Prevalence and causes of malnutrition among under-five children in selected geographies of India

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Abbreviations

ANC	Antenatal care
ANM	Auxiliary nurse midwife
ASHA	Accredited social health activist
AWW	Anganwadi worker
AWC	Anganwadi centre
CDPO	Child development project officer
CF	Complementary feeding
CHC	Community health centre
CSO	Civil Society organisation
DH	District hospital
DTC	Delhi transport corporation
EBF	Exclusive breastfeeding
ECCD	Early childhood care and development
EIBF	Early initiation of breastfeeding
FGD	Focus group discussion
FLW	Front line worker
GHI	Global hunger index
GP	Gram panchayat
HAZ	Height-for-Age Z-score
HFIAS	The household food insecurity access scale
ICDS	Integrated child development service
IFA	Iron folic acid
IYCF	Infant and young child feeding
JSY	Janani suraksha yojana
LHV	Lady health supervisors
MAM	Moderate acute malnutrition
MAS	Mahila Arogya samiti
MDM	Mid-Day meal
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MMR	Maternal mortality rate
MUAC	Mid-upper arm circumference
NFHS	National family health survey
NFSA	National food security Act
NGO	Non-government organisation
NRC	Nutrition rehabilitation centre
NHM	National health mission
OBC	Other backward castes
OPELEP	Odisha PVTG Empowerment and livelihoods improvement programme
ORS	Oral rehydration solution
PDS	Public distribution system
PHC	Primary health centre

PMMVY	Pradhan Mantri Matru Vandana Yojana
PNC	Post natal check-up
PSE	Pre-school education
PVTG	Particularly vulnerable tribal group
SAM	Severe acute malnutrition
SC	Scheduled caste
SD	Standard deviation
SEAR	South-East Asia Region
SHG	Self help group
SN	Supplementary nutrition
SNP	Supplementary nutrition programme
ST	Scheduled tribe
THR	Take home ration
UNICEF	United Nations Children's Fund
USAID	The United States Agency for International Development
VHND	Village health nutrition day
VHSNC	Village Health Sanitation & Nutrition Committee
VHSND	Village Health Sanitation and Nutrition Day
WAZ	Weight for Age Z Score
WFA	Weight for Age
WHO	World Health Organization

Executive Summary

Malnutrition remains a significant problem among children under the age of five in India, leading to lifelong consequences, high child mortality and morbidity rates. The first 1000 days, from pregnancy to the child's second birthday, are crucial for effectively addressing malnutrition. According to UNICEF's 2019 report, one in three children in India suffers from visible malnutrition, while one in every two children experiences hidden hunger or micronutrient deficiencies. The prevalence of underweight, stunting, and wasting in India, as reported by the National Family Health Survey - 5 (2019-2021), is 32.1%, 35.5%, and 19.3%, respectively. Although some progress has been made in reducing underweight and stunting, wasting has shown no significant improvement.

Following table shows the prevalence of childhood undernutrition in the study locations and its comparison with NFHS-5 district level estimates.

		Stunting	Wasting	Underweight
Kamrup (Assam)	NFHS-5	22.6	14.8	19.7
	Study Sample	32.9	6.3	17.4
Karauli (Rajasthan)	NFHS-5	37.6	26.6	37.3
	Study Sample	40.8	11.5	20.8
Rayagada (Odisha)	NFHS-5	43.6	16.1	39.8
	Study Sample	53.3	16.4	31.2
North-West Delhi (Delhi)	NFHS-5	26.9	10.9	22.8
	Study Sample	43.3	19.6	36.5

Despite implementing various programs, progress in combating malnutrition among children in India has been slow and inconsistent, with different states showing varying levels of improvement. The existing programs primarily focus on food and diet, while other critical factors such as disease, hygiene, sanitation, poverty, employment, and socio-economic and political contexts receive insufficient attention.

In response to an invitation from the National Human Rights Commission, a study on the prevalence and causes of malnutrition among under-five children was conducted in four selected states of India: Northwest Delhi (Delhi), Kamrup (Assam), Rayagada (Odisha), and Karauli (Rajasthan). The aim of the study was to assess the prevalence and determinants of malnutrition among children enrolled in Anganwadi Centres in selected geographies and identify the factors at various levels leading to the poor health and nutritional status of the children.

The study utilised mixed methods, including qualitative and quantitative components, to identify household, community, and system-level determinants of malnutrition.

The findings of the study shed light on the specific circumstances and factors influencing malnutrition in each region:

Kamrup: This region demonstrated relatively better nutritional trends than the state and national averages. Factors contributing to its success include effective anthropometric practices at the Anganwadi centres (AWCs), providing birth weight data for all children, and delivering supplementary nutrition. Kamrup also displayed good levels of dietary diversity, particularly concerning animal-based proteins. However, food insecurity and low land ownership rates remain significant challenges.

Karauli: This region exhibited high levels of underweight (20.8%) and wasting (11.5%). While anthropometric practices at the AWCs were less efficient, the area showed better healthcare services, hygiene practices, and land ownership rates. However, the lack of dietary diversity, especially regarding animal-based proteins, was notable among households with underweight children. The shift from hot cooked meals to packaged rations for children aged 3 to 6 raised concerns.

Northwest Delhi: This site recorded high level of stunting (43.3%), primarily due to issues with height measurements at the AWCs. The region faced challenges related to food insecurity, low land ownership, and poor environmental conditions, such as overcrowding and inadequate water drainage. Despite relatively higher dietary diversity, the consumption of animal-based proteins was insufficient. Cash insufficiency and a high proportion of Scheduled Caste households were also observed.

Rayagada: This region exhibited a high prevalence of all forms of malnutrition. While anthropometric data collection for weights was adequate, height measurements were problematic. The delivery of supplementary nutrition services was relatively low, and immunisation levels were the lowest among the study sites. Food insecurity, poor dietary diversity, low hygiene practices, and open defecation were prevalent issues. Multiple determinants, including poverty, landlessness, and limited access to education, contributed to the high levels of malnutrition.

Recommendations: The study's recommendations emphasize the need for site specific interventions to address malnutrition. It suggests improving the implementation of the Anganwadi scheme by universalizing the ICDS with comprehensive functions, addressing issues related to anthropometry, enhancing capacity building, and ensuring accurate reporting of malnutrition data. Additionally, the study highlights the importance of conducting micro-assessments at the village and Anganwadi centre levels to identify areas and households with high vulnerability to malnutrition, enabling the development of tailored interventions.

Furthermore, the study identifies specific determinants that hinder malnutrition treatment, including socioeconomic inequity and lack of development. To tackle these issues, it recommends interventions such as improving women's literacy and schooling, providing childcare support to enable women's participation in education, promoting child dietary diversity with a focus on animal-based proteins, enhancing access to fruits and vegetables through

initiatives like kitchen gardens, integrating nutrition requirements into agricultural practices, implementing comprehensive plans for improving living conditions in urban slums, and addressing open defecation issues.

In conclusion, the study underscores the importance of localised and geographical approaches to combat malnutrition. By addressing the limitations in current programs, conducting thorough assessments, and site-specific determinants, it aims to achieve better outcomes in combating malnutrition and improving overall nutritional status.

1.Introduction

Malnutrition is a significant public health problem among children under the age of five in India. It occurs due to a deficiency or imbalance of energy, proteins, and other essential nutrients, accounting for approximately 45% of total child mortality worldwide [1][2]. However, in India specifically, malnutrition is responsible for 68.2% of all under-five deaths [3]. During early childhood, nutritional deficiencies can adversely affect a child's social, mental, and physical well-being. The consequences of malnutrition during this critical period can be long-lasting and perpetuate a cycle of malnutrition, leading to increased child mortality and morbidity. Proper nutrition is vital in maintaining good health and is fundamental to children's physical, mental, and emotional development, especially during their formative years.

1.1 Rationale

The study was conceptualised and developed following an invitation from the National Human Rights Commission intending to promote research projects which are more focused along the lines of applied research with the ultimate aim to translate research into action to protect and promote human rights- civil and political as well as economic, social and cultural rights.

Despite various programs in place, progress in reducing malnutrition among children in India has been slow and inconsistent, with some states showing significant improvement while others lag. The programs primarily focus on food and diet, whereas other factors such as disease, hygiene, sanitation, poverty, employment, and socio-economic and political contexts suffer from relative inattention. Studies suggest that a demographic-geographical approach should be taken when addressing malnutrition, as a one-size-fits-all approach is not suitable for different geographies and communities[7][8][9][10][11].

Based on this, the study has been undertaken to deepen the understanding of malnutrition determinants in various contexts to enable a more granular geospatial approach. Since the study depends upon the performance of the ICDS in these contexts, it is likely to also serve as an illustration of the functioning of this scheme, considered critical for malnutrition interventions.

Data suggests that malnutrition varies in different geographical locations; thus, the study sites were selected based on varied demographic and community characteristics and on the prevalence of malnutrition as per the National Family Health Survey (NHFS) 4 & 5 data and the operational feasibility for the study team.

In this context, the study was undertaken across four states of India. Delhi was chosen in the country's northern region, Rajasthan in the western region, Assam was chosen in the north-eastern region, while Odisha in the eastern coast. Looking at the feasibility for conducting the study, no states were selected in southern region of the country considering the limitations of resources to manage distance and language.

In each state the study was conducted in one district namely- Kamrup (Assam), Karauli (Rajasthan), Northwest Delhi (Delhi), and Rayagada (Odisha). The selection of the districts was done in collaboration with the Department of Women and Child Development (DWCD) of respective state governments based on burden of disease and feasibility. One block was then selected from each study district, representing tribal, PVTG, mixed and urban settlements. In each block, five Anganwadi centres were chosen based on the average enrolment of children under five and Anganwadi centre being functional. Further details are provided under the methods section.

2. Literature review

Malnutrition is a major problem among children under five in India, with lifelong consequences and high child mortality and morbidity. Malnutrition can affect people at any stage in life. Still, it is more likely to occur when the body needs more nutrients for growth and development, such as in early childhood, adolescence, pregnancy, and lactation. Malnourished children may also become less productive adults, highlighting the importance of proper nutrition during the formative years.

Children under the age of five are particularly vulnerable to malnutrition. Of this age group, it is considered that the under-twos require the greatest focus. In fact, it is the first 1000 days; beginning from pregnancy to the child attaining the age of two, that is considered vital for actions against malnutrition [32].

One in three children globally suffers from one or more forms of malnutrition: undernutrition, micronutrient deficiencies, or obesity [4]. One indicator of undernutrition is underweight, in which a child's weight is at least two standard deviations below the median for their age. A child is considered stunted if their height-for-age is below two standard deviations of the median height-for-age. A child is considered wasted if their weight-for-height is below two standard deviations of the median weight-for-height.

Globally, nearly 663 million adults are undernourished, and one in every four faces food insecurity [12]. UNICEF's 2019 report on child, food and nutrition states that one in three children suffers from a visible form of malnutrition, and one in every two suffers from hidden hunger or micronutrient deficiencies[4].

Similarly, recent WHO global estimates have shown that more than 149 million children under five years are stunted, while 45.4 million are wasted[13]. The situation is far worse in the South-east Asian Region, where about 75% of the population of wasted children reside, and a majority of under-five mortality occurs[14].

India faces a high burden of malnutrition, particularly among children under five, and reducing it has been a major challenge for the country for many decades. The Global Hunger Index 2022 reported that India's hunger situation is worsening, with the GHI score increasing from 27.5 in

2021 to 29.1 in 2022 and the country's ranking dropping from 101 in 2021 to 107 in 2022, with the highest rate of child-wasting in the world[15].

According to the National Family Health Survey - 5 (2019-2021), the prevalence of underweight, stunting, and wasting in India is reported to be 32.1%, 35.5%, and 19.3%, respectively. While there seems to be a slight improvement in the prevalence of underweight and stunting since the last two rounds of national surveys, there has been no significant progress in reducing wasting.

Furthermore, the survey indicated an increase in the rate of anemia in children under five, with a prevalence of 67.1% in 2019-21 compared to 58.69% in 2015-16. Moreover, the progress in improving infant and young child feeding practices has been unsatisfactory, with only 11.3% of children receiving an adequate diet, 41.8% of children being breastfed within an hour of birth, and only 63.74% being exclusively breastfed up to six months of age. [16].

The improvement of child health and nutrition indicators has been slow in some states, with significant increases in malnutrition among children under five in states such as Assam and Bihar. However, Karnataka, Kerala and Manipur have shown noteworthy declines and were the best-performing states.

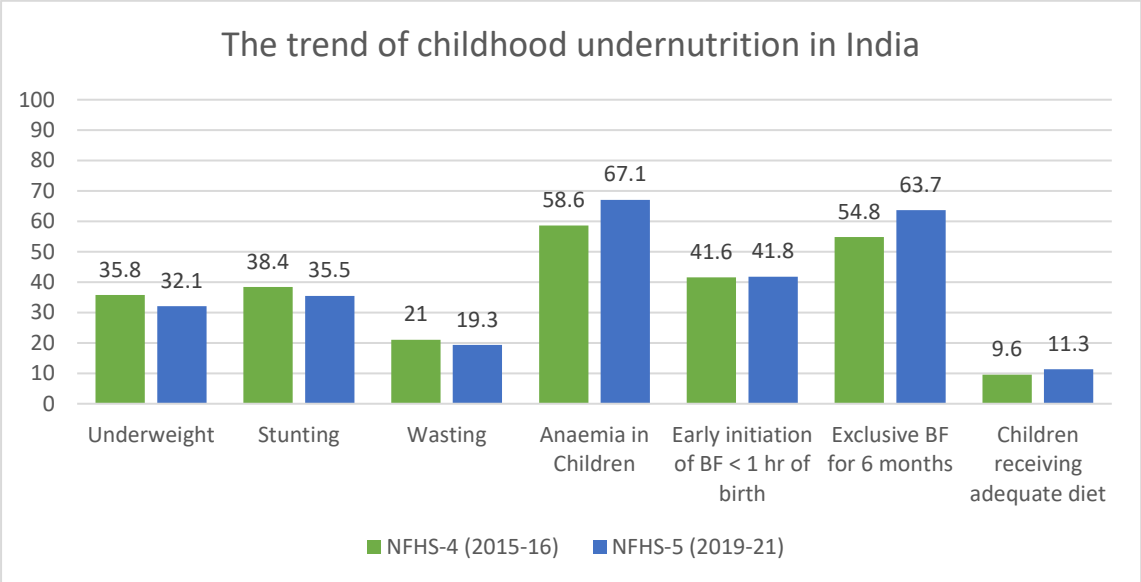

Figure 1: Trend of childhood undernutrition in India (source-NFHS 4 & 5)

2.1 Causal framework of childhood undernutrition

According to UNICEF's causal framework, the cause of child undernutrition depends on a range of immediate, underlying, and basic determinants and their interactions [5]. As shown in the Figure 2, the framework explains the interactions of these three levels of determinants.

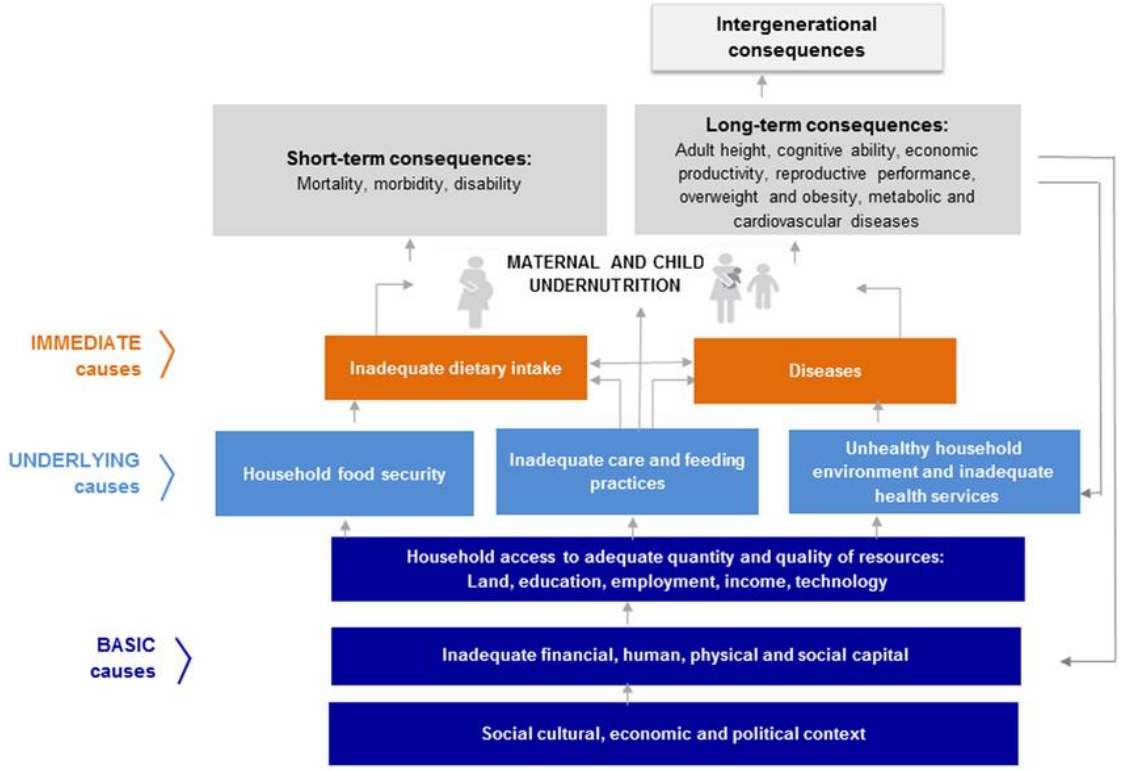

Figure 2: The UNICEF conceptual framework of undernutrition. Source: UNICEF. Improving Child Nutrition: The achievable imperative for global progress. United Nations Children's Fund; 2013. p. 4.

Furthermore, nutrition interventions are categorized as specific and sensitive. Nutrition-specific interventions are those interventions that address the immediate determinants of undernutrition while nutrition-sensitive interventions are those that address the underlying and basic determinants. Studies have shown that scaling up coverage of nutrition-specific interventions is crucial for undernutrition reduction[6]. Infant and Young Child Feeding (IYCF) practices; breastfeeding and complementary feeding, are the main immediate determinants of nutrition and remain a major challenge in our country. However, beyond a point, nutrition sensitive interventions that focus on socio-economic conditions become critical. These interlink with the nutrition specific interventions of IYCF since societal support is required by way of, for instance, maternity entitlements and creches, in the context of a large female workforce engaged in the informal sector.

Much of the focus on alleviating malnutrition has relied mainly on a diet as the immediate determinant of malnutrition, even to the relative exclusion of health and the overall care context.

2.2 Infant and Young Child Feeding Practices

The WHO report states that globally, only 44% of infants under six months of age are exclusively breastfed[17]. Similarly, UNICEF's report on “The State of World's Children – 2019” states that only two in five infants under six months of age are exclusively breastfed, and nearly 44% of the children aged 6-23 months do not have an adequate intake of fruits and vegetables. The situation is worse among poor households where 4 out of five children do not receive the minimum recommended age-appropriate diverse diet[4].

In India, only 41.8% of the children were breastfed within an hour of birth, and 64% of the children are exclusively breastfed for the first six months. Only 11% of children under two years of age receive an adequate diet[16]. Literature also suggests that the country's infant and young child feeding practices are poor. Pre-lacteal feeds are still given to almost 8.2% of the infants, and only 18.8% of the children received age-appropriate complementary feeding[18]. The NFHS-5 data shows that in India, amongst children between 6 and 23 months only 22% had minimum dietary diversity while only 35% consumed minimum recommended number of meals and only 11% were fed minimum acceptable diet. The report also states that only 68% of the children received any of the Anganwadi services, while only 62% received food supplements[16].

2.3 Access to WASH services

Efforts have been made in recent decades to address access to safe water and sanitation as significant determinants of malnutrition. According to the WHO sanitation report of 2022, over 1.7 billion people lack access to basic sanitation facilities, and 673 million lack access to toilets and continue to practice open defecation[19]. The WHO's 2022 report found that 2 billion people have access to contaminated drinking water which can transmit diseases like cholera and diarrhoea. Due to poor drinking water, hygiene, and sanitation, 1.7 billion children are affected by diseases such as diarrhoea, which is a leading cause of malnutrition and death in children[20]. In India, only 70% of the households have improved sanitation facilities.

2.4 Influence of food security, socio-economic and political factors

Despite being crucial to transforming nutritional outcomes, the overarching enabling environment has not been the focus of nutritional programmes to date. Strong political commitments, adequate resources in terms of finances, workforce, social and environmental resources, and positive socio-cultural norms are critical to achieving the optimum nutritional status among children. The Global Nutrition Report 2022 states that the nutrition-specific spending has been very low across the globe[22].

The report also states that many of the countries perform poorly in combating the burden of malnutrition due to short-falls in governance and policies and poor political commitment [23]. Studies have also shown that in India the household food insecurity is as high as 77.2% with 9.2%

of the households being severely food insecure while 18.8% as moderately food insecure and 49.2% with mild food insecurity[21].

Socio-economic inequality is one of the major reasons of the slow pace of reduction in malnutrition in our country. Literature suggests that higher proportions of children are found in the household with poor socio-economic status[24][25][26]. Maternal nutrition and education, income, family size, and employment are the other consistent factors contributing to malnutrition in our country[23]. Studies have also shown that low maternal education was strongly associated with undernutrition among under-five children. Current literature also shows a direct association between maternal nutritional status, wealth of the family and caste with the nutritional status of the children [27] [28]. Social and cultural norms such as son preference in the household increases the risk of undernutrition among the girl child[29].

The government also adopted the National Nutrition Policy in 1993 to eradicate malnutrition and achieve optimum nutrition for all. In 2018, the POSHAN Abhiyaan (National Nutrition Mission) was launched with the vision of making India malnutrition-free by 2022. In 2021, Saksham Anganwadi and Mission POSHAN 2.0 was launched to strengthen the existing programs and promote nutrition awareness and healthy eating practices. The POSHAN tracker is a mobile-based application that tracks and identifies the prevalence of stunting, wasting, and underweight among children and the last-mile tracking of nutrition service delivery.

Despite several remarkable initiatives, prevalence of malnutrition among children under five is still high, suggesting gaps in the policies, design and implementation of the programme[30][31].

This study intends to capture the determinants described in the framework above to help frame suggest interventions specific to the contexts being studied. The following section describes the development of the study and its methodology.

2.5 Prevalence of malnutrition in the study locations

Assam: In Assam, there has been a marginal improvement in stunting among under-five children, but the proportion of children in the wasting and underweight categories has increased. There has also been a sharp drop in the proportion of children receiving early initiation of breastfeeding; less than 65% of children receive exclusive breastfeeding up to six months of age. The nutrition status of children under two years of age is also poor, with only 8% receiving adequate diet, which has decreased in recent years[16].

The Kamrup district in Assam, a culturally diverse north-eastern state of India, has relatively better nutritional trends compared to the state and national average. It was considered that covering a district performing better than the state average might reveal factors that impact malnutrition positively. However, some health and nutrition indicators also suggest poor performance in the district with respect to child nutrition. For instance, according to the NFHS 5 report, 57% of pregnant women receive antenatal care in the first trimester which is lesser than national (70%) and state (64%), while 61% received postnatal care which is higher than national average (36.5%) but lower than the state (65%) average. Additionally, 48% of children under

three years of age receive breastfeeding within an hour of birth, compared to 49% in the state overall. Among children under two years of age, only 6.5% receive an adequate diet, which is almost two percentage points less than the state average. These indicators have worsened in the time between the NFHS-4 and NFHS-5. Anaemia among children in the district is relatively higher (73%) as compared to the state (68%) and national (67%) average[16].

Rajasthan: The state of Rajasthan in the west of India has seen a decrease in the prevalence of malnutrition over time. Since 2015-16 (NFHS-4), stunting has reduced by more than eight percentage points, wasting has reduced by around six percentage points, and underweight has reduced by nine percentage points. However, the state still has a high burden of undernutrition, with 31.8% of children stunted, 16.8% wasted, and 27.6% underweight.[16].
Karauli is an eastern district of the state and has 24.4% SC&ST population, with the majority of its population residing in rural areas. The sex ratio in the district has improved over the years, but the sex ratio among under-five children in the district has decreased from 936 (NFHS-4) to 863 (NFHS-5). About 19% of children under the age of six do not receive exclusive breastfeeding, and only 6% of children between 6-23 months receive an adequate diet[16].

Delhi: Undernutrition remains a critical issue in Delhi, with only minor improvements in child nutritional indicators in recent years. In the last five years, stunting decreased by only one percentage point to 30.9%, 22% of children are underweight, and 11% are wasted. Only half of the children start breastfeeding within an hour of birth, and only 64% receive exclusive breastfeeding for six months[16].
The Northwest district of Delhi is known for having numerous colonies with a large migrant population, whose residents work as daily wage laborers in occupations such as construction, domestic work, and street vending. Unfortunately, malnutrition is a prevalent issue among children residing in this district. The latest data shows that 26.9% of children under the age of five years are stunted, 22.8% are underweight, 11% are wasted, and 6% are severely wasted.[16].
Odisha: Odisha has made progress in reducing malnutrition in recent years, but many children in the state continue to suffer from undernutrition. Around 30% of children under-five are underweight, and over 30% are stunted. Additionally, more than 68% of children did not receive timely initiation of breastfeeding, and nearly 73% did not receive exclusive breastfeeding until six months of age, which is higher than the national average[16].
The Rayagada district in Odisha mainly consists of PVTG population, primarily of Khonds and Soras tribes. The health and nutrition indicators of the district are worse than the state and national averages, with nearly 40% of its children underweight and even more in the stunted category. Less than one-fourth of the children under two years of age receive an adequate diet[16].

As the NFHS-5 survey reveals, there are considerable variations in the prevalence of childhood undernutrition in the states selected for the study (Table 1). Further, there is considerable intra-district variation with three of the four selected districts performing worse than the state average with respect to childhood underweight.

Table 1: Nutritional status of children under 5 in study sites

Nutritional status of children under 5 in the study sites									
Indicator	**India**	**Assam**		**Rajasthan**		**Delhi**		**Odisha**	
		Assam (Total)	Kamrup	Rajasthan (Total)	Karauli	Delhi (Total)	North West Delhi	Odisha (Total)	Rayagada
Stunting	35.5	35.3	22.6	31.8	37.6	30.9	26.9	31.0	43.6
Wasting	19.3	21.7	14.8	16.8	26.6	11.2	10.9	18.1	16.1
Underweight	32.1	32.8	19.7	27.6	37.3	21.8	22.8	29.7	39.8
Source: NFHS-5 (2019-21)									

3. Methodology

3.1 Aim and objectives of the study

To assess the prevalence and determinants of malnutrition among children enrolled in Anganwadi Centres in selected geographies and identify the factors at various levels leading to the poor health and nutritional status of the children.

Objectives

- To determine the prevalence of malnutrition among children under five years enrolled in the Anganwadi centres in selected geographies
- To study the household, community, and systems-level factors associated with malnutrition among underweight children in the Anganwadi centres
- To assess the service delivery of ICDS in the selected AWCs
- To identify gaps and formulate targeted recommendations to improve the nutritional status of children under five.

3.2 Study location

As mentioned above, the study was undertaken across four geographies covering the sample districts such as Kamrup (Assam), Karauli (Rajasthan), Northwest Delhi (Delhi), and Rayagada (Odisha) in collaboration with the department of women and child development based on burden of the problem and feasibility for the study team. In each district, one block was selected that included representation of PVTG, tribal, mixed population and one urban slum.

Figure 3: Study locations

3.3 Selection of block and Anganwadi centres

In Assam, the study was conducted in the Chhayagaon block of Kamrup district. The selection of five Anganwadi centers namely - Dhumgara, Barbakara, Nuwapara, Bhebheri, and Kukurmara was selected based on consultation with the CDPO. Kamrup district has 14 blocks, and the selected villages were representative of different populations, including PVTG, minority, and mixed caste groups. The selection was based on the average enrollment of children in each center.

In Rajasthan, the Karauli district is divided into 8 blocks. Among them, the Karauli block was chosen for the study. The CDPO of Karauli district provided a list of Anganwadi centers (AWCs) in the Karauli block along with enrollment details of each center's children. Five AWCs namely- Mandakheda, Kheda, Gunesara, Jahangirpur and Sengarpura were then selected based on their average

enrollment of 80-82 children in each center. The selected AWCs were located in five different sectors of the Karauli block.

In the Shahbad Dairy area, an urban slum in north west Delhi, the selection was made in consultation with the Director of the Department of Women and Child Development (DWCD) and the study team. We obtained a list of Anganwadi centers in the area, along with the enrollment of children per center, from the Child Development Project Officer (CDPO) of Shahbad Dairy. Five Anganwadi centers- AWC 41, 43,46, 51 and 53 were then selected based on the average enrollment of children.

In Odisha, the study team consulted with the DWCD to select the Bissamcuttack block in Rayagada district. The block is composed of two PVTG and five non-PVTG sectors. After obtaining a list of functional Anganwadi centers in the block and excluding [1]PHRS intervention, the team selected five centers namely- Batiguma, Kadraguma, Sahada, Samudra Buduni and Badabudahada based on the average enrollment of 50-100 children and operational feasibility.

Overall, the selection of Anganwadi centers in each location was made based on the average enrollment of children, malnutrition status and representation of different population groups, as well as operational feasibility.

Table 2: List of blocks and Anganwadi centres

State	District	Block	Anganwadi centres
Assam	Kamrup	Chahyagaon	Dumgara, Kukurma Bherberi, Nuwapa Barbakara
Rajasthan	Karauli	Karauli	Kheda, Gunesri, Jahangirp Mandakheda, Sengapura
Delhi	North west Delhi	Shahbad dairy	AWC 41, AWC 43, AWC 4 AWC 51, AWC 53
Odisha	Rayagada	Bissamcuttack	Badabudhahada, Batigun Kadraguma, Sahada, Samuc Buduni

3.4 Study design

This study has applied mixed methods to identify the household, community, and system-level determinants of malnutrition. Both qualitative and quantitative components have been used to assess the knowledge and skill of frontline workers, the availability of services at Anganwadi centres, the convergence between the ICDS and health department, and to understand household-level conditions, food security, and dietary practices.

[1] PHRS is implementing community based creches for children under 3 to reduce malnutrition. The programme aims to provide comprehensive, community-based management of malnutrition and child care services through day care service. The programme is operational in 13 blocks of southern Odisha that includes three blocks of Rayagada districts.

3.5 Tools for data collection

Child Data Sheet: A structured child data sheet was developed to collect recent anthropometric data and other relevant information of children from Anganwadi centers. This child data sheet was used to develop a child database and assess the nutritional status of children.

Household Survey Tool: A structured household survey tool was developed to assess the socio-demographic conditions of the households with children in the underweight category as per Anganwadi records, the status of food security and IYCF practices, service delivery of health and ICDS, the status of hygiene and sanitation, and women dietary diversity, and to identify the various factors at the household level leading to malnutrition among children. The household survey tool was introduced to the mother as primary care giver of the child. In absence of the mother, it was asked to the most relevant care provider who could provide the required information.

Focus Group Discussion Checklist: A focus group discussion checklist was developed to assess community-level factors across themes including livelihood, IYCF practices, maternal and child nutrition, and hygiene and sanitation leading to malnutrition among children. The focus group discussions were conducted among two cohorts: one exclusively with mothers of children and the other composed of a mixed group involving mothers, community members, FLWs, and other community stakeholders.

Interview Guide for Key Informants: Interview guides were developed for frontline workers such as Anganwadi workers, ASHA, and ANM, as well as officials of ICDS such as supervisors and CDPOs. These interview guides assessed their roles and responsibilities and challenges they faced in effectively delivering health and nutrition services to their beneficiaries.

Facility Survey: A pre-structured, pre-tested Anganwadi checklist was used to assess infrastructure, inventory management, availability of drugs/medicine, and service availability at Anganwadi centres. Additionally, a VHSND checklist was used to assess service delivery during VHSNDs. The convergence of ICDS with the district health administration was assessed by observing the VHSND.

Area mapping: Area mapping was conducted in all the 20 AWC villages to understand the socio demographic features and resource availability.

3.6 Pilot study

A pilot study was conducted in Delhi in July-August 2022 to test the feasibility of the study and tools developed for the study. The study was conducted at two sites, Bajara Pahadi and Shahbad Dairy, and included household surveys, Anganwadi interviews, and observations of ICDS services. The pilot study helped develop a data collection protocol and improve the data collection procedures.

3.7 Sampling

This study considered all children under five years of age enrolled at the selected Anganwadi Centers from each block. A database containing anthropometric data of the children was obtained from each Anganwadi centre, and analyzed using WHO anthro analyzer to identify children in the underweight category to assess their nutritional status. The households of children identified as underweight were visited and surveyed. Additionally, FGD was conducted with the community, and interviews were conducted with FLWs and ICDS supervisor cadre. For the qualitative data, the frontline workers of National Health Mission and ICDS, the supervisory cadre workers and, and the ICDS officials working in the catchment area of each Anganwadi Center were selected for key informant interviews. FGDs were conducted in two groups, one with mothers of under-five children and the other with a mixed group of community members residing in the area.

A total of 20 Anganwadi centres were selected, five in each block. Considering an average enrolment of 40 children per AWC, 200 children were estimated per location (800 in 4 locations). All the children enrolled at the selected Anganwadi centres were considered for the study.

The household surveys were planned to be conducted only for the children identified as underweight. Assuming a prevalence of underweight children as 32% (based on NFHS-5 India data) and a maximum enrollment of 800 children in 20 AWCs, the total estimated number of households (HH) to be surveyed was 256 children (32% of 800 children). However, during the survey, it was discovered that the total enrollment of children in the age group of 0-5 years across the 20 Anganwadis was 1471, out of which 344 children were categorized as underweight. As a result, the sample considered for the HH survey was 344, but the survey could only be conducted for 312 households. 32 households could not be covered either because they were unavailable at the time of the survey or because the residents had migrated.
Focused group discussions and key informant interviews were conducted until saturation was achieved. 40 FGDs were estimated considering 2 FGDs per village (one with the mothers' group and one with a mixed group in the community). However, 27 FGDs were conducted as data saturation was achieved.

A total of 68 Key Informant interviews (KII) were planned with the AWWs ASHA, ANM, Lady Supervisor and CDPO in four locations, however, finally, 58 KII were conducted for this study.

Table 3: Total number of KII conducted

Stakeholder (KII)	Estimated Number	Total achieved
ASHA	20	16
AWW	20	20
ANM	20	14
Lady Supervisor	4	4
CDPO	4	4
Total	**68**	**58**

Facility surveys were conducted for all the Anganwadi centers, and VHSND observations were done during all the VHSNDs that were organized in the study areas within the data collection period.

Table 4: Sample Distribution

Category	Sample size per site	Total as per proposal	Total achieved
No. of AWCs to be covered (5 in each of 4 states)	5	20	20
No of children (assuming 40 children per AWC)	All children enrolled at AWC	800	1471
No. of household surveys conducted with underweight children	All children identified as underweight	256	312
Focus group discussion (2 at each AWC village)	Till data saturation is achieved	40	27
Key Informant Interviews (AWW, ASHA, ANM, Lady Supervisor at each site, CDPO at each site)	Till data saturation is achieved	68	58

3.8 Recruitment and training of survey team

After receiving necessary permission from appropriate authorities for conducting the field survey, the field investigators were recruited and trained on the study protocol and its tools. A virtual training was organized for field investigators for Assam, Delhi and Odisha on the 12th and 13th of September 2022 and 28th and 29th December 2022 for the investigators in Rajasthan, covering the context of the research study. The investigators were trained in data collection tools, including Kobo Toolbox (a mobile-based data collection tool deployed for the study).

3.9 Data collection, analysis and management

Primary data was collected from Anganwadi centers in the form of a child data sheet, which was then entered into excel worksheets. The data was analyzed using the WHO Anthro survey analyzer to assess the nutritional status of children and identify those who were underweight. Data for household surveys, facility surveys, and VHSND observations were collected digitally using Kobo Toolbox and analyzed in excel for descriptive analysis and inferences. Qualitative data was transcribed and analyzed manually, with the local language being translated to English and

then back-translated to ensure accuracy. Codes were generated, similar codes were combined into themes, and transcripts were analyzed to understand the links between themes.

3.10 Study timeline

The one-year research study started in April 2022, with data collection in Assam, Odisha and Delhi in September 2022 and Rajasthan in December 2022. The data was collected in approximately 45 days in each study site.

3.11 Ethical considerations

Following the development of a study protocol and tools, ethical clearance was taken from the Institutional Ethics Committee of Public Health Resource Society. Participant information sheet and informed consent form in local language were developed for use. The form was shared with the participants/ read out to the participants, as was required. Thereafter, written, or verbal consent was taken. After every interview, a summary was read back to the participants to ensure validation. Informed consent was also taken for the audio-recording of the discussions and for taking photographs. The confidentiality of the participants was maintained throughout the study. Participation was entirely voluntary with the right of the respondents to withdraw at any stage. No direct risks were anticipated for the participants and it has been ensured that no data can be identified as arising from any specific respondent in order to prevent any systemic backlash related to any testimonies.

