ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 9| Issue: 12| December 2023|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2023: 8.224 || ISI Value: 1.188

TRENDS IN MALNUTRITION AMONG THE UNDER FIVE YEARS CHILDREN OF INDIA

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Article DOI: https://doi.org/10.36713/epra15188
DOI No: 10.36713/epra15188

ABSTRACT

At least 1 in 3 children under 5 years (U-5) is not growing well in the World owing to malnutrition. Stunting, wasting, underweight, and overweight are important measuring indicators of malnutrition. Those indicators also reflect the population health of a country. India's economy is growing faster and already has emerged as the 5th largest economic country in the World. However, stunting, wasting, and underweight prevalence remain high in India. The purpose of this study is to find the trends of stunting, wasting, underweight, and overweight prevalence of U-5 children in India comparing its status with the Global average and to evaluate its status towards the Global target of Sustainable Development Goal (SDG) 2.2 by 2030. Data on stunting, wasting, underweight, and overweight prevalence of U-5 children are collected for 2010 to 2020 from the open website of WHO and the World Bank. The data from the reports of National Family Health Surveys (NFHS-3 to 5, India) are also considered for the study.

It is observed that India's average prevalence of stunting from 2010 to 2020 is 37.59%, which is higher than that of the World (24.55)%. However, India is accelerating its progress with an average annual reduction of 3.58%. Data on wasting and underweight of U-5 are very sporadic. India's wasting and underweight prevalence are found higher than that of the World average to available values in different years from 2010 to 2020. India's average overweight prevalence from 2010 to 2020 is much lower than that of the World's value (5.63%).

In the case of U-5 stunting and overweight prevalence, India will be closer - based on the average annual reduction rate - to the interim global target 2025 (adopted by WHA 2012) which was to reduce 40% stunting and not to increase the overweight prevalence but, India will be far away from the SDG 2.2 in all forms of malnutrition by 2030. An immediate acceleration of progress is required in the reduction of stunting, wasting, and underweight prevalence along with long-term future strategies to manage the growth of overweight prevalence to achieve the Global target (SDG 2.2) by 2030. Further in-depth research studies may be conducted having broader demographic features and on policy implementation.

KEY WORDS: ***Stunting, Wasting, Underweight and Overweight, Global target.***

INTRODUCTION

All the countries in the World are affected by either one or more forms of malnutrition. The greatest health challenge is to combat malnutrition in all its forms. Malnutrition comprises stunting, wasting and underweight (undernutrition), overweight and obesity, inadequate vitamins and minerals, and diet-related non-communicable diseases. The indicators of stunting, Wasting, Underweight, and Overweight prevalence are the important reflectors of the population health in India as well as in the World perspective (WHO, 2021). A child is considered to be stunted when its height-for-age is less than 2SD (Standard Deviation), a child whose weight-for-age is less than 2SD is considered underweight and a child is called wasted when its weight-for-height is less than -2SD (Jamison et al., 2006). A child under five is considered to be overweight when its weight-for-height is greater than + 2SD from the median(WHO, 2017).

Globally around 45% of deaths among children U-5 are linked to undernutrition. 1.9 billion adults in the world are overweight or obese and 462 million adults are underweight (WHO, 2021). Stunting, wasting, and overweight affected 148 million (22.3%), 45 million (6.8%), and 37 million (5.6%) of children under five respectively, in 2022 (WHO et al., 2023).

Undernutrition (with stunting and wasting) causes poor growth, infection, death, poor cognition, and poor school performance. Undernutrition (with stunting and underweight) causes perinatal complications, prematurity low birth weight, and chronic diseases for children in later life. Being overweight results in cardiovascular problems, infection, overweight, obesity and overweight and chronic diseases in for child in later life (UNICEF, 2019). Malnutrition increases healthcare costs, reduces productivity, and slows economic growth, which can prolong a cycle of poverty and ill health (WHO,2021).

Factors associated with malnutrition(Stunting, wasting, underweight & overweight) are the mother's nutritional status, anemia, lack of knowledge to feed children nutritionally, insufficient breastfeeding, early marriage and conception, short intervals between pregnancies, and Women's education and sanitation (Narayan, 2019).

