haryana, 2019-21*

Child Mortality Rate	Total	Urban	Rural
Neonatal mortality rate (NNMR)	22	19	22
Infant mortality rate (IMR)	33	29	35
Under-five mortality rate (U5MR)	39	36	40

Source: National Family Health Survey (NFHS-5), India, 2019-21: Haryana.

Rural areas had 40 deaths per 1000 live births, while urban areas have 36. The state average is 22 deaths per 1000 live births for Neonatal mortality rate. In Haryana's urban areas, there are 19 deaths per 1000 live births, while rural areas have 22 deaths of neonatal. The state's infant mortality rate is 39 deaths per 1000 live births. Haryana's urban mortality rate is 29 per 1000 live births, while rural death rates are 35 (Table 1.1). Under-five mortality has declined because of reductions in the neonatal, post neonatal and child mortality rates. Child mortality could be reduced by improving female nutrition and education, as well as improving the utilisation of health services during pregnancy and delivery.

**Fig. 1.1:** *Child mortality rates in Haryana, 2019-21*

(Based on Table 1.1)

1.6 Impact of Malnutrition

Malnutrition is one of the most concerning health and development issues in India as well as in other parts of the world. It continues to remain one of the greatest challenges for the world. Malnutrition affects all countries and almost one in three people on the planet. Nearly half of all countries are dealing with more than one type of malnutrition at the same time. Despite progress, improvements in nutrition still represent a massive unfinished agenda. Malnutrition takes many forms which include stunting, wasting, underweight, and deficiencies of essential vitamins and minerals (micronutrients) together referred to as denutrition.

Table 1.2: District wise Malnutrition children in Haryana, 2019-21

Districts	Stunted Children (%)	Wasted Children (%)	Underweight Children (%)
Ambala	24.1	10.9	13.7
Bhiwani	29	6	20.6
Charkhi Dadri	23.9	10.6	16.9
Faridabad	28.9	8	19.5
Fatehabad	24.6	16	26.6
Gurgaon	22.1	15.7	22.2
Hisar	27.8	16.4	21.4
Jhajjar	15.6	8	9.7
Jind	25.5	8.8	22.9
Kaithal	29.9	20.7	29.9
Karnal	29.9	9.8	20.5
Kurukshetra	24.9	12.8	22.5
Mahendergarh	25.2	8.4	15.4
Mewat	44.4	14.2	37.3
Palwal	31	9.9	21
Panchkula	27.7	12.1	23.1
Panipat	25.1	9.9	18.9
Rewari	25.9	9.3	20.5
Rohtak	28.9	12.5	22.1
Sirsa	25	12.6	23.4
Sonapat	23.6	9.2	12.7
Yamunanagar	27.7	12.1	23.1
HARYANA	26.85	11.54	21.08
INDIA	35.5	19.3	32.1