3.12 Limitations of the Study

1. The study couldn't be conducted in the southern region of the country considering the limitations of resources to manage distance and language.

2. Given the resource limitation, covering all children enrolled in AWC was difficult. This would have helped in comparing the determinants of malnutrition among underweight children with children in the normal categories.

3. Due to the delay in getting permission from the state departments for conducting the field work, the time period for anthropometry data of all sites is slightly different which may have some implications for seasonal variations.

4. The latest anthropometric data available at the AWC was used rather than using an independent process of anthropometry. Considering the exponential increase in HR, equipment, capacity building, quality control and expenses that would have entailed, independent measurements at scale were beyond the scope of the present study. However, this method enabled the study to evaluate the functioning of the ICDS system for anthropometric capture.

4. Findings

4.1 Study site description

Kamrup, Assam

The study was conducted in five villages of Chhayagaon block in Kamrup district. These villages include Dhumgara, Barbakara, Nuwapara, Bhebheri, and Kukurmara. The residents of these villages belonged to scheduled tribes and mixed-caste groups. The village areas range from 2 to 4 kilometre. On average, there was approximately 300 households in each village, with the range varying from 120 to 600 households.

Most of the people in these villages had received education up to the 10th grade or secondary level. The community institutions, such as government schools and AWCs (Anganwadi Centers), were found functional. The primary health centre was located within a distance of 1 to 3 kilometres from all the villages, except for Bherberi, which was 5 kilometres from the farthest household. The religious institutions found in these villages were temples and namghars.

The common sources of drinking water were hand pumps and tube wells. Almost all households have their own latrines and toilets. However, the road connectivity in these villages were very poor, with dilapidated conditions prevailing in almost all of them. Moreover, public transport facilities were also inadequate in some of the villages. In the study site it was found that people have access to phone, but the internet connectivity was very poor.

The commonly domesticated livestock in these villages were cows, goats, hens, pigs, and ducks. Additionally, almost all households had kitchen gardens. The common vegetables grown and consumed included ridge gourd, bottle gourd, radish, cabbage, potato, chilli, and onion. Rice was the staple food, and pulse cultivation was also practised.

Ration stores (PDS) are available in all the villages, situated at a distance of 500 meters to 1 kilometre from the farthest households. However, only rice is provided through the PDS.

Most of the people in these villages were engaged as daily wage labourers, agricultural labourers, or in fish farming. Most of the women were engaged in unpaid family work, while some were involved in manufacturing handicrafts and weaving activities. Approximately 30% of the village population migrates to other places for livelihood activities.

Various schemes and programs, such as ICDS (Integrated Child Development Services), MDM (Mid-Day Meal), NHM (National Health Mission), PDS (Public Distribution System), and MGNREGA (Mahatma Gandhi National Rural Employment Guarantee Act), were found to be operational in all these villages. However, there was no presence of NGOs (Non-Governmental Organizations) or CSOs (Civil Society Organizations) in these villages.

Karauli, Rajasthan

In Rajasthan, the study was conducted in five villages: Mandakheda, Kheda, Gunesara, Jahangirpur, and Sengarpura, in Karauli block of Karauli district. These villages consisted of people from scheduled tribes and scheduled castes. The village areas ranged from 4 to 5 square kilometres, and the average number of households was around 130-140.

The literacy rate varies from 58% to 85%. The community members were primarily engaged in agricultural activities, including animal rearing. Community institutions such as government schools, primary health centres (PHC), and Anganwadi Centers (AWC) were found functional. The government schools in these villages were located at a distance of 1.5 to 2.5 kilometres, while the primary health centre was approximately 2 to 3 kilometres away. The religious institution found in these villages were temples.

The common source of drinking water was borewells. However, there was lack of toilet facilities, and open defecation was practised. The road connectivity in these villages was good, and the common modes of transportation were jeeps, buses, and tempos. The government bus stand was located 22 kilometres away, while the nearest railway station was 30 kilometres away. Phone and internet facilities were available in all the villages.

The commonly domesticated livestock in these villages were cows, buffaloes, and goats. Around 40% of households had kitchen gardens. The commonly consumed vegetables included potatoes, cauliflower, and eggplant, while the grains mainly consist of wheat and bajra.

Ration stores (PDS) were available in all the villages, situated approximately 1 kilometre away from the farthest household.

Close to 50-60% of the village population migrates to other places for livelihood activities.

Schemes and programs like ICDS (Integrated Child Development Services), MDM (Mid-Day Meal), NHM (National Health Mission), PDS (Public Distribution System), and MGNREGA (Mahatma Gandhi National Rural Employment Guarantee Act) were found to be operational in all these villages. However, MGNREGA cannot provide jobs to many villagers, and only a few benefits from it. Self-Help Groups (SHGs) were found to be very active in these villages. No NGOs (Non-Governmental Organizations) or CSOs (Civil Society Organizations) were working in these villages.

Northwest Delhi, Delhi

The study was conducted in five villages of the Shahbad Dairy area in Northwest Delhi. These urban slums consisted of people from the Scheduled Caste, predominantly dominated by the Harijan community. The area spans from 500 to 800 meters, and the average number of households were approximately 270, ranging from 80 to 350 households. The roads and alleys (kuccha) in this area were very narrow, and waterlogging was a common issue observed.

The literacy level in this area was very low, with a majority of people being uneducated. However, it was found that the schools located nearby. There was a government school at a distance of 500 meters and a private school across the road. Children from this area attend the government school. Male members of this community were mostly engaged as daily wage earners, rickshaw pullers, or own tea stalls. Some men also workedw in factories in Bawana or Daulatpur. Women were engaged as domestic workers. Each village had a functional Anganwadi Center (AWC), and a government dispensary located at a distance of 500 meters. ASHA workers were active and conducted frequent home visits with the AWW (Anganwadi Worker). No religious institutions were found in these villages.

As informed by the community most of the households had individual taps (direct supply). When there is no direct supply, water is provided through tankers. This water was used for drinking, cleaning, washing, and other purposes. Almost all households had their own latrines and toilets, and there were public toilets primarily used by shopkeepers and vendors. The villages were well connected through public transport, with common modes of transportation being rickshaws and DTC buses. The nearest railway station was 5 to 6 kilometres away from the slum. In the study site it was found that people had access to phone, but the internet connectivity was very poor.

Due to the lack of space, kitchen gardening and livestock rearing were not practised in this area. The living condition was very poor as the houses were very small.

Ration stores (PDS) were available in these villages. People obtained their ration from these stores but often faced difficulties procuring food items, mainly due to a lack of money. They had to rely on moneylenders. Schemes and programs like ICDS (Integrated Child Development Services), MDM (Mid-Day Meal), NHM (National Health Mission), and PDS were found to be operational in all these villages. Organisations, like Save the Children and Mobile Creches, were working in this area.

Rayagada, Odisha

In Odisha, the study was conducted in five villages: Batiguma, Kadraguma in Kurli, Sahada, Samudra Buduni in Sahada, and Badabudahada in Dakluguda, all located in the Bissamcuttack block of Rayagada district. Batiguma and Kadraguma were inhabited by people from the PVTG (Primitive Vulnerable Tribal Group), while Sahada, Samudra Buduni, and Badabudahada consisted of scheduled tribes (Kandha tribe) and mixed caste groups, including SC and OBC. The village areas ranged from 1 to 5 square kilometres, and the average number of households were approximately 100, varying from 46 to 202 households. Most of the houses in these villages were semi- pucca.

The level of education varied among the villages. In Batiguma, only 3-4 individuals had received primary education, while in Kadraguma, 40% of the population had completed primary education. In Samudra Buduni, Sahada, and Badabudahada, people had studied till class 10th or secondary education. Community institutions such as government schools and Anganwadi Centers (AWC) were found to be functional, but Batiguma lacked both an AWC and a government school within the village. The primary health centre was located at a distance of 1 to 5 kilometres

from all the villages. Temples served as religious institutions in these villages. The common sources of drinking water were stream water and bore wells. Approximately 40% of villagers in Sahada, Samudra Buduni, and Badabudahada had their own latrines and toilets, while in Batiguma and Kadraguma, most people practiced open defecation.

The road connectivity is good in these villages, with well-maintained roads. However, public transport facilities were limited, and only a few villagers own vehicles. Mobile networks have been installed in all the villages. Weekly Iron Folic Acid Supplementation (WIFS) was found to be available for adolescent girls in most villages.

The commonly domesticated livestock in these villages were cows, goats, hens, pigs, and lambs. The households didn't have kitchen gardens and instead purchased vegetables from the local market (haat), which was approximately 14 kilometres away from the villages. Villagers grew crops such as biri, mandia, various millets, paddy, and fruits like pineapple, turmeric, jackfruit, and mango. Rice and mandia (finger millet) were the staple foods and pulse cultivation was practised.

Ration stores were available at the Gram Panchayat headquarters, which was located at varying distances from 0 meters to approximately 8.5 kilometres from the farthest household. Only rice was provided through the PDS.

Most people were engaged as daily wage labourers and agricultural labourers, particularly in hilly areas. The majority of women were engaged in hilly agricultural work. In Batiguma and Kadraguma, some women in these communities were engaged in traditional handicraft and weaving activities.

Approximately 20% to 30% of the village population migrates to other places for livelihood options.

Schemes and programs such as ICDS (Integrated Child Development Services), MDM (Mid-Day Meal), NHM (National Health Mission), PDS (Public Distribution System), MGNREGA (Mahatma Gandhi National Rural Employment Guarantee Act), and OPELEP (Odisha PVTG Empowerment and Livelihoods Improvement Programme) were found to be operational in all these villages. Furthermore, NGOs/CSOs like AKSUS, CINI, and Harsha Trust were present and were actively working in these villages.

4.2 Prevalence of malnutrition among under 5 enrolled in selected AWCs

The analysis of data obtained by the methods described relies upon the coverage and accuracy of the Anganwadi system in capturing anthropometry. Though the Anganwadi system is intended to be universal, in fact, the coverage is short of 100%. Even within the children enrolled, anthropometric indicators are not available for all children due to multiple reasons including migration.

Total sample size of the enrolled children as per AWC records during the study was 1471. After filtering for age less than 60 months the analyzable sample remained at 1373. (Table 4). Height measurements were available for only 1208 (88%) children, and weight measurements were obtained for only 1267 (92%). Out of 1373 children, 69.2% of children did not have birth weight data. The average birth weight was 2.9 kg estimated from the birth weight data available for only 423 children (30.8%) of the enrolled children. Of the 423 children, 9.7 % of children had LBW (birth weight less than 2.5 kg). NFHS – 5 (2019-21) shows that 18.2 % of children in India are LBW while this is 22.1%, 16.1%, 17.7% and 19.2% for Delhi, Assam, Rajasthan and Odisha respectively.

It is interesting to note that there was minimum missing data found in Kamrup (Assam) and while it's maximum in northwest Delhi (Table 4). The issue of missing data must be kept in mind while assessing the validity of the prevalence of various forms of malnutrition in this study. Missing data was least for weight and most for height, thus affecting the parameter of underweight least and wasting and stunting most.

In assigning the z-scores, checks were made on their plausibility as recommended by the WHO. Children with height-for-age z-scores below -6 SD or above +6 SD, with weight-for-age z-scores below -6 SD or above +5 SD, or with weight-for-height z-scores below -5 SD or above +5 SD were flagged as having invalid data as per WHO norms. Following this process, there were 168 (12.2%) flags for length- or height-for-age, 5 (0.4%) flags for weight-for-age, 32 (2.3%) flags for weight-for-length or height.

Children who were flagged for out-of-range z-scores or invalid z-scores were excluded from both the denominator and the numerators**.** *Hence the analyzable sample size for stunting was 1040, underweight was 1262, and wasting was 1069.*

Table 5: Missing data by Geographical Region

Study location	N	Age* (days)	Weight (kg)	Length or height (cm)	Sex
Kamrup (Assam)	263	0 (0%)	4 (1.5%)	4 (1.5%)	0 (0%)
North-West Delhi (Delhi)	441	0 (0%)	62 (14.1%)	64 (14.5%)	0 (0%)
Rayagada (Odisha)	312	0 (0%)	10 (3.2%)	67 (21.5%)	0 (0%)
Karauli (Rajasthan)	357	0 (0%)	30 (8.4%)	30 (8.4%)	0 (0%)
Total	1373	0 (0%)	106 (7.7%)	165 (12%)	0 (0%)

After filtering for the age under 60 months, 1373 children were retained and the following is the age group-wise distribution of enrolled children at that point of time (Figure 4).

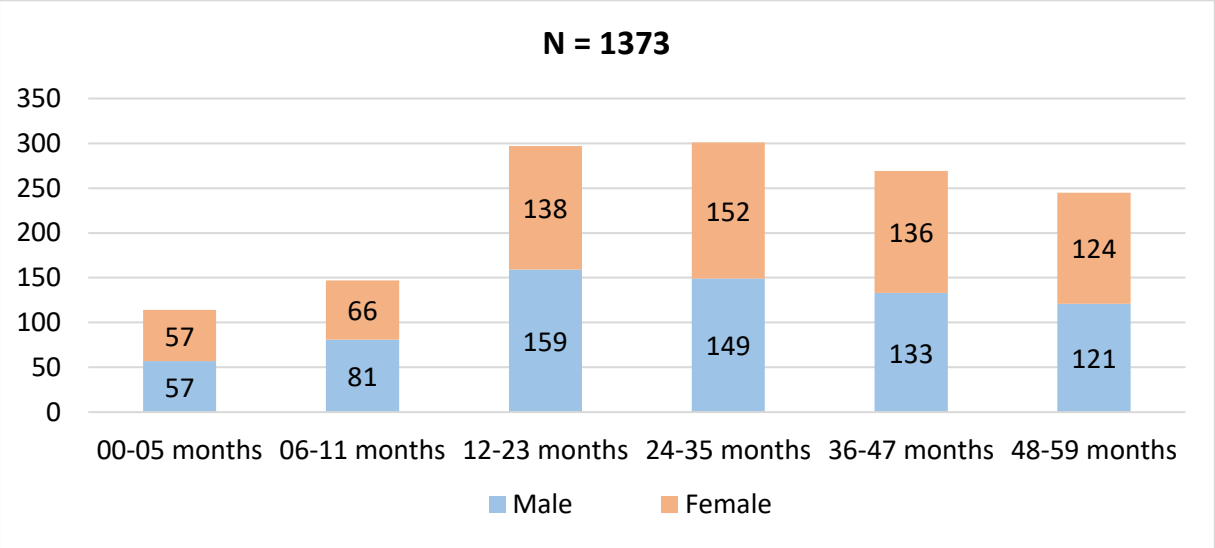

Figure 4: Age and Sex distribution of children enrolled in the study

More or less the enrolment of boys and girls were evenly distributed across all age groups except in the age group of 12-23 months where there were more boys (159) than girls (138).

Prevalence of underweight

Children with low weight-for-age (WAZ) are considered underweight. WHO child Growth Standards defines that the children with weight-for-age Z score < -2SD are underweight and similarly children with weight-for-age Z score < -3 SD are severely underweight.

In our study, after excluding missing anthropometric parameters and implausible Z scores, a total of 1262 children were considered for the analysis of underweight. The analysis shows 27.25 % of children were underweight (WFA <-2SD) *(*Figure 5*)* and nearly 7.92 % were found to be severely underweight (WFA <-3SD). The recent NFHS-5 survey data revealed that approximately 32.1% of children in India are underweight which is five percentage points higher than the results of the study.

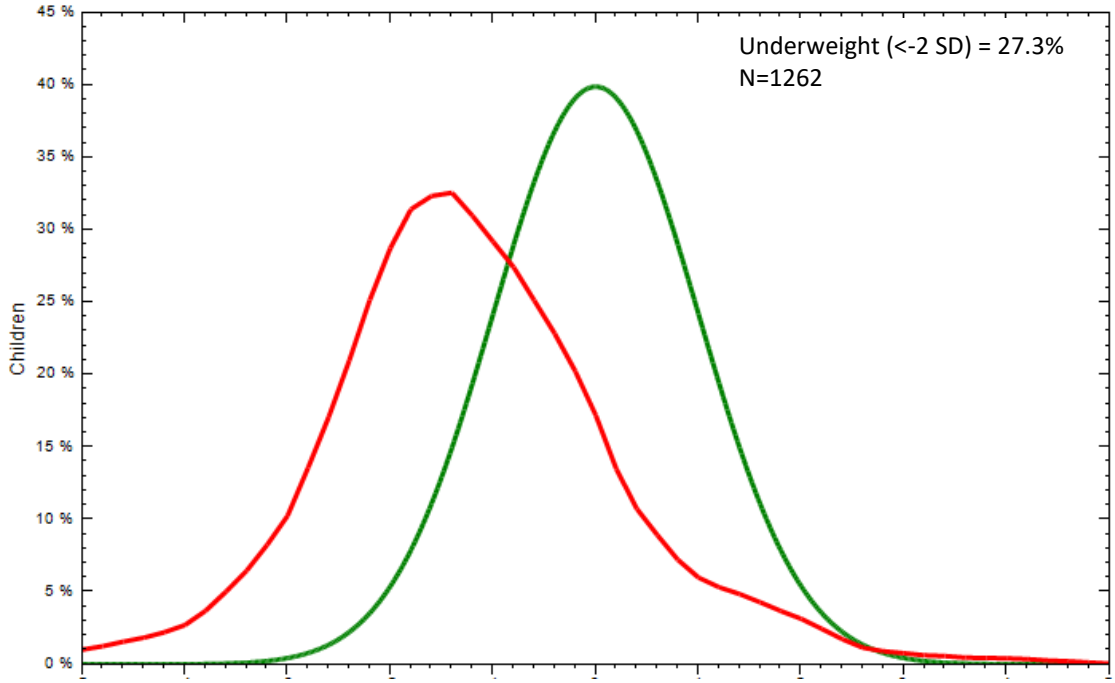

Figure 5: Prevalence of Underweight

WHO standard normal distribution as the reference
The distribution of children from the study population

In our study, the prevalence of underweight was slightly higher among boys (28.5%) as compared to girls (25.9%) This differential of gender on underweight is similar to that of NFHS-5. Among the four study locations, northwest Delhi had the maximum proportion (36.5%) of underweight children. Similarly, the prevalence of severe underweight was also higher in northwest Delhi (11.8%) and much less in Kamrup Assam (4.2%). (Table 5).

Table 6: Prevalence of Underweight (age, gender and region wise)

Group	N	% < -3SD (95% CI)	% < -2SD (95% CI)	Z-score mean (95% CI)	SD
All	1262	7.92 (6.43; 9.41)	27.26 (24.8; 29.72)	-1.25 (-1.33, -1.18)	1.36
Age Group					
00-05 months	69	15.94 (6.52; 25.36)	26.09 (15.73; 36.45)	-0.52 (-1.11, 0.07)	2.51
06-11 months	132	6.06 (1.86; 10.26)	21.21 (14.24; 28.19)	-0.83 (-1.09, -0.56)	1.55
12-23 months	282	8.16 (4.82; 11.49)	25.53 (20.44; 30.62)	-1.08 (-1.25, -0.91)	1.44
24-35 months	284	9.86 (6.21; 13.51)	30.63 (25.27; 36)	-1.4 (-1.54, -1.26)	1.21
36-47 months	260	5.38 (2.56; 8.21)	23.46 (18.31; 28.61)	-1.34 (-1.46, -1.22)	0.99
48-59 months	235	6.81 (3.47; 10.14)	33.19 (27.17; 39.21)	-1.65 (-1.77, -1.53)	0.96
Gender					
Female	620	8.23 (6.06; 10.39)	25.97 (22.52; 29.42)	-1.21 (-1.32, -1.1)	1.42
Male	642	7.63 (5.58; 9.69)	28.5 (25.01; 32)	-1.3 (-1.4, -1.2)	1.30
Region					
Kamrup (Assam)	259	4.25 (1.79; 6.7)	17.37 (12.76; 21.99)	-0.96 (-1.11, -0.81)	1.23
North-West Delhi (Delhi)	375	11.73 (8.48; 14.99)	36.53 (31.66; 41.41)	-1.6 (-1.73, -1.47)	1.28
Rayagada (Odisha)	301	6.64 (3.83; 9.46)	31.23 (25.99; 36.46)	-1.37 (-1.52, -1.21)	1.39
Karauli (Rajasthan)	327	7.65 (4.77; 10.53)	20.8 (16.4; 25.19)	-1 (-1.15, -0.84)	1.41

Comparing these results with the NFHS-5 data, the prevalence of underweight was high in northwest Delhi (36.5%). However, the prevalence of underweight in Karauli, Rajasthan was much less (20.8%) compared to NFHS 5. (Figure 6).

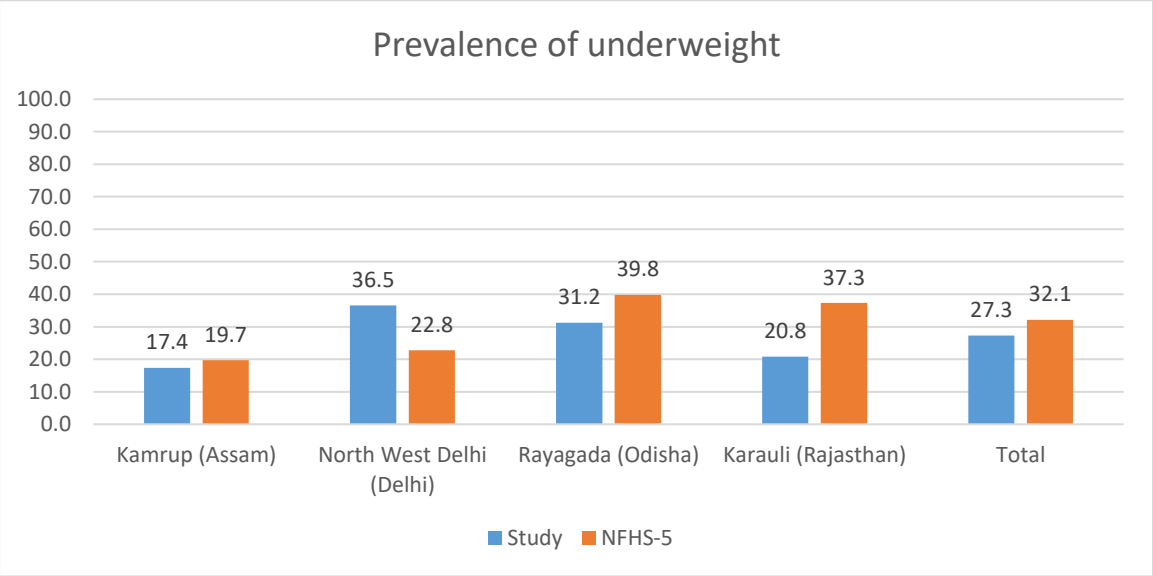

Figure 6: Comparative representation of underweight in the study and NFHS-5 data

Prevalence of Stunting

WHO defines stunting as low height-for-age. As per the WHO child Growth Standards a child is stunted if their height-for-age score is >2SD below the WHO child growth standard.

In our study after excluding children with missing height and/or weight data/ implausible HAZ score, 1040 children were considered to determine the prevalence of stunting. Stunting was seen among 42.31% of children (Figure 7) and severe stunting was seen among 20.96% of the total children (Table 6). The global nutrition report 2022 states that the prevalence of stunting among under-five children in India is 34.7% while the prevalence of stunting was 35.5% as per the NFHS-5 survey.

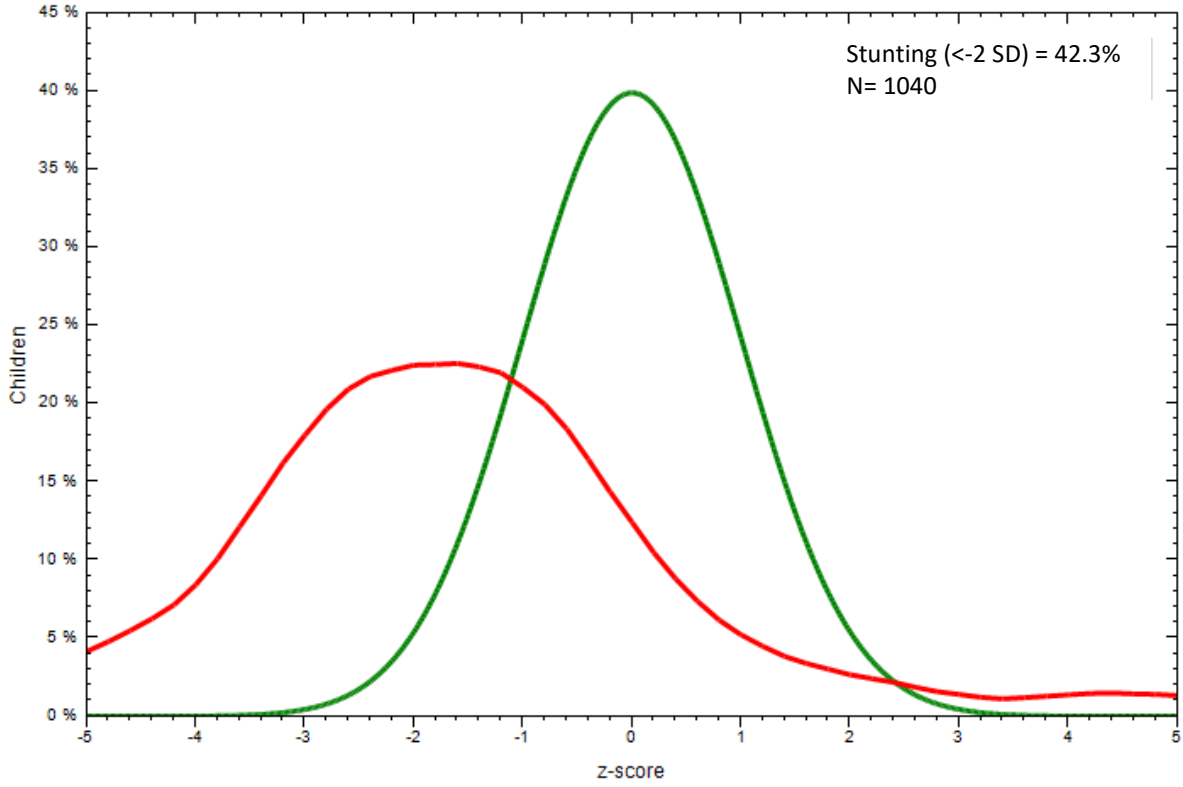

Figure 7: Prevalence of Stunting

WHO standard normal distribution as the reference
the distribution of children from the study population

Our study found that stunting prevalence was higher among girls (43.8%) than boys (40.8%). In contrast to our study, the prevalence of stunting was 1.6-point percentage higher among males compared to females as per the NFHS-5 report.

Table 7: Prevalence of Stunting (age, gender and region wise)

Group	N	% < -3SD (95% CI)	% < -2SD (95% CI)	z-score mean (95% CI)	SD
All	**1040**	**20.96 (18.49; 23.44)**	**42.31 (39.31; 45.31)**	**-1.51 (-1.63, -1.39)**	**2.00**
Age Group					
00-05 months	42	21.43 (9.02; 33.84)	33.33 (19.08; 47.59)	-0.29 (-1.18, 0.61)	2.95
06-11 months	106	25.47 (17.18; 33.77)	43.4 (33.96; 52.83)	-1.37 (-1.81, -0.93)	2.32
12-23 months	224	25.45 (19.74; 31.15)	47.77 (41.23; 54.31)	-1.42 (-1.76, -1.09)	2.57
24-35 months	237	18.99 (13.99; 23.98)	48.1 (41.74; 54.46)	-1.62 (-1.85, -1.39)	1.81
36-47 months	236	19.49 (14.44; 24.55)	35.59 (29.48; 41.7)	-1.58 (-1.78, -1.38)	1.56
48-59 months	195	17.44 (12.11; 22.76)	38.46 (31.63; 45.29)	-1.72 (-1.9, -1.54)	1.28
Gender					
Female	502	21.12 (17.55; 24.69)	43.82 (39.48; 48.17)	-1.54 (-1.72, -1.37)	2.01
Male	538	20.82 (17.39; 24.25)	40.89 (36.74; 45.05)	-1.48 (-1.64, -1.31)	1.99
Region					
Kamrup (Assam)	252	11.9 (7.91; 15.9)	32.94 (27.13; 38.74)	-1.28 (-1.49, -1.08)	1.63
North-West Delhi (Delhi)	358	18.99 (14.93; 23.06)	43.3 (38.16; 48.43)	-1.51 (-1.71, -1.31)	1.90
Rayagada (Odisha)	212	30.19 (24.01; 36.37)	53.3 (46.59; 60.02)	-1.9 (-2.18, -1.61)	2.14
Karuli (Rajasthan)	218	25.69 (19.89; 31.49)	40.83 (34.3; 47.35)	-1.39 (-1.69, -1.08)	2.31

Among all the study sites, the prevalence of stunting (53.3%) and severe stunting (30.2%) was highest in Rayagada, Odisha followed by the Northwest district in Delhi (43.3%). The stunting prevalence was relatively lower in Kamrup, Assam (32.9%). Stunting remains high in all our 4 study regions compared to NFHS 5. (Figure 8).

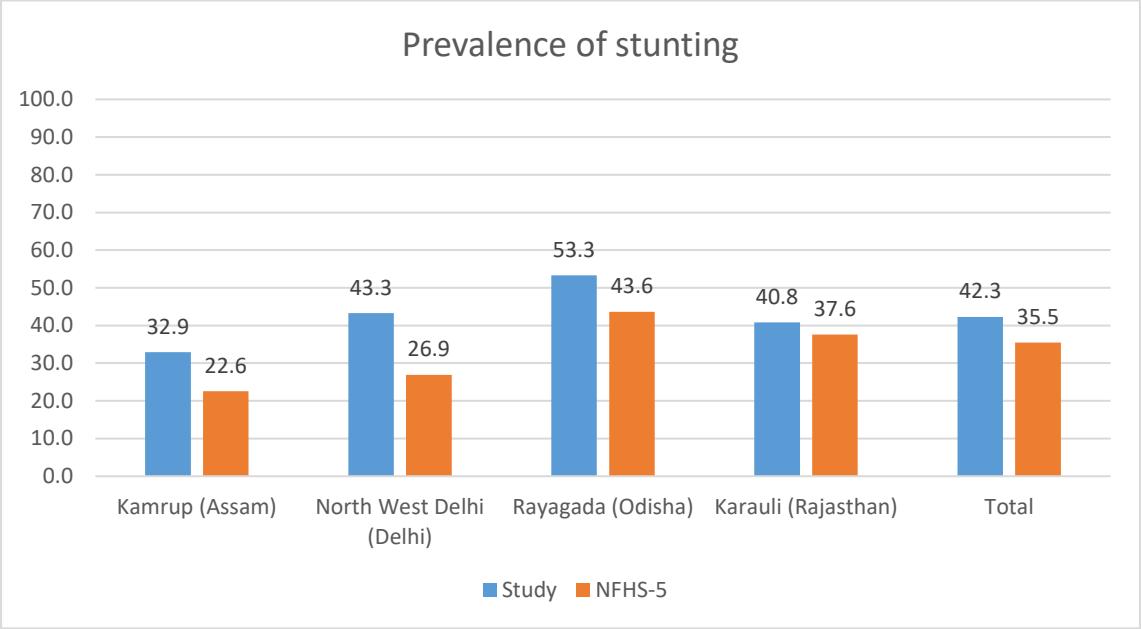

Figure 8: Comparative representation of Stunting in the study sites and NFHS -5 data

Prevalence of wasting

Wasting, also known as acute malnutrition occurs due to recent and severe weight loss and is defined as low weight-for-height. The WHO child Growth Standards define wasting as the weight-for-height score below -2SD of the WHO child growth standard.

After excluding children with missing height and weight data and with implausible z scores, 1069 children were considered to estimate the prevalence of wasting. The prevalence of wasting among the children was 14.03% (Figure 9) and that of severe wasting was 4.2%.

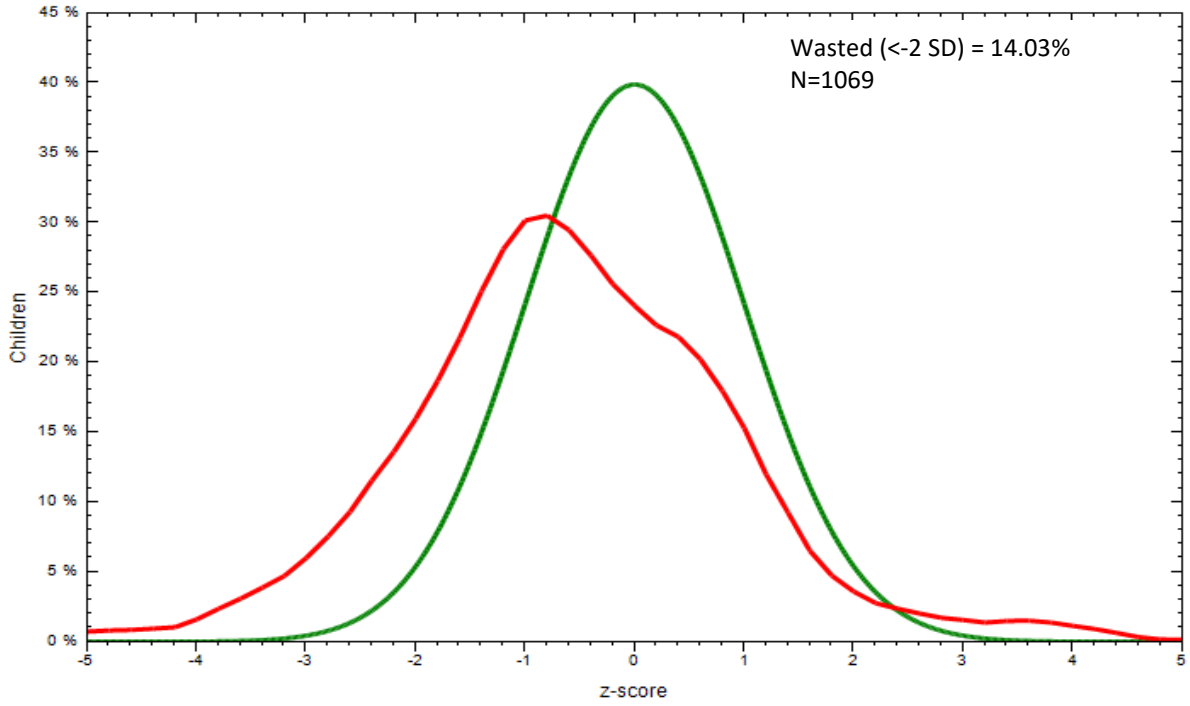

Figure 9: Prevalence of Wasting

WHO standard normal distribution as the reference
the distribution of children from the study population

Our study found that the prevalence of wasting among boys (17%) was much higher as compared to girls (10.8%). The NFHS-5 survey reported the prevalence of wasting higher among boys (20.0%) as compared to the s (18.5%) only by 1.5 percentage points (Table 7).

Table 8: Prevalence of Wasting (age, gender and region wise)

Group	N	% < -3SD (95% CI)	% < -2SD (95% CI)	z-score mean (95% CI)	SD
All	1069	4.21 (3.01; 5.41)	14.03 (11.95; 16.11)	-0.57 (-0.66, -1.23)	1.43
Age Group					
00-05 months	45	11.11 (1.93; 20.29)	20 (8.31; 31.69)	0.15 (-0.59, 0.44)	2.53
06-11 months	112	3.57 (0.13; 7.01)	10.71 (4.99; 16.44)	-0.23 (-0.51, -0.78)	1.51
12-23 months	238	7.56 (4.2; 10.92)	17.23 (12.43; 22.02)	-0.52 (-0.73, -0.99)	1.64
24-35 months	244	3.28 (1.04; 5.51)	12.3 (8.17; 16.42)	-0.63 (-0.78, -1.29)	1.19
36-47 months	235	1.28 (-0.16; 2.71)	10.21 (6.34; 14.08)	-0.63 (-0.78, -1.21)	1.14
48-59 months	195	3.59 (0.98; 6.2)	17.44 (12.11; 22.76)	-0.85 (-1.02, -1.46)	1.26
Gender					
Female	510	3.33 (1.78; 4.89)	10.78 (8.09; 13.48)	-0.48 (-0.59, -1.14)	1.38
Male	559	5.01 (3.2; 6.82)	16.99 (13.88; 20.11)	-0.66 (-0.78, -1.25)	1.47
Region					
Kamrup (Assam)	254	1.97 (0.26; 3.68)	6.3 (3.31; 9.29)	-0.39 (-0.55, -0.81)	1.25
North-West Delhi (Delhi)	367	5.72 (3.35; 8.1)	19.62 (15.56; 23.68)	-0.91 (-1.04, -1.43)	1.30
Rayagada (Odisha)	213	3.76 (1.2; 6.31)	16.43 (11.46; 21.41)	-0.41 (-0.62, -1.21)	1.54
Karuli (Rajasthan)	235	4.68 (1.98; 7.38)	11.49 (7.41; 15.57)	-0.39 (-0.59, -1.01)	1.61

In our study, the Northwest district in Delhi showed highest prevalence of wasting (19.6%) followed by Rayagada, Odisha (16.4%). The estimated prevalence of wasting in Kamrup, Assam was relatively low (6.3%). On comparing the study results with the NFHS-5 district-level prevalence, northwest Delhi has higher prevalence of wasting than its corresponding NFHS-5 level (10.9%). On the other hand, Kamrup in Assam has a lower rate of wasting compared to NFHS 5 (6.3% v/s 14.8%). (Figure 10).