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At least 1 in 3 children U-5 is not growing well in the World owing to malnutrition and at least 1 in 2 children under 5 is suffering from hidden hunger owing to vitamins and other nutrients deficiency in the World (UNICEF, 2019). At least 2 in 3 children are not fed the minimum diet to be healthy (UNICEF, 2020).

Various initiatives have been taken to make the world free from malnutrition. Food And Agriculture Organisation (FAO) was formed on 16th October, 1945, to struggle perpetually against hunger and malnutrition, worldwide (Philips,1981). Now the objectives and strategic framework of FAO are intrinsically aligned with the Sustainable Development Goals aiming towards Zero Hunger, No Poverty, and Sustainable Use of Natural Resources (FAO, 2019).

The World Food Programme, the largest humanitarian organisation in the World, was founded in 1961 to eradicate hunger and malnutrition (WFP, 1993). The goals of the WFP Strategic Plan (2017-21) were to support the countries in achieving zero hunger (SDG 2) and to support the implementation of 17 SDGs (WFP, July 2016).

In 2012, the Comprehensive Implementation Plan on maternal, infant, and young child nutrition was endorsed by the World Health Assembly resolution 65.6. Six Global targets were adopted out of which the three targets are: (i). 40% reduction in the number of U-5 are stunted, (ii). Reduce and maintain childhood wasting to less than 5% and (iii). No increase in childhood overweight, by 2025 (WHO, 2014).

'Nutrition for Every Child' UNICEF Nutritional Strategy 2020-2030, was adopted with a golden Goal to protect and promote diets, services, and practices that support optimal nutrition, growth and development for all children, adolescents, and Women; to enable children to have a nutritious diet and end all forms of malnutrition as per 2030 agenda for Sustainable Development Goals (UNICEF, 2020).

'The 2030 Agenda for Sustainable Development' was adopted by the United Nations General Assembly on 25th September 2015 by 2030 through fixing 17 sustainable Goals (United Nations, 2015). The SDG target 2.2 was to end all forms of malnutrition by 2030, including achieving the targets of stunting and wasting in children U-5 of age by 2025 (WHO, 2023).

Several initiatives have been taken by India to fight against malnutrition emphasising the reduction of poverty, fortification of food, improvement in sanitation, enhancement of Women's education, and improvement of agricultural practices. Many policies and schemes have been adopted by the Government of India to improve nutrition such as the Integrated Child Development Scheme(ICDS,1975), Mid-day Meal (MDM,1995), National Health Mission (NHM,2005), National Food Security Act (NFSA, 2013) and Rajiv Gandhi Scheme for Empowerment of Adolescent Girls (RGSEAG) or Sabala (Narayan et al., 2019).

To reduce the number of stunting children, under-nutrition, anemia & low birth weight, the Prime Minister of India launched POSHAN Abhiyaan (Prime Minister's Overreaching Scheme for Holistic Nourishment) on 8th March 2018, with a budgetary allocation of over 9000 crore (FY 2017-18 to 2019-2020) (Niti Aayog, 2019).

As per data from the World Bank (2022), India ranked as the 6th largest economic country concerning the Gross Domestic Product(Growth) in the years 2019, 2020 and 2021. Now India has become the 5th largest economic country in the World (World Bank, 2022).

But, as per the report of the Global Hunger Index (GHI), 2023 is calculated based on the values of the four indicators: undernourishment, child stunting, child wasting, and child mortality) India's rank is 111th (Score 28.7) out of 125 countries in the World. In 2015 the GHI score was 29.2, ranking 80th out of 104 countries (Grebmer et al., 2023; Grebmer et al., 2015).

Global Food Security Index 2022 which evaluated the food security of 113 countries based on the four key pillars: affordability, availability, quality, and safety, shows that India's rank is 68th with a score of 58.9 out of 100 (Economist Impact, 2022). About 48% of Indian infants under five years of age are reported to suffer from stunted growth owing to malnutrition (Narayan, 2019). National Family Health Survey 2019-21 also reported a higher prevalence of stunting, wasting, and underweight children under five years. But India has to achieve SDG target 2.2 by 2030.

There is an urgency to look into the trends of Stunting, Wasting, Underweight, and Overweight prevalence in India and to evaluate the status of stunting, wasting, underweight, and overweight prevalence with the World average and with Sustainable Development Goal 2.2.