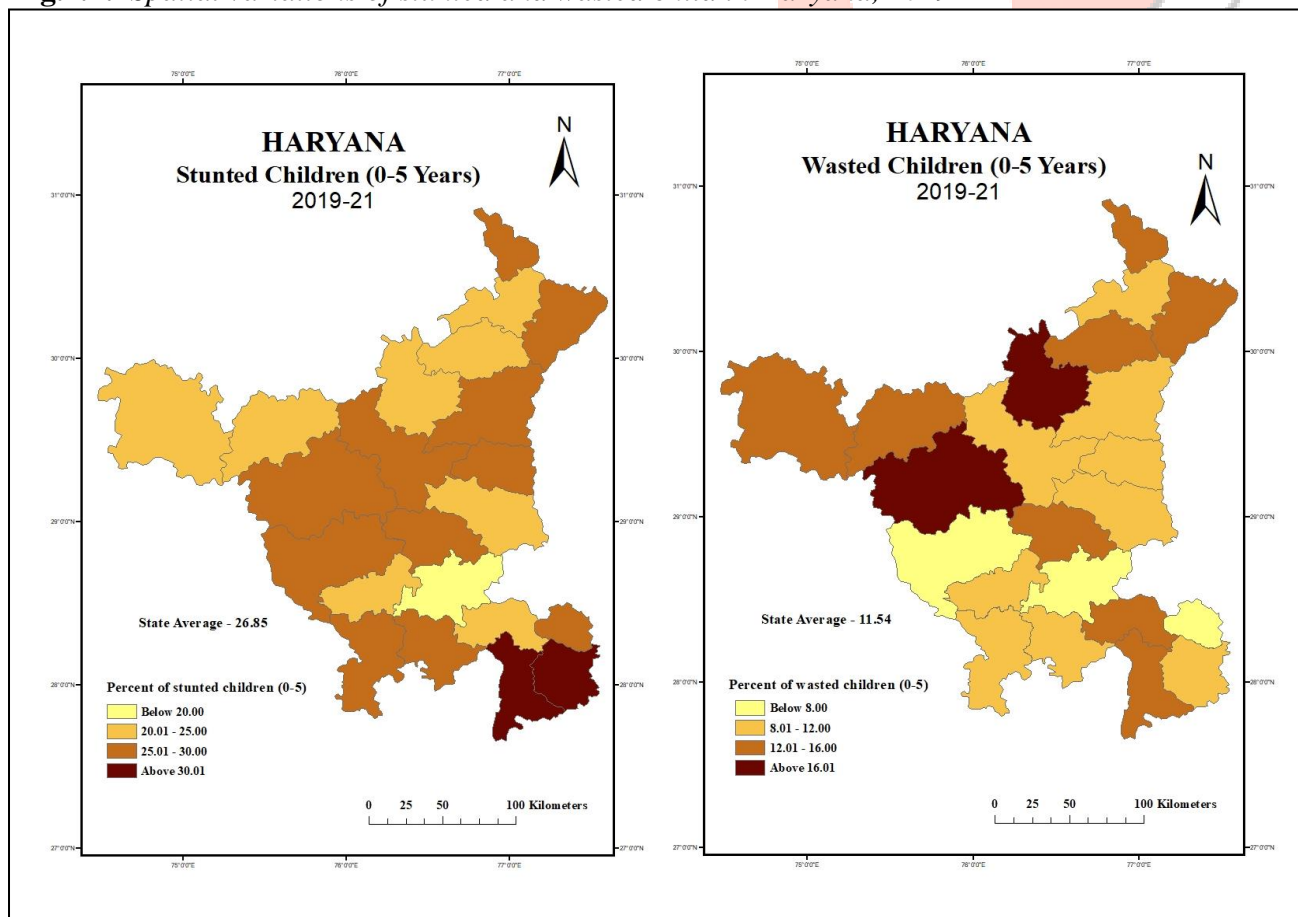
Source: National Family Health Survey (NFHS-5), India, 2019-21: Haryana.

1.6.1 Stunting

Stunting is most important and most widely used indicator to measure nutritional status of a community. Stunting is a risk factor for diminished survival, childhood and adult health, learning capacity, and productivity. Stunting (low height-for-age / “shortness for their age”) is a measurement of chronic malnutrition characterized by a slowing in the growth of a fetus or child and resulting in a failure to achieve expected length in comparison to a healthy, well-nourished child of the same age. It is an indicator of past growth failure, and is associated with a number of long-term factors, including chronically inadequate levels of protein and energy intake, micronutrient deficiencies, frequent infection, inappropriate feeding practices over a sustained period, and household poverty (WHO, 1995). On a population basis, high levels of stunting are associated with poor socioeconomic conditions and increased risk of frequent and early exposure to adverse conditions such as illness and/or inappropriate feeding practices.

The fig. 1.2 shows percent of stunted children below five year of age in Haryana. It shows that the state average is 26.85 percent whereas national average is 35.5 percent. National average is significantly higher than the state average. As per figure 1.2az, stunting was observed maximum in Mewat district touching 44.4 percent while Only Jhajjar (15.6) district has the minimum percent of stunted children in the state. Mewat and Palwal district has high percent of stunted children that is above 30 percent. Other districts the prevalence was found to be between 20-30 percent.

