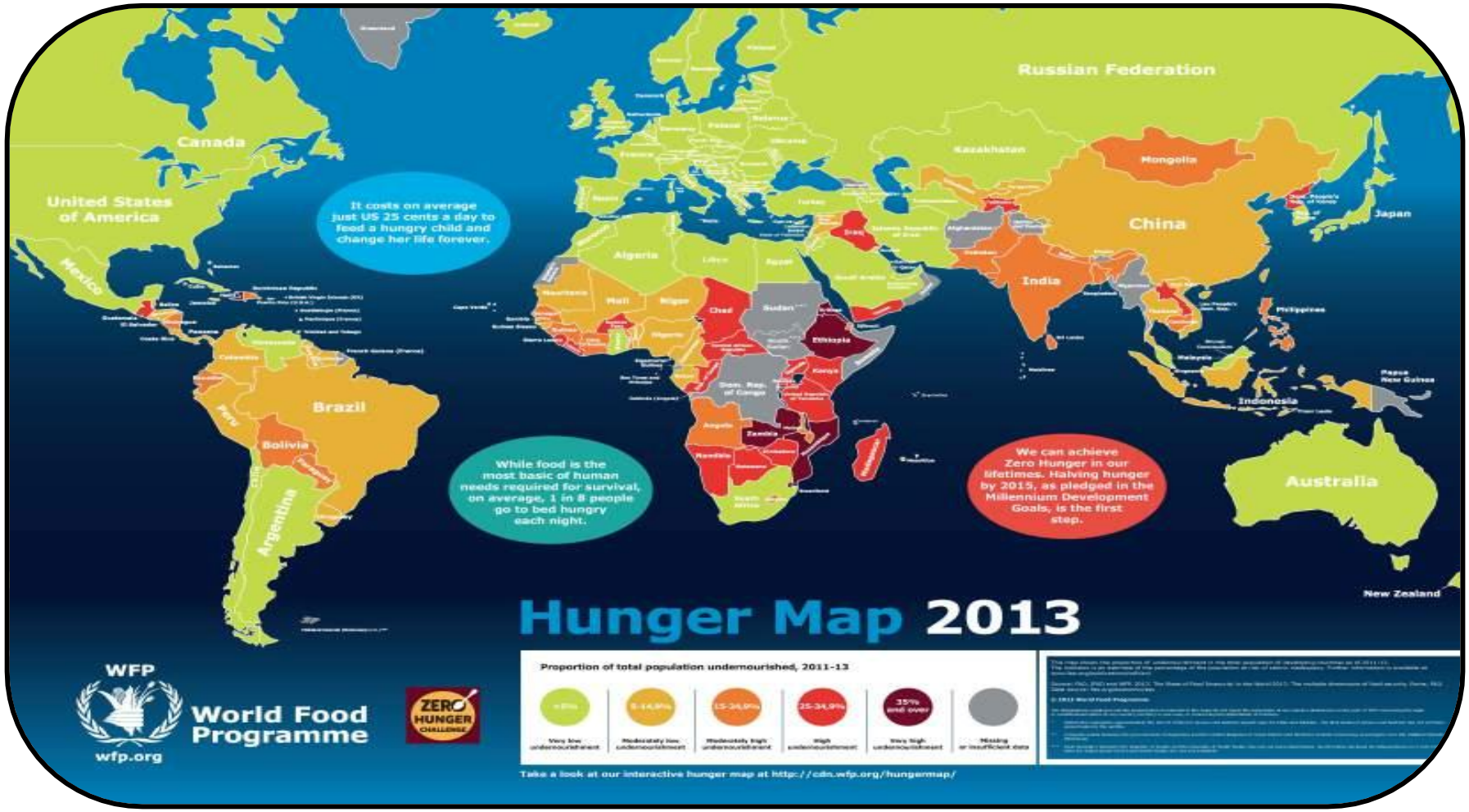
Malnutrition is one of the most important constraints in achieving the MDGs. Improving nutrition is essential to reduce extreme poverty. The number and proportion of hungry people in the world are declining as the global economy recovers and food prices remain below their peak levels, but the number of undernourished people remains unacceptably high – higher than before the food price and economic crisis, making it more difficult to meet the internationally agreed hunger-reduction targets (FAO, 2010).

