Fortified Food Staples Availability, Consumption And Assessing Its Impact Through Existing ICDS Services During COVID Situation (2020-2021)

JUNE, 2021

KUNJAN PARMAR

B.Sc. FOODS AND NUTRITION

(Public Health Nutrition)

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A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

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(PUBLIC HEALTH NUTRITION)

BY

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VADODARA -390008, GUJARAT

JUNE-2021

CERTIFICATE

This is to certify that the thesis entitled "Fortified Food Staples Availability, Consumption And Assessing Its Impact Through Existing ICDS Services During COVID Situation (2020-2021)" is based on the research work carried out independently by Ms. Kunjan Parmar under the guidance of Prof. (Dr.) Sirimavo Nair in pursuit of Master's degree of Science (Faculty of Family and Community Sciences) with major in Foods and Nutrition (Public Health Nutrition) and represents her original work.

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ABBREVIATIONS

ANM- Auxiliary nurse midwife

ASHA-Accredited Social Health Activist

AWCs- Anganwadi centers

AWW- Anganwadi Worker

BMI- Body mass index

CNNS- Comprehensive National Nutrition Survey

COVID-19- Corona Virus Disease 2019

CONGA- Comprehensive Nutrient Gap Assessment

DDS- Dietary Diversity scores

DFS- Double Fortified Salt

DHS- Demographic and Health surveys

DWCD- Department of women and Child development

FAO- Food Agriculture Organization

FFQ- Food-Frequency Questionnaire

FFRC- Food Fortification Resource Centre

FGI- Food group diversity indicators

FPDS- Farm Production Diversity Score

FSSAI- Food Safety and Standards Authority of India

GBD- Global burden of disease

GHI- Global Hunger Index

HAZ- Height-for-age

Hb- Haemoglobin

HBNC- Home-Based Newborn Care

HFIAS- Household Food Insecurity Access Scale

HHS- Household Hunger Scale

HYVS- High yielding varieties

ICAR- Indian Council of Agricultural Research

ICDS- Integrated Child Development Services

ICDS-CAS- ICDS Common Application Software

IDA- Iron Deficiency Anemia

IEC- Information Education communication

IFA- Iron and Folic Acid

IFPRI- International Food Policy Research Institute

IMR- Infant Mortality Rate

ISSNIP- ICDS System strengthening and Nutrition Improvement Project

LBW- Low Birth weight

MAM-Moderate Acute Malnutrition

MDD- Minimum dietary diversity score

MDM- Mid Day Meal

MIS- Management Information System

MMD- Multiple Micronutrient Deficiencies

MNDs- Micronutrient Deficiencies

MNP- Multiple micronutrient powder

MoAFW- Ministry of Agriculture and Farmers Welfare

MoHFW- Ministry of Health and Family Welfare

MoWCD- Ministry of Women & Child Development

MPA- Mean probability adequacy

MUAC- Mid Upper arm Circumference

NCDs- Non-communicable Diseases

NCHS- National Center for Health Statistics

NFHS- National Family Health Survey

NFSA- Nation Food Security Act

NIPI- National Iron Plus Initiative

NITI- National Institute for transforming India

NNACP-National Nutrition Control Programme

NNMB- National Nutrition Monitoring Bureau

NPNL- Non pregnant and non-lactating

NTDs- Neural tube defects

PDS- Public Distribution System

PIB- Press Information Bureau

PoU- Prevalence Of undernutrition.

PPS- Proportion to population sizes

RDA- Recommended Dietary Allowances

RDI- Recommended Dietary Index

SAM- Severe Acute Malnutrition

SD- Standard Deviation

SDGs- Sustainable Development Goals

SEAR- South East Asia Region

SES- Socio-economic status

SN- Supplementary Nutrition

THR- Take home ration

UHC- Universal Health Coverage

UHC- Urban Health Center

UNICEF- United Nations Children's Emergency Fund

VAD- Vitamin A Deficiencies

WAZ- Weight-for-age

WHO-World Health Organizations

WHZ- Weight-for-height

WIFS- Weekly iron and folic acid supplementation program

ABSTRACT

Malnutrition is the primary concern in the current scenario among pre-school children as they were in the growing stage of their life. Their lack of nutrition affects them in the younger generation and their capabilities of doing work. Moreover, due to the current prevalence of the COVID-19 pandemic, several countries are exposed to a state of high food insecurity globally, which leads to a vicious cycle of malnutrition.

Micronutrient malnutrition is less intake of essential micronutrients (vitamins and minerals) than the recommended level. Micronutrient malnutrition affects at the individual level, but its consequences are long-lasting, especially it can hit the backbone of a country's economy. It is essential to understand the epidemiology of MMD because one intervention strategy cannot work in different situations, land to country conditions are vary, so it is a crucial and very knowledge-intensive task to find such techniques which are need-based and more cost-effective (Bailey et al.,2015)

Global Nutrition Report (2020) states that along with 88 countries, India is also going to miss its global nutrition targets, i.e. (Stunting among under-5 children, anemia among women of reproductive age, Childhood overweight, and Exclusive breastfeeding) by 2025

According to NFHS-4 Vadodara data, the prevalence of stunting, wasting, severe wasting, and underweight in children under five years of age was 43.8%, 16.3%, 5.8%, and 39.1% anemia was 54.3% in children under 6-59 months of age. In the latest NFHS-5 report shows the worsening condition of malnutrition in India. The status of malnutrition in Gujarat reveals that the prevalence of stunting was 39.0%. At the same time, the cases of wasting, severe wasting, and underweight in children under five years of age increased 25.1%, 10.6%, 39.7% respectively, nearly 3.9% of children were overweight, while anemia increased to 79.7% in children of 6-59 months of age. CNNS 2019 data reveal in India, the prevalence of Stunting, Wasting, and underweight was 34.7%, 17.0%, and 33.4%, respectively, while anemia was (40.5%) Vitamin A (17.6%) and folate 23.3%. However, for the children of 36-47- and 48-59-months anemia, (37.7%) and (25.5%), vitamin A (20.8%) and (17.6%) and folate (16.9%) and (10.3%) respectively.

The proposed work was designed to observe the changes in the delivery system in the ICDS services with a significant focus on preschool-aged children during the pandemic time. This study was conducted in three phases; the first phase was to show the situational analysis of mothers of children aged 36-59 months enrolled in ICDS units of urban Vadodara. The second phase was to conduct counseling sessions for the mothers to provide information regarding anemia, fortification, and fortified commodities. And the last step was to analysis of the mother's knowledge after counseling.

This research was carried out in 12 Anganwadi centers of two areas of Urban Vadodara, i.e., Sawad and Karelibaugh. A total of 105 children were enrolled in the study. 56 males and 49 females were there in the study. The results of the study revealed that prevalence of stunting (60%), wasting (45.23%), severe wasting (9.52%), underweight (71.42%), thinness (43.79%), and overweight (17.11%) among the children age-wise. While gender-wise in male prevalence of wasting was (37.5%), severe wasting (6.25%), stunting (59.73%), underweight (76.79%), thinness (41.08%) and overweight (16.37%) in female wasting (38.39), severe wasting (13.89%), stunting (63.17), underweight (71.35%), thinness (46.92%) and overweight (22.62%) respectively. The prevalence of stunting, wasting, thinness, and overweight was more in females than males.

It was also observed that the average consumption of macro and micronutrients among the study population was more minor. Analyzing the nutrient intake of the study population revealed that the mean energy 497.96Kcal, protein 12.93g, carbohydrate 52.20g, total fat was 26.06g while total folate 42.52µg, full ascorbic acid 11.57mg, Retinol 102.94µg, Iron 2.27mg, Iodine 39.72µg among the age group of 1-3 years. Among 4-6 years mean energy 512.54 kcal, protein 13.35g, carbohydrate 54.38g, total fat 26.5g, total folate 46.39µg, total ascorbic acid 13.27mg, Retinol 114.05µg, Iron 2.27mg, Iodine 39.33µg.

They were comparing the differences in nutrient intake among boys and girls; it was observed that in among 1-3 years age group, consumption of energy, carbohydrate, and total fat was more in boys, i.e., 504 Kcal, 52.87g, and 26.52g respectively and other nutrients were protein 12.76g, total folate 39.88 µg, full ascorbic acid 10.89mg, retinol 100.91µg, iron 2.14mg, and iodine 42.88 µg. While among girls, mean intake of energy

was 486.91 Kcal, carbohydrate 51.00g, Protein 13.17g, total fat 25.24g, total folate 47.25 µg, full ascorbic acid 12.78mg, retinol 106.6 µg, iron 2.51mg, and iodine 42.88 µg respectively.

It was observed among the age group of 4-6 years consumption of nutrients in girls was energy 528kcal, carbohydrate 54.37g, Protein 13.65g, total fat 28.12g, total folate 43.21 µg, full ascorbic acid 12.39mg, retinol 118.92 µg, iron 2.15mg, and iodine 39.72 µg. On the other hand, while in boys, it was energy 496.63kcal, carbohydrate 54.37g, Protein 13.05g, total fat 24.82g, total folate 49.66µg, full ascorbic acid 14.18mg, retinol 108.91 µg, iron 2.40mg, and iodine 38.92 µg respectively.

Fruits and vegetables rich in Vitamin A and C-rich foods were consumed on a seasonal basis due to the affordability and availability. On the other hand, consuming iron-rich foods was mainly every week and twice a week in both groups. At the same time, most of the green leafy vegetables were not consumed by the subjects. Only fortified oil is consumed daily, and double fortified salt is consumed 20.93% in Kareli Baugh and 69.35% in Sawad.

Observing the responses given by the mother, it can be concluded that most of the mothers were not aware of the importance of fortified commodities and micronutrients in our day-to-day life. And the harmful consequence of anemia. And other nutrients among the mothers and even the Anganwadi workers were not aware of fortification, but they were knowledgeable on double fortified salt. However, after counseling, it was observed that the knowledge improved among the subjects 68.3% were having average scores of knowledge, 20% with good scores of knowledge, and 11.67% with insufficient knowledge. Thus, if proper counseling continuously will be given in the community, improvement will be seen. Moreover, if fortified foods at low cost will be there, their consumption will also increase.

INTRODUCTION

'Don't let children be the hidden victims of COVID-19 pandemic' UNICEF, (2020)

Investment in human resource development is a globally acknowledged fact which is a prerequisite for any nation's economic development. India is home to the largest number of children in the World, constitutes 15.42% of the country's total population below six years as per the 2001 census. A significant proportion of this sensitive population still lives in an unhealthy environment, poverty, poor sanitary conditions, disease, infection, and inadequate access to primary health care. (MoWCD, 2011) Further, the current pandemic exacerbated the condition. COVID-19 is a highly transmissible and unpredictable infection as some people infected with this virus do not show positive symptoms, making it difficult to control for the health care workers. It is not as deadly as historical infections like Bubonic Plague, Spanish flu, and Ebola; however, it jeopardized the health and wellbeing of billions of people throughout the globe drastically. As per an estimate of the World Bank, the tragic pandemic of COVID-19 will bring a great economic recession. The world economy will shrink by 5% due to the disruption in the global food chains, lockdown, social distancing, etc. (IFPRI, 2020). According to the World Health Organization (2020) report, 47 million children under-5 years of age are wasted, 14.3 million are severely wasted, and 144 million are stunted, while 38.3 million are overweight or obese. Similarly, UNICEF, 2020 highlighted that due to the COVID-19 pandemic, nearly 99% of the children are currently facing the pandemic-related movement restriction. According to an estimate due to the current pandemic prevalence of wasting may aggravate by 10-50% due to food insecurity, economic instability, and poor management of malnutrition.

Malnutrition is a complex state of deficiencies, excesses in nutrient intake, or disparity of essential nutrients, or impaired nutrient utilization in an individual. It can be classified into three wide groups of conditions, i.e., under-nutrition includes stunting (low height for age), wasting (low weight for height), underweight (low weight for age), micronutrient malnutrition (lack of important vitamins and minerals), overweight/obesity which results into diet-related non-communicable diseases (namely heart disease, stroke, diabetes, and cancer). (WHO, 2019) Different combinations of many etiological factors are responsible for malnutrition; *Social and economic factors* such as poverty that result in low food availability, overcrowded and

unsanitary living conditions, improper child care, etc. ignorance are also associated with a poor infant, and child-rearing practices, misconceptions about the use of certain foods, inadequate feeding during illness all are associated with poor health which ultimately leads to an invisible cycle of malnutrition. *Biological factors* such as maternal malnutrition before or during pregnancy are more likely to produce an underweight newborn. Malnutrition also results in less enzyme synthesis and loss of appetite, leading to less food consumption. Infectious diseases such as measles, respiratory infections, diarrhea, etc., result in harmful protein and energy balance. *Environmental factors* like overcrowded, unsanitary living conditions lead to frequent illnesses like diarrhea, agricultural pattern, drought, floods, earthquakes, and forced migration leads to cyclic, sudden, and prolonged food insecurities. (FAO, 2019) Developing each child's complete human potential adequate nutrition is fundamental during the infant and early childhood years. According to UNICEF causal analysis framework, appropriate dietary intake and diseases are the immediate causes of children's malnutrition. Children's dietary intake is affected by their age, gender, cultural pattern and health status, etc. UNICEF, (1995) *Malnutrition* encompasses both under-nutrition and over-nutrition, which are the most significant health concern globally. Maternal and child under-nutrition, including wasting, stunting, underweight, and additionally low stores of vitamin and minerals deficiencies, leads to a devastating impact on health and wellbeing. Since conception first 1000 days of life are very crucial for the growth and development of children. This period is highlighted as a critical '***Window of opportunities'*** (Black et al., 2013). As per the evidence generated through various researches, early or timely intervention measures give better results than late intervention measures (Heckman, 2013).

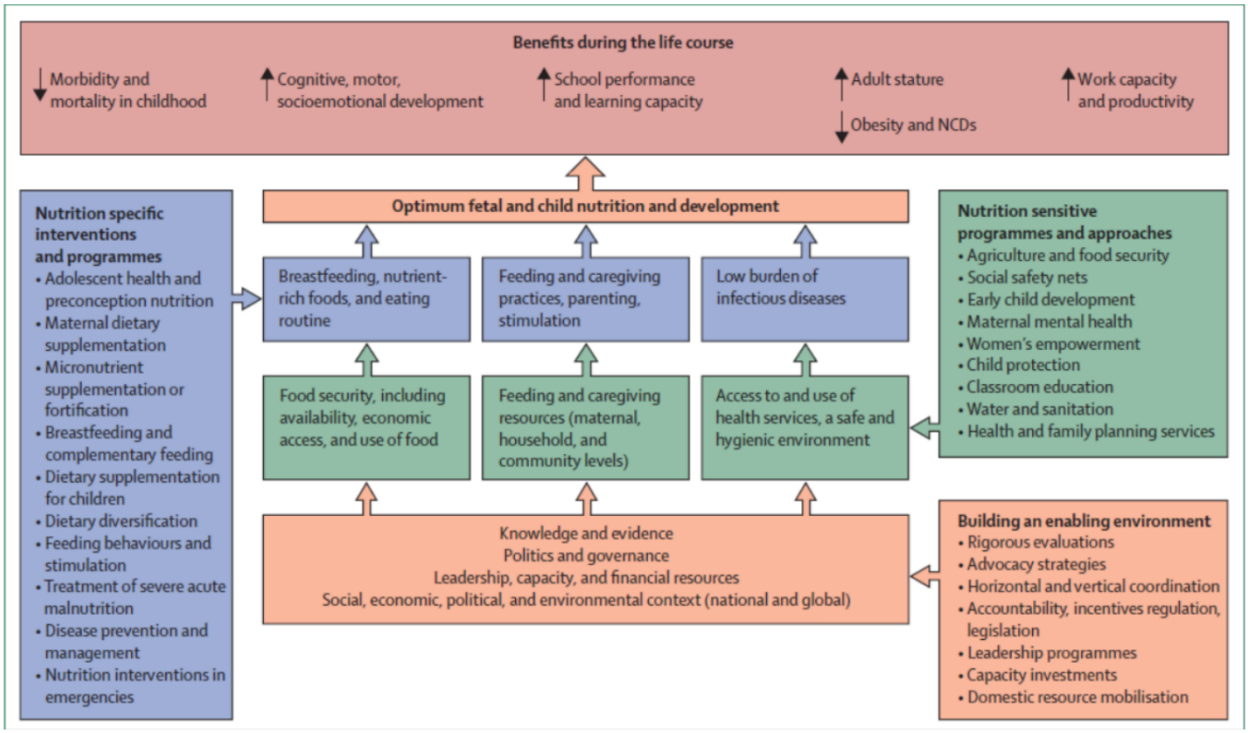
Figure 1.1: Global deaths in children younger than 5 years attributed to nutritional disorders

	Attributable deaths with UN prevalences*	Proportion of total deaths of children younger than 5 years	Attributable deaths with NIMS prevalences†	Proportion of total deaths of children younger than 5 years
Fetal growth restriction (<1 month)	817 000	11·8%	817 000	11·8%
Stunting (1–59 months)	1 017 000*	14·7%	1 179 000†	17·0%
Underweight (1–59 months)	999 000*	14·4%	1 180 000†	17·0%
Wasting (1–59 months)	875 000*	12·6%	800 000†	11·5%
Severe wasting (1–59 months)	516 000*	7·4%	540 000†	7·8%
Zinc deficiency (12–59 months)	116 000	1·7%	116 000	1·7%
Vitamin A deficiency (6–59 months)	157 000	2·3%	157 000	2·3%
Suboptimum breastfeeding (0–23 months)	804 000	11·6%	804 000	11·6%
Joint effects of fetal growth restriction and suboptimum breastfeeding in neonates	1 348 000	19·4%	1 348 000	19·4%
Joint effects of fetal growth restriction, suboptimum breastfeeding, stunting, wasting, and vitamin A and zinc deficiencies (<5 years)	3 097 000	44·7%	3 149 000	45·4%

Source: Black et al., (2013)

For improving child nutrition, specific essential inputs need to be taken; Timely initiation of breastfeeding within one hour of birth, exclusive breastfeeding during the first six months of life, Timely introduction of complementary foods at six months, Age-appropriate complementary feeding, adequate in terms of quality, quantity, and frequency, for children ages 6–24 months, Prevention of anemia, Safe handling of complementary foods and hygienic complementary feeding practices, Full immunization, Reducing vitamin A deficiency, Reducing the burden of intestinal parasites, Prevention, and treatment of diarrhea, Timely and quality therapeutic feeding and care for all children with severe acute malnutrition, Improved food and nutrition intake for adolescent girls, mainly to prevent anemia, Improved food and nutrient intake for adult women, including during pregnancy and lactation and Prevention and treatment of malaria **(**Butta et al., 2008)

Figure 1.2: Framework for actions to achieve optimum fetal and child nutrition and development



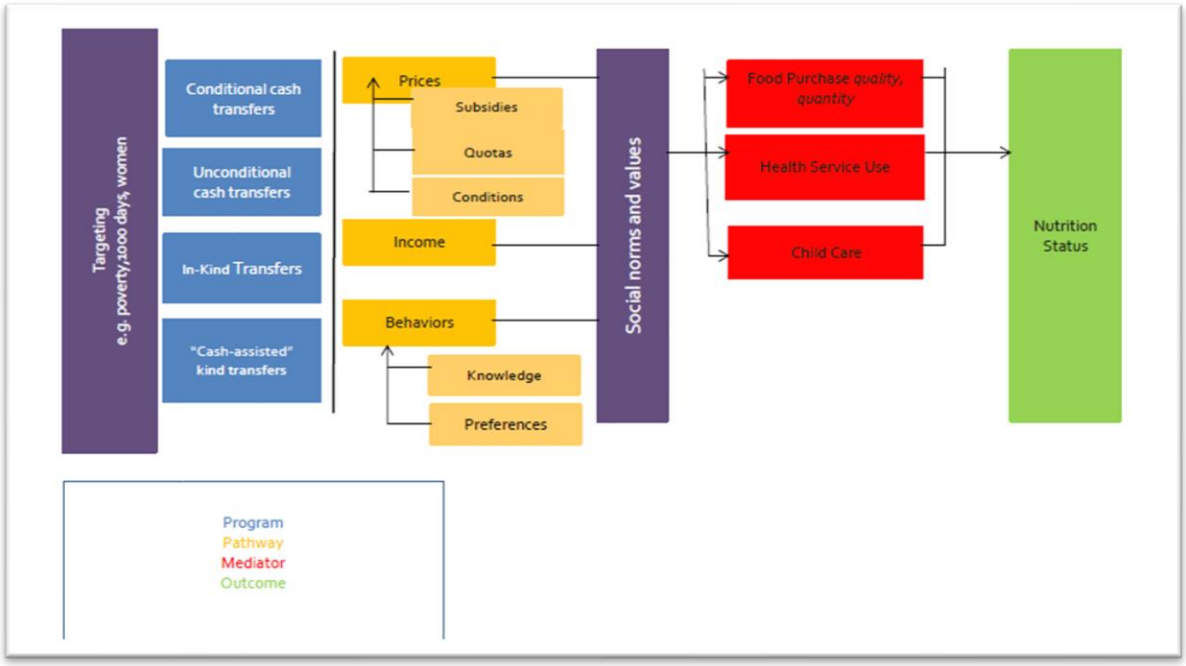
Source; Black et al., (2013)

According to the last *National Family Health Survey-4* (2014-16), at the national level, approximately 38.4% of children under five years of age are stunted, whereas, in a rural area, this figure goes to around 41.2%. Prevalence of wasting and underweight is 21% and 35.8%, respectively. The recently released National Family Health Survey (NFHS-5), 2019-20, shows the prevalence of anemia among children under five years of age has increased in 18 out of 22 states and Union Territories. (as per the published report). A similar trend was seen in the prevalence of anemia among women between the age of 15-49 years. Out of the 22 states/UTs, 16 showed an increase in anemia among women.

India is currently operating various food-based interventions for improving the nutritional status of a sensitive population. The National food security act of 2013 covers the three food-based safety nets, i.e. *(Integrated child development services, public distribution system, and Mid-day meal).* This act aims to cater to the need of

75% of the rural and 50% of the urban population. However, this act is full of controversies related to matters of transparency, etc.

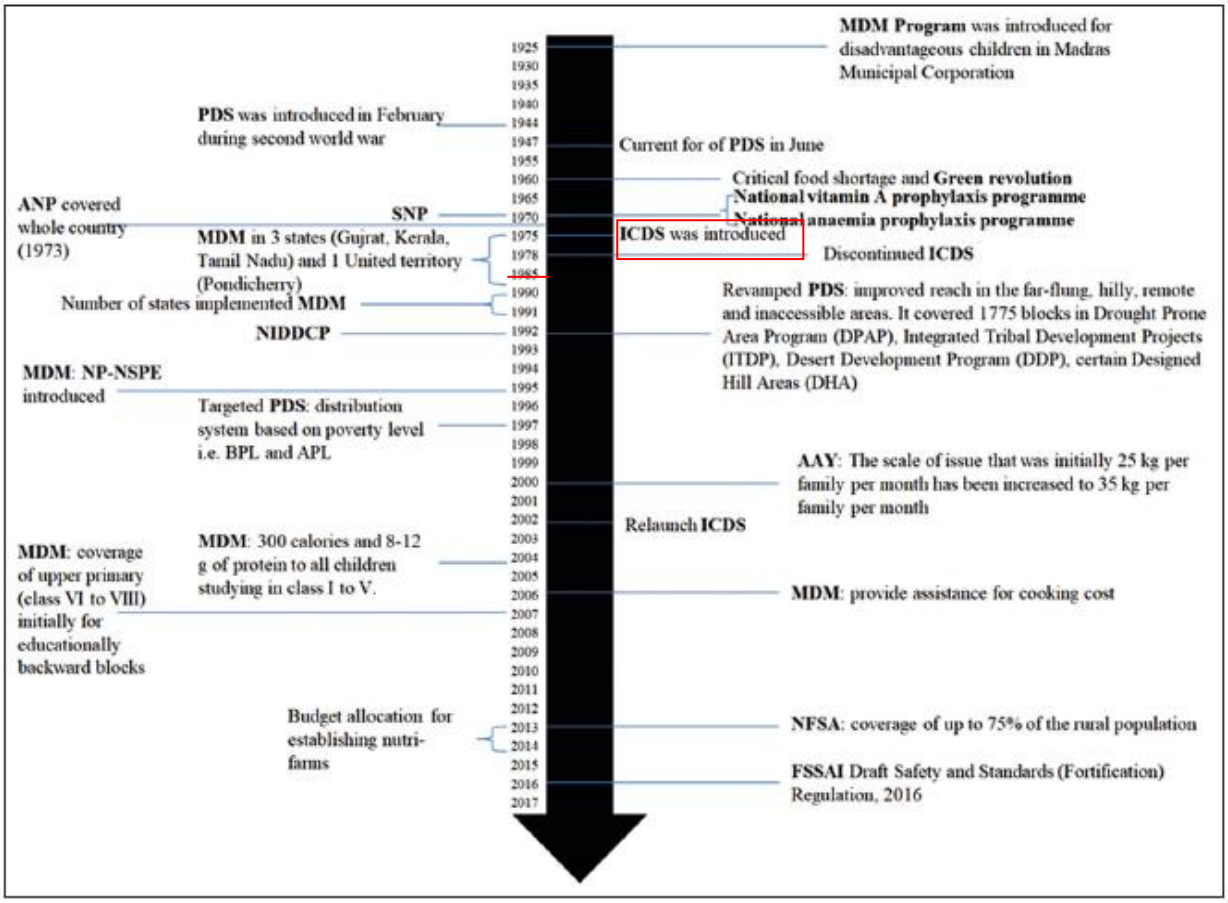
Figure 1.3-Conceptual pathways from transfer to nutritional outcomes



Source: (Narayanan and Saha,2021)

India lies in the South Asian region, characterized by the home to the most significant number of people after China as the living condition in this region can support billions of livelihoods. Several factors are responsible for keeping high population density here, such as, Himalayan rivers support the freshwater needs of people, Indo-Gangetic plains of northern India, central highlands, and Deccan plateau provide land for cultivation of various crops. Accessible means of transportation and presence of Arabian sea and Bay of Bengal of this vast peninsula are very conveniently brought monsoon every year twice in June and December respectively. (Leong, G.C., 1995). Two of the World's biggest economies, i.e., the Republic of India and the Republic of China, are situated here. Fortunately, India has an extensive ***food safety Net/ Social protection system*** due to which some of the nutritional needs of the poor are managed during this emergency period.

Figure 1.4: Schematic diagram of policies in India to address food and nutrition crisis



Source: Sirohi et al., 2018

Currently, three food-based programs are working in the length and breadth of the country, i.e., public distribution system, Mid-day meal, and integrated child development services. Currently, the *Public distribution system* of India is serving 800 million people. Indian Government announced a $ 22.6 billion relief package on 26th March 2020.

However, the implementation challenges faced by the Govt. of India were; Coverage of PDS in Urban areas is only 50% as compared to 70% in rural areas. Only Delhi Govt announced that people without ration cards could also avail ration from the PDS shop during the lockdown. Later on, the Central govt. Also told free distribution of 5 kg of rice and wheat and 1 kg of pulses per household, and the total targe beneficiary under this provision was nearly *80 million migrant workers*. Secondly, the Indian Government also announces to complete one nation one ration card by March 2021 to get ration quickly.

Figure 1.5 State government's food-based relief measures during COVID-19 lockdown.

States	Total beneficiaries	Subsidy/ free	Quantity (per month)	Duration (months)	Install-ments	Additional information
Kerala	NFSA ration cardholders/ people under quarantine/passengers stranded in the state	Free (Canteen meals subsi-dised)	BPL families to get 30 kg of rice along with the kit/ Those entitled to 2 kg of rice will get free 15kg rice /hh & food kit (Sunflower oil - 1kg; Coconut oil - 1/2kg; Salt - 1kg; Wheat flour - 2kg; Rava - 1kg; Green gram - 1kg; Black chana - 1kg; Tur dal - 1/4kg; Mustard - 100gm; Fenugreek - 100gm; Coriander - 100gm; Urad dal - 1kg Chilli powder - 100gm; Sugar - 1kg; Tea - 250gm)	1		1000 food canteens for subsidized meals at Rs. 20; Open community kitchen to be formed at the panchayat level will operate across the state: a telephone number will be given for people to reach out and ask for food. Passengers stranded in the state will be given special accommodation and food. Dealer may introduce a token system to avoid crowding of card-holders. Volunteers and ward members may be needed help in door delivery of grains for the elderly and bed-ridden who are unable to reach the retail outlets
Delhi	7.2 million (including people without ration cards who need to apply online and ration to be disbursed on that basis)	Free	NSFA ration with 50% more quantity (7.5 kg rice/wheat instead of 5kg	1		Lunch and dinner free for night shelters
Haryana	NFSA ration cardholders	Free	NFSA wheat & rice*, mustard oil & 1kg sugar/hh	1		Doorstep delivery . The state Food Supplies Department has issued a list of 22 items under the PDS, adding masks, sanitizers and gloves (no information on the list of items)
Uttar Pradesh	16.5 million construction workers, AAY card holders (poorest), destitute old age pension holders, PWD pensioners, daily wage labourers	Free	20 kg wheat/hh & 10 kg rice/hh	2		Door-to-door delivery of essential commodities apart from the e-commerce companies and supermarkets that will use their own workforce for the home delivery of essentials; community kitchens to distribute food packets to the poor; Mobile vans, e-rickshaws, thelas (carts) and other vehicles being arranged in various districts for door-to-door delivery of essential items
Karnataka	38.3 million	Free	5 kg rice & 2 kg wheat per person	2	1 (April)	
Andhra Pradesh	14.2 million (Beneficiaries already identified under the YSRCP last year)	Free	1 kg tur dal, 4 kg rice per person, oil & salt	1		Doorstep delivery by village and ward volunteers
Telangana	8.75 million white ration card holders, BPL, unorganized sector (Beneficiaries were chosen based on a 'comprehensive household survey' held last year)	Free	12 kg rice/person (double the monthly supply)	1		
Bihar	16.8 million	Free	NFSA wheat & rice*	1		In addition to food grains, Rs. 1000 DBT for food to 1.8 million ration card holding households Rs. 1000 DBT to state residents stranded outside Bihar (about 0.2 million people) because of the lockdown. "
Maharashtra	NFSA ration card holders	Free	5 kg wheat & rice	1		
Tamil Nadu	NFSA ration cardholders	Free	15 kg rice, 1 kg dal & 1 kg cooking oil/hh	1		Through token system at an appointed day and time. Tamil Nadu follows Universal Public Distribution System

Source: IFPRI, 2020

Punjab	1 million (daily wagers and labourers)	Free	10 kg wheat, 2 kg dal & 2 kg sugar	1		Doorstep delivery NFSA beneficiaries can collect 6 months advance ration at one go
West Bengal	79 million	Free	5 kg rice & 5 kg wheat per person	6		
Jharkhand	NFSA ration cardholders	Free	2 months ration in advance	2	1 (April)	"600 dal bhat Kendra (Rice-dal centres) 2000 food kits (2kg crushed rice, 1/2 kg jaggery, 1/2 kg gram)"
Rajasthan	48 million NFSA ration cardholders	Free	Wheat	2		PDS food grains distribution will be carried out in phased manner to prevent crowding at these shops. Distribution of ration packs (wheat, pulses, rice, oil and other essential commodities for urban poor not included in NFSA list)
Chhattisgarh	NFSA ration card holders, disabled, single destitute and Annapurna ration cardholders	Free	NFSA rice	2		
Gujarat	6 million	Free	3.5 kg wheat/person, 1.5 kg rice/person, 1 kg pulses/hh, 1 kg sugar/hh, 1 kg salt/hh	1		Distribution will be carried out in phased manner to prevent crowding at these shops.
Jammu and Kashmir	0.16 million NFSA ration card holders	Free	NFSA Rice and Wheat	2	1(April)	Doorstep delivery of PDS ration and other essential commodities
Odisha	32.6 million NFSA ration cardholders and 0.45 million State Food Security Scheme beneficiaries	Free	3 kg rice, 2 kg wheat/person, oil	3		Three months PDS food grains without any biometric verification. Doorstep delivery for elderly
Uttarakhand	2.3 million	Free	NFSA wheat & rice*	3		
Mizoram	NFSA ration card holders	Free	NFSA wheat & rice*	1		
Manipur	NFSA card holders	Free	3 kg rice, 2 kg wheat/person	1		

Source: IFPRI, (2020)

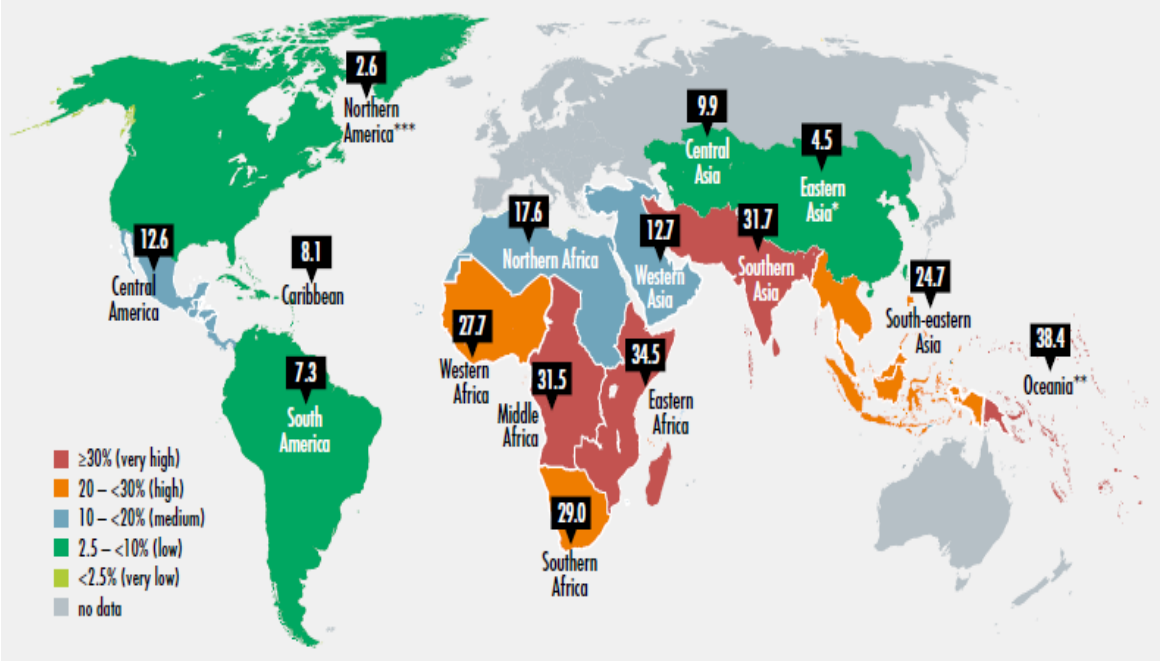
According to the *Global Nutrition report 2020*, the global number of stunted and wasted children under-5 is 149 million and 49.5 million, respectively. The primary reason behind the unacceptably high malnutrition rate is the inadequate implementation of policies/ intervention programs, poor utilization of resources, lack of coordination among multiple sectors, and failure of agricultural production due to extreme weather phenomena like droughts, flooding, etc. All these factors amplify the existing condition of malnutrition. It can be said that World can achieve global nutritional targets and SDGs by 2025 and 2030 only if a dynamic and multifaceted approach can be employed. Due to the current condition of COVID-19, the SDG's agenda of '***Ending malnutrition in its all forms*** is a long way to go.

In 2019, the World leaders signed Universal Health Coverage (UHC) at United Nations General Assembly, where the emphasis was given to a resilient food system, adequate nutrition, food security, and food safety are the indispensable components for a healthier population. Further, they emphasized mainstreaming nutrition with universal health coverage can elicit better responses in the long run. (GNR, 2020)

For ensuring better nutrition among the sensitive subgroup of the population (Maternal, infant, and young child nutrition), WHO in 2012 adopted a resolution of six global nutrition targets *viz.*

1) Reduction in the prevalence of low birth weight up to 30%
2) Reduction in the number of wasted children up to 40%
3) 50% reduction in anemia in women of reproductive age
4) Reducing childhood stunting up to <5%
5) No increase in childhood overweight
6) Increase in the rate of exclusive breastfeeding in the first 6-months up to 50%

Figure 1.6: globally, 21.3% of children under-5 are stunted, and seven sub-regions out of 17 have high or very high stunting prevalence in 2019



Source: FAO, (2019)

STATUS OF MICRONUTRIENT CONSUMPTION ACROSS THE WORLD

Iron deficiency is the major etiological factor for developing anemia. Worldwide it affects one-third of the population. Approximately 39% of preschool children and 52% of pregnant women are anemic; most of them are residents of developing nations. Iron deficiency has profound negative effects on human health and development. Among infants and young children, ID can lead to a long-lasting impact on their immune function, psychomotor development, coordination, academic achievement, and physical activity levels. As per the population census-2011, in India, approximately 499,811 children are under five years of age. In Vadodara children, under-5 years of age constitute 12% of the total population. (Census2011, Vadodara). The comprehensive national nutritional survey of Gujarat denotes that approximately 38.5% of children under five are anemic. Out of this, 41.9% are male, and 34.1% of female. (CNNS, 2018-19)

Similarly, VAD is a public health problem among young children in 96 countries globally. The most significant number of children with VAD is in Africa, while the highest numbers of clinically affected are in South-East Asia. It was estimated than

nearly 3 million children under five years are struggling with *Xeropthalmia*, while 140 and 250 million children affected by VAD do not have clinical manifestations but are at greater risk of developing severe infections and mortality. (Micronutrient manual 2018) In India, National figures of VAD among preschoolers have reported a prevalence of 18%, while in Gujarat, it was 14.6%. The lowest VAD was reported in Goa, i.e., 2%, whereas Jharkhand reported the highest prevalence of VAD, i.e., 43%. (CNNS-2018-19).

It was by virtue of the situation, during 2019-20, the study had an intervention session with fortified food products. Due to sudden lockdown in the last week of March dampened our result recording of the post-intervention phase. Thus, after the impact of the consumption was recorded vaguely.

The previous study period had 60 days of supplementation (*January last week to the second week of March 2020).* Out of the total population, 30% of mothers agreed to purchase fortified commodities knowledge of the mothers in buying and utilizing fortified commodities and assessing services under the ICDS units of Vadodara, which showed improvement.

Therefore, the current study aimed to understand the provision available through ICDS to address the consumption of fortified food during COVID-19. We tried to observe the impact of the fortified wheat flour given in previous studies and dietary practices to see the betterment effects in the children concerning addressing iron deficiency anemia and other nutrients along with the convergence of health and ICDS services among the study population.

REVIEW OF LITERATURE

It is not incorrect to say that COVID-19 threatened food and nutrition security very devastatingly. On the other hand, it shows the fragilities of food systems with a more significant impact on the labor-intensive system. The majority of the LMICs are dependent on labor for operating fruits and vegetable supply chains. Due to the pandemic, poor people from developing countries lost their employment, precipitating high food insecurity. (IFPRI, 2020) According to an estimate of the National Bureau of Statistics, 2020 perishable food chains affected the most due to restriction in transportation, which led to a drop in pork production up to 29.1%, and total reduction in meat production was up to 19.5%. The possible factors were disruption in inputs like feeds, labor shortage, and difficulty in delivery due to blockage in transportation.

COVID-19, a lesson to change the existing food system

The historical episode of COVID-19 was started from the Wuhan city of the Republic of China, where the first confirmed case was seen on 8 December 2019. Following the repercussion faced by the COVID-19 infected people, the World Health Organization on 11 March 2020 declared it a *pandemic*, and every country was advised to close the international borders and adopt social distancing as an immediate measure. In India, the first case of COVID-19 was reported in Kerala on 27 January 2020. Looking into the increment in the number of people infected with this deadly virus, India announced the world's biggest lockdown on 21 March 2020.

Figure 2.1: COVID-19 Global economic Recession in 2020

	PERCENTAGE CHANGE FROM BASE YEAR VALUES				
	Real GDP	Household consumption	Export of goods (value in constant dollars)	Agrifood real value added	Agrifood exports (value in constant dollars)
World	−5.0	−1.0	−20.9	−1.8	−24.8
Developed countries	−6.2	−0.1	−23.5	−3.1	−23.8
Developing countries	−3.6	−2.5	−18.0	+0.1	−30.5
Africa south of Sahara	−8.9	−3.2	−35.2	+3.9	−20.6
South Asia	−5.0	−3.7	−27.1	−2.0	−30.7
Southeast Asia	−7.0	−4.2	−27.7	−2.8	−31.9
Latin America	−5.9	−4.4	−30.8	−3.9	−28.5

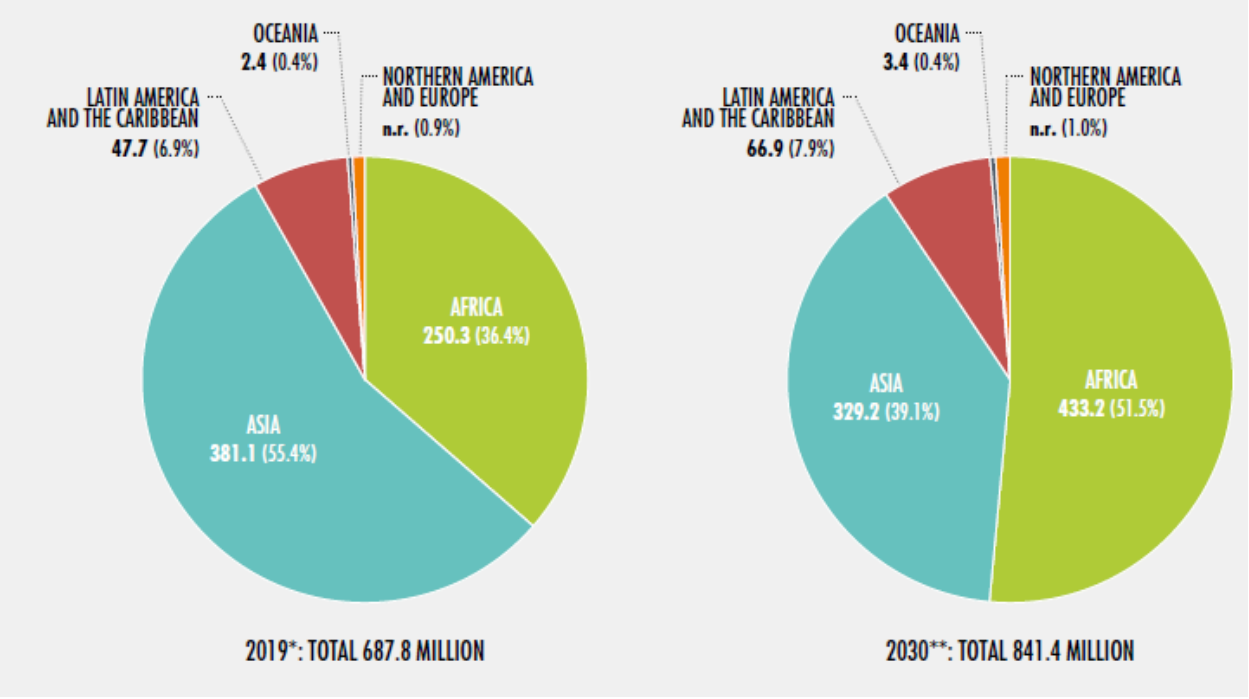
Source: IFPRI, (2020)

Financial Year 2019-2020 will be a memorable year for the entire world due to the global community's adversities. COVID-19 is a *health crisis* that adversely affected the global economy.