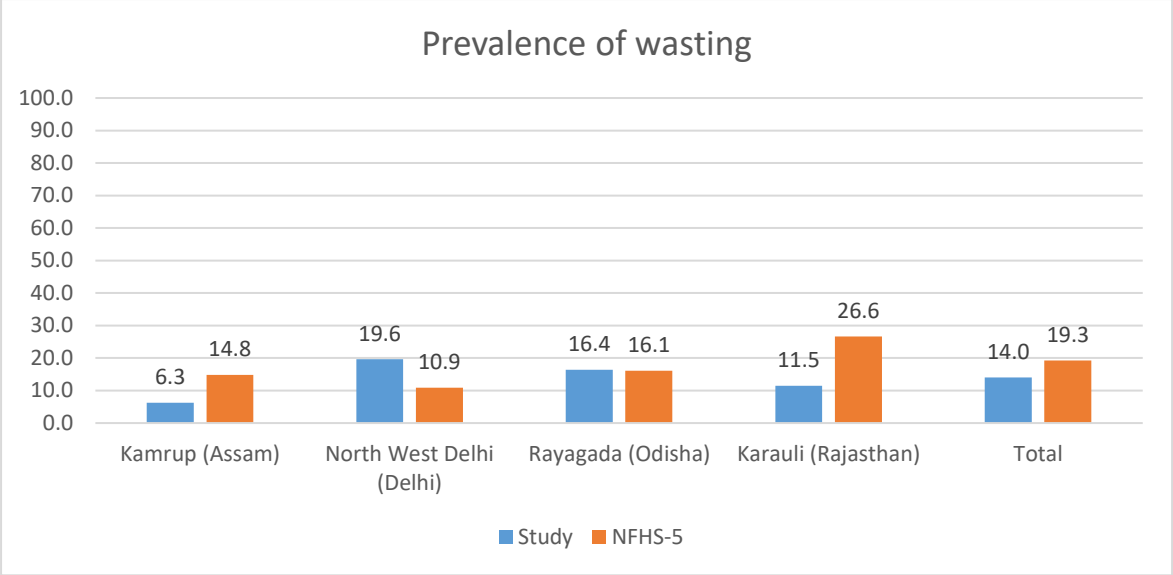

Figure 10: Comparative representation of wasting in study sites and NFSH -5 data

Severe wasting prevalence was also higher in northwest Delhi (5.7%) followed by Karauli, Rajasthan (4.68%). Kamrup in Assam fared better than other states with severe wasting of 1.97%.

Layering of Malnutrition

The below diagram shows multiple anthropometric deficits amongst the study population of children. 21.3% children were stunted and underweight at the same time while 7.2 % children were both wasted and underweight. (Figure 11).

There were 3.5% children who experienced all the three forms of undernutrition (stunting, wasting and underweight) at the same time exhibiting higher vulnerability to mortality and morbidity.

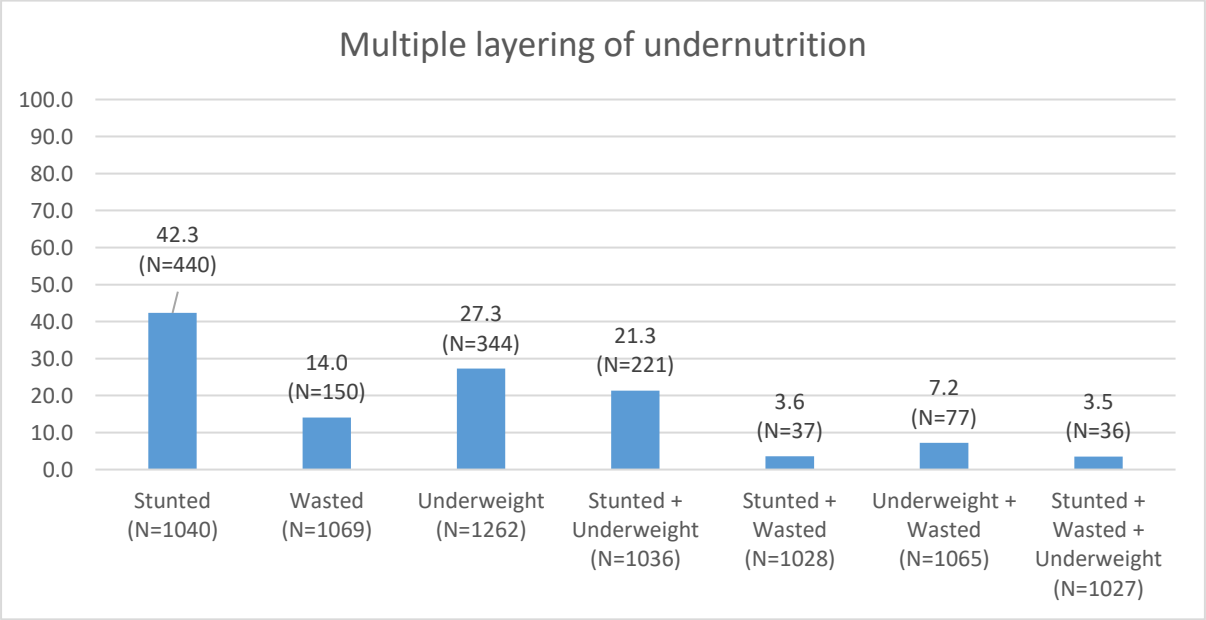

Figure 11: Multiple layering of Undernutrition

4.3 Household-level factors associated with malnutrition among children under 5 in the selected geographies

This section of the report describes the household and community characteristics contributing to children's malnutrition, including caregiver characteristics, sociodemographic characteristics, environmental factors, food habits, household food security, dietary diversity, child care and feeding practices, and community health and nutrition services. It is important to note that this household-level information pertains to the households of ***children that were identified to have underweight***.

Following is the distribution of household-level surveys conducted across regions.

Table 9: Distribution of household-level survey

District	Targeted Samples	Target achieved	% achieved out of the total target
Kamrup	45	37	82.2
Karauli	68	65	95.5
Northwest Delhi	137	118	86.1
Rayagada	94	92	97.8
Total	344	312	93.3

Household information

According to the survey conducted, the distribution of households among various categories is as follows: 38.8% belonged to the Scheduled Castes (SCs), 34.6% were from the Scheduled Tribes (STs), 12.2% were classified as Other Backward Classes (OBCs), and 7.7% fell under the General category. It is worth noting that a small percentage (6.7%) did not provide a response.

The data reveals that the SC population is notably high in northwest Delhi, accounting for 64.4% of the households surveyed, followed by Karauli with 35.4%. On the other hand, Rayagada had the highest proportion of Scheduled Tribe population, with 78.3%, while there were no ST households in northwest Delhi.

Analyzing the religious composition, Hindus constituted the majority with 91.3%, followed by Muslims with 8.3%, and a small percentage identifying as Christians (0.3%). Rayagada exhibited the highest proportion of Hindus, comprising 98.9% of the households, followed closely by Karauli with 98.5%. In contrast, Kamrup had a Muslim population of 43.2%.

In terms of household finances, the average monthly income among the surveyed households amounted to Rs. 12,570. This income was derived from a combination of various sources. Karauli exhibited the highest average income at Rs. 15,631, surpassing northwest Delhi with an average income of Rs. 12,317. Kamrup had a relatively lower average income of Rs. 10,806 compared to Rayagada, whose average income was Rs. 11,222.

Additionally, each household had an average total of 6.1 members. Regarding housing ownership, 91.7% of the sampled houses were self-owned, while only 7% stayed in rented houses. When considering specific locations, only 19.5% of residences in Northwest Delhi were rented, whereas all houses in Rayagada were self-owned. Karauli and Kamrup had ownership percentages of 98.5% and 97.3%, respectively. In relation to household assets, 69.5% of households owned a mobile phone, but only 58.9% had access to the internet. Approximately 51% of households didn't have a television.

Out of the total sample studied, only 26.9% households used their own land for agricultural food crop production and 25% of the total sample consumed their own agricultural produce. The consumption was highest in Karauli (78.4%) followed by Rayagada (20.6%), Kamrup (13.6%), and Northwest Delhi (2.5%).

Table 10: Household information

Variable	n	Proportion (%)
Caste		
OBC	38	12.2
SC	121	38.8
ST	108	34.6
General	24	7.7
No response	21	6.7
Religion		
Christian	1	0.3
Hindu	285	91.3
Muslim	26	8.3
Income and Total Members		
Average Monthly Income	12570	
Average total members in the Household	6.1	
Assets		
Have a mobile phone	217	69.5

Have access to the Internet	184	58.9
Have a TV at home	153	49
Land Ownership and Consumption		
Household owning land	107	34.3
Households not owning any land	205	65.7
Households using the land for agricultural purposes	84	26.9%
Consume your agricultural produce	78	25%

The data presented in the figure below shows the educational attainment of mothers and fathers. The data is divided into five categories: no formal education, primary education (1-8), secondary education (9-10), higher secondary education (11-12), and graduate and above (13+). According to the data, more fathers (37.2%) have completed primary education than mothers (30.4%). Whereas mothers (12.8%) with higher secondary education slightly outnumbered fathers (10.9%). On the other hand, a greater percentage of mothers (32.7%) had no formal education compared to fathers (19.3%). The percentage of mothers with secondary education is 17.9% while fathers account for 22.8%. The same trend is observed for graduates and higher education, where fathers have a higher percentage (8.7%) than mothers (5.8%). (Figure 12).

Looking at region-specific data, it was observed that all mothers and fathers in Kamrup had attained some level of education. However, in Rayagada, 78.3% of mothers and 53.3% of fathers had no formal education.

Regarding secondary-level education (grades 9-10), only 3.1% of mothers in Karauli had achieved this level, while the corresponding figure for Kamrup was 56.8%. Notably, no mothers in our sample from Rayagada were found to be graduates, and only 1.1% of fathers in Rayagada were graduates.

The data shows that both mothers and fathers have varying levels of educational attainment. However, there is a slight disparity in the highest level of education completed, with fathers having a higher percentage of completion in graduate and primary education.

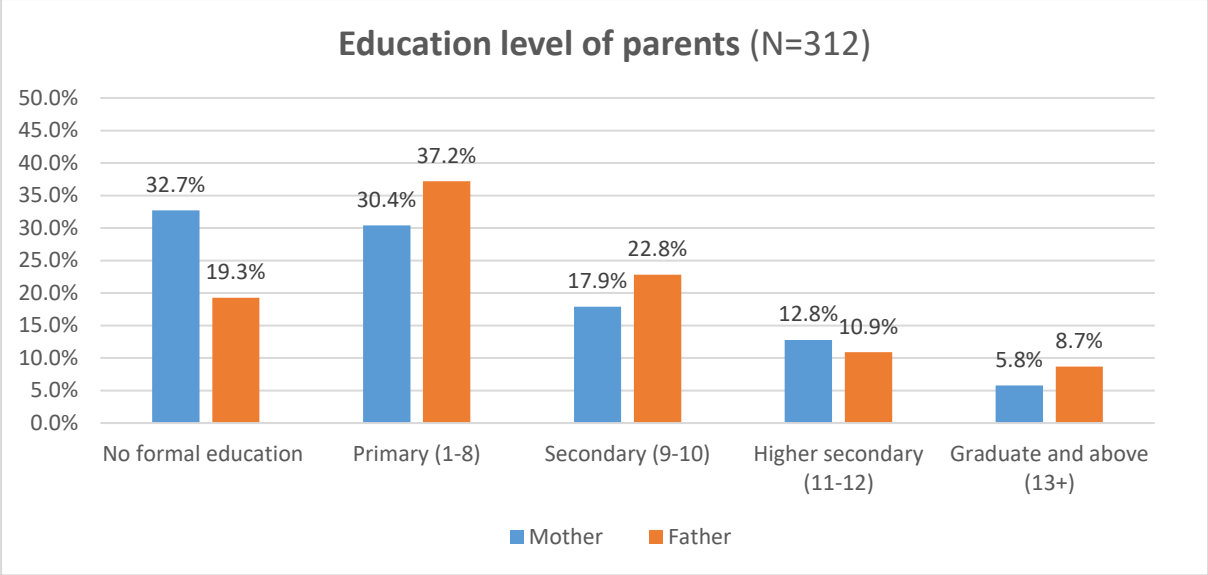

Figure 12: Education level of Parents

Regarding employment status, the data suggests that a significant proportion of mothers (59.3%) were engaged in unpaid family work, while only a small percentage of fathers (1%) did the same and were mostly engaged in paid work. 18.6% of women were engaged in self-employed agriculture work. In contrast, fathers had a higher representation in daily wage non-agriculture work (49%). This suggests that mothers may have limited opportunities for employment outside of agriculture and may earn lower wages than fathers. A higher percentage of fathers were engaged as salaried private employees (6.7%) compared to mothers (0.3%). Meanwhile, the proportion of mothers and fathers unemployed is (15.4% and 2.2%, respectively). (Figure 13).

Analyzing the district-specific data, it was found that no mothers in Kamrup were unemployed, whereas 8.1% of fathers experienced unemployment. In contrast, a considerable proportion of mothers in northwest Delhi, around 36%, were unemployed.

Looking at the occupation patterns, approximately 62% of mothers in Rayagada were involved in self-employed agricultural work, while none of the mothers in Kamrup and Karauli were engaged in this type of work. Interestingly, neither mothers nor fathers in Karauli were involved in daily wage agricultural work.

In terms of fathers' occupation, a significant percentage of fathers in northwest Delhi (71.2%) worked as daily wage earners in non-agricultural sectors, while in Rayagada, this figure was much lower at 16.3%

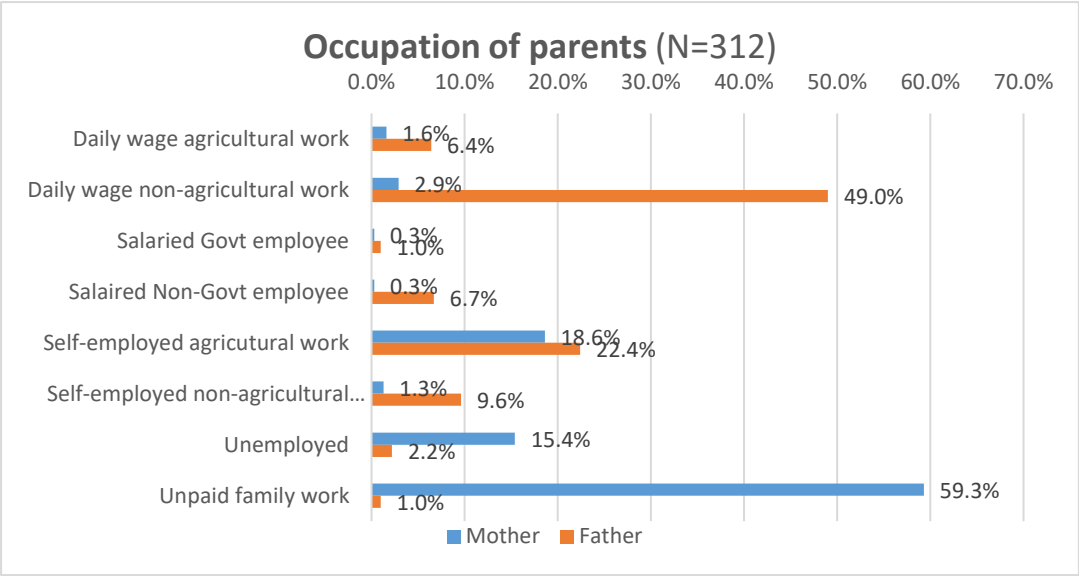

Figure 13: Occupation of Parents

Food and Nutrition Security

The Household Food Insecurity Access Scale (HFIAS) is a tool used to measure the level of food insecurity within households [33]. Our study used the Household Food Insecurity Access Scale (HFIAS) developed by USAID to estimate household food insecurity. Based on a score of 0-27, this nine-pointer scale classifies food security into four categories: food secure, mildly food insecure, moderate food insecure and severely food insecure.

Food-secure households have stable access to sufficient and nutritious food, while mildly food-insecure households may experience some uncertainty but still have enough food. Moderate food-insecure households have limited access to food and may have to skip meals, while severe food-insecure households face hunger and malnutrition.

The findings presented below is based on the responses from 301 (96.4%) households. The data showed that 56.5% of households were food secure, 9.3% were mildly food insecure, 10.6% were moderately food insecure, and 23.6% were severely food insecure. Our findings indicated that households in Karauli (Rajasthan) did not suffer from food insecurity, while severe food insecurity was seen to be prevalent in Kamrup (41.9%), followed by Northwest Delhi (40.4%) (Figure 14). The presence of food insecurity at the household level implies a high level of vulnerability to broad consequences other than poor access to adequate food, including psychosocial stress among household members, especially children, socioeconomic predicaments and poor overall health status.

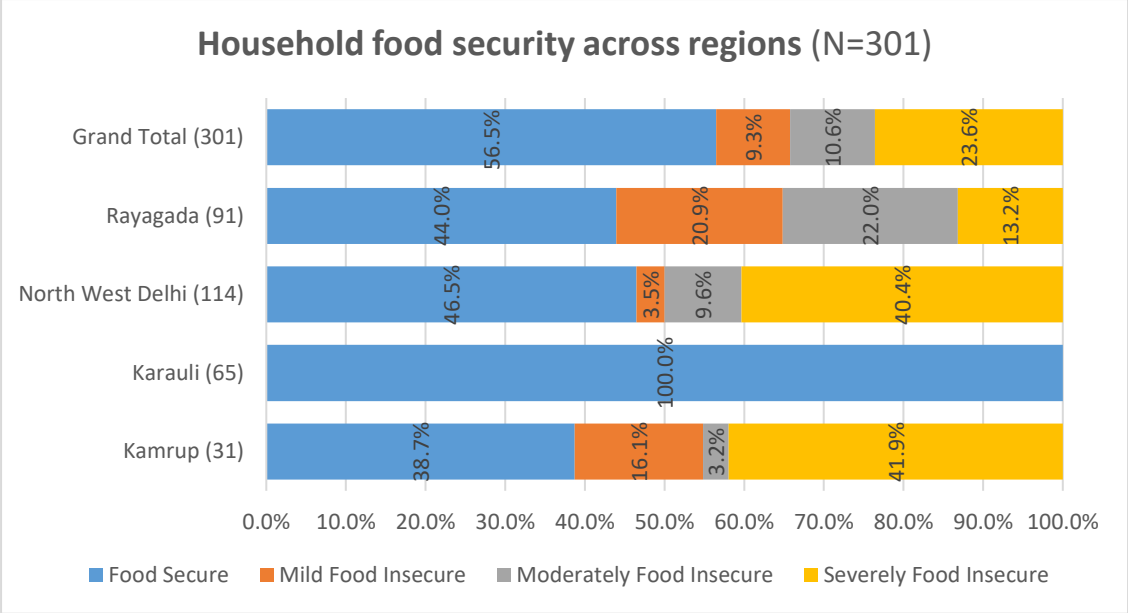

Figure 14: Household Food Security across regions

Information on caregivers

The study revealed that the average age of the caregivers was 29.1 years. Among the mothers in the study, a significant majority, approximately 96.2%, were married, while a small percentage had experienced divorce, widowhood, or desertion. Four respondents did not provide an answer regarding their marital status.

The analysis revealed that the mean age at which the mothers in the sample got married was 19.4 years. Subsequently, the mean age at the time of their first childbirth was found to be 21 years. On average, the mothers had experienced three pregnancies and had 2.6 deliveries, resulting in an average of 2.5 children per mother.

Further examining the mean age at marriage, it was observed that in Kamrup, the average age was 21, while in northwest Delhi, it was slightly lower at 18.7 years. Consequently, the mean age at first childbirth for mothers in Kamrup was 22.3 years, while in northwest Delhi, it was 20.2 years. Additionally, the average number of children per mother was three in Karauli, whereas in Kamrup, it was 1.6.

Regarding mobile phone ownership among the caregivers, approximately 63.1% reported having a mobile phone, while the remaining 36.8% did not possess one. Moreover, around 59.6% of the caregivers had no internet access.

The table below briefly describes the caregiver's background, including the mean number of pregnancies, spacing, deliveries, and children Table 10.

Table 112: Information on Caregiver

Variable	N	Proportion (%)
Marital Status:		
Married	300	96.2
Divorced	3	1.0
Widowed	2	0.6
Deserted	1	0.3
Others	2	0.6
Mean estimates		
Age at marriage	19.4	
Age at first childbirth	21	
Pregnancies till now	2.94	
Deliveries till now	2.65	
Number of children	2.51	
Spacing between last 2 pregnancies in years	2.6	

Support received in childcare

Our study found that an overwhelming majority of households (97.4%) had mothers as the primary caregivers for their children. These mothers often received support from family members, with 82.7% reporting consistent support, while 16.3% received support occasionally. Specifically, in the northwest district of Delhi, an overwhelming 97.5% of mothers always received support from their family members for childcare. In Kamrup, Assam, 86.5% of mothers consistently received support, whereas 10.8% received it only sometimes. In Rayagada, Odisha, 66.3% of mothers always received support for childcare, and 32.6% received it sometimes**.** 2 caregivers did not respond. (Figure 15).

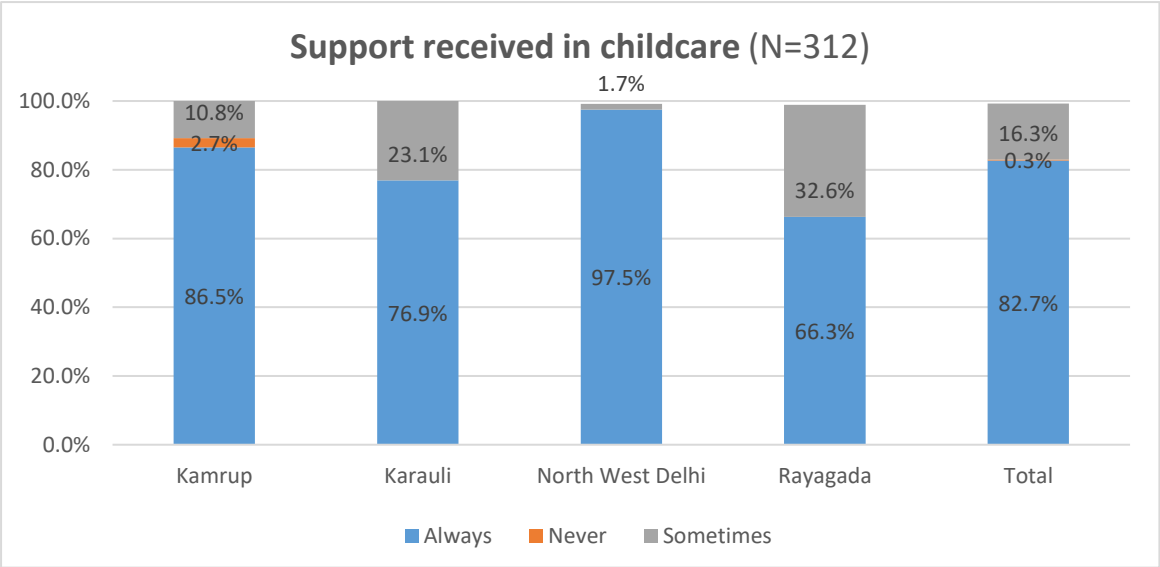

Figure 15: Support received in Childcare

Women's Dietary Diversity

Dietary diversity is essential to overall health and well-being, especially for women. Women have unique nutritional needs during different stages of their lives, such as during pregnancy, lactation, and menopause, and a diverse diet can help to meet these needs. Thus, promoting dietary diversity among women is crucial for their overall health and well-being. This in turn has impact upon her ability to care for young children, specially malnourished children that need special care. The diet of the woman is also a fair proxy indicator of the diversity of diets available in the household. Child dietary diversity is described further below.

In this study, we used the standardized Dietary Diversity questionnaire developed by the Food and Agriculture Organization to assess household dietary diversity in our study sites. The questionnaire consisted of nine questions regarding the consumption of nine food groups, and each food group was scored as 1 and 0 denoting consumed and not consumed in the last 24 hours, respectively. With a maximum score of 9, a score less than or equal to 3 was considered low dietary diversity, a score less than or equal to 5 was considered medium dietary diversity, and a score above five was considered high dietary diversity.

The data showed that around 41.7% of women had high dietary diversity, while 38.1% and 20.2% had medium and low dietary diversity respectively.

The district results showed that Northwest Delhi had a high level of dietary diversity (64.4%), followed by Kamrup with 62.1%. Meanwhile, Rayagada had a low dietary diversity, at 47.8% (Figure 16).

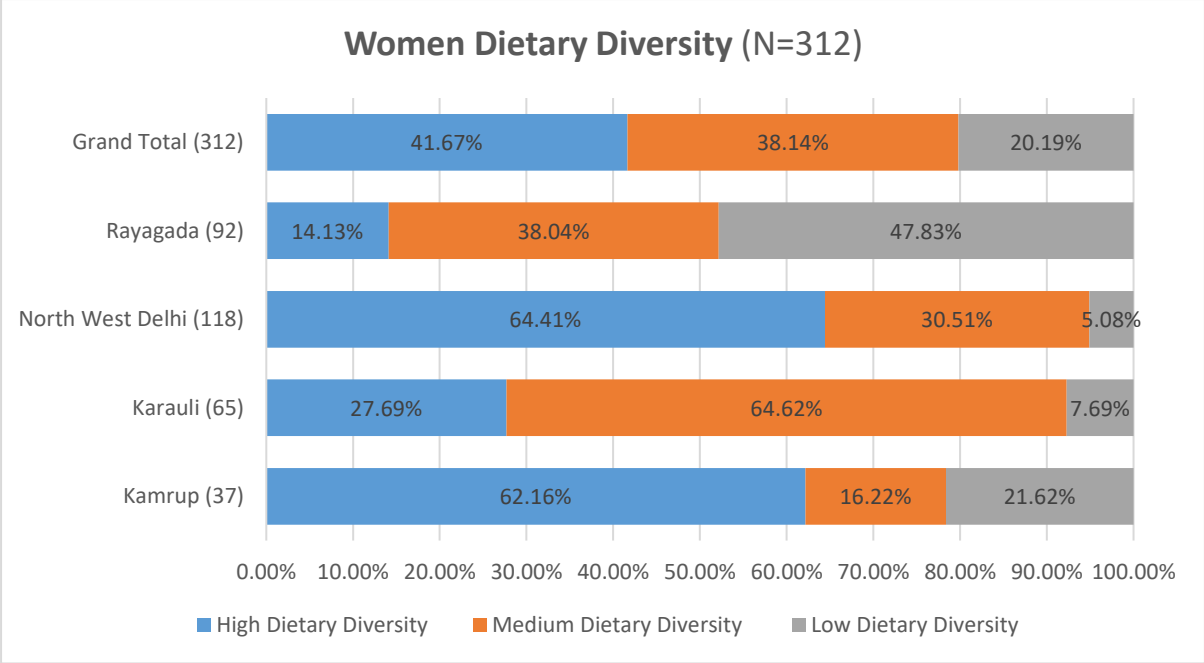

Figure 16: Women Dietary Diversity

In a diverse diet, each of the following nine food groups provides a unique set of nutrients and consumes a variety of foods from each group to ensure they receive a balanced diet. According to our study findings, a high percentage of women consume cereals (100%), followed by vegetables (71.2%) and food made from pulses (68.6%). However, less than a quarter consumed animal protein sources such as eggs (23.4%) and meat (16.7%). (Figure 17). In Karauli, only 7.7% of women and 21.2% in northwest Delhi consumed meat, fish, or eggs, compared to significantly higher percentages of 75.7% in Kamrup and 81.5% in Rayagada.

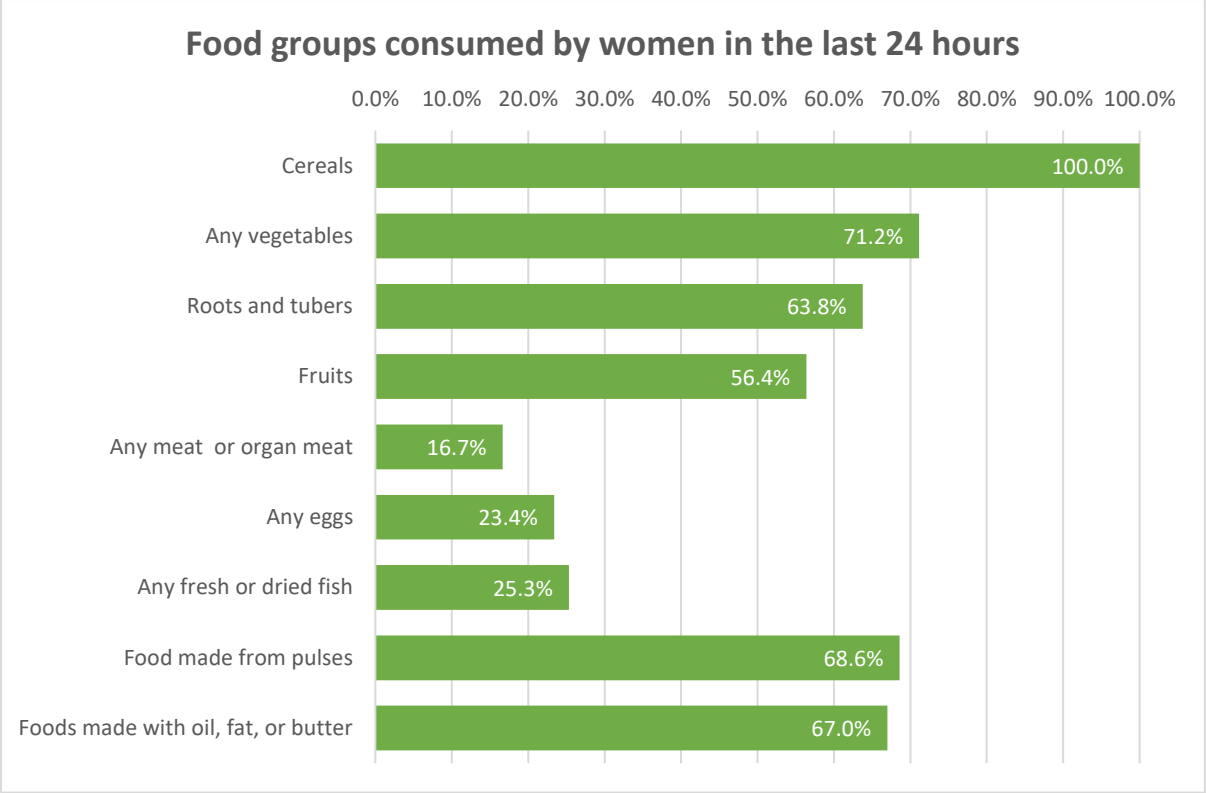

Figure 17: Food groups consumed by women

In our study regions, an analysis of the consumption patterns of caregivers revealed interesting findings regarding non-vegetarian, vegetarian, and vegetarian individuals who consume eggs. Around 67.5% women were non-vegetarians, and 31.8% were vegetarians. In Kamrup, all 37 individuals surveyed identified themselves as non-vegetarian, accounting for 100% of the respondents. Similarly, in Rayagada, the majority of caregivers (94.5%) were found to be non-vegetarian.

This contrasts sharply with the data on consumption and indicates an inability to source/buy non-vegetarian foods. In contrast, Karauli stood out with the majority (85.5%) of caregivers following a vegetarian diet. Notably, no individuals in Karauli reported being egg-consuming vegetarians. Four mothers did not respond (Figure 18).

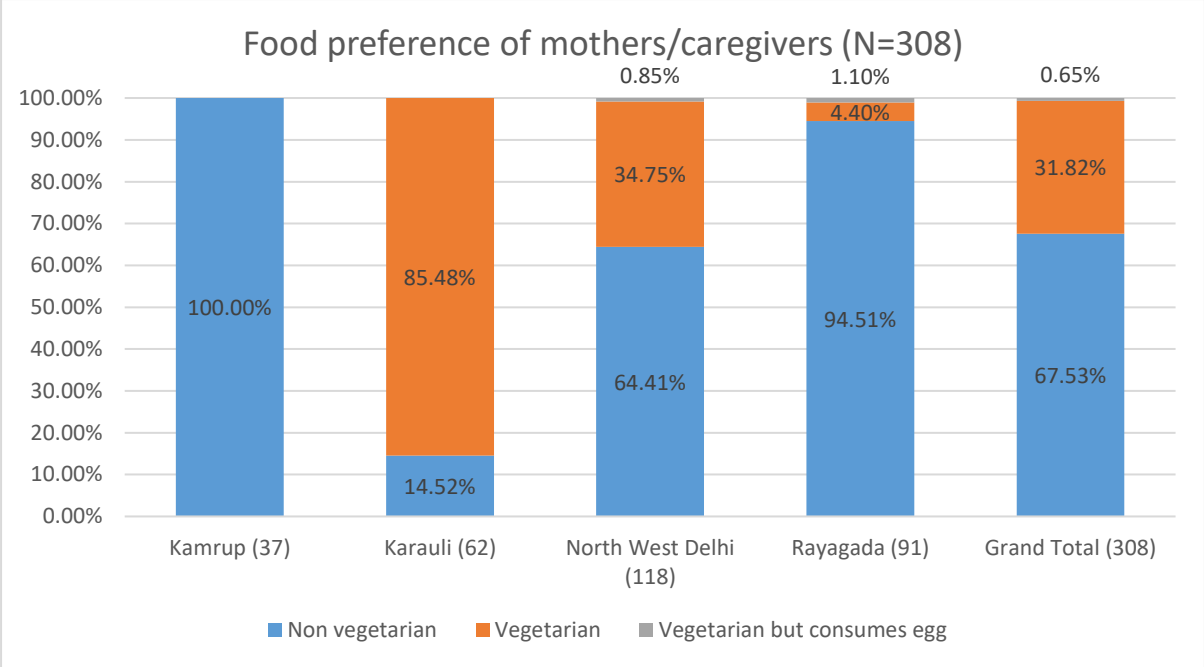

Figure 18: Consumption Pattern of Caregivers

Infant and Young Child Feeding Practices

The early years of life are crucial in the growth and development of the child. Adequate health and nutrition during the initial childhood years lay a strong foundation for children to achieve healthy growth and development and improve child survival. Optimal IYCF practices are crucial in addressing mortality and morbidity among children (41).

Our study found that 30.4% of children had received pre-lacteal feeds, which is twice the average 15.5% reported by the National Family Health Survey-5 (NFHS-5). Our study observed early initiation of breastfeeding within one hour in 78.5% of children, while 70.8% received colostrum. The NFHS-5 reported that only 41.4% of children in India started breastfeeding within one hour of birth. The study also showed that 65.9% of mothers exclusively breastfed for the first six months, compared to 55% reported by the NFHS-5. Only 17.1% of mothers continued breastfeeding for more than 12 months, and about 60.6% of the mothers breastfed their children during illness (Figure 19).

Looking at our four study areas, North-West Delhi had a high percentage of mothers who started breastfeeding their babies early, with a rate of 90.7%. In Karauli, many mothers fed their babies colostrum, with a rate of 98.5%. However, in Rayagada, the percentage of mothers who fed their babies colostrum was lower at 42.4%.

Regarding exclusive breastfeeding, North-West Delhi had a lower percentage of 25.5%. On the other hand, in Karauli, all mothers practised exclusive breastfeeding, achieving a rate of 100%, while in Rayagada, the rate was 91.7%.

However, regarding continued breastfeeding for more than 12 months, Rayagada had a low percentage of 7.7%, indicating that fewer mothers continued to breastfeed their babies for an extended period. (district-wise variation is presented in Table xx).

