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TRENDS OF MALNUTRITION AND UNDER-FIVE MORTALITY AMONG CHILDREN IN INDIA - TROTTING `PUBLIC HEALTH CHALLENGES AMIDST EFFECTIVE STRATEGIES: A REVIEW.

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ABSTRACT

OBJECTIVE: Malnutrition is a complex multitude issue. Global estimates found that malnutrition alone is responsible for the forty five percent of deaths among children under-five years of age which is otherwise preventable. India has started its war against malnutrition way back in 1970. The aim is to analyse: the trends on malnutrition indicators; state-wise prevalence of malnutrition among under-five children; the under-five mortality rate in India; the socio-economic-demographic factors common to both malnutrition and U5MR and national nutritional policy in system and its challenges ahead.

MATERIALS AND METHODS: Desk review and analysis National Family Health Survey1 to 5 and Combined national nutritional surveys, Sample registration survey – recent and review of the relevant journal articles and editorials.

RESULTS: India is one of the worst affected countries of the World and is under 'Very High Category' for all the three major indicators of malnutrition: Stunting, wasting and under nutrition. Integrated Child Development Services, which developed as an experimental initiative in India, has evolved overtime imbibing Millennium development goals, Global nutritional policy, Sustainable development goals to address the overall complexity of malnutrition including immunization, maternal health, adolescent health, primary health care, best feeding practices, sanitation and hygiene practices. Yet, India ranks One hundredth and two rank out of one hundred seventeen countries as per the Global Hunger Index report, 2019.

CONCLUSION: A more concerted and intersectoral collaborative actions, a real time monitoring, independent reviewing and progressive efforts would only help India's National nutrition mission to achieve its goal 'Kuposhan Mukt Bharat', malnutrition free India by 2025.

BACKGROUND:

According to the 'State of Food Security and Nutrition', an annual flagship report of 2019, one in every nine people of the world remain hungry due to lack of food.(Food and Agriculture Organization of the United Nations, 2019) Recent estimates from WHO- UNICEF had also found that one in four children under five years of age is underweight. Globally, this accounts to 88 million children(*GHO | By Category | Global and Regional Trends by WHO Regions, 1990-2030 - Underweight,* n.d.) under five years of age are underweight, one-hundred and forty four million are stunted, forty seven million are wasted and seventeen million are severely wasted (2020).(UNICEF / WHO / World Bank Group Joint Child Malnutrition Estimates, 2020) Asia is worst hit and homes more than half of world's children under five who are stunted and two-thirds of World's under five children who are wasted (2020). In Asia, South-eastern Asia sub-region has reported the highest levels of these indicators in children under five years of age, compared to the other world regions: twenty five percent were underweight,(*GHO | By Category | Global and Regional Trends by WHO Regions, 1990-2030 - Underweight*, n.d.) thirty two percent were stunted and fourteen percent were wasted.(2020a) In India, as per the recent, comprehensive national nutritional survey:2016-2018 report (CNNS), 2019 thirty five percent children under five are stunted, seventeen percent are wasted and thirty three percent were underweight,(Ministry of Health and Family Welfare (MoHFW), Government of India, et al., 2019) almost one-third of under-five children are severely malnourished and all of which are considerably higher than the average of South-eastern Asian sub-region.

Malnourishment and nutritional related factors alone account for more than forty five percent of the deaths as observed in Children under five years of age, globally.'(2020b) Malnutrition particularly, acute malnutrition impairs immune functions, increases the chance of infection like pneumonia, diarrhoea and nutrition, resulting in the death of children under five years of age.*(Children,* n.d.)The article reviews the state-wise prevalence of malnutrition in children under five years of age in India based on the recent Comprehensive national nutritional survey (CNNS) : 2016-2018 report , 2019 and the under-five mortality rate (U5MR) in India from sample registration survey report (SRS), 2017 and various socio-economic – demographic factors observed in common to both malnutrition and U5MR; and government nutrition schemes and policies that are fully devised and in existence to combat the burden of malnutrition in children under five years of age, as it is one of the most predominant and preventable factors for U5MR in India; it also attempts to envision the challenges ahead.

SEARCH STRATEGY:

Review of reports: National Family Health Survey reports and Combined national nutritional survey report, Sample registration survey reports up to the current year 2020, journal articles and relevant editorials are done.