Nearly every sector of the economy experienced economic depreciation, which affected even the world's strongest economies like the United States of America, Japan, Germany, China, and India. COVID-19 impacted adversely on the food system, social system, and decreased economic development. Due to this crisis entire world is suffering from a high state of food insecurity. Every nation has realized that there is a strong need for a resilient food system for maintaining the nutritional status of the disadvantaged population during such emergencies. For controlling the spread of the virus, almost every country adopted the historic lockdown as a measure. Due to lockdown, millions of people who were primarily working in the informal sector became unemployed.

Further long-term lockdown enhances the rate of food insecurity. This phase was exacerbated by severe restrictions in labor, transport, processing, retailing services, etc. Nearly *303 million* people work in the informal sector in India, and most of them live in Uttar Pradesh and Bihar (80% of the total workforce) and Maharashtra (70% of the entire workforce). The worst effects of lockdown were seen on Seasonal migrant workers throughout the globe. (IFPRI, 2020)

Figure 2.2: If recent trends persist, the distribution of hunger in the world will change substantially, making Africa the region with the highest number of undernourished in 2030



Source: FAO, 2019

Expert suggests that ensuring nutrition security among the population, and particular emphasis should be given to the agricultural programs. An effective agriculture program determines improved access to affordable, healthy fresh diet and improves nutrition outcomes. Support to the local food production which can decide the regular supply of nutritious food. (Peirse et al., 2019)

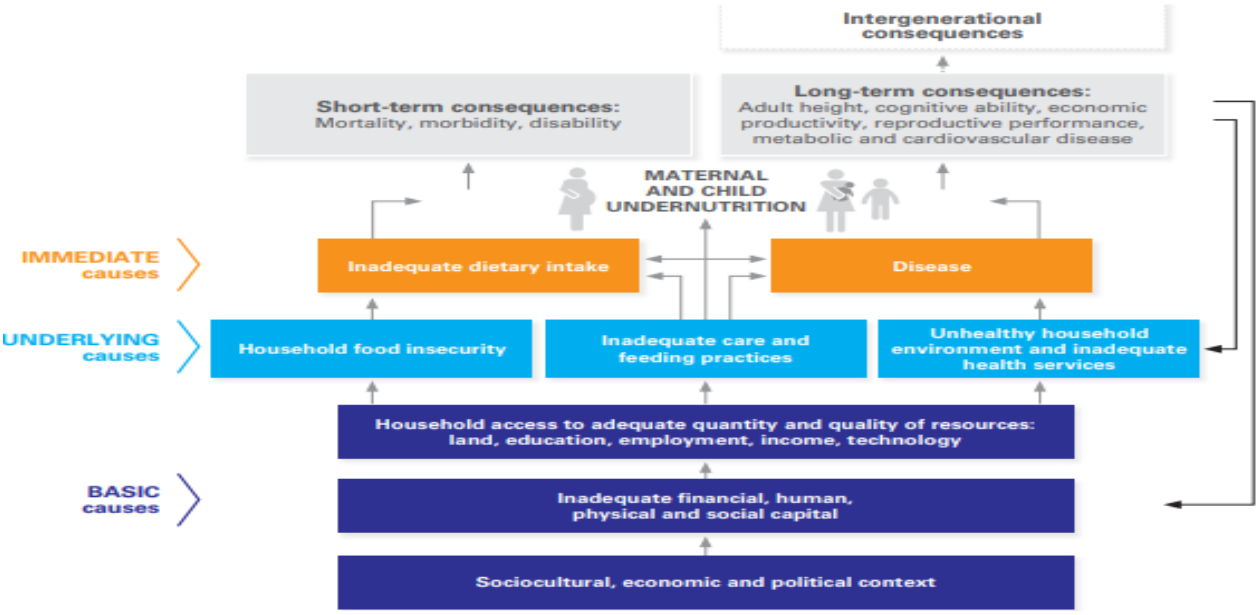
For a healthy mind and body, a balanced diet is essential. According to World Health Organization, "***Malnutrition refers to deficiencies or excesses in nutrient intake, imbalance of essential nutrients or impaired nutrient utilization***" malnutrition is an umbrella term that encompasses both under-nutrition and over-nutrition (overweight and obesity as well as diet-related NCDs). Term Under-nutrition manifests in four major forms *wasting* (*low weight*-for-height), *stunting* (*low* height-for-*age*), *underweight* (*low weight-for-age*) and *micronutrient deficiencies*.

According to UNICEF, 2013 three broad factors, *viz.* food, health, and care, affect an individual's nutritional status. Adequate nutritional status can be achieved if the following factors can be ensured;

- Accessibility to affordable diverse & nutrient-rich food
- Appropriate maternal and child-care practices
- Adequate health services
- Healthy surroundings including safe water, sanitation, and good hygiene practices

Children born with LBW (Low birth weight) can lead to a greater chance's mortality and morbidity. Less space between two pregnancies and having several children can lead to the transfer of deficiencies into children. When infection and undernutrition interact with each other, they ended up in the vicious cycle of malnutrition. (UNICEF, 2013)

Figure 2.3: The UNICEF Conceptual framework of the determinants of child under-nutrition



The black arrows show that the consequences of under-nutrition can feedback to the underlying and primary causes of under-nutrition, perpetuating the cycle of under-nutrition, poverty, and inequities.

Source: UNICEF, 2013. Improving Child Nutrition: The achievable imperative for global progress

The WHO's Southeast Asia Region (SEAR) carries the double high burden of malnutrition due to poor socio-economic conditions and other biological and social determinants. Dietary choices of the people of southeast Asia lack dietary diversity. A majority of the diet portion is plant-based, which is low in protein and various micronutrients, which contribute to a high burden of underweight, stunting, wasting, and nutritional anemia. According to an estimate, major risk factors which contribute to disease burden in this region are underweight (7.8%), iron deficiency (1.0%), unsafe water, sanitation and hygiene (4.6%), high blood pressure (3.0%), overweight and obesity (2.3%), low fruit and vegetable intake (1.0%) and suboptimal breastfeeding (2.9%). Globally, more than one-third of child death is directly a consequence of poor maternal and child under-nutrition.

DHS data from India, Bangladesh, Nepal, Bhutan, and Timor-Leste indicate that anemia is a severe public health concern in these countries. India is the largest country in this region, which constitutes

higher incidences of anemia among children under five, pregnant women, and non-pregnant women. (WHO 1995-2011)

Figure 2.4: : **Level of public health burden caused by anemia among children, non-pregnant women, and pregnant women**

Children aged 6–59 months			Women 15–49 years (non-pregnant)		Women 15–49 years (pregnant)	
Country	Anaemic children[i]	Public health significance	Anaemic non-pregnant[i]	Public health significance	Anaemic pregnant[i]	Public health significance
Bangladesh	56%	Severe	43%	Severe	48%	Severe
Bhutan	55%	Severe	44%	Severe	46%	Severe
DPR Korea	34%	Moderate	25%	Moderate	27%	Moderate
India	59%	Severe	48%	Severe	54%	Severe
Indonesia	32%	Moderate	22%	Moderate	30%	Moderate
Maldives	30%	Moderate	37%	Moderate	39%	Moderate
Myanmar	40%	Severe	30%	Moderate	33%	Moderate
Nepal	51%	Severe	36%	Moderate	44%	Severe
Sri Lanka	36%	Moderate	26%	Moderate	25%	Moderate
Thailand	29%	Moderate	24%	Moderate	30%	Moderate
Timor-Leste	45%	Severe	22%	Moderate	24%	Moderate

Figure 2.5: Map of countries with overlapping forms of stunting in children under 5, Anaemia among women of reproductive age, and overweight in adult women

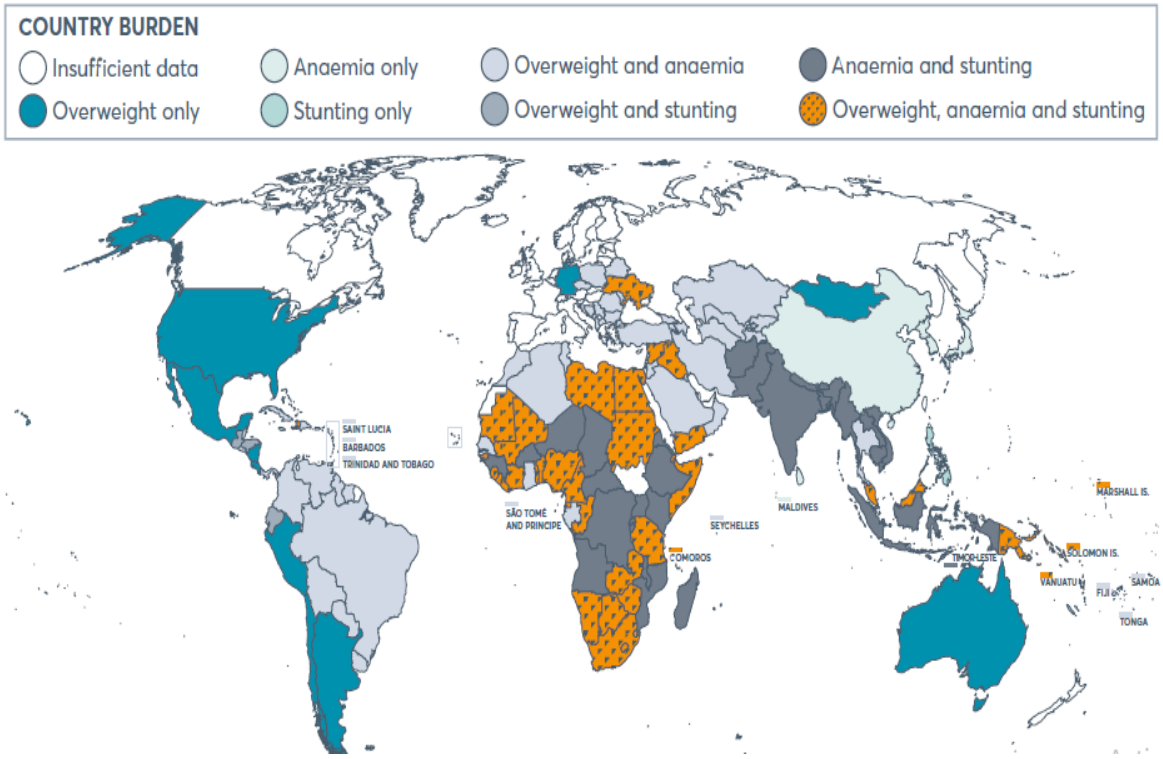
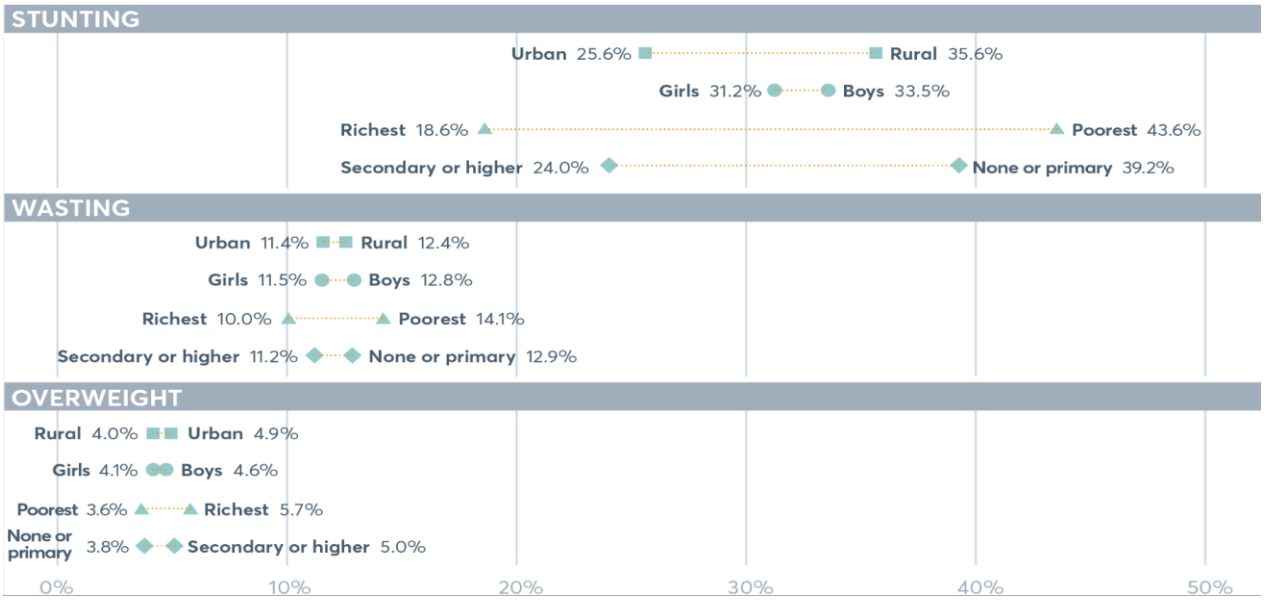


Figure 2.6: Inequalities in stunting, wasting and overweight in children under 5, by urban-rural location, sex, wealth, and education

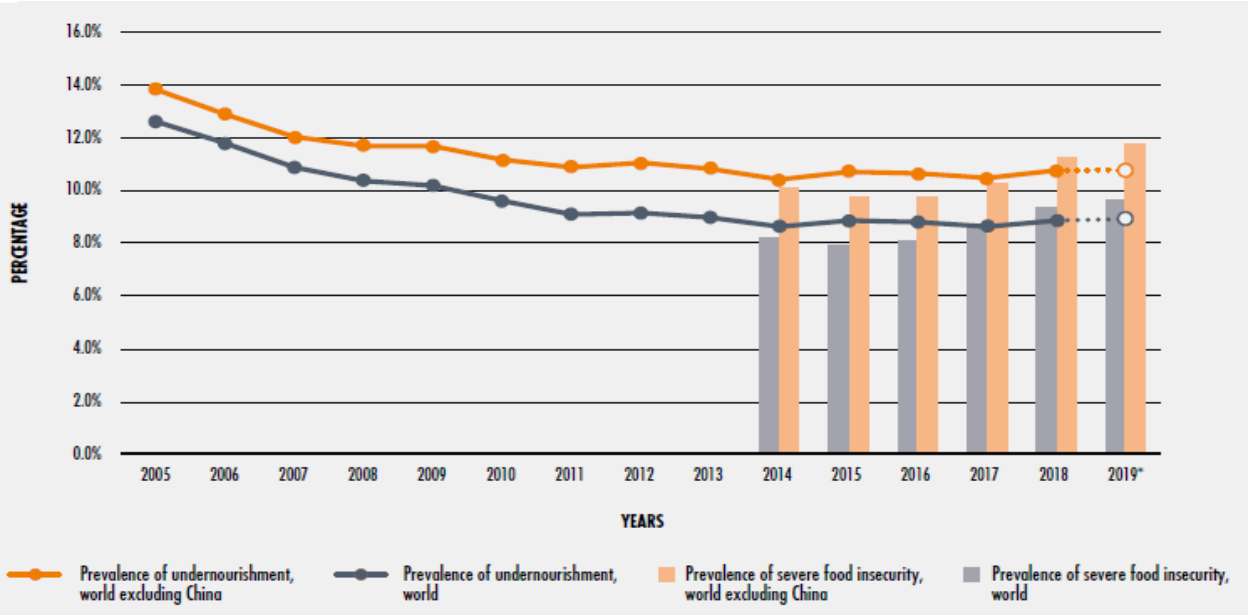


Source: Global Nutrition report 2020

According to the definition given by United Nations Food and Agriculture Organization, food insecurity is defined as; ***"A situation that exists when people lack secure access to sufficient amounts of safe and nutritious food for normal growth and development and an active and healthy life."***

Both nutrition and food security are interlinked, as the quality and quantity of diet directly influence an individual's nutritional status. Some regions in the world are highly food insecure. Sub-Saharan African region and South Asia are the malnutrition hotspot of the world, and their Hunger index score (27.8 and 26.0 respectively) shows the alarming rate of malnutrition. Among all the 107 nations Chad, Timor-Leste, and Madagascar have the highest under-nutrition status. India holds a place of 94th among 107 countries, with a score of 27.2. ***Global Hunger Index*** is a 100 point scale that categorizes countries based on four indicators, including; The proportion of undernourished in a population, the proportion of children under the age of five suffering from wasting (less weight in proportion to their height), the ratio of children under five suffering from stunting (low height in proportion to their age) and mortality rate of children under five. (GHI, 2020)

Figure 2.7: Prevalence of undernourishment in the world with and without China, compared to the prevalence of severe food insecurity based on the FIES

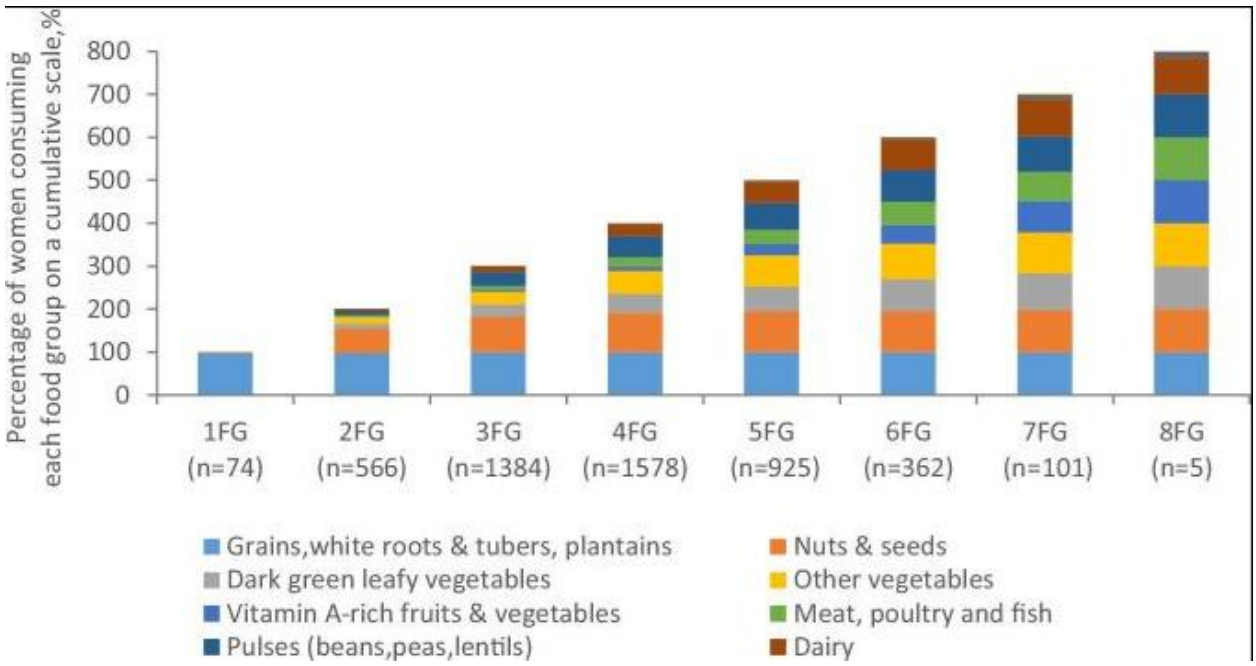


Source: FAO (2019)

Arimond et al., 2010 conducted a study on 5 data sets available from three African countries (Mali, Burkina Faso, Mozambique) and two Asian countries (the Philippines and Bangladesh) for calculating Food group diversity indicators (*FGI*) and mean probability adequacy (*MPA*) using repeated 24-hr dietary recall for NPNL (Nonpregnant and non-lactating) and nursing mothers. Results of this study showed that the prevalence of micronutrient adequacy was < 50% in at least 4 of the five sites for B-group vitamins B_2 (riboflavin), B_3 (niacin), B_9 (folate), B_{12} (Cyanocobalamin); calcium, and iron. In Mozambique, MPA values for both NPNL and Lactating mother were highest among all the sites; however, seasonal factor (Mango season) affected the MPA values during the offseason. Further, a strong association was also found between higher FGI and MPI values.

In 2013 a cross-sectional study was conducted on reproductive-aged women in Mali (Western Africa). A total of 5046 reproductive-aged women were selected for the study. Minimum dietary diversity score (MDD-W), Household Hunger Scale (HHS), Farm Production Diversity Score (FPDS), and Household Food Insecurity Access Scale (HFIAS) were calculated. This study shows that only 1362 women, i.e., 27% of the total sample, achieved an MMD-W as the frequency of consumption of vitamin A-rich fruits and animal protein was higher.

Figure 2.8: Percentage of women consuming different food groups



Source: Adubra et al., (2019)

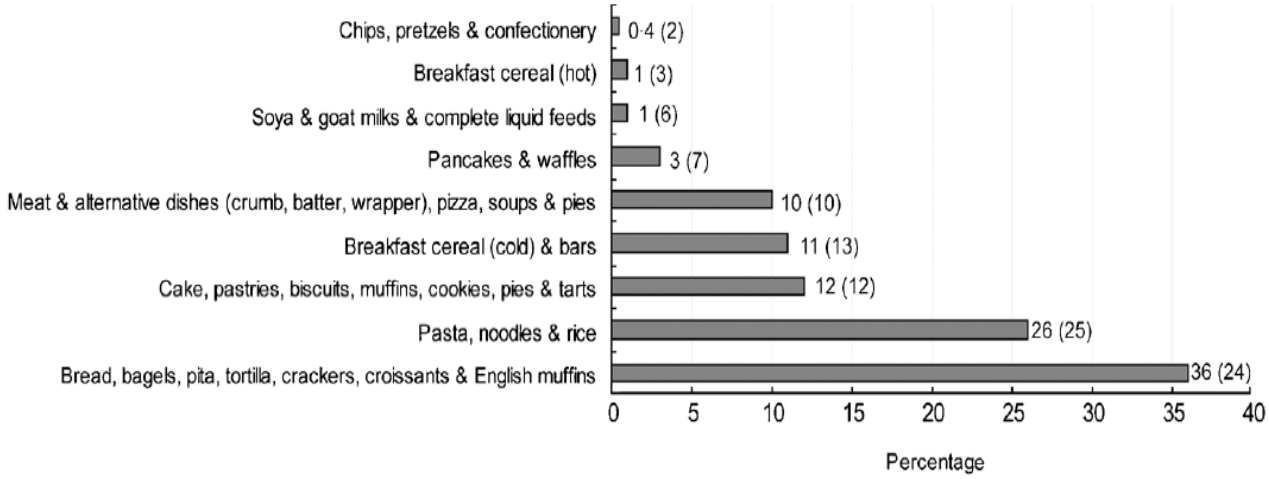
A cross-sectional study was conducted in two districts of Tanzania (Bahi district of Dodoma region and Mbarali district of Mbeya region) for assessing the following factors; factors influencing the dietary diversity of households, children under-5, and women. This study highlights that the most often consumed foods within the households were cereals, vegetables, oils, fats, spices, condiments, and beverages. 46% of women and 26% of children scored less than the minimum dietary score. Ochieng et al., (2017). Ali et al., 2019 carried out a study on 6-59 months of children between 2014-2017 for assessing the association of food security, dietary diversity, and other socio-economic factors in rural Bangladesh. Highlights of this study reveal that 40% of the children received a score of 4.

Further, it was noticed that children whose mothers are educated and skilled workers have higher dietary values than their counterparts. In this study, the prevalence of stunting, wasting, and underweight were reported as 36.8%, 18.2%, and 37.7%, respectively. Pritchard et al., 2019 carried out a study on the importance of non-farm livelihood for household food security and dietary diversity in rural Myanmar.

A study was carried out in the metropolitan region of the southern part of Brazil by Beinner et al., 2010. It was a 5months intervention trial where only 6-24months old children were selected for the study. Fortified rice was introduced as a fortified vehicle for improving the iron status of the targeted population. Keeping a rough record of rice consumption by the participant single 24hr dietary recall was also conducted. When Baseline and end-line results were compared, Hb and SF were both increased among URG and CG groups. Prevalence of ID was decreased from 69.1% at the baseline to 25% at the end-line among URG, whereas it was reduced from 76.9 to 52.7% among CG.

In November 1998 Govt. of Canada mandated the fortification of wheat flour with folic acid as a strategy for reducing the prevalence of Neural tube defects (NTDs). Priest et al., 2009 conducted a cross-sectional study to assess preschool-aged children from five different places of Ontario, Canada. Total 254 preschool-aged (3-5Y; 130 girls and 124 boys) ethnically diverse children were enrolled for the study. Other fortified foods (Bread, Pasta, bagels, cookies, and breakfast cereals) were introduced among the targeted population. It was noticed that fortified folic acid consumption helps maintain appropriate dietary levels.

Figure 2.9: Percentage contribution (SD) to fortificant folic acid intake made by specified folic acid-fortified foods, by group, in Ontario preschoolers (n 254)



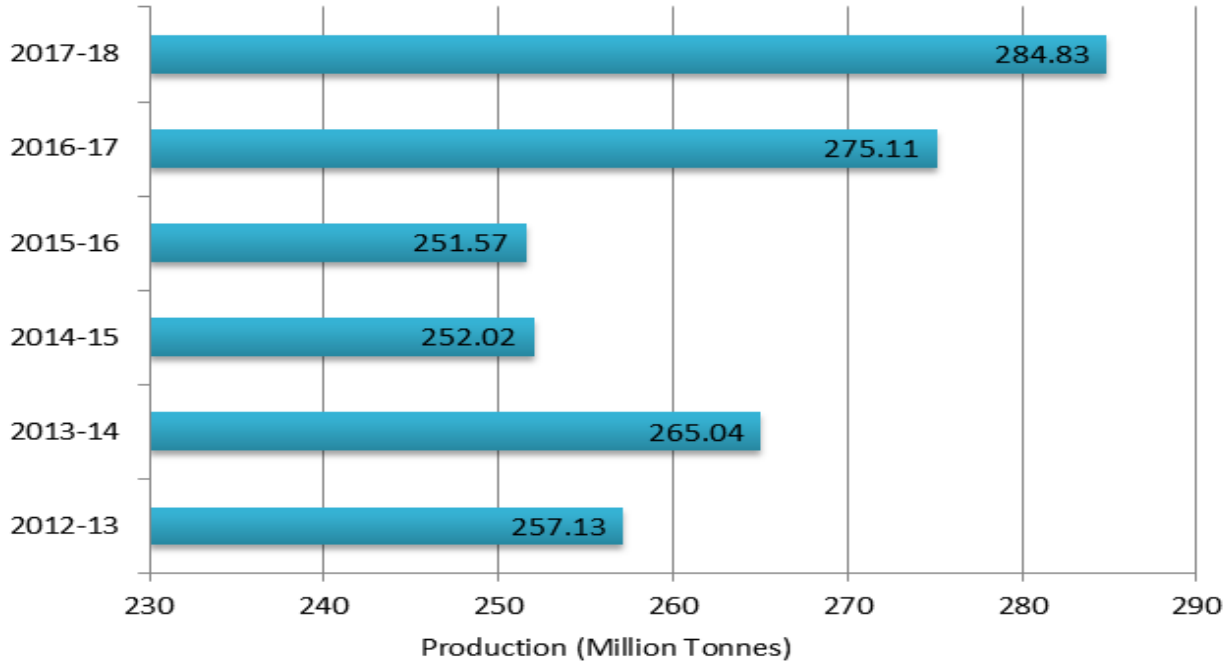
Source: Priest et al., (2009)

FOOD AND NUTRITION SECURITY IN INDIA

India became self-sufficient in food production in the 1970s. The historic *wave of the green revolution* or third agricultural revolution was started by American agronomist *Norman* Ernest *Borlaug (also known as Father of green revolution)* during 1950-60. He emphasized the introduction of HYVS (High yielding varieties) for increasing agricultural production. Due to high-yielding varieties' high fertilizer and irrigation demand, soil desertification is the most significant emerging concern. Currently, Punjab is facing desertification, and due to this water table is also going very down up to 25-30cm every year. Indeed, the high production of water-guzzling crops like rice and sugarcane is exacerbating this condition (MoAFW, 2021).

India is the world's most giant milk, pulses, and millets and second in rice, wheat, sugarcane, groundnuts, vegetables, fruits, and cotton. However, a decline was observed in 2014-2016 due to drought. The second advance released by the Ministry of Agriculture and Farmers Welfare 2019-20 India break its previous year food production record of 285.21 million tones (2018-19) by estimated production of 291.95 million tons in 2019-20. (Economic Times, 2021)

Figure 2.10: Annual Grain Production in India

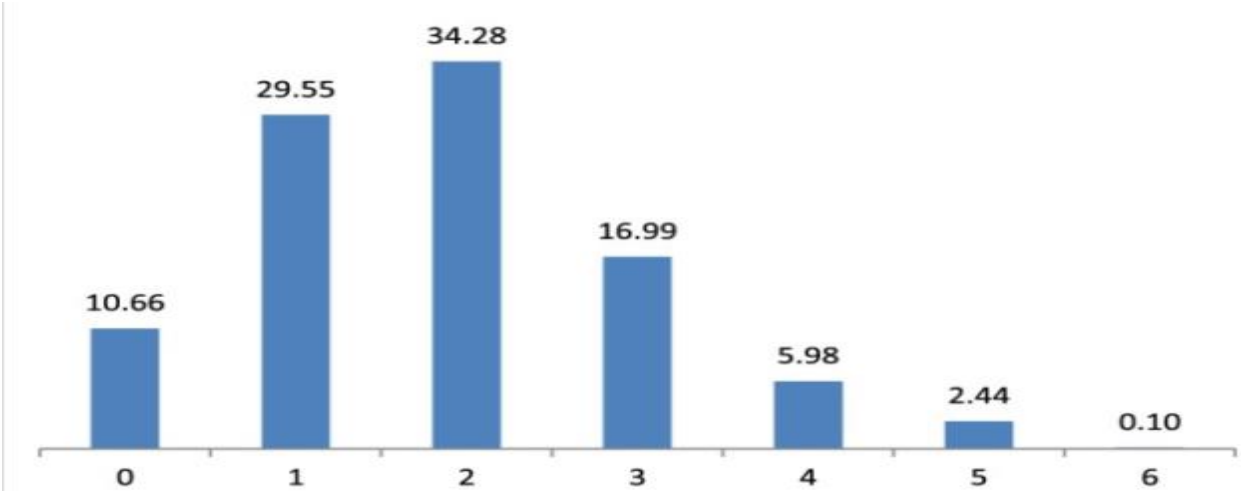


Source: Ministry of Agricultural and Farmers welfare, 2018-19

According to the Press Information Bureau (PIB) food advanced estimates for 2021 for Kharif crops (only) is approximately 303.34 million tones, whereas rice constitutes 120.32 million tonnes. (record), Nutri / Coarse Cereals; 49.36 million tones, Maize; 30.16 million tones, Pulses; 24.42 million tones, Tur; 3.88 million tones, Oilseeds; 37.31 million tones, Groundnut; 10.15 million tonnes, Soyabean;13.71 million tones, Sugarcane – 397.66million tones. According to the Indian Council of Agricultural Research (ICAR), in 2016, about 3.9% to 6% portions of cereal, 4.3% to 6.1% pulses, 2.8% to 10.1% oilseeds, 5.8% to 18.1% fruits, and 6.9% to 13% vegetables were lost during harvesting, post-harvesting activities, handling and storage respectively.

Assessing the household food insecurity, children's dietary diversity, and nutrition in India, Chandrasekhar et al., 2017 carried out a study on children aged 6-23 months of age from 2670 households. Children <6mo of age were excluded from the study as they receive no complimentary food. Prevalence of under-nutrition (PoU) among children aged 6–23 months in the sample is as follows: 18.3% of children are stunted (9.6% severely stunted), 18% are underweight (6.9% severely underweight), and 10.7% are wasted (3.7% severely wasted). Among all the enrolled children, nearly 75% of the children received only two food groups.

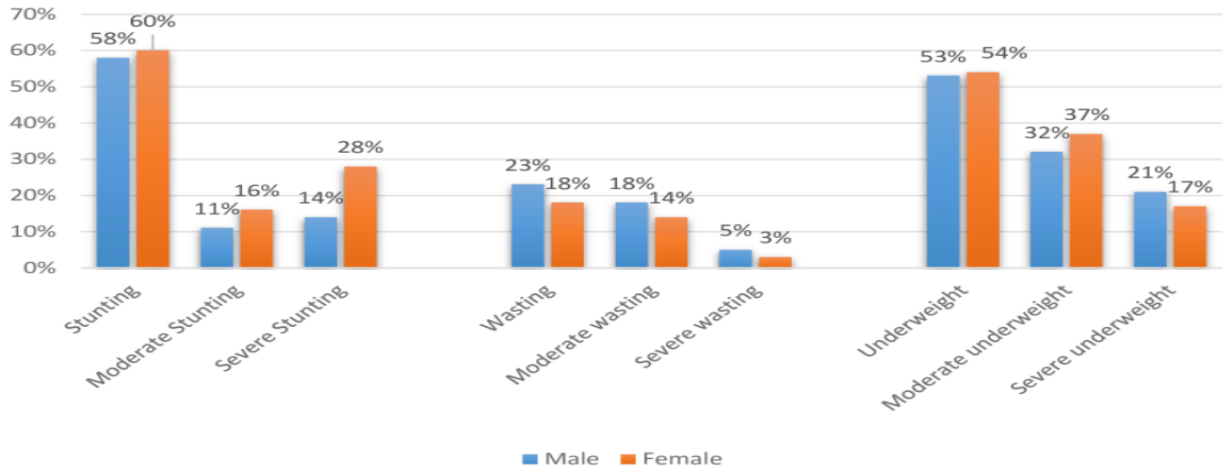
Figure 2.11 Distribution of children aged 6–23 months by diet diversity (seven food group score)



Source: Chandrasekhar et al., (2017)

Despite being the financial capital of India, Maharashtra has a high prevalence of malnutrition. *Ghosh and Varerkar***,** 2019 conducted a study on children in the Palghar district of Maharashtra using *WHO Child Growth Standard-2006.* Scheduled Tribe (ST) was the most unprivileged section of the population in Maharashtra, representing 34.6% of the total population of palghar, which is highly food insecure. It was reported that nearly half of the tribal children under-5 years of age are stunted. Stunting is characterized as the worst form of malnutrition. Estimates of this study suggested that the prevalence of stunting, wasting, and underweight was 59%, 20%, and 53%, respectively. 26% of the children received a minimum dietary diversity score of 2 (consumed only two food groups), and 57% of children had a DDS of 3 (consumed only three food groups) whereas, nearly 83% of children did not achieve a score relevant to a minimum acceptable diet.

Figure 2.12: **Prevalence of stunting, wasting, and underweight among the children by sex, Vikramgad, Maharashtra, 2017.**



Source: Ghosh and Varerkar, 2019

Three models were used for assessing the relationship between household food security and anthropometric measures of children *viz.* stunted (equals one if stunted, else zero), underweight (equals one if underweight, else zero), and wasted (equals one if wasted, else zero). Children from severely food insecure households have 53% higher odds of being stunted (AOR 1.528; 95% CI 1.142–2.045) and 64% higher odds of being wasted (AOR 1.640; 95% CI 1.149–2.341) than children from food-secure households. Further, their findings reveal no statistically significant relationship between household food security and malnutrition indicators like stunting, wasting, and underweight, whereas their recommendations denote that children who consume a more dietary diverse diet are less likely to become stunted and underweight.

INTEGRATED CHILD DEVELOPMENT SERVICES

Recognizing the importance of nutrition during the early childhood period ***Integrated Child Development Services*** scheme was launched under the Ministry of Women and Child Development by the Govt. of India in 1975 under the leadership of late Prime Minister Mrs. Indira Gandhi in 33 community development blocks with a view of improving the maternal and child health. This scheme provides the following packages of services, which includes;

Table 2.1: The Scheme offers a package of six services

SN	Package of services
1.	**Supplementary nutrition****
2.	**Immunization***
3.	**Nutrition and Health Education***
4.	**Health Checkup***
5.	**Referral service***
6.	**Preschool non-formal education for children ages three to six years**

********Services for children under six years and pregnant and lactating women*

*******Services delivered through the public health infrastructure under the Ministry of Health and Family Welfare.* **Source: India, MoWCD (2011)**

ICDS program was implemented with the following objectives;

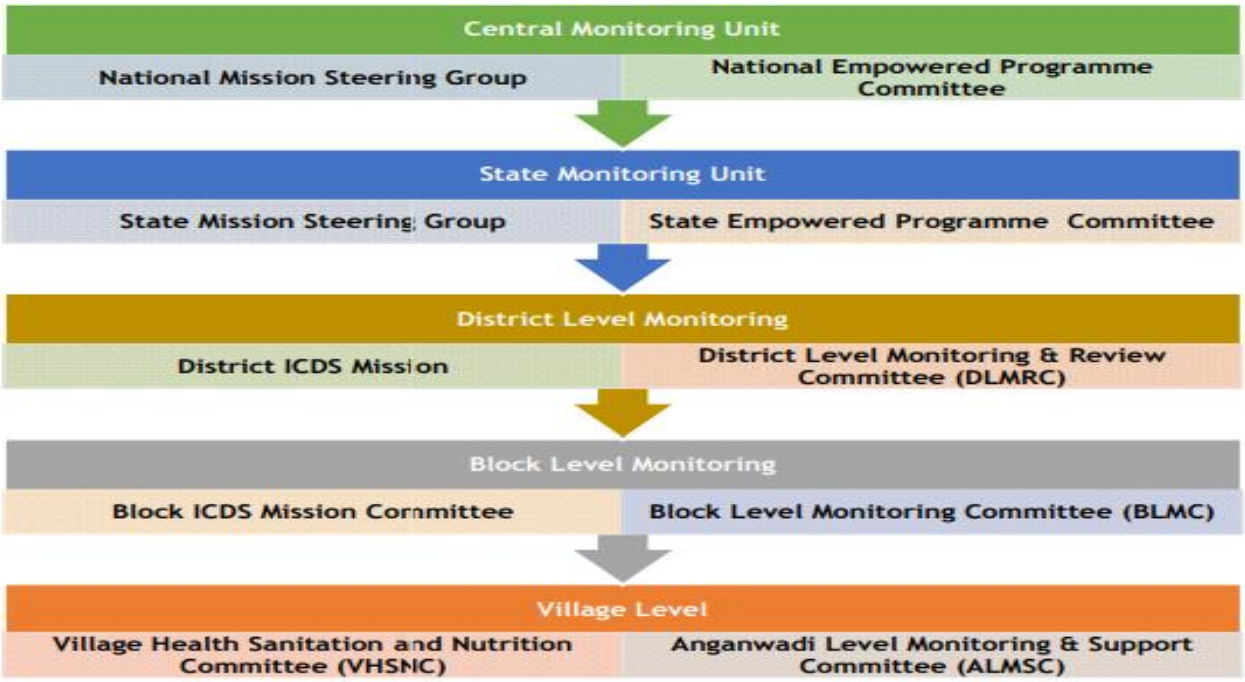
1. Improve the nutritional and health status of children below the age of six years and that of pregnant and lactating mothers as well as of adolescent girls
2. Lay the foundations for proper psychological, physical and social development of the child
3. Reduce the incidence of mortality, morbidity, malnutrition, and school dropout
4. Achieve effective coordination of policy and implementation among various departments to promote child development
5. Enhance the capability of the mother to look after the usual health and nutritional needs of the child through proper health and nutrition education (DWCD, 2004)

It is the prime responsibility of the Primary Health Care workers to provide health checkups, immunization, and the Anganwadi workers solely provide referral services whereas supplementary nutrition, non-formal preschool education, and nutrition and health education. ICDS is designed in such a way that covers the sensitive segment of the population. The main agenda of providing services to children under five years of age is to reduce the likelihood of child mortality and morbidity. It also helps to bring down the incidences of maternal mortality in pregnant and lactating women and reduce infant mortality (IMR). The inclusion of adolescent girls is mainly based on improving the nutritional status in the long run. (MoWCD, 2011)

ICDS is the world's most unique outreach program, which is currently the largest feeding program addressing the sensitive population of our country, i.e., Children under five years of age, pregnant women, lactating mothers, and adolescent girls. Its primary goal is to break the inter-generational cycle of malnutrition, preventing mortality and morbidity due to nutritional deficiencies. It focuses

on a multi-sectoral approach by integrating health, nutrition, and education interventions and emphasizes a life cycle approach towards malnutrition. (Ministry of WCD, 2021)

Figure 2.13: Monitoring units of ICDS



Source: Manual for District level Functionaries, (2017)

(A) INFRASTRUCTURE

The Anganwadi centers are the primary platform for delivering the ICDS interventions, and front-line health care workers are the backbone of this program. The establishment of the Anganwadi center is based upon the number of beneficiaries in an area. According to the policy guidelines, One AWC is meant to cover approximately 400-800 beneficiaries. However, this range is not uniform for the entire country as some regions of India are densely populated, whereas others are scarcely populated. For example, Northeast region one AWC cater to the need of 300-800 beneficiaries. (Das-gupta, 2005) Every month in village health and nutrition days are observed at the Anganwadi centers were various services such as pregnancy registration; antenatal care; immunization for children; vitamin A supplementation; growth monitoring; supplementary nutrition for underweight children; counseling on family planning, pregnancy care, and child nutrition; and anti-tuberculosis drugs are provided. (MHFW, 2007) At the grass-root level, ASHAs are responsible for identifying anemia among children. ANM holds the stock of IFA tablets for

pediatric anemia, and AWWs keep the stock of IFA for ANMs. All three front-line workers are responsible for delivering the nutrition and health interventions. (MoHFW, 2021)

Anganwadi workers are the community-based front-line health care personal; they maintain different registers for keeping an eye on the other components of this program: Timely vaccination of children, non-formal preschool education, growth monitoring of children, pregnant and pregnant lactating mothers, Supplementary nutrition services, and village census, etc. Every month this set of information is collected from the targeted beneficiaries, and appropriate record-keeping is done. (MIS, 2019)

In 2016 for improving the service delivery of the nodal ministry of ICDS, the Women and Child Development implemented ICDS System Strengthening and Nutrition Improvement Project (ISSNIP). This project emphasizes using ICDS Common Application Software (ICDS-CAS) to record and monitor the data over electronic devices such as tablets and mobile phones. (MIS, 2019)

State-specific data monitoring system

In Chhattisgarh, every year, *Vajan Tyohar* (Weighing festival) is celebrated to monitor the growth of children <6 years of age. Odisha is using *an e-Pragati* application, and it is also observed that there is a significant difference between data generated through ICDS rapid reporting system and NFHS. (ICDS, 2019)

(A) FINANCIAL ASSISTANCE

A top-down model is adopted for allocating funds for ICDS functioning by bifurcating it into two components, i.e., ***ICDS (G)*** and ***ICDS (SN)***. The total operational cost of this program is covered under the ICDS general (G) component, and ICDS supplementary nutrition (SN) covers the supplementary nutrition cost. Earlier, 100% cost was bear by the central government only. Later on, since 2009, 90% of the ICDS (G) component is shared by the central government and 10 % by the respective state government. For ICDS (SN) component central and state govt. Contributes 50:50 shares since 2005-06 except northeast states of India where the center and the state share is still 90:10 respectively.