The majority of the world's undernourished people live in developing countries as shown in **Figure 1.1.** Two-thirds live in just seven countries (Bangladesh, China, the Democratic Republic of the Congo, Ethiopia, India, Indonesia and Pakistan) and over 40 percent live in China and India alone. Chronic hunger and undernutrition is the worst tribulation of the poverty that still plagues millions of households in India and the plight of children is of special concern. India ranks 2^{nd} in child malnutrition, which is an alarming fact as child malnutrition has a long term negative impact on country's economic growth.

School age group (5-18 years) spans the period between preschool years and adult life. In India, nearly about one third of the population corresponds to school age children. Primary school age is a dynamic period of physical growth and mental development of the child. Research indicates that nutritional deficiencies and poor health in primary school age children are among the causes of low school enrolment, high absenteeism, early dropout and poor classroom performance. The present position with regard to the health and nutritional status of the children in our country is very unsatisfactory. Apart from mid day meal programme which is run by the Government of India in government run schools, there are no other efforts for children in age group 5-14 years (Neelu et al., 2010). They have not received as much attention from health providers/planners as the under fives (Ananthakrishnan, Pani, & Nalini, 2001)

Figure 1.1: Fighting Hunger Worldwide



Children are most vulnerable to undernutrition due to low dietary intake, inaccessibility to food, inequitable distribution of food within the household, improper food storage and preparation, dietary taboos and infectious diseases. Especially, micronutrient deficiencies are a result of inadequate intake or inefficient utilization of available micronutrients due to infections and parasitic infestations (Amare et al., 2012).

The nutritional status of school-aged children impacts their health, cognition, and subsequently their educational achievement. The school is an opportune setting to provide health and nutrition services to disadvantaged children. Yet, school-aged children are not commonly included in health and nutrition surveys. An up-to-date overview of their nutritional status across the world is not available (Best et al., 2010).

Undernutrition is a major public health problem among children worldwide, particularly in the developing countries like India (Singh & Mondal, 2013). One third of the children under 5 years old worldwide are moderately or severely undernourished (Mehrotra, Arora, & Nagar, 2011). The cost of lost productivity, illness and death due to malnutrition amounts to US$ 10–28 billion or 3%–9% of the gross domestic product (GDP). (Jeemon et al., 2009)

United nation for children's fund reported that more than 200 million school-age children were stunted by the year 2000, and if no action is taken and at this rate, about 1 billion stunted children will be growing up by 2020 with impaired physical and mental development (Sultan, 2014; Wolde, Berhan, & Chala, 2015).

Micronutrient deficiencies rank among the top twenty risk factors for morbidity and impaired quality of life worldwide, with particular burdens falling on populations in poor countries (Harrison, 2010). Micronutrients are essential to sustain life and for optimal physiological function. Widespread global micronutrient deficiencies (MNDs) exist, with pregnant women and their children under 5 years at the highest risk. Iron, iodine, folate, vitamin A, and

zinc deficiencies are the most widespread MNDs, and all these MNDs are common contributors to poor growth, intellectual impairments, peri-natal complications, and increased risk of morbidity and mortality which in turn have a direct impact on individuals and on societies, resulting in poorer health, lower educational attainment and decreased work capacity and earning potential (Bailey, West Jr, & Black, 2015).