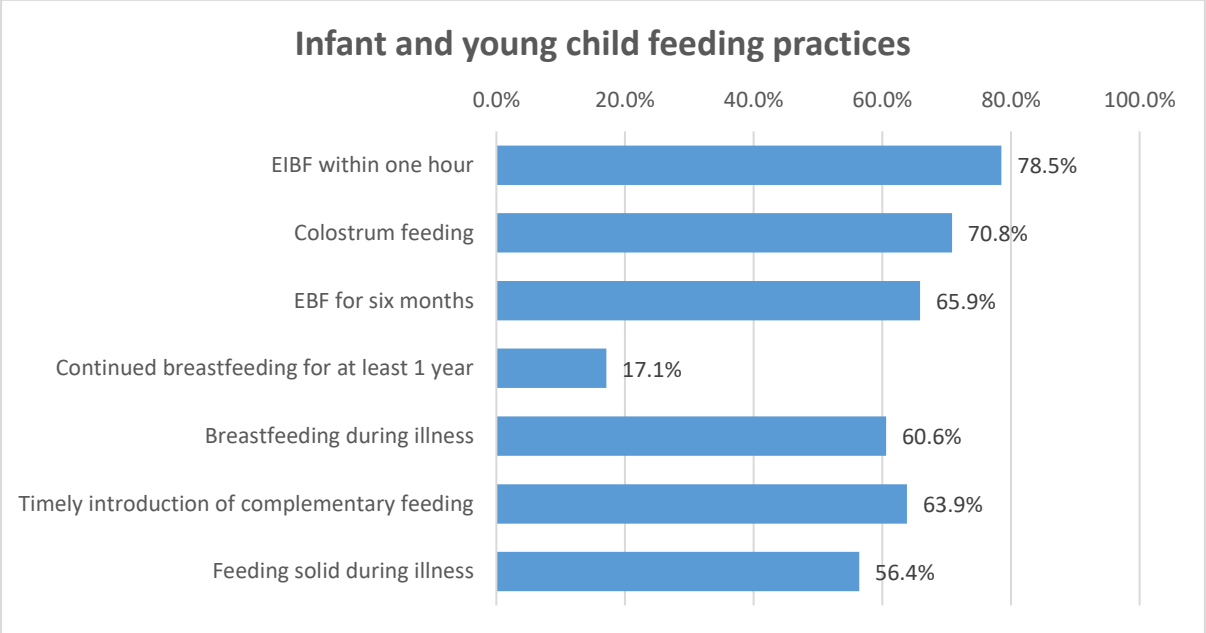

Figure 19: Infant and Young Child feeding practices

'Based on 27 FGDs conducted with mothers across four different geographical locations, it was found that exclusive breastfeeding for the first 6 months of a newborn's life is a well-known practice in the communities. However, there is variation in the degree to which this practice is implemented. Some mothers exclusively breastfed their babies for the recommended 6 months, while others supplemented with packaged milk or other liquids. Some mothers provided prelacteal feeds or janam ghutti alongside exclusive breastfeeding.'

It was observed that some mothers were unable to exclusively breastfeed their babies for the recommended 6 months due to work obligations. Some mothers breastfeed their babies only when they cried or before leaving for work. Despite these variations in practice, the commonality across the communities was that feeding mother's milk to children for at least 6 months was prevalent. In some communities, the practice of feeding mother's milk to children till 12 months was also observed.

It is worth noting that some mothers were aware of the importance of exclusive breastfeeding for 6 months but faced barriers to implementing it fully. The data suggests a positive attitude towards exclusive breastfeeding, but additional support may be needed to ensure that mothers are able to fully implement this practice for the recommended duration.

Complementary feeding

WHO defines complementary feeding as the transition period of a child from exclusive breastfeeding to family foods. At around six months of age, when the energy requirements of an infant cannot be fulfilled by only breastmilk, complementary foods are to be given to the child

to meet their energy requirement. This stage is critical in a baby's growth and development as they develop the skills and abilities to eat and digest more complex foods (17).

Our study found that nearly 63.9% of households introduced complementary feeding to their child's diet at the completion of 6 months. This percentage is significantly higher compared to the 45.9% reported in the NFHS 5 survey, which focused on children receiving complementary foods between the ages of 6 to 8 months. When examining the timely introduction of complementary feeding, it was observed that Karauli, Rajasthan had the highest rate at 87.7%, followed by Northwest Delhi at 77.3%. However, in Rayagada, Odisha, the introduction of complementary feeding was lower, with only 35.7% of households following this practice. Similarly, feeding solid or semi-solid food during illness was relatively low in Kamrup, Assam, with only 35.1% of households adhering to this practice (Table 11).

Table 12: Infant and Young Child Feeding practices across regions

IYCF practices across regions (in %)	**Geographical locations**				
	Kamrup	**Karauli**	**Northwest Delhi**	**Rayagada**	**Total**
Initiation of breastfeeding (N=312)					
EIBF<1 hr	70.3%	84.6%	90.7%	62.0%	78.5%
Between 1 and 24 hours	18.9%	15.4%	5.9%	17.4%	12.8%
After 24 hours	5.4%	0.0%	0.8%	1.1%	1.3%
Don’t know	5.4%	0.0%	2.5%	19.6%	7.4%
Colostrum feeding (N=312)					
Yes	78.4%	98.5%	75.4%	42.4%	70.8%
Know	8.1%	1.5%	20.3%	42.4%	21.5%
Don’t know	13.5%	0.0%	4.2%	15.2%	7.7%

EBF for six months (N=296, for children in the age group of 6m-59m)	67.6%	100.00%	25.5%	91.7%	65.9%
Duration of continued breastfeeding (N=312)					
6-9 months	6.1%	8.1%	0.0%	7.7%	4.8%
9-12 months	6.1%	8.1%	4.2%	15.4%	8.6%
>12 months	9.1%	9.7%	32.3%	7.7%	17.1%
Didn't breastfeed at all	0.0%	0.0%	0.0%	3.8%	1.1%
No response/prefer not to say	66.7%	72.6%	53.1%	20.5%	49.8%
Upto 6 months	12.1%	1.6%	10.4%	44.9%	18.6%
Breastfeeding during illness (N=312)					
Yes	37.8%	76.9%	55.9%	64.1%	60.6%
No	56.8%	21.5%	40.7%	26.1%	34.3%
No response	5.4%	1.5%	3.4%	9.8%	5.1%
Feeding solid or semi-solid during illness (N=296, for children in the age group of 6m-59m)					
Yes	35.1%	84.6%	52.7%	48.8%	56.4%
No	56.8%	15.4%	44.5%	44.0%	39.5%
Don’t know	2.7%	0.0%	0.0%	7.1%	2.4%
No response/prefer not to say	5.4%	0.0%	2.7%	0.0%	1.7%

Timely introduction of complementary feeding (N=296, for children in the age group of 6m-59m)					
Yes	45.9%	87.7%	77.3%	35.7%	63.9%
No	43.2%	3.1%	8.2%	22.6%	15.5%
Don't know	10.8%	9.2%	14.5%	41.7%	20.6%

'Based on the discussion with the caregivers in all the study locations around complementary feeding (CF) for children, participants generally agreed that CF should begin after six months, with some suggesting 9-10 months as the appropriate age. However, there was some variation in the age at which CF is initiated, with some mothers starting as early as 4 months and others waiting until the child is one year old. Home-cooked food, such as millet khir and dalpani, were commonly given for CF.

The discussion also highlighted a lack of understanding and inconsistent practices around CF, with some mothers unable to provide an exact age for when CF should be initiated. There was also a general sense that age-appropriate feeding practices were not being followed. Overall, the discussion emphasized the need for greater education and awareness-raising around appropriate CF practices, including the appropriate age to start CF and the types of foods that should be given.'

Child Dietary Diversity

Adequate dietary diversity is of utmost importance in the early years of life and is needed to achieve the required growth and development. To assess the dietary diversity among children, the minimum dietary diversity scale designed by the World Health Organisation was used in this study. The analysis considered age groups such as 6-23 months and 6-59 months for assessing the minimum dietary diversity. Although, the dietary groups recommended for both groups are the same, for the age group 6 months to 23 months breastmilk has been added.

In this study, the overall percentage of children with minimum dietary diversity was found to be 37.2% and 55.4% for children between 6-23 months and children between 6-59 months, respectively.

As shown in Figure 20, out of four geographical locations, Karauli in Rajasthan has the lowest prevalence of MDD among children in both age groups. Kamrup in Assam had a minimum dietary diversity of 70.3%, followed by Northwest Delhi at 63.6% for 6-59 months.

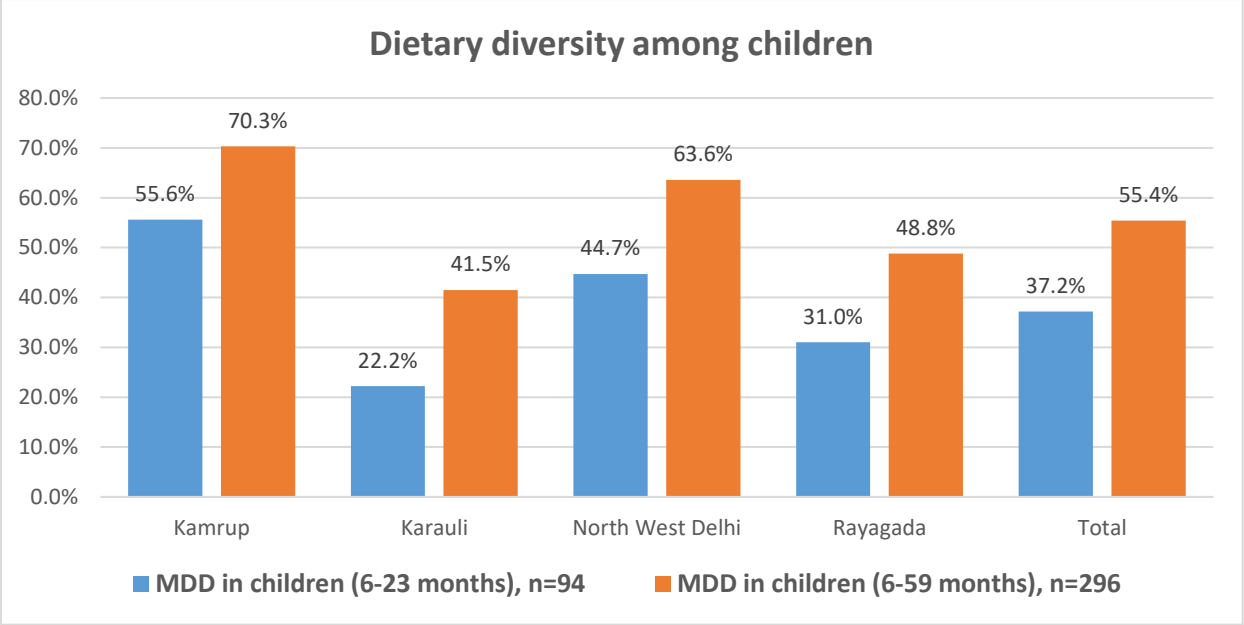

Figure 20: Dietary Diversity among Children

When considering diverse diets across all age groups, the data shows that 37.2% of children had a diverse diet, while 62.8% had a non-diverse diet. Among children aged 6-11 months, 44.4% had a diverse diet, while 55.6% did not. In the 12-17 months age group, only 32.3% had a diverse diet, while the majority, 67.7%, had a non-diverse diet. Similarly, in the 18-23 months age group, 36.1% had a diverse diet, while 63.9% had a non-diverse diet. These findings indicate that a significant proportion of underweight children in each age group have a non-diverse diet, with a higher percentage observed among older age groups (Figure 21).

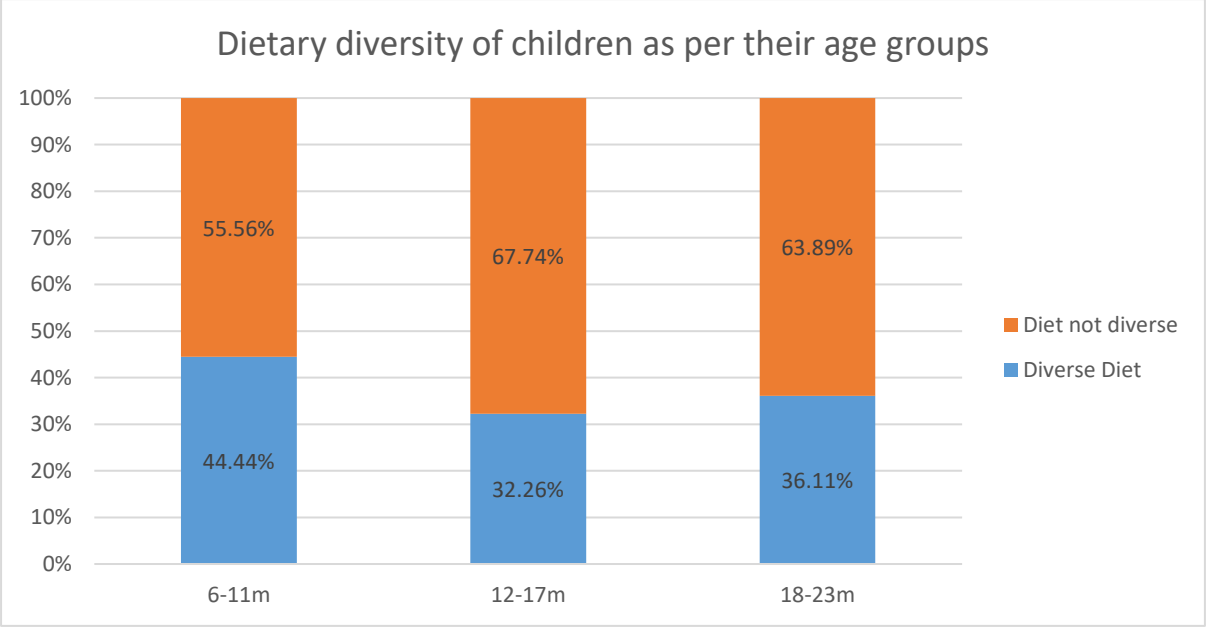

Figure 21: Diverse Diet of Children as per age group

The common food items provided to children in both age groups (6-23 months) and (6-59 months) included cereals, pulses, dairy products, eggs, meat, vitamin A-rich foods, and various fruits. In the 24-hour dietary recall, 89.4% of children aged 6 months to 23 months had consumed

cereals, while 91.9% of children aged 6 months to 59 months had consumed cereals. Additionally, 69.1% of children aged 6 months to 23 months had consumed pulses, compared to 68.9% of children aged 6 months to 59 months. Eggs and meat were the least consumed food items among both age groups (Figure 22 and 23).

In the specific region of Karauli, no children aged 6-23 months consumed meat, fish, or eggs; only 3.1% of children aged 6-59 months in Karauli consumed the same. Similarly, in northwest Delhi, the consumption rates were relatively low, with only 7.9% of children aged 6-23 months and 7.3% of children aged 6-59 months consuming such foods. In stark contrast, the consumption rates in Kamrup were significantly higher, with 66.7% of children aged 6-23 months and 64.9% of children aged 6-59 months consuming meat, fish, or eggs.

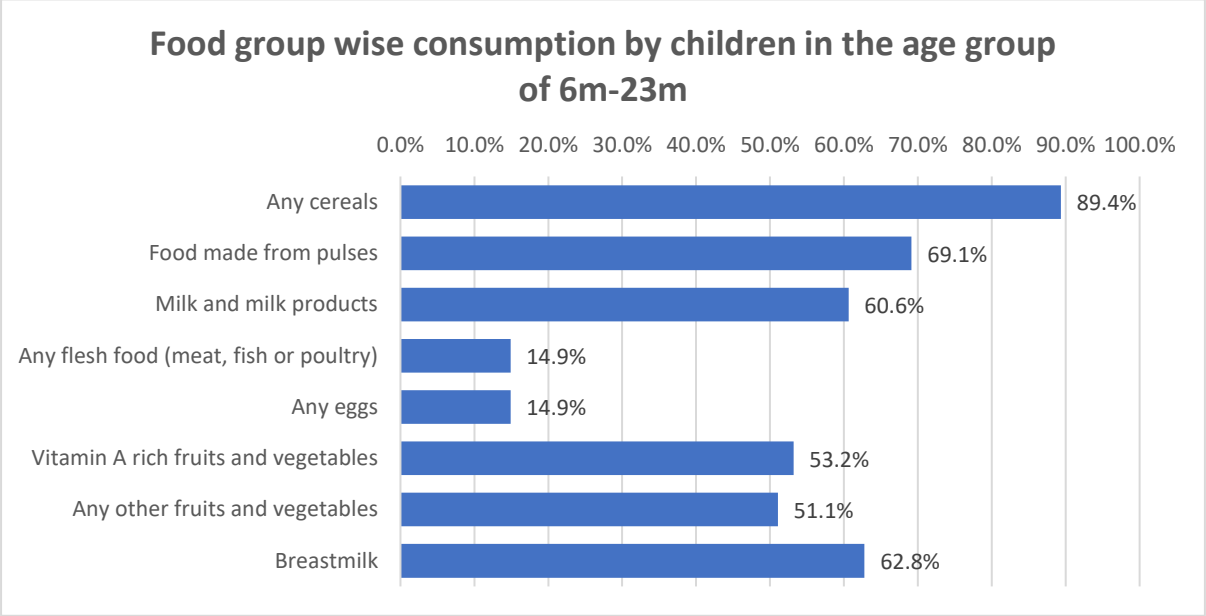

Figure 22: Food group consumption by children (6-23 months)

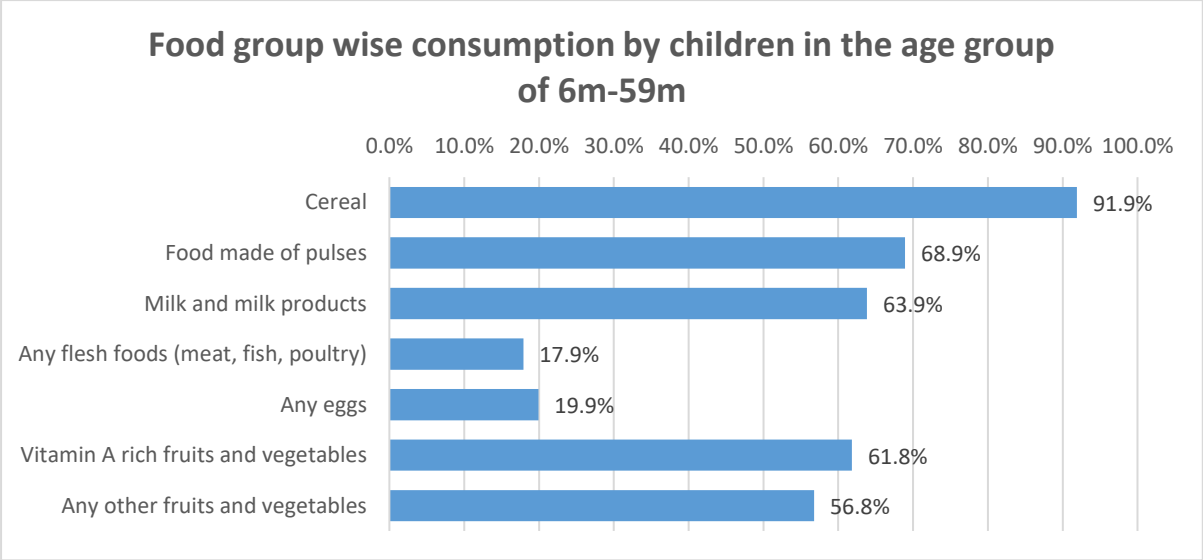

Figure 23: Food group consumption by children (6-59 months)

As mentioned earlier, mothers typically serve as the primary caregivers for children. The study's findings revealed that the mother fed the child in 97.1% of households. However, in cases where the mother was absent or unwell, the responsibility of feeding the child fell to the father in 38.1% of households. Grandparents took on this role in 23.1% of households, while siblings were responsible for feeding the child in the mother's absence in 10.6% of households. Notably, in Rayagada, 26.1% of siblings were involved in feeding the child in the mother's absence, while in Kamrup, this figure was only 2.7%. In 4.8% of households, others were responsible for feeding the child, and in 23.4% of households, no specific caregiver was identified. Furthermore, in 87.8% of households, the child was served food on a separate plate, indicating a distinct serving arrangement for the child.

Access to Health and Nutrition services

A well-functioning and comprehensive healthcare system delivering effective healthcare services is necessary to improve both mother and child's health and nutrition status, enhance child survival, and reduce mortality and morbidity among children.

The table below shows access to maternal health and nutrition services. 99% of women mentioned that their last pregnancy was registered. Three women said they didn't know if their pregnancy had been registered. When asked about the number of Antenatal Care (ANC) visits during their last pregnancy, 75.8% of the women had 4 or more visits, while 24.1% had less than 4 visits.

In terms of the type of delivery during the last pregnancy, 88.1% of the women experienced a normal delivery, while 11.9% underwent a cesarean delivery. Furthermore, the place of delivery was documented, revealing that 14.7% of the women delivered at home, 82% at a government facility, and 3.2% at a private facility (Table 12).

When analyzing the district-specific data, it was observed that Rayagada had the highest percentage of deliveries at home, accounting for 31.5% of the total. This was followed by northwest Delhi, where 13.6% of deliveries occurred at home. On the other hand, in Karauli, all deliveries took place at government health facilities, with no deliveries reported at home or private facilities. Northwest Delhi had the second-highest proportion of deliveries at government facilities, representing 83.9% of the total.

Table 3: Access to Health services

Variable	n	Proportion (%)
Maternal Health and Nutrition		
Was the last pregnancy registered (N=304)	301	99.0
4 or more ANC (N=244)	185	75.8

Type of delivery during last pregnancy (N=311)		
Normal	274	88.1
Cesarean	37	11.9
Place of Delivery (N=311)		
Home	46	14.7
Government health facilities	255	82
Private health facilities	10	3.2

The table represents the data on the source of Iron Folic Acid (IFA) tablets for a given population. Out of the 312 respondents, there were 270 women (86.5%) received IFA from multiple sources like any government facility (CHC/PHC/DHH), Anganwadi Centre (AWC) or Village Health and Sanitation Day (VHSND). Nine women (2.9%) received IFA from a private facility or practitioner. 3 women (1%) stated they did not receive IFA.
In summary, the majority of the women in this population received IFA from government facilities, with only a small fraction receiving it from private facilities.

For health checkups, 30.8% of children received it from AWC/VHSND, 65.1% from other government facilities (PHC/CHC/DH), 1.6% from private facilities/practitioners, and 0.3% did not receive it (Table 13). Similarly, it was found that around 89.4% of children have received supplementary nutrition from the Anganwadi Centre. Looking at district-specific data, all children in Karauli have received supplementary nutrition compared to 71.7% in Rayagada. In Kamrup and northwest Delhi supplementary nutrition received was 89% and 97.5% respectively.

Table 14: Access to Health services

Variable	**n**	**Proportion (%)**
Women received IFA from (N=312)	**279**	**89.4%**
Any govt facility (AWC-VHSND/any other govt health facility-CHC/PHC/DHH)	270	86.5
Any private facility/practitioner	9	2.9
Did not receive service at all	3	1.0
Don’t know/No response/prefer not to say	34	10.9

Children received health checkups (N=312)	304	97.4
AWC/VHSND	96	30.8
Other govt. facility- PHC/CHC/DH	203	65.1
Private facility/practitioner	5	1.6
Did not receive	1	0.3
Don't know/No response/prefer not to say	7	0.2

The table provides information on the frequency of weight recording of children. Out of 312 children, 76.6% had their weight recorded every month by the Anganwadi, 23.1% had it recorded once every two months, and 0.3% did not know (Table 14). This data suggests some gaps in anthropometry by the Anganwadi, which was also evident in the quantum of missing data. In Karauli it was observed that the weight of the children at the Anganwadi was recorded every 2 months instead of monthly compared to other study sites.

Table 15: :Frequency of weight recording

Variable	**N**	**Proportion (%)**
Weight of the child recorded by the Anganwadi (N=312)		
Every month	239	76.6
Once in 2 months	72	23.1
Don't know	1	0.3

The data below presents information about the vaccination status of children and where they received their vaccinations. Out of 312 children, 269 (86.2%) had received all vaccines according to their age, 30 (9.6%) had received some but not all vaccines and only 2 (0.6%) were yet to receive any vaccines. 11 children (3.5%) have information unavailable regarding their vaccination status (Figure 24). In Karauli all children have received vaccination according to their age.

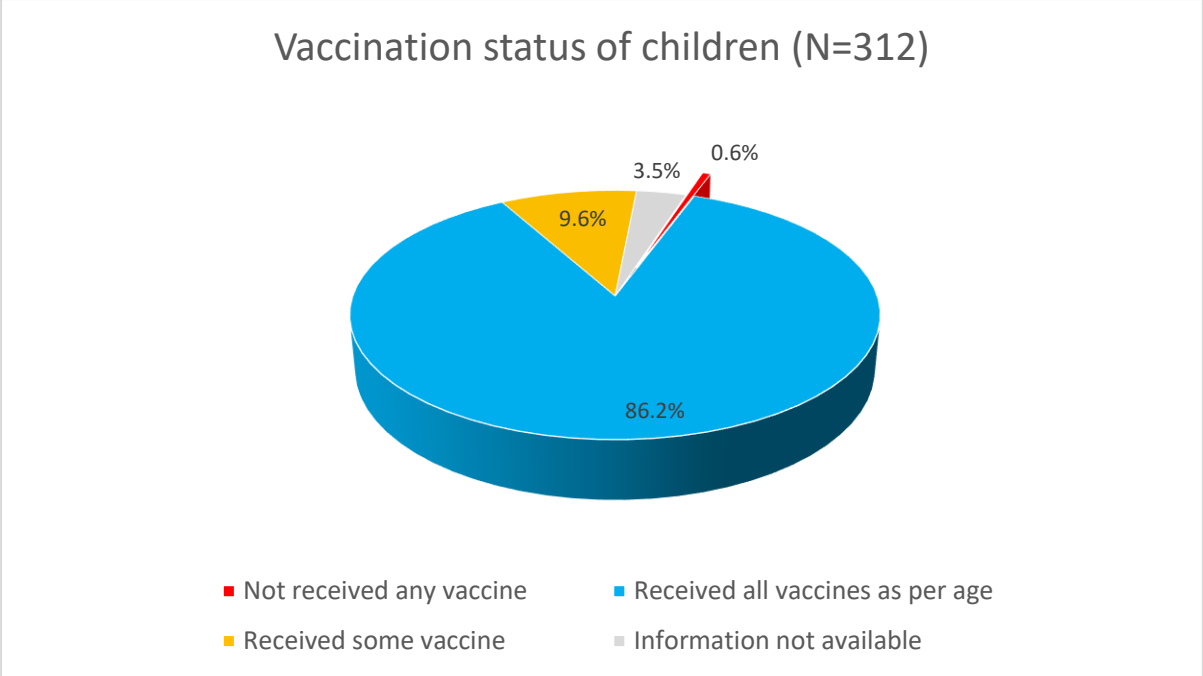

Figure 24: Vaccination Status of children

Regarding the source of vaccinations, most children (98.1%) received their vaccines from government facilities/AWCs, while only 0.3% received vaccines from private facilities, and 5 children (1.6%) don't know from where they received their vaccinations (Table15).

Table 16: Source of Vaccination

Variable	n	Proportion (%)
Source of Vaccination (N=312)		
Government facility/AWC	306	98.1
Private facility	1	0.3
Don't know	5	1.6

The results of a survey on the frequency of a child's illness in the last 6 months have been presented in Table 16. The findings indicate that a vast majority of the respondents, 80.4%, reported that their child rarely fell ill. A small percentage of the respondents, 9.9%, reported that their child experienced illness approximately once a month. Conversely, only 4.5% of the respondents reported very frequent illnesses, and 5 did not respond.

The most reported illnesses among the children were fever, cold, cough and diarrhoea. Overall, the data suggests that most children experienced relatively low levels of illness in the last 6 months.

Regarding the healthcare facilities visited during illness, 83.6% of the households took their children to a government health facility, while 14.1% visited a private health facility. A small percentage of households, 2.3%, approached frontline health workers during the child's illness.

Table 17: Child health and treatment

Variable	n	Proportion (%)
The child falling ill in the last 6 months (N=312)		
Approximately once in a month	31	9.9
More than twice in a month	11	3.5
Rarely	251	80.4
Very frequently	14	4.5
Child sought care and treatment from (N=311)		
ASHA/ANM/AWW	7	2.3
Govt. health facilities/practitioners	260	83.6
Private health facilities/practitioners	44	14.1

"The most common illnesses among children mentioned in the focus group discussions were fever, cold, cough, and diarrhoea. The participants reported visiting both PHC and private health facilities. However, the cost of treatment at private facilities ranged from 300 to 400 rupees. In contrast, the cost of treatment at government facilities was much lower, ranging from 20 to 40 rupees or only transportation costs. Participants also reported using traditional herbal medicines as an initial treatment and visiting health workers such as ASHA and ANM for medication. The participants emphasized maintaining hygiene and sanitation and improving water purification methods to prevent the spread of illnesses. Vaccination and health education were also mentioned as important prevention methods."

Water, Sanitation and Hygiene

Hygiene and sanitation practices play a significant role in the prevalence of malnutrition among children.

Our study, conducted in various regions of India, found that 88.8% of households had access to safe and improved drinking water sources, including tap water, bore wells, tube wells, tankers, and handpumps. The results showed that tanker water was the primary source of drinking water

for 31.4% of households**,** while 16.3% used tube well water and 23.1% used borewell water. Notably, 9.9% relied on stream or surface water and only 11.2% on tap water (Figure 25). Only 36.2% of respondents followed some process to purify the drinking water.

In comparison, the National Family Health Survey-5 (NFHS-5) reported that 36% of households used tube well water for drinking, with only 1.5% using tanker water. Our study also found regional variations in the primary source of drinking water. In Northwest Delhi, 83.1% of households used tanker water; in Kamrup (Assam), tube wells were the main source of drinking water for 64.9% of households. In Rayagada (Odisha) and Karauli (Rajasthan), bore wells were the primary source of drinking water (39.1%) and (53.8%) of households respectively.

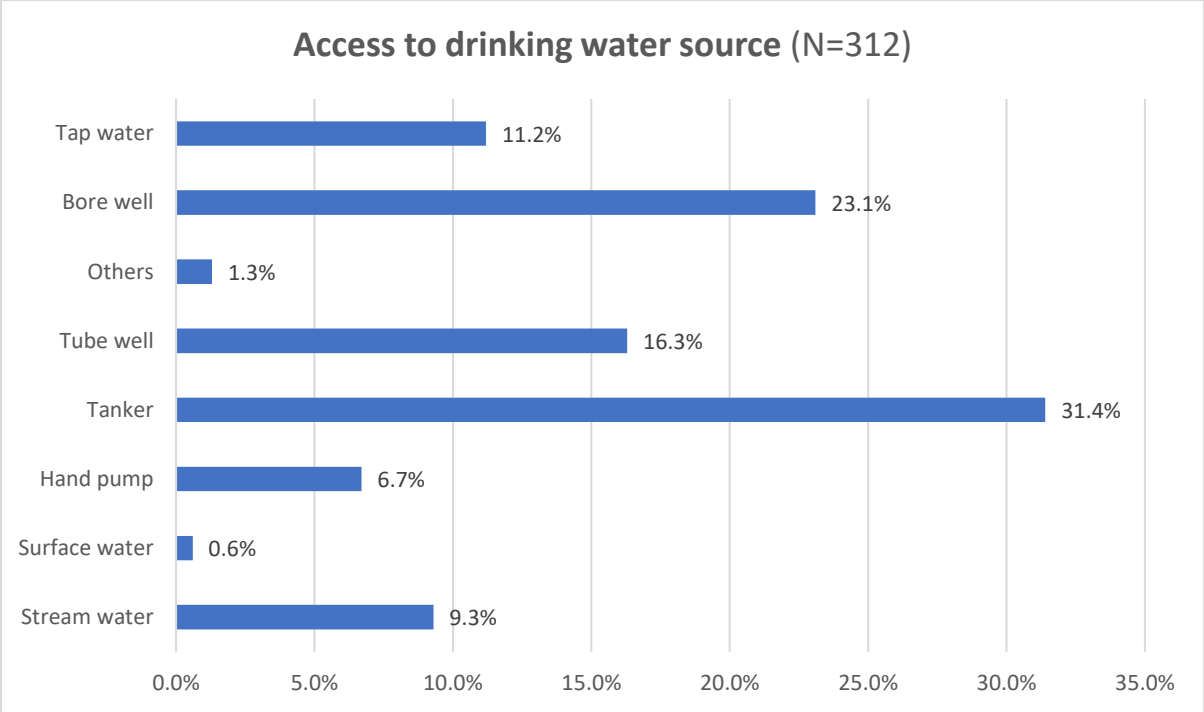

Figure 25: Access to drinking water source

Regarding access to sanitation facilities, around 59.3% of households have access to an improved sanitation (Own or community toilets) facility, the highest in Northwest Delhi (99.2%), followed by Kamrup (86.5%). Open defecation was highest in Rayagada (87%), followed by Karauli (61.5%) and lowest in Northwest Delhi (0.8%). Own latrines were highest in Kamrup followed by Delhi (86.5% and 81.4% respectively) and only 10.9% in Rayagada (Figure 26).

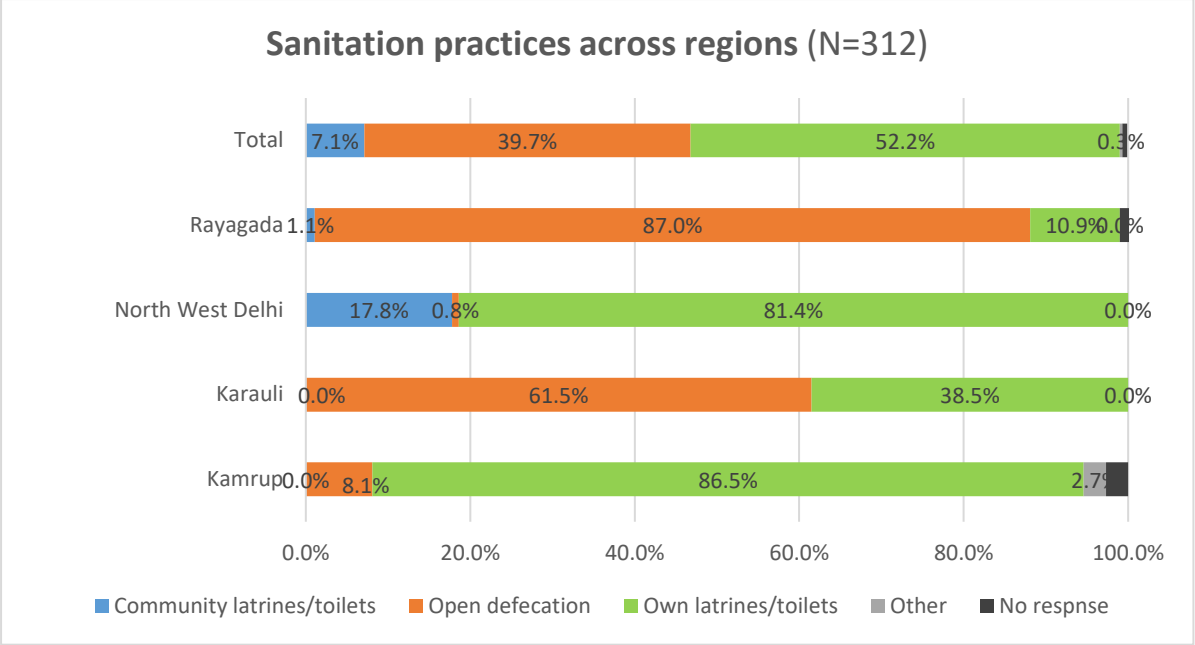

Figure 26: Sanitation practices across regions

Handwashing practices were observed to be generally present among both children and adults. Most respondents washed their hands after critical events, such as using the toilet or before eating. When focusing on the children surveyed, it was observed that 66% of them always washed their hands after using the toilet, while 6.1% never did so. Among adults, 71.2% consistently washed their hands with soap after using the toilet or before eating, whereas 19.9% occasionally washed their hands, and 8% never did. In terms of mothers washing their hands before cooking or feeding a child, 72.8% consistently followed this practice, while 18.3% sometimes washed their hands, and 4.8% never did (Table 17).

Analyzing specific district data, it was found that Karauli had the highest percentage (100%) of children, household members, and mothers who always washed their hands with soap after using the toilet. In Rayagada, 18.5% of children and 15.2% of mothers never practised handwashing with soap after using the toilet.

Table 18: Handwashing practices among children and adults

Hand Washing practices (N = 312)	n	Percentage
Child hand washing after toilet		
Always	206	66
Sometimes	67	21.5
Never	19	6.1
Don't know	3	1.0
No Response	17	5.4
Household members hand washing after toilet and before a meal		
Always	222	71.2
Sometimes	62	19.9
Never	25	8.0
Don't know	3	1.0
Caregivers hand washing before cooking and feeding the child		
Always	227	72.8
Sometimes	57	18.3
Never	15	4.8
Don't know	5	1.6
No response	8	2.6

'The focus group discussions revealed that the community is facing poor hygiene and sanitation conditions, mainly due to the lack of adequate toilet facilities and prevalence of open defecation. Access to clean drinking water is also a major challenge in the community, and tanker water is consumed without proper purification. Hard water is used for household chores, which makes cleaning difficult.

The Anganwadi Worker (AWW) and Accredited Social Health Activist (ASHA) provide some information on hand washing and use of toilets, but the awareness needs to be spread more

effectively. Cleanliness campaigns are conducted occasionally, but they are not enough to tackle the hygiene and sanitation issues the community faces.