(B) SUPPLEMENTARY NUTRITION

Since 2013 SN component of ICDS has become a legal entitlement as per the order issued by the Supreme Court of India. It is mandatory to provide 300 days/year of nutritional support to the targeted beneficiaries. Section 4, 5, and 6 of the National Food Security Act 2013 about nutritional support to pregnant and lactating mothers, nutritional support to children, and

prevention and management of child malnutrition. The primary objective is to fill the gap between protein-energy intake and the average dietary intake of the target population (pregnant women, lactating women, and children). The norms for ICDS (SN) expenditure per beneficiary per day fall under three categories: Children aged 6-72 months, severely malnourished children 6-72 months, and pregnant and lactating women. From 2008 onwards, these norms have been revised. The daily expenditure for category one has increased from ₹ 2 to 4; category two from ₹ 2.7 to INR 6 and category three from ₹ 2.3 to 5. For children 0-6 months, exclusive breastfeeding is emphasized, whereas for children six months to 3 years, a ***Take Home Ration*** (THR) in wheat or rice is given. Lastly, for children 3-6 years, hot cooked meals are provided at the AWCs.

Table 2.2: The extent of nutritional supplements to different types of beneficiaries

Beneficiaries	Calories (Kcal)	Protein (g)	Cost (per beneficiary per day)
Children (6 months to 72 months)	500	12-15	₹ 8.00
Pregnant and Lactating mothers	600	18-20	₹ 9.50
Severely Malnourished Children (SAM) (6 months to 72 months)	800	20-25	₹ 12.00

Source: FFRC, 2008

Anganwadi centers are the main plate-form for delivering IFA (Iron and folic acid) tablets to the beneficiaries. The weekly iron and folic acid supplementation program (WIFS) is struggling with poor compliance. Some of the reasons could be the issues of gaps in supply chain management of IFA, unacceptability by the children due to the strong metallic taste of the tablets, development of nausea, epigastric pain, and gastrointestinal problems. However, some observational studies report that IFA supplementation increased iron stores among adolescent girls. (Malhotra et al., 2018)

Table 2.3: IFA Supplementation Program and Service Delivery

Age group	Intervention/Dose	Regime	Service delivery
6–60 months	1 ml of IFA syrup containing 20 mg of elemental iron and 100 mcg of folic acid	Biweekly throughout the period 6–60 months of age and de-worming for children 12 months and above.	Through ASHA Inclusion in MCP card
5–10 years	Tablets of 45 mg elemental iron and 400 mcg of folic acid	Weekly throughout the period 5–10 years of age and biannual de-worming	In school through teachers and for out-ofschool children through Anganwadi centre (AWC) Mobilization by ASHA
10–19 years	100 mg elemental iron and 500 mcg of folic acid	Weekly throughout the period 10–19 years of age and biannual de-worming	In school through teachers and for those out-of-school through AWC Mobilization by ASHA
Pregnant and lactating women	100 mg elemental iron and 500 mcg of folic acid	1 tablet daily for 100 days, starting after the first trimester, at 14–16 weeks of gestation. To be repeated for 100 days post-partum.	ANC/ ANM /ASHA Inclusion in MCP card
Women in reproductive age (WRA) group	100 mg elemental iron and 500 mcg of folic acid	Weekly throughout the reproductive period	Through ASHA during house visit for contraceptive distribution

Source: Guidelines for the control of Iron Deficiencies anemia, 2013

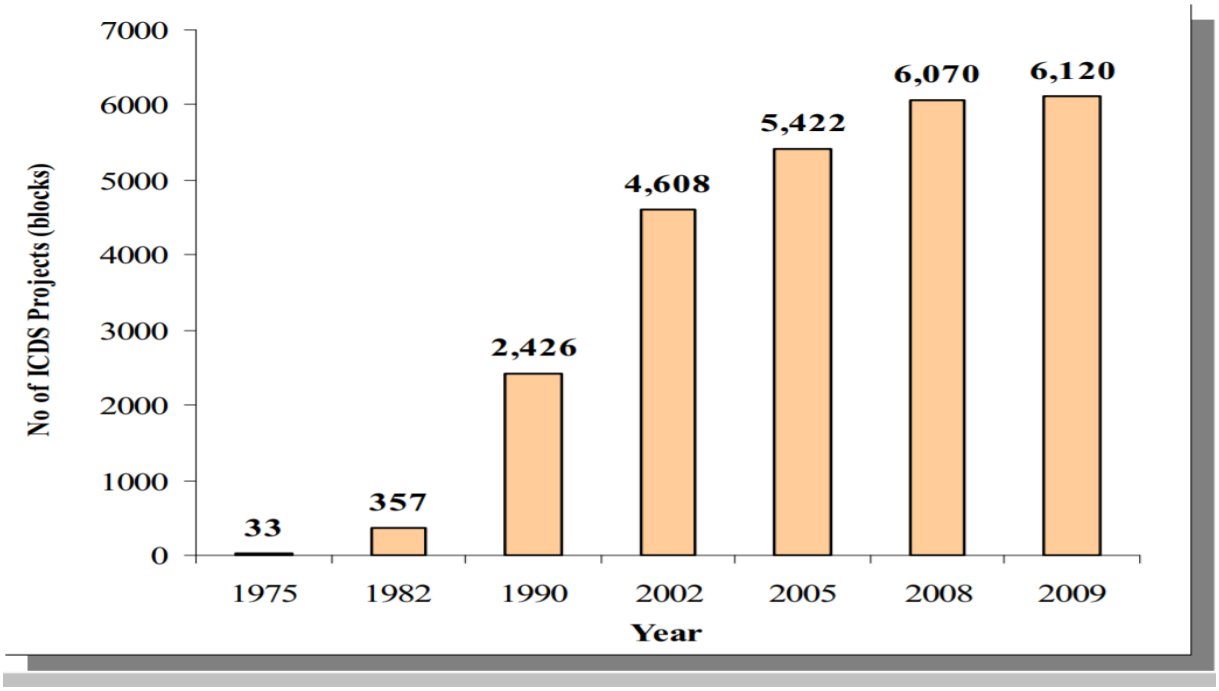
Dasgupta et al., 2005 classified all the Indian states into five categories based on the socio-economic differences that exist between states;

1. **The South:** Andhra Pradesh, Karnataka, Kerala, and Tamil Nadu
2. **The Northeast:** Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, and Tripura
3. **The "Poor" North: Bihar**, *Jharkhand, Uttar Pradesh, *Uttarakhand, Orissa, Madhya Pradesh, and Rajasthan
4. **The "Rich" North:** Punjab, Haryana, Gujarat, and Maharashtra
5. **The "Other" North**: Himachal Pradesh, Jammu & Kashmir, and West Bengal

** Jharkhand and Uttarakhand were not included in the analysis; however, they are included in this study and are considered a part of the Poor North because of their relation to Bihar and Uttar Pradesh, respectively, which both belong to the Poor North category*

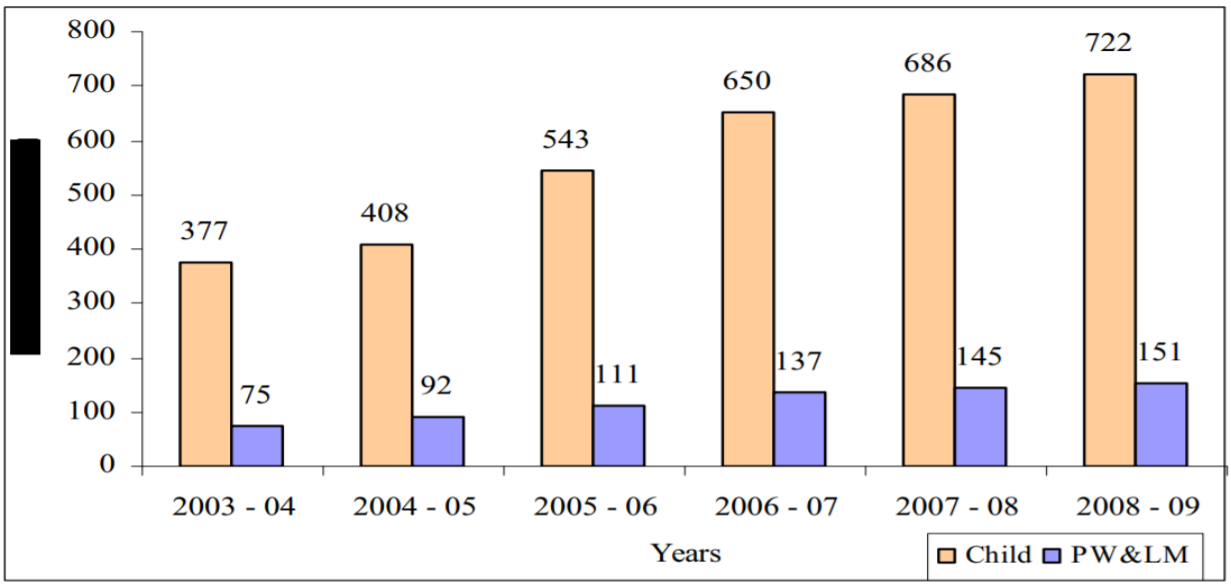
India's ICDS program is the most studied nutritional interventional program. Various studies highlighted its positive role in reducing the prevalence of malnutrition. Since its inception in 1975, it has achieved remarkable progress in terms of expansion of the services and the increment in the number of beneficiaries.

Figure 2.14: Trend in the number of blocks covered by ICDS (1975-2009)



Source: Evaluation Report on Integrated Child Development Services Volume I, 2011

Figure 2.15: Growth in the number of ICDS beneficiaries (2003-09)



Source: Evaluation Report on Integrated Child Development Services Volume I, 2011

Since its inception, several factors are affecting the performance of the ICDS program, which include; inadequate resource allocation, poor governance, and programmatic deficiencies. **DasGupta et al., (2005)** ICDS programs are surrounded by various challenges. In 2011 a study was conducted for evaluating the gaps in service delivery, surveys, and coverage. It was revealed that 24% did not receive any benefits, and only 64% of children received supplementary nutrition (SN), immunization, and others; 12% received did not receive SN however received other benefits. Among all the states, the proportions of service deliveries vary from one state to another. It was also observed that some states performed well with a 70% penetration, viz. Andhra Pradesh, Assam, Chhattisgarh, Gujarat, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Karnataka, Uttarakhand, Kerala, Tamil Nadu, and West Bengal. It was also observed that states like Bihar, Haryana, Rajasthan, and Uttar-Pradesh with coverage of services was 53%, 52%, 56%, and 41%, respectively. MoWCD, (2011) Further, this study highlighted that universalization of ICDS is associated with various challenges;

- Inadequate infrastructure for operating six packages of service
- High resource demand
- Gaps in the training programs conducted for assessing the skill of AWW.
- AWW are overburdened and underpaid, and mostly unskilled.
- Dilution of focus on severely acute children (SAM)
- Need to converse the complementary services
- Gram Sabha need to use sensitization of people

Challenges associated with inappropriate data generation in ICDS

- According to Grangnolati et al. (2006), the ICDS program is struggling with implementation challenges such as supply chain gaps (unbalanced focus on the food security component of the program, poor targeting, inadequate coverage, irregular supply of IFA, and deworming tablets.
- Professionals use Anthropometric measurements (height, weight, and MUAC) to assess growth faltering and compare them with the World Health Organization's Child Growth Monitoring Standards. It was observed that Anganwadi workers are trained on height and weight measurement once a year with very low follow-ups, which demonstrates a skill gap in the growth monitoring.
- Due to the low supply of appropriate anthropometric equipment, proper growth monitoring is not taking place. Some of the key issues are; lack of age-appropriate instrument for height

measurement, use of analog scale/Salter scale for weight measurement shows variation compared to the digital scale.

- During recording, the data biasness can happen because the lady supervisor does the normal routine of recording checking every month where she corrects the mistakes done by the AWWs. So, this can lead to a discrepancy inappropriate data generation. Using ICDS-CAS can remove all those biases. (Singhania et al., 2019)

According to the recently released Economic Survey of India 2021-22, only Rs 2,700 crore is allocated by the Ministry of Finance for improving maternal and child nutrition, which is less than the amounts given in the last fiscal year 2020-21, i.e., Rs 3,700 crore.

Table 2.4: Health and wellbeing -expenditure (in ₹ crores)

Ministry/Department	Actuals 2019-20	BE 2020-21	BE 2021-22
D/o Health & Family Welfare	62,397	65,012	71,269
D/o Health Research	1,934	2,100	2,663
M/o AYUSH	1,784	2,122	2,970
CoVID related Special Provisions			
Vaccination			35,000
D/o Drinking Water & Sanitation	18,264	21,518	60,030
Nutrition	1,880	3,700	2,700
FC Grants for Water and Sanitation			36,022
FC Grants for Health			13,192
TOTAL	86,259	94,452	2,23,846

Source: Economic Survey of India, (2021-22)

It is miserable to say that the existing food policies of India are not able to address the likelihood of micronutrient deficiencies. *Comprehensive National Nutrition Survey* (2018-19) of Gujarat demonstrates that 39.1% of children under five are stunted, whereas the prevalence of severely stunted children was 14.2%. Similarly, 17.0% of children under five and 6.9% of children under-5 are wasted and severely stunted, respectively. 10.2% of children under-5 are underweight, whereas 34.2% of children lie under the severely underweight category. The prevalence of anemia in children under 5 in Gujarat is 38.5%. It was also observed that the prevalence of anemia is higher in boys (41.9%) compared to the girl (34.1%) under five years of age. From all the above-mentioned statistical figures, it can be clearly stated that anemia is a severe public health concern in India. In recent years anemia has emerged as the most significant public health concern.

STRATEGIES FOR REDUCING THE PREVALENCE OF MALNUTRITION AND MICRONUTRIENT MALNUTRITION

According to World Health Organization, 2006, food-based strategies for addressing malnutrition are; Supplementation, fortification, and dietary diversity. Among all the food-based studies, food fortification has a low economic burden concerning higher health returns. Food fortification is defined as "*deliberately adding key vitamins and minerals (including trace elements) in a food to improve the nutritional quality of the food supply and provide a public health benefit with minimal health* risk."

Depending upon the extent of a public health concern, a country's fortification can be Mass fortification, targeted fortification, and market-driven fortification. In India, all three forms of fortification exist. In India, various pilot projects have been conducted for assessing the implication of food fortification strategy over the nutritional status of the target population. In India, FSSAI decided to provide five staple food commodities (Rice, Wheat, DFS, milk, and oil) in India's food safety net programs in 2017. Currently, in ICDS, only double fortified salt is available; however, the FSSAI has issued all the standards for the five major food staples for the Indian population. The level of fortification for different food commodities has been set in such a way so that it should only meet the one-third requirement of the people. Double fortified salt is intended to provide the daily requirement of iodine and 30-60% of daily iron requirement. (FSSAI, 2021)

In West Bengal, Varma et al., 2007 conducted a double-blind cluster randomized trial study among preschool children of 36-60 months from thirty selected Anganwadi centers for assessing the impact of fortified Khichdi on the iron and vitamin A level of children. During the study, SAM children were not taken as a part of the study group, whereas VAD children were not removed.

Anganwadi workers were instructed to monitor the record of children receiving fortified Khichdi. Khichdi was fortified with an encapsulated ferrous fumarate and vitamin A premix. End line data was collected at 24 weeks, and results reveal that with an absorption factor of 4%, due to the presence of phytic acid in Khichdi, the blood hemoglobin concentration of the experimental group was increased significantly.

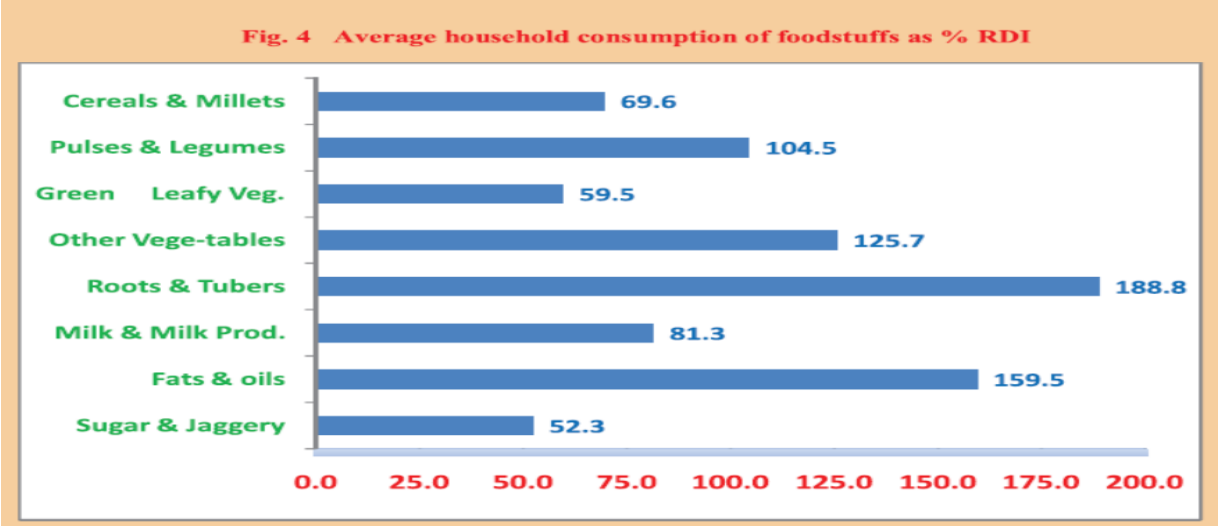
Yadav et al., 2012 conducted an intervention-based study in the Garhwal division of Uttarakhand for assessing the impact of consumption of fortified food commodities (FBF) on 12-59 months of children. Two blocks, i.e., Kalsi Block and Paunta Sahib, were selected as experimental and control blocks. Thirty villages were selected by probability proportional to population sizes (PPS) model. A total of 750 school-aged children were assessed, and FBF was introduced for approximately one year. It was revealed from the study that there was a considerable improvement in the prevalence of anemia among the experimental block, i.e., a 24.4% reduction was found. In contrast, in the control block, it was 19%. Further, it was also noticed that a significant decrease was found in VAD at the end-line of the study (Vitamin A deficiency disorders).

A study was conducted by Tam et al., 2020 to evaluate the evidence available on the strategies to combat micronutrient malnutrition in children under five of low- and middle-income countries through supplementation, large-scale fortification, etc., and it has shown that using supplementation of iron and folic acid and other micronutrient and fortification at targeted and large-scale level has significantly reduced the prevalence of anemia. Further, their findings also reveal that zinc supplementation reduces the prevalence of diarrhea. In contrast, it has not significantly affected the risk of anemia, wasting, stunting, and all-cause of mortality. The reduction in all-cause mortality was seen due to vitamin A supplementation decreasing the incidence of diarrhea.

FOOD CONSUMPTION PATTERN OF INDIAN POPULATION

According to NNMB, urban nutritional survey report (2017), Cereals are the primary food consumed in the urban population. Consumption of millets is more in Gujarat, Maharashtra, and Karnataka, while the consumption of roots and tubers is high in Assam, Andaman & Nicobar Islands, Bihar, and West Bengal. The average intake of cereal and millets was 320 g/CU/day. It is lower than the RDI, and the intake of pulses and legumes 42 g/CU/day; even the consumption of Green leafy vegetables, sugar, jaggery, and dairy-based products was lower.

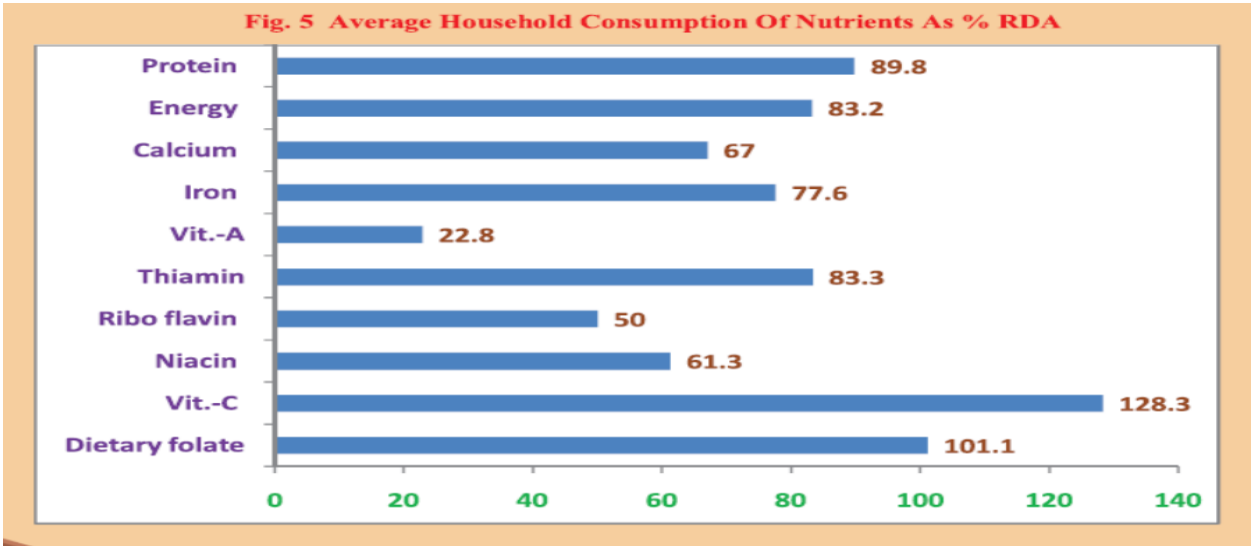
Figure 2.16: Average household consumption of foodstuff as % RDI



Source: NNMB urban nutritional survey report (2017)

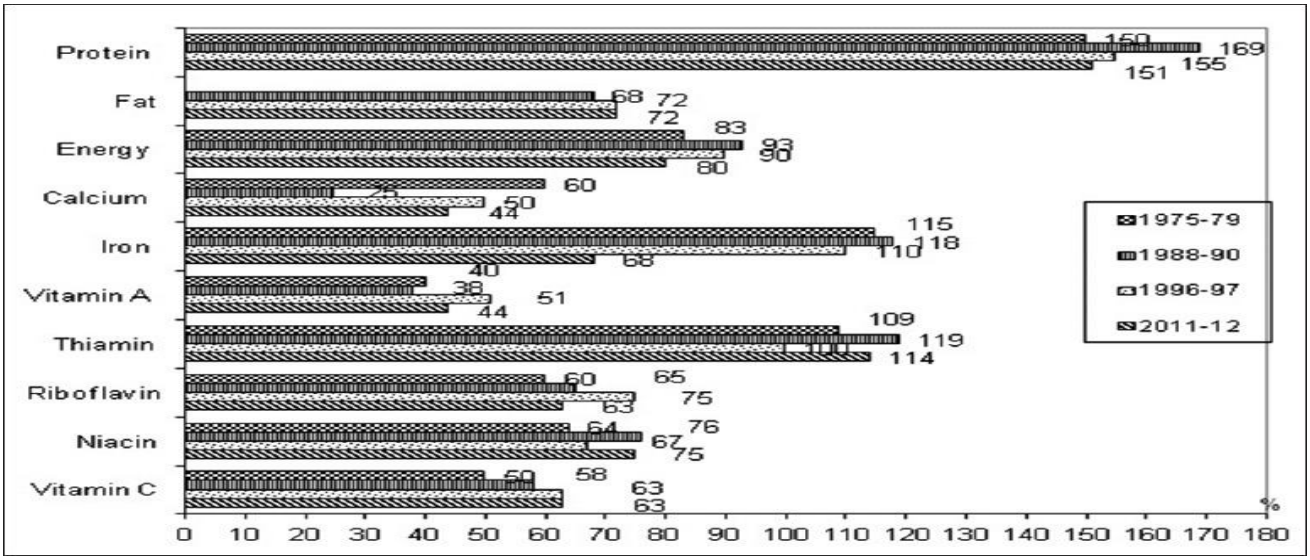
The average intake of macro (energy and protein) and micronutrient like (Iron, Niacin, and thiamine) were observed below the RDA even though vitamin A and riboflavin were inadequate. Still, intake of vitamin C and folic acid were meeting the RDA.

Figure 2.17: Average household consumption of Nutrients as % RDA



Source: NNMB urban nutritional survey report (2017)

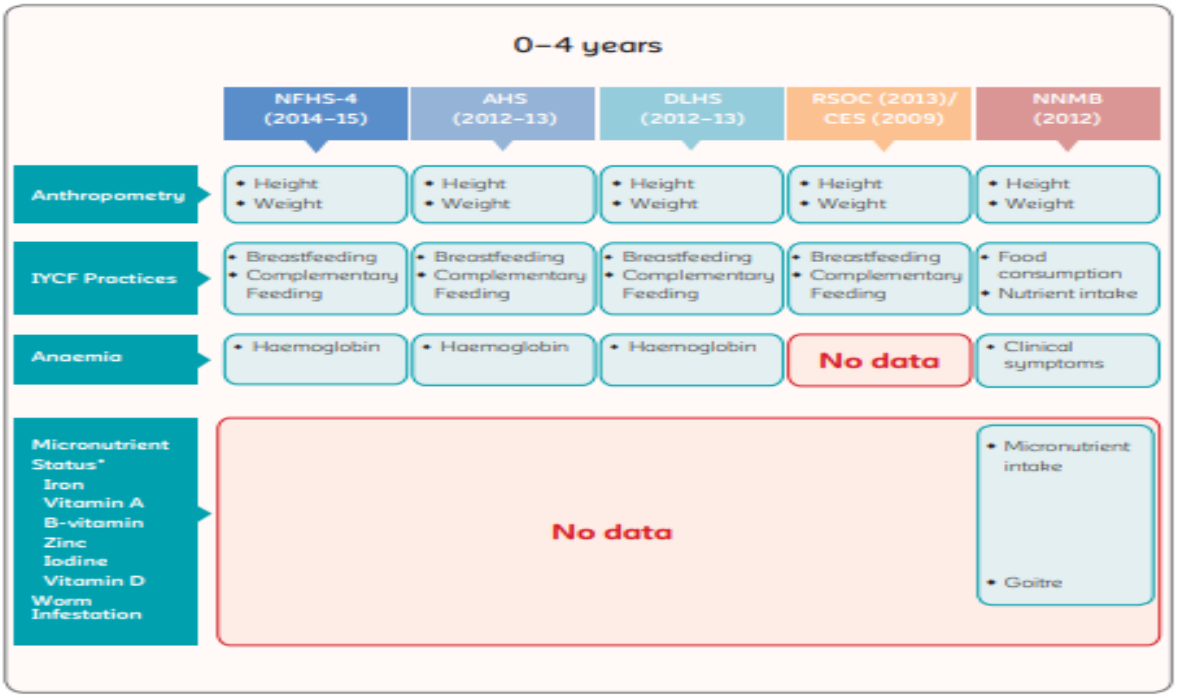
Figure 2.18: Trends in nutrient intakes among 3-6 years old children (% of RDA)



Source: NNMB Survey, (2012)

A study was conducted in Urban Vadodara of Gujarat by Joshi & Nair (2016) to see the micronutrient status of pregnant women and children who were affected due to less iron and iodine intake. An increase in Haemoglobin concentration in the experimental group (0.42 g/dl) at ($p<0.001$) was reported at the end of the study as compared to the control group (0.20 g/dl). It can be concluded from their results that DFS is an effective method to overcome both the micronutrient together.

Figure 2.19: Nutrition Data Availability and gaps in preschool children aged 0-4 years



Source: CNNS, (2018)

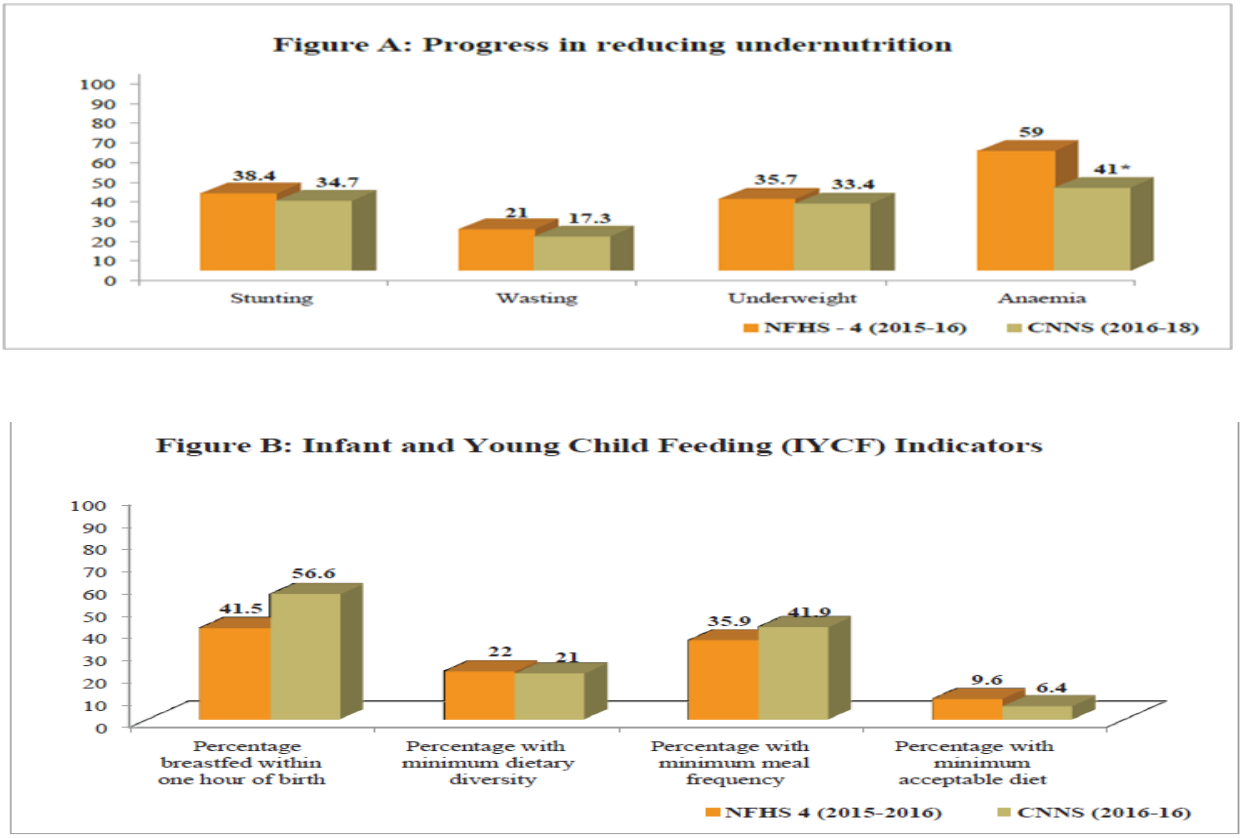
State of Malnutrition among under Five children in Gujarat

The Comprehensive National Nutrition Survey (2017-18) prevalence of stunting, severely stunted, wasted, and severely wasted among children under-5 is 39.1%, 14.2%, and 17%, 6.9%, respectively. However, approximately 34.2% of children had low weight for age. The figures of existing micronutrient malnutrition prevalence of anemia among preschool children (1-4 years) are approximately 38.5%. It was found that anemia is more prevalent among males (41.9%) and females (34.1%). Cyanocobalamin (B_{12}) prevalence among preschoolers is 29.2%, whereas approximately 39.5% of children are deficient in folate. Among preschool-aged children, vitamin D (<12ng/ml) and zinc deficiency are emerging faster, i.e., 25.2% and 20%, respectively. Young children are the most sensitive group in which Vitamin A deficiency or VAD is a very widely prevalent health concern. In Gujarat, 14.6% of preschoolers have deficient stores of Vitamin A/Retinol.

Comparing the data generated through National Family Health Survey-4 (2015-16) and CNNS (2016-18)

Significant progress has been made in reducing under-nutrition. At the national level, stunting was 38.4% in 2015, which was reduced up to 34.7% in 2018. Similarly, the prevalence of wasting was reduced up to 21-17.3%, underweight up to 35.7-33.4%.

Figure 2.20: Progress in reducing Under-nutrition



Source: NITI Aayog, (2019)

For preventing the likelihood of anemia among children of 2-12 years of age, the World Health Organization recommended the use of MNP (Multiple micronutrient powder) containing 12.5 milligrams of elemental iron for children aged 2-4 years and 12.5 - 30 milligram elemental iron for children 5-12 years of age. However, care should be taken before introducing a universal iron fortification program among those with hemoglobinopathies and hereditary hemochromatosis (autosomal recessive gene disorder), as they can develop the conditions of iron overload. (UNICEF, 2020)

According to the Global burden of disease project globally, iron deficiency anemia (IDA) ranks 9th among 26 preventable risk factors for death (GBD, 2015). Evidence from industrialized countries shows that particular set of factors are responsible for IDA, such as; consumption of only vegan

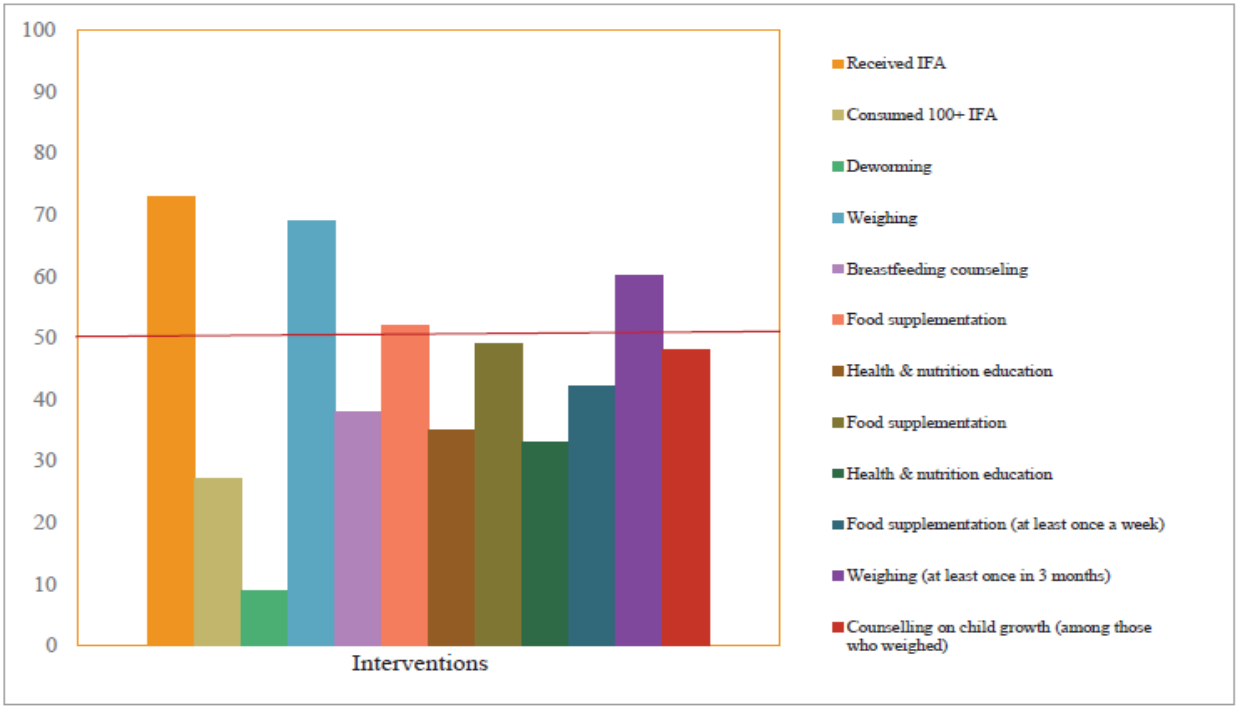
diet, preference of lean meat over red meat, low gastric acidity, giardiasis, gastrectomy, cultural taboos, whereas, among young children, prolonged breastfeeding with iron supplementation beyond the fourth month, initiating cow milk before one year, consumption of cow milk >500ml per day are the possible risk factors for the development of iron deficiency anemia. Among developing countries, the significant risk factors for IDA are genitourinary bleeding and gastrointestinal (GIT) hemorrhage, and inadequate consumption of food. In some countries, hookworm infestation, peptic ulcer (*Helicobacter pylori*), is the additional risk factor for IDA in all the countries (Parkin, 2016). Premature infants are more prone to iron deficiency anemia because most of the iron is deposited during the third trimester of pregnancy. On the other hand, milk intake by infants and toddlers adversely affects their iron content as cow milk is low in iron content (Garofalo et al., 2012).

The Comprehensive National Nutrition Survey (2016-18) has provided data regarding children's essential Nutrition and Health indicators. For the first time, it also generated data regarding the prevalent micronutrient deficiencies among Indian children. It was also revealed that the coverage of IFA (Iron and Folic acid) tablets is only 70%.

As per the National Institution for Transforming India (NITI Aayog) report 2017 for the year 2019-2020 following areas need to be addressed;

- the supply chain gaps in ***Take Home Rations*** (THR) to pregnant and lactating mothers and children.
- Emphasis should be given to intensified and augmented Home-Based Newborn Care (HBNC) program.
- Need to fill the gap in the management of SAM and MAM children
- Taking a solid step towards the ***Anemia Mukt Bharat Campaign***
- Promotion of complementary feeding

Figure 2.21: Coverage of a selected set of nutrition interventions in India, CNNS (2016-18)



Source: CNNS, 2018-19

METHODS AND MATERIALS

Rationale

During the Pre-school age period, nutrition plays a crucial role in a child's life, not only physically but mentally also. Lack of optimal calories, inappropriate dietary intake, and compromised nutrient intake lead children to stunting, wasting, and under-nutrition. The vice versa precipitates over nutrition, and it will lead to overweight and obesity. Nutrient deficiency in the growing stage of life affects the child's physical, mental, and social development. The current pandemic of COVID-19 impacted the global food system tribally. During this high time of food crisis, every Government is trying to beat the ill effects of COVID-19. Reducing the prevalence of malnutrition among the target population, nutrition-based intervention is recognized globally. One such potential intervention is food fortification. It has been a century now; food fortification has played a crucial role in dealing with micronutrient deficiencies. Food fortification has long been recognized as an intervention-based strategy that can address the problem of malnutrition worldwide. As per the Copenhagen Consensus cost, the benefit ratio of food fortification is high. Food fortification has the potential to combat micronutrient malnutrition. Still, it has several other associated advantages such as scalability, cost-effectiveness, and most importantly, it does not change the organoleptic properties of food.

The proposed study is a prospective research study. The previous study period had 60 days of supplementation (*January last week to march the second week of 2020).* Currently, we have a wash-out period of 8 months. An observation was made based on the post-data collection; 30% of the mothers agreed to purchase fortified commodities. Though the initial plan was to study the impact of fortified foods consumed, it drifted a bit away due to the declaration of lockdown and a red alert in the communities due to widespread covid. Thus, in the current study, we assessed the change in knowledge and practice in purchasing and utilizing fortified commodities and assessing under ICDS units of Vadodara.

A baseline data survey was conducted in the community through the food frequency questionnaire and twenty-four-hour dietary recall methods and anthropometric measurement of children to know the impact of the COVID situation and to see awareness about fortified commodities, their consumption pattern of nutrient-dense food. Further Knowledge and Practice of the mothers (children of 36-59 months) will be assessed on the consumption pattern of fortified food commodities and changes in their behavior.

OBJECTIVES

Broad Objective

- To assess the availability of fortified food staples in ICDS units of urban Vadodara during the pandemic situation of COVID-19.

Specific Objective

- To assess the consumption pattern of fortified food.
- To counsel the mothers of children (36-59 months) for consuming healthy and fortified foods.
- To assess any issues and concerns faced during COVID-19 time in availing the fortified food staples.
- To assess the dietary intake and consumption pattern by FFQ and 24-hour dietary recall method.
- To assess the impact of nutritional knowledge of the mother after getting the nutritional counseling.

Sampling

It was a follow-up study, so the children who were enrolled in the previous study were taken. Due to the COVID-19 conditions, some of the children left the study; hence new children were also assessed for maintaining the sample size. Before enrolling the children, their consent was also taken.

Inclusion Criteria

- Mothers of children age 36-59 months who were enrolled in a previous study of the ICDS units of urban Vadodara.
- Children enrolled in the previous study
- Anganwadi centers of Sawad and Karelibaugh area

Exclusion Criteria

- Women of reproductive age of urban Vadodara.
- Pregnant and lactating mothers do not enroll in ICDS units of urban Vadodara.
- Children and Mothers who are severely malnourished
- Children who are on medications

Sample Size

The sample size is 105

In a Previous Study, the sample size calculation was done by using MEDCALC software. From which they came to the sample size of 120 children. Using NFHS-4 (2015-16) as a reference prevalence of anemia in urban Vadodara was 55.6% among children aged 6-59 months. The following values were used for the calculation of sample size. **(Sonal and Nair, 2020)**

(Type 1 error (alpha, significance=0.05), Type 2 error (beta= 1-power (0.10) and Attrition: 20%)

Due to the COVID-19 situations, cases of positive patients were higher in the Karelibaug area refused to be a part of this study. Hence new children from other Anganwadi centers of the same area were enrolled for the study. Only 48 children were followed for the study.

There were 21 children in the study who were exceeding the age group but as they were enrolled in the previous study, they were followed up for this study also.

Site of the Study

This study was carried out in the Anganwadi centers of Sawad and Karelibaugh of urban Vadodara among the children of (36-60 months) who were enrolled in the Anganwadi and were there in the previous study.

Study Design

This study was the follow-up study. Study population from two areas of Vadodara was taken, and knowledge of the mothers on availability of ICDS services and Fortified Commodities and utilization was observed in both the regions and also the availability of fortified commodities through Anganwadi was also recorded. The impact of COVID on the nutritional status of the child is also observed through FFQ and 24-hour dietary recall.

- **Situation analysis of the study population**

This study was conducted in the ICDS units of urban Vadodara. Earlier mothers of children aged 36-59 months were contacted through the telephonic survey, but the response rate of mothers was very low due to that personal interview method was used to collect the data following the strict social distancing measures due to the current conditions of a pandemic. The proposed work is a follow-up study; we assessed the same children (36-59 months) who were a part of previous research work, and new children are also enrolled because of the situation. Consents of the participants (Mothers) were taken; only those participants were interviewed who were willing to participate and fulfill the proposed research criteria. Pre data from105 mothers on 36-59 months who were enrolled in the study are collected from the following grounds, i.e., baseline information on ICDS services given to the

children, awareness about fortified commodities, their consumption pattern of nutrient dense food. Further Knowledge and Practice of the mothers (children of 36-59 months) was assessed on the consumption pattern of fortified food commodities and changes in their behavior.

