

INTRODUCTION

When India attained independence in 1947, the country was not self-sufficient in food production. Over three quarters of the population was poor, food-insecure and under-nourished. Under-nutrition, poor environmental sanitation and poor access to health services resulted in high mortality rates; the life expectancy at birth was 33 years. Recognising the primacy of nutrition and health in human and national development, the Constitution of India stated “the state shall regard raising the level of nutrition and standard of living of all people to attain improvement in public health among its primary duties”. The country invested in planned development, utilized technology and human resources as change agents to hasten nutrition and health transition and improve the nutritional status and quality of life of citizens. Given the vast and varied regions, limited economic and natural resources, the country faced many challenges in its efforts to improve quality of life of the citizens. The progress in second half of the last century was slow but sustained; there were regional disparities and progress was slowest amongst vulnerable segments (Ramachandran, 2008; Ramachandran, 2013; Ramachandran, 2018). .As a result of all these initiatives, there had been a slow but steady improvement in the household food security and nutritional status of women and children (Ramachandran, 2013). But prevalence of undernutrition in Indian children have remained the highest in the world (NNMB,1979; IIPS NFHS 3, 2005-06; IIPS NFHS 4, 2015-16; NFHS-5, 2020-21);NNMB,1996-97;NNMB-2012). Because of the high child undernutrition rates India ranks very low in terms of global food security indicators.

Food production

In the 1960s and 1970s, the term "food security" was originally used to describe a region's or a nation's capacity to produce an adequate food supply for both its existing and projected populations. The Malthusian hypothesis, which states that if population expansion outpaces increases in food production, there would be disastrous consequences (FAO), was accepted by majority of policy makers at this time. The goal of national and international efforts was to increase food production and stabilise population growth rates. The production of food grains to stave off hunger, increasing the availability of affordable food to fulfil energy needs, and preventing chronic

undernutrition among the continuously increasing population were used to assess food security (FAO, 1996).

At the time of independence India was not producing enough food to meet the requirements of the population. India had to import food grains to meet the needs of the population. The green revolution ensured that the food grain production increased substantially to meet the needs of the growing population. By mid-seventies India achieved national food security. However, food security at the national level did not ensure food security of the household and improvement in nutritional status of the family members. In the seventies of the last century, poverty and household food insecurity were experienced by over 70% of the population. Over 70% of the pre-school children and the majority of women were undernourished (NNMB, 1979).

Poverty reduction

Lack of gainful employment had been identified as a major factor responsible for persistent poverty and household insecurity. India was a pioneer in starting national initiatives to improve household food security for low-income households. The Food for Work programme was aimed at directly improving household food security by providing food as wages to poor people participating in the employment programmes. Much more recently, the National Rural Employment Guarantee Act (NREGA) came into effect to provide paid jobs to unemployed rural persons as a legal entitlement. Despite infirmities in the implementation of these employment programmes, the landless marginalised segments of rural households did benefit from them in terms of reduction in acute distress and seasonal migration, and some improvement in household food security. In the last two decades, there has been a steep reduction in poverty rates, partly due to India's rapid economic growth. India achieved the MDG target for poverty reduction in 2012, three years ahead of the target date

Providing subsidised food grains to improve household food security.

Right from the seventies Indian government started providing of subsidised food to the poorer household through the Public Distribution System to improve household food security (Ramachandran, 2007). India built up the Public Distribution System (PDS) to overcome regional and seasonal food grain shortages; PDS also provided food grains at heavily subsidised costs to those below the poverty line. Despite the shortfalls in the distribution system and substantial leakages, the PDS has helped in keeping the food prices low. Data from NSSO show that between 1970 and 2012, there has been a progressive reduction in the household expenditure on food as a

percentage of household income. The reduction in food expenditure was mainly due to reduction in expenditure on purchase of cereals. It is noteworthy that, despite reduction in overall food expenditure, there was an increase in cereal consumption in the lowest tertile of the population. This is likely to be due to access to subsidised food grains through PDS

National Food security Act

India was the first country in the world to provide subsidised food grains as a legal entitlement to over 67% of its citizens. The National Food Security Act aims to improve household food security through this entitlement. Priority households are entitled to 5 kgs of foodgrains/person/ month. The poorest of the poor (Antyodaya) households are entitled to 35 kgs/household/month. The combined coverage of Priority and Antyodaya

households (called “eligible households”) is up to 75% of the rural population and up to 50% of the urban population.

During the COVID epidemic provisions under NFSA was utilised to provide free food grains and two hot cooked meals to all persons who needed them and came to the facilities to access them between April 2020 and November 2020. This measure prevented acute food insecurity especially among labourers who were left jobless during lock down and subsequent slow improvement in employment and low emoluments. This might also been an important factor that prevented deterioration in nutritional status of women and children in poorer segments of the population.