Sustainable Development Goals: Malnutrition And U5mr:

Sustainable development goal (SDG), as adopted by the members of the United Nations, in 2015, has seventeen goals with broader scope than millennium development goals and specific health related targets and was deliberated with an aim to achieve by 2030. *SDG -2: Zero Hunger,* is to 'End hunger, achieve food security and improved nutrition and promote sustainable agriculture'. *SDG Target 2.2,* aimed to end all forms of malnutrition by 2030, including achieving, the internationally agreed targets on stunting and wasting in children under-five years of age by 2025 viz., reduction of stunting by forty percent and to reduce and maintain childhood wasting to less than five percent besides these it also address the nutritional needs of adolescent girls,

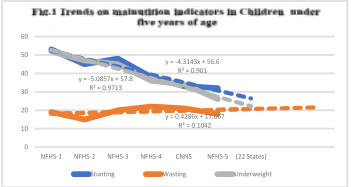
pregnant and lactating women and older persons, as health of future children is dependent on women in reproductive age. SDG 3: Good health and wellbeing, ensures healthy lives and promotes well-being for all at all ages. SDG Target 3.2., focus is to end preventable deaths of new-born and children under-five years of age, by 2030. The internationally agreed target to be achieved by 2025, on under-five mortality in children is at least as low as twenty-five deaths per thousand live births and the current rate in India is thirty-seven deaths per thousand live births. Malnourishment and nutritional related factors have a greater influence on the U5MR both directly and indirectly(Sustainable Development Goals .:. Sustainable Development Knowledge Platform, n.d.).

Trends On Malnutrition Indicators In Children Under-five Years Of Age In India:

Figure.1. represents the trends on malnutrition indicators: stunting, wasting and underweight in children under-five years of age, in India, over the period of years, as per the data obtained from the National Family Health Survey (NFHS) -1 to NHFS-5 and CNNN survey reports. Comparing the facts of NFHS 1 (1992-1993)(1995), NFHS 2 (1998-1999)– (International Institute forPopulation Sciences (IIPS) & ORC Macro. 2000, n.d.), NFHS 3 (2005-2006)(International Institute for Population & Macro International. 2007., n.d.), NFHS 4 (2015-2016) (Ministry of Health and Family Welfare, Government of India & International Institute for Population, n.d.-a) & CNNS report (2016-2018)(Ministry of Health and Family Welfare (MoHFW), Government of India, et al., 2019), NFHS 5 (2010-2020), it is inferred that the prevalence of malnutrition in children, Chronic malnutrition: stunting and underweight respectively has shown a decrease from fifty three percent in NFHS-1 (1998-1999) to thirty three percent in CNNS report (2016-2018), and from fifty two percent in NFHS-1 (1998-1999) to thirty two percent in NFHS-5 report (2019-2020) and wasting which is indicative of acute malnutrition has decreased from nineteen percent in NFHS-1 (1998-1999) to eighteen percent in NFHS-5 report (2019-2020) .

However, the presentation of these three indicators is not always mutually exclusive and it may overlap to co-exist based on the severity. Thus, occurrence of all the three together signifies more severe forms of malnutrition. Besides these indicators, Iron deficiency, deficiency of micronutrients such as Vitamin A, Vitamin D, Vitamin B12, Folate, Iodine and Zinc also are prevalently measured, as deficiency of these have known to cause significant morbidity and mortality, neural tube defects, poor cognitive function development, poor development growth and decreased work productivity in adulthood(Thompson & Amoroso, 2010). Iron, Vitamin A, Iodine and Zinc has significant importance in public health whereas Folate, Vitamin B12 and Vitamin D have an important role in Maternal and Child health development(Ministry of Health and Family Welfare (MoHFW), Government of India, et al., 2019).

Fig.1. Trends on malnutrition indicators in Children under five years of age, in India (1995),–(International Institute forPopulation Sciences (IIPS) & ORC Macro. 2000, n.d.), (International Institute for Population & Macro International. 2007., n.d.),(Ministry of Health and Family Welfare, Government of India & International Institute for Population, n.d.-a),(Ministry of Health and Family Welfare, Government of India & International Institute for Population, n.d.-b),(Ministry of Health and Family Welfare (MoHFW), Government of India, et al., 2019)



Linear trend analysis of stunting and underweight as indicated from the regression equation is found to be best fit and the decrease in these two indicators are statistically significant, based on their R^2 values closer to 1, unlike the acute malnutrition indicator, Wasting.