EXPERIMENTAL DESIGN

This study is a follow-up study; it will be undertaken in the following three phases:

Phase I (Situational Analysis and Nutritional Assessment)

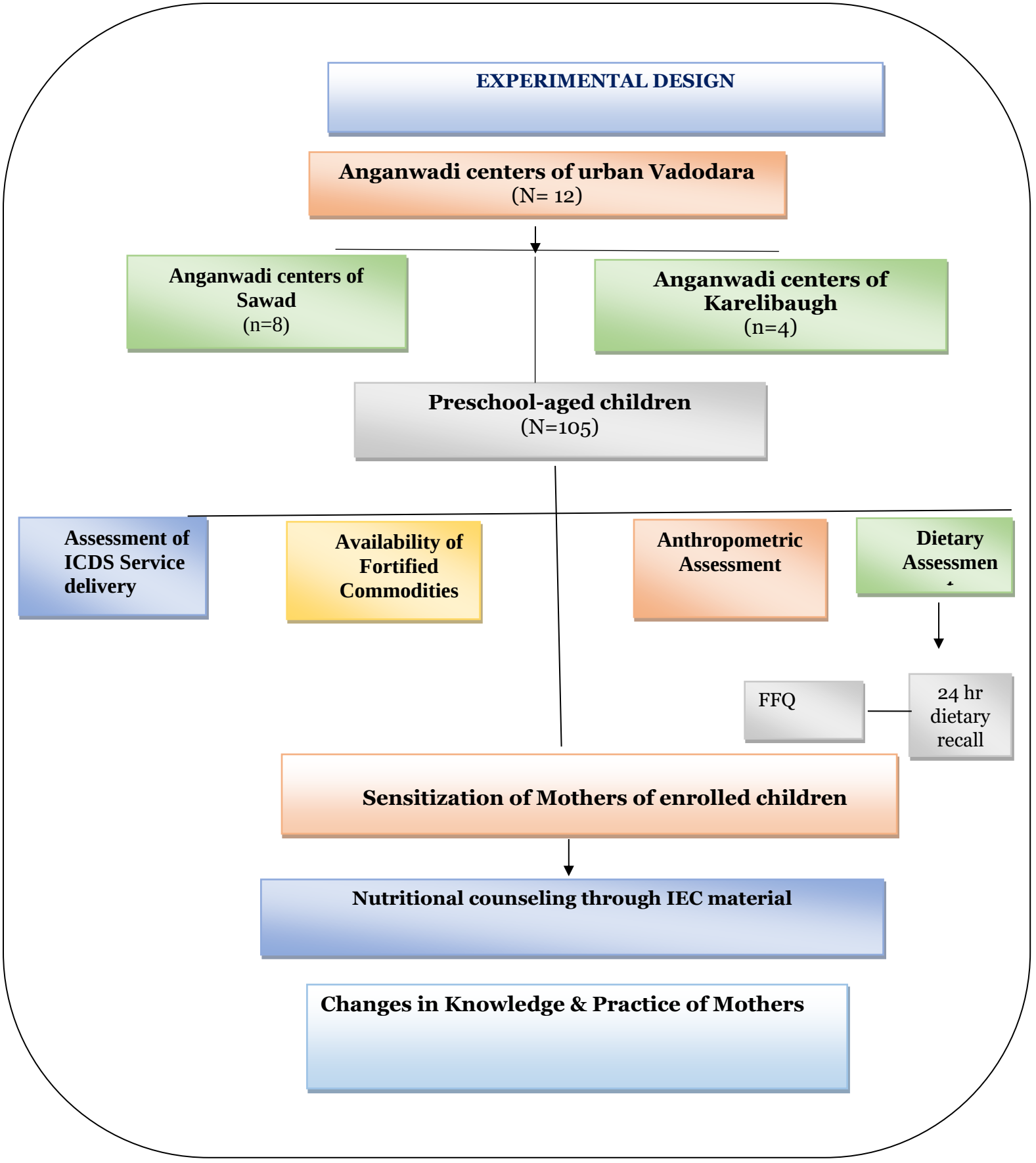
The first phase of the study consists of the situation analysis of mothers of children aged 36-59 months enrolled in ICDS units of urban Vadodara on the consumption of fortified food staples. In this study, the same mothers of children aged 36-59 months (participants of the previous research work) and due to the current situation new mothers and children were also enrolled, and their informed consent was also taken. A wash-out period of seven months was also taken into consideration. The nutritional status of the children of enrolled mothers was seen even though their services under ICDS are also considered. Consumption of Fortified food staples of the enrolled mothers (36-59 months children) was assessed with the nutrition.

Phase II (Counseling)

This phase focused on counseling mothers for the consumption of fortified food staples. The study population was motivated to consume Fortified food recipes and counseling regarding anemia and other nutrient deficiencies. Further, mothers will be encouraged to purchase fortified food commodities.

Phase III (Impact of Counseling)

This phase assessed change in knowledge and practice of mothers after receiving counseling. A questionnaire was prepared for the assessment of knowledge gain through the nutritional counseling session.


EXPERIMENTAL DESIGN
Anganwadi centers of urban Vadodara
(N= 12)
Anganwadi centers of Sawad
(n=8)
Anganwadi centers of Karelibaugh
(n=4)
Preschool-aged children
(N=105)
Assessment of ICDS Service delivery
Availability of Fortified Commodities
Anthropometric Assessment
Dietary Assessmen
FFQ
24 hr dietary recall
Sensitization of Mothers of enrolled children
Nutritional counseling through IEC material
Changes in Knowledge & Practice of Mothers

Tool for Data collection

A semi-structured questionnaire was prepared. Data on socio-demographic profile, anthropometric measurements, and ICDS services their utilization knowledge of mothers on fortified foods and anemia was collected. Data on consumption of foods of the child through 24-hour dietary recall of 3 days.

General Information

- Education qualification
- Occupation
- Income
- Nutritional Status of children

Knowledge topics

- What is fortification, malnutrition, anemia
- Identification of Fortified commodities
- Fortified commodities available
- Which salt to be consumed

IEC Developed

A flip book was prepared for counselling mothers and anganwadi workers. The book consists following topics: -

- Anemia
- Fortification
- Fortified Commodities
- Identification Of fortified commodities
- Nutrients added in fortified staples
- Food products made from fortified wheat flour.

Counselling Given

Mothers of the enrolled subjects were counselled**.** A two-day counselling session on appropriate messages on anemia, fortification and other related aspects using the flip book was prepared. The counselling was carried out for half an hour to each group of mothers, who were in batches of 5-8.

In the counselling session, the functionaries (anganwadi workers) were also counselled once with the expectation that, they can continue to counsel the mothers as and when required.

Post-knowledge data collection

A structured questionnaire was prepared to elicit the knowledge of mothers and Anganwadi worker on fortification, fortified commodities, anemia and other related topic after counselling given. The information and post knowledge on following topics was gathered.

Knowledge topics

- Fortification
- Micronutrient deficiencies
- Fortified Commodities
- Anemia
- Identification of Fortified staples
- Nutrient added in Fortified staples

Socio-economic status

Socio-economic data was taken to know the expenditure capacity of the household and its impact on the health status of the population. From the KuppuSwami scale, it was known in which category the household falls by taking education, occupation, and income of the head of the family.

Anthropometric Indicators

Anthropometric measurements are the quantitative noninvasive body measurement that is frequently used to assess growth and development. Some of the commonly used anthropometric measurements are height, weight, head circumference, MUAC, etc.

Weight Assessment

Weight is one of the most simple and reproducible measurements of growth and nutritional status. It is a more sensitive measure of nutritional adequacy in children than height, and it reflects recent nutritional intake. It is very sensitive even the small changes in nutritional status due to childhood morbidities like diarrhea and rapid weight loss. For assessing the weight *Weighing scale* is placed on the smooth surface, and the subject is asked to stand straight without touching anything and looking ahead on the scale removing their shoes or any other extra clothing carried with them, and the weight is recorded.

Height Measurement

Measurement of Height entails the long-term nutrition status. The individual is asked to stand near where the scale is fixed by removing their shoes and keeping feet parallel and heels, shoulders, and the back of head touching the scale. An individual is asked to stand straight and look ahead, and then the headboard attached to the stadiometer was adjusted on the top of the subject's head in the center, crushing the hair at the right angle the height is recorded.

Body Mass Index

BMI requires weight and height measurements of the subject based on that the individual are classified nutritional categories. For this, the individual's weight and height are classified into nutritional categories according to the ASIA pacific cut-offs.

Table 3.1: BMI classification

SN	BMI Score	BMI Category
1	**<18.5**	**Underweight**
2	**18.5-22.9**	**Normal**
3	**23-24.9**	**Overweight**
4	**≥25**	**Obesity**

MUAC Measurement

Mid Upper Arm Circumference indicates muscle mass and fat. It is done on the left upper arm using standard, flexible, and non-stretchable tape independent of age. It is age-independent. The tape is encircled around the left upper arm of the child by keeping the elbow at a right angle, and the reading is taken at the mid-point.

Table 3.2: Classification for MUAC for children

Classification	MUAC(cm)
SAM	**<11.5**
MAM	**11.5-12.5**
Normal	**>12.5**

(Source: IMCI-WHO, 2014)

Nutritional Indicators

In 2013, the American Academy of Pediatrics emphasized the use of z-scores to define underweight or malnutrition in children. A Z-score represents the number of standard deviations an observation or data point is above or below the population mean. Identifying malnutrition in children is critical for determining appropriate treatment options. Z-scores for the following may be used to assess malnutrition: weight-for-height (WFH), weight-for-age (WFA), BMI for age, and head circumference (HC). Levels of malnutrition based on BMI for age Z-scores are defined as follows: -1.0 to -1.9 is mild malnutrition, -2.0 to 2.9 is moderate malnutrition, and < -3.0 is *severe malnutrition*. There is not a consensus on the use of Z-scores for classifying overweight and obesity. **(American Academy of Pediatrics, 2013)**

Weight for age: This indicator is used to see whether the individual taken comes under the Underweight category for children less than five years. Below minus two standard deviations from median weight for age of reference population in considered underweight and Severe underweight are below minus three standard deviations from median weight for age.

Height-for-age: This indicator is used to see wasting children less than five years below minus two standard deviations from median weight for height is considered as wasting, and Severe wasting is below minus three standard deviations from median weight for height.

Weight for Height: This indicator is used to assess the prevalence of stunting among children less than five years. As per the WHO guidelines, weight for height below minus two standard deviations from median weight for height is considered stunting, whereas below minus three standard deviations from median weight for height are severely stunted children.

Dietary information

Data on the daily dietary pattern of children were taken through the 24-hour dietary recall method. A three-day dietary recall was recorded and collected using Standard cups and spoons for the quantity of food consumed by children. Food Frequency Questionnaire was also used to register for the assessment of dietary diversity of the children.

Data Processing and analysis

Data were processed and analyzed through Microsoft excel 2016. Data recorded through 24-hour dietary recall was analyzed using Diet Cal software to arrive at children's daily and average nutrient intake.

ETHICAL APPROVAL

The study was approved by the Institution of Medical Ethics Committee and given No. **IECHR/FCSC/2020/52**, The Maharaja Sayajirao University of Baroda, Vadodara, India.

RESULT AND DISCUSSION

Before the COVID-19 pandemic, maternal and child under-nutrition incidences declined slower in low- and middle-income countries. It was also observed that people affected with the novel corona virus or SARS-CoV-2 risk for complications is highest among people with low nutritional status and individuals struggling with NCDs (Non-Communicable Diseases). Bhutta, Z. (2021). COVID-19 has crippled the entire global community, with more long-lasting impacts on people from low- and middle-income countries. Due to the prolonged lockdown, the global food chains were adversely affected. Due to the disruption in global food chains, the nutritional status of the sensitive population group was seriously affected IFPRI (, 2020). The food supply chain can be divided into five stages: *agricultural production, postharvest handling, processing, distribution/retail/service, and consumption*. On average, globally, nearly 40% of the fruits and vegetables and 30% of the cereals are lost due to poor management practices.

COVID-19 did not directly influence the food supply chains and production like bird flu, *Escherichia coli*, Foot and Mouth disease, *Compylobactor species*, and *Listeria monocytogenes*. This is because it does not transmit directly through the livestock and agricultural products. However, due to the severity of the respiratory infections produced by this virus, Govt. around the world forced their population to maintain social distancing, restricted the transportation of goods and services as strict regulations on the inter and intra country migration of labor which significantly reduces the food security all around the world. In developing countries, seasonal or temporary employment is a common phenomenon. Therefore, due to travel restrictions and social distancing, food supply chains are affected drastically due to the absence of labor. FAO (2020)

Integrated child development services are one of the world's largest social safety net networks, which fulfills the nutritional needs of millions of children under six years, pregnant, lactating mothers, and adolescent girls. This program is operational in all the states and UTs since 1975. It is implemented and monitored through a coordinated effort of front-line health workers popularly known as 3As, i.e., ASHAs, AWWs, and ANMs. All three Health care workers are the backbone of this program. During this pandemic, they provided door-to-door services following strict social distancing measures. The SN

(Supplementary Nutrition) component of ICDS plays a significant role in improving the nutritional status of young children. (MoWCD, 2021)

This study was conducted to assess the impact of the historic lockdown of 2020 on young children's ICDS services and nutritional status (36-60 months). This study was conducted during the COVID-19 pandemic situation from September 2020-April 2021 with a broad objective of monitoring the ICDS services and availability of fortified commodities during the pandemic situation. The major focus of this study was to assess the nutritional status of the enrolled children between 36-60 months of age from the selected Anganwadi centers of Karelibaugh and Sawad area of the urban Vadodara. For conducting this study, a total of 105 preschools aged were assessed. This study was carried out in two phases with the following parameters;

Enrolling the 105 preschool-aged children, a total of 12 Anganwadi centers were assessed. From the Sawad region total of eight Anganwadi centers, whereas from the Karelibaugh region, four Anganwadi centers were selected for the study. List of all the Anganwadi Centers (AWCs) is given below;

Table 4.1: List of the Anganwadi centers

Sr. No	SAWAD AREA	KARELIBAUGH AREA
1.	SAWAD 1	KARELIBAUGH 5
2.	SAWAD 2	KARELIBAUGH 6
3.	SAWAD 3	KARELIBAUGH 7
4.	SAWAD 4	KARELIBAUGH 8
5.	SAWAD 5	
6.	SAWAD 6	
7.	SAWAD 7	
8.	SAWAD 9	

Table 4.2: List of Male and Female child

Age Group	Male	Female	Total
36-47 Months	**22**	**15**	**37**
48-59 Months	**26**	**21**	**47**
60-70 Months	**5**	**8**	**13**
71-80 Months	**3**	**5**	**8**

ASSESSMENT OF THE SOCIOECONOMIC STATUS OF THE HOUSEHOLDS THROUGH KUPPUSWAMI SCALE

The Kuppuswami scale is used for assessing the socioeconomic status of a household. In this survey study, mothers were taken as respondents as they are the key players in providing nutritional services to the family. The socioeconomic profile of the households was undertaken on the following parameters;

(1) Economic Status: As per the observation, out of 105 preschool-aged children, 46.51% and 44.18% households in Karelibaugh and 54.83% and 45.16% in Sawad area were under the poverty line (BPL) and APL (*Above the poverty line*) ration card holders respectively whereas 9.3% household does not have an APL or BPL ration card.

(2) Religion: As per the reviews of the household major religion, the interviewees of both the area were Hindu, i.e., 58.1% in Karelibaugh and 98.38% in Sawad. At the same time, approximately 41.86% in the Karelibaugh region and only 1.61% in the Sawad region follow the Muslim religion.

(3) Educational Status: In the Sawad region majority of the head of the family had only primary school certificate, i.e., 75.80% and 9.30% were illiterate, Whereas, in the Karelibaugh region, the frequency of head of the family with primary school certificate, middle school certificate, high school certificate, and graduate was 34.88%, 16.27%, 18.60%, and 20.96% respectively.

(4) **Occupation:** Most of the mothers in the Sawad and Karelibaugh region were unemployed, i.e., 74.19% and 86.04% respectively, whereas 9.30% in Karelibaugh and 14.51% were involved in either the Skilled Workers Shop or Market Sales Workers.

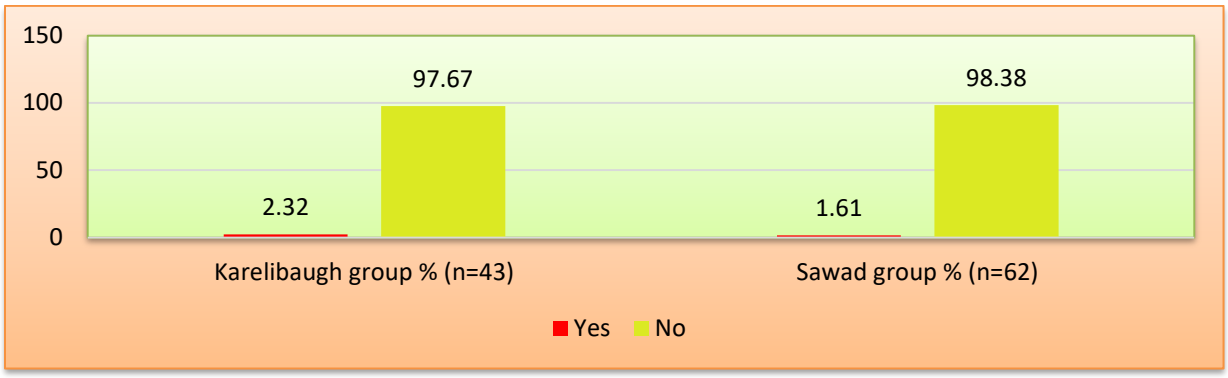
(5) **Type of the Family:** In the Karelibaugh area, nearly 46.51%, 32.87%, and 20.93%, while in Sawad, almost 33.87%, 27.41%, and 38.7% belonged to joint, nuclear, and extended families. The proportion of families with extended families was more compared to the Karelibaugh area.

Knowledge and Awareness of mothers

Before the wake of COVID, all the beneficiaries received IFA syrup, but due to the pandemic, children in both areas did not receive *Iron and Folic acid* syrup. As per the remarks of the Anganwadi workers, the insufficient supply of IFA tablets/Syrup from the primary health centers was not given to the enrolled children. Anganwadi centers provide two meals of the day at the center, but due to pandemics, none of the children in all Anganwadi centers receive any meal; instead, they received one packet of ***Sukhadi*** every week.

It was found that most of the mothers in both Karelibaugh (97.67%) and Sawad (98.38%) areas were aware of malnutrition. In comparison, only 2.32% in Karelibaugh and 1.61% in the Sawad area were unaware of the term malnutrition.

Figure 4.1: Awareness about malnutrition



It was also observed that in the Karelibaugh area, none of the mothers were aware of ***micronutrient deficiencies***. While in the Sawad area, only 1.61% of mothers were aware of the micronutrient deficiencies. However, it was surprising that in the Karelibaugh area, approximately 2.32%, and in Sawad, nearly 4.83% of mothers were aware of the term 'anemia,' which is locally known as *Pandurog.* Approximately 66.66% of mothers Sawad reported the source of information is Information and educational communication (IEC).

Figure 4.2: Awareness of mothers about Anemia

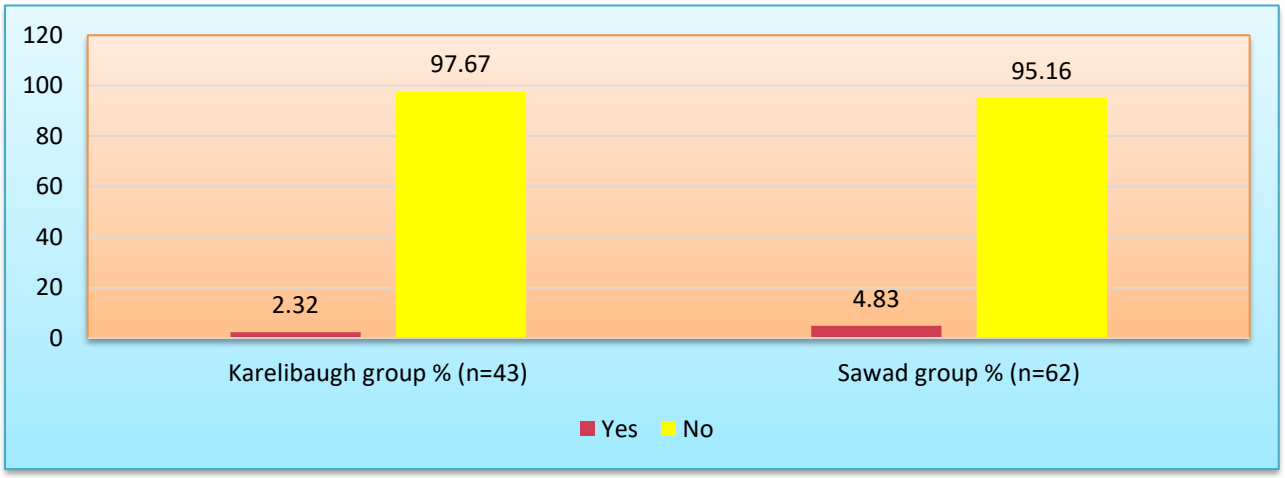
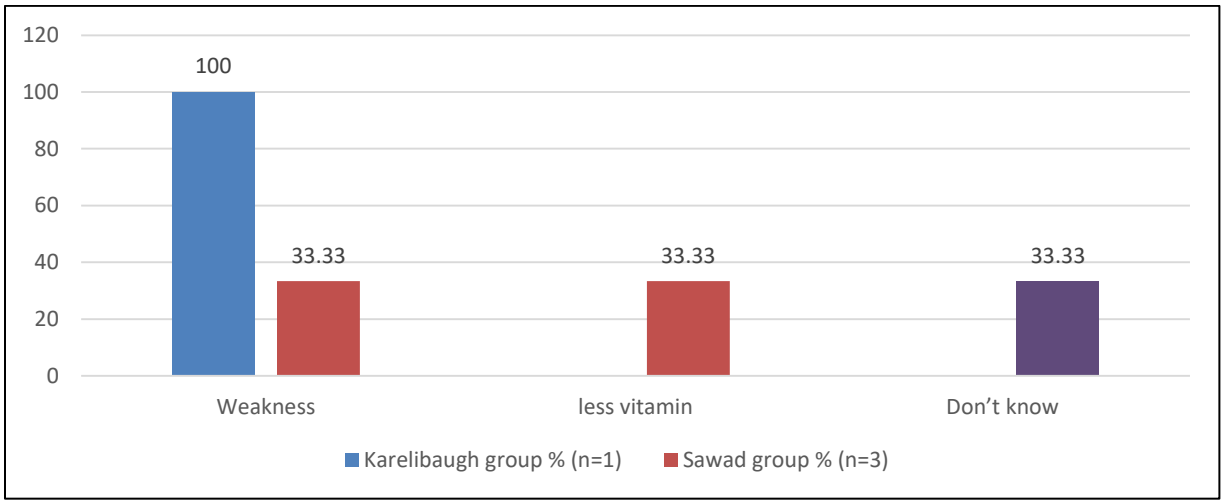


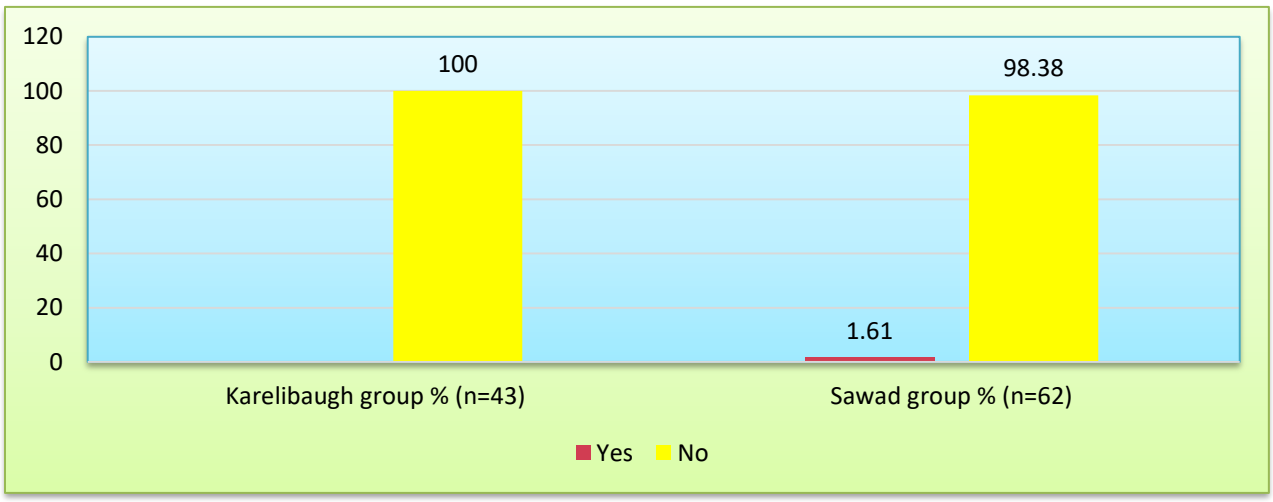
Figure4.3: Awareness about the causes of Anemia



AWARENESS ABOUT FORTIFICATION

It was observed that none of the mothers were aware of the +F logo. It was also noticed that most of the mothers were not even aware of fortified wheat flour. In Karelibaugh, none of the respondents was aware of the term fortification. In Sawad, only 1.61% of respondents were aware of the term fortification.

Figure 4.4: Awareness about fortification

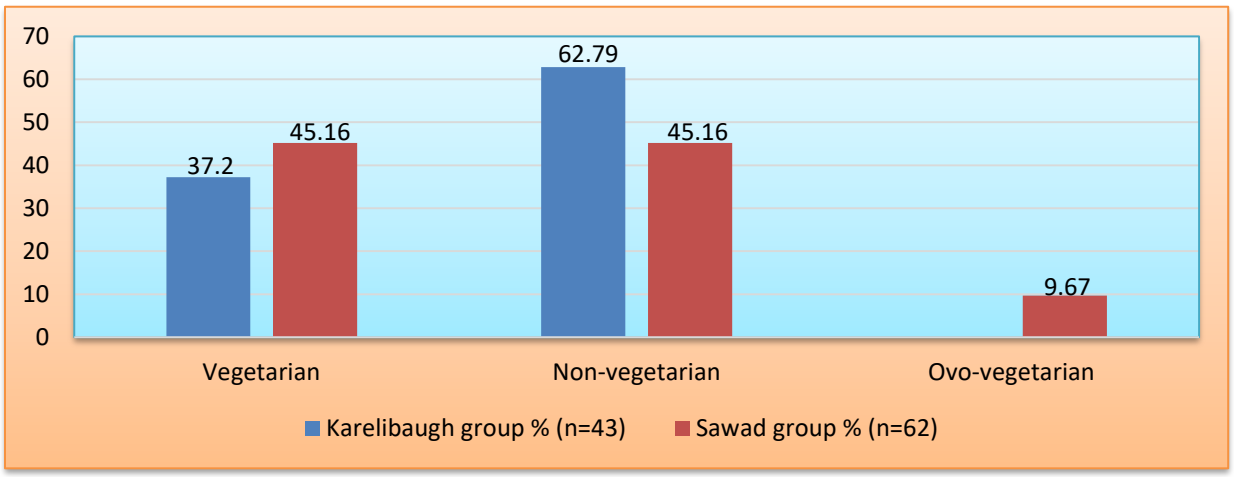


It was found that in Karelibaugh, none of the mothers was aware of the five fortified food staples of India, while in Sawad, only one respondent was aware of double fortified salt, fortified oil, and fortified wheat flour.

Among all the selected households, the Karelibaugh area majority of the population was non-vegetarian, i.e., 62.79%, while in Sawad proportion of vegetarian and non-vegetarian households was similar, i.e., 45.16% with nearly 9.67% population was ovo-vegetarian.

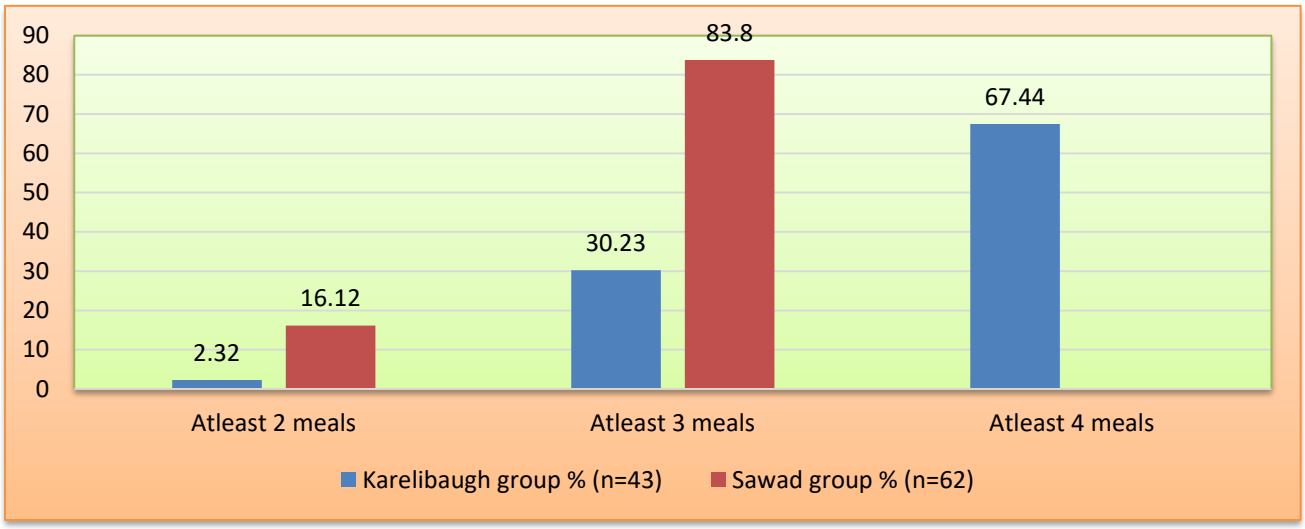
As per the Comprehensive National Nutrition Data 2018-19, it was revealed that in India, approximately 54.4% population is purely vegetarian, while 39.4% non-vegetarian and 6.2% population consume a vegetarian diet along with eggs. In Gujarat, the percentage of population groups with vegetarian, non-vegetarian, ovo-vegetarian are 54.4%,39.4%,6.2%

Figure4.5: Dietary practices of the selected households



Analyzing the frequency of per day diet consumed by the children revealed that in Sawad, approximately 83.8% of children consumed at least three meals in a day, while in Karelibaugh, nearly 67.44% of children consumed at least four meals in a day. However, nearly 16.12% of children in Sawad and 2.32% of children in Karelibaugh consumed only two meals in a day.

Figure 4.6: Number of Meals consumed by the child per day



ASSESSMENT OF NUTRITIONAL STATUS OF PRESCHOOL-AGED CHILDREN

Preschool years are critical from the nutrition point of view; optimal nutrition and care during this period form the foundation stone for the later years. Nutritional needs of preschool-age children are crucial due to the rapid increase in height, weight, and brain development. According to a child development psychologist, this period is characterized as a transition phase where a child's thinking shifts from the preoperational stage to the concrete operational stage of cognitive development. According to the famous psychosocial analyst Erik Erickson, who gave the *Theory of Psychosocial Development*, preschool-age period is characterized by a period of Initiative versus guilt, where parents or caregiver support maximizes a child's psychosocial development. As preschool-aged children are dependent upon their parents for their growth and development needs hence at this stage, effective parenting is the very determining factor. A regular supply of nutrients is essential for optimizing a child's physical, cognitive, and social development. Unfortunately, India has a high burden of malnutrition and micronutrient malnutrition due to the lack of food security, health, and nutrition education. This study found that the nutrient intake of enrolled subjects was not meeting the recommended dietary intake level. As per the results in the Sawad and Karelibaugh region of urban Vadodara, children were nutritionally insecure.

Anthropometric Measurement: Children's anthropometric measurements are globally recognized for assessing the nutritional status of children. Worldwide WHO Child growth standards and National Center for Health Statistics (NCHS) growth reference standards are used to assess children's growth patterns. In the current study, the pandemic data regarding the anthropometric indices were obtained from the Anganwadi workers. Anthropometric measurements are body measurement which entails information about body muscle mass and fat reserves. The human body shows morphological changes as a response to nutritional deprivation. Hence these indices are very useful in assessing the growth faltering among children. (WHO, 1995)

Table 4.3: Cut off values for Public Health Significance

Indicator	Prevalence cut-off values for public health significance
Underweight	< 10%: Low prevalence 10-19%: Medium prevalence 20-29%: High prevalence ≥ 30%: Very high prevalence
Stunting	< 20%: Low prevalence 20-29%: Medium prevalence 30-39%: High prevalence ≥ 40%: Very high prevalence
Wasting	< 5%: Acceptable 5-9%: Poor 10-14%: Serious ≥ 15%: Critical

Reference: WHO, 1995.

Table 4.4: Anthropometric indices of the children

Area	Age group	Gender	N	Weight (Mean± SD)	Height (Mean± SD)	MUAC (Mean± SD)
	36-47 months	Male	15	12.66±1.95	93.6±6.84	14.46±0.83
		Female	10	11.96±1.49	93±3.29	14±1.15

Sawad		Total	25	12.38±1.78	93.36±5.61	14.28±0.97
	48-59 months	Male	12	12.92±1.21	96.16±4.83	14.65±0.64
		Female	11	13.85±2.25	98.63±9.53	14.77±1.12
		Total	23	13.36±1.80	97.34±7.38	14.71±0.88
	60-70 months	Male	3	14.66±1.15	102±4.50	14.66±0.577
		Female	5	15.64±3.51	109.6±11.97	15.2±1.09
		Total	8	15.27±2.77	107±10.02	15±0.92
	71-80 months	Male	3	16.96±2.40	108.66±7.63	15.33±1.52
		Female	3	16±1.73	101.66±6.65	15±1
		Total	6	16.48±1.94	105.16±7.46	15.16±1.16
Karelibaugh	36-47 months	Male	7	13.28±1.49	95.14±7.19	14.07±0.93
		Female	5	12.8±1.92	94±5.29	15±0.70
		Total	12	13.08±1.62	94.66±6.22	14.45±0.94
	48-59 months	Male	14	15.23±3.86	100.14±9.50	15.32±2.95
		Female	10	13.42±2.43	97±7.97	14.4±1.62
		Total	24	14.47±3.40	98.83±8.85	14.93±2.49
	60-70 months	Male	2	18±1.41	114.5±2.12	18±1.41
		Female	3	15.66±1.52	108.66±4.50	16.66±3.21
		Total	5	16.6±1.81	111±4.63	17.2±2.48
	71-80 months	Male	-	-	-	-
		Female	2	17.5±0.70	103±4.24	16.85±2.61
		Total	2	17.5±0.70	103±4.24	16.85±2.61
Total			**105**			

PREVALENCE OF MALNUTRITION AMONG CHILDREN

Weight for Age (WAZ)

Low weight for age depicts the acute state of malnutrition. Weight for age Z-score value of <-2SD of WHO growth reference median denotes underweight. As per the current

observation, all the enrolled children were underweight as per their age. All the children showed a z-score value of <-1SD, which denotes the mild form of malnutrition in both the Sawad and Karelibaugh areas.

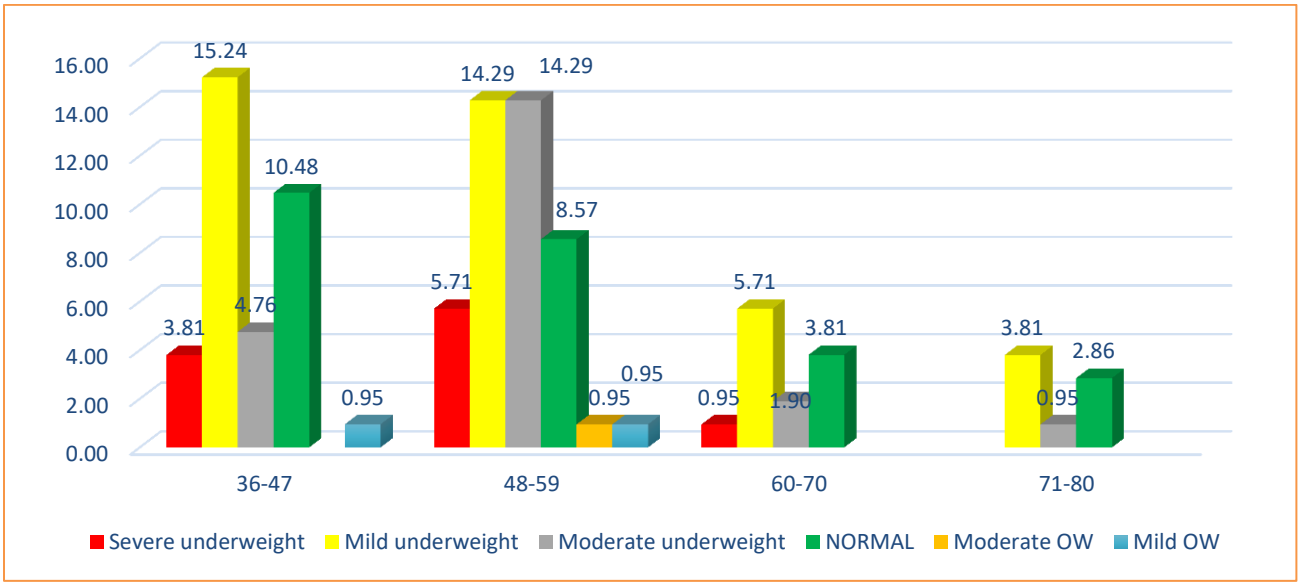
Prevalence of ***mild underweight*** was highest among 36-47 months old children (15.24%), followed by 48-59 months (14.29%), 60-70 months (5.71%), and 71-80 months (3.81%). While ***moderately underweight*** children were highest among 48-59 months (14.29%) flowed by 36-47 months (4.76%), 60-70 months (1.90%) and 71-80 months (0.90%). Prevalence of ***severely underweight*** children was highest among 48-59 months (5.71%), followed by 36-47 months (3.81%).

As per the CNNS 2018-19, Gujarat data prevalence of stunting and wasting was higher among higher age groups. Among 36-47 months old children prevalence of underweight is 11.5% (WAZ -3SD), 38.0% (WAZ-2SD), while among 48-59 months old children, it was 8.5% (WAZ -3SD), 35.5% (WAZ-2SD) with a mean z score of -1.6. National Family Health Survey of Gujarat denotes that the prevalence of underweight children (under five) was high in rural areas (39.7%) compared to urban areas (33.3%).

Table 4.5: Mean WAZ of the children (Mean ± SD, Z scores)

AGE GROUP	MALE		FEMALE		TOTAL	
	MEAN±SD	N	MEAN ±SD	N	MEAN±SD	N
36-47 Months	-1.43±1.10	22	-1.53±0.97	15	-1.45±1.03	37
48-59 Months	-1.61±1.49	26	-1.80±1.14	21	-1.69±1.34	47
60-70 Months	-1.23±0.82	5	-1.55±1.30	8	-1.43±1.11	13
71-80 Months	-1.08±0.95	3	-1.31±0.60	5	-1.22±0.69	8

Figure 4.7: Age-wise Prevalence of WAZ (Underweight)



Height for Age (HAZ)

Height is affected due to long term or chronic malnutrition status of an individual. Comparing height with age reflects the long duration nutritional status of an individual. A height for age z-score <-2SD of WHO child growth reference median represents stunting. Z-score is a statistical term that reflects the deviation from the relative or standard value. As per the current observation, a Z-score value of >-1SD was observed among children 36-47 months and 48-59 months. It can be concluded that children were marginally malnourished. While among girl's children, the prevalence of stunting was higher compared to boys.

Prevalence of ***mildly stunted*** children was high among 48-59 months (11.43%) followed by 36-47 months (10.48%), 60-70 months (3.81%), and 71-80 (2.86%). The prevalence of ***moderately stunted*** children was high in 48-59 months old children (5.71%). A similar score was recorded among 36-47 months old and 71-80 months old. However, the lowest prevalence of moderately stunting children was observed among 60-70 months. Prevalence of ***severely stunted*** children was approximately 12.38%, 4.76%, 0.95%, and

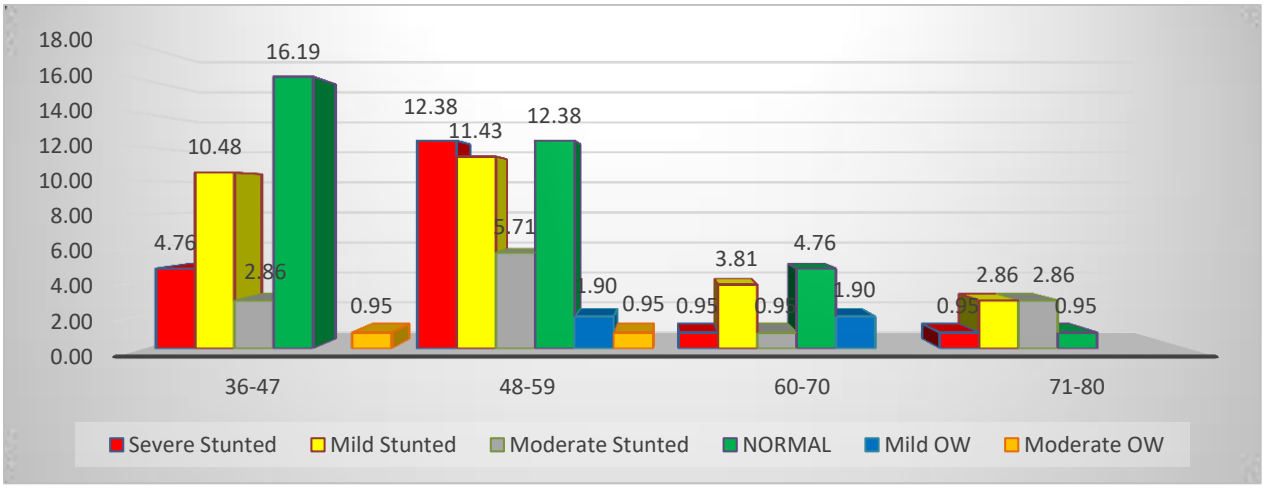
0.95% among 48-59 months, 36-47 months, 60-70 months, and 71-80 months old, respectively.

NFHS-5 report of Gujarat shows that prevalence of stunting under-five years of age was 39.0%, while CNNS report presented that in India HAZ for 36-47 months children were (14.9%) of below -3SD, (41.2%) of below -2SD, while among 48-59 months age group it was 10.3% (below -3SD), 30.9% (below -2SD).

Table 4.6: Mean HAZ of the children (Mean ± SD, Z scores)

AGE GROUP	MALE		FEMALE		TOTAL	
	Mean ±SD	N	Mean ±SD	N	Mean ±SD	N
36-47 Months	-1.31±1.73	22	-1.23±0.77	15	-1.28±1.41	37
48-59 Months	-1.70±1.85	26	-1.86±1.89	21	-1.77±1.85	47
60-70 Months	-1.02±1.12	5	-0.60±1.64	8	-0.76±1.43	13
71-80 Months	-0.88±1.45	3	-2.04±0.96	5	-1.83±1.32	8

Figure 4.8: Age-wise Prevalence of HAZ (Stunting)



Weight for Height Z-Score(WHZ)

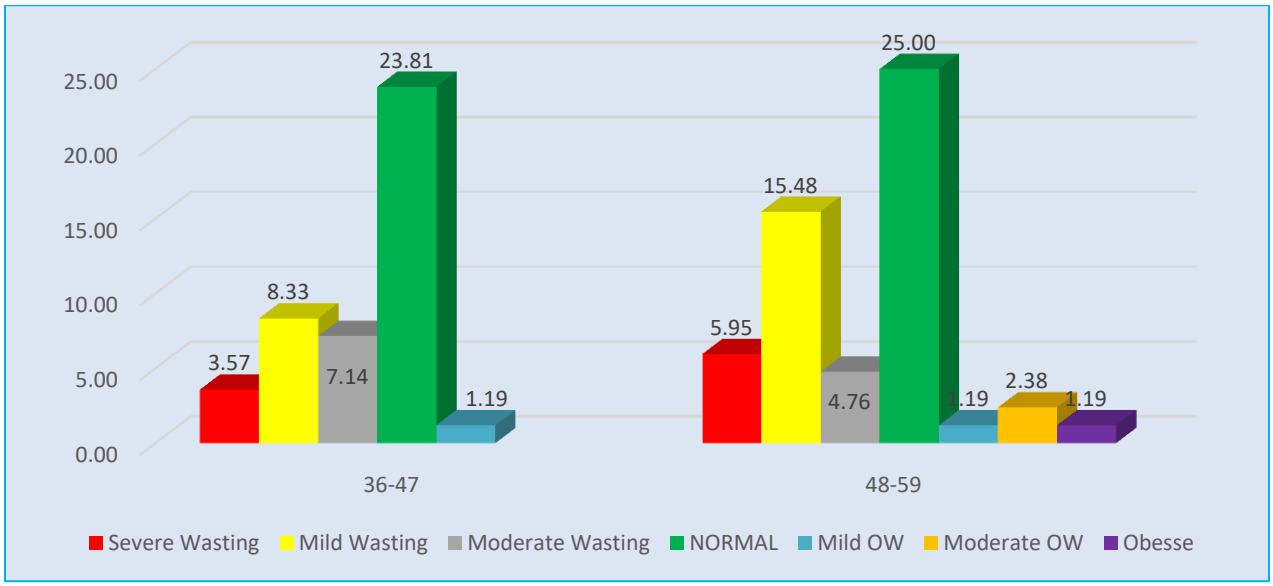
Weight for height z-score determines whether a child is suffering from wasting or not. According to the World Health Organization, a WHZ score of <–2 SD of the WHO Child Growth Standards median is considered wasting. In the current observation, it was found that none of the children were laid under this score among 60-70 months and71-80 months old. While among 36-47 months and 48-59 months old children, the prevalence of severe wasting was 3.57% and 5.95%; Prevalence of mild wasting was 8.33% and 15.48%; Prevalence of moderate wasting was 7.14% and 4.76%, respectively.