Fig.1.2: Spatial variations of stunted and wasted child in Haryana, 2019-21



Source: Districts fact sheets of Haryana, NFHS-5 (2019-21).

1.6.2 Wasting

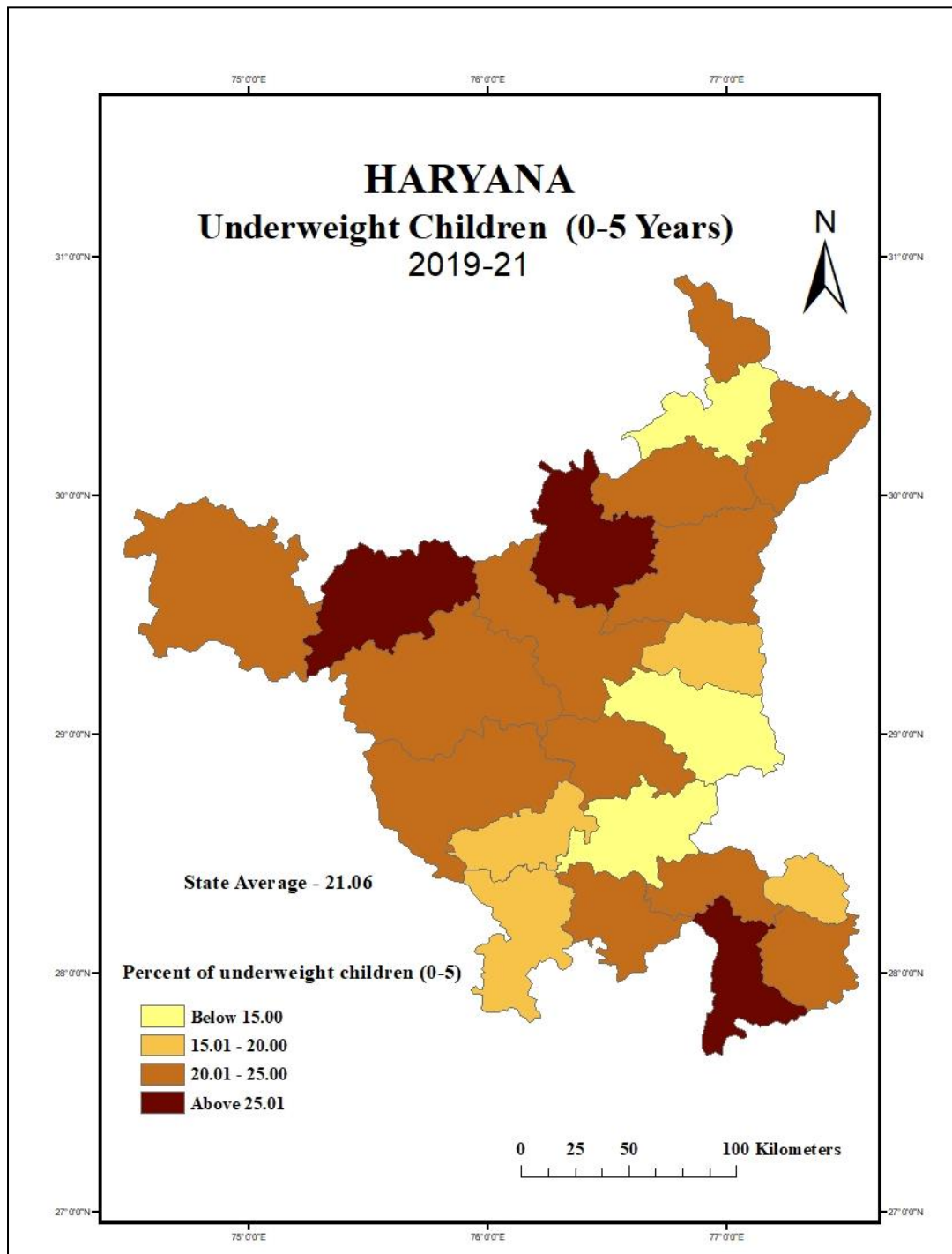
Wasting (low weight-for-height) is a measurement of acute malnutrition characterized by considerable weight loss or failure to gain weight, which results in a child's weight being substantially below what would be expected of a healthy child of the same length or height. It is an indicator of current malnutrition and is associated with inadequate food intake, incorrect feeding practices, disease, infection, or a combination of these factors. Also, it indicates a recent change in nutritional status related to a sudden deprivation of food or negative reaction to nutritive substances that result in fast loss of weight. Wasting in individuals and population groups can change quickly, showing marked seasonal patterns associated with changes in food availability and access, as well as disease prevalence. Because we do not need the age of the child to calculate wasting, the difficulties encountered in contexts where exact age is difficult to determine do not affect the accuracy of wasting as a proxy indicator of acute malnutrition (WHO, 1995).