It was suggested that there is a need for the government and NGOs to take more proactive measures to improve the hygiene and sanitation conditions in the community. This could include constructing more toilet facilities, providing clean drinking water, and awareness campaigns on sanitation and hygiene practices. It was also recommended that the community members be involved in planning and implementing these initiatives to ensure their sustainability and effectiveness.'

4.4 ICDS Service delivery and system level determinants

The Government of India has been working to address the country's malnutrition burden through various programs, including the Integrated Child Development Services (ICDS) program and the Village Health Sanitation and Nutrition Day (VHSND) initiative. These programs aim to provide health and nutrition services to children, adolescents, and pregnant and lactating women at the village level to promote their holistic development. ASHAs, AWWs, and ANMs are critical frontline workers in the healthcare sector, particularly in rural and remote areas. They work closely with the communities, and provide health services and information, particularly in hard-to-reach areas, and play a key role in improving health and nutrition outcomes.

This section of the report provides a description of the system-level determinants of malnutrition among children and offers a detailed analysis of the status of service delivery through ICDS. A standard observation checklist was used, and interviews were conducted with the Anganwadi Workers (AWWs). In addition, interview guides were developed, and detailed insights and reflections from frontline workers as well as officials of ICDS, such as Lady supervisors and CDPOs, form a major part of this analysis. A total of 14 ANMs, 20 AWWs, 16 ASHA workers, 4 Lady Supervisors and CDPOs in 4 study locations, respectively were interviewed.

The WHO systems framework has been referred to analyse the systems level determinants. The WHO (2010) has proposed a framework describing health systems[2] in terms of six building blocks: *service delivery, human resource, leadership and governance, financing, management information systems, and supplies and logistics.*

Of the total 20 AWCs observed, 16 were open during the visit, while 3 AWCs in Odisha and 1 in Rajasthan were found closed. However, the survey team subsequently visited these closed AWCs to observe the infrastructure and services and interact with the FLWs. In addition to this, a total of 14 VHSND was also observed to understand the service delivery for children, adolescents and women. It is to be noted that UHND is not organized in northwest Delhi. The average enrolled

[2] "Monitoring the building blocks of health systems." https://apps.who.int/iris/handle/10665/258734. Accessed 25 Feb. 2023.

children between 6months-3years in the AWC was 19 and average enrolled children between 3 years-6 years was 17 (N=19) across the study location.

- **Location and status of infrastructure in the selected AWCs**:

The location and infrastructure of AWCs varied across different study sites. 13 out of 20 centres were located at a distance of more than 500 m from the remotest habitation. This ranged from 600m to 2 km. In 16 centres the AWWs were residents of the same village. All centres in Assam and Rajasthan had their own premises; in Odisha, four out of five were owned buildings. In Delhi, all centres were running in rented buildings (Figure 27).

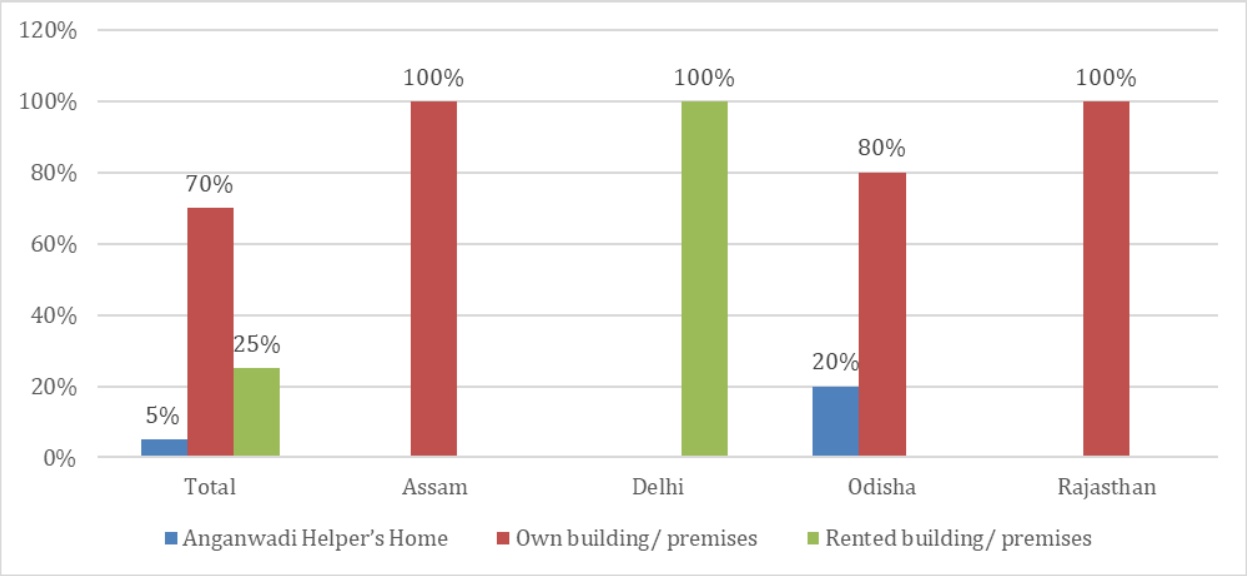

Figure 27: Anganwadi Centre building

Further observations made in our study found that only 5 AWCs had sufficient outdoor space and ceiling fans. Of the total, 15 centres were adequately ventilated, and 12 had sufficient lighting. However, indoor space was only adequate in 8 centres, and waterproofing was observed in only 11 centres. 13 AWCs required repair, indicating that the infrastructural conditions of these centres were not adequate.

Kadraguma village in Rayagada does not have an Anganwadi centre, and all the services - anthropometry, provision of hot cooked meals, pre-school was conducted in the Anganwadi helper's house. With lack of space and absence of dedicated infrastructure, children were not getting adequate opportunity to play, walk, and engage in other activities. Furthermore, it was noted that there was no proper seating arrangement for the children during the pre-schooling program. This makes it difficult for them to concentrate and engage in learning activities.

All the Anganwadi centers in Karauli, Rajasthan was clean but the buildings were in a poor condition with a damaged floor, and no separate kitchen. The play area for children was also missing. The centres lacked basic facilities such as electricity and fans, and the roofs were leaking. Moreover, there was a lack of other facilities such as toilets and drinking water in these centres (Figure 28).

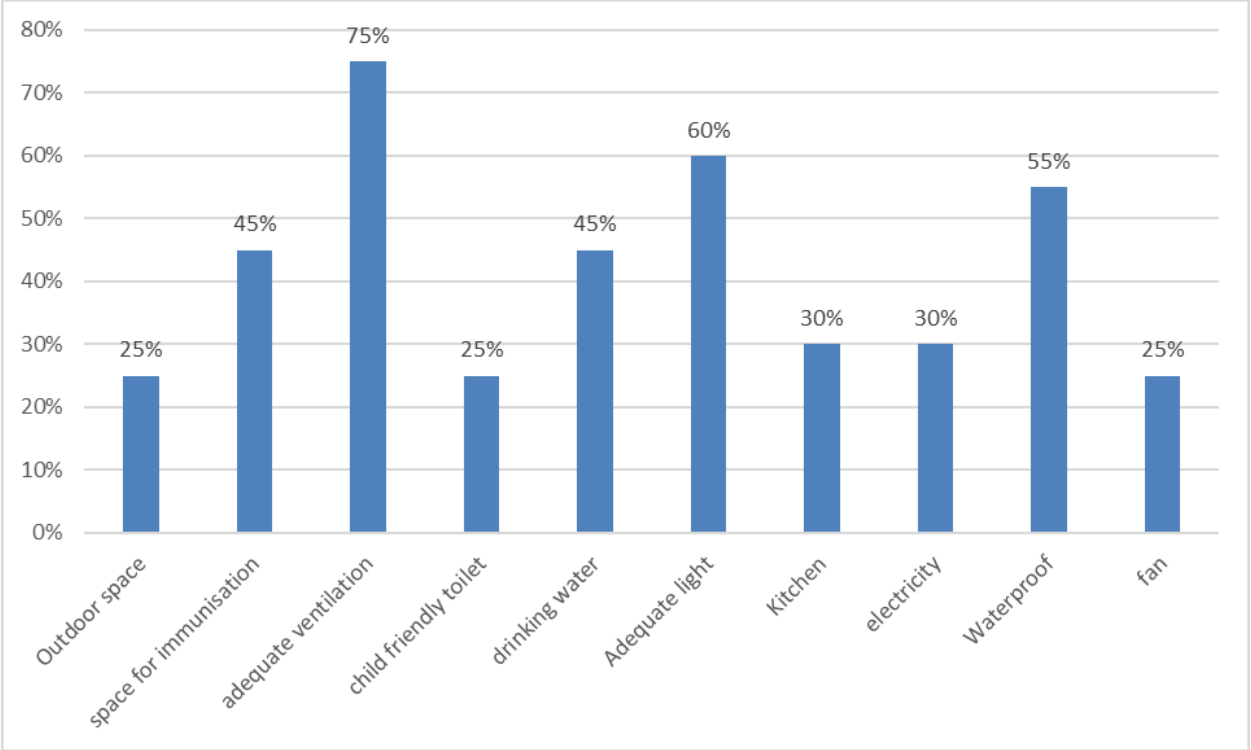

Figure 28: Status of infrastructure at selected Anganwadi centres

- **Availability and provision of health and nutrition services for children under five through AWCs and VHSND**

Supplementary nutrition, growth monitoring, nutrition and health education, immunization and referral services are the main services provided at the AWCs for children under 5. In the study area, 90% of the AWCs provided supplementary nutrition, health and nutrition education was done in 95% of the centres, and 85% provided early childhood care and education (ECCE). However, only 65% of the centres provided health check-ups and immunizations through VHSND, while referral services were only provided in 35% of the centres. (Figure 29).

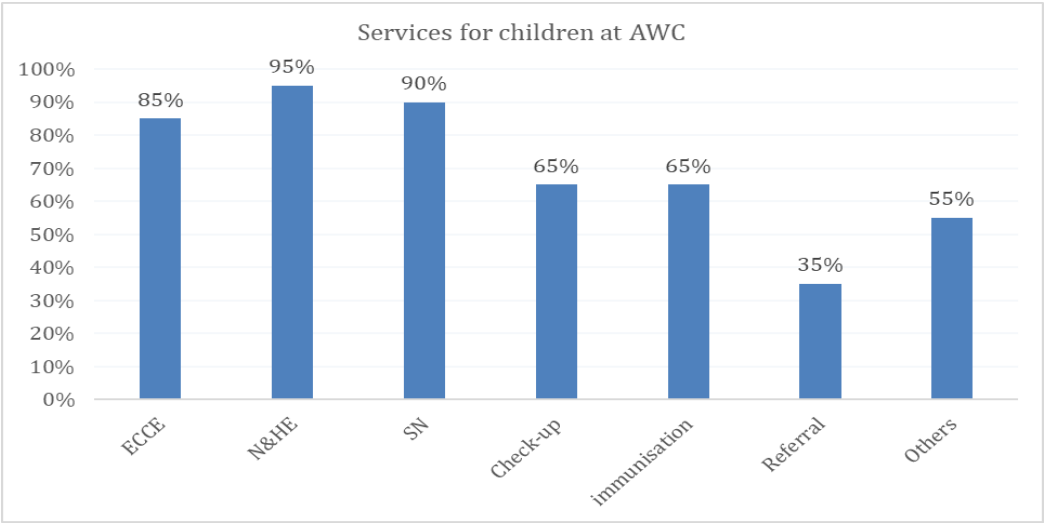

Figure 29: Services for children at AWC

Supplementary nutrition- The observations indicate that the quantity of food given to the children was generally sufficient and of good quality. There were some cases where the menu was suggested to be changed or the quality of certain food items could be improved. However, in Rajasthan, a dry packaged ration was being given instead of a hot cooked meal. In one centre, the food packet was found to be kept open.

Growth monitoring: It was seen that the growth monitoring (taking height and weight of children) is carried out regularly in almost all the AWCs. The weight and height measurements were conducted monthly in most of the AWCs. However, in Rajasthan, the weight measurement was only done once every two or three months and height once in every two, three, or sometimes six months.

In many of the centres it was observed that the height data was not entered correctly, mostly the previous month height was reported again and again. It was also reported by the AWWs in most of the states that they have been directed to report very few underweight cases in their village. It was also found that the height and weight data available in the POSHAN tracker or the MPR is different from the data available at the AWCs. The AWWs expressed their difficulties in entering anthropometric data in the POSHAN tracker. It has increased their workload and due to poor internet connectivity, it is even more difficult for them to upload data on time.

The capacities of Anganwadi worker on interpreting the growth charts was also assessed by showing a weight-for-age growth chart that plotted the height of the child over time. The chart showed that the child grew well for the initial few months, but later on, the growth faltered.

The interpretations of the growth chart by the Anganwadi workers varied based on their understanding of the chart and their experience in working with children.

In Odisha, four out of five Anganwadi workers interpreted the chart correctly. One worker was unable to read and interpret the chart.

However, in north west Delhi, the Anganwadi workers were able to identify that the child's growth was faltering, and they suggested that the child needed more support as the child borderline malnourished. They also explained the interpretation of different colours in the growth chart. One out of the five AWW mentioned that the child initially showed good growth but has now transitioned to the yellow category, indicating a need for intervention. The parents should receive counselling, the child's weight and medical history must be monitored, and their nutrition and diet should be assessed to ensure proper growth and development

In Assam, all the Anganwadi workers were able to categorize the weight of the child with respect to age using the growth chart. They could identify the underweight children, and the growth chart helped them identify the children who needed more attention. They were also able to interpret the color-coding system used in the growth chart accurately.

In Rajasthan, three out of five Anganwadi workers did not respond to the questions about the growth chart, and one worker stated that she did not know anything, and the ASHA does the

growth monitoring in that village. Only one worker was able to identify that the child's growth was faltering.

Overall, the study showed that while many Anganwadi workers were able to interpret the growth chart accurately, there is still a need for more training and support to ensure that all workers have a good understanding of growth charts and can use them effectively to monitor the growth and development of children.

Health check ups and referral services: The provision of health and nutrition education is happening in almost all the centres except one AWC in Kamrup. Health check ups took place in 13 AWCs. Out of the 20 Anganwadi centres observed, there was no referral shown in 50% of the centres. In one AWC in Odisha, even though children were found in the Severe Acute Malnutrition (SAM) category, they had not been referred to the Nutrition Rehabilitation Centre (NRC).

Immunization: Immunization services were conducted during the VHSND sessions in the Anganwadi centres. Out of the 20 AWCs, immunization for children took place in 13 centres. In Odisha, a fixed day for immunization is scheduled for each AWC villages. It was reported that the AWW coordinates with the ANM for providing the immunization services.

Zinc, vitamins and IFA provision were available only in 11 out of 14 VHSNDs. Additionally, dietary counselling was provided in 10 of the VHSNDs. However, newborns were only checked for danger signs in 6 of the VHSNDs. The AWCs in our study also provided a range of services catering to the needs of various other groups, such as adolescents, pregnant women and lactating mothers. Health check-ups for the above groups were conducted in 13 of these centres. Immunization and micronutrient supplementation were provided in 14 AWCs. It was heartening to note that health and nutrition education was imparted in 17 AWCs, which can go a long way in creating awareness and promoting healthy practices among these vulnerable groups.

The study also found that screening of Severe Acute Malnutrition (SAM) children was conducted across 5 out of 14 (35.7%) VHSNDs observed (Figure 30).

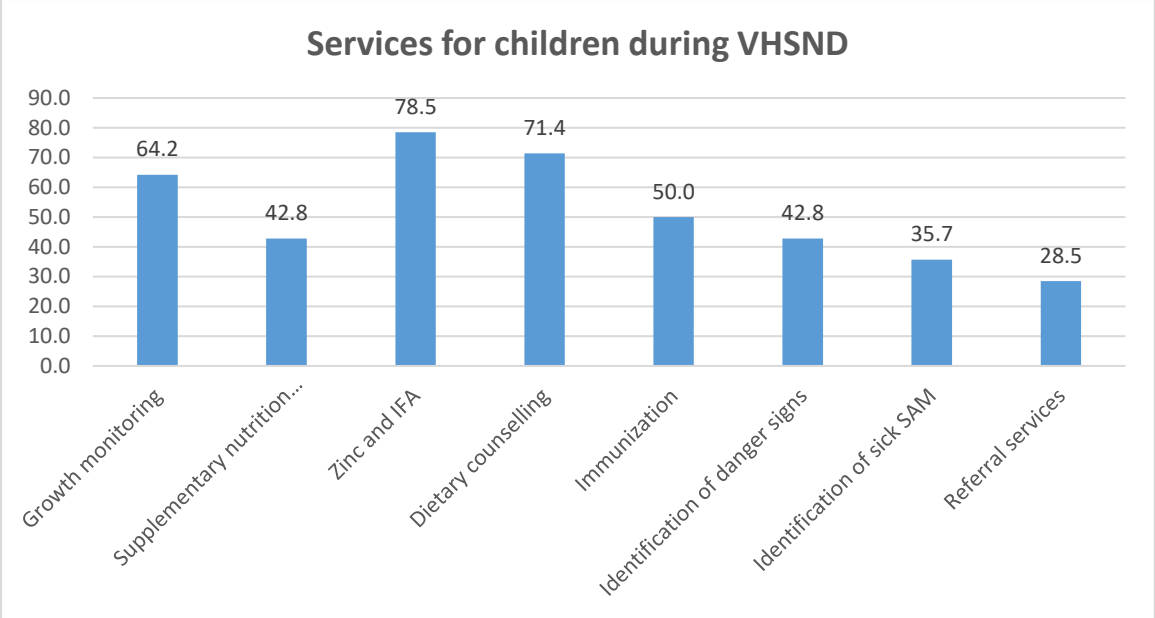

Figure 30: Services for Children during VHSND

- **Availability and provision of health and nutrition services for adolescent girls, pregnant and lactating mothers**

The health and nutrition services for adolescent and pregnant women and lactating mother is provided through the VHSNDs. In our study sites 14 such sessions were observed. It is to be noted that UHND was not observed in northwest Delhi. In almost all the VHSND observed, it was noted that antenatal services provided included pregnancy registration, abdominal examination, IFA and calcium tablets distribution, and Hb test among others. Among various services related to ANC, high-risk identification was found only in 6 out of 14 places (Figure 31). These took place mostly in Karauli.

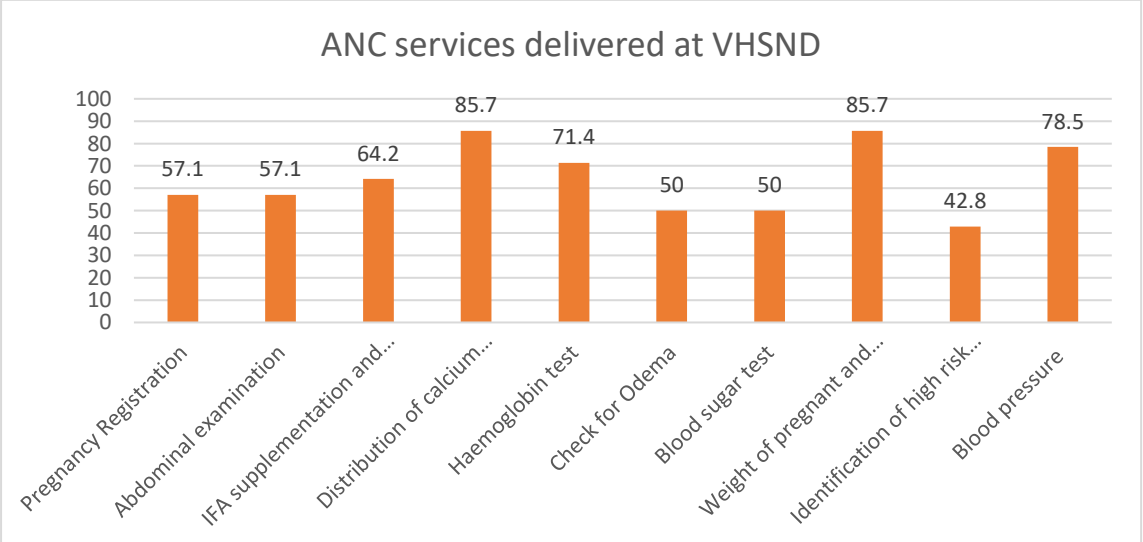

Figure 31: ANC services delivered at VHSND

Counselling services for women and adolescents were examined, revealing that 78.5% of Village Health, Sanitation, and Nutrition Days (VHSNDs) included family planning counselling. However, only 28.5% of VHNDs provided counselling on feeding sick newborns (Figure 32). The VHSNDs witnessed active participation from all the Female Health Workers (FLWs). ASHAs played a crucial role by inviting beneficiaries to the event, while ANMs provided counselling and conducted check-ups. AWWs coordinated the activities at the Anganwadi centre, offering support, guidance, and education on various healthcare components, their significance, and details about healthcare schemes and policies.

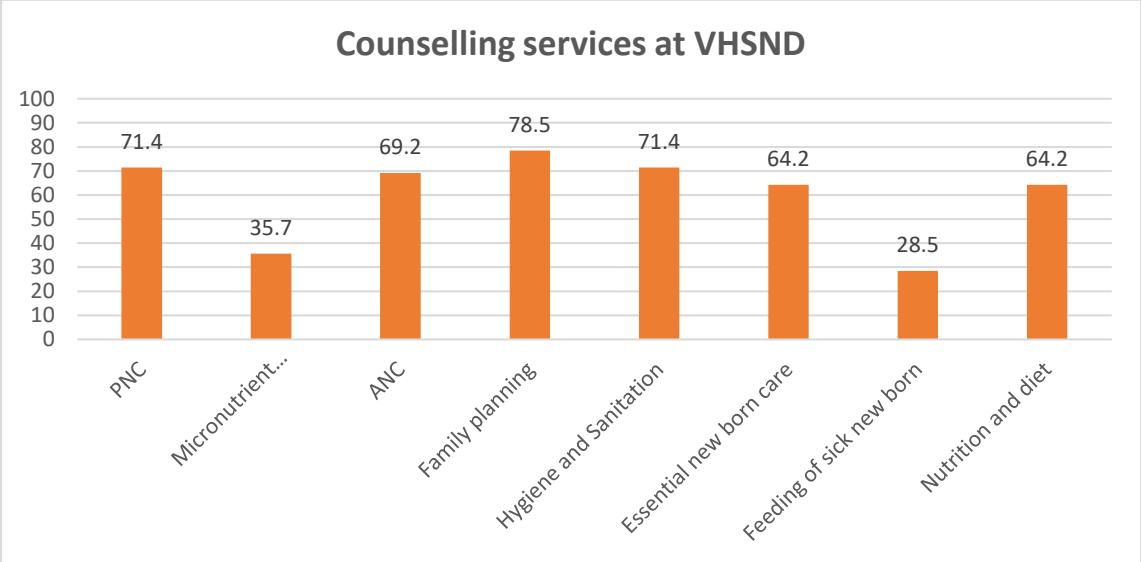

Figure 32: Counselling services at VHSND

Human resources for ICDS service delivery

The table below displays the mean age and the years of experience of the various frontline workers and supervisor.

Table 49: Mean age and years of experience

Variable	ANM	ASHA	AWW	LS
Mean Age	50.4	39.2	48.7	48
Mean years of working	22.5	12	20.5	15

The table below presents the level of education of ANMs, ASHAs, AWWs, and LSs. Out of the 14 ANMs, 50% had passed higher secondary, while 21.4% had a diploma in nursing and midwifery. For the 16 ASHAs, the majority (62.5%) had completed secondary education, and 25% had primary education. Out of the 20 AWWs, 45% had completed secondary education, and 20% had a graduate degree. (Table 19).

Table 20: Level of Education

Variable	ANM (N-14)	ASHA (N-16)	AWW (N- 20)	LS (N-4)
Level of education N (%)				
No formal education			1 (5%)	
Primary		4 (25%)	6 (30%)	
Secondary	1 (7.1%)	10 (62.5%)	9 (45%)	1 (25%)
Higher Secondary	7 (50%)	1 (6.2%)		
Graduate	3 (21.4%)	1 (6.2%)	4 (20%)	3 (75%)
Diploma in nursing and midwifery	3 (21.4%)			

- **Role and responsibilities of front-line health workers:**

ANM: ANM (Auxiliary Nurse Midwife) provides various health services to children, mothers, and adolescents. Services for children include immunization, health and nutrition education, counseling, and medication such as ORS, IFA syrup, and albendazole. ANM provides counseling on menstrual hygiene and distributes sanitary napkins for adolescents. For pregnant and lactating mothers, ANM provides antenatal and postnatal care, medication, counseling, and health education. ANM also conducts home visits, referrals, and health checkups for mothers and children.

ASHA: ASHA workers provide essential services to children, mothers, and adolescents in rural areas. For children, ASHA provides counselling on feeding, growth monitoring, home visits, immunization, and referral services. ASHA also educates mothers on child care practices and distributes medication. For adolescents, ASHA provides menstrual hygiene counselling, distributes IFA tablets, sanitary pads, and conducts health check-ups. For pregnant and lactating mothers, ASHA provides health and nutrition counselling, check-ups, and distributes medication. ASHA also provides counselling on newborn care, family planning, and supports health service delivery through home visits and immunization sessions.

AWW: Anganwadi workers offer services to children, pregnant and lactating mothers, and adolescents. These services include growth monitoring, pre-school education, supplementary education, health check-ups, referral health and nutrition education, and immunization. They also provide supplementary nutrition, conduct activities such as games, singing, dancing, and more for the amusement of children, and identify SAM and MAM children, providing special care

for them. Additionally, they distribute food, provide health care, weight and height monitoring, sanitation, and call people for door-to-door visits. For adolescents, they provide education on menstrual hygiene and services such as IFA tablets and pad distribution. For pregnant and lactating mothers, they offer nutrition and health education, ANC, PNC, home visits, and counselling. They also provide linkage to the PMMVY scheme.

One of the challenges faced by Anganwadi centers in north west Delhi, is the lack of availability of Aadhaar cards for children, which prevents them from being enrolled in the center. Additionally, some communities may not prioritize regular check-ups or weight monitoring, making it difficult for workers to engage with and provide services to them. Workers may sometimes face logistical challenges in reaching certain remote or hilly areas, making providing services to children in those communities difficult.

Anganwadi workers have made several recommendations to improve the functioning of Anganwadi Centers (AWCs). They have emphasized the need for adequate infrastructure such as space, teaching aids, stationary, blackboards, and cleaning supplies. They have also recommended the provision of outdoor toys and space for preschool activities, better quality of supplementary nutrition with eggs, fruits, and milk. Moreover, hygiene and sanitation outside the center needs improvement, along with increased financial support and community-based programs.

Furthermore, the workers have suggested renovating AWCs with proper toilet facilities, electricity, and storage facilities. They have also stressed the need for training for workers to work on the nutrition tracker. Due to the limited digital literacy of some workers, they find it challenging to understand online work.

The Lady Supervisor carries out a variety of activities to promote Infant and Young Child Feeding (IYCF) practices. These activities include counselling, meetings, home visits, and rallies to celebrate occasions such as Breastfeeding Week and POSHAN Maah. She also stays informed about campaigns related to IYCF and takes action accordingly.

Furthermore, on the second Thursday of every month, the Lady Supervisor conducts Annaprashan sessions, and on the 3rd Thursday of every month, she organizes mother meetings to promote IYCF practices. She also adheres to an IYCF plan, conducts home visits, trains the AWWs, and provides counselling to mothers to encourage IYCF practices.

- **Status of Training and capacity building of the project functionaries and FLWS:**

All the ANM interviewed for this study received in-service training at different times, with the most recent one in November 2022, and previous ones in January 2022, March 2022, and October 2021. The training covered various themes, such as communication skills, immunization, and disease prevention. 12 ANMs found the training useful, while 2 reported that it was useful to a limited extent. Based on the responses provided, some ANMs felt that additional training on specific topics, such as immunization and nutrition, would be helpful in improving service delivery. Refresher training was also considered essential by some ANMs. However, some ANMs felt they have received sufficient training and do not require any additional training. A few ANMs

did not provide any specific response or had no suggestions about what additional training they needed.

All the 16 ASHA workers interviewed said they had received the refresher training, and 15 had received induction training. They mentioned that this training was useful for them to deliver services in the community, except for one who said it was useful to a limited extent.

Out of 20 AWWs interviewed, 13 reported that they had received refresher training, while 6 (in 1 in Northwest Delhi, 3 in Rayagada and 2 in Kamrup) reported that they had not received any training. One worker did not respond. 12 workers commented on the usefulness of the training, 3 stated that it was helpful to a limited extent, and 1 stated that it was not useful at all. The remaining workers did not provide a response.

Additional training and aids needed to help the AWWs in better service delivery includes teaching aids, improving meal quality, availability of stationary, Early Childhood Care and Development (ECCD), Pre-School Education (PSE), refresher training on PSE, child and women health, use of new technology, handicrafts, and daily anthropometry for identifying Severe Acute Malnutrition (SAM) and Moderate Acute Malnutrition (MAM). Some respondents emphasized the need for training on weight taking and health issues. Additionally, one response highlighted the need for training on properly utilizing the POSHAN tracker application.

All four Lady Supervisors had undergone induction and refresher training, which covered various topics such as immunization, growth monitoring, document management, Poshan Tracker, and services offered under the ICDS scheme. The Lady Supervisor from Rayagada highlighted the need for additional training on the Advika Module and Poshan Tracker MIS.

The Lady Supervisors expressed that the training sessions were beneficial to them, particularly in supervising the AWWs and ensuring that the services provided at the AWCs were effective.

The CDPOs have received several trainings as well refresher trainings over time. These trainings helped them understand the context and ways to curb malnutrition among beneficiaries, understand job responsibilities, properly implement various schemes, ensure the six ICDS services are provided, and provide orientation for LS and AWWs.

Governance and Leadership

Interactions with four CDPOs (Child development project officers), one from each block in all four study sites, revealed insights into how various nutrition services are delivered and monitored and how convergent mechanisms are established.

The CDPOs address the challenge of malnutrition in their block by implementing various measures. This includes ensuring proper implementation of schemes and programs, creating WhatsApp groups for timely updates, conducting frequent visits to check the status and listen to beneficiaries' queries, and referring SAM cases to NRC for further treatment. They also used

state-level Sampark portals to resolve community grievances and implement newer schemes such as UDAAN, which targets adolescent girls and young women.

As reported by the CDPOs, they ensure quality in service delivery in the area through planned monitoring visits, supervision of the work of AWW and LS, surprise visits to AWCs and villages, periodic training of LS and AWW, home visits, and regular updates on WhatsApp via photos and videos. Additionally, they ensure quality in the supply of THR and rice by conducting monitoring visits on a regular basis. Follow-ups are done regularly to ensure quality ICDS services in the block.

The CDPO employs various strategies to strengthen the knowledge and skills of the LS and AWWs in the area. This includes periodic and refresher training sessions, training on new schemes, and meetings with the AWWs. They also provide monthly training to LSs and AWWs and sometimes refer selected ones for intense training on 6 ICDS services.

The major challenges by CDPO in implementing ICDS services are lack of proper infrastructure, including the difficulty of accommodating beneficiaries in small rented areas, and the need to provide dedicated buildings for AWC. Other community-level challenges include lack of awareness and communication, early marriages, early pregnancies, patriarchal norms, cultural norms and stigma, leading to poor service utilization and outcomes.

The CDPO ensures the convergence of different departments through various measures. They seek help and support from their respective departments whenever needed. Regular convergence meetings are held at the district and block level under the POSHAN Abhiyaan, where issues are discussed and solutions formulated. They also issue letters to promote convergence with different government departments.

CDPOs recommend the provision of dedicated buildings for AWCs, a better honorarium for AWWs, and more awareness campaigns in the community to improve the health and nutritional status of women and children in the block. They suggested using local foods as supplementary nutrition instead of a common recipe, improving the quality and diversity of the supplied SN, and closely monitoring the consumption of food by pregnant and lactating mothers, including supplying cooked food at AWCs. Additionally, they suggested that AWCs should be attached to villages, have toilets and safe drinking water facilities, child-friendly wall paintings, and a kitchen garden and boundary walls.

When we spoke to the Lady Supervisors on governance and leadership issues, she mentioned that support is provided to upgrade the skills of AWWs through training sessions, counselling, supervision, and review meetings, as well as providing advice and conducting orientation sessions on programs. They felt that AWWs feel comfortable discussing their issues with them.

LS conducts monthly visits to AWCs to supervise and monitor operational functions, verify attendance and the quality of the food, check registers, monitor growth, verify immunization records, conduct meetings, and ensure pre-schooling activities are carried out. Regarding the village health plans, the LS of northwest Delhi and Karauli in Rajasthan mentioned that they provide support to the AWW to develop village health plans, whereas LS from Rayagada in

Odisha and Kamrup in Assam had no idea about it. The number of AWCs (Anganwadi Centers) covered by the lady supervisors also varied, with Northwest Delhi and Kamrup, Assam covering 24 centers each, and Karauli, Rajasthan covering 63 centers.

Financing

There were few observations related to financing and funding of health and nutrition programs in the community. Findings related to untied fund utilization for Village Health, Sanitation and Nutrition Committee (VHSNC) and Mahila Arogya Samiti (MAS) are captured here. The Village Health Sanitation & Nutrition Committee (VHSNC) is important in developing and implementing micro health plans for communities' health, nutrition, and sanitation. It is envisaged to help to increase accountability and transparency in the health sector and ensure proper utilization of funds allocated for health and nutrition programs. The VHSNC has the potential to empower communities to assess, prioritize, and resolve local health challenges.

Mahila Arogya Samiti (MAS) is a community participation program under the National Health Mission that focuses on health, nutrition, water, sanitation, and social determinants at the slum level. It aims to promote local collective action and decentralized health planning. MAS must open a joint bank account to receive the annual untied fund of Rs. 5000/- from the NUHM, which can be used for activities such as MAS meetings, sanitation, hygiene, and emergency health needs [34].

Regarding the untied funds, only 3 out of 14 ANMs mentioned that the untied fund received for VHSNC was 10000 rupees, while others could not recall the amount. One ANM mentioned that the medical officer receives the fund. Most of the frontline workers had no idea how the untied funds were being used, while a few mentioned that it was used for purchasing furniture, cleaning equipment, and filling up pits with soil around the centre. Additionally, it was used for expenses related to meetings, IEC materials, cleanliness programs, and painting the centre as well as buying chairs, tables, and cabinets for all centres.

'The community during the FGD discussed that the Mahila Aarogya Samiti (MAS) is being formed in the majority of the places and meetings are conducted regularly, usually once a month, to discuss the health issues in the village. Health and nutrition topics such as washing hands and using toilets, safe drinking water, nutrition, and hygiene are discussed during meetings. The MAS also organizes VHSND sessions once a month, where services such as immunization, ANC check-ups, family counselling, and distribution of IFAs are provided. The MAS faces challenges such as lack of building and funds.'

Management information systems

It was observed that all the records were mostly available in the AWCs; however, many of them were not updated. In one of the AWCs in Odisha, the records were unavailable due to a conflict between the AWW and the supervisor. The supervisor took custody of all the records. In an AWC in Rajasthan, all the records were with the Lady supervisor. Overall, it was seen that only a few

AWCs adequately maintained the registers, whereas in most cases, they were not updated (Figure 33). When asked about issues faced by AWWs in maintaining registers at the centres, the Lady Supervisors mentioned that documentation can be an issue due to their low education levels.

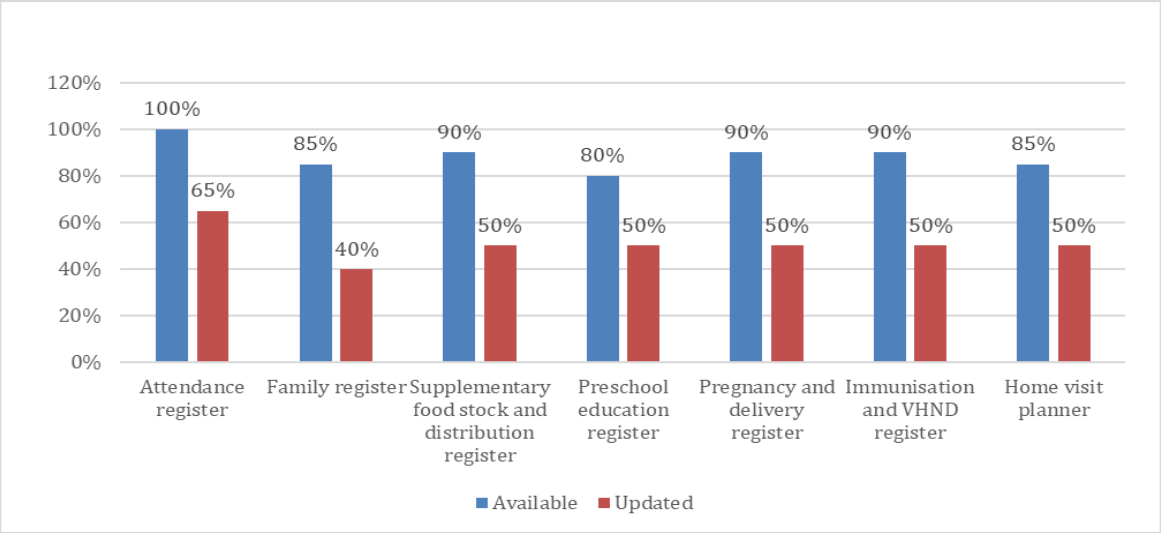

Figure 33: Records and Registers

When it comes to record-keeping, an average ANM spends approximately two hours per day. In some cases, the entire workday can be consumed by the task of filling out records and preparing reports. However, most ANMs do not face issues with data entry, except for occasional technological challenges like network issues or lack of familiarity with technology. The level and type of support received from their Lady Health Supervisors (LHVs) varies for ANMs, with some receiving adequate support in all tasks and activities while others do everything themselves.