METHODOLOGY

Investigators tried to compare India's status of stunting, wasting underweight, and overweight with the World average and to assess its status towards the Global targets.

The sources of available data are open websites of the World Health Organisation (Global Health Observatory), the World Bank, and the reports of National Family Health Surveys of India. The prevalence of stunting, wasting, underweight and overweight of U-5 children are extracted for the study. All the collected data are interpreted, computed and analysed for educational research purposes only and no professional interest or profit-making organisational interest is involved with it. The Prevalence of Stunting, wasting, underweight and overweight among U-5 children are estimated based on standardised methodology used by WHO Child Growth Standards & also based on UNICEF-WHO-The World Bank Joint child malnutrition estimates-Levels & trends (UNICEF/WHO/WB 2021 edition).

Prevalence of stunting estimates the percentage of U-5 children whose height-for-age is below -2SD(Standard Deviation) from the median of the WHO Child Growth Standards(WHO,2021).

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Prevalence of Wasting estimates the percentage of U-5 children whose weight-for-age is below -2SD(Standard Deviation) from the median of the WHO Child Growth Standards(WHO,2022). Prevalence of Underweight estimates the percentage of U-5 children whose weight-for-age is below -2SD(Standard Deviation) from the median of the WHO Child Growth Standards(WHO,2022). Prevalence of Overweight estimates the percentage of U-5 children whose weight-for-height is above +2SD (Standard Deviation) from the median of the WHO Child Growth Standards(WHO,2021).

Available data are interpreted and computed and are expressed through tables and figures. The average prevalence of stunting, wasting, underweight and overweight children under five years (from 2010-2020), Arithmetic annual growth rate (2010-2020), Arithmetic annual reduction rate (from 2010-2020), Projected Growth and Projected reduction (by 2025 and 2030) are conducted for the study. Microsoft Excel 2010 is used for the different numerical calculations.

RESULTS

Stunting

Table-1 shows that India possesses a higher prevalence of average stunting (37.59%) from 2010 to 2020 than that of World value (24.55%), but India's average annual reduction in stunting from 2010 to 2020 is higher than that of the Global average.

Table-1: A .P, AAR of stunting among U-5 children of India during 2010-2020 and projected prevalence

Country/ World	Average Prevalence of stunting 2010 - 2020	Avg. Annual Reduction of stunting from 2010 to 2020.(%)	Prevalence of Stunting in 2020 (%)	Projected prevalence by 2025	Projected Prevalence by 2030
India	37.59	3.58	31.8	25.75	21.46
World	24.55	2.28	22	19.6	17.47

A.P> Average Prevalence, AAR> Average Annual Reduction

By 2025, the projected stunting prevalence will be 25.75% in India and 19.6% in the World based on the average annual reduction of stinting.

By 2030, the projected values (based on the annual reduction) of prevalence of stunting children under 5 Yrs. will also be higher in India(21.46%) than that of the World (17.47%) by 2030 (Table 1)

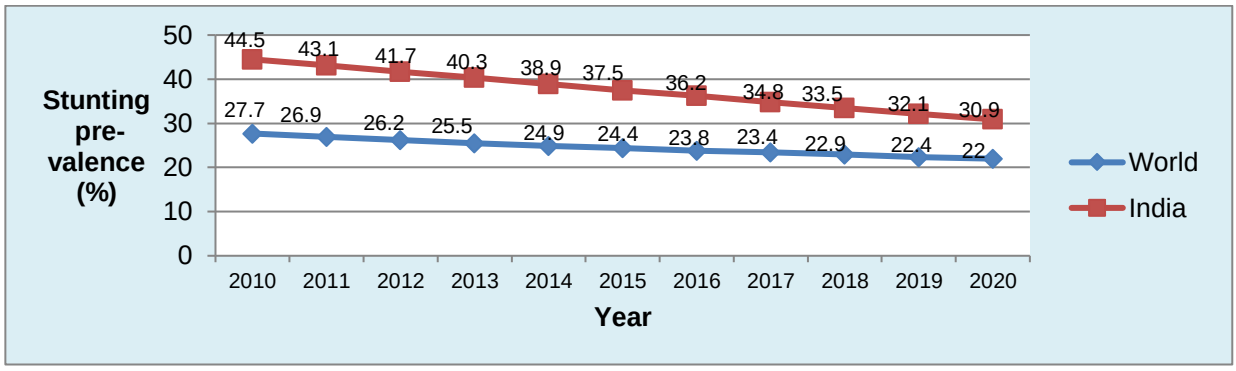

Figure-1: Stunting prevalence of World and Indian U-5 Children from 2010 to 2020 (As per WHO, 2021,year).