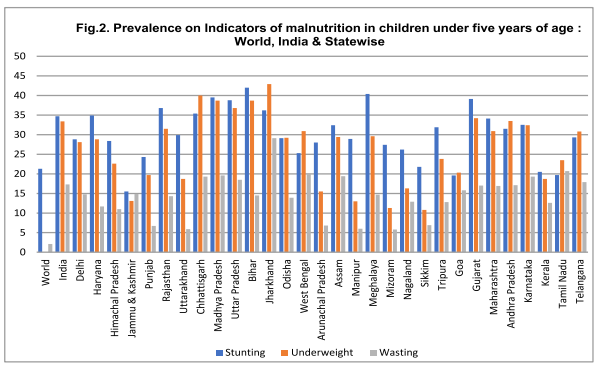
State-wise Prevalence Of Malnutrition Indicators:

The states across India have shown reduction in the prevalence of malnutrition in the last decade. As per NFHS-5 (2021) data, nation's average for stunting, wasting and under-weight is thirty-two percent : very high category of stunting in comparison to the world's twenty one percent (global average); eighteen percent, which is a very high category for wasting , whereas the world average is 6.9 percent and twenty six percent , again a very high category of under – weight respectively(Ministry of Health and Family Welfare (MoHFW), Government of India, et al., 2019). India is reportedly under very high category(de Onis & Blössner, 1997) for all the three indicators: Stunting, wasting and under-weight, which is alarming.

Also , these malnutrition indicators are not consistently same throughout India and even within the states and inter districts, there is a widespread disparity in its distribution as attributed to numerous factors like large number of population, socio-economic-demographic factors like urban areas and rural areas, literacy level of mother, sanitation and social category - castes of people(Ministry of Health and Family Welfare, Government of India & International Institute for Population, n.d.-a).

Few States And Union Territories Like Bihar, Dadar And Nagar Haveli (diu), Gujarat, Himachal Pradesh, Karnataka, Lakshwadeep And Telengana Had reported highest stunting, wasting and underweight , higher than that of nation's average(Ministry of Health and Family Welfare (MoHFW), Government of India, et al., 2019).

Fig.2. Prevalence On Indicators Of Malnutrition In Children Under Five Years Of Age : World, India & Statewise(ministry of health and family welfare (mohfw), government of india, et al., 2019)

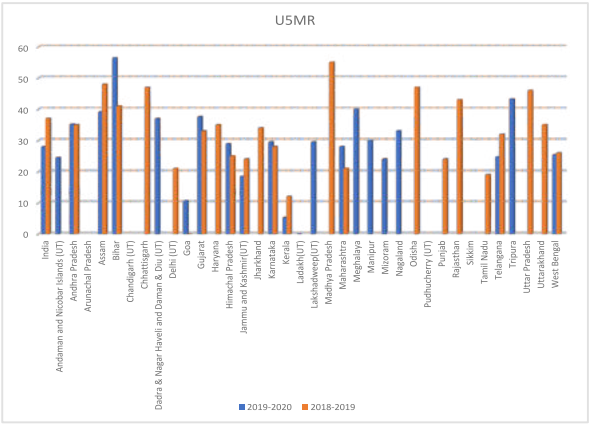


U5MR IN INDIA:

Under five mortality rate (U5MR) in children, as per the sample registration survey report (SRS), 2017 & were analyzed (fig.2). India's U5MR estimated to be twenty-eight per thousand live births in 2018. A detailed analysis in here is made from the SRS report States like Madhya Pradesh, Assam, Chhattisgarh, Orissa, Uttar Pradesh, Rajasthan and Bihar had reported U5MR above than the national average (37 per 1000 live births). Andhra Pradesh, Gujarat, Haryana, Jharkhand, Uttarakhand and Telangana had U5MR closer to the national average. Comparing the malnutrition indicators like stunting, wasting and underweight of these states, are considerably higher, as inferred from the CNNS report. Also, U5MR, in rural areas (42 per 1000 live births) found to higher than urban areas (25 per 1000 live births) which is in conjunction with the distribution of malnutrition and also the Under-five mortality

rates of female are higher than that of male except in Andhra Pradesh, Chhattisgarh, Gujarat, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Tamil Nadu and Uttarakhand *(SAMPLE REGISTRATION SYSTEM STATISTICAL REPORT 2017,* n.d.).

Fig.3. Under-five Mortality Rate In India Based On Sample Registration Survey Report, 2018



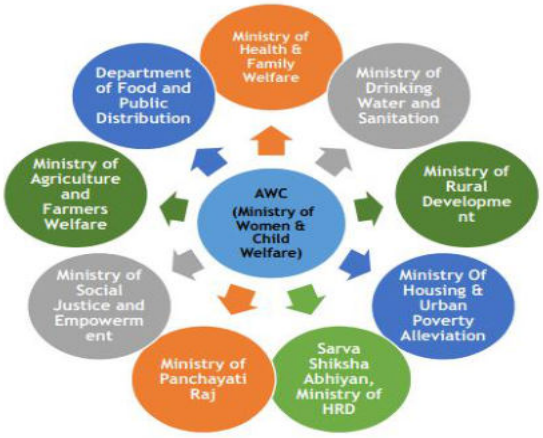
Socio-demographic Factors Common To Malnutrition And U5mr:

Socio-demographic factors, few as observed in common to both malnutrition and U5MR are as follows: residence status (urban/rural), mother's education / literacy status, sanitation, mother's nutritional status, wealth index, social category and order of birth of the child. It is observed that all the three indicators of malnutrition: stunting, underweight and wasting and U5MR are reportedly higher in rural than in urban area; all of these are again higher than the national average in rural and well below the national average in Urban area. Similarly stunting, wasting, underweight and U5MR are evidently increased in mothers' who never had a formal education and mothers' with lower BMI (maternal malnutrition). Occurrence of malnutrition indicators and U5MR has decreased steadily with increase in wealth index and has improved with improvement in sanitation and increased with increasing birth order of the child in India. Among caste categories, all forms of malnutrition is highest among Scheduled tribe (ST) and scheduled caste (SC) population at national level, while the exception being northeastern states of India. As stated earlier, these factors are the reasons for the disparity in the distribution of malnutrition and U5MR among various states within India and various districts within same states (Ministry of Health and Family Welfare, Government of India & International Institute for Population, n.d.-a),(Ministry of Health and Family Welfare (MoHFW), Government of India, et al., 2019)(*SAMPLE REGISTRATION SYSTEM STATISTICAL REPORT 2017,* n.d.). These socio-demographic factors are the greatest hurdles. Hence, correcting malnutrition and improving U5MR without addressing these socio-demographic factors would not be possible.

CONTROL STRATEGIES AND POLICIES:

India's first battle against malnutrition started with the launch of Special Nutrition Programme (SNP) way back in 1970-1971, confined to tribal areas and slums, to provide supplementary feeding to the beneficiaries. Following SNP, Integrated Child Development Services (ICDS) started as an experimental initiative in 1975-1976 under Ministry of Women and Child development, covering thirty three blocks, which later expanded to sixty six blocks in 1978(FAO, n.d.). Since then, it has expanded in phased manner and presently covering all six hundred and forty districts of the country. The delivery of services by ICDS is through Anganwadi Centres (AWCs), an umbrella ICDS, a centrally sponsored scheme, where it became a key agent, which besides Nutrition Care also deliver Health Care, early childhood education and development and Community mobilization, awareness and advocacy through convergence of various ministries as mentioned in the figure 4 below(Programme Evaluation Organisation, 2015).

Fig.4. Convergence of different department through Anganwadi Centres Reproduced from ICDS – Manual for District level Functionaries (2017)(Programme Evaluation Organisation, 2015)



Following Global Nutrition Targets (2014)(2014) and replacement of the five year planning commission in India with NITI Aayog in 2015, a cooperative federalist approach , involving all states and UTs and members from reputed institution, in the economic policy making use of Bottom to top approach(*Meetings Of Governing Council | NITI Aayog,* 2020). With Sustainable Development Goals (2015) and an agreement to achieve International targets by 2025, Poshan Abhiyaan (National Nutrition Mission) was launched in 2018. The mission is backed by a National Nutrition Strategy (NNS) in 2017 prepared by the NITI Aayog(*POSHAN Abhiyaan | NITI Aayog*, n.d.). The goals of Poshan Abhiyaan and NNS is to attain "Kuposhan Mukt Bharat", malnutrition free India and targets are to prevent and reduce under-weight prevalence in children (0-3 years) by three percentage points per annum from NFHS-4 levels; to reduce the prevalence of anaemia among young children, adolescent girls and women in the reproductive age group (15-49 years) by one-third of NFHS-4 levels(Shwetha Khandelwal, 2019). It is observed that these targets: under-weight prevalence has been reduced from thirty-six percent (NFHS-4) to thirty-three percent (CNNS); prevalence of anaemia among young children, has found to be reduced from Fifty-eight percent of children aged under-five (NFHS-4) to forty one percent of pre-schoolers aged one to four years (CNNS)(Ministry of Health and Family Welfare, Government of India & International Institute for Population, n.d.-a),(Ministry of Health and Family Welfare (MoHFW), Government of India, et al., 2019).