As per the NFHS-5 report, the prevalence of wasting and severe wasting under-five years was 25.1% and 10.6%, respectively, while in CNNS India data, it was observed that among 36-47 months old children who fall below -3SD were (4.0%), and falls under -2SD (16.7%) while (1.1%) falls above +2SD of the WHO growth reference median standards Among 48-59 months nearly 2.9% children fall below -3SD,16.0% falls below -2SD and (1.2%) above +2SD.

Table 4.7: Mean WHZ of the children (Mean ± SD, Z scores)

WHZ						
AGE GROUP	MALE		FEMALE		TOTAL	
	MEAN±SD	N	MEAN ±SD	N	MEAN±SD	N
36-47 Months	-1.01±1.07	22	-1.19±1.45	15	-1.08±1.23	37
48-59 Months	-0.91±1.50	26	-0.95±1.61	21	-0.93±1.53	47

Figure 4.9: Age-wise Prevalence of Wasting among children



Prevalence of Thinness (BMIZ)

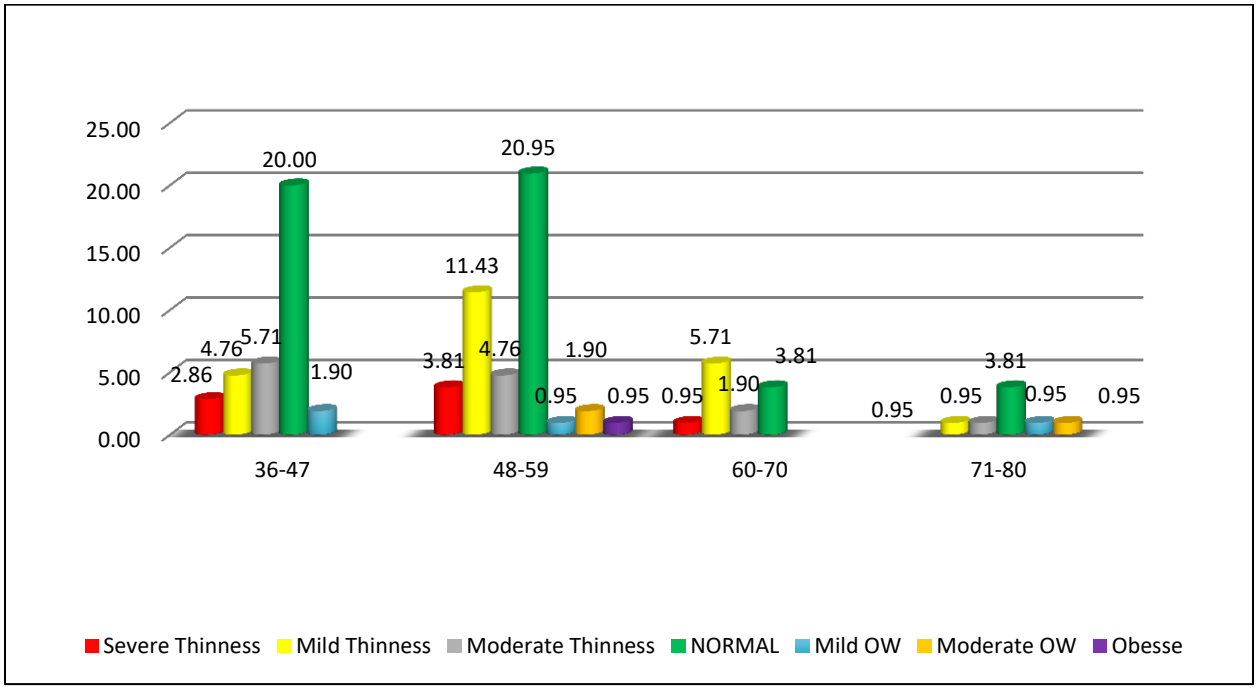
According to the World Health organization, a BAZ score of <-2SD to the WHO growth reference median is referred to as thinness, while a <-3SD is considered severe thinness. In the present investigation, it was found that none of the children was severely thin among the 71-80 months age group. However, the prevalence of mild thinness among the four age groups was 4.76%, 11.43%, 5.71%, and 0.95% in 36-47months, 48-59months, 60-71months and 71-80 months, respectively whereas, the prevalence of severe thinness among the first three age groups was 2.86%, 3.81%, and 0.95%.

Table 4.8: Mean BMIZ of the children (Mean ±SD, Z scores)

Age Group	MALE		FEMALE		TOTAL	
	Mean ±SD	N	Mean ±SD	N	Mean ±SD	N
36-47 Months	-0.86±1.17	22	-1.13±1.54	15	-0.97±1.32	37
48-59 Months	-0.70±1.54	26	-0.86±1.60	21	-0.77±1.55	47
60-70	-1.18±0.52	5	-1.87±1.15	8	-1.60±0.99	13

Months						
71-80 Months	-0.77±0.28	3	0.25±1.64	5	-0.12±1.35	8

Figure 4.10: Age-wise Prevalence of thinness (BMIZ) among children



Assessment of average nutrient intake through 24 hr dietary recall

For calculating the difference between RDA and the mean intake of a nutrient, a one-sample t-test (equality of two population means) was used to analyze the data. Using the test statistics, the following points were obtained;

Mean energy consumption among children between 1-3 years and 4-6 years was 497.96±174.44Kcal and 512.54±169.57 Kcal, respectively. Comparing the values with the RDA 2020, a mean difference of 612.03 Kcal among 1-3 years and 847.45 Kcal among 4-6 years below the RDA level was observed. It shows that the energy consumption of preschool-aged children was significantly different at 5% level of

significance. According to Patil et al., 2019 energy intake of tribal children (below 3 years of age) was56.6% (nontribal area) and 65.2% in (tribal area), while in 4-5 years, it was 78.4% in non-trial area and 81.5% in the tribal area. Protein intake was 23.5% in nontribal and 28.7% in tribal in 1-3 years of age group while for 4-5 years children 20.1% in nontribal area and 26.2% in the tribal area. Further, this study also documented that the prevalence of stunting was high in this tribal block compared to the national level.

As per the RDA (2020), the average consumption of carbohydrates should be 100 grams per day. However, in the current study mean carbohydrate intake of subjects in both the age group was only 52.20±19.05g and 54.38±19.64g, respectively. Thus, statistically, the sample data is significantly different from the population data at 95% CI, with a mean difference of 47.79g and 45.62g, respectively.

The mean protein consumption of children in both groups was 12.93±5.38 Kcal and 13.35±5.91Kcal, respectively. In both, the group consumption of protein was found below the RDA level with a mean difference of 0.43 in 1-3 years and 2.64 g in 4-6 years.

Similarly, the average consumption of fat among the subjects was 26.06±9.63g and 26.5±9.07g, respectively. Comparing the values with the reference RDA level, it was found that the mean difference was 5.72 g, while among 4-6 years, it was only 1.49g. Therefore, it can be concluded that fat consumption among 4-6 years is very close to the RDA level at 5% level of significance.

Table 4.9: Dietary nutrient intake age-wise

Nutrient	AGE GROUP					
	1-3 years			4-6 years		
	Mean ± SD	Difference with RDA	P-value	Mean ± SD	Difference with RDA	P-value
Energy (Kcal)	497.96±174.44	55.14	<0.00001	512.54±169.57	62.31	<0.00001

Carbohydrate (g)	52.20±19.05	-16.02	0.055	54.38±19.64	-20.83	0.00007
Protein (g)	12.93±5.38	-3.45	0.67	13.35±5.91	16.51	0.00019
Total fat (g)	26.06±9.63	-4.26	0.56	26.5±9.07	-5.99	0.151
Total folate B9 (µg)	42.52±14.43	64.57	<0.00001	46.39±23.29	65.63	<0.00001
Total ascorbic acid (mg)	11.57±5.75	61.44	<0.00001	13.27±7.15	62.06	<0.00001
Retinol (µg)	102.94±88.27	73.60	<0.00001	114.05±91.2	77.93	<0.00001
Iron (mg)	2.27±0.93	71.52	<0.00001	2.27±1.13	79.28	<0.00001
Iodine (µg)	39.72±6.16	55.86	<0.00001	39.33±10.77	67.22	<0.00001

Analyzing the intake of micronutrients of the subjects revealed that the mean intake of the subjects in both groups was very low. Iron is an indispensable nutrient of our body. It is the major element required by the blood and muscle protein.

Unfortunately, IDA is the leading public health concern of our nation and many parts of the world. Analyzing the intake of iron-rich food revealed that the mean intake of study subjects was very low, i.e., only 2.27±0.93mg and 2.27±1.13mg. A mean difference of 5.72mg and 8.72mgrespectively below the RDA level was observed in both the age group.

Similarly, another vital nutrient for the erythropoiesis process is folic acid. The mean consumption of total folate in both the groups was 42.52±14.43µg and 46.39±23.29µg, respectively. Comparing the observed values with the RDA level, it was found that both the values were lower than the RDA with a mean difference of 84.56µg and 88.60µg at 95% CI. Vitamin A and Vitamin C are known as iron absorption influencers because they enhance the absorption of iron.

It is unfortunate to report that mean consumption of vitamin A and C among 1-3 years was 102.94±88.27µg and 11.56±5.75mg, whereas among 4-6yeras it was 114.05±91.2µg and 13.27±7.15mg respectively. Comparing the values with the reference RDA, it was found that the sample data was significantly different from the population mean at 5% level of significance. Iodine is an indispensable micronutrient of our daily diet. A regular supply of this vital nutrient is essential for the functioning of the thyroid gland. In India, it is mandatory to fortify edible salt with iodine. In the current study, the mean iodine intake of the sample was 39.72±6.16 and 39.33±10.77µg. Comparing it with the RDA, it was found that there was a mean difference of 52.66 µg and 80.66µg among 1-3 years and 4-6 years below the RDA level was observed respectively.

For analyzing the difference in nutrient intake among girls and boys in both groups independent sample t-test was used. The following observations were made; most of the subject's difference between girls and boys was insignificant at 95% confidence interval.

As per the observation, it was revealed that the nutrient consumption was below the recommended dietary intake level in all the age groups. It is surprising that the integrated child development scheme was launched to prevent malnutrition among children below six years of age. After analyzing all the subjects, it was revealed that children are not receiving the nutrients according to their bodily requirements. Almost all the children were deficient in nutrients. Statistical analysis of the data revealed that nutrient difference in term of energy was (-55.14 Kcal), protein (-3.45g), Carbohydrate (-16.02), Fat (-4.26), Total folate (-64.57µg), vitamin-C (-61.44mg), Retinol (-73.60µg) and iron (-71.52µg) among 1-3 years of age while among 4-6 years the difference was energy (-62.31Kcal), Carbohydrate (-20.83), Fat (-5.99), Protein (-16.51g), total folate (-65.63µg), vitamin-C (-62.06 mg), Iron (-79.28 mg), and retinol (-77.93µg).

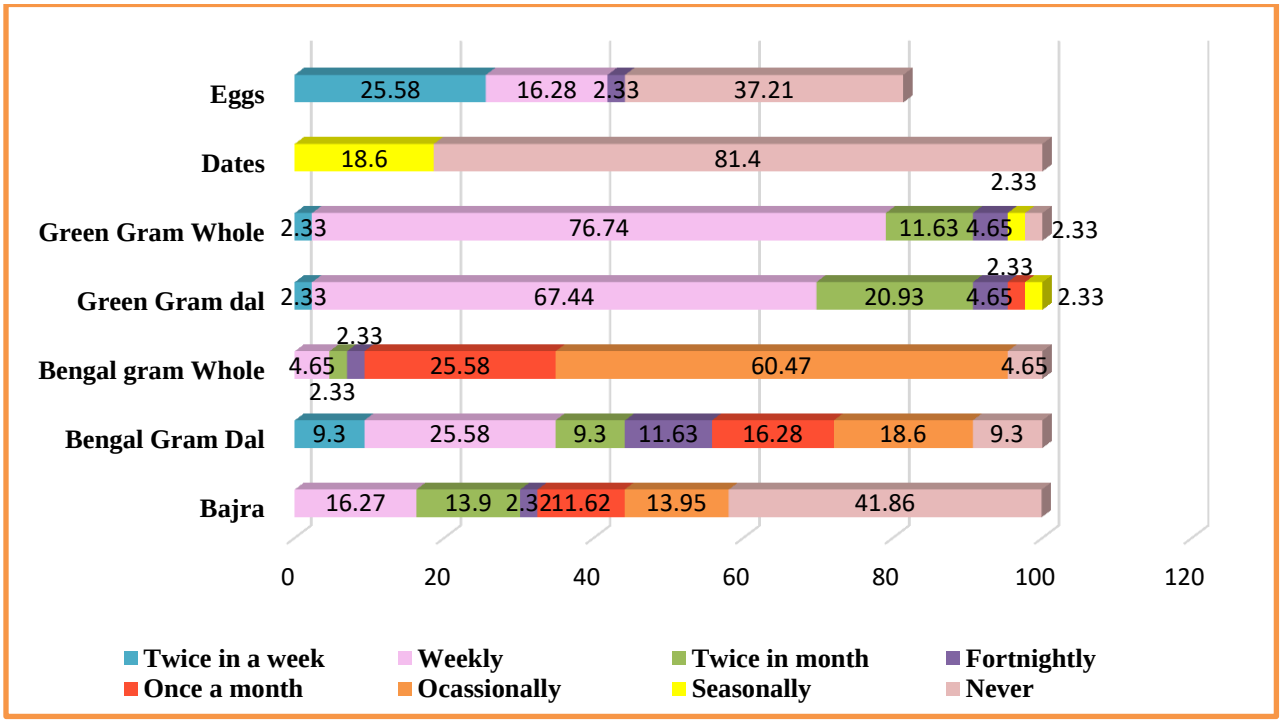
Table 4.10: Dietary nutrient intake gender-wise

Nutrients	AGE GROUP (1-3 years)		AGE GROUP (4-6 Years)	
	Girls (N=10)	Boys (N=18)	Girls (N=39)	Boys (N=38)
	Mean± SD		Mean± SD	
Energy	486.91±195.21	504±167.46	528±158	496.63±181.39
Carbohydrate	51.00±20.10	52.87±19.07	54.37±17.04	54.37±22.24
Protein	13.17±5.23	12.76±5.61	13.65±5.37	13.05±6.47
Total fat (gm)	25.24±11.59	26.52±8.69	28.12±8.99	24.82±8.95
Total folate B9 (µg)	47.25±17.88	39.88±13.90	43.21±17.43	49.66±27.95
Total ascorbic acid (mg)	12.78±6.12	10.89±5.59	12.39±5.24	14.18±8.66
Retinol (µg)	106.60±68.06	100.91±99.55	118.92±88.64	108.91±94.77
Iron (mg)	2.51±1.02	2.14±0.89	2.15±0.90	2.40±1.33
Iodine (µg)	42.88±5.66	37.96±5.84	39.72±11.83	38.92±9.71

FREQUENCY OF CONSUMPTION OF IRON-RICH FOODS

One of the key objectives of this research was to analyze the frequency of consumption of iron-rich foods. It is a well-known fact that Anemia is a very prevalent health concern among children below six years. Hence, all the subjects were asked about the frequency of consumption of some locally available iron-rich foods. Food items included in the questionnaire were Dates, pulses (green gram whole, green gram dal, Bengal gram dal, Bengal gram whole, Bajra and eggs, green leafy vegetables. As per the responses of the subjects of the Karelibaugh area, it was observed that the frequency of consumption of green gram dal and green gram whole weekly was nearly 67.44% and 76.74%, respectively. Dates are a concentrated source of iron and other vital nutrients; it was surprising that approximately 81.40% of children never consumed dates—only 18.60% of children consumed dates seasonally. On the other hand, consumption of Bajra was every week (16.27%), twice a month (13.9%), occasionally (13.95%), and never (41.86%).

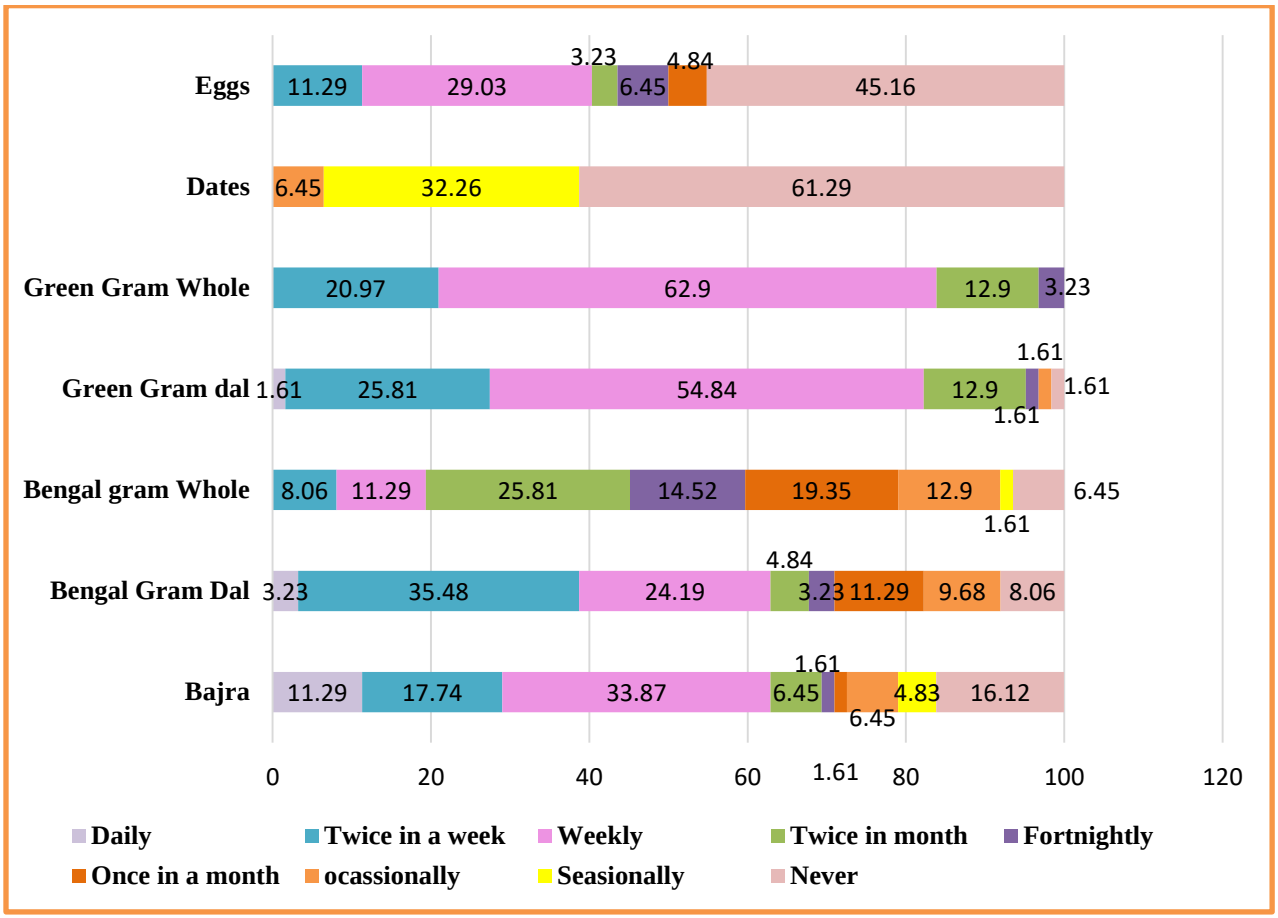
Figure 4.11: Consumption pattern of Iron-rich foods in Karelibaugh Area



Similarly, in the Sawad area, 61.29% of children never consumed dates; further, only 6.45% consumed it occasionally, and 32.26% of children consumed it on a seasonal basis. Here the frequency of consumption of Bajra every week is more compared to the Karelibaugh area, i.e., 33.87%. Similarly, Green gram dal and Green gram whole was 54.84% and 62.9%, respectively. Consumption of Bengal gram dal was 35.48% (Twice a week), 24.19% (weekly), and 16.12% of children never consumed it. Among all the pulses, it was found that Bengal gram dal was the most consumed food item (35.48%; twice in a week). The frequency of egg consumption among children was low; nearly 11.29% consumed it (twice a weekly), weekly (29.03%), while 45.16% of children never consumed eggs. It was noticed that except for Bajra (11.29%), Bengal gram dal (3.23%),

and green gram dal (1.61%), none of the iron-rich food items was consumed by the children daily.

Figure 4.12: Consumption pattern of Iron-rich foods in Sawad Area

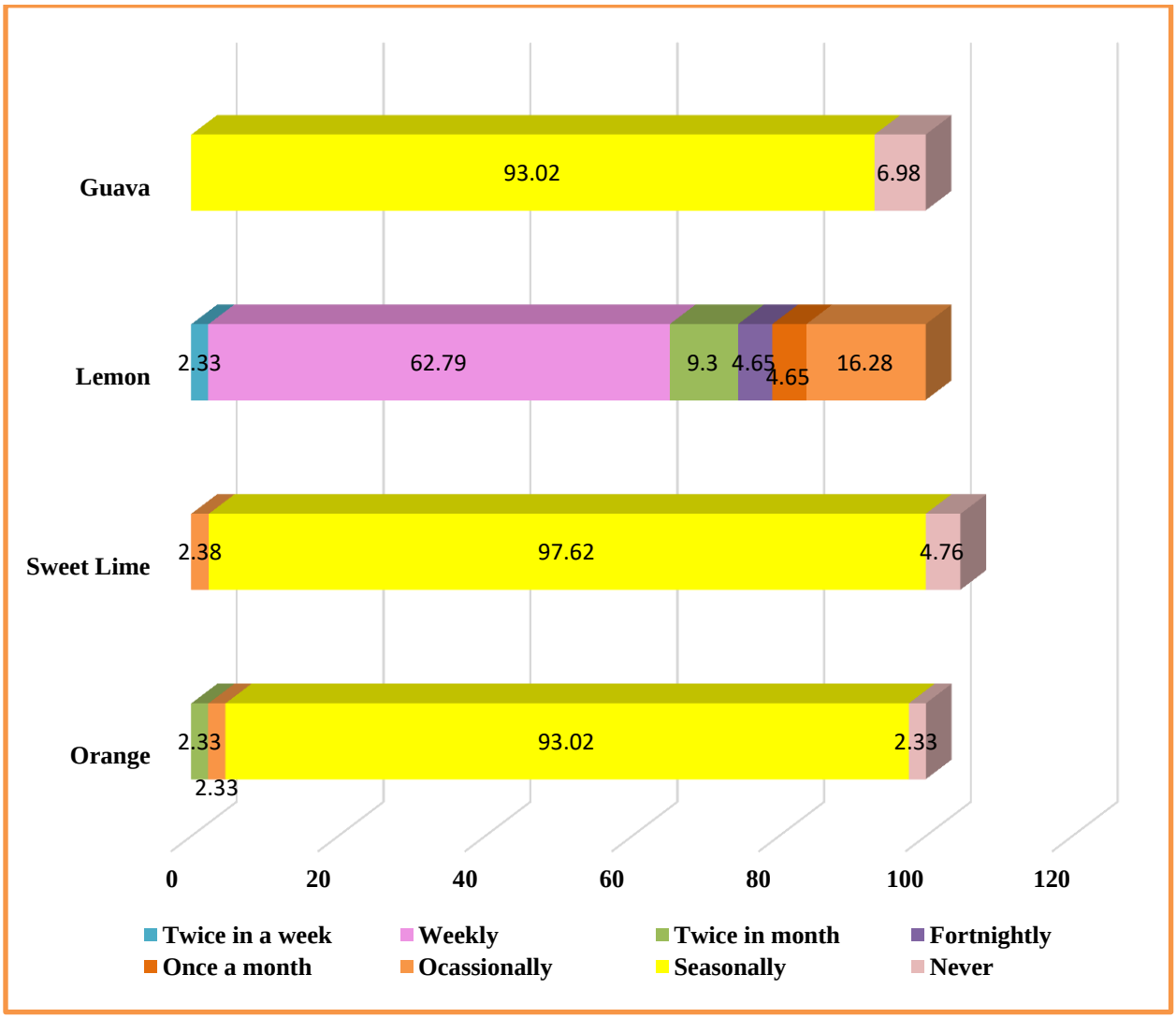


FREQUENCY OF CONSUMPTION OF VITAMIN-C RICH FOODS

Vitamin C is chemically known as ascorbic acid. Due to the lack of the gluconolactone-oxidase enzyme, human beings cannot synthesize vitamin C; hence it became a dietary essential. Vitamin C influences iron absorption. Presence of vitamin C in adequate amount results in better absorbency of iron. This study observed that consumption of vitamin C-rich food was seasonal among the selected population. Frequency of consumption of Vitamin C-rich food on seasonal basis guava (93.02%), Sweet lime

(97.62%), and orange (93.02%) was observed while lemon was the only food item which was consumed every week. None of the vitamin C food was consumed daily.

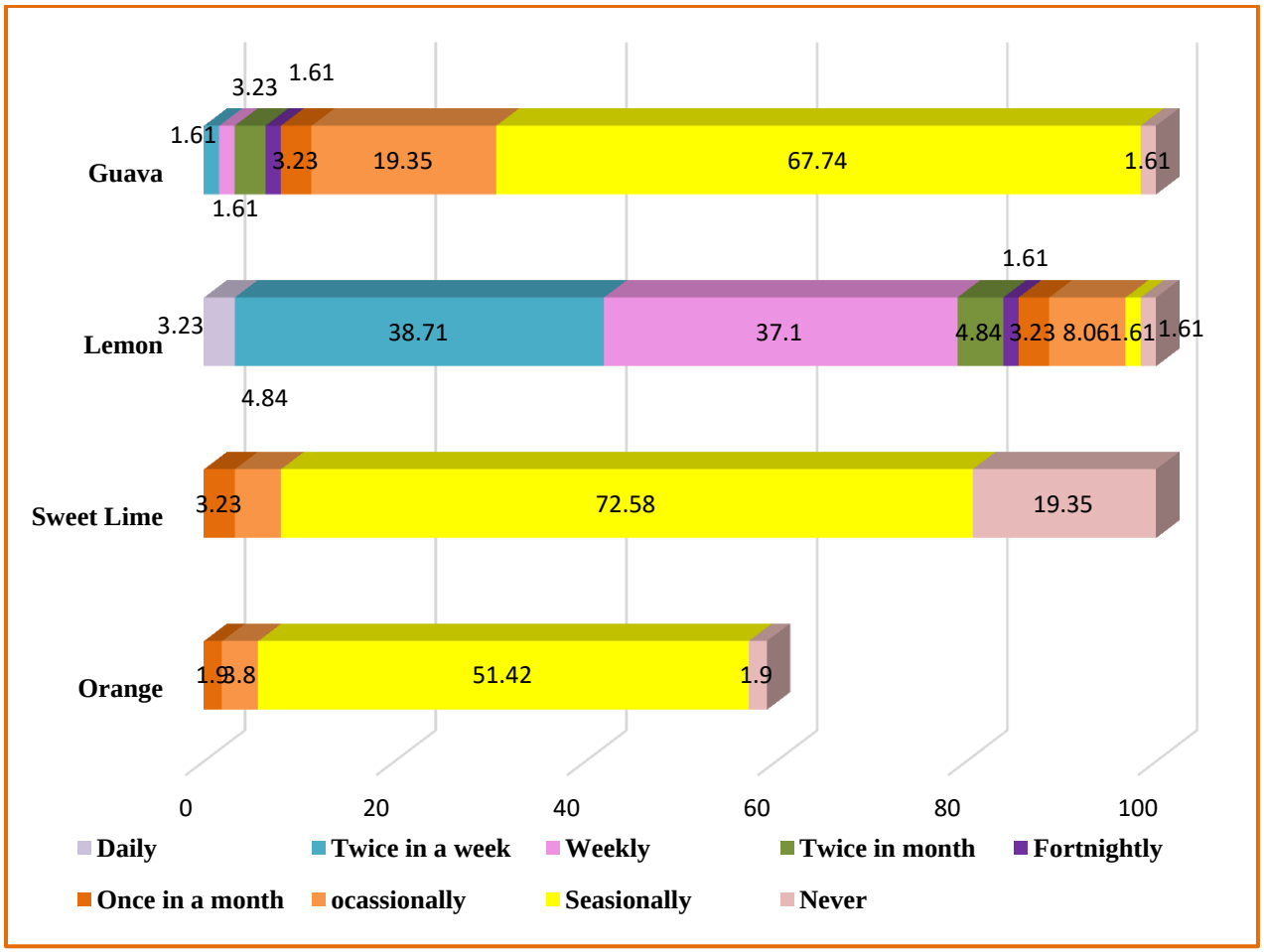
Figure 4.13: Consumption pattern of vitamin C rich food in Karelibaugh Area



In the Sawad, it was observed that the consumption pattern of lemon on a daily, twice in a week, weekly, occasionally was 3.23%, 38.71%, 37.10%, and 8.060%, respectively. The frequency of consumption of guava, sweet lime, and orange was very low. Approximately 67.74% (never consumed guava), 72.58% (never consumed sweet lime) and 51.42% (never consumed orange). However, only 19.35% consumed guava

occasionally, 4.84% consumed sweet lime, and 3.8% of children consumed orange on an occasional basis. Only 3.23% of children consumed lemon daily.

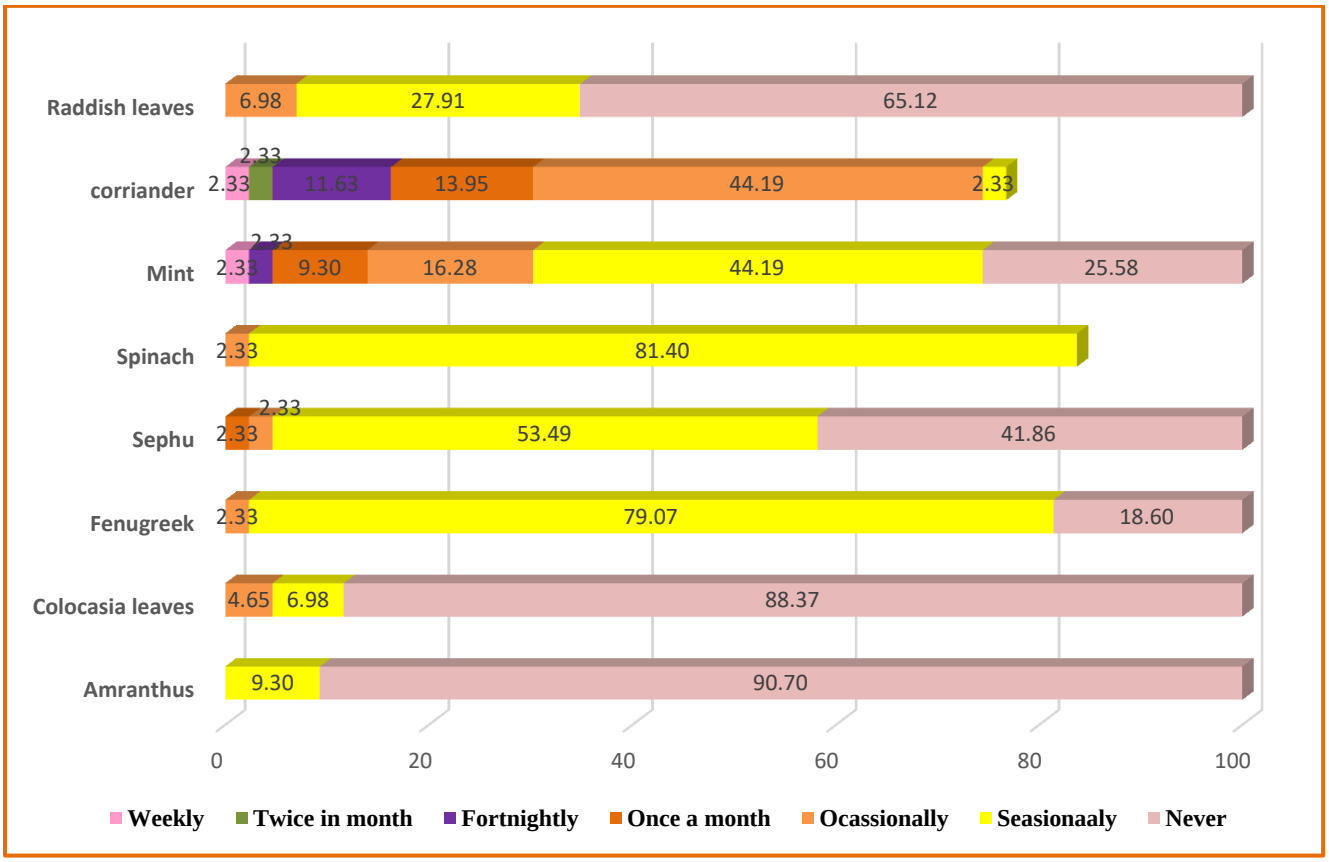
Figure 4.14: Consumption pattern of Vitamin C rich foods in Sawad Area



FREQUENCY OF CONSUMPTION OF GREEN LEAFY VEGETABLES

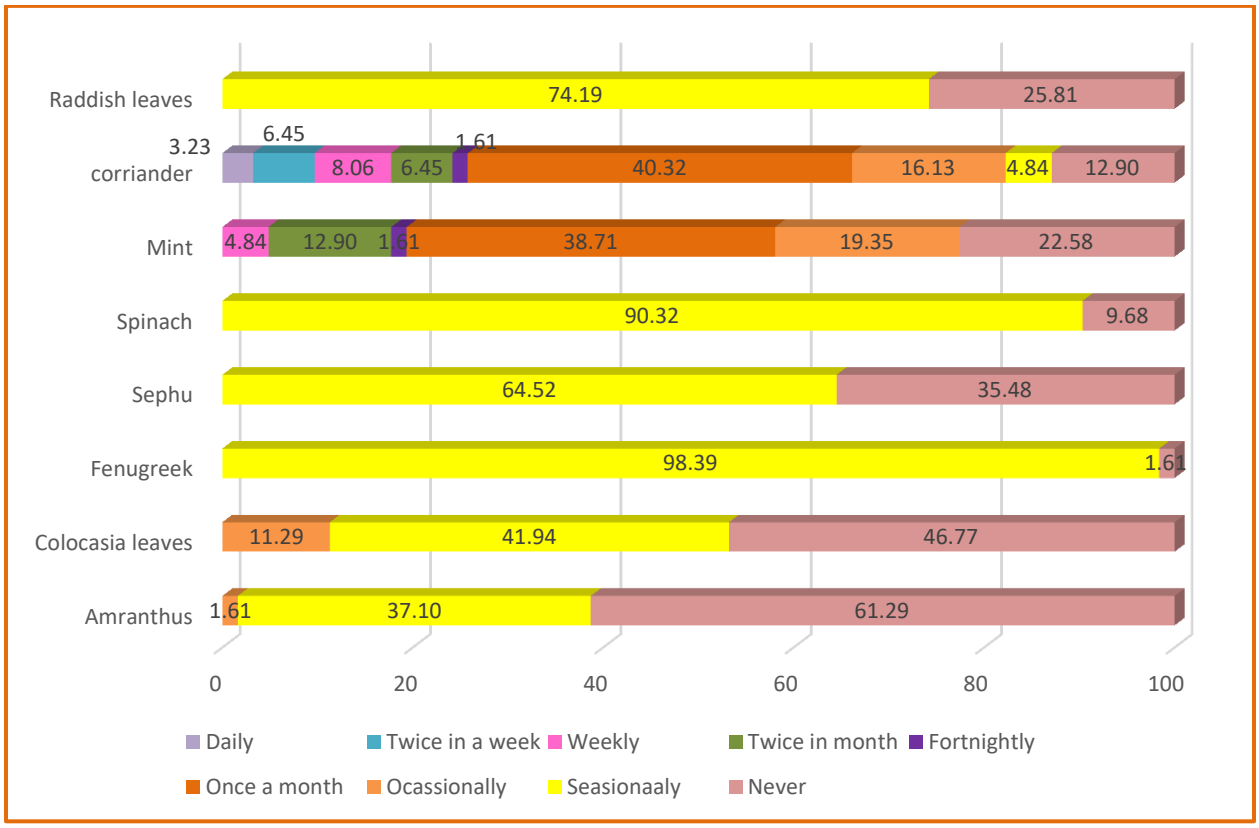
According to the CNNS data in Gujarat, the consumption of green leafy vegetables is (81%) in 5-9 years of age group. In this, it was observed that in both the groups average consumption of green leafy in both groups is(8.29%).

Figure 4.15: Consumption Pattern Of Green leafy vegetables in Karelibaugh Group



Consumption of green leafy vegetables in the Karelibaugh area was seasonal. 90.70%mothers responded that they never consumed Amaranthus, 88.37% never consumed Colocasia leaves, 65.12% never consumed Radish leaves, 41.86% never consumed Sephu, 25.58% never consumed mint, and 18.60% never consumed Fenugreek leaves. However seasonal consumption of amaranths (9.30%),) Colocasia leaves(6.98%), Radish leaves (27.91%), Mint (44.19%),, Spinach (81.40%) and fenugreek leaves 79.07%, Sephu (53.49%), coriander leaves (2.33%). It was found that Spinach had the highest seasonal consumption, followed by Fenugreek leaves and Sephu. Similarly, in the Sawad area, seasonal consumption of green leafy vegetables such as Spinach, Sephu, Fenugreek, Colocasia and amaranths was (74.19%), (90.32%), (64.52%), (98.39%), (41.94%), and (37.10%) respectively. However, only 8.06% of mothers responded yes for weekly consumption of coriander leaves, and 4.84% weekly consumed mint.

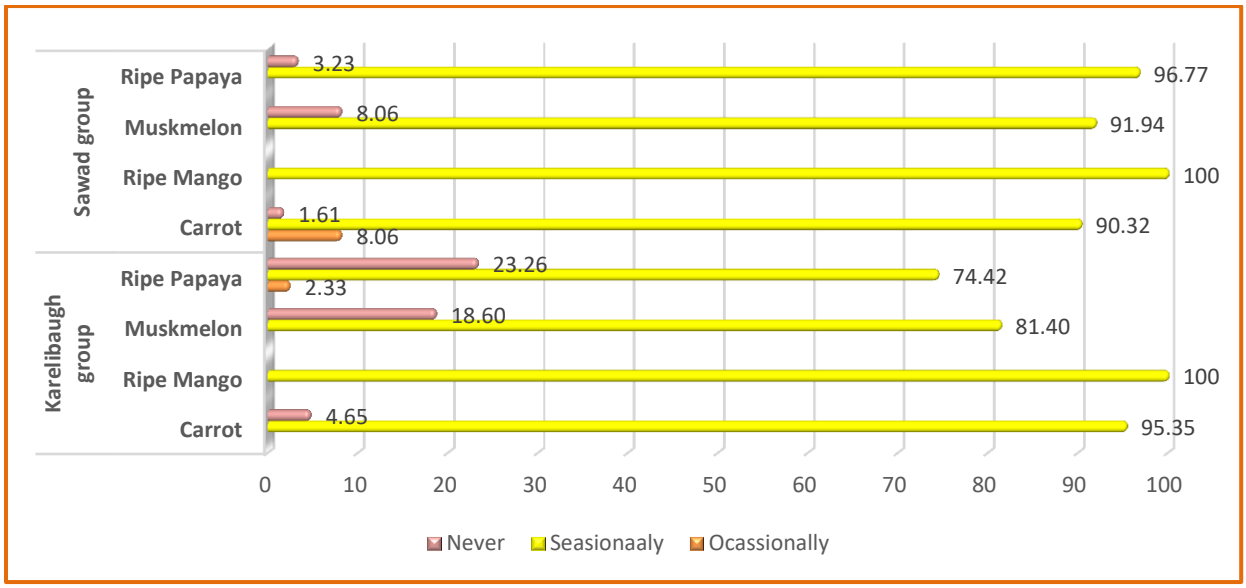
Figure 4.16: Consumption Pattern of Green leafy vegetables in Sawad group



FREQUENCY OF CONSUMPTION OF VITAMIN-A RICH FOODS

Vitamin A deficiency is one of the major concerns in India. Children under five years are very susceptible to develop VAD. In India, nearly 17.5% of children of 1-4 years and 21.5% of 5-9 years suffer from VAD (CNNS, India 2018). The likelihood of VAD in Gujarat is nearly 55%in 2-4 years (CNNS,2018). According to The CNNS report, consumption of Vitamin A-rich food (fruits and vegetables) was 56.30% among 36-47 months old, while it was 56.70% among 48-59 months, old children.

Figure 4.17: Consumption Pattern of Vitamin A rich fruits and vegetables in Karelibaugh and Sawad Group



It was observed in Karelibaugh the consumption of Vitamin-rich fruits and vegetables is majorly on a seasonal basis, i.e., 74.42%, 81.40%, 95.35%, 100% consumed ripe papaya, Muskmelon, carrot, and ripe mango, respectively. Similar observations were found in the Sawad area, where the consumption of ripe papaya, ripe mango muskmelon, and carrot was 96.8%, 100%, 91.94%, and 90.32%, respectively**.**

FREQUENCY OF CONSUMPTION OF FORTIFIED FOOD STAPLES

According to FSSAI, fortified food staples (Wheat flour, DFS, Milk, Oil, and Rice) are potential sources of essential micronutrients. Therefore, FSSAI promoted the consumption of fortified wheat flour, Rice, and DFS to reduce the likelihood of Anemia. Unfortunately, after so much endorsement of fortified staple, none of the households in Karelibaugh used fortified wheat flour, Rice, Milk. As per the FSSAI claims, fortified oil is a good source of vitamin A and D. In the Karelibaugh area, nearly 93.02% of children consumed fortified oil. The rest of them never used fortified oil. Double fortified salt was consumed by 20.93% of subjects daily, while 79.07% of children never consumed double fortified salt.