Food supplementation programmes

As the dietary intake in young children must meet the nutrient needs for both growth and the maintenance of essential body functions and everyday activities, preschool children have been identified as nutritionally vulnerable population. Children became undernourished if these nutrient needs were not met. To address the gap between requirement and actual dietary intake in vulnerable groups such as children, pregnant and lactating women food supplementation programmes such as the Integrated Child Development Services (ICDS) and Midday Meal Programme (MDM) were initiated. These programmes were established forty years ago and were designed to provide food supplementation to women and children from families living below the poverty line without assessing a person's nutritional status (Ramachandran, 2013). These supplementation programmes are the largest in the world and have been sustained over decades. Under NFSA food supplementation under MDM and ICDS are

provided as entitlements for women and children. The coverage under Integrated Child Development Services (ICDS) programme offers is currently universal though here are issues related to content and quality of services provided (Ramachandran & Kalaivani, 2018).

Physical activity

In the 1950s and 60s, Indian adults, both men and women had adequate physical activity because a lot of manual work was involved in domestic as well as occupational activities. Walking or riding a bicycle were the major modes of getting from one place to another. In the last three decades, there has been a vast improvement in access to mechanised transport; consequently there has been a steep reduction in walking. Occupational and household activities have become increasingly mechanised; and as a result majority of Indians especially those living in urban areas have a sedentary life style. With the pervasive presence of TV and digital devices in every home, adults and children spend more and more time sitting and less time on playing or walking. Research studies in urban areas and NNMB surveys in rural areas showed that, by the mid-1990s a majority of Indian women and one-third of Indian men had sedentary life styles (NNMB 1995). Due to the substantial decline in physical activity over the past three decades brought on by mechanisation in the job, home, and transportation sectors (NSSO; NNMB, 1979-2012), current energy intake is sufficient to fulfil the EAR for short-statured sedentary Indians (ICMR, 2020). The physical activity situation has worsened over the last couple of decades and currently a majority of people even in the rural areas have sedentary lifestyles. In India, a steep fall in physical activity appears to be the major driver for rising over-nutrition rates in adults.

Nutritional Status of Pre-school Children

Pre-school children have been considered to be the most vulnerable group for under-nutrition, and health and nutrition services have focused on improving their nutritional status. NNMB repeat surveys indicate that, over the last four decades, there has been a slow, steady and sustained reduction in stunting and underweight rates in pre-school children. However, there is no consistent reduction in the wasting rates (low BMI-for-age). It is now globally recognised that food insecurity is not the factor responsible for the high under-nutrition rates in South Asia (SOFI 2013). In India, one third of neonates weigh less than 2.5 kg at birth. (IIPS NFHS 2,1998-99) These small, but gestation-wise mature, infants survive with just the essential new-born care, but they

grow along a lower growth trajectory, as compared to normal birthweight infants. Birthweight and length are major determinants of weight and height in childhood and adolescence and does determine the height and weight in adults also. A part of the stunting and under-weight in under-five children could be attributable to low weight at birth.

Data from NNMB surveys and NFHS 1, 2, 3 4 and 5, show that over the last four decades there has been a reduction in stunting, underweight rates in under five children. The rate of reduction in stunting rates is about 1% /year. However, there has been an increase in wasting rates in the last fifteen years. The increase in overnutrition rates in preschool children over this period is very small. Data from the Comprehensive National Nutrition Survey (CNNS), the Clinical Anthropometric and Biochemical component of the Annual Health Survey (CAB-AHS), the District Level Household Survey (DLHS), the Rapid Survey of Children (RSOC) show that undernutrition rates in preschool children remain high. (IIPS NFHS 1 92-93; IIPS NFHS 2 1998-99; IIPS NFHS 3 2005-06; IIPS NFHS 4 2015-16; RGI AHS-CAB 2014; IIPS DLHS 2 1996-97; IIPS DLHS 4 2012-13; RSOC,2013-14; CNNS, 2016-18).

Long term follow- up studies in India have shown that in India both undernutrition and overnutrition in children predispose them to overnutrition in adult life and increase the risk of non-communicable diseases. Therefore efforts have to be made to reduce the prevalence of undernutrition and halt any rise in overnutrition in children

Nutritional status of women

In adults, BMI is used for assessing both undernutrition (UN) (<18.5 Kg/m²) and over-nutrition (ON) (>25 Kg/m²). NNMB repeat rural surveys showed that, between 1975 and 2012, there was a reduction in under-nutrition from 59% to 32% in men and from 52% to 33% in women. Over the same period, prevalence of overnutrition increased from 2% to 12 % in men and 3% to 16% in women. Data from NFHS 2, 3, 4 and 5 showed that, both in men and women, there was a sustained fall in under-nutrition rates and a steady rise in over-nutrition rates. It is a matter of concern that the reduction in under-nutrition is matched by the rise in over-nutrition, and so the proportion of normally nourished (NN) persons remained unchanged at around 60% (IIPS NFHS 2 1998-99; IIPS NFHS 3 2005-06; IIPS NFHS 4 2015-16; IIPS NFHS 5, 2019-21).