ASHA spends an average of 2 hours per day preparing their progress reports. ASHA facilitators provide various kinds of support to ASHA workers, such as conducting home visits, organizing VHSND sessions, and training, although the level of support received may vary from worker to worker.

The time taken for the AWW to prepare their progress report is varied, with responses ranging from 20 minutes to 3-4 days, and the progress report is prepared on a monthly basis using the Poshan tracker. The lady supervisor visits the AWW centers, but the frequency and support provided during these visits vary, with some visits occurring 2-3 times a month and others once a month, and support including training, assessment, and resource procurement.

The use of the POSHAN tracker by AWW is challenged by various issues such as poor network connectivity, server problems, and phone-hanging. Data uploading and online data entry also consume time and increase workload. Many children do not have Aadhaar cards, which creates issues during registration. The AWW recommends enhancing infrastructure, training, and community involvement to improve the reporting of health and nutrition status of children at the AWC.

Supplies and logistics

Out of 20 AWWs interviewed, 18 mentioned they always receive a monthly ration and other materials on time. In some cases, AWW must make their own arrangements for carrying and bringing food items to the centre. Price fixation also poses a problem for buying qualitative products at the right time, such as eggs, dal, and oil, as the market price is sometimes higher than the fixed price. In addition, some AWWs lack access to an AWC and must manage in the house of the Anganwadi worker, using their own money to purchase necessary supplies.

Our study observed that out of the total AWCs, 17 had the necessary equipment, such as a stadiometer, IEC materials, an adult weighing scale and PSE kits. However, only 14 AWCs had access to the infantometer and growth charts. The infantometer and stadiometer were not in good condition in Karauli. The condition of growth charts seemed to be in good condition only in 10 AWCs.

Table 21: Availability and condition of anthropometric equipment across study sites

Anthropometric equipment	**Northwest Delhi**	**Kamrup**	**Karauli**	**Rayagada**
Infantometer	3	2	5	4
Condition of the Infantometer				
Functional	2	2	3	3
Non functional	1	-	2	1
Stadiometer	4	5	5	3
Condition of the Stadiometer				
Functional	3	3	4	3
Non functional	1	2	1	
Weighing scale for children	5	5	5	5
Condition of the weighing machine				
Functional	3	4	4	2
Non functional	2	1	1	1
Availability of growth charts	5	3	1	5

On enquiring about the availability of medicine kits or first aid boxes, it was found that only three AWCs had them. Despite the availability of these materials in some AWCs, their condition was not appropriate for use. We observed that in many AWCs, the weighing machines were either broken or not properly calibrated, while the medicine kit was unavailable in several centres (Figure 34). Furthermore, the few centres with medicine kits lacked essential medicines, ointments, and other drugs. Another concern was the lack of waterproof storage space in the AWCs in Rajasthan.

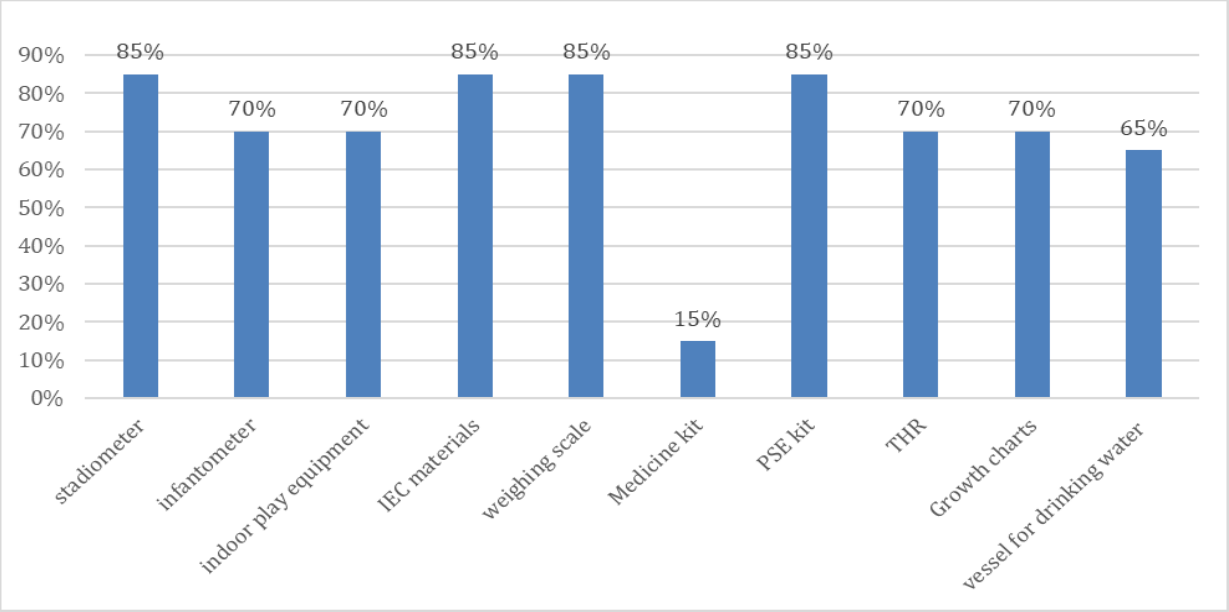

Figure 34: Status of equipment, inventory and materials at AWC

Among the 14 ANMs who participated in the survey, 9 reported that they have never experienced any delays in procuring drugs and equipment. However, 4 ANMs (1 from northwest Delhi, 1 from Rayagada, and 2 from Kamrup) indicated that there are occasional delays. Only one ANM from northwest Delhi reported consistent delays in procuring drugs and equipment. Calcium and Iron tablets are among the items that are often delayed or not provided in the centres where medicines of regular use are available. Multivitamins, antibiotics, and painkillers are sometimes not provided in sufficient quantities. In addition to Iron Folic Acid, Calcium Tablets, and Vitamin A, sanitary napkins are also items that may be delayed or not provided.

Out of 16 ASHA interviewed, 8 mentioned no delay in procuring drugs or equipment, whereas 4 ASHAs (2 from Kamrup and 2 from Rayagada) said there was a delay, and 4 chose not to respond. Essential items such as Paracetamol, Zinc tablets, Bandages, Ointments, and Medicine kit bags were in short supply.

- **System level determinants: community perspective**

This is based on the interaction with the community members. The community seemed informed about the health and nutrition services offered by the government in all of the study locations.

The majority of community members were found to be aware of the services provided by the Anganwadi worker, ASHA worker, and other frontline workers.

'Based on the qualitative inputs provided during the focus group discussions, the community seems to have a general awareness of the services offered at the AWC, which includes preschool education, supplementary nutrition, immunization, growth monitoring, and counselling. Some mothers mentioned the provision of morning and evening meals and Take Home Ration. However, few were aware of all the services to be provided. A few mothers also mentioned receiving information about AWC services from ANM, ASHA, and AWW. Counselling was also given on care during pregnancy and the postpartum period, and the care of the child.

The focused group discussion also revealed that frontline workers, including ASHA, AWW, and ANM, support the community in tackling malnutrition. These supports include home visits and counselling on child nutrition and care, supplementary nutrition like hot cooked meals and take-home rations, growth monitoring, referral services to other healthcare providers as necessary, immunization services, and counselling on childcare practices, such as providing adequate and nutritious diet, hygiene, and cleanliness. They even provide eggs and Chhatua (a type of cereal) to families and give advice on hygiene, cleanliness and the importance of safe drinking water.

Women reported receiving various forms of government support during pregnancy and lactation, including ANC and PNC care, free check-ups and medicines, financial assistance through schemes like JSY and PMMVY, supplementary nutrition, immunization, counselling, referral, and education on family planning, infant feeding practices, and newborn care. Mothers have also received maternal benefits for institutional delivery and Mamata benefit of Rs 5000/ during pregnancy and lactation. Some reported receiving specific services such as blood and urine tests, abdominal exams, and blood pressure check-ups.

5. Discussion and Conclusions

5.1 Prevalence of malnutrition in select AWCs

As described, the prevalence of underweight, stunting and wasting at the Anganwadi level was found to be less than the NFHS 5 levels for underweight and wasting and markedly more for stunting. There are many methodological reasons for this to be the case, such as less-than-universal coverage of AWs themselves, missing data, and the characteristics of the children that have been left out of enrollment. Regarding coverage, the National Food Security Act (NFSA) pronounces the SNP in Anganwadis as a universal entitlement. However, coverage remains at only 47% of the total number of children 6 months to 6 years in the country [35]. In our experience of working in the field for many years, in remote areas, typically households that are more vulnerable in terms of class and caste, tend to get excluded, especially because the Anganwadis are often located in better-off areas of the village, and the Anganwadi workers often belong to higher caste.

There are many country-wide issues related to anthropometry that are known. The issues of capacity to do anthropometry emerge from this study, where height measurements were found to be far more problematic, compounded by the recent directive to do heights every month even though this is not technically required, meaningful or practical [36]. Data and anecdotal information from independent sources also suggest a significant underreporting from Anganwadis, often due to unwritten directives from superiors. For instance, in one survey of multiple sites, only about 60% of children suffering from severe underweight were reported as such by the AWC, and this percentage was as low as 29% in one of the sites [37].

Nonetheless, data from our own MIS in similar areas does corroborate the high levels of stunting found in this study, and other studies have also pointed to this as discussed further below.

It should also be noted that the POSHAN TRACKER, the main monitoring mechanism of Poshan Abhiyan, completely depends upon Anganwadi data using the same methods with the same limitations as used in this study. Poshan tracker data is not publicly available for comparison with our study results.

5.2 Context-specific determinants and differences

Clearly, the results from the study are not directly comparable to other studies because of the differences in methods. However, the study does provides valuable insights into the fact that local (Anganwadi) level data can be very different from NFHS district-level data and that this could occur for a variety of reasons. The study highlights the many processual reasons that affect the quality and quantity of data being acquired from Anganwadis for nutrition monitoring even by the Poshan Abhiyan; the issue of missing enrollment, missing data, missing equipment, delays in data collection, unwritten diktats for underreporting, lack of capacities for doing measurements – especially height measurements affect the ultimate true capture of anthropometric status. In addition, there are actual contextual differences in the areas from where the data has been captured. Thus, the two broad issues that determine status are:

1. Capture of anthro data
    a. Missing enrollment
    b. Missing data
    c. Incorrect data
    d. Delayed measurements
    e. Migration
2. True contextual differences
    a. Low-income pockets
    b. Deprivation in major determinants, including water, sanitation, food security schemes, and education

Taking the data at face value, we can try and compare the sites showing the most variation in malnutrition levels, as seen from the Anganwadi data.

5.3 Data capture and other systems-level determinants

One notable finding from the study is the significantly low prevalence of missing data in Kamrup. Only 1.5% of children had missing data for both height and weight, which is considerably lower compared to Delhi, where 14% of children had missing weight data and 14.5% had missing height data. Rayagada had the highest percentage of missing data in any category, with 21.5% of children having missing height data.

Regarding birth weight data, Kamrup had a remarkably low rate of missing data at 0.4%, Delhi had a staggering 96.5% of missing data, and Karauli had 100% missing data. Rayagada had a moderately high rate of missing data at 53.5%.

When it comes to implausible data, Kamrup had the lowest prevalence, with Delhi following closely behind. The highest occurrence of implausible data was observed in Karauli for height-for-age measurements. Additionally, the frequency of anthropometric measurements was reported to be once every 2-3 months or even every 6 months for Karauli.

It is highly significant that birth weight was captured for all children in Kamrup compared to practically zero data captured at other sites. These findings point to a better anthropometric measurement system in the Anganwadis of Kamrup as compared to the other sites, with Karauli standing out as the worst performer for data capture overall.

This observation is corroborated by qualitative findings that suggested that AWWs in Karauli were not well versed in plotting or interpreting growth charts as compared to the other sites. Some AWWs reported that they had been instructed informally not to report too many underweight cases. However, this fact is contradicted by the reported high level of malnutrition in that site[3]. In many AWCs, it was observed that the ICDS data differed from the data entered in the Poshan Tracker, and that the issue of incorrect data was much higher for height data. AWWs expressed difficulties with poor internet connectivity and high workload as reasons for not being able to upload data properly in the Poshan Tracker. The lack of Aadhar cards was also cited as a reason.

In terms of other systems-level issues, the issues with water and toilet facilities within AWCs, especially in Karauli was alluded to in Household Section of this report as well as the fact that all the AWCs were running in rented rooms in Northwest Delhi as compared to 100% own buildings in Kamrup and Karauli. Northwest Delhi reported problems with enrolling children due to lack of Aadhar Card. 7 of 20 AWWs had not had any refresher training and 6 had not had any training at all. In Karauli, the supervisor was covering 63 AWCs!

Overall, the study sites suggest better delivery for most AWC services compared to State averages except for health care check-ups. Kamrup stands out for not achieving monthly weight records. The table below is a summary of utilization of ICDS services in our sites vs NFHS 5.

[3] The site has been anonymized for ethical reasons.

Table 52: Utilization of ICDS services in our study sites vs NFHS 5

Indicators	Utilization of ICDS services-NFHS 5 vs our study sites[4]									
	Assam NFHS 5	Kamrup	Rajasthan NFHS 5	Karauli	Delhi NFHS 5	Northwest Delhi	Odisha NFHS 5	Rayagada	India (Total)	Total (Study site)
Percentage of children in the age group of 0-6 years who received food supplement	65.3	89	50.4	100	46.4	97.5	86.5	71.7	62.1	89.4
Percentage of children in the age group of 0-6 years who received immunisation	34.9	89.2	49.4	100	40.6	92.4	75.8	67.4	53.2	86.2
Percentage of children in the age group of 0-6 years who received health check-up	56.2	78.3	46.8	30.7	41.5	6.7	82.6	42.3	56.5	30.8
Percentage of children in the age group of 0-5 years who were weighed at AWC on a monthly basis	51.9	89.2	50.1	0	46.8	97.5	87.6	98.9	59.7	76.6

5.4 Status of malnutrition

Considering that data capture was relatively good in Kamrup, the findings of the much better status of ALL measured malnutrition parameters in Kamrup compared to other sites hold high credibility.

Northwest Delhi stands out as having the highest levels of malnutrition across all parameters, except for stunting, which was most prevalent in Rayagada. Moreover, severe stunting was more common in Karauli and Rayagada. However, it is important to note that the accuracy of height measurements in Rayagada was questionable, and Karauli had the highest occurrence of implausible height data. Additionally, the frequency of anthropometric measurements in Karauli was irregular, further undermining the reliability of the data. It is worth mentioning that only one in five Anganwadis in Karauli had growth charts available on-site. Nonetheless, the data of this study corroborates fairly well with findings from other sources and research.

[4] Our study site has considered children in the age group of 0-59 months for all indicators

The levels of malnutrition, particularly stunting, in Rayagada are comparable to those observed in our creche program areas for children aged 0-3 years upon entry into the program during the same time frame as the study, as depicted below (Figure 35):

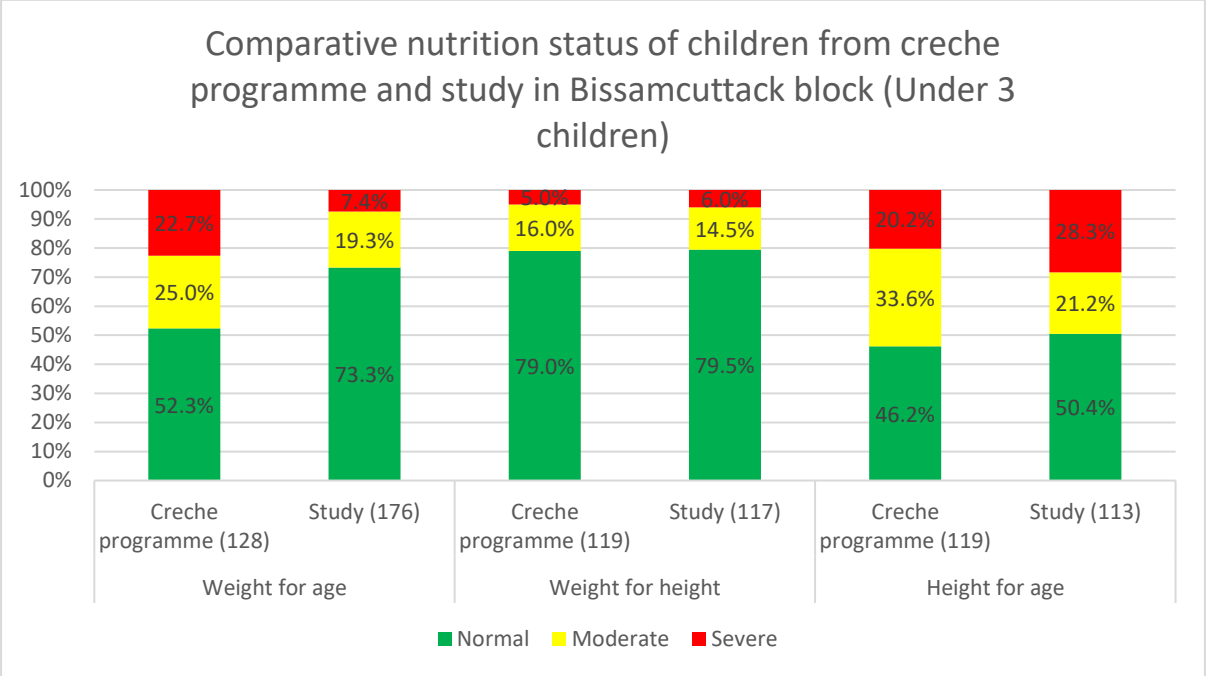

Figure 35: Comparative nutrition status of children from creche programme and study at Bissam Cuttack block

The data from northwest Delhi is comparable to findings in another study that found the prevalence of underweight at 34.0% and stunting at 42.6% [compared to 31% and 53% respectively in our study areas] in children under 5 years age in a 'lesser developed area' of South Delhi comprising households engaged in informal labour [38]. This is corroborated by other NGO-conducted studies in Delhi slum areas [39] that suggest high levels of malnutrition though there is hardly any published literature specific to slums, especially in recent times. In one of the few studies available, however, a study of children under the age of 5 years in Maharashtra [40] concludes that "prevalence of wasting, stunting and underweight were more seen in an urban slum than a rural area".

A study of malnutrition in five high-burden pockets of Jharkhand, Odisha, Madhya Pradesh and Uttar Pradesh by doctors from Kalawati Saran Hospital et al states a high level of geographical variation with stunting ranging from 38% to 71% and underweight from 46.5% to 72.5% [41].

5.5 Context-Specific Determinants (General Observation)

Kamrup: While it was known at the selection that Kamrup has relatively better nutritional trends compared to the state and national average and might reveal factors that impact malnutrition positively, these findings corroborate that fact as well as add the information that anthropometry is tackled well in the district as well, which is likely to be a major contributing

factor to better management of malnutrition. Additionally, observation of the 5 study sites in Kamrup revealed that schemes and programmes; including PDS and ICDS are running well in the area; most houses have latrines, and levels of education are somewhat higher in the 10th class in general. Most households have kitchen gardens and poultry, and non-vegetarian foods are consumed. Regarding relative disadvantages, there is poor road connectivity and poor public transport. Most households comprise daily wagers with about 30% seasonal migration for work.

Karauli : In Rajasthan the study was conducted in 5 villages- Mandakheda, Kheda, Gunesara, Jahangirpur and Sengarpura of Karauli block of Karauli district. The villages were constituted of people from scheduled tribes and scheduled caste categories. The village area ranged from 4-5 sq km and the average number of households was 130-140 per village. The literacy rate varied from 58% to 85 %. The community members were mostly engaged in agricultural activities, including animal rearing. The commonly domesticated livestock in these villages are cow, buffalo and goat, and nearly 40% of households had kitchen gardens.

The community institutions like government schools, PHC and AWC were functional. The primary health centre was at a distance of 2-3 kms from the sites. The common source of drinking water is the borewell. There was a general absence of toilet facilities, and open defection was practiced. The road connectivity was good, and the common modes of transportation were jeep, bus and tempo. Phone and internet facility was available in all the villages.

A ration store (PDS) was available in all the villages at a distance of about 1 km from the remotest household. It was reported that close to 50-60 % of people of these villages migrate to other places for livelihood activities. Schemes and programmes like ICDS, MDM, NHM, PDS, MGNREGA were operational in all these villages. However, MGNREGA cannot provide jobs to many villagers with only a few benefitting. SHGs are very active in these villages. There was no presence of NGO/CSOs in these villages.

These contextual findings, especially related to kitchen gardens and livestock rearing, correlate well with the findings on general food security in this site. However, the perception that Anganwadi services are performing well is belied by the findings of the study with respect to data capture, which was found to be poor, as discussed above.

Northwest Delhi: It is evident that the Northwest Delhi sample area, has a much higher level of malnutrition than overall district-level data. As discussed previously, this site demonstrates better capture of data. As far as the context is concerned, in Delhi the study was conducted in 5 AWC villages in Shahbad Dairy area of North-West Delhi, representing an urban slum. The AWC in all these villages was found to be well-functional. There is a government dispensary at a distance of 500m. ASHA workers are very active and undertake frequent home visits along with the AWW. Schemes and programmes like ICDS, MDM, NHM, PDS, are operational in all these villages. Organisations like Save the Children, Mobile Creches are working in this area, and their presence is likely to have facilitated the operations of these programmes.

The villages are well connected through public transport. Common modes of transport are rickshaws and DTC buses. The mud streets (galis) are very narrow, and water logging is common.

The area receives water supply from the Delhi Jal Board through tankers. However, most people have individual taps from where they get the water. Almost all the household had their own latrines and toilets. Public toilets are also seen, mostly used by shopkeepers and vendors. The living conditions are very poor as the houses are very small. Kitchen garden and livestock rearing are not practised due to lack of space. To illustrate the overcrowding, a village area ranged from 500-800 meters, with the average number of households being approximately 270 (ranging from 80-350). In all the other 3 areas, the ratio of households to area was much smaller.

Residents mainly comprise people from the scheduled caste category with low literacy levels and schooling among adults. There is a government school at a distance of 500 m and a private school across the road. Children in this area go to the government school. The male members of this community are mostly engaged as daily wage earners: rickshaw pullers, or own tea stalls. A few male residents also work in the factories of Bawana or Daulatpur. The women are mostly engaged as domestic workers. There is a general sense of cash insufficiency with a high dependence upon money lenders, even to source food over and above that received from the PDS.

These factors, especially the environmental ones related to overcrowding, do help to explain the higher levels of malnutrition in North-West Delhi

Rayagada: In Odisha the study was conducted in 5 villages- Batiguma, Kadraguma of Kurli GP, Sahada and Samudra Buduni of Sahada GP, Badabudahada of Dakluguda GP, of block Bissamcuttack of Rayagada district. The villages like Batiguma and Kadraguma comprised people from PVTGs (Primitive Vulnerable Tribal Group), and Sahada, Samudra Buduni, and Badabudahada village comprised a scheduled tribe – Kandha, and mixed caste groups including SC and OBC. The village areas ranged from 1- 5 square km. The average number of households was approximately 100 (ranging from 46-202). Most of the houses were semi pucca in all the villages. Villages like Batiguma had only 3-4 people with primary education whereas in Kadraguma 40% of people had completed primary education , and at Samudra Buduni, Sahada and Badabudahada had studied till class 10th /secondary education. The community institutions like government schools and AWC were functional but in Batiguma there was no AWC and government school at the village. The primary health centre was at a distance of 1-5 kms from all the villages. The common source of drinking water was stream water and bore well. About 40% of villagers of Sahada, Samudra Buduni and Bada Budahada were using own latrines and toilets however, in Batiguma and Kadraguma most people practiced open defecation. The road connectivity was good in almost all the villages. The availability public transport facility was, however, limited. Recently a mobile network facility had been installed in all the villages.

The commonly domesticated livestock in these villages are cow, goat, hen, pig, and lamb. The household did not have kitchen gardens. The residents buy vegetables from the local market (haat), which is at a distance of 14 km from the villages. The villagers grow biri, mandia, variety of millets, paddy and fruits like pineapple, turmeric, jackfruit mango etc. Rice and mandia is a staple food. Pulse cultivation is also done.

Ration store (PDS) was only available at the GP headquarters which is at a distance ranging from 0 m to 8.5 KM approximately from the remotest household. Only rice was provided through PDS.

Most of the people were engaged as daily wage labourers, or engaged in agricultural work in hilly fields. Majority of women were engaged in hilly agricultural work. At Batiguma and Kadraguma some of the women in these communities were engaged in traditional handicraft and weaving activities.

It was reported that close to 20%-30 % people of these village migrate to other places for livelihood activities.

Schemes and programmes like ICDS, MDM, NHM, PDS, MGNREGA, and OPELEP were operational in all these villages. There is a presence of NGO/CSOs like AKSUS, CINI, Harsha Trust in these villages.

The factors related to open defecation and unsafe water sources may have implications for the findings of high levels of stunting in the area which are corroborated repeatedly by findings from the MIS being operated by PHRS in these areas over the last many years.

5.6 Household level determinants

Examining the household characteristics of children with underweight reveals some interesting findings as summarized in Table 22. While the range of determinants of malnutrition is well understood and known to exist across three different levels of action: immediate, underlying and basic (5), different permutations and combinations of these factors exist in different contexts and also in different phases of the country's development.

The current findings suggest that more immediate determinants of food security, water and sanitation and access to health services have been taken care of to a large extent across the board. Families show a fair awareness and practice of IYCF practices as well. To some extent, these developments have been of the 'low hanging fruit variety' and India appears to have made fair headway on these fronts on the whole, with extremes and exceptions persisting nonetheless.

However, across the board, it is the underlying issues of women's own nutrition, time and energy; as reflected by the data on women's lack of dietary diversity and the percentage of women engaged in unpaid care work often in addition to wage work, as well as very significant determinants of women's literacy rates, that seem of paramount importance in this cohort of malnourished children.

Some of the studies mentioned in the discussion on prevalence also studied determinants to find food security, use of toilets, and low body mass index status of mothers as the major predictors of stunting and being underweight among children [41].

One key factor that stands out is the issue of dietary diversity and, in particular, the low consumption of animal-based proteins by children in the age group 6 – 60 months. This factor

has been found to be significant in several other studies correlating the lack of dietary diversity with undernutrition [42]. The data on dietary diversity from NFHS 5 is depicted below (Figure 36). Notably, dietary diversity in our study ranges from 22-56% in the age group 6-23 months.

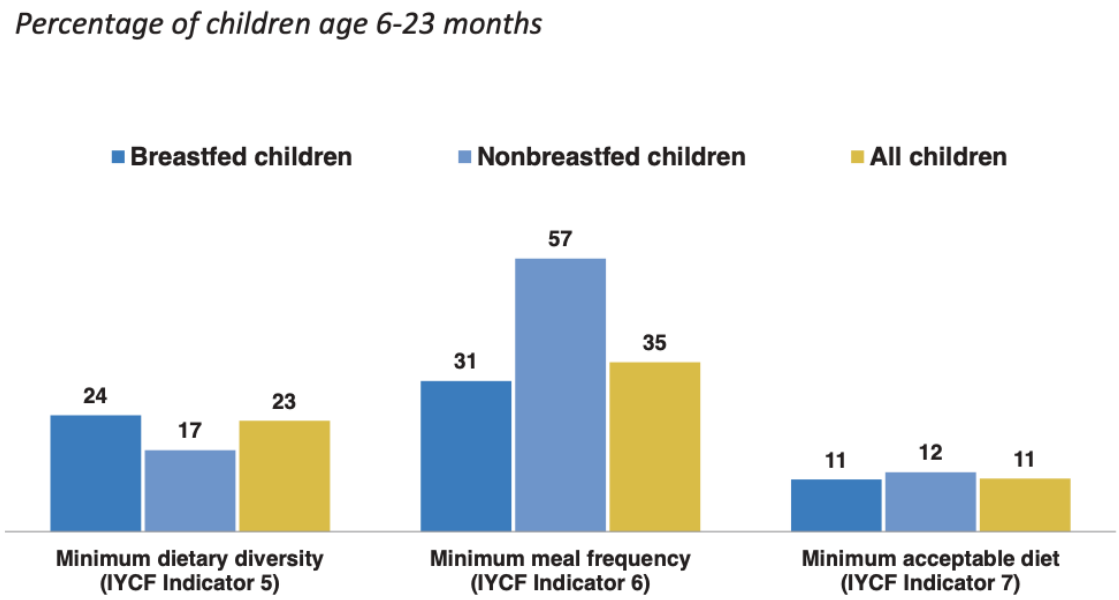

Figure 36: Dietary Diversity from NFHS 5 (6-23months)

As with all the other data discussed, there are key differences amongst the study sites in terms of factors uncovered by the household survey. These are organised in the table below (Table 22) in the conclusions section and point to the need for specific and decentralized assessment of factors in different contexts, which can then lead to specific interventions.

6. Conclusions

Determinants of malnutrition have been examined using mixed methods and multiple tools, from general observation of study sites, observation of services, analysis of AWC data, household surveys for underweight children and FGDs conducted with community members. All the data from varying sources are summarized below, specific to each study site and context, to enable a deeper understanding of context-specific determinants.

Clearly, in each study context, there is a coexistence of factors that are protective towards child nutrition with those that are correlated with malnutrition, as highlighted in the table below.

Table 63: Site-specific data for select indicators

Indicator	Kamrup	Karauli	Northwest Delhi	Rayagada	Total
Prevalence					
Underweight (N=1262)	17.4%	36.5%	31.2%	20.8%	**27.3%**
Wasting (N=1069)	6.3%	19.6%	16.4%	11.4%	**14.0%**
Stunting (N=1040)	32.9%	43.3%	53.3%	40.8%	**42.3%**
Anthro not available					
Weight (N=1373)	1.5%	14.1%	3.2%	8.4%	**7.7%**
Height (N=1373)	1.5%	14.5%	21.5%	8.4%	**12.0%**
Implausible Anthro					
WAZ (N=1267)	0.0%	1.1%	0.3%	0.0%	**0.4%**
WHZ (N=1101)	1.2%	1.6%	2.3%	7.1%	**2.9%**
HAZ (N=1208)	2.7%	5.0%	13.5%	33.3%	**13.9%**
Caste (N=312)					
OBC	16.2%	15.4%	16.1%	3.3%	12.2%
SC	13.5%	35.4%	64.4%	18.5%	38.8%
ST	29.7%	38.5%	0.0%	78.3%	34.6%
Religion (N=312)					
Hindu	56.8%	98.5%	92.4%	98.9%	91.3%
Muslim	43.2%	1.5%	7.6%	0.0%	8.3%
Christian	0.0%	0.0%	0.0%	1.1%	0.3%
Avg Monthly income (N=312)	10806	15631	12317	11222	12570
Land Ownership (N=312)	21.6%	80.0%	22.9%	21.7%	34.3%
Household consuming own agricultural produce	13.6%	78.4%	2.5%	20.6%	25%
Sibling's engagement in feeding the child in the absence of mother (N=312)	2.7%	4.6%	4.2%	26.1%	10.6%
Education Of Father (N=312)					

No formal education	0.0%	0.0%	9.3%	53.3%	19.2%
Primary education	37.8%	36.9%	40.7%	32.6%	37.2%
Secondary	43.2%	26.2%	23.7%	10.9%	22.8%
Higher Secondary	8.1%	16.9%	15.3%	2.2%	10.9%
Graduate and above	8.1%	20.0%	8.5%	1.1%	8.7%
Education of Mother (N=312)					
No formal education	0.0%	24.6%	11.9%	78.3%	32.7%
Primary education	21.6%	52.3%	34.7%	13.0%	30.4%
Secondary	56.8%	3.1%	22.0%	7.6%	17.9%
Higher Secondary	13.5%	12.3%	22.0%	1.1%	12.8%
Graduate and above	8.1%	7.7%	8.5%	0.0%	5.8%
Occupation – Mother/Caregiver (N=312)					
Daily wage agriculture work (fishing, farming, forest work, livestock rearing)	0.0%	0.0%	1.7%	3.3%	1.6%
Daily wage non-agriculture work (construction work, factory work, mason, driver)	2.7%	0.0%	5.1%	2.2%	2.9%
Don't know	0.0%	0.0%	0.0%	1.1%	0.3%
Salaried government employee	2.7%	0.0%	0.0%	0.0%	0.3%
Salaried non-government employee (domestic worker, form of continuous employment other than those below)	0.0%	0.0%	0.8%	0.0%	0.3%
Self-employed agriculture work (livestock rearing, fishing, farming, forest work)	0.0%	1.5%	0.0%	62.0%	18.6%
Self-employed non-agriculture work (transport business, shopkeeper, etc)	0.0%	0.0%	1.7%	2.2%	1.3%
Unemployed	0.0%	1.5%	36.4%	4.3%	15.4%
Unpaid family work (housewife/engaged in household chores all day)	94.6%	96.9%	54.2%	25.0%	59.3%
Occupation – Father (N=312)					
Daily wage agriculture work (fishing, farming, forest work, livestock rearing)	2.7%	0.0%	4.2%	15.2%	6.4%
Daily wage non-agriculture work (construction work, factory work, mason, driver)	51.4%	53.8%	71.2%	16.3%	49.0%
No response/prefer not to say	0.0%	1.5%	2.5%	1.1%	1.6%
Salaried government employee	8.1%	0.0%	0.0%	0.0%	1.0%

Salaried non-government employee (domestic worker, form of continuous employment other than those below)	10.8%	12.3%	7.6%	0.0%	6.7%
Self-employed agriculture work (livestock rearing, fishing, farming, forest work)	0.0%	21.5%	1.7%	58.7%	22.4%
Self-employed non-agriculture work (transport business, shopkeeper, etc)	16.2%	10.8%	10.2%	5.4%	9.6%
Unemployed	8.1%	0.0%	2.5%	1.1%	2.2%
Unpaid family work (housewife/engaged in household chores all day)	2.7%	0.0%	0.0%	2.2%	1.0%
HH Food Security (n=312)					
Food Secure	32.4%	100.0%	44.9%	43.5%	54.5%
Mild food insecure	13.5%	0.0%	3.4%	20.7%	9.0%
Moderate food insecure	2.7%	0.0%	9.3%	21.7%	10.3%
Severely food Insecure	35.1%	0.0%	39.0%	13.0%	22.8%
SNP from ICDS	89%	100%	97.5%	71.7%	89.4%
Mean Care giver age at marriage **(N=312)**	21.0	19.5	18.7	19.5	19.4
Mean Care giver age at 1st childbirth **(N=312)**	22.3	21.6	20.2	20.8	21.0
Mean Number of children **(N=312)**	1.6	3.0	2.2	2.9	2.5
Low-birth weight	21.6%	Not available	0.0%	7.7%	12.6%
Birthweight not available	0%	100%	95%	43%	70%
Support received in childcare (N=312)					
Always	86.5%	76.9%	97.5%	66.3%	82.7%
Never	2.7%	0.0%	0.0%	0.0%	0.3%
Women's Dietary Diversity (N=312)					
Low	21.6%	7.7%	5.1%	47.8%	20.2%
Medium	16.2%	64.6%	30.5%	38.0%	38.1%
High	62.2%	27.7%	64.4%	14.1%	41.7%
Animal protein consumption (24 hr recall)					
Any (Meat, fish, egg)	75.7%	7.7%	21.2%	81.5%	42.6%
Meat	48.6%	7.7%	6.8%	22.8%	16.7%
Eggs	32.4%	1.5%	16.9%	43.5%	23.4%
Fresh or dried fish	29.7%	3.1%	11.9%	56.5%	25.3%
Child dietary diversity (6-23) (N=94)	55.6%	22.2%	44.7%	31.0%	37.2%
Animal protein consumption (24 hr recall)					
Any meat, fish or egg	66.7%	0.0%	7.9%	41.4%	22.3%
Meat or fish	44.4%	0.0%	5.3%	27.6%	14.9%
Egg	55.6%	0.0%	2.6%	27.6%	14.9%
Child dietary diversity (6-59) (N=296)	70.3%	41.5%	63.6%	48.8%	55.4%

Animal protein consumption (24 hr recall)					
Any meat, fish or egg	64.9%	3.1%	7.3%	61.9%	29.1%
Meat or fish	32.4%	1.5%	5.5%	40.5%	17.9%
Egg	56.8%	1.5%	2.7%	40.5%	19.9%
Weight of the child recorded by AWW monthly (N=312)	89.2%	0.0%	97.5%	98.9%	76.6%
Received all Vaccination as per age **(N=312)**	89.2%	100.0%	92.4%	67.4%	86.2%
Child hand washing after toilet (N=312)					
Always	40.5%	100.0%	90.7%	20.7%	66.0%
Never	5.4%	0.0%	0.0%	18.5%	6.1%
Mother hand washing after toilet and before cooking (N=312)					
Always	59.5%	100.0%	92.4%	33.7%	72.8%
Never	2.7%	0.0%	0.0%	15.2%	4.8%
Open Defecation	8.1%	61.5%	0.8%	87%	39.7%

For every individual child, it is the net balance of these protective and inimical factors that leads to malnutrition. However, for the purposes of public health and nutrition interventions, it is appropriate to come to site-specific conclusions at a systems and community level. The importance of village-level data has recently been corroborated by a nationwide anthropometric data study suggesting that "of the total geographic variation in predicted child anthropometric failure estimates, 54.2% to 72.3% were attributed to the village level" [43]. The importance of cluster-level dietary surveys and targeting clusters to improve child dietary diversity is also highlighted in another recent study [44][45].