Figure 4.18: Consumption pattern of fortified foods in Karelibaugh Area

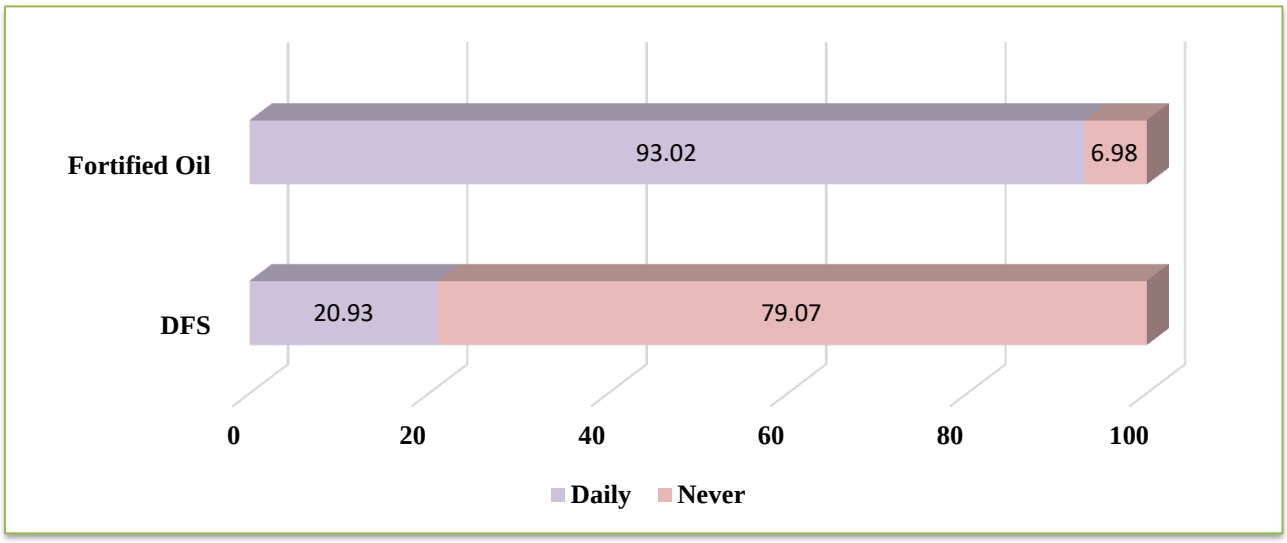
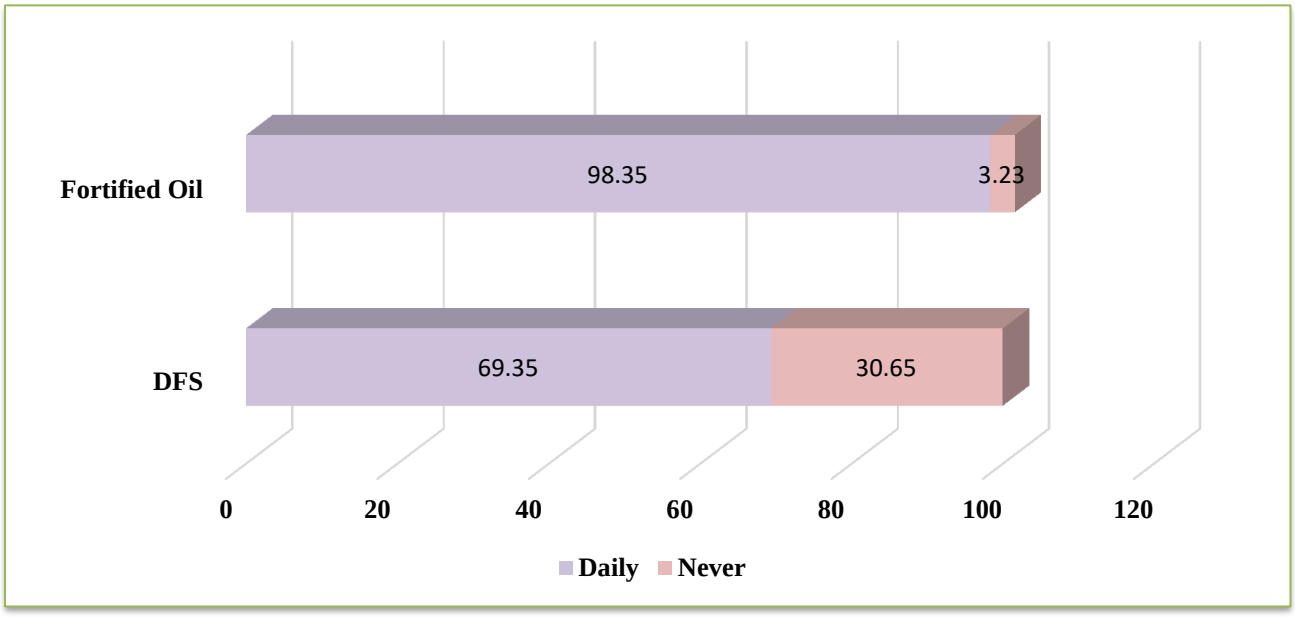


Figure 4.19: Consumption pattern of fortified foods in Sawad



In the Sawad area, approximately 98.35% of households consumed fortified oil daily, while 3.28% never used fortified oil. Double fortified salt frequency of consumption was 69.35% (daily), whereas nearly 30.65% never consumed DFS. Comparing the values

with the Karelibaugh area, it can be concluded that DFS and fortified oil consumption were more in the Sawad area.

IMPACT OF NUTRITIONAL COUNSELING ON MOTHERS

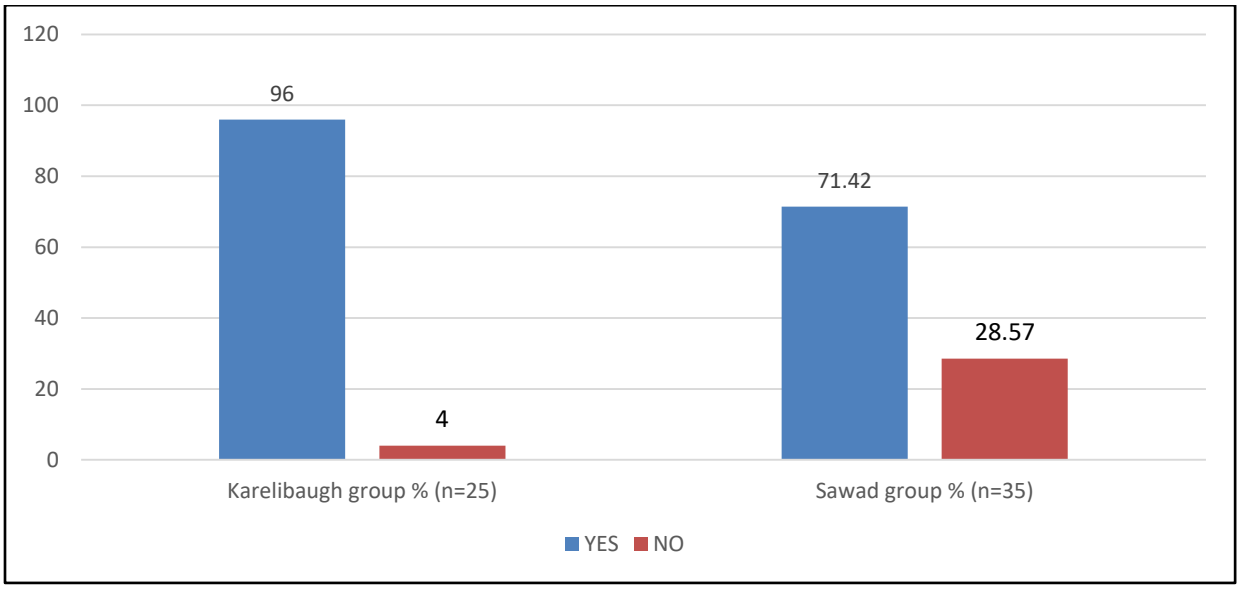
It was observed in the study that during pre-data, the knowledge of the mothers was very poor, but after counseling, it improved. Assessment of knowledge was done by giving the score to the individual the score range was from 0-43 higher the score higher the knowledge and lowered the score the poor the knowledge. It was observed that (20%) were having good knowledge (68.33%), mothers had average knowledge, and (11.67%) mothers were having poor knowledge after the counseling was given.

Table 4.11: Knowledge score classification

SCORE	CATEGORY
>25	**GOOD**
15-25	**AVERAGE**
<15	**POOR**

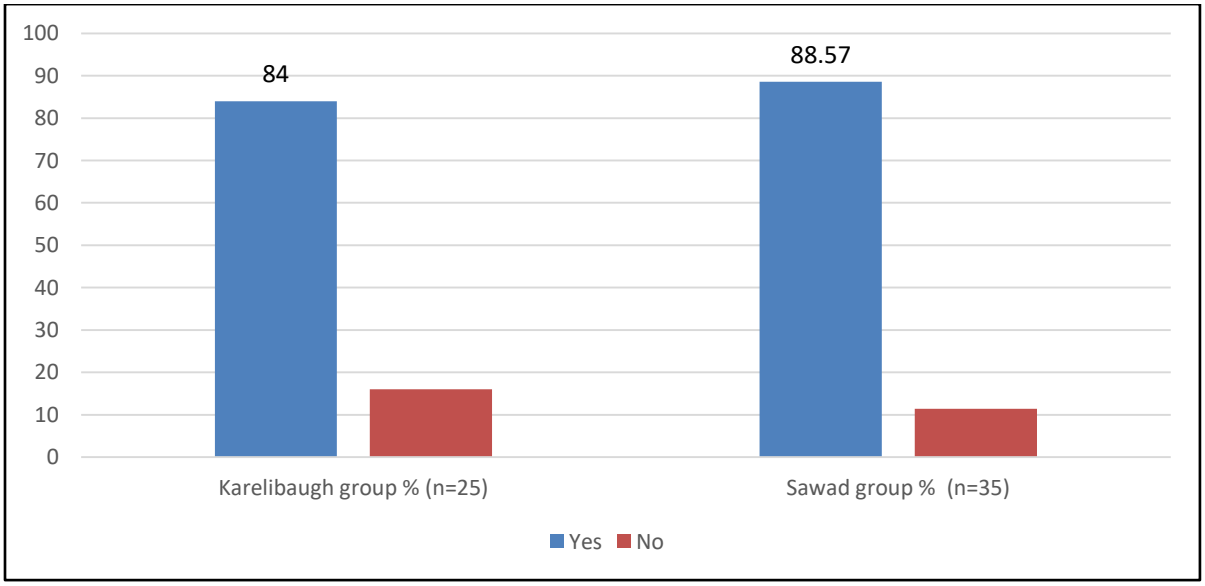
Due to the COVID-19 pandemic, 45 mothers left the study. In February, deworming tablets/syrup was given to the children. All the mothers were aware of the importance of deworming tablets for young children. As per the responses given by the mothers, it can be concluded that the percentage of children received deworming tablets in Karelibaugh (96%) compared to Sawad (71.42%).

Figure 4.20: Awareness about deworming Tablets



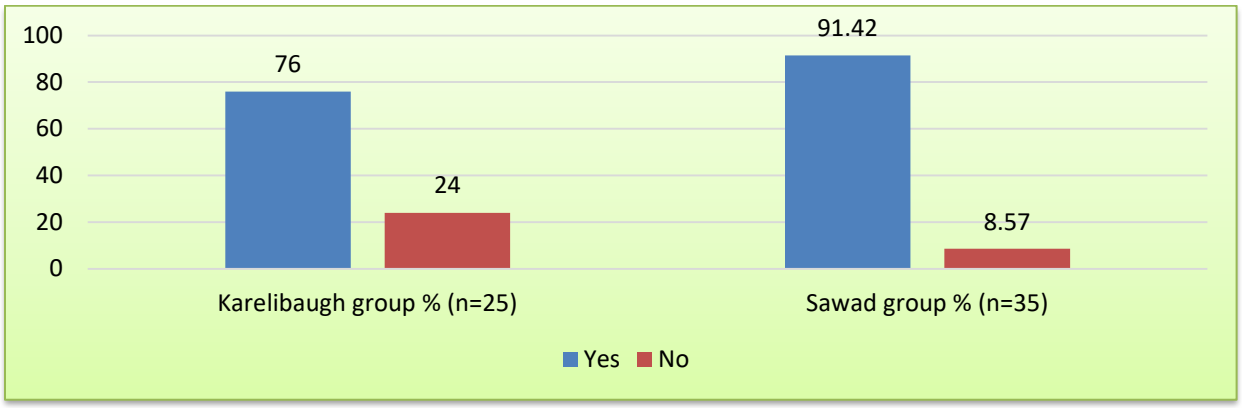
Awareness of micronutrient deficiencies

Figure 4.21: Awareness about micronutrient



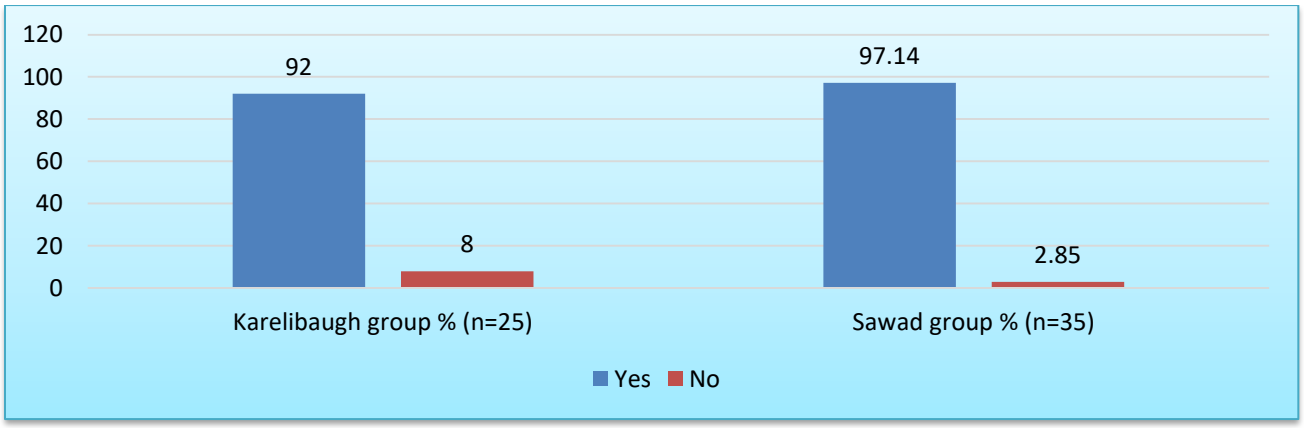
It was observed that approximately 84% of mothers of the Karelibaugh area and 88.57% of mothers of Sawad were aware of the term micronutrients. However, nearly 91.42% of mothers of the Sawad area and 76% of mothers of the Karelibaugh area knew about micronutrient deficiencies.

Figure4.22: Awareness about micronutrient deficiencies



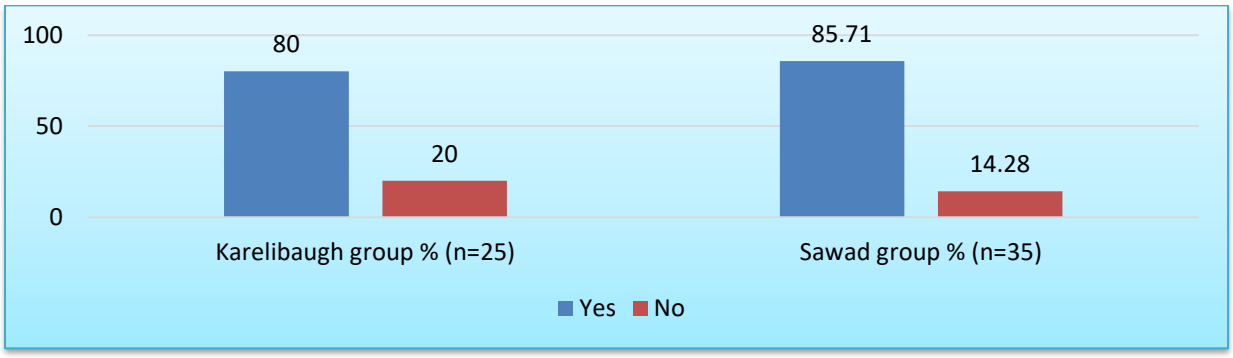
It was observed that following counseling, nearly 84% of the mothers were aware of micronutrients in Kareli Baugh and 88.57% in Sawad. Further, 76% of mothers in Karelibaugh and 91.42% in Sawad were able to say on micronutrient deficiencies.

Figure 4.23: Awareness of Anemia



It was observed that in the study population, mothers of the enrolled children knew about ***Anemia*** or ***Pandurog***(local name of Anemia). Approximately 92% of mothers of Karelibaugh and 97.14% of mothers responded yes when asked about what is Pandurog? All the mothers were either counseled at the Anganwadi Centre or the virtual platform.

Figure 4.24: Awareness of causes of Anemia



After receiving counseling, it was observed that 80% of mothers in the Karelibaugh area and 85.17% from Sawad were aware of the *causes of Anemia*. Most of the mothers were even aware of different etiological factors of Anemia. In the Karelibaugh area, responses of the mothers about the symptoms of Anemia was lack of iron-rich diet (20%), frequent illness (5%), lack of iron-rich diet and frequent Illness both (25%), lack of Iron Rich Diet, Loss of blood during an accident (5%), Weakness, Frequent Illness (5%), lack of Iron Rich Diet and Weakness both (10%), lack of Iron-rich diet and loss of blood during delivery both (5%), Lack of Iron Rich Diet, Weakness, and frequent illness (10%), lack of iron-rich Diet, loss of blood during accident and Weakness (5%), Lack of Iron Rich Diet, Heavy work and frequent Illness (5%). While in the Sawad area, responses of the mothers were lack of Iron Rich Diet (30%), Weakness (3.33%), frequent illness (3.33%), lack of iron-rich diet and frequent Illness (20%), Weakness, Frequent Illness (6.66%), Lack of Iron Rich Diet and Weakness(13.33%), Lack of Iron Rich Diet, Weakness and Frequent Illness (6.66%), Lack of Iron Rich Diet, Loss of blood during accident and Weakness (3.33%), Lack of Iron Rich Diet, Loss of blood during an accident, loss of blood during delivery (3.33%), Lack of Iron Rich Diet, Weakness, Frequent Illness (3.33%) and Lack of Iron Rich Diet, Loss of blood during delivery, Heavy Work (3.33%).

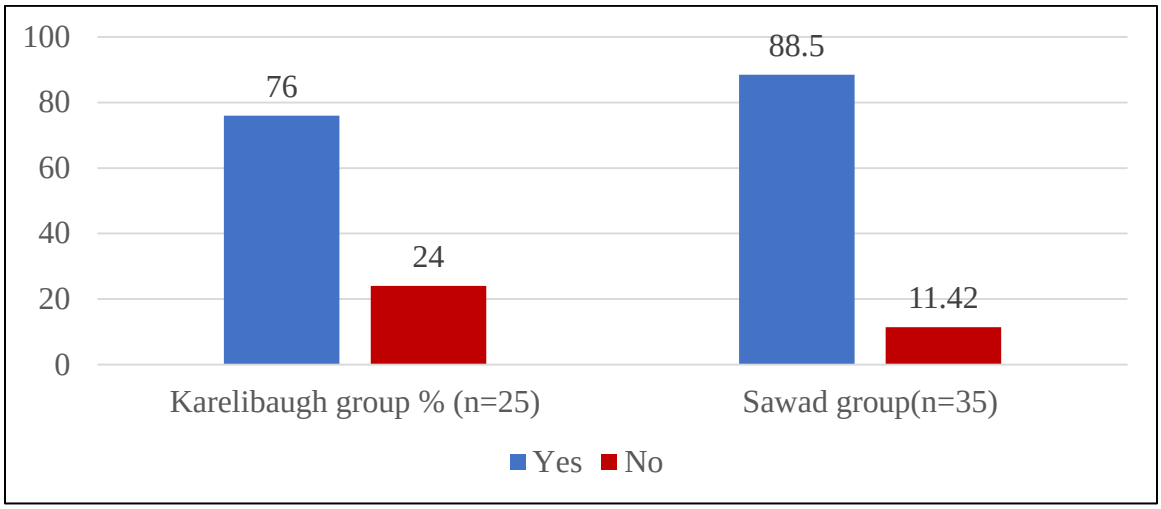
AWARENESS OF SYMPTOMS OF ANEMIA

It was observed that the mothers were aware of symptoms of Anemia in both groups in Sawad 34.48% of the mothers responded Pale nails, tongue, Pale palm/Eyes are the major symptoms associated with anemia while, 24.13% responded Pale nails and Pale tongue, (13.79%) said Pale nails, Pale tongue, and Pale skin, 6.89% said Pale nails, Pale tongue and Shortness of breath, (6.89%) Pale nails, Pale tongue, Pale skin and Pale palm/Eyes, (3.44%) Pale nails and Pale palm/Eyes same percentage of the mothers were responded for Pale nails, Pale skin and Pale palm/Eyes and Pale nails, Pale tongue, Pale palm/Eyes, Shortness of breath respectively while in karelibaugh (5%) Pale nails, (45%) Pale nails, Pale tongue and Pale palm/Eyes, (40%) Pale nails and Pale tongue, (5%) Pale nails, Pale tongue, and Pale skin, (5%) Pale nails, Pale tongue, Pale skin, Pale palm/Eyes responded respectively.

PREVENTION OF ANEMIA

In Karelibaugh area, asking about the prevention strategies of Anemia following responses were given by the mothers consumption of iron-rich foods and consumption of green leafy vegetables (45%), consumption of green leafy vegetables (25%), consumption of iron-rich foods, consumption of green leafy vegetables, IFA tablet/ IFA syrup (15%), consumption of iron-rich foods, consumption of green leafy vegetables, Maintain clean and hygienic environment (10%), consumption of iron-rich foods, consumption of green leafy vegetables, Avoid drinking tea or coffee along with meals (5%). In the Sawad area, nearly 79.31% of mothers said consumption of iron-rich foods could prevent, anemia followed by 13.79% (Consumption of iron-rich) and 6.89% (Consumption of green leafy vegetables).

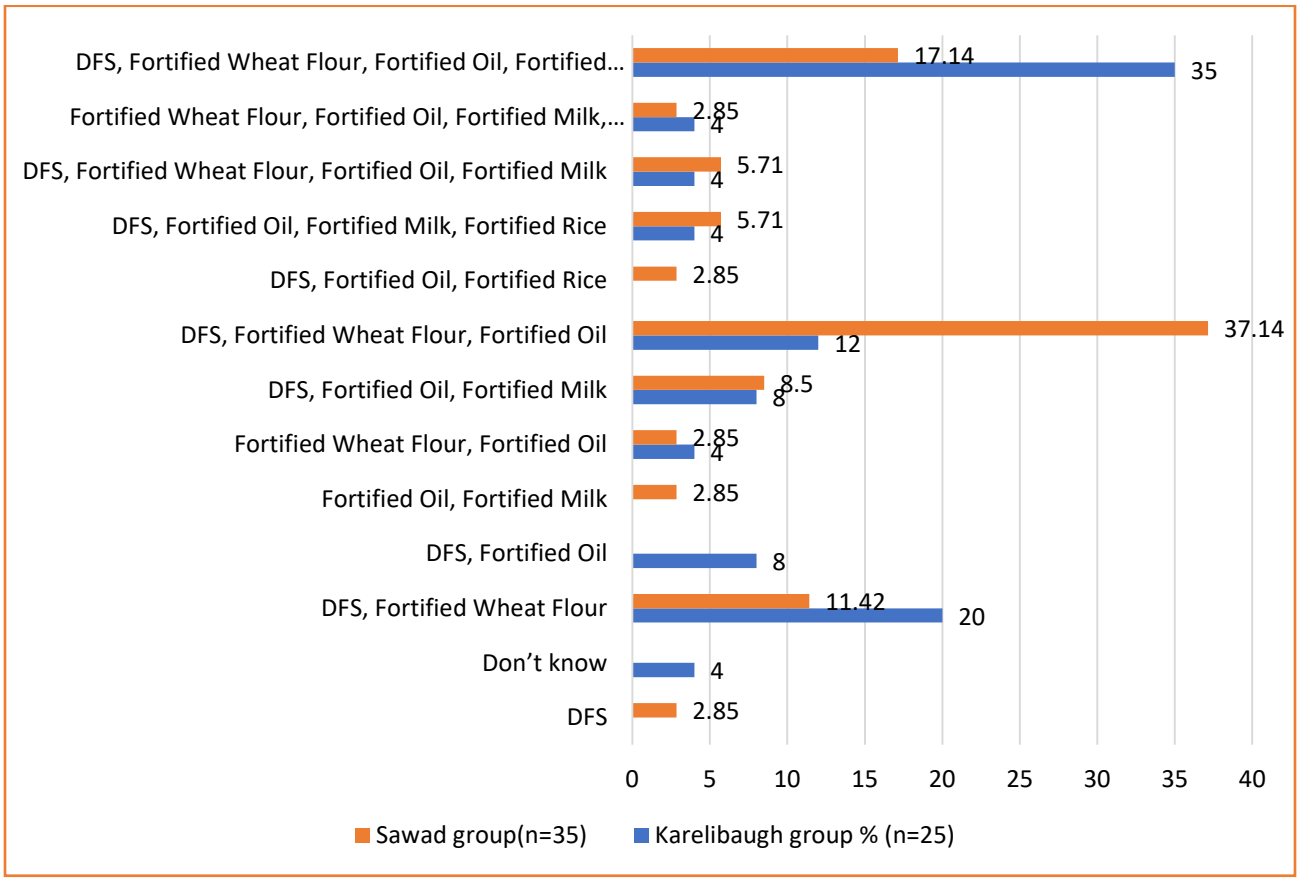
Figure 4.25: Awareness of Fortification among mothers



It was observed that among the study population, after receiving counseling nearly 76% mothers in Karelibaugh and 88.5% mothers in Sawad were able to respond the question related to fortification in their *vernacular language.*

As per the current observation awareness of mothers in Sawad area regarding only DFS was 2.85% , only DFS, Fortified Wheat Flour 11.42% , Fortified Oil, Fortified Milk 2.85%, Fortified Wheat Flour, Fortified Oil 2.85% , DFS, Fortified Oil, Fortified Milk 8.5%, DFS, Fortified Wheat Flour, Fortified Oil 37.14%, DFS, Fortified Oil, Fortified Rice 2.85%, DFS, Fortified Oil, Fortified Milk, Fortified Rice 5.71%, DFS, Fortified Wheat Flour, Fortified Oil, Fortified Milk 5.71%, Fortified Wheat Flour, Fortified Oil, Fortified Milk, Fortified Rice 2.85%, DFS, Fortified Wheat Flour, Fortified Oil, Fortified Milk, Fortified Rice 17.14%. Whereas, awareness of mothers in Karelibaugh area regarding only DFS, Fortified Wheat Flour 20%, DFS and Fortified oil 8%, Fortified Wheat Flour, Fortified Oil 4% DFS, Fortified Oil, Fortified Milk 8%, DFS, Fortified Wheat Flour, Fortified Oil 12%, DFS, Fortified Oil, Fortified Milk, Fortified Rice 4% (n=1), DFS, Fortified Wheat Flour, Fortified Oil, Fortified Milk 4%, Fortified Wheat Flour, Fortified Oil, Fortified Milk, Fortified Rice 4%, DFS, Fortified Wheat Flour, Fortified Oil, Fortified Milk, Fortified Rice 35% while, nearly 4% mothers were not aware about any fortified staples.

Figure 4.26: Awareness of fortified staples among mothers



It was observed that nearly 76% from Karelibaugh and 94.28% from Sawad, mothers were aware about DFS and most of them consumed DFS in their day to day life and all the mothers were able to identify plus F logo on the fortified commodities while in Sawad only 2.8% mothers were not able to identify plus F logo.

Figure 4.27: Awareness of the importance of consumption of Double Fortified Salt among mothers

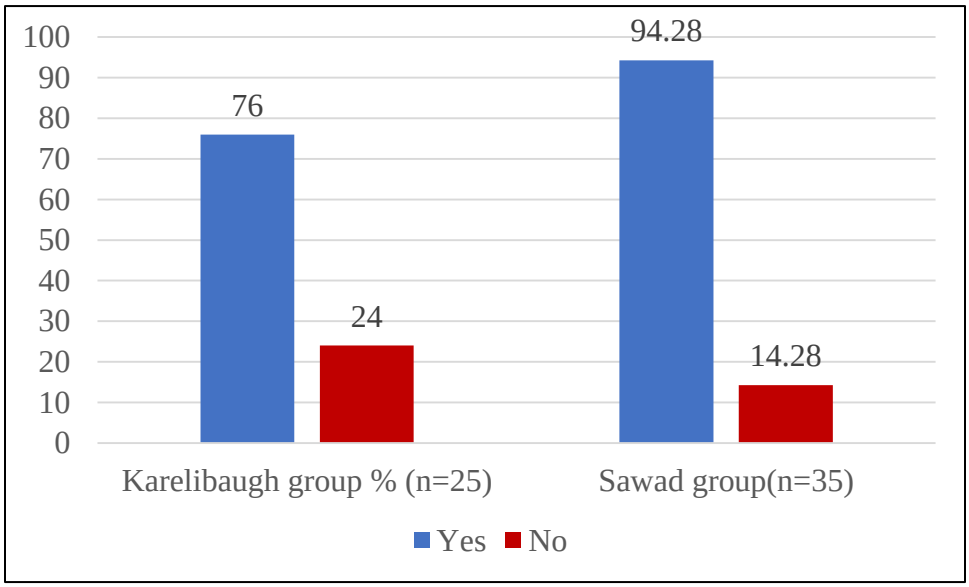
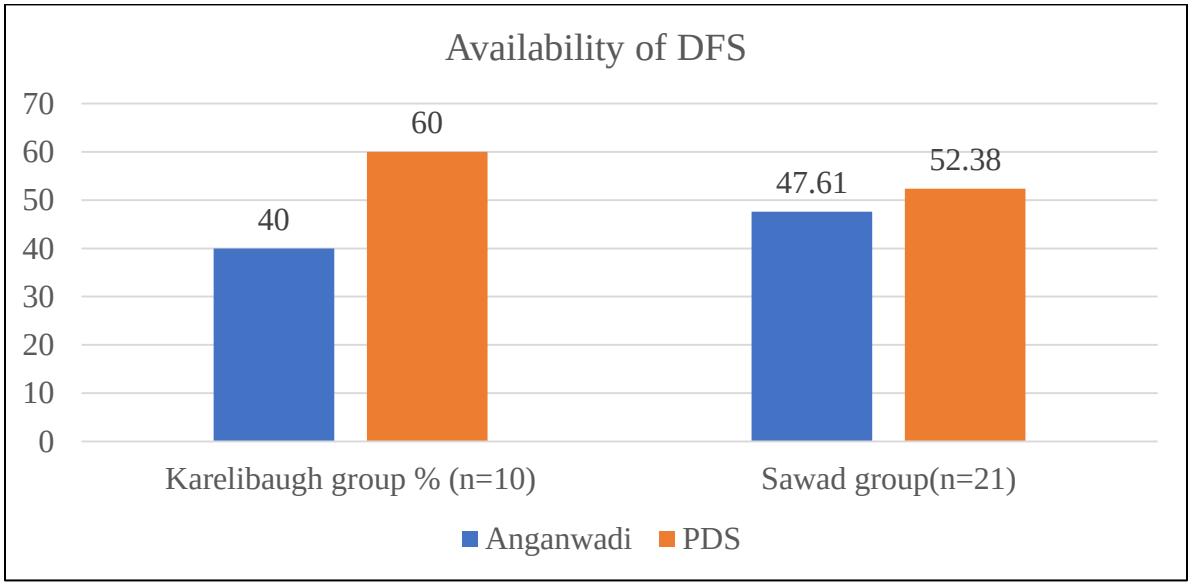
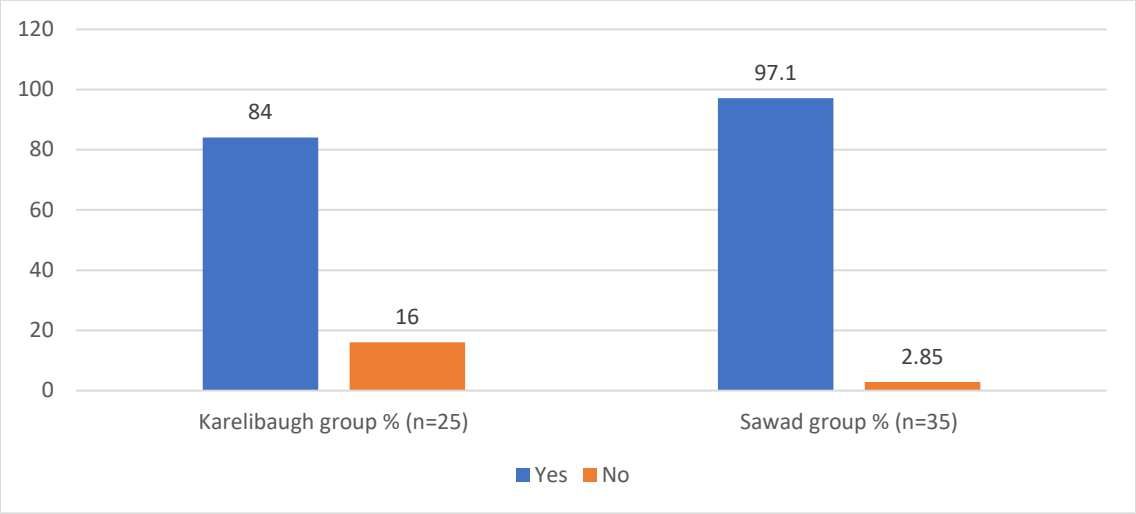


Figure 4.28: Availability of DFS in Anganwadi centers and PDS



In Karelibaugh area nearly 60% households consumed DFS through PDS shops and 40% received through ICDS units i.e. Anganwadi Centers while in Sawad nearly 53.38% received it from PDS (Ration Shops) and 47.61% get from Anganwadi centers.

Figure 4.29: Awareness of Consumption of Fortified Wheat Flour



It was also recorded that nearly 84% mothers from Karelibaugh and 97.1% mothers from Sawad were aware about one should consume fortified wheat flour and out of them two mothers from Sawad and four from Karelibaugh responded that they have started consuming fortified wheat flour.

Anganwadi workers play a major role in the community. They are the health care front line workers who transfer knowledge in the community. In this study 12 Anganwadi centers were chosen for the study out of that eight AWCs were selected from Sawad and four from Karelibaugh area. It was observed that knowledge regarding fortification was very low among Anganwadi workers i.e. only two Anganwadi workers from Sawad area were aware of fortified staples. Most of the AWWs aware about the importance of Double fortified salt and motivated towards using in their diet. Further, most of the AWWs (nearly 62.5% from Sawad area) also stated that they used DFS whenever, they celebrate ***Annaprasan Diwas***.

Community awareness was a major pillar of this research work. For inculcating Nutrition and Health education to all the AWWs and mothers leaflets and Charts were prepared. Due to the cases COVID-19 was increasing at that time hence only few mothers and AWW were attended the counseling session i.e. only six Anganwadi workers from Sawad, and 2 Anganwadi workers from Karelibaugh attended the counseling session. While interacting with the mothers and AWWs it was observed that **IFA Syrup** was not

given to the children, but children received **Albendazole tablet/syrup** (i.e. nearly 87.5%). The Anganwadi workers responded that it should be twice a year i.e. once in the month of February and second in the month August. The majority of the Anganwadi workers was able to respond to the questions like *what is fortification and fortified commodities available*.

According to an unpublished entitled **"Trials to address the anemic status of children aged 36-60 months using the synergistic approach in urban Vadodara"** conducted by Nakra and Nair (2019) showed that the mean dietary iron intake of iron was 6.83±2.64mg among 36-60 months old children.

Table 4.12: Dietary Iron Consumption during 2019 (previous study)

	Experimental		Control	
	Mean ± SD	Diff. with RDA	Mean ± SD	Diff. with RDA
POST	6.17±1.45	-52.54	3.41±1.05	-73.76%

Table 4.13: Comparison of Mean dietary Iron Intake (both 2019 & 2020)

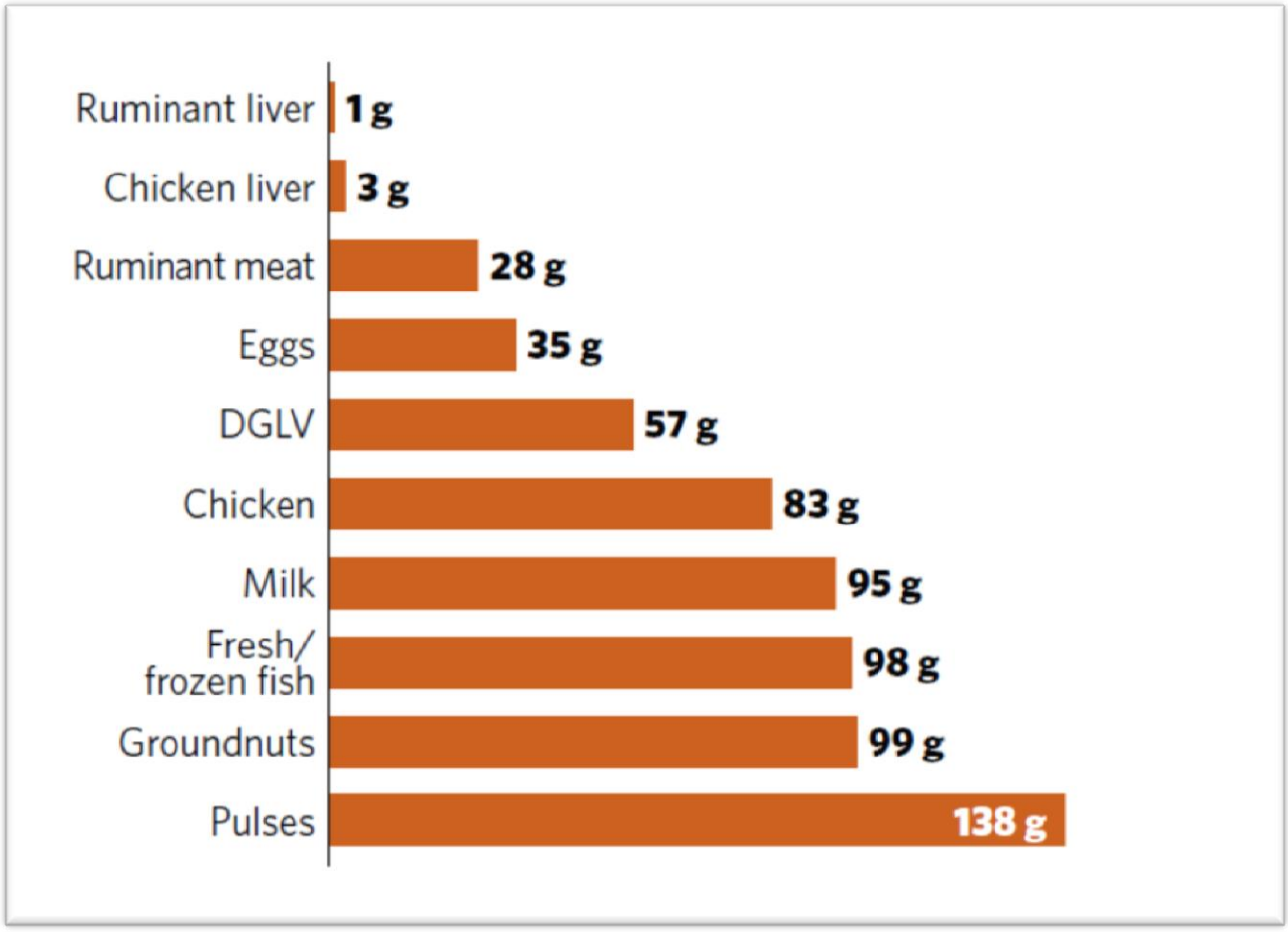
Mean ± SD 2019	Mean ± SD 2020
9.31±2.5	4.54±2.06

The mean dietary iron intake of 9.31±2.5mg was observed among 36-60 months old children in the previous study. However, comparing the results of the previous study with the present study revealed that the mean dietary iron consumption of children was reduced to 4.54±2.06mg. Thus, it was observed a drastic reduction of 50% in dietary iron intake.

In the previous study, enrolled subjects received iron and folic acid supplementation, hot cooked meal, and an additional supplementation of fortified atta (fortified wheat flour). According to a meta-analysis conducted by GAIN, India, 2021, no study was found in India where nutrient adequacy of the individual or household diet was observed.

However, for improving the nutrient adequacy of children, the average portion size of micronutrients should be approximately 33.33%.

Figure 4.30: Portion size needed to achieve an average of 33.3% of micronutrient requirements for iron, vitamin A, zinc, folate, vitamin B12, and calcium from complementary foods.



Source: Comprehensive Nutrient Gap Assessment (CONGA), 2021

With reference to the figure, it shows that the importance of nutrient-dense animal-sourced foods in young children's diets. However, for improving the nutrient adequacy of children, the average portion size of micronutrients should be approximately 33.33%. Achieving this 35 g of eggs, 28 g of ruminant meat, 3 g of chicken liver, and 1 g of the ruminant liver is required.

Due to the pandemic situation, children did not receive the fortified food commodities, which may be a determining factor in the observed reduction of iron consumption among

children. They were getting 1 kg Sukhadi (per week), which gives them 500 Kcal and 12-15 grams of protein so that the deterioration of health among children can be controlled. Respite the government's efforts; the impact was not seen among the children as it should have been evident since these children are in the growing stage. This indicates that the current portion sizes are not sufficient for them to meet their growth requirement.

Further, mothers of the children in the previous study received counseling for consuming food products rich in iron and vitamin A and fortified Atta-like ***Sukhadi, Laddu, Sheera***, etc. Earlier, the mean hemoglobin [Baseline] was 9.85±1.42g/dl. Observing the hemoglobin level of the same children at the end of one year showed an improvement of 13.00±1.32g/dl. Thus, along with the convergence of ICDS, IFA syrup, fortified food supplementation brought a positive impact on the population. The mean iron intake at the beginning of the study 2019-2020 was 6.83±2.64g and post counseling of 60 days brought the levels to 9.31±2.5.g. The gap period of 8 months showed the decline in dietary iron intake in 2020 October, where the observed levels were at 4.54±2.06g. Due to the COVID situation, we observed that neither supply of IFA nor fortified staples were available to the children.

The counseling provided improvement in the knowledge part, but in practice, to improvise, the iron remained at stake. This would have hampered further the growth pattern of the children.

The situation of COVID hampered various multi-sectoral inputs which were in place to address malnutrition in young children.

SUMMARY AND CONCLUSION

Poor accessibility and availability of nutritious food is the leading cause of malnutrition globally. Malnutrition is a condition of imbalances in nutrient intake. As per the reported evidence, the young children's diet in India is deficient in nutrients. UNICEF, 2020 said that only 16% of young children (6-23months old) consume a minimum number of recommended food groups in India. NFHS-4 data reveals that only 9% of children consume sufficient iron-rich food. In the south Asian region, the diet of young children generally lacks six micronutrients, namely; iron, vitamin A, zinc, folate, vitamin B12, and calcium. (Beal et al., 2021).

The socio-economic status of the study population revealed major religion of the interviewees of both the area was Hindu, i.e., 58.1% in Karelibaugh and 98.38% in Sawad. At the same time, approximately 41.86% in the Karelibaugh region and only 1.61% in the Sawad region follow the Muslim religion. In the Karelibaugh area, nearly 46.51%, 32.87%, and 20.93%, while in Sawad, almost 33.87%, 27.41%, and 38.7% belonged to joint, nuclear, and extended families. The proportion of families with extended families was more compared to the Karelibaugh area.