Nutrition transition in India

India has undergone socioeconomic, demographic, and nutritional transition during the past three decades. The country's per capita income, and level of food security in households have all significantly increased and the poverty rate has decreased during the past 50 years (Ramachandran & Kalaivani, 2018). The percentage of people living in poverty has significantly decreased, while family food security, per capita income and children's health have all improved. Currently the country produces enough food grains, milk, fruits and vegetables to meet the food requirements of the families. It is expected that India will continue to remain food secure at the national level and meet the SDG targets by 2030. Access to health and nutrition services have improved there by reducing the nutrition toll of infection. Coverage under nutrition surveys is universal though there are lacunae in terms of content and quality and timeliness of the interventions. As a result of all these there has been a slow but steady decline in undernutrition in adults so that undernutrition rates are half of what they were four decades ago. Concurrently there has been a moderate but consistent increase in adult overnutrition (IIPS NFHS 3 2005-06; IIPS NFHS 4 2015-16; IIPS NFHS 5, 2019-21, NNMB-1996-1997; NNMB,2012; NNMB,1979; Ramachandran & Kalaivani, 2018). Data from NFHS 1-5 showed that though there has been a decline in the prevalence of undernutrition in preschool children prevalence of stunting and underweight are high. Household food insecurity and low energy intake may not be the main causes of undernutrition in preschool children. (IIPS NFHS 3, 2005-06). Wasting rates are relatively unaltered and over time. Over weight rates in children are low but in some segments (urban affluent) there has been a rise in overnutrition in children.

The Tenth Five Year plan recognised the emergence of dual nutrition burden in India and recommended that all children and mothers must be screened so that undernourished and overnourished people could be identified and appropriate intervention based on their nutritional status can be initiated (Tenth Five Year Plan Planning commission 2003-2007). These recommendations have not been widely implemented.

Intra-family Differences in Dietary Intake

Most of the intervention programmes aimed at improving household food security did so with the assumption that within the family food will be shared equitably. Data from NNMB survey in mid-nineties showed that this assumption was no longer correct. Even in households where adults are getting adequate food, children are not getting

adequate food. Data from subsequent NNMB surveys have shown that the situation has worsened over years; in 2012 in over 50% of the households, adults are getting adequate food but children do not. Poor child feeding and caring practices and not food insecurity at household level has been the factor responsible for the inadequate dietary intake of children in families where adults are getting adequate food.

Intrafamily differences in nutritional status

Data from NFHS3 showed that the prevalence of undernutrition in preschool children was high, even if the mother was normally nourished or overnourished (IIPS Nutrition in India NFHS 3, 2005-06.). Several large-scale studies carried out over the past two decades, including the NNMB survey (NNMB 2012), the Annual Health Survey Clinical Anthropometric and Biochemical Component (AHS-CAB) (RGI AHS-CAB 2014), the District Level Household Survey-4 (IIPS DLHS 4 2012-13), and the Comprehensive National Nutrition Survey (CNNS 2016-18), which measured all children between 0 and 18 years old in the surveyed families, revealed that the prevalence of under nutrition continues to be high and overnutrition relatively low.

Adult undernutrition has significantly decreased, and overnutrition has gradually increased; the increase in overnutrition was more pronounced in urban than in rural areas (IIPS NFHS 2 1998-99; IIPS NFHS 3 2005-06; IIPS NFHS 4 2015-16; IIPS NFHS 5 2019-21; RGI AHS-CAB 2014;IIPS DLHS 2 1996-97;IIPS DLHS 4 2012-13;). Small-scale studies have revealed that urban women's dietary energy intakes were greater than requirement, which may be the major cause of a gradual and steady rise in body weight (Pramanik, Kalaivani and Ramachandran, 2021).

Over the last two decades, there had been progressive increase in overnutrition across all age groups and all segments of the population. Over-nutrition is emerging as a major problem in urban areas even among women in low-income families where under-nutrition in preschool children continues to be high. In the current dual nutritional burden era, investigations on the nutritional status of preschool, primary school students, and adolescents from the same household have not been conducted. The focus of public health initiatives must be on screening all children, identifying those who are under and over-nourished, and launching appropriate treatments depending on their nutritional status if there are significant differences in the nutritional status of children from the same household. Data from Indian studies have shown that both under and overnutrition in childhood predispose to overnutrition and

non-communicable diseases in adult life. It is important to assess the magnitude of the under and over nutrition in men, women and children (0-18 years) in families, estimate the magnitude of intrafamily differences nutritional status between children and other members of the family and ascertain the factors responsible for the differences and in nutritional status. Based on these data it will be possible to bring about midcourse corrections in ongoing interventions to improve nutritional status of the population especially women and children to accelerate the progress towards reduction in under nutrition and halting the rise in overnutrition.

Objective of the study

- The primary objective of the study was to assess the intrafamily differences between under five children and other members of the family and also ascertain the factors responsible for these differences.
- The secondary objectives were to assess the intra-family differences in nutritional status between other members of the family and in a sub sample of households to assess household food security, energy intake and physical activity.