Chapter 1 Introduction

Adolescence is an important phase in human lifespan. World Health Organisation has defined adolescence as the period of 10-19 years. Although, defining this phase on the basis of age is convenient, the fact that this is not just a duration but an important developmental phase of human life needs to be emphasised (WHO 2001). According to Christian and Smith (2018), adolescence is a physiological and social process through which a child matures into an adult. Thus, it is a transitional period between childhood and adulthood. An individual goes through physical, psychological and social transition during this phase (WHO 2001).

It is also a demographically important age group contributing to 16.1% of the total World population and 18.7% of the total population in South East Asia as well as India (UNFPA 2019). The total population of adolescents is 1.2 billion (1,244,883 thousand) Worldwide out of which one fifth, i.e.- 20.3% (252,674 thousand) adolescents reside in India (UNFPA 2019).

India is a developing country. According to the Human Development Report 2021, India has been positioned at 131 out of 189 countries and territories (UN 2021). According to Winter et al. (2022), good health is a foundation of happiness and well-being of people. It also contributes significantly to economic advancement as healthier people live longer and have better productivity. Ensuring optimum health and nutrition for the future productive generation is crucial for development of a country like India. Hedaoo and Gavaravarapu (2019) have stated that *"Investing in India's adolescents is the best way to leverage the nation's demographic dividend".*

Inadequate nutrition during adolescence affects development of the adolescents not only in terms of growth but also in terms of cognitive, psychological and social development. Health for World's Adolescents (H4WA) summary report by WHO (2014), on the basis of analysis of 109 National Health Policy Documents, shows that nutrition during adolescence is an important issue found to be infrequent in the policies along with injuries and physical activity (Dick and Ferguson 2015).

High prevalence of undernutrition among adolescents is a matter of concern. The State of Worlds Children report (2019) states that prevalence of thinness (BMI for age <2SD- WHO 2007 growth reference standards) is 11% Worldwide but it is as high as 25% in South East Asia and 27% in India (UNICEF 2019). WHO (2020) estimates for the year 2016 showed that the highest prevalence of thinness among adolescents across the globe was reported for India. Higher prevalence was reported among boys (31.1%) as compared to girls (21.7%). The CNNS (2019) has also reported a high prevalence of thinness i.e. 24.1% among (10-19 years) adolescents. This report suggest that thinness prevalence increase from school age childhood (23%) to adolescence and is higher in 10-14 years old adolescents (27.4%) than 10-19 years olds (20.0%). More than one fourth (26.4%) of the adolescents in India are stunted indicating a long term nutrition deprivation. High prevalence of micronutrient deficiencies among adolescents is also a major challenge. The CNNS (2019) has reported prevalence of anaemia (28.4%), low serum ferritin (21.5%), folate deficiency (36.5%), vitamin B12 deficiency (30.9%), vitamin D deficiency (23.9%), vitamin A deficiency (15.6%) and zinc deficiency (31.7%) in India. (MOHFW 2019)

Apart from macro and micro nutrient deficiencies, overweight and obesity among growing children and adolescents is also a major health concern Worldwide. WHO (2020) database shows the prevalence of overweight and obesity in India to be 6.3% and 1.5% respectively (WHO 2020). Similar prevalence of overweight (3.7%) and obesity (1.1%) among adolescents in India has been reported in CNNS (2019) report. (MOHFW 2019) These figures may not look worrisome but a slow yet steady increase in these figures as a result of changing lifestyle poses a concern.

Children entering adolescence with poor nutritional status are exposed to higher risk of growth retardation due to compromised food security, poor food choices and improper health behaviours. Poor dietary intake of nutrients is often a result of limited food options and seasonal food shortages in rural areas and easy availability of fast food and nutrient poor snacks and drinks in urban areas (UNICEF 2019).