Integrated Child Development schemes (ICDS), linked to Anganwadi centres (AWCs) implement various programmes including 'Poshan Abhiyaan' through Anganwadi workers (AWW). ICDS/AWCs/AWW provide package of services comprising supplementary nutrition, immunization, health check-up, referral services to children below six years of age and expectant and nursing mothers. Non-formal pre-school education is imparted to children of the age group three to six years and health and nutrition education to women in the age group fifteen to forty-five years. High priority is accorded to the needs of the most vulnerable younger children under three years of age in the programme through capacity building of caregivers to provide stimulation and quality early childhood care. It plays an instrumental role in catering to the vulnerable sections in the community. AWW also helps Auxillary Nursing Midwifery (ANM) in identifying the target group. Registration of beneficiaries for availing benefits under these schemes is not restricted to population below

poverty line. Any child under six years of age, expectant and lactating mother can register to avail the benefits. This is to ensure equitable distribution irrespective of social, economic and demographic disparity(n.d.).

CHALLENGES AHEAD:

Besides Poshan Abhiyaan, there are near about thirty programmes for Maternal and child health, nutrition in India that are most often operational in isolation, under various ministeries. Two major programmes specially designed to improve food safety and security are public distribution system (PDS) and anti-poverty & employment generation schemes(FAO, n.d.). Yet when it comes to maternal and child health indicators,India is a poor performer. India presently ranks one-hundreth and second in Global Hunger Index scores (GHI) 2019, which is higher than its neighbouring countries - Nepal, Srilanka, Bangladesh and Pakistan (*2019 Global Hunger Index: The Challenge of Hunger and Climate Change*, 2019). Malnutrition is a complex multitude issue, where poverty, lack of adequate food, lack of balanced diet, improper maternal, infant and child feeding care and practices, inequity and gender imbalances, poor sanitary and environmental conditions and restricted access to quality health, education and social care services all adds fuel to the fire. The challenges in managing nutritional status across the countries run deep into India's complex social structure. India's patriarchal community facilitates the malnutrition and is a long and vicious cycle that starts with the birth of girl child, which is often considered as an economic burden, a girl child is deprived of health, nutrition, education, finances and is married of at an early age, in most cases lesser than eighteen years of age. Under-nourished women go-on to bear under-nourished children. Gender disparity and inadequate birth planning may lead to birth of unhealthy children and it goes on and on. A child who is deprived of nutrition, in the early childhood years, has reduced mental and physical development and condemned to live in the margins of society, and is more likely to do poor in schools, who subsequently have low incomes, high fertility and is unable to provide proper care and nutrition to his' wife and children continuing the vicious cycle of poverty and malnutrition(Shaket Khandelwal, n.d.).

The critical evaluation of ICDS programme was done by many government and independent agencies periodically, it is observed that at many instances, it is observed that the programme has not effectively reached children under – three years of age and at many places, the Supplementary food has become the main food source for the beneficiaries, rather as a supplementary nutrition. The funding and coverage have been found to be lowest level in poorest states and those with the highest level of undernutrition. Evaluation of implementation, detected that there is a lack of adequate training in AWW, proper resource supply and food implementation services (Dixit et al., 2018).

India being a vast country with enormous population and being one among the 51 countries of 'Low-income food-deficit country', it needs more unified, concerted and well-coordinated efforts from various ministries and other non-governmental organizations to work at grass root level to curb the menace of poverty, food security, social inequalities, gender biases, sanitation, hygiene, maternal health, pregnancy- peri natal care, institutional delivery, compulsory education besides focusing on the existing severe acute malnutrition, chronic malnutrition and U5MR burden. As all these are interdependent, hence adult education and family health education programmes to improve societal attitudinal change, health and hygiene practices could be the cost-effectiveness strategies to address malnutrition and U5MR.

CONCLUSION:

Maternal health, children health, sanitation, immunization, malnutrition and under 5 mortality rate are all interrelated. Existing nutrition and food safety programmes under ICDS and other schemes should be observed and reviewed for its actions and achievement. The potential of ICDS in mitigating malnutrition, improving women's health of reproductive age, focusing on maternal health, promoting Water, sanitation and hygiene (WASH) practices among children, younger women and mother, reaching vulnerable sections of the community, immunization, promoting exclusive breast feeding, addressing anaemia and other micronutrients deficiency is enormous and their role is commendable in many states. Assessment of real time data on the burden of malnutrition indicators, identification and generation of financial and human resources and collaboration with the National nutritional mission is recommended. Such periodic evaluation of the existing schemes and programmes in states by an external independent review committee, preferably from other states with suggestions for improvement is mandated to scale down the malnutrition burden and U5MR.

DECLARATIONS:

Ethics approval and consent to participate: Not Applicable, as it is a review of open-source data and literature.

Availability Of Data And Materials:

All the data analysed and discussed in the article are available at public domain system and the references are cited appropriately.

Competing Interests: Nil

Funding: Nil

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