Kamrup: Kamrup; with the lowest levels of malnutrition as per this study, demonstrates the best anthropometric practice at the level of the AWC, is the only site to capture birth weight data for all children and also reflects good delivery of supplementary nutrition suggesting a general better level of functioning for all the ICDS services. It also shows the best levels of dietary diversity even amongst malnourished children and their mothers. Within children's dietary consumption, the consumption of animal-based proteins is significant. The other strong finding pertains to women's literacy levels with a 100% of mothers having had formal schooling. Own latrines were highest in Kamrup.

However, the area continues to suffer from high levels of food insecurity and low levels of land ownership leading to a high dependence upon markets for food; other than that sourced from the ICDS and the PDS. The incidence of low birth weight is also high as compared to the state average (16%).

Karauli: With the highest levels of underweight and wasting amongst the study sites, Karauli also offers an interesting example of the interplay of determinants. As far as anthropometric practice of the AWCs is concerned, it was found to be the least well-functioning for anthropometry with the unavailability of data but a 100% for delivery of SNP to children. Low birth weight data were

not available at all. It is very significant that in Karauli, the Lady Supervisor covered 63 centres for monitoring compared to about 24 in each of the other sites.

However, the indicators related to delivering health care services such as immunization were much better than the other study sites. The households studied also displayed the best hygienic practices related to hand washing. Land ownership is high in Karauli, with most households able to consume food from their own land, 40% or so ownership of kitchen gardens noted in general observation of the whole community and reporting a 100% food security in the household survey. However, the lack of dietary diversity among women and children was very high amongst households with underweight children, especially with respect to animal-based proteins, despite the livestock rearing that was noted in the general description of the site above. Yet, Anganwadis had shifted from providing the hot cooked meals mandated by the NFSA for children 3yrs to 6yrs to providing dry packaged rations. A quarter of the mothers had received no formal schooling at all. Open defecation was fairly high at 61.5%.

In terms of policies, it is well known that the government of Rajasthan has kept a high focus on delivery of health care (especially medical) services. It is also obviously a state policy decision to replace hot cooked meals with packaged rations for children aged 3 years to 6 years.

Northwest Delhi: this site exhibited the highest levels of stunting, but with the caveat that height measurements were not being taken properly by the ICDS with high levels of missing height data and implausible height data. Again, birth weight data were largely missing. Healthcare services and hygiene practices were fair.

The households had a high percentage of severely food insecure households. Land ownership was low, with low consumption from own land for obvious reasons, including push factors for migration to the metropolitan city. Though dietary diversity was relatively high, especially for women, the consumption of animal-based proteins was not commensurate.

Here, environmental factors seem to be of paramount importance, such as overcrowding and poor water drainage. Though the per household income is similar across the sites, the implications are vastly different with Northwest Delhi noting a high perception of cash insufficiency from the general qualitative observations since living costs are obviously higher in Delhi compared, for instance, to tribal Odisha or rural Rajasthan and Assam. Notably, the households in this area were largely of the SC category.

Other studies of urban poor locations have also found similarly high levels of malnutrition and associations with similar determinants. In the study of a low-income area in South Delhi discussed previously, the socio-cultural factors associated with underweight and stunting were found to be fathers' education, mothers' education, poverty status, and overcrowding [46].

Rayagada: Rayagada displays an overall high prevalence of all forms of malnutrition. However, height measurements are definitely problematic with the highest levels of implausible anthropometry related to heights. Recording of weights was the highest and this corresponds well with the NFHS 5 data suggesting that all ICDS services in Odisha are more efficient as

compared to other states, as discussed above. However, SNP services for children in our sample were the lowest. This again demonstrates how state averages may be much different from the data in specific pockets of deprivation since Rayagada is a predominantly tribal area with difficulties of access, supplies etc. Similarly, immunization levels are the lowest amongst the study sites.

Rayagada showed the highest levels of sibling care and the lowest and extremely high levels of education among men and women both. Land ownership was also amongst the lowest with resultant low consumption levels from own land. Food insecurity was high but in the mild and moderate categories. Animal-based proteins were consumed (delivered through the ICDS scheme in Odisha) but dietary diversity remained low especially for women. Hygiene practices were the lowest among the study sites. Rayagada has the highest levels of open defecation (87%) as well.

On the whole, Rayagada seems to suffer from very high levels of the disadvantage of multiple determinants such as poverty, landlessness, food insecurity, low dietary diversity, poorer ICDS and health services, poorer sanitation and hygiene conditions, very low levels of education and frequent migration. Despite this, the levels of food insecurity and malnutrition are higher in the slum of Northwest Delhi.
State policies related to the distribution of eggs in ICDS may be playing a major protective role, as well as the general environment of an open rural area with lower pollution levels.

7. Recommendations Arising

Malnutrition is the net result of multifactorial processes, which is well known [5]. A comprehensive set of nutrition-sensitive and nutrition-specific interventions have also been well-established theoretically [47]. However, this study clearly demonstrates that different permutations and combinations of factors come into play in different areas and within different households, thus demanding a more tailored approach to interventions that can only be arrived at if there is a routine decentralized process of examining malnutrition at the village level.

The study also clearly illustrates the importance of the additional systemic factor of data capture in evaluating malnutrition using AW data. Clearly, much more must be done to enable better data capture through better capacity building and monitoring. Third-party quality checks can be a critical advantage in enabling this. The specific recommendations arising from this study are thus as follows:

I. The Anganwadi scheme implementation suffers from many limitations related to anthropometry; insufficient coverage, lack of capacity - especially for height measurements and underreporting. In some geographies, due to poor internet connectivity the AWWs are not able to enter data in the POSHAN Tracker application. There are also continuing issues with respect to the delivery of SNP services, as highlighted above. The key recommendations arising from the findings of the study on this point are as follows:

    1. True universalisation of the ICDS with all its comprehensive functions, including anthropometry.
    2. Review of the requirement, process and HR to do monthly heights since this is found to be the most problematic measurement at the field level
    3. Capacity building for anthropometry with regular maintenance and calibration of equipment
    4. Building capacity on the effective use of POSHAN tracker application and providing necessary logistical support and ensuring connectivity
    5. Clear communication to AWWs from the WCD department that there will be no negative consequence to them for reporting malnutrition data correctly and a directive to steer clear of considering any targets in the reporting of anthropometric data.
    6. The inattention to birth weight data stands out as dire in the findings of this study and must be rectified. A clear directive to AWW and ASHA to fill birth weight data in the MCH cards that are made available to each woman during pregnancy.

II. The need for village/ AWC level micro-assessments of malnutrition leading to micro-plans at the community and household level has been well established by this study and other recent research discussed in the section above. These processes need to be set into the strategy for identifying geospatial and socio-economic-cultural pockets of vulnerability and tailoring interventions to achieve better outcomes for malnutrition.

III. Recommendations for specific determinants: the study suggests that the main determinants holding out against accelerated progress on malnutrition relate to high levels of socioeconomic inequity and general lack of development. However, some stand-out factors needing interventions and recommendations for the same are listed below:
    1. Urgent interventions to intervene in women's literacy and schooling in the areas displaying severe inequity in access to education. This needs to happen at the level of the next generation of children and adolescents. These objectives cannot be achieved without improving village-level educational facilities with economic support for higher education.
    2. Childcare support for women can release siblings (specially girl children) for schooling and also take care of early childhood nutrition and health care needs in the context of high involvement of women in unpaid care work. There has been a long-standing demand for the extension of ICDS services to include Creches; the AWC-cum-Creche [48], and the outcomes of creches for nutritional improvement are also well known [49] [50].
    3. Urgent need to develop strategies for achieving child dietary diversity, with special reference to animal-based proteins: dairy-based foods, and eggs and flesh foods for non-vegetarian communities. This is consonant with long-standing demands to introduce eggs through the ICDS as done in Odisha and some other states.
    4. However, access to fruits and vegetables is also needed with stronger interventions to enable better coverage of kitchen gardens at household and community levels.
    5. Attention is needed to land ownership and land use to incorporate nutrition requirements in agriculture. Nutrition-sensitive agriculture is now a known domain for policy intervention. However, integrated agricultural practices involving livestock rearing and multiple cropping systems functioning synergistically have not received support for scale-up. These have the potential to improve dietary diversity and food security as suggested by this study.
    6. Urban slums need a comprehensive plan for better living conditions, with special reference to overcrowding, water drainage and sanitation.
    7. The practice of open defecation is varied, with a 1-87% range in our study. This needs urgent attention in the areas concerned. The issue is not merely one of toilet construction but water availability and participatory processes to enable behaviour change.

It is hoped that this study will establish a better process of monitoring key services, specially related to anthropometry, as well as a deeper understanding of how important it is to establish AWC-level processes to identify area-specific determinants and to enable site-specific interventions to be made. All these point to the urgent need to decentralize and devolve our programmes and schemes for malnutrition and create flexibility for action with community participation.

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Annexures

Annexure 1: Area mapping checklist

GENERAL INSTRUCTIONS

- *The responses should be based on the process of observation, informal discussion and probing*
- *Based on your informal discussions with community members, pick cues and add detailed notes for the responses and observations*

1. What is the approximate area of the village?
2. How many average numbers of households are found in the village?
3. How are the household /clusters/ tola/ sectors organised in the village? (segregated based on caste, religion, class etc)
4. What are the social groups and institutions found in the village? What are the different castes based discrimination existing in this village? (for instance: are the panchayat members/teachers/AWW/ASHA etc from a different caste treated differently)
5. What is the literacy status in the village?
6. How far is the primary health facility from the most remote household of the village?
7. How far is the school from the most remote household of the village?
8. What religious institutions are there in the village?
9. List any NGOs/ institutions that provide social services in the village? What services/support do they provide?
10. What is the common source of drinking water in your village? Do the village/any transect/tola/cluster of village face water scarcity?
11. How are the toilet facilities in the village? What is the mechanism of sewage disposal in the village?
12. How are the communication and transport facilities in the village? (availability of phone and internet, radio, newspaper, condition of roads, distance of bus stand, railway station etc)
13. What are the commonly domesticated live stocks in the village?
14. Do the household in the village have space for kitchen gardens? Does any household have a kitchen garden?
15. What are the common stable crops used in the households? What are the common sources of fuel used for cooking?
16. What are the common livelihood practices in the village? What are the common livelihood practices of women? Does livelihood varies with seasonality?
17. What proportions of villagers migrate to other areas in search of livelihood?
18. What are the major crops grown in the area? What is the status of pulse cultivation and its consumption? What are the major vegetables in use of the community for cultivation and consumption?
19. How far is the ration/kirana store from the most remote household of the village? How is the availability of food items through the public distribution system?

20. What is the status of food security? Are there times of the year when families have insufficient food in the household and resources to purchase food? What are some of the coping measures used to get through the lean season?
21. How is the implementation different scheme and programmes associated with health and nutrition in your village (ICDS, NRHM, PDS, MNREGA)? Do adolescents avail of services such as WIFS, RKS, etc. in the village? Do the children in the village get THR, MDM etc?

Annexure 2: Child datasheet

DETAILS OF CHILDREN COLLECTED FROM THE ANGANWADI CENTRES
Date of visit:
Name of Anganwadi/village:
Number of children enrolled:
Number of children whose weight data available for last month:
Number of children whose height data available for last month:

S.no.	Name	Sex	Name of Mother	Name of the father	DOB	Birth weight	Date of anthro	Height (in cm)	Weight (in kg)	Remarks

Annexure 3: Household Survey Tool

Instructions to interviewer/data collector:

- The respondent for this tool should be the primary caregiver of the child.
- Wherever prompted, please ensure you collect additional information and put the details in the notes area.
- The child-related questions in this questionnaire pertain to the youngest child between the ages of 0-5 years. This child is called the INDEX CHILD.
- The numbers you see in front of the options are for coding after data collection. Please select the appropriate code based on the response and write it in the last column. This instruction is to be followed throughout the questionnaire except where other instructions are provided (e.g. question number 32)
- Some questions can be observed, while most will be reported by the respondent. The O/R symbol will indicate the suggested method.

A. GENERAL INFORMATION					
1.	State (O)	District (O)	Block (O)	Village (O)	Contact no. (R)

B. INFORMATION ABOUT THE CAREGIVER/MOTHER			
2.	Name of the respondent? (R)		
3.	Age of the respondent? (R)		
4.	Who is the primary care giver for the child? (R)	Mother……1	
		Father……2	
		Siblings……3	
		Grandparents……4	
		Others; specify_____ _____	
5.	Do you receive support from other members of the family in taking care of the child? (R)	Always……1	
		Sometimes……2	
		Never……3	
		No response/ prefer not to say…99	
6.	Who is the caregiver of the child in absence of mother? (R)		
7.	Mother's information (R)		
	What is your marital status?	Married……1	
		Widowed….2	
		Divorced……3	
		Separated…..4	
		Deserted….5	

		Others (please specify)_____ _____	
		No response/prefer not to say….99	
	What was your age at marriage?		
	What was your age at first childbirth?		
	How many pregnancies did you have till now?		
	How many deliveries did you have till now?		
	How many children do you have?	Male	
		Female	
	Note to interviewer: If the total number of children, total pregnancies and/or deliveries differs, ask about miscarriages/abortions/early childhood deaths.		
	What was the spacing between your last two pregnancies? In years		
	What were the dietary changes during your last pregnancy? (multiple responses allowed) [PROMPTED]	No change ...0	
		Increase in number of meals….1	
		Increased consumption of vegetables and fruits……2	
		Increased consumption of cereals……3	
		Increased consumption of proteins (egg/meat/milk etc)……4	
		Others; specify_____ _____	
	What type of delivery did you have during your last pregnancy?	Normal…1	
		Caesarean…2	
		Don't know…98	
		No response/ prefer not to say…99	
	What was the place of delivery during your last pregnancy?	At home…1	
		Govt. health facilities…2	
		Private health facilities…3	
		Any other place; specify_____ _____	
		None ...0	

	Do you have any chronic illness? [PROMPTED]	Diabetes…1	
		Hypertension…2	
		Anaemia…3	
		Tuberculosis…4	
		Others; specify_____ _____	
		Don't know…..98	
		No response…..99	

C. HOUSEHOLD INFORMATION			
8.	Which religion is followed in your household? (R)	Hindu…….1	
		Muslim…..2	
		Christian…3	
		Sikh…4	
		Buddhist…5	
		Jain…6	
		Others…7	
		No religion…8	
		No response…99	
9.	Which caste do you belong to? (R)	Unreserved…….1	
		SC……2	
		ST, non PVTG……3	
		ST, PVTG……4	
		OBC……5	
		No Response……99	
		If PVTG, please specify name of tribe _____ _____	
10.	How many individuals are parts of your household? [note: one household = one kitchen] (R)	Adults	
		Children	
11.	Is the house you live in owned or rented? (R)	Owned……1	
		Rented……2	
		Others……3	
		Don't know……98	
		No response/prefer not to say……99	
		If rented, amount: Rs. _____ per month	
12.	What is your educational level? (R)	No formal education (0)……0	
		Primary (1-8)……1	
		Secondary (9-10)……2	
		Higher secondary (11-12)……3	

		Graduate and above (13+)……4	
		No response/prefer not to say……99	
13.	What type of work are you currently engaged in? (R)	Salaried non-government employee (domestic worker, form of continuous employment other than those below)……1	
		Salaried government employee……2	
		Self-employed agriculture work (livestock rearing, fishing, farming, forest work)……3	
		Daily wage non-agriculture work (construction work, factory work, mason, driver)……4	
		Self-employed non-agriculture work (transport business, shopkeeper, etc) ……5	
		Daily wage agriculture work (fishing, farming, forest work, livestock rearing)……6	
		Unemployed……7	
		Unpaid family work (housewife/engaged in household chores all day)……8	
		Others/non-salaried government (please specify – government workers such as AWW, ASHA worker, others)…..98	
		Don't know……98	
		No response……99	
	How many hours a day do you spend in doing the above work?		
14	What is the educational level of the father? (R)	No formal education (0)……0	
		Primary (1-8)……1	
		Secondary (9-10)……2	
		Higher secondary (11-12)……3	
		Graduate and above (13+)……4	
		No response……99	
15.	What type of work is the father currently engaged in? (R)	Salaried non-government employee (domestic worker, form of continuous employment other than those below)……1	
		Salaried government employee……2	

		Self-employed agriculture work (livestock rearing, fishing, farming, forest work)……3	
		Daily wage non-agriculture work (construction work, factory work, mason, driver)……4	
		Self-employed non-agriculture work (transport business, shopkeeper, etc) ……5	
		Daily wage agriculture work (fishing, farming, forest work, livestock rearing)……6	
		Unemployed……7	
		Unpaid family work (housewife/engaged in household chores all day)……8	
		Others/non-salaried government (please specify – government workers such as AWW, ASHA worker, others)…..9	
		Don't know……98	
		No response……99	
16.	Does your household currently own any land? (R)	Yes…..1	
		No….2	
	If yes, what is the utility of the land? (R)	Agricultural food crops……1	
		Agricultural cash crops……2	
		Non-agricultural……3	
		Don't know……98	
		No response……99	
	If agricultural food crop, do you consume your own agricultural produce? (R)	Yes…..1	
		No….2	
17.	Average monthly total income of the household from all sources combined (in INR) (R) [If daily wage then ask for number of days worked before calculating]		
18.	Does this income remain same throughout the year?	Yes….1	
		No….2	
		Don't know……98	
		No response……99	
19.	If no, then how does it change?	It increases during some time of the year….1	

		It decreases during some time of the year…2	
		Don't know……98	
		No response……99	
20.	Does your household have the following assets? (O/R)	**Assets**	Yes….1 No…..2
		Electricity	
		Smartphone/mobile phone	
		Internet	
		(Motor) Two-wheeler/four-wheeler	
		Radio/transistor	
		Television	
	Do you use a mobile phone? (R)		
	Do you have access to internet? (R)		

D. DRINKING WATER AND SANITATION			
21.	What is the primary source of drinking water for your household? (O/R)	Tap water……1	
		Tube well……2	
		Bore well……3	
		Hand pump…4	
		Surface water…5	
		Tanker...6	
		Others; specify	
22.	Time taken to obtain drinking water? (in minutes) (R)		
23.	Do you follow any specific water purification process for drinking water? (R)	Yes…..1	
		No….2	
	If yes, what process do you follow? (R)		
24.	What is the mechanism for solid waste disposal in your household? (O/R)	Own latrines/toilets……1	
		Open defecation……2	
		Community latrines/toilets……3	
		Others, specify_____	
		Don't know……98	
		No response……99	
25.	Does your child (in the age group of 3 to 5 years) practice handwashing with soap after using the toilet or before meals? (R)	Always……1	
		Sometimes……2	
		Never……3	
		Don't know……98	
		No response/ prefer not to say……99	
26.	Do you and other household members practice handwashing with	Always……1	
		Sometimes……2	

	soap after using the toilet or before meals? (R)	Never……3	
		Don't know……98	
		No response/ prefer not to say……99	
27.	Do you practice handwashing before cooking or feeding the child? (INDEX CHILD) (R)	Always……1	
		Sometimes……2	
		Never……3	
		Don't know……98	
		No response/ prefer not to say……99	

E. FOOD HABITS, DIETARY INFORMATION, AND FOOD SECURITY AT THE HOUSEHOLD LEVEL				
			Mother	Child (6months to 5 years)
28.	Do you/your child consume non-vegetarian food items? (R)	Yes…..1		
		No…..2		
		Vegetarian, but consume egg…..3		
		Don't know …..98		
		No response/prefer not to say……99		
29.	If you/your child are a non-vegetarian, which one do you and your child prefer the most? (R)	Chicken……1		
		Mutton……2		
		Beef……3		
		Pork……4		
		Fish……5		
		Egg……6		
		Others (please specify)……7_____ _____ _____ ____		
		Don't know……98		
		No response/prefer not to say……99		
30.	On average, how many meals do you/your child consume in a day? (R)	One ……1		
		Two ……2		
		Three ……3		
		Four ……4		
		Five ……5		
		Six or more ……6		
		Don't know ……98		
		No response/prefer not to say……99		

31.	Do you/your child skip meals? (R)	Always……1		
		Sometimes……2		
		Never……3		
		Don't know……98		
		No response/ prefer not to say……99		
32.	What are the reasons of mother for skipping meals? (R)			
33.	What are the reasons of child for skipping meals? (R)			
34.	Household dietary diversity: Now I would like to ask you about the types of foods that you or anyone else in your household ate yesterday during the day and at night. (R) *Note to interviewer: Read the list of foods. Place **a one** in the box if you/anyone in the household ate the food in question, place **a zero** in the box if no one in the household ate the food.*			
	Any rice, wheat, biscuits, or any other foods made from millet, sorghum, maize, rice, wheat, or any other locally available grain?			
	Any potatoes, carrot, beetroot, sweet potato or any other foods made from roots or tubers?			
	Any vegetables like bottle/bitter gourd, pumpkin, raw papaya, lady finger, or any other locally grown vegetables?			
	Any fruits like papaya, apple, pineapple, or any other locally grown fruits?			
	Any beef, pork, lamb, goat, chicken, duck, or other birds, liver, kidney, heart, or other organ meats?			
	Any eggs?			
	Any fresh or dried fish, etc?			
	Any foods made from pulses, lentils, or any other locally consumed pulses?			
	Any foods made with oil, fat, or butter?			
35.	In the past 30 days did you **worry that your household would not have enough food?** If yes, how often did this happen? (R)			
	Rarely (1-2 times)…….1			
	Sometimes (3-10 times)…….2			
	Often (> 10 times)……3			
	No……4			
	No response/ don't know……99			
36.	In the past 30 days, you or any household member were not able to eat the kinds of foods you **preferred because of a lack of resources**? If yes, how often did this happen? (R)			
	Rarely (1-2 times)…….1			
	Sometimes (3-10 times)…….2			
	Often (> 10 times)……3			
	No……4			

	No response/ don't know……99	
37.	In the past 30 days, did you or any household member have to eat a **limited variety** of foods **due to a lack of resources**? If yes, how often did this happen?	
	Rarely (1-2 times)…….1	
	Sometimes (3-10 times)…….2	
	Often (> 10 times)……3	
	No……4	
	No response/ don't know……99	
38.	In the past 30 days, did you or any household member have to eat some **foods that you really did not want to eat** because of a lack of resources to obtain other types of foods? If yes, how often did this happen?	
	Rarely (1-2 times)…….1	
	Sometimes (3-10 times)…….2	
	Often (> 10 times)……3	
	No……4	
	No response/ don't know……99	
39.	In the past 30 days, did you or any household member have to eat a **smaller meal** than you felt you needed because there was not enough food? If yes, how often did this happen?	
	Rarely (1-2 times)…….1	
	Sometimes (3-10 times)…….2	
	Often (> 10 times)……3	
	No……4	
	No response/ don't know……99	
40.	In the past 30 days, did you or any household member have to **eat fewer meals** in a day because there was not enough food? If yes, how often did this happen?	
	Rarely (1-2 times)…….1	
	Sometimes (3-10 times)…….2	
	Often (> 10 times)……3	
	No……4	
	No response/ don't know……99	
41.	In the past 30 days, was there ever **no food** to eat of any kind in your household because of lack of resources to get food? If yes, how often did this happen?	
	Rarely (1-2 times)…….1	
	Sometimes (3-10 times)…….2	
	Often (> 10 times)……3	
	No……4	
	No response/ don't know……99	
F. CHILD CARE AND FEEDING PRACTICES		
I will now ask you questions related to the child care and feeding practices that you follow/followed for your youngest child when s/he is/was in the age group of 0 – 6 months.		
42.	After delivery, was anything else, such as 'janam ghutti' or prelacteal	Yes…..1 No…..2

	feed, given to the child apart from breast milk?	Don't know …..98	
		No response/prefer not to say……99	
43.	How long after birth did you first put your child to the breast?	Within 1 hour……1	
		> 1 hour but less than 24 hours……2	
		> 24 hours……3	
		Don't know……98	
		No response/prefer not to say……99	
44.	Did you give your first milk (colostrum) to the child?	Yes…..1	
		No…..2	
		Don't know …..98	
		No response/prefer not to say……99	
	If yes, please specify [Note: ask specifically about water]		
45.	For the first six months, which of the following did you feed to your child? [put a tick mark against the response-multiple response]	Breastmilk	
		Any other milk	
		Plain water	
		Sugar/glucose water	
		Gripe water	
		Sugar saltwater solution	
		Fruit juice	
		Infant formula	
		Tea	
		Honey	
		Janam Ghutti	
		Others, specify;_____	
46.	How long did you continue breastfeeding?	Didn't breastfeed at all……1	
		Up to 6 months……2	
		6-9 months……3	
		9-12 months……4	
		> 12 months……5	
		No response/prefer not to say……99	
47.	Are you still breastfeeding (index child)?	Yes…..1	
		No…..2	
		No response/prefer not to say……99	
48.	Do you breastfeed your child during illness?	Yes…..1	
		No…..2	
		No response/prefer not to say……99	
I will now ask you questions related to the child care and feeding practices that you follow/followed when your child is/was in the age group of 6 months to 2 years.			
49.	At what age did you introduce any other semi solid food apart from breastmilk into your child's regular diet?		

50.	In what frequency were the following food items given at the time of introducing complementary foods (first one or two months)? [Note: Use the options below to assess the response] Multiple times daily- 1 Once daily- 2 A few times a week- 3 A few times a month- 4 Rarely- 5 Never- 6 No response/prefer not to say- 99	Items	Frequency
		Animal milk	
		Rice/Khichdi	
		Any other grains/millets	
		Dal	
		Eggs	
		Flesh foods other than eggs	
		Pureed vegetables	
		Any other solid or semi solid food (please specify) _____ _____ _____ _____	

Now, I will ask you about certain foods and the age they were introduced into the child's diet.				
		Yes……1 No……2 Don't know……98 No response/prefer not to say……99	At what age was it introduced?	In what frequency during the last week
51	Did/does your child consume any rice, wheat or any other cereal/grain/millets or any other foods made from grains?			
52	Did/does your child consume any pumpkin, carrots, sweet potatoes, mango, papaya or any other food item that are yellow or orange inside?			
53	Did/does your child consume any dark green, leafy vegetables?			
54	Did/does your child consume any other fruits or vegetables?			
55	Did/does your child consume any liver, kidney, heart or other organ meat?			

56	Did/does your child consume any other meat?			
57	Did/does your child consume any eggs?			
58	Did/does your child consume any fresh or dried fish or any other sea food?			
59	Did/does your child consume any dal, lentils, etc.			
60	Did/does your child consume any sugar, sweet, etc.			
61	Did/does your child consume any milk or milk product (curd/paneer/lassi)			
62	Did/does your child consume any other solid, semi solid or soft food (specify the local food, apart from the above list)			
63	Did/does your child consume any namkeen/chips/biscuits/cookies/fried foods?			

64.	Who generally feeds the child at home?	Mother……1	
		Father……2	
		Grandparents……3	
		Siblings……4	
		Any other (please specify)……98	
65.	Who **feeds** your child in your absence or when you are sick?	Father……1	
		Grandparents……2	
		Siblings……3	
		Any other (please specify)……98	
66.	Do you serve your child in a separate plate/katori?	Yes……1	
		No……2	
67.	Generally, whatever food you serve, does your child eat the complete portion served at home?	Yes……1	
		Always leaves some……2	
		Demands for more food……3	
		Sometimes…..4	
		Don't know……98	
		No response/prefer not to say……99	
68.	Do you continue feeding the child during when the child is ill?	Yes……1	
		No ……2	
		Don't know……98	

		No response/prefer not to say……99	
69.	Child dietary diversity: Now I would like to ask you about the types of foods that your child (INDEX CHILD) ate yesterday during the day and at night. *Note to interviewer: Read the list of foods. Place **a one** in the box if the child ate the food in question, place **a zero** in the box if they did not eat the food.*		
	Any rice, wheat, any other foods made from millet, sorghum, maize, rice, wheat, or any other locally available grain?		
	Any foods made from pulses, lentils, or any other locally consumed pulses?		
	Any dairy products (milk and milk products)?		
	Any flesh foods (meat, fish, poultry and liver/organ meats)?		
	Any eggs?		
	Any vitamin A rich fruits and vegetables (yellow/green/orange in colour) – *eg: mango, pineapple, fresh dates, papaya, tomato, pumpkin, peas, beans, spinach or any other green leafy vegetables,*		
	Any other fruits and vegetables?		
Please score the overall knowledge of the respondent on a scale of 1 to 5, with 1 being poor and 5 being excellent.			
70.	From where did you learn or receive information regarding the IYCF practices?	POSHAN Maah…….1	
		Breastfeeding week…….2	
		VHSND…….3	
		Mahila Mandal meetings……..4	
		Home visits and counselling…….5	
		Others; specify _____	
		Don't know……98	
		No response/prefer not to say……99	

G. HEALTH AND NUTRITION SERVICES			
71.	Did you get your last pregnancy registered?	Yes……1	
		No ……2	
		Don't know……98	
		No response/prefer not to say……99	
	If yes, how many ante-natal checkups did you have during your last pregnancy?		
	Where did you receive these services during pregnancy/lactation/post-	Supplementary nutrition	
		Weight measurement	

	natal period? [Note: Use the following options to assess the responses] AWC/VHND……1 Other govt facility – PHC/CHC/DH……2 Private facility/practitioner….3 Did not receive …0 Don't know……98 No response/prefer not to say……99	BP check-up	
		Urine test	
		Blood tests	
		Immunization – TT	
		Abdominal examination	
		Supplementary iron (IFA)	
		Referral services	
		Nutrition education	
		Others (please specify) _____ _____	
72.	Where did your child receive these services? [Note: Use the following options to assess the response] AWC/VHND……1 Other govt. facility – PHC/CHC/DH……2 Private facility/practitioner….3 Did not receive …0 Don't know……98 No response/prefer not to say……99	Supplementary nutrition	
		Immunization	
		Supplementary iron (IFA)	
		Growth monitoring	
		Health check up	
		Referral services (if the child is sick or needs care)	
		Others (please specify) _____ _____ _____ _____	
73.	How often is the child's weight recorded by Anganwadi? (R)	Every month……1	
		Once in 2 months……2	
		My child was never weighed……3	
		Any other……4	
		Don't know……98	
		No response/prefer not to say……99	
74.	Is the child vaccinated? (R)	Yes……1	
		No ……2	
		Don't know……3	
		No response/prefer not to say……99	
75.	If yes, from where does he/she receive vaccinations? (R)	Government facility/AWC……1	
		Private facility……2	
		Don't know……98	
		No response/prefer not to say……99	
I would like to know a bit more about the child's immunization status. Please show me the MCP card of the child.			

[Note: Using the MCP card, please note if the child has received all vaccinations as suitable and required for their age.]			
76.	Vaccination status of the child (O)	Received all vaccines as per age……1	
		Received some vaccines but not all……2	
		Not received any vaccines……3	
		MCP card/information not available……4	
77.	On average, how often did your child fall ill in the last 6 months?	Rarely……1	
		Approximately once in a month……2	
		More than twice in a month……3	
		Very frequently……4	
		No response/ Do not prefer to say……99	
78.	What is the most common/frequent illness your child suffered from in the last 6 months? (Probe: Diarrhea, Pneumonia, Fever, Cold/cough)		
79.	Where do you take your child for treatment and care during illness?	Govt. health facilities/practitioners……1	
		ASHA/ANM/AWW……2	
		Private health facilities/practitioners……3	
		Practitioners of indigenous forms of medicine (unqualified)……4	
		No response/prefer not to say……99	

Annexure 4 : AWC Observation Checklist

Name of the observer:
Date of Visiting:
Time of visiting:

General information

State_____/District/_____/Block-
City_____/Village_____/Population covered by the AWC/_____/Male_____/Female_____
Anganwadi Centre name: _____
Anganwadi Centre no. (If any): _____
Year of start of the AWC: _____

S.no	List				Response	Remark
.	**Preliminary Observation**				**(Yes= 1, No= 0)**	
	Was the Anganwadi centre open when you arrived?					
	Was the Anganwadi worker present when you arrived?					
	Was the Anganwadi helper present when you arrived?					
	Was the AWW expecting your visit?					
	Were the AWC premises clean and hygienic?					
	Was sign board display available?					
	Availability of records and registers?	Attendance register				
		Family register				
		Supplementary food stock and distribution register				
		Preschool education register				
		Pregnancy and delivery register				
		Immunisation and VHND register				
		Home visit planner				
		Others, specify				
	Records and registered were maintained and updated regularly?	Attendance register				
		Family register				
		Supplementary food stock and distribution register				
		Preschool education register				
		Pregnancy and delivery register				
		Immunisation and VHND register				
		Home visit planner				
		Others, specify				
.	**Coverage and Attendance**	Children 6m-3 yrs	Children 3-6 yrs	Pregnant women	Lactating women	Adolescent girls

	(refer records)	Female	Male	Female	Male			
	Enrolled in the AWC							
	No. of beneficiaries who visited the AWC on the day							
	No. of children who attended AWC in last one week							
	Status of AWC: Location, infrastructure and equipment							
.	Is the AWC easily accessible?							
	What is the distance of the AWC from the remotest habitation?							
	Is the Is the AWW a resident of the same village?							
	What is the average time spent by the AWW in commuting to the AWC daily?							
.	**Where is the AWC housed?**	Own building/ premises						
		Rented building/ premises						
		Anganwadi Worker's Home						
		Anganwadi Helper's Home						
		Panchayat Bhavan						
		Other (specify)						
.	Condition of the AWC	**Yes= 1** **No= 0**						**Remarks**
	The centre requires repair?							
	Is waterproof?							
	Is adequately ventilated?							
	Has a boundary wall?							
	Has adequate light?							
	Has electricity?							
	Clean and safe drinking water within the premises							
	Adequate space for outdoor activities							
	If immunization/VHND conducted at AWC, adequate space for the same							
	Electric fan in working condition							
	Working telephone							

	Child friendly toilet facility			
	Indoor activity space for preschool			
	Separate kitchen			
	Storage facilities for food			
	Storage facilities for equipment			
.	**Status of inventory/materials at the AWC**			
	Item	**Is it available? (1)=Yes (0)=No**	**What is the condition? (1)=Good, (2) =Fair, (3) =Poor, (4) Not Observable**	**Remarks**
	Medicine kit/ first aid box			
	Weighing scale for children			
	Stadiometer			
	Infantometer			
	Adult weighing scale			
	Vessels for cooking			
	Indoor play equipment			
	Vessel for storing drinking water			
	Utensils for serving hot cooked meals			
	Mats for children			
	Growth charts			
	Posters/IEC material			
	Preschool education kits			
	Take Home Ration stocks (closing stock as on the date of the visit)			
.	**Availability of drugs and medicines**			
	List of drugs and medicines	Currently available in the kit (Yes=1 and No=0)	Use	Supply	Remarks
	Tab. Iron Folic Acid				
	ORS Packets				
	Tab. Paracetamol				
	Syrup paracetamol				
	Anti-septic ointment/lotion				
	Thermometer				
	Tab. Chloroquine				

	Sulphacetamide eye drops				
	Tab. Albendazole				
	Antifungal ointment (Gentian violet)				
	Others, specify				

.	**Anganwadi services**		
	Services for the children	Supplementary nutrition	
		Immunisation	
		Early Childhood Care and Education / Preschool education	
		Health check-ups	
		Nutrition & health education.	
		Referral services	
		Others, specify	
	Services for pregnant women and lactating mothers	Supplementary nutrition	
		Health check-ups	
		Care, health, nutrition and hygiene education	
		Immunization and Micronutrient Supplementation	
		Referral services	
		Others, specify	

.	**Nutritional status of children (refer registers)**			
	When the children were last weighed?			
	What is the frequency of weight monitoring?			
	When were the last time children height measured?			
	What is the frequency of height monitoring?			
	Number of malnourished children identified by the AWW	(0-3 yrs)	(3-6 yrs)	
	Number of children referred to NRC			
	Home visits in the last month	Planned	Completed	Missed

0.	Investigator's remarks
	What were the AWW, AWH and children doing when you arrived? Please describe in detail.
	Observations related to quantity and quality of the food given to the children
	Any other remark: (overall management of the AWC and services, behaviour of the AWW and helper when dealing with children, handwashing, et

Annexure 5: VHSND Checklist

Name of the observer:

Date of Visiting:

Time of visiting:

General information

State_____/District/_____/Block-City_____/Village_____/Population covered/_____/Male_____/Female_____

Anganwadi Centre name: _____

S.no.	Services	Response (Yes= 1/No= 0)	No. of beneficiary	Remarks
1.	**Services for children**			
	Immunization			
	Growth monitoring			
	Identification of MAM and SAM			
	Identification of sick SAM children			
	Identification of danger signs in newborn			
	Referral services			
	Dietary counselling			
	Provision of Zinc, Vitamin A, IFA syrup and ORS			
	Supplementary nutrition for underweight children			
	Dietary counselling			
2.	**Women/adolescent girls/ pregnant and lactating mothers**			
	Distribution of contraceptive to beneficiaries			

	Distribution of sanitary napkins to beneficiaries			
	Pregnancy test kits			
	Registration of pregnancy			
	Identification of high risk pregnancy			
	Blood pressure measurement			
	Identification of anaemia			
	Weight of pregnant and lactating mother			
	Immunisation			
	Abdominal examination			
	Haemoglobin test			
	IFA supplementation and counselling			
	Deworming			
	Distribution of calcium tablets			
	TT injections			
	Malaria test			
	Urine test			
	VDRL test			
	Blood sugar test			
	Check for Odema			
	Referral to health facility			
3.	**Counselling**			
	ANC			
	PNC			

	Family planning			
	Nutrition and diet			
	Essential newborn care			
	Feeding of sick child			
	Micronutrient supplementation			
	Hygiene and sanitation			
4.	Describe the display of IEC material?			
5.	How was the availability of logistics?			
6.	Was the space adequate for the VHSND? Provide details			
7.	Was there any facility of drinking water and toilets?			
8.	Was there any provision of curtains for privacy?			
9.	Did AWW/ASHA/ANM/PRI participate? Describe activities undertaken by each of them during VHSND?			
10.	Were the beneficiaries linked to appropriate schemes and programmes? (RBSK, JSSY, PMMVY etc)			
11.	Any other remark? Specify			

Annexure 6: FGD Guide

Introduction

Namaste everyone. My name is _____. I am working with an organisation named PUBLIC HEALTH RESOURCE NETWORK. We are conducting a study on prevalence and causes of malnutrition among under-five children in selected geographies in India. We are here to discuss the status of health and nutrition in your villages The collected information on nutrition and health of the children will help the researchers to determine the extent of this issue and understand the underlying causes.