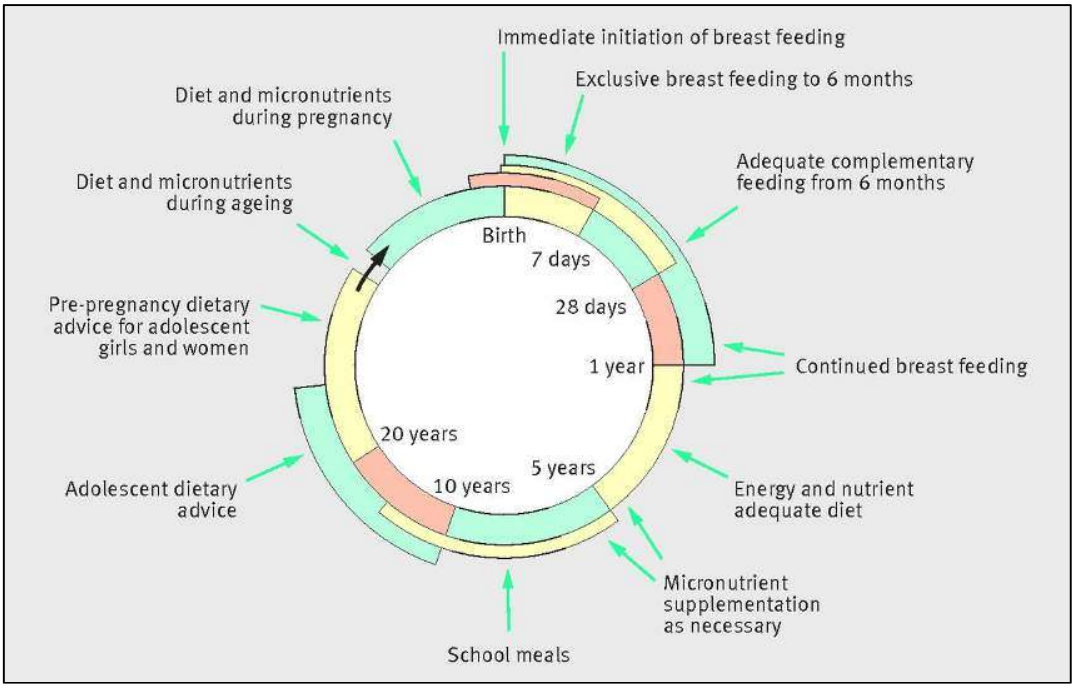
According to Lassi et al. (2017), along with the first 1000 days, next 7000 days of life (up to the age of 21 years) need to be focused as a step towards improving human development. There is a need to adapt scalable cost effective intervention strategies focusing on school age and adolescence. Addressing needs in middle childhood and early adolescence through a school-based approach and focusing on older adolescents through a mixed community and media and health systems approach are the two effective strategies for developmental approaches (Lassi et al. 2017). Schools are considered to be a great platform for delivering health and nutrition services to school age children and adolescents. WHO Information Series on School Health states that school health services are potential strategies as they have better accessibility, equity and they represent adolescents' needs in a better way (WHO, 2021).

World Health Organization advocates that nutrition should be mainstreamed throughout the life course by essentially focusing on all the age groups and adopting a life cycle approach (WHO 2019). Providing school meals, micronutrient supplementation and adolescent dietary advice are the interventions identified by WHO (2013) targeting improvement in nutritional status of adolescents (Figure 1.1).

As mentioned in a report by World Bank group, providing children with health and nutrition services package at school level along with ensuring good quality education can contribute positively to the development of school children and adolescents and in turn the human capital of the country. School feeding is one such effective strategy in improving school enrolment and attendance rates. Further, with regular attendance and good compliance of school feeding, the problems of hunger as well as poor cognitions are well addressed by these programmes. Children from the poorest and most disadvantaged groups can be benefitted to a great extent by school feeding programmes (Bundy et al. 2020).