Table-2: U-5 Stunted Children (Height-for-Age) in India (%).

Indicators	NFHS-3) (2005-06)	NFHS-4) (2015-16)	NFHS-5 (2019-21)			Reduction % from NFHS 4 to NFHS 5
	Total	Total	Urban	Rural	Total	Total
Children under 5 years who are stunted (height-for-age) (%)	48	38.4	30.1	37.3	35.5	7.55

Data are in %, * Source: National Family Health Survey -5, (2019-21), Ministry of Health and Family Welfare, Government Of India

India's tendency in reduction of stunting children from 2010 to 2020 is more than that of the World average but as the initial value was high in 2010 its prevalence of stunting children also remains considerably high in 2020(Figure1).

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As per the National Family Health Survey, NFHS-3(2005-06), NFHS-4(2015-2016) and NFHS 5(2019-21) India's percentage of total Stunting children under 5 Yrs. were 48, 38.4 and 35.5 respectively, however, but as per WHO (2021), the stunting percentage in India was 30.9 in 2020. Rural children are more vulnerable than urban children (NFHS-5) (Table-2).

Wasting

Data on Wasting children under five years are very sporadic. India's Wasting prevalence was much higher than that of the World average in respect of the respective years(Table 3).

In 2015 it was approx. 3 times greater than that of the World, in 2017 it was 2.5 times greater and in 2020 it was 2.75 times greater than that of the World average (Table 3).

Table 3: Wasting Prevalence among U-5 children of India and the World from 2010 – 2020

YEAR	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
India	-	-	-	-	15.1	20.8	-	17.3	-	-	18.7
World	7.7	7.6	7.5	7.4	7.3	7.2	7.1	7	6.9	6.9	6.8

(-) Data not available, # Last updated on 17.04.2023 By WHO.

Table 4: Wasting (Weight-For-Height) U-5 (%) according to National Family Health Survey, India.

INDICATORS	NFHS-3 (2005-06)	NFHS-4) (2015-16)	NFHS-5 (2019-21)			NFHS-4 to NFHS-5, Reduction. (%)
	Total	Total	Urban	Rural	Total	Total
Children under 5 years who are wasted (weight-for-height) (%)	19.8	21	18.5	19.5	19.3	8.10

*Source: National Family Health Survey -5, (2019-21), Ministry of Health and Family Welfare, Government Of India

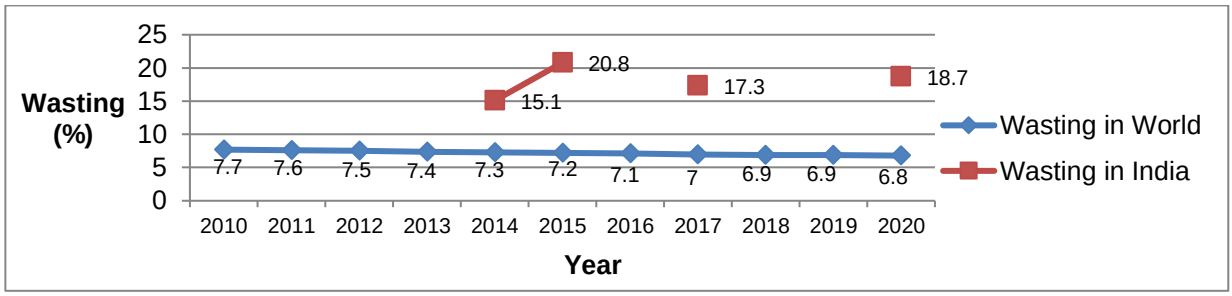

Figure-2: Prevalence of Wasting among the U-5 children in the World and in India (%) from2010-2020 (WHO, 2023)

Report of the National Family Health Survey, NFHS-3(2005-06), NFHS-4(2015-16) and NFHS-5(2019-21) shows the percentage of U-5 children are wasted (Weight for height) as 19.8, 21 and 19.3 (Urban 18.5 and Rural 19.5) respectively (Table 4). In respect of the World average India's Wasting percentage is very high(Figure 2). No effective reduction is found in the percentage of wasting both as per data from the World Health Organization and from the National Family Health Survey. The present prevalence of wasting children in India as per the latest available data is 18.7 %(WHO, 2020) and 19.30% (NFHS-5, 2091-21). Both values are much higher than all the other countries and as well as the World average. National Family Health Surveys reveal that from 2005-06 to 2015-16 the percentage of wasting increased by 6.06% and thereafter decreased by 8.1% from 2015-16 to 2019-21.