The fig. 1.2 shows percent of wasted children below five year of age in Haryana. It shows that the state average is 11.54 percent whereas national average is 19.3 percent. National average is significantly higher than the state average. As per figure 1.2, Fatehabad, Hisar and Kaithal districts shows very high percent of wasted children, this is above 16 percent. Bhiwani, Faridabad and Jhajjar districts have the minimum percent of wasted children. Other remaining districts have medium percent of wasted child in the state. It is observed that the Haryana's situation is good in terms of wasting as compared to NFHS-4.

1.6.3 Underweight

Underweight (low weight-for-age) is a composite measurement of stunting and wasting as it is influenced by both height and weight. The most extreme symptoms of this form of malnutrition are characterized by a severe muscular atrophy resulting from a loss of weight or a delay of growth. This form of malnutrition is relatively sensitive to the fluctuations in the short term access to health. For example, weight-for-age fails to distinguish between short children of adequate body weight and tall, thin children.

However, in the absence of significant wasting in a community, similar information is provided by weight-for age and height-forage, in that both reflect the long-term health and nutritional experience of the individual or population. Short-term change, especially reduction in weight-forage, reveals change in weight-for-height. In general terms, the worldwide variation of low weight-for age and its age distribution are similar to those of low height-for-age (WHO, 1995). Fig. 1.3 shows percent of underweight children below five year of age in Haryana. It shows that the state average is 21.06 percent whereas national average is 32.1 percent. National average is significantly higher than the state average. As per figure 1.4, Jhajjar, Sonipat and Ambala districts lies in the minimum underweighted children category. Mewat, Fatehabad and Kaithal districts have the maximum percent of underweight children in the state that is above 25 percent. Other remaining districts have medium percent of underweighted children (Table 1.2 and Fig. 1.3).

Fig. 1.3: Spatial variations of underweight child in Haryana, 2019-21

Prepared by researcher with the help of Arc GIS by using Table 1.2.