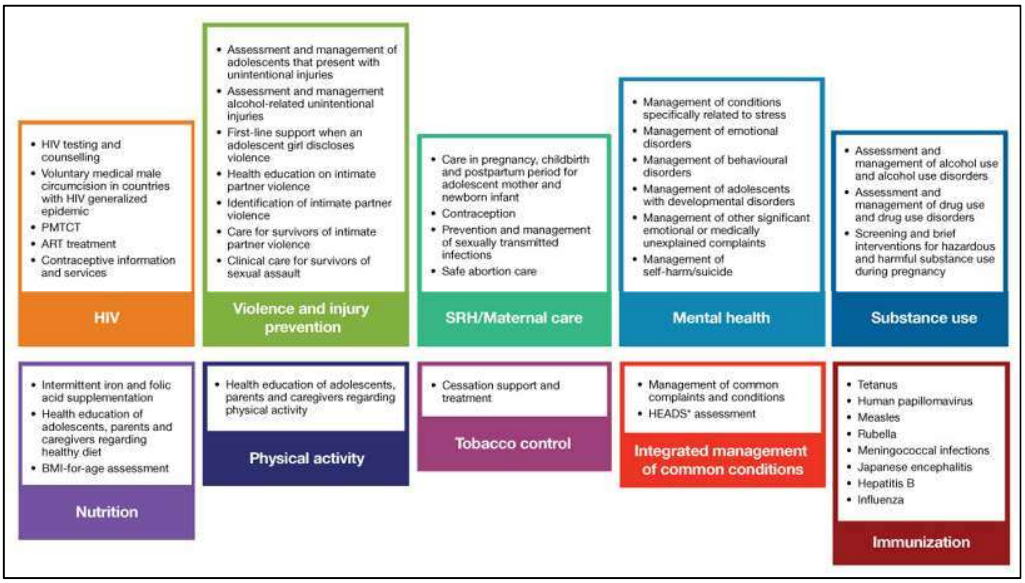
A report by United Nations, World Food Programme (2019) titled, 'The impact of school feeding programmes' have emphasised on how school feeding programmes are positively impacting the societies and nations. According to

Figure 1.1 Interventions for Improving Nutrition throughout the Life Course (WHO 2013)



Source: WHO 2013

Figure 1.2 Health services and interventions addressed in WHO guidelines



Source: WHO 2014

the report (WFP 2019), school feeding programmes not only improve nutritional and health status of school going children by ensuring macronutrient and micronutrient adequacy of their diets but has many other positive outcomes. These programmes have been found effective in improving school enrolment, reducing dropouts, increasing school attendance, school participation and improved learning outcomes. School feeding programmes have contributed to gender equality and have helped in reduction of rates of child marriages. These programmes help in ensuring social protection and are a safety net. Purchasing local produce and involving local manpower in functioning of school feeding can positively impact local economy and agriculture.

Currently 163 countries throughout the World have some form of school feeding programme providing school meals to 388 million school children (one in two children) everyday in World, making it the World's largest social safety net (WFP 2020).

India runs the largest school feeding programme catering to 90 million children. Although, this number has decreased from 2013, number of children receiving school feeding in India remains to be the highest in the World (WFP 2020). The history of Government run school meal programmes in India dates back to the pre-independence era (year 1925) when the Madras Government started school meal programme. It was started to cater to disadvantaged school children in the Madras Municipal Corporation. (MHRD 2006) Pondicherry was the second state where school meal programme was started in the pre-independence era, since French administration, the year 1930. (GOI 2020)

Post-independence, the Mid Day Meal programme started being implemented in 1980s by state Governments in three states namely Tamilnadu (1982), Gujarat (1984) and Kerala (1984) as well as the union territory of Pondicherry. By the year 1990-91 a total of twelve states including Goa, Gujarat, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Mizoram, Nagaland, Sikkim, Tamilnadu, Tripura and Uttar Pradesh had universal Mid Day Mal Programme run by state Governments. The central Government implemented National

Programme of Nutritional Support to Primary Education (NP-NSPE) on 15th August 1995 initially in 2408 blocks and it was expanded to all the blocks of India by 1997-98. The Supreme Court of India converted the MDM scheme into a legal entitlement and directed the provision of hot cooked meals to children in the year 2001. (MHRD 2006)

This programme was revised in September 2004 to provide cooked Mid Day Meal with 300 calories and 8-12 grams of protein to all children studying in 1st to 5th standard which was further revised to 450 kcal and 12 g of protein in the year 2006. In 2007, children in upper primary standards that is, 5th to 8th standard were included (MHRD 2007) and in 2008 nutritional norms for upper primary were revised to 700 kcal and 20 grams of protein. (MHRD 2008)

The National Food Security Act (2013) of India covers Mid Day Meal Programme. As stated in the Gazette, in the case of children, up to class VIII or within the age group of six to fourteen years, whichever is applicable, one mid-day meal, free of charge, everyday, except on school holidays, in all schools run by local bodies, Government and Government aided schools should be provided to meet the nutritional standards.