Under Weight

Very sporadic data are available among the U-5 children in the selected countries. As per available data, it is observed that India's prevalence of underweight children under 5 Yrs. age was 29.4% & 36.3% in 2014 and in 2015 and it was 33.4% in 2017.

Table 5: Underweight prevalence (%) among U-5 Children (Weight- For- Age <-2SD)

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
India (%)	-	-	-	-	29.4	36.3	-	33.4	-	-	-
WORLD %	16.2	15.8	15.3	14.9	14.5	14.1	13.7	13.4	13.1	12.9	12.6

(-) Data is not available, #Last updated on 30.06.2022 by WHO

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Table-6: U-5 Children with underweight (Weight-for-Age) (%) in India

INDICATORS	NFHS-3 2005-06	NFHS-4) (2015-16)	NFHS-5 (2019-21)			NFHS-4 to NFHS-5, Dec.%
	Total	Total	Urban	Rural	Total	Total
Children under 5 years who are underweight (weight-for-age) (%)	42.5	35.8	27.3	33.8	32.1	10.34

*Source: National Family Health Survey -5, (2019-21), Ministry of Health and Family Welfare, Government Of India

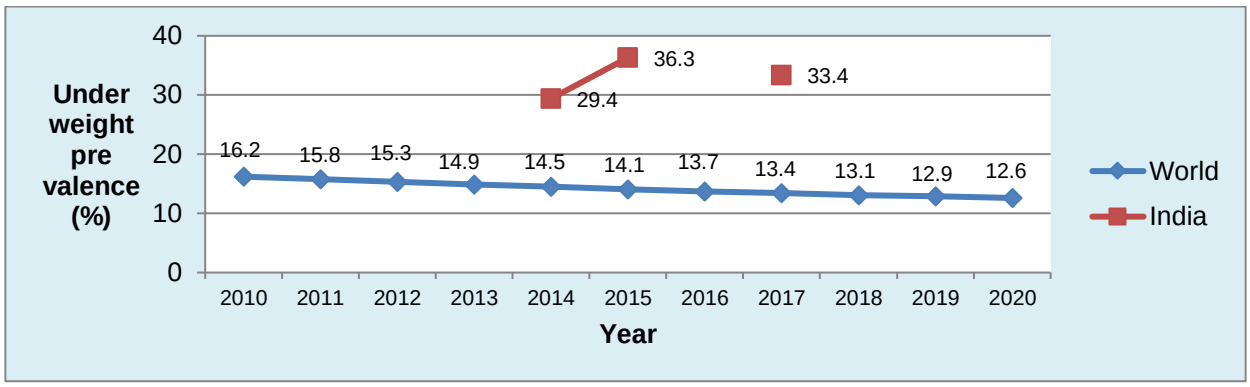

Figure 3: Prevalence of U-5 Underweight Children in the World and India during 2010-2020 (%).(WHO 2022)

As per the latest data available from the WHO, in the year 2017, India's prevalence of underweight children under 5Yrs. was 33.4% and at that time the World average was 13.4% and it reveals that India's prevalence of underweight children under five was two and half times (approx.) that of the World in 2017 (Table 5 and Figure 3).

To National Family Health Survey, India's underweight children (Under 5 Yrs.) percentage was 42.5 in 2005 -06 (NFHS-3), 35.8 in 2015-16 (NFHS-4) and 32.1 in 2019-21(NFHS-5)(Table 6). In the year 2020 World percentage of underweight children under 5 Yrs. age was only 12.6% and in 2019-21 (NFHS-5) its value was 32.1 i.e. more than two and half times the World values(Table 6)(Figure 3). As per NFHS, from 2015-16 to 2019-21 reduction of underweight prevalence was noticed by 10.34% (approx.) only.