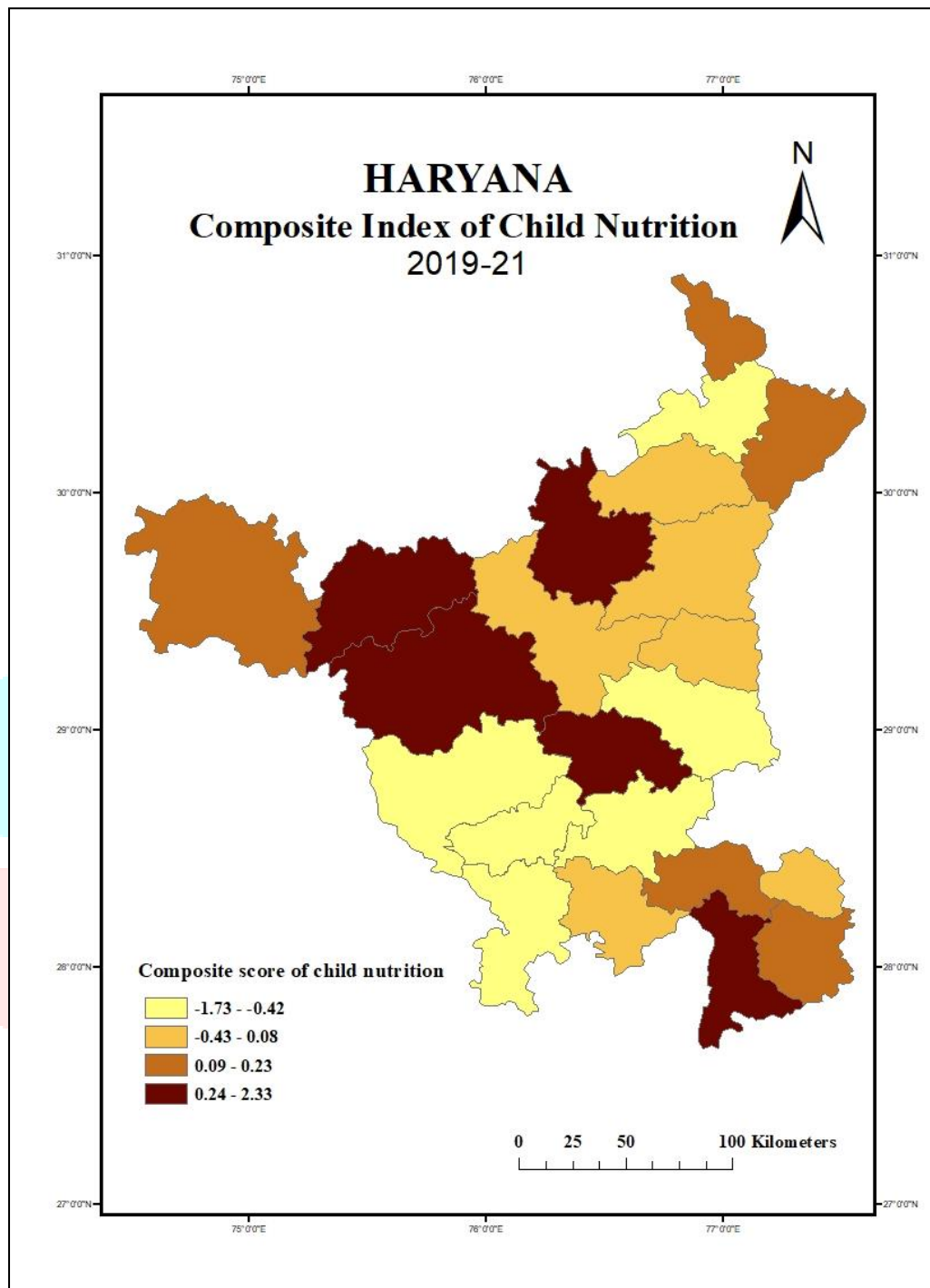
1.6.4 Composite Index of Child Nutrition

Figure 1.4 shows child nutrition impact in Haryana. This map explains overall status of child nutrition, which based on the three important indicators of child nutrition like; stunting, wasting and underweight. This map shows that the six districts of Haryana are lying in the best category of child nutrition. Thus, Jhajjar, Sonapat, Bhiwani, Charkhi Dadri, Mahendergarh and Ambala are the districts which show high nutrition level in the state. Five districts namely Mewat, Fatehabad, Rohtak, Hisar and Kaithal districts shows the poorest level of child nutrition. Other remaining districts show moderately child nutrition in the state (Table 1.3 and Fig. 1.4).