Studies on Mid Day Meal Programme have shown that it helps in improving enrolment, attendance, classroom performance and retention. It also helps in reducing dropout rates and classroom hunger along with promoting social equity (Paul and Mondal 2012, Bond 2012, Jayaraman and Simroth 2015, Nath and Nath 2015, Sharma and Saini 2015, Tyagi and Siddiqui 2015, Panigrahi 2018). However, poor infrastructure, inadequate staff, compromised teaching time and quality, monotonous menu, poor quality and frequency of meal distribution, unavailability of soap for hand-washing have been reported as limitations of the programme (Kumar and Sharma 2011, Uma 2013, Mehta, Grover and Kaur 2013, SCERT 2014, Acvida 2014, Dowarah 2020, Sahoo and Pati 2018). Other than the gaps related to infrastructure and logistics management, timing of the meal and average nutritional contribution of MDM to the children's diet remain to be major gaps (NFI 2003, Acvida 2014, Kantawala and Iyer 2015).

Adopting a centralised kitchen model and involving Non-Government Organisations under Public Private Partnership (PPP) model can help address some of these gaps. As per the guidelines for National Programme of Nutritional Support to Primary Education (MHRD 2006), centralised kitchen can be setup in urban area, wherever it is possible, to prepare MDM and transport to schools in a cluster. The guidelines also have a provision for involving a Non-Government Organisation for operating the centralised kitchens (MHRD 2010). The centralised kitchen model can also help in addressing issues such as compromised teaching-learning activities due to extra work load on teachers leading, negative attitude of teachers towards MDMP, students' involvement in cooking process, compromised food quality due to poor infrastructural facility for storage and cooking (Chauhan and Milind 2011, TISC 2014). Research studies done on the impact of centralised kitchen have demonstrated a better improvement in enrolment, attendance, retention, nutritional status as well as reduction in dropout rates among children in the areas where NGOs are involved in MDMP (Chauhan and Milind 2011, Sigma 2014, Iyer and Kantawala 2016). However, there have also been studies where contradictory results pertaining to the impact of MDM provided by centralised kitchens on improvement of nutritional status of children have been reported. Sharma et al. in 2010 reported an improvement in micronutrient status of the children receiving MDM provided by a centralised kitchen but no improvement in growth was observed. A comparison study of improvement in nutritional status of children receiving MDM through a centralised kitchen v/s school level kitchen showed a higher but non-significant improvement in nutritional status of children getting MDM through centralised kitchen compared to school kitchen (Devara and Deshmukh 2017). A study done in Vadodara showed that there was no difference in the mean anthropometric measurements of children receiving MDM through centralised kitchen and non-centralised kitchen (Gandhi and Panchal 2016).

A study by Kantawala and Iyer (2015) conducted in Government primary schools of urban Vadodara where MDM was being provided by a centralised kitchen reported that only 50% of the children consumed MDM everyday

despite the fact that a large number of children (85.3%) reported to be liking the meals served to them. It was further reported that children were not consuming adequate quantity of MDM to meet the nutrient norms of the programme. Similar observation was reported in the 10th Joint Review Mission report conducted in Gujarat. (MHRD 2018) These findings emphasise on the fact that there is a need to raise awareness regarding importance of nutrition and MDM among children which would help in tackling the gap.

Nutrition Health Education can be an effective strategy to address these gaps. Conteilo I R (2007) has defined Nutrition education as, "any combination of educational strategies, accompanied by environmental supports, designed to facilitate voluntary adoption of food choices and other food- and nutrition-related behaviours conducive to health and well-being."

Various studies carried out to study impact of NHE on MDM beneficiaries have shown that NHE helps in bringing improvement awareness among parents, children and the MDM staff about nutrition. It also can bring positive changes in dietary intakes and personal hygiene practices which further help in addressing the problem of undernurition among children by improving. (Nambiar & Subramaniam, 2008; Nambiar and Desai, 2009; Dhruv and Karbhari, 2012)

Rationale: Adolescence is an important phase of life with distinct characteristics and needs. Nutrition plays an important role in this last phase of growth spurt as providing proper nutrition can help them achieve optimum growth. It also provides a great opportunity to inculcate appropriate eating habits and health behaviours. Thus, it is a window of opportunity for ensuring a healthy adulthood for the children. However, it is not defined as a stand-alone group by existing nutrition related large scale interventions. There is a need for more research and evidence based data on adolescent nutrition, especially with special attention on nutrition of adolescent boys.