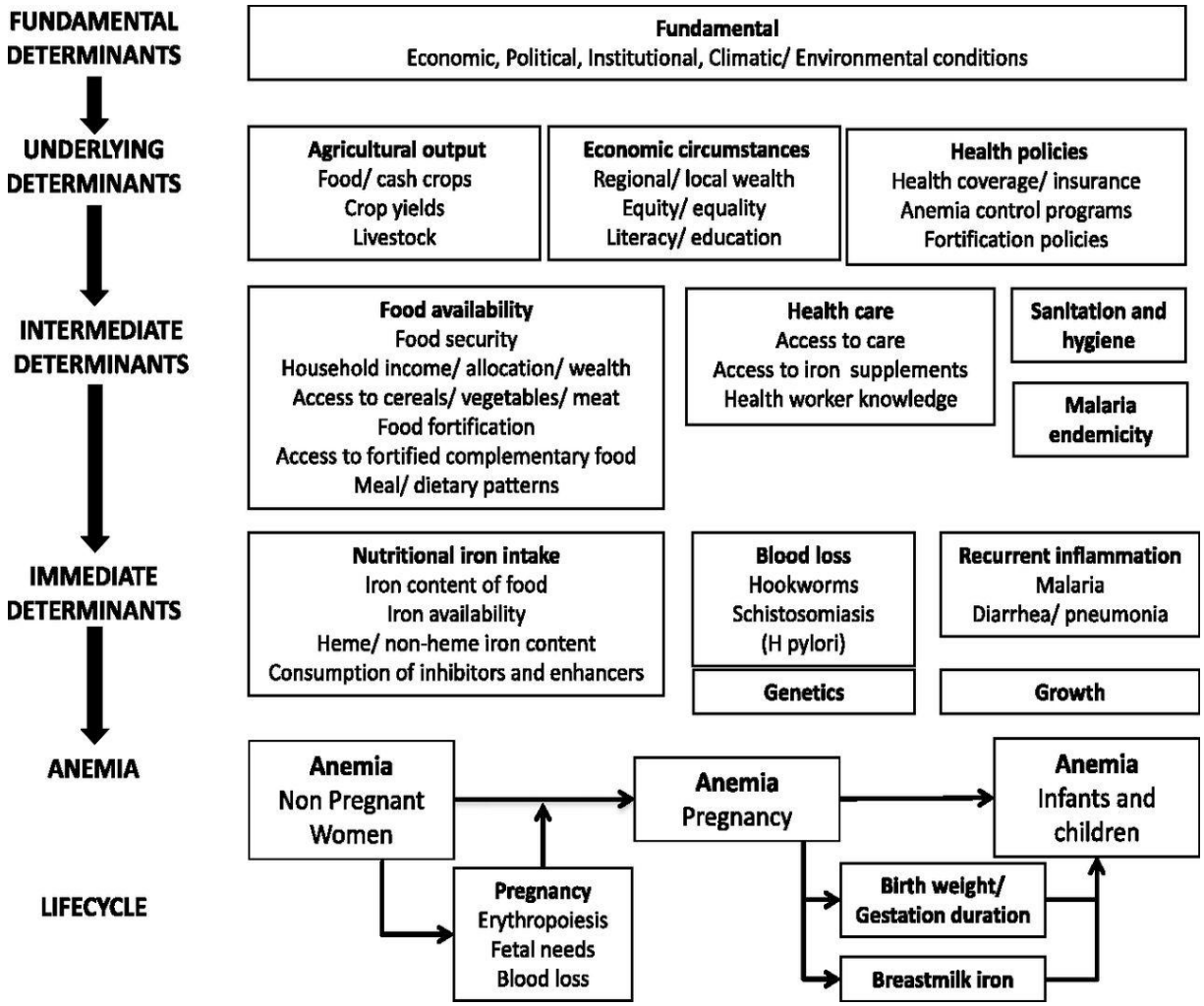
Iron deficiency anaemia (IDA) is the most common nutritional deficiency worldwide. It can cause reduced work capacity in adults and impact motor and mental development in children and adolescents (Killip, Bennett, & Chambers, 2007). Iron deficiency may result from inadequate iron intake and absorption, increased iron requirements during growth, and excessive iron losses as shown in **Figure 1.2**.

Food-based approaches, which include bio-fortification, dietary diversification and food fortification, are short, intermediate and long term sustainable strategies for improving the micronutrient status of populations (Thompson & Amoroso, 2011).

Development activities that target children are tools for eradicating chronic hunger and lifting developing countries out of the poverty trap. By investing in the health and nutrition of school-age children, a country can increase the human capital of its younger generations and achieve sustainable economic growth and human development (Molinas & Mothe, 2010).

School feeding is a longstanding and popular development assistance program in low and middle income countries to improve both the physical health and the psychosocial health of children (Galloway et al., 2009). There is evidence that school feeding programme increases school attendance, cognition, and educational achievement, particularly when supported by actions such as de-worming and micronutrient fortification or supplementation (Bundy et al., 2009).

Figure 1.2: Causes of Iron Deficiency Anaemia



Source: Pasricha et al., 2013

The Mid-Day Meal Programme is the world's biggest school lunch programme and is being implemented all over India for primary and upper primary school children (Shukla, 2014), emerged to address the multiple challenges of poverty, hunger, and access to education (Upton et al., 2007).

The programme was launched in 1995 with the following objectives:

- To address hunger in schools by serving hot cooked meal.
- To improve nutritional status of children.
- To encourage poor children, belonging to disadvantaged sections, to attend school more regularly and help them concentrate on classroom activities, thereby increasing the enrolment, retention and attendance rates.

Unlike in rural areas, space is a constraint in urban areas as well as implementation of MDM in rural areas is taken up by Self Help Groups (SHGs), but in urban areas there is no such well knit SHG network. It is in this context that idea of the centralized kitchen becomes relevant. However, the centralized kitchen throws up the problem of huge cost of cooking infrastructure for cooking the meals and also transport logistics to take the cooked food to different schools in the urban areas. This calls for public private partnership interventions to have better implementation of the MDM programme.