Overweight:

The average prevalence of overweight children Under 5 Yrs. from 2010-2020 in India (2.18%) is lower than that of the World average (5.63%).

Table 7: Avg. Overweight Prevalence and Avg. annual Growth of U-5 children during 2010-2020 and projected prevalence.

Country/ World	Average prevalence of overweight 2010 to 2020. (%)	Avg. Annual Growth of overweight from 2010 to 2020.(%)	Prevalence of overweight in 2020 (%)	Projected prevalence by 2025	Projected Prevalence by 2030
India	2.18	-3.07	1.90	1.63	1.39
World	5.63	0.18	5.7	5.75	5.80

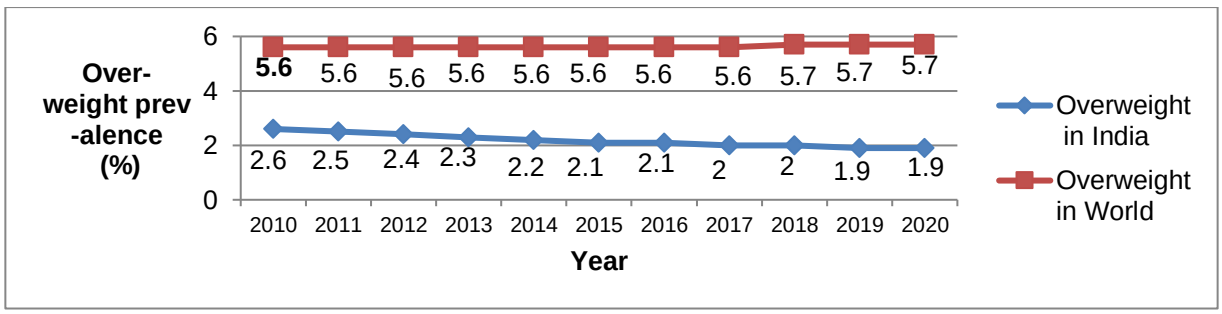

Figure 4: Prevalence of Overweight among the U-5 Children in the World and India (WHO, 2021)

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In 2019 and 2020 India maintained a statuesque position having the values (1.9) same for those two consecutive years as per WHO data. It is observed that India will fulfill the targets set by the World Health Assembly (WHA 2012) to have no increase in childhood overweight by 2025 and will be very close to the Global target of 2030 to make the World free from all types of malnutrition(Table 7) (Figure 4).

Table 8: U-5 children (%) with overweight (Weight-for-Height).

INDICATORS	NFHS-3 (2005-06)	NFHS-4 (2015-16)	NFHS-5 (2019-21)			NFHS-4 to NFHS-5 Growth.(%)
	Total	Total	Urban	Rural	Total	Total
Children under 5 years who are overweight (weight-for-height) (%)	-	2.1	4.2	3.2	3.4	61.90

*Source: National Family Health Survey -5, (2019-21), Ministry of Health and Family Welfare, Government Of India

But, the report of the National Family Health Survey (NFHS-5) (2019-21), reflects **quite increasing tendencies (2.1 to 3.4, Approx. 62%**) in respect of overweight prevalence value 2015-16 to 2019-21 (Table 8).

DISCUSSION

The average prevalence of stunting in India (37.59%) was higher than that of the World (24.55%)(Table 1). But, India's average annual reduction (3.58%) in stunting from 2010 to 2020 is higher than that of the World (2.28%).

In 2012, the World Health Assembly (resolution 65.6) adopted one of the Global targets which was to 40% reduction in the number of children under 5 Yrs. who are stunted by 2025. It is observed that India will be very close to the Global target by 2025 (Table 1) by its existing average annual reduction rate in stunting but, India will not be able to hit the Global target SDG 2.2 by 2030 to be freed from any kind of malnutrition as India's initial prevalence of stunting considerably very higher and by 2030 its projected prevalence will be 21.46% based on the existing average reduction rate (Table 1 and Figure 1).

Data on wasting children under five years are very sporadic. India's Wasting prevalence was much higher than that of the World average (Table 3). In 2015 it was approx. 3 times greater than that of the World, in 2017 it was 2.5 times greater and in 2020 it was 2.75 times greater than that of the World average(Table 3).