As per National Council of Educational Research and Training (2006), children in India spend 6 to 18 years of their life in schooling. World Health Organisation identifies 10-19 years of age as adolescence. According to NCERT, a child enrolled in first standard at 6 years of age in 5+3 schooling

pattern will spend 6-14 years in primary schooling. Thus, 10-14 years of duration is spent in primary school. This phase is known as early adolescence. Growth rate is at the peak during this phase. 80% of the total adolescent growth occurs during this phase. Unfortunately prevalence of undernutrition is also high in this age group compared to late adolescence. According to NCERT definition, children are in upper primary school, i.e.-5th to 8th standards during this phase.

Gujarat is one of the first states that implemented school meal programmes (MDMP) for children studying in primary schools at state levels in 1980s. A public private partnership model has been adopted in MDM in some of the areas of Gujarat. Under this model, The Akshaya Patra Foundation is providing meals to schools in urban Vadodara as well as selected rural areas of Vadodara. Despite nutritious food being served to the school children under MDMP, the prevalence of undernutrition is still high. There is a need to improve utilization of MDMP for better outcomes. Awareness generation activities such as Nutrition Health Education (NHE) interventions can be a helpful tool in achieving better outcomes of the programme. NHE strategies that can be easily implemented without demanding much of efforts or time from teachers can be suitable for the existing programme.

Several research questions arise on evaluating the present situation such as:

- What is the current scenario of nutritional status among school children of rural industrial area of Vadodara block in relation to growth, anaemia and morbidity?
- What is the prevalence of moderate and severely thin children in rural block of Vadodara?
- What is the current scenario of MDM programme at school level?
- How is the quality of meals provided by the centralised kitchen?
- What is the impact of NHE on growth and haemoglobin levels of moderately and severely thin school children?

In view of these questions, present study was planned with the broad objective, “To evaluate the Mid Day Meal programme in rural Vadodara and to

study the impact of Nutrition Health Education on the nutritional status of moderate and severely undernourished children."

The Broad Objectives of the study are

1. Evaluation of Mid Day Meal Programme in Rural Vadodara
2. Impact of Nutrition Health Education on the Nutritional Status of Moderate and Severely Undernourished Upper Primary School Children of Rural Vadodara

Based on the Broad Objectives, the study was divided in two main phases:

Phase 1: Evaluation of Mid Day Meal Programme in Rural Vadodara

Phase 1 A- Evaluation of MDM at school level (Academic Year 2017-18)

Phase 1 B- Evaluation of MDM at centralised kitchen

Phase 1 C- Nutrient Composition and quality attributes of MDM

Specific Objectives:

- To study the implementation of Mid Day Meal Programme at the school level in the industrial area of rural block of Vadodara.
- To investigate the storage, food handling and cooking practices in the central kitchen of TAPF.
- To study the nutrient composition, quality and safety attributes of MDM provided by TAPF in the rural block of Vadodara.

Phase 2: Impact of Nutrition Health Education on the Nutritional Status of Moderate and Severely Undernourished Upper Primary School Children of Rural Vadodara

Phase 2 A: Formative Research: screening of children using anthropometric measurements.

Phase 2 B: Impact evaluation of Nutrition Health Education

Specific Objectives:

- To assess the magnitude of under nutrition in rural upper primary school children using WHO 2007 standards.
- To assess the prevalence of anemia amongst moderate and severely undernourished rural upper primary school children.
- To develop NHE material for moderate and severely undernourished upper primary school children.
- To assess the impact of NHE on the following

  1. Growth, Using Anthropometric Indices
  2. Iron Deficiency Anemia based on Hb levels,
  3. Practices and Perceptions regarding MDM along with Sanitation and Hygiene practices,
  4. Morbidity profile
  5. Cognitive Function
  6. Physical Work Capacity
  7. Dietary intake.