Rationale:

According to Haddad et al (1999), the urban poor and the urban underfed have increased, and will surpass those in rural areas. This is attributed to deterioration in conditions in urban areas rather than an improvement in rural areas. The deterioration in urban areas is attributed to the rapid population growth therein which has surpassed the provision of sanitation and health services (Abuya, Ciera, & Kimani-Murage, 2012). Children are among the most vulnerable members of the society and will disproportionately suffer the negative effects of poverty and inequality. Insufficient attention is given to children living in urban poverty, as it is relatively easy to reach children

through institutions such as schools. Thus, the present study aims to assess the nutritional status of school children of urban vadodara. Numerous studies conducted across the globe have used different classifications like IAP, Gomez, Waterlows etc to assess the nutritional status of children. Since different cut off value for normality was used in different systems therefore these cannot be used universally. To overcome this problem, WHO has recommended the use of Z score system for classifying malnutrition in children. In the present study, an attempt was made to assess the nutritional status of school going children using Z-score system with the help of WHO Anthro-plus software.

According to several recent reviews, the evidence for the impact of school feeding programmes on growth and nutritional status is weak, mainly because there have been few published evaluations of large-scale school feeding programmes.

The evaluation of Mid Day Meal Scheme is very important in terms of its implementation and achievement of the objectives for which it is launched. The success of any programme depends upon its proper implementation and hence evaluation of such programmes is needed in order to know its strengths and weaknesses. To tackle the problem of micronutrient malnutrition, in September'2009, Government of Gujarat promoted fortification of wheat flour under its food providing social safety net programs: ICDS, PDS and MDM. To strengthen the implementation of MDM programme; Government has roped in various well-established NGOs and charities, one of them being The Akshay Patra Foundation (TAPF). In November'2009, TAPF started its centralized kitchen with the help of 3 industries of Vadodara, Gujarat to provide good quality and hygienic school meals to the children of municipal schools of urban vadodara. The present research study was undertaken to address the following research questions

- What is the current scenario of nutritional status among urban school children of Vadodara in relation to growth, Iron Deficiency Anaemia and Morbidity?

- What is the scenario of MDM Programme at school level. How effective is the centralized kitchen in providing MDM?
- What is the impact of Mid Day Meal program provided by TAPF on growth and haemoglobin levels of school children?
- What is the knowledge of Teachers about the MDM programme?
- What is the perception of Teachers, Parents, and Children about MDM Programme provided by TAPF?

The broad objective of the study was to assess the nutritional status of primary school children of municipal schools of urban Vadodara and to see the impact of school meals provided by TAPF on nutritional status of school children. The study was divided in to 5 phases as follows

PHASE 1: FORMATIVE RESEARCH

- To assess the school profile
- To assess the nutritional status of the municipal school children of Baroda in relation to
    a. Growth
    b. Morbidity Profile
    c. Anaemia

PHASE 2: PROCESS EVALUATION

- To evaluate the Akshay Patra kitchen
- To do spot observations in the Schools for MDM consumption

PHASE 3: IMPACT EVALUATION

- To study the impact of the Akshay Patra Foundation supported MDM programme on the following
    - Growth
    - Iron deficiency anemia
    - Morbidity profile
    - Attendance

- Scholastic performance

PHASE 4: WORKSHOP ON MID DAY MEAL PROGRAMME FOR MUNICIPAL SCHOOL TEACHERS OF VADODARA

To conduct a workshop on MDM Programme and obtain the

- Feedback from Teachers
- Feedback from Akshay Patra

PHASE 5: KAP OF PARENTS, TEACHERS & CHILDREN REGARDING MID DAY MEAL PROGRAMME PROVIDED BY THE AKSHAY PATRA FOUNDATION

To conduct exit interviews at the schools at the end of the study to elicit information on

- Perceptions of Parents
- Perceptions of Teachers
- Perceptions of Children

LIMITATION OF THE STUDY

As TAPF was providing meals to all the schools of Vadodara city, there was no control group.

DELIMITATIONS OF THE STUDY

The present study was delimited to the following aspects:

1. Only Vadodara urban city was selected for the study as the Akshay Patra Kitchen was providing Mid Day Meal to Municipal Primary schools of Urban Vadodara.

2. The study was further restricted to the government primary schools. Government aided primary schools and EGS/AIE Centers were excluded from the study.