The Global target which was to Reduce and maintain childhood wasting by less than 5% by 2025 and the SDG2.2 target by 2030 will not be fulfilled by the India in existing reduction percentage (8%) from 2015-16 to 2019-21(NFHS 4 to NFHS 5) as the latest prevalence are very high as 18.7% in 2020 (WHO) and 19.3% in 2019-21(NFHS 5)(Table 4 and Figure 2).

India's underweight prevalence in 2014, 2015, and 2017 are much higher than that of the World average in respective years(Table 5). The report NFHS 3, NFHS 4 and NFHS 5 reveals decreasing tendencies in underweight prevalence by 15.76%(42.5 to 35.8, from 2005-06 to 2015-16) and by 10.34% (35.8 to 32.1, from 2015-16 to 2019-21). However, this reduction rate is not enough to achieve the Global target of SDG 2.2 by 2030.

Hemaltha et al. (2020) also assessed the prevalence of stunting, wasting and underweight prevalence from 2010 to 2017 and its findings are also compatible with the trends of stunting, wasting and underweight prevalence in the present study.

India can meet the Global targets (Adopted by WHA, 2012) which are not to increase childhood overweight, by 2025, based on existing trends in overweight prevalence among the U-5 children as per WHO data. The projected overweight prevalence of India will also be close to the Global Target(SDG 2.2) by 2030 (Table 7), but it is quite alarming that the National Family Health Survey (NFHS-5) reflects much increasing tendency in overweight prevalence(%) under five years from 2015-16 to 2019-21 (2.1 to 3.4) by 62% approximately (Table 8). The findings of Varghese et al.(2022) also prove an increasing tendency in overweight children in India.

India is in the same boat as all the other countries in the World with a vision of 'Transforming our World by 2030' through achieving all the SDGs. SDG 2.2 is to end all forms of malnutrition by 2030, including achieving by 2025, the internally agreed targets. India's rank in the Global Hunger Index 2023, is 111th out of 125 countries and its rank in the Global Food Security Index 2022, is 68th out of 100 countries. India's prevalence of Stunting, Wasting, Underweight and Overweight among children under five years as per the National Family Health Survey 2019-21, are 35.50%, 19.30%, 32.10% and 3.4% respectively. The prevalence of Stunting, wasting and underweight in India are much higher than that of the World. Only overweight prevalence is lower in India than that of the World average.

As the present trends of progression are not enough to achieve the goals in time, India has to accelerate its improvement regarding immediate reduction in Stunting, Wasting, Underweight prevalence mostly to reach the global target by 2030, and effective strategies have to be taken to control overweight prevalence in future.

CONCLUSION

India's economy is growing very fast but, India is still a large hub of under-nutrition children, adolescents and adults. The researcher has tried to investigate the trends in stunting, wasting, underweight and overweight prevalence among U-5 children in India comparing its status with the World average

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and evaluating its status towards the Global targets. All the data on stunting, wasting, underweight and overweight prevalence are collected from the open websites of WHO, the World Bank and the National Health Surveys (NFHS), India.

The Stunting, Wasting and Underweight prevalence in under five years in India is much higher than that of the World average. India is still in the safe zone in Overweight prevalence among children under five years as per the report of WHO, but effective strategies have to be taken to control overweight prevalence in the future as NFHS-5 reflects a highly increasing tendency. With the existing progress rate India will be far away from SDG 2.2 by 2030 in stunting, wasting and underweight prevalence despite having the possibility to be close to the interim Global target by 2025 in case of prevalence of stunting. Big challenges are ahead, India has to do progress faster along with maximum implementations of different policies and strategies.

ACKNOWLEDGEMENT

Acknowledgment is extended to the World Health Organisation, the World Bank and the Ministry of Health and Family Welfare, Govt. of India for having available data for the study, and indebtedness is expressed to the Department of Physical Education, Jadavpur University for needful assistance.
Abbreviation: WHO-World Health Organization, SDG-Sustainable Development Goal, Avg. -Average. NFHS-National Family Health Survey.

Competing Interest: The Authors declare there are no competing interest.
Fund: No funding involved.

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ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 9| Issue: 12| December 2023|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2023: 8.224 || ISI Value: 1.188

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