Table 1.3: Calculation of Composite score of child malnutrition in Haryana

Districts	Z Score of Stunted children $Z = \frac{x - \mu}{\sigma}$	Z Score of Wasted Children $Z = \frac{x - \mu}{\sigma}$	Z Score of Underweight Children $Z = \frac{x - \mu}{\sigma}$	Composite Value of Z score (Stunted + Wasted + Underweight children)	Composite Score C.S. = Composite value of Z score / Number of Variables
Ambala	-0.53	-0.19	-1.28	-2.00	0.64
Bhiwani	0.42	-1.61	-0.08	-1.27	0.07
Charkhi Dari	-0.57	-0.27	-0.72	-1.57	0.46
Faridabad	0.40	-1.03	-0.27	-0.90	0.30
Fatehabad	-0.44	1.29	0.95	1.81	0.53
Gurgaon	-0.92	1.21	0.19	0.48	0.40
Hisar	0.18	1.41	0.05	1.65	0.03
Jhajjar	-2.19	-1.03	-1.97	-5.18	0.38
Jind	-0.26	-0.80	0.31	-0.74	-0.42
Kaithal	-0.59	2.66	1.52	4.77	0.32
Karnal	0.59	-0.51	-0.10	-0.01	7.42
Kurukshetra	-0.38	0.37	0.24	0.23	1.06
Mahendergarh	-0.32	-0.91	-0.98	-2.21	0.44
Mewat	3.41	0.77	2.80	6.98	0.40
Palwal	0.81	-0.48	-0.01	0.32	-0.05
Panchkula	0.17	0.16	0.35	0.68	0.51
Panipat	-0.34	-0.48	-0.38	-1.19	0.32
Rewari	-0.18	-0.65	-0.10	-0.94	0.11
Rohtak	0.40	0.28	0.17	0.85	0.21
Sirsa	-0.36	0.31	0.40	0.35	1.15
Sonipat	-0.63	-0.68	-1.45	-2.76	0.52
Yamunanagar	0.17	0.16	0.35	0.68	0.23

Source- Calculated by the researcher with the help of Table 1.2

Fig. 1.4: Composite Index of child nutrition in Haryana, 2019-21

Prepared by researcher with the help of Arc GIS by using Table 1.2.

1.7 Conclusion

Haryana is the second highest contributor of food grains to country's central pool and is one of the wealthier states of the country. However, despite its progressive status among other states, Haryana exhibits high rates of denutrition and its impact. The ongoing programmes are making efforts to improve nutrition but denutrition among children are rising alarmingly in Haryana. There were 21.5 percent of children who were underweight, 27.5 percent stunted and 11.5 percent wasted as per NFHS-5, 2019-21. There are improvements in the prevalence of underweight children from 29.4 percent in 2015-16 (NFHS-4) to 21.5 percent in 2019-21 (NFHS-5) and in stunted children from 34 percent to 27.5 percent (NFHS-5) but the

percent of wasted children has significantly decreased from 21.2 percent (NFHS-4) to 11.5 percent (NFHS-5).

Food intake is not the only determinant of child's nutritional status. The effect of the feeding efforts can decline if environmental hygiene and domestic health management practices are poor. There have been recent successes in the fight against child under nourishment in India, particularly since 2005. The Government of India has scaled up nutrition-specific interventions over the past decade, including expansion of Integrated Child Development Services program that aims to improve the health, nutrition, and development of children in India; and the creation of the National Rural Health Mission, a community-based health initiative designed to deliver essential health services to rural India (Avula et al. 2013). However, progress in reducing child denutrition has been uneven across districts of Haryana. While the reasons for the improvements—or lack thereof—are not entirely clear, one factor that seems to correlate with denutrition in India is open defecation, which contributes to illnesses that prevent the absorption of nutrients. Additionally, the low social status of women, which affects women's health and nutrition, makes it more likely that babies will be born underweight (Economist 2015). Children in the age group of 1-3 years and 3-5 years were found to have a greater risk of under-nutrition. Maternal education has also associated with nutritional outcomes among children. There is high and persistent problem of under nutrition in Haryana which is more concentrated among the poor, uneducated, slum dwellers, and among children of women who do not take ANC care/ breastfeed. The low social status of women, which affects women's health and nutrition, makes it more likely that babies will be born underweight.

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