Out of 105 subjects, 46.51% and 44.18% of households in Karelibaugh and 54.83% and 45.16% in Sawad area were under the poverty line (BPL) and APL (*Above the poverty line*) ration card holders respectively, whereas 9.3% of household does not have an APL or BPL ration card.

As mothers were taken as the head of the family, their education and occupation status was seen. It was observed that In the Sawad region majority of the head of the family had only primary school certificates, i.e., 75.80% and 9.30% were illiterate. In contrast, in the Karelibaugh region, the family's frequency with primary school certificate, middle school certificate, high school certificate, and graduate was 34.88%, 16.27%, 18.60%, and 20.96%, respectively. Most of the Sawad and Karelibaugh region mothers were unemployed, i.e., 74.19% and 86.04% respectively, whereas 9.30% in Karelibaugh and 14.51% were involved either the Skilled Workers Shop or Market Sales Workers according to KuppuSwami socio-economic scale.

In India, the National Nutrition Monitoring Bureau data 2017 showed that the average household consumption of nutrients in an urban area as percentage RDA for Energy, Protein, Iron, Vitamin A, and Dietary Folate was 83.2%, 89.8%, 77.6%, 22.8%, and 101.1% respectively. The current study observed that the prevalence of HAZ, WHZ, severe WHZ, WAZ, and thinness was 60%, 45.26%, 9.52, 71.42%, and 43.79%, respectively overweight was 10.93%. Four individual groups were segregated, i.e., 36-47 months, 48-59 months, 60-70 months, and 71-80 months. Among the 36-47 months age group, the HAZ, WHZ, severe WHZ, WAZ, and thinness were 18.1%, 19.07%, 3.57%, 23.81%, and 13.33%. In 48-59 months, age group HAZ, WHZ, severe WHZ, WAZ, and thinness was 29.52%, 26.19%, 5.95%, 34.29%, and 20%, respectively. For 60-70 months and 71-80 months, HAZ is 5.71% and 6.67%, WAZ is 8.56% and 4.76%, while thinness 8.56% and 1.9%, respectively.

Gender-wise it was seen that male of 36-47 months age group WHZ, severe WHZ, HAZ, WAZ and thinness 18.74%, 2.08%, 17.85%, 26.78%, and 12.5% in 48-59 WHZ, severe WHZ, HAZ, WAZ, and thinness 27.09%, 4.17%, 30.36%, 35.72, and 21.43%, for 60-70 and 71-80 HAZ 8.94% and 3.58, WAZ 7.15% and 5.36% and thinness 5.36% and 1.79% respectively. While in female of 36-47 months age group WHZ 19.45%, severe WHZ 5.56%, HAZ 18.37, WAZ 20.41% and thinness 14.28% in 48-59 WHZ 25%, severe WHZ 8.33%, HAZ 28.56%, WAZ 32.65% and thinness 20% for 60-70 and 71-80 HAZ 8.16 and 10.2, WAZ 12.24% and 6.12% and thinness 12.24% and 2.04 respectively.

It was observed in the study among the age group of 1-3 years the consumption micronutrient was significantly less only carbohydrate, protein, and fat are the nutrients which consumed more than the RDA. While in the 4-6 years of age group, only carbohydrates and fat are consumed more (20.83%) and (-5.99).

Mean intake of macronutrient among the 1-3 years age children energy 497.96kcal, carbohydrate 52.20g, protein and total fat 12.93g and 26.06g while in 4-6 years age children energy, carbohydrate, protein, and total fat 512.54kcal, 54.38g, 16.51g, and 26.5g respectively. Micronutrient intake among 1-3 years age children was iron 2.27mg, iodine 39.72µg, retinol 102.94 µg, total ascorbic acid, and folate was 11.57mg and 42.52

µg among 4-6 years iron, IodineIodine, retinol was 2.27mg, 67.22 µg, 114.05 and total ascorbic acid and folate 13.27mg and 46.39 µg.

Compared to RDA in 1-3 years age children, micronutrient consumption was significantly less Iron 71.52%, retinol 73.60%, total ascorbic acid 61.44%, Total folate, and IodineIodine was 64.57% and 55.86. While among 4-6 years age children, iron 79.28%, retinol 77.93%, total ascorbic acid 62.06%, total folate, and IodineIodine was 65.63% and 67.22%, respectively.

Mean intake of macro and micronutrient among the boys of 1-3 years of age was energy 504kcal, carbohydrate 52.87g, Protein 12.76g, total fat 26.52g, total folate 39.88 µg, total ascorbic acid 10.89mg, retinol 100.91µg, iron 2.14mg, and IodineIodine 37.96µg while in girls' energy 486.91kcal, carbohydrate 51.00g, Protein 13.17g, total fat 25.24g and total folate 47.25µg, total ascorbic acid 12.78mg, retinol 106.60µg, iron 2.51mg, and Iodine 42.88µg. In 4-6 years of age group, boys were consuming energy 496.63kcal, carbohydrate 54.37g, Protein 13.05g, total fat 24.82g, total folate 49.66µg, total ascorbic acid 14.18mg, retinol 108.91µg, iron 2.40mg, and IodineIodine 38.92µg while girls consumed energy 528kcal, carbohydrate 54.37g, Protein 13.65g, total fat 28.12g, total folate 43.21µg, total ascorbic acid 12.36mg, retinol 118.921µg, iron 2.15mg, and IodineIodine 39.72µg respectively.

Iron is an essential constituent of the metalloprotein hemoglobin and myoglobin. Both proteins help in the transport of oxygen throughout our bodies. Consumption of iron-rich foods was significantly less as most of them are consumed weekly in both areas (Karelibaugh and Sawad). In contrast, vitamin A and C-rich fruits and vegetables were majorly consumed on a seasonal basis as their availability was more. For fortified commodities, only fortified oil and double fortified salt were consumed by the population. The mother of the respective communities was counseled on anemia, fortification, identification of fortified commodities, and healthy eating practices. After the counseling was given, the mothers' knowledge on anemia, fortification, and identification of fortified things increased, i.e., 20% with improved knowledge score 68.33% with average knowledge score and 11.67% with average knowledge score poor knowledge score respectively. In a nutshell, it can be said that young children in India are

deficient in almost all the vital nutrients such as iron, vitamin A, zinc, calcium, thiamine, niacin, vitamin B12, vitamin B6, folate, and vitamin C. Hence there is a need to give attention over the micronutrient requirement of young children. It is not wrong to say that this persisting pandemic is worsening our population's nutritional status. As per the responses of the AWW, it was observed that due to the pandemic, nearly every service of the ICDS was provided at the doorsteps of the households. According to a leading organization like WHO UNO and FAO 2020, it is unlikely that this SARS Co-2 can be transmitted from food to food. As per the available literature review, none of the strain of this virus was detected in tap water. COVID-19 destructive every aspect of our routine life. It affected the marginalized section of the global community the most due to the international and national shutdown and restrictions. It involved the plantation and harvesting work, too, due to the unavailability of the guest work. In this study impact of COVID-19 on the functioning of Anganwadi centers was observed. It was revealed that services such as distribution of IFA tablets and routine checkups of children were affected the most. However, during this time, children received *Sukhadi*. It clearly states that due to the pandemic, normal functions of ICDS units (i.e., AWWs) were affected. The non-formal preschool education component was adversely affected because of the lockdown and social distancing. Children did not receive their early stimulation of education.

CONCLUSION

The most commonly consumed food was rice, wheat flour, milk, potato, red gram dal, etc. from the recommended eight food groups by WHO minimum of five was consumed. In iron, vitamin-a and Vitamin-c rich fruits and vegetables were mostly consumed on a seasonal basis.

Increase in knowledge of the mothers is observed after counselling even the 2 mothers from Sawad and 4 mothers from karelibaugh stated they consumed fortified wheat flour.

Fortified flour given in the previous study showed positive impact on hb level among the children and even some of the children demanded for the flour again.

When accessibility towards foods was observed, all families could not reach affordable purchases. Hence there was minimal consumption observed based on their income. It is noteworthy that they were highly dependent on the hot-cooked meal provisions provided through ICDS and other government support channels like PDS.

Increase in knowledge of the mothers is observed after counselling even the 2 mothers from Sawad and 4 mothers from karelibaugh stated they consumed fortified wheat flour.

Major highlights

- This study was conducted during the peak COVID period with appropriate precautionary guidance.
- It was observed that the population was not receiving any fortified commodities from Anganwadi Centers except Double Fortified Salt.
- The households purchased fortified oil from local market shops.
- It was also observed that malnourishment among the children from the selected Anganwadi's is at risk.
- Fortified Flour Played a significant role in improving children's Hb status as their dietary iron consumption was deficient.

Limitations

- Due to the covid pandemic situation, some subjects refused to participate, so instead of them, others subject from the same area of the same age groups were enrolled.
- Some of the population also migrated.
- Measurement of Hb of some subjects was possible since others did not agree due to covid.
- Since red alert was declared, counseling and post-data collection were not carried out effectively during the pandemic.

Recommendation

- Decentralization up to village/ Panchayat level to provide hot cooked meals can be tried as one option.
- Reachability to all mothers should be ensured.
- Appropriate counseling through digital platforms should be prenoted.
- Inclusion of bigger age group should be there in NFHS data other than under 5
- The development of SMART Anganwadi should be started with speed so that the targeted age groups get attracted and come to Anganwadi regularly.
- Accessibility of fortified foods through government channels should be made so that their consumption increases.

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ANNEXURES

Annexure 1 (a): Permission obtained from IECHR

Institutional Ethics Committee for Human Research (IECHR)

FACULTY OF FAMILY AND COMMUNITY SCIENCES
THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA

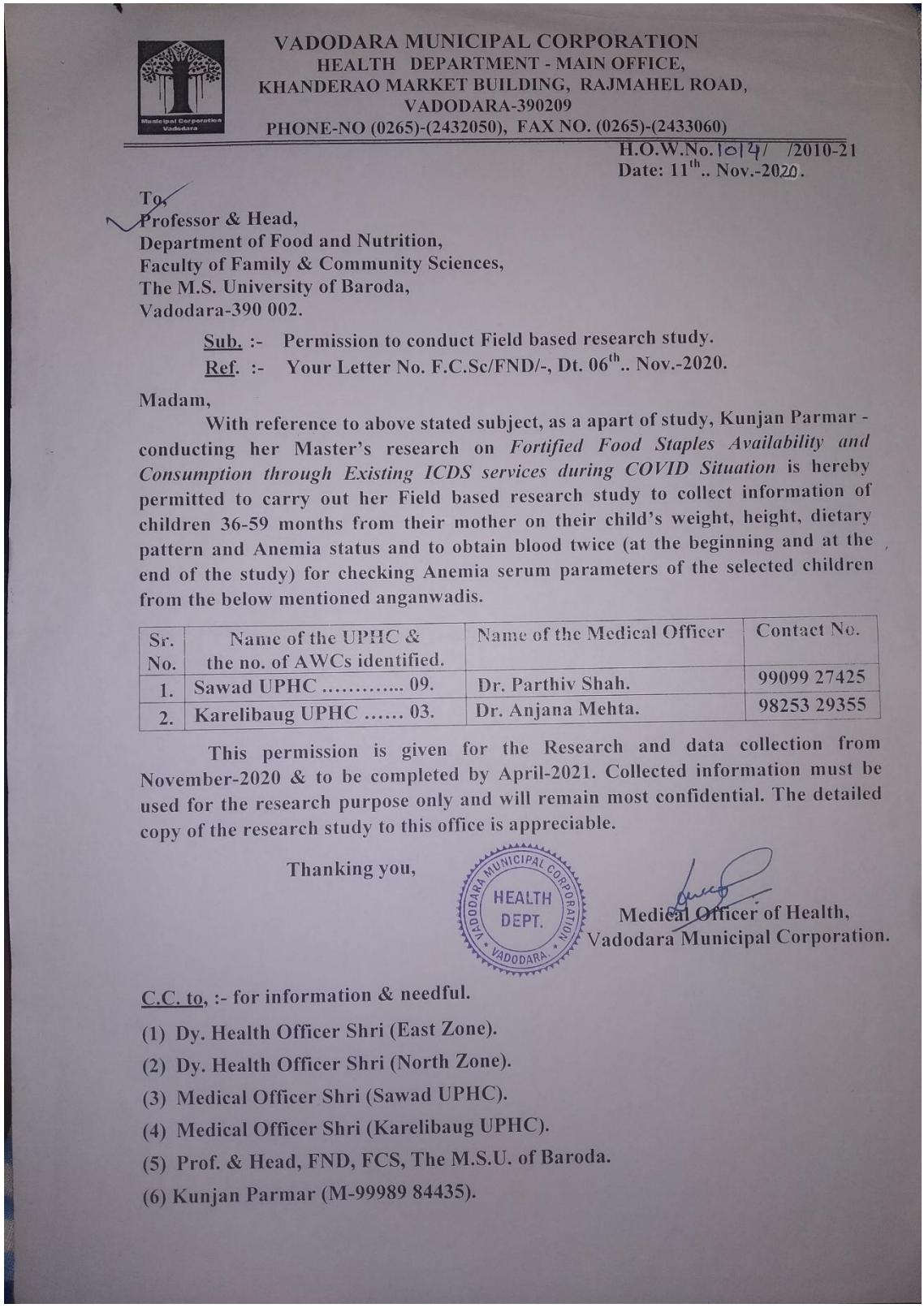
Ethical Compliance Certificate 2020 – 2021

This is to certify that **Ms. Parmar Kunjan Pankaj**'s study titled, "**Fortified Food Staples Availability, Consumption and Assessing its impact through Existing ICDS services during Covid situation (2020 – 2021)**" has been approved by the Institutional Ethics Committee for Human Research (IECHR), Faculty of Family and Community Science, The Maharaja Sayajirao University of Baroda. The study has been allotted the ethical approval number **IECHR/FCSc/2020/52.**

Prof Mini Sheth
Member Secretary
IECHR

Prof Shagufa Kapadia
Chairperson
IECHR

Annexure 1 (b): Permission obtained from VMC



VADODARA MUNICIPAL CORPORATION
HEALTH DEPARTMENT - MAIN OFFICE,
KHANDERAO MARKET BUILDING, RAJMAHEL ROAD,
VADODARA-390209
PHONE-NO (0265)-(2432050), FAX NO. (0265)-(2433060)

H.O.W.No.1014/ /2010-21
Date: 11th.. Nov.-2020.

To,
Professor & Head,
Department of Food and Nutrition,
Faculty of Family & Community Sciences,
The M.S. University of Baroda,
Vadodara-390 002.

Sub. :- Permission to conduct Field based research study.
Ref. :- Your Letter No. F.C.Sc/FND/-, Dt. 06th.. Nov.-2020.

Madam,

With reference to above stated subject, as a apart of study, Kunjan Parmar - conducting her Master's research on *Fortified Food Staples Availability and Consumption through Existing ICDS services during COVID Situation* is hereby permitted to carry out her Field based research study to collect information of children 36-59 months from their mother on their child's weight, height, dietary pattern and Anemia status and to obtain blood twice (at the beginning and at the end of the study) for checking Anemia serum parameters of the selected children from the below mentioned anganwadis.

Sr. No.	Name of the UPHC & the no. of AWCs identified.	Name of the Medical Officer	Contact No.
1.	Sawad UPHC ..... 09.	Dr. Parthiv Shah.	99099 27425
2.	Karelibaug UPHC ..... 03.	Dr. Anjana Mehta.	98253 29355

This permission is given for the Research and data collection from November-2020 & to be completed by April-2021. Collected information must be used for the research purpose only and will remain most confidential. The detailed copy of the research study to this office is appreciable.

Thanking you,

VADODARA MUNICIPAL CORPORATION HEALTH DEPT. VADODARA

Medical Officer of Health,
Vadodara Municipal Corporation.

C.C. to, :- for information & needful.

(1) Dy. Health Officer Shri (East Zone).
(2) Dy. Health Officer Shri (North Zone).
(3) Medical Officer Shri (Sawad UPHC).
(4) Medical Officer Shri (Karelibaug UPHC).
(5) Prof. & Head, FND, FCS, The M.S.U. of Baroda.
(6) Kunjan Parmar (M-99989 84435).

Annexure 2 (a): Consent Form Mothers (English)

THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA

FACULTY OF FAMILY AND COMMUNITY SCIENCES

DEPARTMENT OF FOODS AND NUTRITION

CONSENT FORM

(Mothers of Children aged 36-59 months)

Date: / /

Research Topic: Fortified Food Staples Availability and Consumption through Existing ICDS Services during COVID Situation (2020-2021)

Primary Investigator: Prof. (Dr.) Sirimavo Nair

Student: Kunjan Parmar

Micronutrients are essential for body functions they are important for growth of the body and for producing enzymes and hormones. Their deficiency leads to various problem in the body. Iron, Iodine and Vitamin A are the major problems currently. Their impact is not only seen in the individual's health but also country's economy is also affected.

Considering this I am doing my master's research on availability of fortified foods under ICDS and their impact on the individual. For this I require information about your child's dietary consumption pattern. Also, your acceptance to consume the fortified wheat flour

and anthropometric measurements and blood would be taken of the child for the nutritional and biochemical assessment (Depending on the situation)

It will take 30 minutes to provide this information. During the interview if you don't know about some questions or don't want to answer any question then you can avoid the question. This information will be used for research purpose only if you want any kind of information regarding research you can contact below mentioned numbers. We need your consent for the research. Sign the form to give consent.

Prof. (Dr.) Sirimavo Nair: 9899698277 or Kunjan Parmar: 9998984435

I _____ give consent to enroll in the research, purpose of the research was explained and liberty of leaving research at any point of time is given

Date:
Sign:

Contact No:

Address:

Annexure 2(b): Consent Form Mothers (Gujarati)

सत्यं शिवं सुन्दरम्

THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA

FACULTY OF FAMILY AND COMMUNITY SCIENCES

DEPARTMENT OF FOODS AND NUTRITION

સૂચિત સમંતિ પત્ર

(૩૬-૫૯ મહીના ના બાળકોની માતા માટે)

તારીખઃ / /

સંશોધન વિષયઃ ફોર્ટીફાઇડ ફુડ સ્ટેપલ્સ અવેઇલેબીલીટી એન્ડ કન્સમ્પશન થ્રુ એડિઝસટન્સ આઇ.સી.ડી.એસ. સર્વિસીસ ડયુરીંગ પ્રેવિડ સીમ્યુએશન (૨૦૨૦-૨૧)

મુખ્ય સંશોધક : પ્રોફ.(ડો.).સીરીમાવો નાયર
વિદ્યાર્થી : કુંજન પરમાર

સુક્ષ્મ પોષકતત્વો શરીરના પ્રર્યો માટે જરૂરી છે. તે શરીરની વૃદ્ધિ માટે, ઉત્સેચકો અને હોર્મોન્સ ઉત્પન્ન કરવા માટે મહત્વપૂર્ણ છે. તેમની ઉણપથી શરીરમાં વિવિધ સમસ્યા થાય છે. આર્યન, આયોડીન અને વિટામિન A એ હાલમાં મોટી સમસ્યાઓ છે. તેમની અસર ફકત વ્યક્તિના સ્વાસ્થ્ય પર જ નહી પરંતુ, દેશની અર્થવ્યવસ્થાને પણ થાય છે.

આને ધ્યાનમાં રાખીને હું આઇ.સી.ડી.એસ. હેઠળ ફોર્ટીફાઇડ ખોરાકની ઉપલબ્ધતા અને તેનો વ્યક્તિગત પર પ્રભાવ વિશે સંશોધન કરી રહી છું. આ માટે મારે તમારા બાળકના આહાર વપરાશની રીત વિશેની માહિતીની જરૂર છે. ઉપરાંત તેની માટે તમારી ફોર્ટીફાઇડ થઉના લોટના વપરાશ પ્રત્યે સ્વીકૃતતા તથા તમારા બાળકની ઊંચાઇ, વજન (એન્થ્રોપોમેટ્રીક માપન) અને લોહીનો નમુનો પોષણ સ્તર અને બાયોકેમીકલ ચકાસણી માટે લેવામાં આવશે. (પરિસ્થિતિના આધારે)

આ માહિતી મેળવવા ૩૦ મિનિટનો સમય લાગશે. ઈન્ટરવ્યુ દરમિયાન જો તમને કેટલાક પ્રશ્નો વિશે ખબર નથી હોતી અથવા કોઇ પ્રશ્નનો જવાબ આપવા માંગતા ન હોય તો તમે પ્રશ્ન ટાળી શકો છો. આ માહિતી સંશોધન પુરતી સીમિત રાખવામાં આવશે અને સંશોધનને લગતી કંઇ પણ માહિતી જાણવી હોય તો નીચે આપેલ પ્રેન્ટેડ્ટ નં. પર સંપર્ક કરી શકો છો.

પ્રોફ.(ડો.).સીરીમાવો નાયરઃ૯૮૯૯૬૬૮૨૭૭ કુંજન પરમારઃ૯૯૯૯૯૮૪૪૩૫

હું _____ સંમતિ આપુ છું આ સંશોધનમાં દાખલ થવા, સંશોધનનો હેતુ અને કોઇ પણ જગ્યાએ સંશોધન છોડવાની સ્વાતંત્ર્યતા આપવામાં આવેલ છે.

તારીખઃ / / સહીઃ _____

પ્રેન્ટેડ્ટ નં.: _____

સરનામું: _____

Annexure 2(c): Assent Form for children (English)

THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA

FACULTY OF FAMILY AND COMMUNITY SCIENCES

DEPARTMENT OF FOODS AND NUTRITION

Assent FORM

(Mothers of Children aged 36-59 months)

Date: / /

Research Topic: Fortified Food Staples Availability and Consumption through Existing ICDS Services during COVID Situation (2020-2021)

Primary Investigator: Prof. (Dr.) Sirimavo Nair

Student: Kunjan Parmar

Micronutrients are essential for body functions they are important for growth of the body and for producing enzymes and hormones. Their deficiency leads to various problem in the body. Iron, Iodine and Vitamin A are the major problems currently. Their impact is not only seen in the individual's health but also country's economy is also affected.

Considering this I am doing my master's research on availability of fortified foods under ICDS and their impact on the individual. For this I require information about your child's dietary consumption pattern. Also your acceptance to consume the fortified wheat flour and anthropometric measurements and blood would be taken of the child for the nutritional and biochemical assessment (Depending on the situation)

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Prof. (Dr.) Sirimavo Nair: 9899698277 or Kunjan Parmar: 9998984435

I _____ give consent to enroll in the research, purpose of the research was explained and liberty of leaving research at any point of time is given.

Date: Sign:

Contact No:

Address:

Annexure 2(d): Assent Form for children (Gujarati)

सत्यं शिवं सुन्दरम्

THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA

FACULTY OF FAMILY AND COMMUNITY SCIENCES

DEPARTMENT OF FOODS AND NUTRITION

સૂચિત સમંતિ પત્ર

(૩૬-૫૯ મહીના ના બાળકોની માતા માટે)

તારીખ: / /

સંશોધન વિષય: ફોર્ટીફાઇડ ફુડ સપ્લીમેન્ટ અવેઇલેબીલીટી એન્ડ કન્સમ્પશન થ્રુ એડિઝસટન્સ આઇ.સી.ડી.એસ. સર્વિસીસ ડયુરીંગ કોવિડ સીચ્યુએશન (૨૦૨૦-૨૧)

મુખ્ય સંશોધક : પ્રોફ.(ડો.).સીરીમાવો નાયર
વિદ્યાર્થી : કુંજન પરમાર

સુક્ષ્મ પોષકતત્વો શરીરના કાર્યો માટે જરૂરી છે. તે શરીરની વૃદ્ધિ માટે, ઉત્સેચકો અને હોર્મોન્સ ઉત્પન્ન કરવા માટે મહત્વપૂર્ણ છે. તેમની ઉણપથી શરીરમાં વિવિધ સમસ્યા થાય છે. આર્યન, આયોડીન અને વિટામિન A એ હાલમાં મોટી સમસ્યાઓ છે. તેમની અસર ફકત વ્યકિતના સ્વાસ્થ્ય પર જ નહીં પરંતુ, દેશની અર્થવ્યવસ્થાને પણ થાય છે.

આને ધ્યાનમાં રાખીને હું આઇ.સી.ડી.એસ. હેઠળ ફોર્ટીફાઇડ ખોરાકની ઉપલબ્ધતા અને તેનો વ્યકિતગત પર પ્રભાવ વિશે સંશોધન કરી રહી છું. આ માટે મારે તમારા બાળકના આહાર વપરાશની રીત વિશેની માહિતીની જરૂર છે. ઉપરાંત તમારી ફોર્ટીફાઇડ થઉના લોટના વપરાશ પ્રત્યે સ્વીકૃતી તથા તમારા બાળકની ઊંચાઇ, વજન (એન્થ્રોપોમેટ્રીક માપન) અને લોહીનો નમુનો પોષણ સ્તર અને બાયોકેમીકલ ચકાસણી માટે લેવામાં આવશે. (પરિસ્થિતિના આધારે)

આ માહિતી મેળવવા ૩૦ મિનિટનો સમય લાગશે. ઈન્ટરવ્યુ દરમિયાન જો તમને કેટલાક પ્રશ્નો વિશે ખબર નથી હોતી અથવા કોઇ પ્રશ્નનો જવાબ આપવા માંગતા ન હોય તો તમે પ્રશ્ન ટાળી શકો છો. આ માહિતી સંશોધન પુરતી સીમિત રાખવામાં આવશે અને સંશોધનને લગતી કંઇ પણ માહિતી જાણવી હોય તો નીચે આપેલ ફોન્ટેક્ટ નં. પર સંપર્ક કરી શકો છો.

પ્રોફ.(ડો.).સીરીમાવો નાયર:૯૮૯૮૬૬૮૨૭૭ કુંજન પરમાર:૯૯૯૮૯૮૪૪૩૫

હું _____ સંમતિ આપુ છું આ સંશોધનમાં દાખલ થવા, સંશોધનનો હેતુ અને કોઇ પણ જગ્યાએ સંશોધન છોડવાની સ્વાતંત્ર્યતા આપવામાં આવેલ છે.

તારીખ: / / સહી: _____

ફોન્ટેક્ટ નં.: _____

Annexure 2 (e) Consent form for mothers for socio-economic status (English)

THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA

FACULTY OF FAMILY AND COMMUNITY SCIENCES

DEPARTMENT OF FOODS AND NUTRITION

CONSENT FORM (Mothers)

Date: / /

Research Topic: Fortified Food Staples Availability and Consumption through Existing ICDS Services during COVID Situation (2020-2021)

Primary Investigator: Prof. (Dr.) Sirimavo Nair

Student: Kunjan Parmar

Micronutrients are essential for body functions they are important for growth of the body and for producing enzymes and hormones. Their deficiency leads to various problem in the body. Iron, Iodine and Vitamin A are the major problems currently. Their impact is not only seen in the individual's health but also country's economy is also affected.

Considering this I am doing my master's research on availability of fortified foods under ICDS and their impact on the individual. For this I require information about your socio-economic status and acceptance to consume the fortified wheat flour.

It will take 30 minutes to provide this information. During the interview if you don't know about some questions or don't want to answer any question then you can avoid the question. This information will be used for research purpose only if you want any kind of information regarding research you can contact below mentioned numbers. We need your consent for the research. Sign the form to give consent.

Prof. (Dr.) Sirimavo Nair: 9899698277 or Kunjan Parmar: 9998984435

I _____ give consent to enroll in the research, purpose of the research was explained and liberty of leaving research at any point of time is given.

Date: Sign:

Contact No:

Address:

Annexure 2 (e) Consent form for mothers for socio-economic status (Gujarati)

THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA

FACULTY OF FAMILY AND COMMUNITY SCIENCES

DEPARTMENT OF FOODS AND NUTRITION

સૂચિત સમંતિ પત્ર

(માતા માટે)

તારીખ: / /

સંશોધન વિષય: ફોર્ટીફાઇડ ફુડ સ્ટેપલ્સ અવેઇલેબીલીટી એન્ડ કન્સમ્પશન બ્રુ એડિઝસટન્સ આઇ.સી.ડી.એસ. સર્વિસીસ ડયુરીંગ કોવિડ સીચ્યુએશન (૨૦૨૦-૨૧)

મુખ્ય સંશોધક : પ્રોફ.(ડો.).સીરીમાવો નાયર
વિદ્યાર્થી : કુંજન પરમાર

સુક્ષ્મ પોષકતત્વો શરીરના પ્રાર્યો માટે જરૂરી છે. તે શરીરની વૃદ્ધિ માટે, ઉત્સેચકો અને હોર્મોન્સ ઉત્પન્ન કરવા માટે મહત્વપૂર્ણ છે. તેમની ઉણપથી શરીરમાં વિવિધ સમસ્યા થાય છે. આર્યન, આયોડીન અને વિટામિન A એ હાલમાં મોટી સમસ્યાઓ છે. તેમની અસર ફકત વ્યકિતના સ્વાસ્થ્ય પર જ નહી પરંતુ, દેશની અર્થવ્યવસ્થાને પણ થાય છે.

આને ધ્યાનમાં રાખીને હું આઇ.સી.ડી.એસ. હેઠળ ફોર્ટીફાઇડ ખોરાકની ઉપલબ્ધતા અને તેનો વ્યકિતગત પર પ્રભાવ વિશે સંશોધન કરી રહી છું. આ માટે મારે તમારા બાળકના આહાર વપરાશની રીત વિશેની માહિતીની જરૂર છે. ઉપરાંત તેની માટે તમારી ફોર્ટીફાઇડ થઉના લોટના વપરાશ પ્રત્યે સ્વીકૃતતા તથા સામાજીક આર્થિક સ્થિતિ અંગે માહિતી લેવામાં આવશે.

આ માહિતી મેળવવા ૩૦ મિનિટનો સમય લાગશે. ઈન્ટરવ્યુ દરમિયાન જો તમને કેટલાક પ્રશ્નો વિશે ખબર નથી હોતી અથવા કોઇ પ્રશ્નનો જવાબ આપવા માંગતા ન હોય તો તમે પ્રશ્ન ટાળી શકો છો. આ માહિતી સંશોધન પુરતી સીમિત રાખવામાં આવશે અને સંશોધનને લગતી કંઇ પણ માહિતી જાણવી હોય તો નીચે આપેલ ફોન્ટેક્ટ નં. પર સંપર્ક કરી શકો છો.

પ્રોફ.(ડો.).સીરીમાવો નાયર:૯૮૯૯૬૯૮૨૭૭ કુંજન પરમાર:૯૬૯૮૯૮૪૪૩૫

હું _____ સંમતિ આપુ છું આ સંશોધનમાં દાખલ થવા, સંશોધનનો હેતુ અને કોઇ પણ જગ્યાએ સંશોધન છોડવાની સ્વાતંત્યતા આપવામાં આવેલ છે.

તારીખ: / / સહી: _____

ફોન્ટેક્ટ નં.: _____

સરનામું: _____

Annexure 2 (f) Consent form for UHC (English)

THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA

FACULTY OF FAMILY AND COMMUNITY SCIENCES

DEPARTMENT OF FOODS AND NUTRITION

CONSENT FORM (UHC)

Date: / /

Research Topic: Fortified Food Staples Availability and Consumption through Existing ICDS Services during COVID Situation (2020-2021)

Primary Investigator: Prof. (Dr.) Sirimavo Nair

Student: Kunjan Parmar

Micronutrients are essential for body functions they are important for growth of the body and for producing enzymes and hormones. Their deficiency leads to various problem in the body. Iron, Iodine and Vitamin A are the major problems currently. Their impact is not only seen in the individual's health but also country's economy is also affected.

Considering this I am doing my master's research on availability of fortified foods under ICDS and their impact on the individual. For this I require information on the acceptance to consume the fortified wheat flour and about nutrition status of child his/her anemia status and if they have any complication.

It will take 30 minutes to provide this information. During the interview if you don't know about some questions or don't want to answer any question then you can avoid the question. This information will be used for research purpose only if you want any kind of information regarding research you can contact below mentioned numbers. We need your consent for the research. Sign the form to give consent.

Prof. (Dr.) Sirimavo Nair: 9899698277 or Kunjan Parmar: 9998984435

I _____ give consent to enroll in the research, purpose of the research was explained and liberty of leaving research at any point of time is given.

Date:

Sign:

Contact No:

Address:

Annexure 2 (g) Consent form for UHC (Gujarati)

सत्यं शिवं सुन्दरम्

THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA

FACULTY OF FAMILY AND COMMUNITY SCIENCES

DEPARTMENT OF FOODS AND NUTRITION

સૂચિત સમંતિ પત્ર

(યુ.એચ.સી માટે)

તારીખઃ / /

સંશોધન વિષયઃ ફોર્ટીફાઇડ ફુડ સ્ટેપલ્સ અવેઇલેબીલીટી એન્ડ કન્સમ્પશન ધ્રુ એડિઝસટન્સ આઇ.સી.ડી.એસ. સર્વિસીસ ડ્યુરીંગ કોવિડ સીચ્યુએશન (૨૦૨૦-૨૧)

મુખ્ય સંશોધક : પ્રોફ.(ડો.).સીરીમાવો નાયર
વિદ્યાર્થી : કુંજન પરમાર

સુક્ષ્મ પોષકતત્વો શરીરના કાર્યો માટે જરૂરી છે. તે શરીરની વૃદ્ધિ માટે, ઉત્સેચકો અને હોર્મોન્સ ઉત્પન્ન કરવા માટે મહત્વપૂર્ણ છે. તેમની ઉણપથી શરીરમાં વિવિધ સમસ્યા થાય છે. આર્યન, આયોડીન અને વિટામિન A એ હાલમાં મોટી સમસ્યાઓ છે. તેમની અસર ફકત વ્યકિતના સ્વાસ્થ્ય પર જ નહી પરંતુ, દેશની અર્થવ્યવસ્થાને પણ થાય છે.

આને ધ્યાનમાં રાખીને હું આઇ.સી.ડી.એસ. હેઠળ ફોર્ટીફાઇડ ખોરાકની ઉપલબ્ધતા અને તેનો વ્યકિતગત પર પ્રભાવ વિશે સંશોધન કરી રહી છું. આ માટે મારે તમારા બાળકના આહાર વપરાશની રીત વિશેની માહિતીની જરૂર છે. તેના માટે તમારી ફોર્ટીફાઇડ થઉના લોટના વપરાશ પ્રત્યે સ્વીકૃતતા તથા તમારા બાળકનુ પોષણ સ્તર, અનેમિયાનુ સ્તર અને બીજી કોઇ સમસ્યા વિશે માહિતી લેવામાં આવશે.

આ માહિતી મેળવવા ૩૦ મિનિટનો સમય લાગશે. ઈન્ટરવ્યુ દરમિયાન જો તમને કેટલાક પ્રશ્નો વિશે ખબર નથી હોતી અથવા કોઇ પ્રશ્નનો જવાબ આપવા માંગતા ન હોય તો તમે પ્રશ્ન ટાળી શકો છો. આ માહિતી સંશોધન પુરતી સીમિત રાખવામાં આવશે અને સંશોધનને લગતી કંઇ પણ માહિતી જાણવી હોય તો નીચે આપેલ ફોન્ટેક્ટ નં. પર સંપર્ક કરી શકો છો.

પ્રોફ.(ડો.).સીરીમાવો નાયર:૯૮૮૯૯૬૯૮૨૭૭ કુંજન પરમાર:૯૯૯૮૯૮૪૪૩૫

હું _____ સંમતિ આપુ છું આ સંશોધનમાં દાખલ થવા, સંશોધનનો હેતુ અને કોઇ પણ જગ્યાએ સંશોધન છોડવાની સ્વાતંત્ર્યતા આપવામાં આવેલ છે.

તારીખઃ / / સહીઃ _____

ફોન્ટેક્ટ નં.: _____

સરનામું: _____

Annexure 3 (a): Questionnaire	
FORM NO: ફોર્મ નો:	DOB: / / જન્મ તા. / / AGE: ઉંમર:
Name of the investigator તપાસકર્તા નુ નામ	
District જીલ્લો	
Area એરીઆ	
Name of the Anganwadi આંગણવાડી નું નામ	
Name of the Anganwadi worker અંગન્વાડીવોર્કર નું નામ	
Socio-Economic Status સામાજિક આર્થિક પરિસ્થિતિ	
1. Name of the mother ૧.માતા નું નામ	
2. Phone No. ૨. ફોન નો.	
3. Head Of the family ૩.ઘરના વડા નું નામ	
4. Religion ૫. ધર્મ	1.Hindu ૧.હિંદુ 2.Muslim ૨.મુસ્લિમ 3.Sikh ૩.સીખ 4.Christian ૪.ક્રિશ્ચિયન 5.Jain ૫.જેઇન 6.Others

	૬.અન્ય
5. Caste ૬.જાતી	1. ST ૧.એસટી 2. SC ૨.એસી 3.OBC ૩.ઓબીસી 4.General ૪.જનરલ
6.Economic status ૬. આર્થિક સ્તીથી	1.APL એપીએલ 2 BPL બીપીએલ
7.Education of the head of the family ૬.ઘરના વાળા નો અભ્યાસ	1 Profession or Honours ૧. હોન્નર્સ 2 Graduate ૨.સ્નાતક 3 Intermediate or diploma મધ્યવર્તી અથવા ડીપ્લોમાં 4 High school certificates ૪.ઉચ્ચ શાળા 5 Middle school certificates ૫.માધ્યમ શાળા 6 Primary school certificates પ્રાથમિક શાળા 7Illiterate ૭.અભણ
8.Occupation of the Head of the family ઘરના વાળનો વ્યવસાય	1 Legislators, Senior Officials & Managers ૧.ધારા સભ્યો, વરિષ્ઠઅધિકારીઓ અને મેનેજરો 2 Professionals ૨.વ્યવસાયિક

	3 Technicians and Associate Professionals ૩.તેચ્નીશીચ્ન અને સહયોગ વ્યવસાયિક 4 Clerks ૪.કારકુન 5 Skilled Workers and Shop & Market Sales Workers ૫.કુશળ કામદારો and દુકાન વેચાણકામદાર 6 Skilled Agricultural & Fishery Workers ૬.કુશળ કૃષિ અને માછીમાર 7 Craft & Related Trade Workers ૭.હસ્તકલા અને સંબંધિત વેપારીયો 8 Plant & Machine Operators and Assemblers ૮.યંત્ર ચલવનાર 9 Elementary Occupation ૯.પ્રારંભીક વ્યવસાય 10 Unemployed ૧૦.બેરોજગાર
9.Occupation Of the mother ૯.માતાનો વ્યવસાય	1.Unemployed ૧.બેરોજગાર 2. Labour મજુર 3.Skilled worker કુશળ કારીગર 4.Own business ૪.પોતાનો ધંધો 5.Govt. Service સરકારી નોકરી 6.Private job ૬.ખાનગી નોકરી

	7.Housewife ગૃહિણી
11.Total No. of family member ૧૧. ઘરમાં સભ્યો ની સંખ્યા	
12.Total no. of children in the family ૧૨. ઘરમાં કેટલા બાળકો છે	
13.Total Family monthly income (rs) ૧૩.ઘરની મહિનાની આવક	
14.Total Per capita income (rs) ૧૪.માથાદીઠ આવક	
15.Total Income Spend On Food Purchase ૧૫.આવક ખોરાક ખરીદી પર ખરચવામાં	
16.Total Income Spend On Non Food-Items ૧૬.બિન-ખાવાની વસ્તુઓ પર ખરીદવાની આવક?	
Nutritional status Of Child બાળક ની પોષણ સ્તીથી	
Name Of The Child: બાળક નું નામ DOB: જન્મ તા. AGE: ઉમર:	

Gender: લિંગ:	
3. Anthropometric measurement ૩. માંનાશાસત્ર માપન	
1.Weight (kg) ૧. વજન	
2.Height (cm) ૨.ઉંચાઇ	
3.BMI ૩. સારારિક વજન નો આંક	
4.MUAC (cm) ૪. બાવળા નો માપ	
4. Biochemical ૫.બાયોકેમીકલ	
Haemoglobin g/dl હિમોગ્લોબીનગ ગ/ડી.એલ.	1≥12.0 g/dl **૧. ≥12.0** ગ/ડી. એલ 2.10.0-11.9 g/dl (mild), **૨.10.0-11.9** ગ/ડી.એલ 3. 7.0-9.9 g/dl (moderate) **૩. 7.0-9.9** ગ/ડી. એલ 4.<7.0g/dl (severe). **૪.<7.0** ગ/ડી. એલ

Knowledge and Practice of Mother

1. Does your child go to anganwadi? ૧. બાળક અંગન્વાડી પર જાઈ છે?	1.Yes **૧.હા** 2.No **૨.ના**
2. If yes, how frequently? ૨. અગર હા, તો કેટલી વાર	1. Weekly **૧.અઠવાડિયે** 2.Once in a month **૨.મહિનામાં માં એક વાર** 3.Twice a month **૩.મહિનામાં બે વાર** 4.Thrice a month **૪.મહિનામાં ત્રણ વાર**
3. Does he/she get IFA syrup at Anganwadi? ૩. શું તમારા બાળક ને આઇ એફ એ સિરપ મળે છે અંગન્વાડી પર થી?	1.Yes **૧.હા** 2.No **૨.ના**
4. If yes, how frequently? ૪. અગર હા, તો કેટલી વાર	1. Weekly **૧.અઠવાડિયે** 2.Once in a month **૨.મહિનામાં માં એક વાર** 3.Twice a month **૩.મહિનામાં બે વાર**

	4.Thrice a month **૪.મહિનામાં ત્રણ વાર**
5. Does your child get meal in the anganwadi? ૫ શું તમારા બાળક ને જમવાનું મળે છે અન્ગન્વાડી પર?	1.Yes **૧.હા** 2.No **૨.ના**
6. If yes how many? ૬. અગર હા તો કેટલી વાર?	1.One meal **૧. એક વાર** 2.Two Meal **૨.બે વાર**
7. Do you know about malnutrition? ૭. શું તમને કુપોષણ વિશે ખબર છે?	1.Yes **૧.હા** 2.No **૨.ના**
8. If yes, what is malnutrition? ૮. અગર હા તો કુપોષણ શું છે?	
9. Do you know what is micronutrient deficiencies? ૯. શું તમને સૂક્ષ્મ પોશાક્તાત્વો ના લીધે થતી ઉણોપો વિશે ખબર છે?	1.Yes **૧.હા** 2.No **૨.ના**
10. If yes, what is micronutrient deficiency? ૧૦. અગર હા તો સૂક્ષ્મ પોશાક્તાત્વો ના લીધે થતી ઉણોપો કઈ છે?	1.iron **૧.આયર્ન** 2.iodine **૨.આયોડીન** 3.vitamin A **૩.વિટામીન-એ** 4.zinc **૪.ઝહીંક**

	5.Folate ૫.ફોલેટ
11. Do you know about anemia? ૧૧.શું તમને અનેમિયા(પાંડુરોગ) વિશે ખબર છે?	1.Yes **૧.હા** 2.No **૨.ના**
12. From where did you get to know? ૧૨.ક્યાં થી ખબર પડી?	1.Anganwadi **૧.અંગન્વાડી** 2.Hospital **૨.દવાખાનું** 3.IEC **૩.આઇ ઈ સી** 4.Other **૪.અન્ય**
13. What is Anemia? ૧૩. અનેમિયા(પાંડુરોગ) શું છે?	
14. Causes of anemia? ૧૪. અનેમિયા(પાંડુરોગ) કારણો શું છે?	1.Weakness **૧.અશક્તી** 2.Blood loss during pregnancy **૨.ઓછો આયરન યુકત આહાર** 3.lack of iron rich diet **૩.ડીલીવરી ના વખતે લોહી નું વધારે પ્રમાણમાં વહી જવું** 4.Loss of blood during accident **૪.અકસ્માત ના સમય લોહી વધારે પ્રમાણમાં વહી જવું** 5.Frequent illness **૫.વારંવાર બીમાર પડવું** 6.other **૬.અન્ય**

15. Symptoms Of Anemia ૧૫.અનેમિયા(પાંડુરોગ) ના લક્ષણો શું છે?	1.Weakness **૧. અશક્તી** 2.Palness in eyes, tongue and nails **૨.આંખ,જીભ અને નખ માં ફિકાસ** 3.Breathing problem **૩.શ્વાસ લેવામાં તકલીફ** 4.headache **૪.મથામાં દુખાવો** 5.dizziness **૫.ચક્કર**
16. Cure for Anemia ૧૬. અનેમિયા(પાંડુરોગ) થી બચવા શું કરાઈ?	1.Increase intake of iron rich foods **૧.આયરન યુકત આહાર નો પ્રમાણ વધારવો.** 2.IFA tablet **૨.આઈ એફ એ ની ગોળી.** 3.Consumption of vitamin rich foods **૩.વિટામીન સમૃધિત આહાર નો વધારે પ્રમાણમાં વપરાશ.** 4.Drink safe and hygienic drinking water **૪.સાફ અને ચોખુ પીવાનું પાણી નો વપરાશ.** 5.Maintain clean and hygienic environment **૫.સ્વછ અને ચોખું વાતાવરણ રાખવું.**
17. Do you know what is fortification? ૧૭. શું તમને ફોરટીફીકેશન વિશે ખબર છે?	1.Yes **૧.હા** 2.No **૨.ના**
18. Which fortified commodities are	1.DFS salt

available in the market? ૧૮.કઈ ફોરટીફાઇડ વસ્તુઓ મળે છે?	**૧.ડબલ** ફોરટીફાઇડ મીઠુ 2.Fortified Wheat Flour **૨.** ફોરટીફાઇડ ઘઉંનો લોટ 3.Oil **૩.તેલ** 4.milk **૪.દૂધ** 5.Rice ૫.ચોખા
19. Do you know one should eat DFS salt? ૧૯. શું તમને **ડબલ** ફોરટીફાઇડ મીઠુ વિષે ખબર છે?	1.Yes **૧.હા** 2.No **૨.ના**
20. If yes, why? ૨૦. અગર હા તો શું?	
21. If yes, do you consume? ૨૧.અગર હા તો તમે ખાવ છો?	1.Yes **૧.હા** 2.No **૨.ના**
22. If yes, from where do you get it? ૨૨. અગર હા તો ક્યાં થી લો છો	1.Anganwadi **૧.આંગણવાડી** 2.PDS **૨.પી.ડી.એસ** 3.Shop ૩.દુકાન
23. If from shop, how do you identify ૨૩.અગર દુકાન માંથી લો છો તને ઓળખો છો કેમનું?	
24. Can you identify F+ logo?	1.Yes

૨૪. શું તમે +F ચિન્હ ઓળખી શકો છો?	**૧.હા** 2.No **૨.ના**
25. Do you know one should consume fortified wheat flour ૨૫.શું તમને ખબર છે ફોરટીફાઇડ ઘઉંનો લોટ ખાવો જોઈએ?	1.Yes **૧.હા** 2.No **૨.ના**
26. Do you consume fortified wheat flour? ૨૬.શું તમે ફોરટીફાઇડ ઘઉંનો લોટ લો છો?	1.Yes **૧.હા** 2.No **૨.ના**
27. If, yes do you consume it? ૨૭.અગર હા તો ખાવ છો?	1.Yes **૧.હા** 2.No **૨.ના**
28. If yes, from where do you get it? ૨૮.અગર હા તો ક્યાં થી લો છો?	1.Anganwadi **૧.આંગણવાડી** 2.PDS **૨.પી.ડી.એસ** 3.Open Market ૩.દુકાન
29. Do you know which oil you should consume? ૨૯. શું તમને ખબર છે કયું તેલ ખાવું જોઈએ?	1.Yes **૧.હા** 2.No **૨.ના**
30. Which oil do you consume? ૩૦. તમે કયું તેલ ખાવું જોઈએ?	1.Peanut oil **૧.સીંગ તેલ** 2.Cotton seed **૨.કપાસિયા**

	3.Sunflower oil **૩.સૂર્યમુખી નું તેલ** 4.Other **૪.અન્ય**
31. From where to do you get it? ૩૧.ક્યાં થી લાવો છો?	1.Anganwadi **૧.આંગણવાડી** 2.PDS **૨.પી.ડી.એસ** 3.Open Market ૩.દુકાન
32. Type of diet? ૩૨. કયા પ્રકારનો ખોરાક છે?	1.Vegetarian **૧. શાકાહારી** 2.non-vegetarian **૨.માંસાહારી** 3.Ovo-vegetarian **૩.શાકાહારી પણ ઇંડા ખાઇ**
33. How many meals do you take? ૩૩.તમે કેટલા ભોજન લો છો?	1.Breakfast **૧.સવારનો નાસ્તો** 2.Brunch **૨.બ્રનચ** 3.Lunch **૩.બપોર નું જમવાનું** 4.Evening snack **૪.સાંજ નો નાસ્તો** 5.Dinner ૫.રાત નું જમવાનું
34. How many food groups do you consume daily?	1.Cereals **૧.અનાજ** 2.Pulses and legumes

૩૪.કેટલા ખોરાક જુથા નો ઉપયોગ કરો છો?	**૨.કઠોળ અને દાળ** 3.fruits and vegetables **૩.ફળ અને શાકભાજી** 4.non-veg **૪.માંસાહાર** 5.Dairy products **૫.દૂધ ના પદાર્થો** 6.Oil and fats **૬.તેલ અને ચરબી યુકત આહાર** 7.Nuts and oilseeds **૭.માવો અને તેલ બીયા** 8.Green leafy vegetables **૮.લીલા પાનવડા શાકભાજી** 9.Roots and tubers **૯.કંદમૂળ** 10.Egg **૧૦.ઇંડા** 11.Vitamin A rich fruits and vegetables **૧૧.વિટામીન-એ વાળા ફળ અને શાકભાજી** 12.Iron rich fruits and vegetables **૧૨.આયરન યુકત ફળ અને શાકભાજી** 13.Other foods. ૧૫.અન્ય

Name of the Anganwadi: આંગણવાડી નું નામ Anganwadi worker No: આંગણવાડી વર્કર નંબર: Name of the Anganwadi worker: આંગણવાડી વર્કર નું નામ Anganwadi No.: અંગન્વાડી નંબર:	
Total no. Of children Who are under weight? ઓછા વજન વાળા બાળકો ની સંખ્યા?	
1. Do you give IFA syrup to children? ૧. શું તમે બાળકો ને આઇએફએ સીરપ આપો છો?	1.Yes **૧.હા** 2.No **૨.ના**
2. If yes, how frequently you give IFA syrup to children? ૨.અગર હા તો આઇએફએ સીરપ કેટલી વાર આપો છો?	1.Two days per week ૧.અઠવાડિયામાં બે દિવસ 2.1 day per week ૨. અઠવાડિયામાં એક દિવસ 3. Other (specify) ૩.અન્ય (સ્પષ્ટ)
3. On which day you give IFA syrup? ૩.ક્યાં દિવસે આઇએફએ સીરપ આપો છો?	1. Wednesday ૧.બુધવાર 2. Saturday ૨.શનિવાર 3.Both

	૩.બેવ 4.Any other ૪.અન્ય
4. Do you provide Hot cooked meal to children? ૪.શું તમે ગરમા જમવાનું આપો છો બાળકો ને?	1.Yes **૧.હા** 2.No **૨.ના**
5. Which food group to be included in it? ૫.ક્યાં ક્યાં ખોરાક જુથનો સમાવેશ કરો છો?	1. Cereal and millets ૧.અનાજ 2. Pulses ૨.કઠોળ 3. GLVs ૩.લીલા પાન વાળા શાકભાજી 4.Roots and tubers ૪.કંદમૂળ 5.Fats and oil ૫. ચરબી અને તેલ 6.Sugar and jaggery ૬.ખાંડ અને ગોળ
6. Do you distribute THR to children? (6 – 3 year of age) ૬. શું તમે THR નું વિતરણ કરો બાળકોમાં(૬-૩ વર્ષ)	1.Yes **૧.હા** 2.No **૨.ના**
7. If yes, how many packets given in month (per child)? ૭. અગર હા તો કેટલા પેકેટ એક બાળક ને મહિનામાં?	
8. Do you know what is fortification?	1.Yes

૮. શું તમને ફોર્ટીફીકેસન વિશે ખબર છે?	**૧.હા** 2.No **૨.ના**
9. Which fortified commodities are available in the market? ૯.કઈ ફોર્ટીફાઇડ વસ્તુઓ મળે છે?	1.DFS salt **૧.ડબલ** ફોરટીફાઇડ મીઠુ 2.Fortified Wheat Flour **૨.** ફોરટીફાઇડ ઘઉંનો લોટ 3.Oil **૩.તેલ** 4.milk **૪.દૂધ** 5.Rice ૫.ચોખા
10. Do you know one should eat DFS salt? ૧૦. શું તમને **ડબલ** ફોરટીફાઇડ મીઠુ ખાવું જોઇએ વિષે ખબર છે?	1.Yes **૧.હા** 2.No **૨.ના**
11. If yes, why? ૧૧.અગર હા કેમ?	
12. If yes, do you use DFS in cooking at Anganwadi? ૧૨.અગર હા તમે અંગન્વાડી પર જમવાનું બનાવો તો **ડબલ** ફોરટીફાઇડ મીઠુ વાપરો છો?	1.Yes **૧.હા** 2.No **૨.ના**
13. Can you identify F+ logo ૧૩. શું તમે +F ચિન્હ ઓળખી શકો છો?	1.Yes **૧.હા** 2.No **૨.ના**
14. Do you know one should consume	1.Yes

fortified wheat flour? ૧૪.શું તમને ખબર છે ફોરટીફાઇડ ઘઉંનો લોટ ખાવો જોઈએ?	**૧.હા** 2.No **૨.ના**
15. Do you use fortified wheat flour in cooking at Anganwadi? ૧૫.શું તમે ફોરટીફાઇડ ઘઉંનો લોટ વાપરો છો અન્ગન્વાડી પર જમવાનું બનાવો તો?	1.Yes **૧.હા** 2.No **૨.ના**
16. Do you know which oil you should use? ૧૬.શું તમને કયું તેલ વાપરવું જોઈએ એના વિશે ખબર છે?	1.Yes **૧.હા** 2.No **૨.ના**
17. Which oil do you use in cooking at Anganwadi? ૧૭.તમે કયું તેલ વાપરો છો અંગન્વાડી પર જમવાનું બનાવો તો?	1.Peanut oil **૧.સીંગ તેલ** 2.Cotton seed **૨.કપાસિયા તેલ** 3.Sunflower oil **૩.સુર્યમુખી નું તેલ** 4.Other ૪.અન્ય

Annexure 5 (a): 24 Hour Dietary recall

૨૪-કલાક આહાર રિકોલ

Type Of Diet કયા પ્રકારનો ખોરાક છે?	1.Vegetarian **૧. શાકાહારી** Non-Vegetarian **૨.માંસાહારી** 3.Ovo vegetarian **૩. શાકાહારી પણ ઇંડા ખાઇ**
No of Meals કેટલી વાર ભોજન	

Day 1 દિવસ-૧				
SR no. એસ નો.	Meal ભોજન	Food Item ખાદ્ય વસ્તુ	Ingredient સામગ્રી	Amount(gm/ml) જથ્થો(ગ્રામ/એમ્લ)

Day 2 દિવસ-૨

Annexure 6 (a): Food frequency Questionnaire

Food Frequency Questionnaire

SR no. એસ નો.	Meal ભોજન	Food Item ખાદ્ય વસ્તુ	Ingredient સામગ્રી	Amount(gm/ml) જથ્થો(ગ્રામ/એમ્લ)

Day 3 દિવસ-૩				
SR no. એસ નો.	Meal ભોજન	Food Item ખાદ્ય વસ્તુ	Ingredient સામગ્રી	Amount(gm/ml) જથ્થો(ગ્રામ/એમ્લ)

ખોરાક આવર્તન પ્રશ્નપત્ર									
Food groups ખાધ જૂથો અને વસ્તુઓ	1)Daily 1 Yes 2. No ૧)દરરોજ **૧.હા** **૨.ના**	2)Twice a week 1 Yes 2. No ૨)અઠવાડિયા માં એક વાર **૧.હા** **૨.ના**	3)Weekly 1 Yes 2. No ૩)અઠવાડિયે **૧.હા** **૨.ના**	4)Twice a month 1 Yes 2. No ૪)મહિના માં બે વાર **૧.હા** **૨.ના**	5)Fortnightly 1 Yes 2. No ૫)પખવાડિયે **૧.હા** **૨.ના**	6)Once a month 1Yes 2. No ૬)મહિના માં એક વાર **૧.હા** **૨.ના**	7)Seasonally 1. Yes 2. No ૭)મૌસમી **૧.હા** **૨.ના**	8)Occasionally 1.Yes 2. No ૮)ક્યારેક **૧.હા** **૨.ના**	10)Never 1.Yes 2. No ૯)ક્યારેય નહિ **૧.હા** **૨.ના**
Cereals અનાજ									
Bajra બાજરા									
Maize મકાઈ									
Jowar જુવાર									
Rice ચોખા									
Rice Flakes પૌવા									
Rice puffed મમરા									

Wheat flour ઘઉં નો લોટ									
Refined wheat flour મૈદા									
Whole wheat આખા ઘઉં ના ફાળા									
Barley જઉં									
Ragi રાગી									
Wheat semolina સુજી									
Pulses and legumes કઠોળ અને દાળ									
Red Gram dal તુવેર દાળ									
Bengal gram dal ચણા દાળ									
Bengal gram whole									

ચણા									
Cow peas ચોળા									
Peas વટાણા									
Black gram dal કાળી દાળ									
Green gram dal મગ દાળ									
Green Gram whole મગ									
Rajma રાજમહ									
Soyabean સોયાબીન									
Dried tuver બાકરા									
Masoor dal મસૂર દાળ									
Vegetables શાકભાજી									
Potato બટાકા									
Onion									

ડુંગળી									
Beetroot બીટ									
Sweet potato શક્કરીયા									
Yam શુરન									
Radish મૂળા									
Cabbage કોબીચ									
Cauliflower ફ્લાવર									
Cucumber કાકડી									
Brinjal રીંગણ									
Capsicum શિમલા મરચા									
Ride gourd ગલકા									
Pointed gourd પરવર									
Karela									

કરેલા									
Bottle Gourd દુધી									
Snake gourd સાપ લોટ									
Drum stick સરગવો									
Tuver લીલી તુવેર									
Peas લીલા વટાણા									
Valor papdi વાલોર પાપડી									
Cluster beans ગુવાર									
Green Leafy Vegetables લીલા પાન વાળા શાકભાજી									
Amaranthus તંદાલ્જો									
Colocasia leaves									

પતાર્વેલી ના પાન									
Drum stick leaves સરગવા ના પાન									
Fenugreek leaves મેથી									
Cauliflower leaves ફૂલેવાર ના પાન									
Spinach પાલક									
Sephu સુવા									
Mint ફુદીનો									
Coriander leaves ધાણા									
Radish leaves મૂળા ના પાન									
Onion stalk લીલી ડુંગળી									

Fruits ફળ									
Apple સફરજન									
Banana કેળા									
Custard apple સીતાફળ									
Pine apple અનનાસ									
Chickoo ચીકૂ									
Pomegranate દાડમ									
Amla આમળા									
Orange નારંગી									
Mosambi મોઉંસંબી									
Lemon લીંબુ									
Guava જામફળ									
Litchi લીચી									

Jamun જામબુ									
Dates ખજુર									
Grapes દ્રાક્ષ									
Nuts and Oil seeds માવો અને તેલ બીયા									
Almonds બદામ									
Cashew કાજુ									
Walnuts અખરોટ									
Raisins સુકી દ્રાક્ષ									
Coconuts કોપરું									
Peanuts સીન્ગદાના									
Niger seeds (Black til) કાળા તલ									
Gingelly seeds સફેદ તલ									
Garden cress seeds									

અસાળીયો									
Watermelon seeds તરબૂચ ના બીયા									
Papaya Seeds પપાયા ના બીયા									
Sunflower seeds સૂર્યમુખી ના બીયા									
Flax seeds અળસી									
Anjeer અંજીર									
Pistachio પીસ્તા									
Dairy products દૂધ અને દુધ થી બનેલી વસ્તુ									
Cow milk ગાય નું દૂધ									
Buffalo milk ભેસ નું દૂધ									
Goat milk બકરી નું દૂધ									

Skimmed milk મલઈ વગર નું દૂધ									
Curd દહીં									
Buttermilk છાસ									
Panner પનીર									
Cheese ચીઝ									
Khoya ખોયા									
Ghee/Butter ઘી/માખણ									
Meat, Poultry, Fish માસ, મરઘા અને માછલી									
Egg ઈંડા									
Fish માછલી									
Pork									

ડુક્કરનું માસ									
Shrimp જીંગા									
Chicken ચીકન									
Goat મટન									
Beef ગૌમાસ									
Vitamin A rich fruits and vegetables વિટામીન એ વાળા ફળ અને શાકભાજી									
Carrot ગાજર									
Pumpkin કોળું									
Ripe Mango પાકી કેરી									
Muskmelon ખરબુજો									
Orange fleshed sweet potato કેસરી યાલ વાળું									

શક્કરિયું									
Ripe papaya પાકું પપયું									
Discretionary Food વિવેક પૂર્ણ ખોરાક									
Indigenous drinks (Nimbu pani, Thumbs up, mirinda etc.) દેશી પીણા (નીંબુ પાણી, થમ્બ્સ અપ, મિરીન્ડા વગેરે)									
Bakery foods (Puff, Bread, Pastries બેકરી ખોરાક (પફ, બ્રેડ, પેસ્ટ્રી વગેરે)									
Fried									

Snacks (Samosa, Bhajiya, etc.) તળેલા નાસ્તા (સમોસા, ભજીયા, વગેરે)									
Snacks (Chips, Chavanu, biscuits, Kurkure ets.) નાસ્તા(વેફ, કુરકુરે, બિસ્કીટ, ચવાણું, વગેરે)									
Candies/Ice cream (Orange, yellow milk) કેન્ડી અને આઈસ-ક્રીમ(ઓરેન્જ, પીડી,									

દૂધ)									
Vadapav વડાપાવ									
Dabeli દાબેલી									
Chienese ચાઇનીઝ									
Panipuri પાણીપુરી									
Bhel ભેલ									
Sevusad સેવઉસળ									
Bhungra ભૂંગળા									
Packed foods પડીકા									
Others અન્ય									
Fortified staples ફોરટીફાઇડ વસ્તુ									
DFS salt ડબલ ફોરટીફાઇડ મીઠુ									

Fortified Wheat flour ફોરટીફાઇડ ઘઉં નો લોટ									
Milk દૂધ									
Oil તેલ									
Rice ચોખા									

Annexure 7 (a): Post Data Collection Questionnaire (English)

Knowledge and Practice Questionnaires for Mothers		
Date_/_/_ Anganwadi worker Name:_____ Anganwadi No:_____		
1	Mother's Name	
2	Child's Name	
3	Weight (kg)of Child	
4	Height(cm) of Child	
5	BMI of child	
6	MUAC	
7	Haemoglobin	**1. ≥12.0 g/dl** **2.10.0-11.9 g/dl** **3. 7.0-9.9 g/dl** **4.<7.0g/dl**

8	Did your child get IFA syrup?	1.Yes 2.No
9	If yes how many times did your child receive IFA syrup?	1. Two days per week 2. 1 day per week 3. Other …….
10	On which day IFA syrup is given to children?	1. Wednesday 2. Saturday 3. Both 4. Any other
11	Did your child get deworming (Albendazole) tablets)?	1.Yes 2.No
12	If yes, In which month deworming (Albendazole) tablets are given?	1.February 2.August 3.Both 4.Any other month……..
13	Are you aware of micronutrients?	1.Yes 2.No
14	If yes, What is micronutrients?	
15	Do you know what are the micronutrient deficiencies?	1.Yes 2.No
16	If yes, which are they?	
17	Are you aware of Anaemia?	1.Yes 2.No
18	If yes, from where did you get to know?	1.Anganwadi centres 2.Hospital 3.IEC 4. Television 5. Radio 6.Other
19	What is Anemia?	
20	Do you know about the causes of Anemia?	1.Yes 2.No
21	If yes, what are the causes of Anemia?	**Lack of Iron Rich Diet** **Loss of blood during accident** **Loss of blood during delivery** Heavy work Weakness Frequent Illness
22	Do you know about the symptoms of Anaemia?	**1.Yes** **2.No**

23	If yes, what are the Symptoms of Anaemia?	Pale nails Pale tongue Pale skin Pale palm/Eyes Shortness of breath
24	How anemia can be prevented?	**1.consumption of iron rich foods** **2.Consumption of green leafy vegetables** **3.IFA tablet/ IFA syrup** **4.Maintain clean and hygienic environment** **5.**Avoid drinking tea or coffee along with meals
25	Do you know what are iron rich foods?	**1.Yes** **2.No**
26	If yes, What foods are rich in iron?	
27	Do you know what is fortification?	**1.Yes** **2.No**
28	If yes, What is fortification?	
29	Which fortified commodities are available in the market?	**1.DFS salt** **2.Fortified Wheat Flour** **3. Fortified Oil** **4. Fortified Milk** **5. Fortified Rice** **6. All of the above**
30	Have you ever heard about DFS?	**1.Yes** **2.No**
31	If yes, what have you heard?	
32	Can you identify double fortified salt?	**1.Yes** **2.No**
33	How do you identify?	1.Label 2.Expiry Date 3. Plus F logo 4.Smiling Sun Logo 0. Do not know
34	Where did you get DFS?	**1.Anganwadi** **2.PDS** 3.Other
35	When do you add salt?	**1.Before cooking** **2.After cooking** **3.While cooking** **4. Others**

36	Do you know one should consume fortified wheat flour?	**1.Yes** **2.No**
37	Do you consume fortified wheat flour?	**1.Yes** **2.No**
38	If yes, from where do you get it?	**1.Anganwadi** **2.PDS** **3.Open Market**
39	Which oil do you consume?	**1.Peanut oil** **2.Cotton seed oil** **3.Sunflower oil** **4. Corn oil** **5. Mustard oil** **6. Coconut oil** **7. Other…….**
40	From where to do you buy it?	**1.Anganwadi** **2.PDS** **3.Open Market**

Annexure 8 (b): Post Data Collection Questionnaire (Gujarati)

Knowledge and Practice Questionnaires for Mothers		
તા._/_/_ **આંગણવાડી વર્કર નામ :_____** **આંગણવાડી નંબર**:_____		
1	માતાનું નામ	
2	બાળકનું નામ	
3	બાળકનું વજન	
4	બાળકની ઉંચાઇ	
5	બાળક ના શારીરિક વજનનો આંક(BMI)	
6	મધ્યમ ઉપલા હાથનો પરિધ (MUAC)	
7	હેમોગ્લોબિન	**1. ≥12.0 g/dl** **2.10.0-11.9 g/dl** **3. 7.0-9.9 g/dl**

		4.<7.0g/dl
8	તમારા બાળક ને આઈએફએ સીરપ મળે છે?	૧.હા ૨.ના
9	અગર હા તો કેટલી વાર મળે છે તમારા બાળક ને આઈએફએ સીરપ?	૧.અઠવાડિયા માં બે વાર ૨. અઠવાડિયા માં એક વાર ૩.અન્ય.....
10	આઈએફએ સીરપ કયા દિવસ મળે છે?	૧.બુધવાર ૨.શનિવાર ૩.બંને ૪.કોઈ બીજો દિવસ
11	તમારા બાળક ને કૃમિ ની ગોળી મળી?	૧.હા ૨.ના
12	અગર હા, કયા મહિનામાં કૃમિ ની ગોળી મળી?	૧.ફેબ્રુઆરી ૨.ઔગુસ્ત ૩.બેવ મહિનામાં ૪.બીજા કોઈ મહિનામાં
13	શું તમને માઇક્રોનુત્રિએન્ત (સૂક્ષ્મ પોષકતત્વ) વિસે ખબર છે?	૧.હા ૨.ના
14	અગર હા તો માઇક્રોનુત્રિએન્ત (સૂક્ષ્મ પોષકતત્વ) સુ છે?	
15	શું તમને માઇક્રોનુત્રિએન્ત (સૂક્ષ્મ પોષકતત્વ) ના લીધે થતી ઉણોપો ખબર છે?	૧.હા ૨.ના
16	અગર હા, તો તે કઈ કે છે	
17	શું તમને અનેમિયા (પાંડુરોગ) વિસે ખબર છે?	૧.હા ૨.ના
18	અગર હા તો ક્યાંથી ખબર પડી?	૧.આંગણવાડી ૨.દવાખાનું ૩.આઇ ઈ સી ૪.ટેલીવીઝ્ન ૫.રેડીઓ ૬.બીજું કઇ
19	અનેમિયા (પાંડુરોગ) શું છે?	

20	શું તમને અનેમિયા (પાંડુરોગ) કયા કારણો થી થઇ તે ખબર છે?	૧.હા ૨.ના
21	અગર હા તો કયા કારણો છે અનએમિયા (પાંડુરોગ) માટે?	૧.જમવામાં ઓછુ આયરન યુકત આહાર નું પ્રમાણ. ૨.એક્સીડ્ન્ત માં વધારે પ્રમાણમાં લોહી નું વહી જવું ૩.દેલીવેર્ય વખત લોહી નું વધારે માત્રામાં વહી જવું. ૪.ભારે કામ કરવું ૫.કમજોરી ૬.વારમવાર બીમાર પડવું
22	શું તમને અનેમિયા (પાંડુરોગ) ના લક્ષણો ખબર છે?	૧.હા ૨.ના
23	અગર હા તો અનેમિયા (પાંડુરોગ) ના ક્યાં લક્ષણો કયા છે	૧.ફીકા નખ ૨.ફીકી જીભ ૩.ફીકી ચામડી ૪.ફીકી હથેળી/ આંખ ૫.હાંફ ચઢવી
24	અનએમીય (પાંડુરોગ) થી કેવી રીતે બચી શકાઈ?	**૧.આયર્ન સમૃધિત ખોરાક ખાવાનું વધારો.** **૨.લીલા પાંદડાવાળા શાકભાજી ખાવા** **૩.** આઇએફએ ની ગોળી/આઇએફએ સીરપ ૪.ચોખ્ખું અને સાફ વાતાવરણ રાખવું ૫. ભોજન ને ચા અને કોફી જોડે લેવાનું ટાળવું કારણ કે તેમાં રહેલા તત્વો આયરન ના સોષણ ને અટકાવે છે

25	શું તમને આયરન સમૃધિત ખોરાક કયા છે?	૧.હા ૨.ના
26	અગર હા તો આયરન સમૃધિત ખોરાક કયા છે	
27	શું તમને ફોરટીફીકેસન (ખીલ્લેબંધી) વિશે ખબર છે?	૧.હા ૨.ના
28	અગર હા તો ફોરટીફીકેસન (ખીલ્લેબંધી) શું છે?	
29	કઈ કઈ ફોરટીફાઈદ વાસુતો મળે છે ખબર છે?	૧. ડબલ ફોરટીફાઈડ મીઠુ ૨. ફોરટીફાઈડ ઘઉંનો લોટ ૩. ફોરટીફાઈડ તેલ ૪. ફોરટીફાઈડ દૂધ ૫. ફોરટીફાઈડ ચોખા ૬. ઉપરના બધાજ
30	શું તમે ડબલ ફોરટીફાઈડ મીઠા વિશે સાંભળ્યું છે?	૧.હા ૨.ના
31	અગર હા તો સુ સંભાળ્યું છે?	
32	શું તમે ડબલ ફોરટીફાઈડ મીઠુ ઓળખી શકો છો?	૧.હા ૨.ના
33	અગર હા તો તમે કેવીરીતે ઓળખો છો?	૧.લેબલ ૨. સમાપ્તિ તારીખ ૩.પ્લસ એફ ચિન્હ ૪.હસતા સૂર્ય નો ચિન્હ ૦.ખબર નઈ
34	તમે ડબલ ફોરટીફાઈડ મીઠુ ક્યાં થી લો છો?	૧.આંગણવાડી ૨.પીડીએસ ૩.અન્ય
35	તમે જમવામાં મીઠુ ક્યારે નાખો છો?	**૧.જમવાનું બનાવાની શુરુઆત માં** **૨.જમવાનું બનાવીયા પછી** **૩.જમવાનું બનાવતી વખતે** **૪.બીજું કઈ**
36	શું તમને ખબર છે કે આપડે ફોરટીફાઈડ ઘઉં નો લોટ ખાવો જોઈએ?	૧.હા ૨.ના
37	શું તમે ફોરટીફાઈડ ઘઉંનો લોટ ખાવ છો?	૧.હા ૨.ના
38	અગર હા તો ક્યાંથી લાવો છો?	૧.આંગણવાડી ૨.પીડીએસ ૩.બહાર બજાર થી
39	તમે કયું તેલ વાપરો છો?	**૧.સીંગ તેલ**

		૨.કપાસિયા તેલ **૩.સુર્યમુખી નું તેલ** **૪.મકાઈ નું તેલ** **૫. રાઈ નું તેલ** **૬.નારિયલ નું તેલ** **૭. અન્ય.....**
40	તમે ક્યાંથી ખરીદો છો?	૧.આંગણવાડી ૨.પીડીએસ ૩.બહાર બજાર થી

Annexure 9 (a): Post Data Collection Anganwadi worker Questionnaire (English)

Questionnaire For AWW	
Name of the Anganwadi: **આંગણવાડી નું નામ: :_____** Anganwadi worker No: **આંગણવાડી વોર્કર નો નંબર : _____** Name of the Anganwadi worker: **આંગણવાડી વોર્કર નું નામ: _____** Anganwadi No.: **આંગણવાડી નો નંબર: _____**	
1. Total no. Of children Who are under weight? ૧. તમારા અંગન્વાડી માં કુલ કેટલા ઓછા વજન વાળા છોકરાઓ છે?	
2. Do you give IFA syrup to children? **૨.** શું તમે આઇએફએ સીરપ આપી બાળકોને?	1.Yes **૧.હા** 2.No **૨.ના**

3. If yes, how frequently you give IFA syrup to children? **૩.** અગર હા તો કેટલી વાર આઈએફએ સીરપ આપો છો બાળકો ને ?	1.Weekly ૧. અઠવાડિયે 2.Twice a week ૨.અઠવાડિયામાં માં બે વાર ૩. Other (……. ૩.અન્ય(.....
4. On which day do you give IFA syrup? ૪. કયા દિવસે આઈએફએ સીરપ આપો છો	1.Every Wednesday ૧.દર બુધવારે 2.Every Saturday ૨.દર શનિવાર 3. Both ૩.બેવ દિવસ 4.Any other ૪.બીજો કોઈ
5. Did you give Albendazole tablets? ૫.શું તમે કૃમિ ની ગોળી આપી	1.Yes **૧.હા** 2.No **૨.ના**
6. Do you know how many times in a year deworming tablet (Albendazole) should be given to children? ૬.શું તામને ખબર છે કે વરસ માં કેટલી વાર કૃમિ ની ગોળી બાળક ને આપવા ની હોએ?	1.Once in a year ૧. વરસ માં એક વાર 2.Twice in a year ૨.વરસ માં બે વાર 3.Other……. ૩.બીજું કઈ----------
7. In which month deworming (Albendazole) tablets are given? ૭.કયા મહિનામાં કૃમિ ની ગોળી આપવા ની હોએ છે?	1.February ૧.ફેબ્રુઆરી 2.August ૨.ઔગુસ્ત 3.Both the months ૩.બેવ મહિનામાં 4.Any other month ૪.બીજા કોઈ મહિનામાં
8. Do you provide Hot cooked meal to children? ૮.શું તમે ગરમ બનાવેલી જમવાનું આપો છે બાળકો ને ?	1.Yes **૧.હા** 2.No **૨.ના**
9. Which food groups do you include? ૯.કયા ખોરાક જૂથો નો સમાવેશ કરો છો?	1.Cereal and millets ૧. અનાજ અને બાજરી 2.Pulses ૨.કઠોળ 3.GLVs ૩.લીલા શાકભાજી 4.Roots and tubers ૪. મૂળ અને કંદ 5.Fats and oil ૫. ચરબી અને તેલ 6. Sugar and jaggery ૬.ખાંડ અને ગોળ

10. Do you distribute THR to children? ૧૦.શું તમે બાળકો ને THR નું વિતરણ કરો છો?	1.Yes **૧.હા** 2.No **૨.ના**
11. If yes, how many packets given in month (per child)? ૧૧.અગર હા તો કેટલા પેકેટ આપો છો મહિનામાં (બાળક દીઠ)	
12. Do you know what is fortification? ૧૨.શું તમને ફોરટીફીકેસન (ખીલ્લેબંધી) વિશે ખબર છે?	1.Yes **૧.હા** 2.No **૨.ના**
13. If yes, what is fortification? ૧૩.અગર હા તો ફોરટીફીકેસન (ખીલ્લેબંધી) શું છે?	
14. Can you identify F+ logo ૧૪.શું તમે +F ચિન્હ ઓળખી શકો છો?	1.Yes **૧.હા** 2.No **૨.ના**
15. Which fortified commodities are available in the market? ૧૫.કઈ કઈ ફોરટીફાઇદ વાસુતો મળે છે ખબર છે?	**1.DFS salt** ૧. ડબલ ફોરટીફાઇડ મીઠુ **2.Fortified Wheat Flour** ૨. ફોરટીફાઇડ ઘઉંનો લોટ **3.Fortified Oil** ૩. ફોરટીફાઇડ તેલ **4.Fortified milk** ૪. ફોરટીફાઇડ દૂધ **5. Fortified Rice** ૫. ફોરટીફાઇડ ચોખા **6.All of the above** ૬. ઉપરના બધાજ
16. Do you know one should eat DFS salt? ૧૬.શું તમને ખબર છે ડબલ ફોરટીફાઇડ મીઠુ ખાવું જોઈએ?	1.Yes **૧.હા** 2.No **૨.ના**
17. If yes, why? ૧૭.અગર હા તો કેમ?	
18. Have you imparted knowledge about DFS? ૧૮.તમને ડબલ ફોરટીફાઇડ મીઠા વિશે જાણકારી મળી છે?	1.Yes **૧.હા** 2.No **૨.ના**
19. When do you add salt? ૧૯.તમે જમવામાં મીઠુ ક્યારે નાખો છો?	**1.Before cooking** ૧.જમવાનું બનાવાની શુરુઆત માં **2.After cooking** ૨.જમવાનું બનાવીયા પછી **3.While cooking**

	૩.જમવાનું બનાવતી વખતે **4.others** ૪.બીજું કઇ

Annexure 10 (b): Post Data Collection Anganwadi worker Questionnaire (Gujarati)

Questionnaire For AWW	
આંગણવાડી નું નામ: :_____ **આંગણવાડી વોર્કર નો નંબર :** _____ **આંગણવાડી વોર્કર નું નામ:** _____ **આંગણવાડી નો નંબર:** _____	
1. તમારા અંગન્વાડી માં કુલ કેટલા ઓછા વજન વાળા છોકરાઓ છે?	
2. શું તમે આઈએફએ સીરપ આપી બાળકોને?	૧.હા ૨.ના
3. અગર હા તો કેટલી વાર આઈએફએ સીરપ આપો છો બાળકો ને ?	૧. અઠવાડિયે ૨.અઠવાડિયામાં માં બે વાર ૩. અન્ય(.....
4. કયા દિવસે આઈએફએ સીરપ આપો છો	૧.દર બુધવારે ૨.દર શનિવાર ૩.બેવ દિવસ ૪.બીજો કોઇ
5. શું તમે કૃમિ ની ગોળી આપી	૧.હા ૨.ના
6. શું તામને ખબર છે કે વરસ માં કેટલી વાર કૃમિ ની ગોળી બાળક ને આપવા ની હોએ?	૧. વરસ માં એક વાર ૨.વરસ માં બે વાર ૩.બીજું કઈ----------
7. કયા મહિનામાં કૃમિ ની ગોળી આપવા ની હોએ છે?	૧.ફેબ્રુઆરી ૨.ઔગુસ્ત ૩.બેવ મહિનામાં ૪.બીજા કોઇ મહિનામાં
8. શું તમે ગરમ બનાવેલી જમવાનું આપો છે બાળકો ને ?	૧.હા ૨.ના
9. કયા ખોરાક જૂથો નો સમાવેશ કરો છો?	૧. અનાજ અને બાજરી ૨.કઠોળ ૩.લીલા શાકભાજી ૪. મૂળ અને કંદ ૫. ચરબી અને તેલ ૬.ખાંડ અને ગોળ

10. શું તમે બાળકો ને THR નું વિતરણ કરો છો?	૧.હા ૨.ના
11. અગર હા તો કેટલા પેકેટ આપો છો મહિનામાં (બાળક દીઠ)	
12. શું તમને ફોરટીફીકેસન (ખીલ્લેબંધી) વિશે ખબર છે?	૧.હા ૨.ના
13. અગર હા તો ફોરટીફીકેસન (ખીલ્લેબંધી) શું છે?	
14. શું તમે +F ચિન્હ ઓળખી શકો છો?	૧.હા ૨.ના
15. કઈ કઈ ફોરટીફાઇદ વાસુતો મળે છે ખબર છે?	૧. ડબલ ફોરટીફાઇડ મીઠુ ૨. ફોરટીફાઇડ ઘઉંનો લોટ ૩. ફોરટીફાઇડ તેલ ૪. ફોરટીફાઇડ દૂધ ૫. ફોરટીફાઇડ ચોખા ૬. ઉપરના બધાજ
16. શું તમને ખબર છે ડબલ ફોરટીફાઇડ મીઠુ ખાવું જોઇએ?	૧.હા ૨.ના
17. અગર હા તો કેમ?	
18. તમને ડબલ ફોરટીફાઇડ મીઠા વિશે જાણકારી મળી છે?	૧.હા ૨.ના
19. તમે જમવામાં મીઠુ ક્યારે નાખો છો?	**૧.જમવાનું બનાવાની શુરુઆત માં** **૨.જમવાનું બનાવીયા પછી** **૩.જમવાનું બનાવતી વખતે૪.બીજું કઈ**

IEC

પોષકતત્વ અને પોષકતત્વ ઉમેરેલ વસ્તુઓ ના વિશે માહિતી આપતી માતાઓ માટે ની માર્ગદર્શિકા

ડીપાર્ટમેંટ ઓફ ફુડસ એન્ડ ન્યુટરીશન
ફેકલ્ટી ઓફ ફેમીલી એન્ડ કમ્યુમનટી
ધ મહરજા સયજીરવ યુમનવસીટી ઓફ બરોડ
વડોદર , ગુજરાત

માર્ગદર્શક:(પ્રોફ.)(ડો.) સીરીમાવો નાયર
સંકલન કર્તા: કુંજન પરમાર

તમારા આહારમાં આયર્ન શ્રીમંત ખોરાક નો ઉપયોગ કરવું


સારગવાના પાન


મેથિ


ખજુર


ફનગાવેલા મગ


તાંડલજીઆ


પાલક


માછલા


ઇંડા


બાજરી


રાગી

એનિમિયા સામે લડવા માટે પ્રતિબદ્ધ છે

તમારા આહારમાં વિટામિન એ શ્રીમંત ખોરાક નો ઉપયોગ કરવું


ગાજર


પપૈયા

વિટામિન એ

દૂધ


પનીર


ઇંડા

વિટામિન એ ઉણપના મુખ્ય પરિણામો


રાત્રે અંધાપો


ખરાબ ત્વચા


ભૂખ મરી જવી

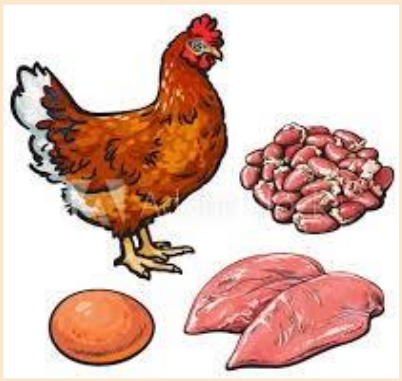

નબળાઇ


બીમારી

વિટામિન બી 12 સમૃદ્ધ ખોરાક

ઇંડા

દૂધ અને દૂધ ઉત્પાદનો



માંસ અને મરઘાં

આયોડિન સમૃદ્ધ ખોરાક

માછલી

આયોડિન યુક્ત મીઠું

ઝીંગા

દૂધ અને દૂધના પદાર્થ

આયોડિનની ઉણપ

ગલગંડ

FORTIFIED
SAMPOORNA POSHAN
SWASTH JEEVAN

ફોર્ટિફિકેશન શું છે

ખોરાકની મજબૂતીકરણને ખોરાકમાં આવશ્યક સુક્ષ્મ પોષકતત્વોની સામગ્રીમાં જાણી જોઈને વધારો કરવા તરીકે વ્યાખ્યાયિત કરવામાં આવી છે જેથી ખોરાકની પોષક ગુણવત્તામાં સુધારો થાય અને આરોગ્યના ન્યૂનતમ જોખમોસાથે જાહેર આરોગ્ય લાભ મળે

તમે ફોર્ટિફાઇડ ફૂડ પેકેટ પર પ્લસ એફ લોગો જોઈને ફોર્ટિફાઇડ ખોરાકને ઓળખી શકો છો

FORTIFIED
SAMPOORNA POSHAN
SWASTH JEEVAN

ડબલ ફોર્ટિફાઇડ મીઠું

આયર્ન

એનિમિયા સામે લડવામાં મદદ કરે છે

રોગપ્રતિરક્ષા વધારે

સાંદ્રતા સુધારે

આયોડિન

સામાન્ય વિકાસ અને મગજના વિકાસમાં મદદ કરે છે

એનિમિયા અને આયોડિનની ઉણપના વિકારોથી બચવા માટે ડબલ ફોર્ટિફાઇડ મીઠું ખાઓ

ફોર્ટિફાઇડ દૂધ

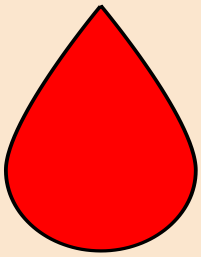
વિટામિન ડી

વિટામિન એ

ફોર્ટિફાઇડ ઘઉંનો લોટ

ફોર્ટિફાઇડ ચોખા

આયર્ન



એનિમિયા સામે લડવામાં મદદ કરે

વિટામિન બી - ૧૨

યાદશક્તિ અને મગજની સામાન્ય કામગીરીમાં મદદ કરે

ફોલિક એસિડ

ન્યુરલ ટ્યુબ ખામીને અટકાવે

ફોર્ટિફાઇડ લોટ થી બનાવેલ વાનગીઓ

શીરો

થપલા

લાડુ

સુખડી

બાજરી અને ઘઉં ની રોટલો

1. **Data collection and anemia screening**

2. Counselling