Any information you provide to us will be kept confidential and your name /identity will not be disclosed during or after completion of the study. The information will be used only for the purposes of the study. You may choose not to answer any question and can also withdraw from the discussion any time if you wish to do so. You can also stop us and ask any questions you may have during the discussion or after it.

The discussion will last from two to three hours.

Name of the field investigators:
Signature:
Date:

Thank you for agreeing to participate.

1. **Introductory questions**
   - What are the common livelihood options in your community?
   - Are those options equally available to men and women?
     (Probe: economic activities women engage in, decision making authority of women in the household)
   - What are the health and nutrition services available in your village? (Probe: ICDS, VHND, immunisation session, role of FLWs, etc)
   - Are you aware of various services provided to the children at the AWC?
   - Do children in this community go to the Anganwadi centres?

2. **Status of health and nutrition among women and children**
   - What are the common health problems among children in your community? How do you protect your children from being affected with such health problems? (Probe- SNP, attend health camps, RBSK, NRC, sanitation and hygiene, immunisation)
   - What do you all understand by malnutrition? What are the major factors leading to poor nutritional status and health of children under 5 years of age?
   - What are the signs and symptoms of malnutrition among under-5 children? What actions are taken when a child is identified as malnourished?
   - Does your child undergo growth monitoring? Who undertakes growth monitoring? Where and at what intervals?
   - Does the AWW share the child related growth status with caregivers?
   - What support is provided by the ASHA and the AWW in managing child malnutrition? (Probe: home based care, extra ration, counselling, referral to NRCs etc)
   - Understanding of IYCF and feeding practices:
     - Tell us about exclusive breastfeeding. Is this practiced in your community? What are the challenges in doing it?
     - In your opinion what is an appropriate age for introducing solid/semi solid food for your child? What food do you give to children in this age?
     - What are the most common foods given to children under 2 years of age? Do children consume the THR provided by the AWC? If no, why?
     - In your opinion, what are the reasons for lack of food intake in your children? How do you ensure that the dietary requirements of your child is met?
     - Is there any food item not given to children in your community? Why?
     - Do any socio-cultural norms in your community influence the feeding practices among children?
   - Information regarding IYCF:
     - who provides information about IYCF? (Probe: FLWs, friends/ relatives, counsellor at the CHC/PHC, FLWs during home visits/ VHSND)
     - What specific messages on IYCF are provided by FLWs? (Probe: EIBF, EBF, CF etc)
   - Describe the various challenges in providing adequate/nutritious food to children?
   - Maternal Health and nutrition
     - Do you think maternal health and nutrition influences child's health?
     - What support is provided to women by their families during pregnancy and lactation? (Special diets, rest etc)

- What are the care practices for pregnant and lactating women in this community?
- Are there any diet modifications/restrictions for women during pregnancy and lactation? (probe: additional meals, milk, restrictions to non-vegetarian foods etc)
- What services do pregnant and lactating women receive from the AWC? When do pregnant women get registered at the AWC?
- Do you avail ANC services? If yes,
  - from where? what are the various services covered under ANC
  - Are all services available in your villages, if not where do you go for ensuring full ANC coverage?

- What support is provided by the government during pregnancy and lactation? (Probes- nutritional, financial, frequent check-ups, AWW visits, Iron tablets, vaccination and counselling etc)

3. Food security

- What is the status of food security in your village? Are there times when families skip meals and/or decrease the quantity of food in meals?
- Which food items are most affected during food shortage? What is the course of action in such scenarios?
- What are the various sources of food entitlements in your village? Is the quantity of ration provided adequate for the consumption? How is the quality of food received? What are the reasons for not availing these entitlements? (probe- PDS, AAY, AWC etc)

4. Hygiene and sanitation

- Describe the physical environment, hygiene and sanitation in your community. What are the measures taken improve the hygiene and sanitation conditions in this community?
- What hygiene practices are followed in your community? Does the ASHAs and AWW provide counselling on care and hygiene practices? (hand washing, use of toilets, safe drinking water etc)

5. Understanding the community processes

- Has the Mahila Aarogya Samiti (MAS) formed in this village? If yes,
  - are you aware who are members?
  - how often MAS meets and what are the major themes of discussion?
  - what specific actions have been taken my MAS for improving the health and nutrition situation
  - challenges faced by MAS (probe: support from FLWs, PRI, funds, infrastructure/space, etc)
- Can you tell us about the VHND sessions:
  - VHND sessions organised in your community? How often these sessions are conducted?
  - what are the services provided during these sessions?
  - Are you satisfied with the service provisioning during the session? (probe: awareness regarding date and time, availability of drugs and medicines, privacy, behaviour of FLWs, etc)

- Are you aware of VHSNC? If yes:
    - Does the VHSNC meet on a regular basis?
    - Who are the members? Does all the members participate in this meeting?
    - Do you also participate in VHSNC meetings?
    - What are major issues that are discussed during these meetings?
- Role of FLWs:
    - Are you aware of the roles of AWW and ASHA in improving the health and nutrition of children?
    - Are you satisfied with the service provided by ASHA and AWW in your village?
    - Does the ASHAs and the AWW provide awareness, education and counselling on health and nutrition? How?
    - Do you follow the advices/messaged delivered by FLWs? Are they useful?

6. Concluding questions:

- How did the COVID-19 pandemic impact the health and nutrition of women and children? (loss of employment, food security issues, entitlements)
- Any impact on AWC services?
- What are the major challenges in achieving good health and nutrition for you and your family? (Probe- social, financial, employment, governance, policies and programmes)
- Recommendations and suggestions for improving nutritional status of children.

Annexure 7: ANM KII Tool

Name of the interviewer: **Date of interview:**

State	District	Block	Health Sub-centre

Background information			
1.	What is the name of the ANM?		
2.	What is the age of the ANM?		
3.	What is your educational level?	Primary (1-8)……1	
		Secondary (9-10)……2	
		Higher secondary (11-12)…..3	
		Graduate and above (13+)/ BSc nursing…….4	
		Diploma in nursing and midwifery……5	
		No response/ prefer not to say…..99	
4.	What is your marital status?	Married……1	
		Widowed……2	
		Divorced……3	
		Separated……4	
		Deserted……5	
		Others (please specify)……98 _____	
		No response/ prefer not to say……99	
5.	How long have you been working as an ANM?		
6.	How long have you been working as an ANM at this centre?		
7.	How many villages are included in your catchment area/cluster/outreach area?		
8.	What is the distance to the farthest village from your HSC?		

9.	What is the time taken to reach the farthest village from your HSC?	
10	What are your key roles and responsibilities in delivering health and nutrition services?	

Understanding of local health and nutrition context				
11.	What are the common illnesses among children in your village?			
12.	Is anaemia a common problem among women, children and adolescent?	Women	Yes…1	
			No…2	
			Don't know…3	
		Adolescents	Yes…1	
			No…2	
			Don't know…3	
		Children	Yes…1	
			No…2	
			Don't know…3	
13.	Is malnutrition a common problem among women, children and adolescent?	Women	Yes…1	
			No…2	
			Don't know…3	
		Adolescents	Yes…1	
			No…2	
			Don't know…3	
		Children	Yes…1	
			No…2	
			Don't know…3	
14.	Name at least three health and nutrition programmes/schemes that help in addressing women and child health issues.			

Community Processes			
15	Are you a member of the VHSNC?	Yes…..1	
		No……2	
		No response/prefer not to say…99	
16	Is the VHSNC functional in your area?	Yes…..1	
		No……2	
		No response/prefer not to say…99	
17	If yes, how often does the committee convene?		
18	Are you involved in the village health planning?	Yes…..1	
		No……2	
		No response/prefer not to say…99	
19	How much untied funds was received by the VHSNC in the last year? [Note: if not received, probe about the duration]		
20	How was the untied fund received last year used?		

Understanding of services delivered by ANM			
21	What are the key services provided by you to the listed beneficiaries?	Children-	
		Adolescents-	
		Pregnant Women and Lactating mothers	
22	Do you conduct VHSND sessions in your catchment area?	Yes…..1	
		No……2	
		No response/prefer not to say…99	
23	If no, state the reasons for not conducting the VHSND session?		
24	What are the services provided during VHSND sessions?		
25		Always……1	
		Sometimes……..2	

	Are there any delays in procuring drugs and equipments?	Never…….3	
		No response/ prefer not to say……..99	
2(	If yes, what are the items that are usually delayed?		

Training and Capacity building			
2	Do you receive in-service trainings?	Yes…..1	
		No……2	
		No response/prefer not to say…99	
2	When did you receive your last training?		
2	What was the theme of the last training received by you?		
3(	Have these training helped you deliver services?	Useful…….1	
		Useful to limited extent…….2	
		Not at all useful…….3	
		Cannot say……..4	
3	In your opinion, what additional training is needed to help you in better service delivery?		
Knowledge and skill of ANM			
3	A 5 month pregnant woman aged 26 years has been experiencing severe headaches, nausea and generalized odema since last week, what advice would you give her?	Immediate referral to SHC/PHC/CHC/DH	
		Immediate Referral to private facility	
		Referral to SHC/PHC/CHC/DH at woman's convenience	
		Referral to private facility at woman's convenience	
		Ensure regular ANC checkups	
		Motivate for institutional delivery	
		Notify ANM / HW	
		Others; specify	

33	A 22-year old pregnant woman is unwilling to go for an institutional delivery and has decided to have a home delivery; What are the six cleans to be followed for a safe home delivery?	Ensure clean hands	
		Ensure clean surface	
		Ensure clean new blade	
		Ensure clean cord tie	
		Ensure clean cord stump	
		Ensure clean cloth	
		Other (specify)	
		Don't know	
34	What advice would you give to mother for newborn care?	Counsel for colostrum feeding	
		Early initiation of breast feeding	
		Advise for keeping the baby warm	
		Advise on immunization of the child	
		Advise on birth registration	
		Not to give immediate bath to the new born	
		Advise on exclusive breast feeding for 6 months	
		Weighing of the child	
		Don't know	
		Others (specify)	
35	How many TT to be given to a woman who is pregnant for 1st time?		
36	What are the danger signs during pregnancy	Swelling of hand and feet	
		Paleness/anaemia	
		Excessive bleeding	
		Weak /no movement of foetus	
		All of above	
37	How many iron tablets should be given to a pregnant woman during?		

38	What is the average weight of a newborn?		
39	What all should a new born be given along with breastmilk from the time of birth?	Water	
		Dal and rice	
		Jaggery or sugar Water	
		Honey water	
		Bottle milk	
		All of the above	
		None of the above	
		Nothing except breast milk	
40	How soon after birth should breast feeding be initiated?	Within half hour of birth	
		After mother has taken proper rest and nutritious diet	
		Three days after birth	
		Within 1 hour of birth	
		Four hours after the birth	
		Don't know	
41	For how many months should the mother exclusively breastfeed the child?	Up to 2 months	
		Up to 4 months	
		Up to 6 months	
		Up to 12 months	
		Don't know	
42	Which activities do you advise for promotion of optimal infant and young child feeding practices?	No pre-lacteal feeding	
		Colostrum feeding and initiation of breastfeeding within one hour of birth	
		Exclusive breast feeding for six months	
		Timely initiation of complimentary feeding after 6 months	
		Continued breastfeeding up to two years	

		Breastfeeding even during illness	
		Ensure registration of child at AWC for growth monitoring and supplementary food	
		Others, specify_____	
43	1-year old child is passing frequent watery stools and has not been passing much urine. She is also very lethargic; What advice would you give to the mother?	Continue feeding the child	
		Give ORS	
		Give extra fluids (dal water etc)	
		Advice boiled water for drinking	
		Immediate Referral to nearby public health facility	
		Immediate referral to the private provider	
		Referral after some time	
		Others (Specify)	
		Don't know	
44	What would you advise to prevent recurrent diarrhea?	Promotion of hand washing before cooking and feeding the child	
		Reduce the amount of sweets / sugar in the child diet	
		Keeping surroundings clean	
		Bathing the child daily	
45	Should immunisation be discontinued if a child is suffering from minor ailments like cough, fever, cold?	Yes…1	
		No….2	
46	How do you identify SAM children?		
47	How do you track SAM children?		
Reporting and coordination mechanisms			

48	How much time do you spend in maintaining registers and records?	
49	What issues do you face in data entry?	
50	Does the Lady Health Visitor visit your centre? If yes, What is the frequency of her visits?	
51	What supports do receive from the Lady Health Visitor?	
52	What additional support do you expect from Lady Health visitor?	
53	Do you receive adequate/regular support from other FLW?	Always……1
		Sometimes……..2
		Never…….3
		No response/ prefer not to say……..99
54	What are the specific activities supported by AWW/ASHA workers?	
Other issues and recommendations		
55	How would you rate community participation and utilization of services delivered for health and nutrition?	Active participation and utilisation by all members
		Participation in and utilisation of some services but not all
		Do not participate/utilise services
		Prefer not to say
Notes: (What services are not utilised? what are the reasons for poor/no participation? what challenges do you encounter? which households are left out?)		
56	What do you recommend to increase community participation and utilisation of the services provided by you?	
57	How much time do you spend in maintaining records and registers on a daily basis? (in hours)	
58	What challenges do you face during home visits and counselling? (Family planning, IYCF, institutional delivery etc)	

59	What are the challenges faced by you in coordinating with the VHSNC?
60	What challenges do you encounter in communicating your issues and grievances to the lady health visitors and medical officer?
61	What do you recommend to improve your working conditions?
62	What do you recommend to improve the health and nutrition status of children?
63	Any other issues/recommendation

Annexure 8: ASHA KII Tool

Name of the interviewer: Date of interview:

State	District	Block	Village

Background information			
S.no.	**Questions**	**Response**	
64.	Name of the ASHA worker		
65.	Age of the ASHA worker		
66.	What is your level of education?	No formal education (0)……1	
		Primary (1-8)……2	
		Secondary (9-10)……3	
		Higher secondary (11-12)……4	
		Graduate and above (13+)……5	
		No response……9	
67.	What is your marital status?	Married……1	
		Widowed…..2	
		Divorced……3	
		Separated…..4	
		Deserted……5	
		Others (please specify)_____.....98	
		No response/ prefer not to say…..99	
68.	How long have you been working as an ASHA worker?		
69.	What are your key roles and responsibilities in delivering health and nutrition services?		

Understanding of local health and nutrition context				
70	• What are the common illnesses among children in your village? (List a few)			
71	• Is anaemia a common problem among women, children and adolescent?	Women	Yes…1	
			No…2	
			Don't know…3	
		Adolescents	Yes…1	
			No…2	

			Don't know…3	
		Children	Yes…1	
			No…2	
			Don't know…3	
71	• Is malnutrition a common problem among women, children and adolescent?	Women	Yes…1	
			No…2	
			Don't know…3	
		Adolescents	Yes…1	
			No…2	
			Don't know…3	
		Children	Yes…1	
			No…2	
			Don't know…3	
73	Name at least three health and nutrition programmes/schemes that help in addressing women and child health issues.			
74.	• Is the VHSND session regularly organised in your village?	Yes…..1		
		No……2		
		No response/prefer not to say…99		
75.	• If yes, what are the services delivered at VHSND?			
76.	• Do you participate in the VHSND session?	Yes…..1		
		No……2		
		No response/prefer not to say…99		
77.	• If no, what is the reason for not participating?			
78.	• If yes, what is your role in organising VHSND session			

Community Processes			
79	Are you a member of the VHSNC?	Yes…..1	
		No……2	
		No response/prefer not to say…99	
80	Is the VHSNC functional in your village?	Yes…..1	
		No……2	
		No response/prefer not to say…99	

81	If yes, how often does the committee convene?		
82	Are you involved in the village health planning?	Yes…..1	
		No……2	
		No response/prefer not to say…99	
83	How much untied funds was received by the VHSNC in the last year? [Note: if not received, probe about the duration]		
84	How was the untied fund received last year used?		

Understanding of services delivered by ASHA worker				
85.	• What are the key services provided by you to the listed beneficiaries?	Children		
		Adolescents		
		Pregnant Women and Lactating mothers		
86.	Are the listed drugs/equipments available in your kit? [multiple response, put a tick mark]			
		○ Slides and lancets	○ Cotrimoxazole tablets	○ Sanitary napkins
		○ Tab. Paracetamol	○ ORS packets	○ Digital wrist watch
		○ Paracetamol syrup	○ Condoms	○ Thermometer
		○ Tab. Iron and Folic acid	○ Oral pills	○ Weighing sca
		○ Tab. Dicyclomine	○ Spirit	○ Baby blanket
		○ Tetracycline ointment	○ Soap	○ Baby feeding spoon
		○ Zinc tablets	○ Sterilized cotton	○ Kit bag
		○ Povidine Iodine tube	○ Bandages	○ Communicati n kit

	○ G. V. Paint ○ Clotrimoxazole syrup ○ DDK for clean deliveries at home	○ Nischay kit ○ Rapid diagnostic kit ○ Emergency contraceptive pills	○ Mucous extractor
87.	• Are there any delays in procuring drugs and equipments?	Yes……..1 No……2	
88.	• If yes, what are the items that are usually delayed?		

Training and Capacity building

89.	Did you receive induction training?	Yes……..1 No……2	
90.	What were the key topics covered during the induction trainings? List a few		
91.	Did you ever receive any refresher training?	Yes……..1 No…….2 No response/ prefer not to say……..99	
92.	When did you receive your last refresher training?		
93.	What were the themes of refresher trainings?		
94.	• Have these trainings helped you deliver services in the community?	Useful……1 Useful to limited extent…….2 Not at all useful……3 Cannot say……4 No response/prefer not to say……99	
95.	• In your opinion, what additional training is needed to help you in better service delivery?		

Knowledge and skill of ASHA worker			
96.	• A 5 month pregnant woman aged 26 years has been experiencing severe headaches, nausea and generalized odema since last week, what advice would you give her?	Immediate referral to SHC/PHC/CHC/DH	
		Immediate Referral to private facility	
		Referral to SHC/PHC/CHC/DH at woman's convenience	
		Referral to private facility at woman's convenience	
		Ensure regular ANC checkups	
		Motivate for institutional delivery	
		Notify ANM / HW	
		Others; specify	
97.	A 22-year old pregnant woman is unwilling to go for an institutional delivery and has decided to have a home delivery; What are the six cleans to be followed for a safe home delivery?	Ensure clean hands	
		Ensure clean surface	
		Ensure clean new blade	
		Ensure clean cord tie	
		Ensure clean cord stump	
		Ensure clean cloth	
		Other (specify)	
		Don't know	
98.	What advice would you give to mother for newborn care?	Counsel for colostrum feeding	
		Early initiation of breast feeding	
		Advise for keeping the baby warm	
		Advise on immunization of the child	
		Advise on birth registration	
		Not to give immediate bath to the new born	
		Advise on exclusive breast feeding for 6 months	
		Weighing of the child	
		Don't know	
		Others (specify)	
99.	How many TT to be given to a woman who is pregnant for 1st time?		

00.	What all should a new born be given along with breastmilk from the time of birth?	Water	
		Dal and rice	
		Jaggery or sugar Water	
		Honey water	
		Bottle milk	
		All of the above	
		None of the above	
		Nothing except breast milk	
01.	How soon after birth should breastfeeding be initiated?	Within half hour of birth….1	
		After mother has taken proper rest and nutritious diet…..2	
		Three days after birth…..3	
		Within 1 hour of birth…..4	
		Four hours after the birth…..5	
		Don't know…..6	
		No response/prefer not to say…..99	
02.	For how many months should the mother exclusively breastfeed the child?	Up to 2 months…..1	
		Up to 4 months……2	
		Up to 6 months…..3	
		Up to 12 months….4	
		Don't know…..5	
		No response/prefer not to say…..99	
03.	Which activities do you advise for promotion of optimal infant and young child feeding practices?	No pre-lacteal feeding	
		Colostrum feeding and initiation of breastfeeding within one hour of birth	
		Exclusive breast feeding for six months	
		Timely initiation of complimentary feeding after 6 months	
		Continued breastfeeding up to two years	
		Breastfeeding even during illness	
		Ensure registration of child at AWC for growth monitoring and supplementary food	

		Others, specify_____	
04.	1-year old child is passing frequent watery stools and has not been passing much urine. She is also very lethargic; what advice would you give to the mother?	Continue feeding the child	
		Give ORS	
		Give extra fluids (dal water etc)	
		Advice boiled water for drinking	
		Immediate referral to nearby public health facility	
		Immediate referral to the private provider	
		Referral after some time	
		Others (specify)	
		Don't know	
05.	What would you advise to prevent recurrent diarrhea?	Promotion of hand washing before cooking and feeding the child	
		Reduce the amount of sweets / sugar in the child diet	
		Keeping surroundings clean	
		Bathing the child daily	
06.	How do you tell the mother to prepare ORS at home? List the steps in order		

Reporting and coordination mechanisms			
07.	How often do you submit a progress report?		
08.	How much time do you spend in preparing the progress reports?		
09.	How often do you meet the ASHA facilitator?		
10.	What support do you receive from the ASHA facilitator?		
11.	What additional support do you expect from the ASHA facilitator?		
12.	Do you receive adequate/regular support from other FLWs?	Always…….1	
		Sometimes……2	
		Never…….3	
		No response/ prefer not to say……99	

13.	What are the specific activities supported by ANM/AWW?	

Challenges and recommendations in delivering health and nutrition services			
14.	How would you rate community participation and utilization of the health and nutrition services provided by you?	Active participation and utilisation by all members…..1	
		Participation in and utilisation of some services but not all…..2	
		Do not participate/utilise services……3	
		No response/prefer not to say….99	
Notes: (What services not used? what are the reasons for poor/no participation? what are the challenges faced while interacting with the community? Which households are often left out?)			
15.	What do you recommend to increase community participation and utilisation of the services provided by you?		
16.	Are there any challenges in enrolling children in the AWC?	Yes……..1	
		No……2	
	If yes, what are the challenges faced by you?		
17.	What challenges do you face during home visits and counselling? (Family planning, IYCF, institutional delivery etc)		
18.	What are the challenges faced by you in coordinating with the VHSNC?		
19.	Do you receive honorarium on time?	Yes……..1	
		No……2	
	If no, for how long it has been pending?		
20.	How much time do you spend in maintaining the records and registers on a daily basis? (in hours)		
21.	What do you recommend to improve the health and nutrition status of children in your village?		
22.	What challenges do you encounter in communicating your issues and grievances to the ASHA facilitator?		
23.	What do you recommend to improve your working conditions?		
24.	Any other suggestions/remark by the ASHA worker		

Annexure 9: AWW KII Tool

Name of the interviewer: Date of interview:

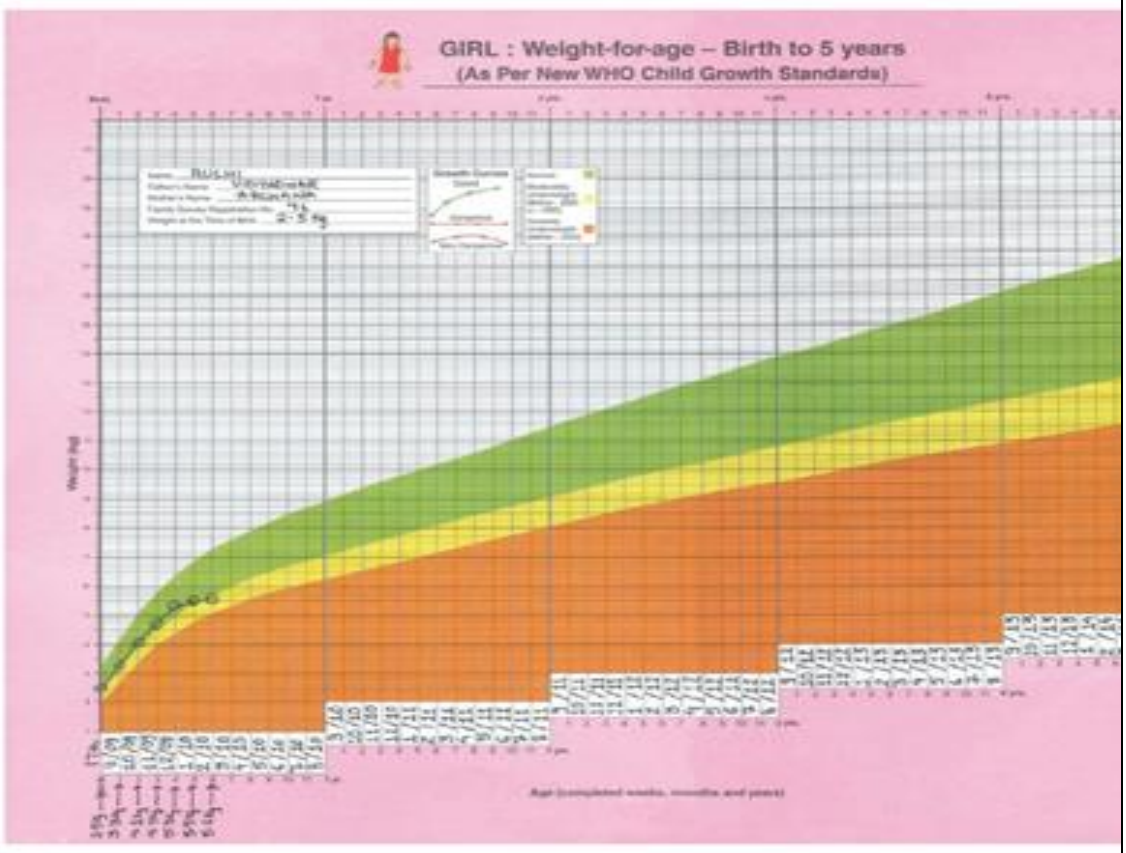
State	District	Block	Village	AWC name	AWC number

A. Background information				
25.	Name of the Anganwadi worker			
26.	Age of the Anganwadi worker			
27.	What is your educational level?	No formal education (0)……1		
		Primary (1-8)……2		
		Secondary (9-10)……3		
		Higher secondary (11-12)……4		
		Graduate and above (13+)……5		
		No response……9		
28.	What is your marital status?	Married……1		
		Widowed……2		
		Divorced……3		
		Separated……4		
		Deserted……5		
		Others (please specify)……98 _____		
		No response/ prefer not to say……99		
29.	How long have you been working as an Anganwadi worker?			
30.	What are your key roles and responsibilities in delivering services as Anganwadi worker?			
B. Understanding of local health and nutrition context				
31.	What are the common illnesses among children in your village? (List a few)			
32.	Is anaemia a common problem among women, children and adolescent?	Women	Yes…1	
			No…2	
			Don't know…3	
		Adolescents	Yes…1	
			No…2	
			Don't know…3	

		Children	Yes…1	
			No…2	
			Don't know…3	
33.	Is malnutrition a common problem among women, children and adolescent?	Women	Yes…1	
			No…2	
			Don't know…3	
		Adolescents	Yes…1	
			No…2	
			Don't know…3	
		Children	Yes…1	
			No…2	
			Don't know…3	
34.	Name at least three health and nutrition programmes/schemes that help in addressing women and child health issues.			
35.	Is the VHSND session regularly organised in your village?	Yes…..1		
		No……2		
		No response/prefer not to say…99		
36.	If yes, what are the services delivered at VHSND?			
37.	What is your role in organising VHSND session?			
C. Community Processes				
38.	Are you a member of the VHSNC/ Mahila Aarogya Samiti (MAS)?	Yes…..1		
		No……2		
		No response/prefer not to say…99		
39.	Is the VHSNC/ MAS functional in your village?	Yes…..1		
		No……2		
		No response/prefer not to say…99		
40.	If yes, how often does the committee convene?			
41.	Are you involved in the village/community health planning?	Yes…..1		
		No……2		
		No response/prefer not to say…99		
42.	How much untied funds was received by the VHSNC/MAS in the last year? [Note: if not received, probe about the duration]			

43.	How was the untied fund received last year used?		
D. Understanding of Anganwadi services and functioning			
44.	What are the key services delivered at the Anganwadi centre?	For children-	
		For adolescents-	
		For Pregnant Women and Lactating mothers	
45.	How many registers are maintained at the AWC?		
46.	Do you receive monthly supply of ration and other materials on time?	Always……1	
		Sometimes……..2	
		Never…….3	
		No response/ prefer not to say……..99	
47.	What challenges do you face in the procurement of ration and other materials?		
48.	Do you receive adequate/regular support from other FLW?	Always……1	
		Sometimes……..2	
		Never…….3	
		No response/ prefer not to say……..99	
49.	What are the specific activities supported by ANM/ASHA workers?		
E. Training and Capacity building			
50.	What were the key topics covered during the induction trainings? List a few.		
51.	Did you ever receive any refresher training?	Yes……..1	
		No…….2	
		No response/ prefer not to say……..99	
52.	When did you receive your last refresher training?		
53.	What were the themes of the last refresher trainings?		
54.	Have these training helped you deliver services at the AWW and in the community?	Useful…….1	
		Useful to limited extent…….2	
		Not at all useful…….3	
		Cannot say……..4	

55.	In your opinion, what additional training is needed to help you in better service delivery?	

F. Knowledge and skills of Anganwadi worker			
56.	Explain the growth curve shown in the following growth chart.		
			
For the following questions in this section, put a 1 against the given options it corresponds the response; put a zero if it is not included in the response. Wherever options are not provided, please note the actual response.			
57.	A 5-month pregnant woman aged 26 years has been experiencing severe headaches, nausea and generalized odema since last week, what advice would you give her? [PROBE: both urgent and convenience basis]	Immediate referral to SHC/PHC/CHC/DH	
		Immediate Referral to private facility	
		Referral to SHC/PHC/CHC/DH at woman's convenience	
		Referral to private facility at woman's convenience	
		Ensure regular ANC checkups	
		Motivate for institutional delivery	
		Notify ANM / HW	

		Others; specify	
58.	A 22-year old pregnant woman is unwilling to go for an institutional delivery and has decided to have a home delivery; What are the six cleans to be followed for a safe home delivery?	Ensure Clean hands	
		Ensure Clean surface	
		Ensure Clean new blade	
		Ensure Clean cord tie	
		Ensure Clean cord stump	
		Ensure Clean cloth	
		Other (Specify)	
		Don't know	
59.	What advice would you give to mother for newborn care?	Counsel for colostrum feeding	
		Early initiation of breast feeding	
		Advise for keeping the baby warm	
		Advise on immunization of the child	
		Advise on birth registration	
		Not to give immediate bath to the new born	
		Advise on exclusive breast feeding for 6 months	
		Weighing of the child	
		Don't know	
		Others (Specify)	
60.	How many TT to be given to a woman who is pregnant for 1st time?		
61.	What all should a new born be given along with breastmilk from the time of birth till 6 months of age?	Water	
		Dal and rice	
		Jaggery or sugar Water	
		Honey water	
		Bottle milk	
		All of the above	
		None of the above	
		Nothing except breast milk	
62.	How soon after birth should breast feeding be initiated?	Within half hour of birth	
		After mother has taken proper rest and nutritious diet	
		Three days after birth	
		Within 1 hour of birth	
		Four hours after the birth	
		Don't know	
63.		Not desirable	

	What do you think about adding fat or oil to the diet of a 1-year old child?	Highly desirable	
		Desirable but cannot be done	
		Don't know	
64.	For how many months should the mother exclusively breastfeed the child?	2	
		4	
		6	
		12	
		Don't know	
65.	Which activities do you advise for promotion of optimal infant and young child feeding practices?	No pre-lacteal feeding	
		Colostrum feeding and initiation of breastfeeding within one hour of birth	
		Exclusive breast feeding for six months	
		Timely initiation of complimentary feeding after 6 months	
		Continued breastfeeding up to two years	
		Breastfeeding even during illness	
		Ensure registration of child at AWC for growth monitoring and supplementary food	
		Others, specify_____ _	
66.	1-year old child is passing frequent watery stools and has not been passing much urine. She is also very lethargic; What advice would you give to the mother?	Continue feeding the child	
		Give ORS	
		Give extra fluids (dal water etc)	
		Advice boiled water for drinking	
		Immediate Referral to nearby public health facility	
		Immediate referral to the private provider	
		Referral after some time	
		Others (Specify)	
		Don't know	
67.	What would you advise to prevent recurrent diarrhea?	Promotion of hand washing before cooking and feeding the child	

		Reduce the amount of sweets / sugar in the child diet	
		Keeping surroundings clean	
		Bathing the child daily	
68.	How do you tell the mother to prepare ORS at home? List the steps in order		
G. Reporting and coordination mechanisms			
69.	How often do you submit a monthly progress report?		
70.	How much time do you spend in making the progress reports?		
71.	Do you use the POSHAN tracker application?		
72.	Does the Lady supervisor visit your centre? If yes, frequency		
73.	What support do you receive from the Lady Supervisor?		
74.	What additional support do you expect from the LS?		
H. Challenges and recommendations in delivering ICDS services			
75.	How would you rate community participation and utilization of ICDS?	Active participation and utilisation by all members……1	
		Participation in and utilisation of some services but not all……2	
		Do not participate/utilise services……3	
		Prefer not to say……99	
What services not used? What reasons for low/no participation? What are the challenges? What households are usually left out?			
What do you recommend to increase community participation and utilisation of ICDS services?			
76.	Do you face any challenges in enrolling children to the AWC?	Yes……1	
		No…….2	
		No response/prefer not to say….99	
If yes, what are the challenges faced by you?			
77.	Do you receive honorarium on time?	Yes……1	

		No…….2	
		No response/prefer not to say….99	
78.	What are the major issues and challenges in proper functioning of the AWC? [Note: Put a 1 against every listed issue that corresponds with a response. Put a zero if it does not match the response.]	Infrastructural issues	
		Supply of ration	
		Availability of equipment	
		Training	
		Supervision and support from ICDS functionaries	
		Support from other FLW	
		Workload	
		Lack of community participation	
		Others; specify_____ _____	
79.	What do you recommend to improve the functioning of the AWC?		
80.	How much time do you spend in maintaining records and registers on a daily basis? (in hours)		
81.	What are the challenges in using the POSHAN tracker?		
82.	What do you recommend to improve the reporting of health and nutrition status of children at the AWC?		
83.	What challenges do you encounter in communicating your issues and grievances to the LS?		
84.	What do you recommend to improve the working conditions at the AWC?		

Annexure 10: Lady Supervisor KII Tool

Name of the interviewer: Date of interview:

State	District	Block	Cluster

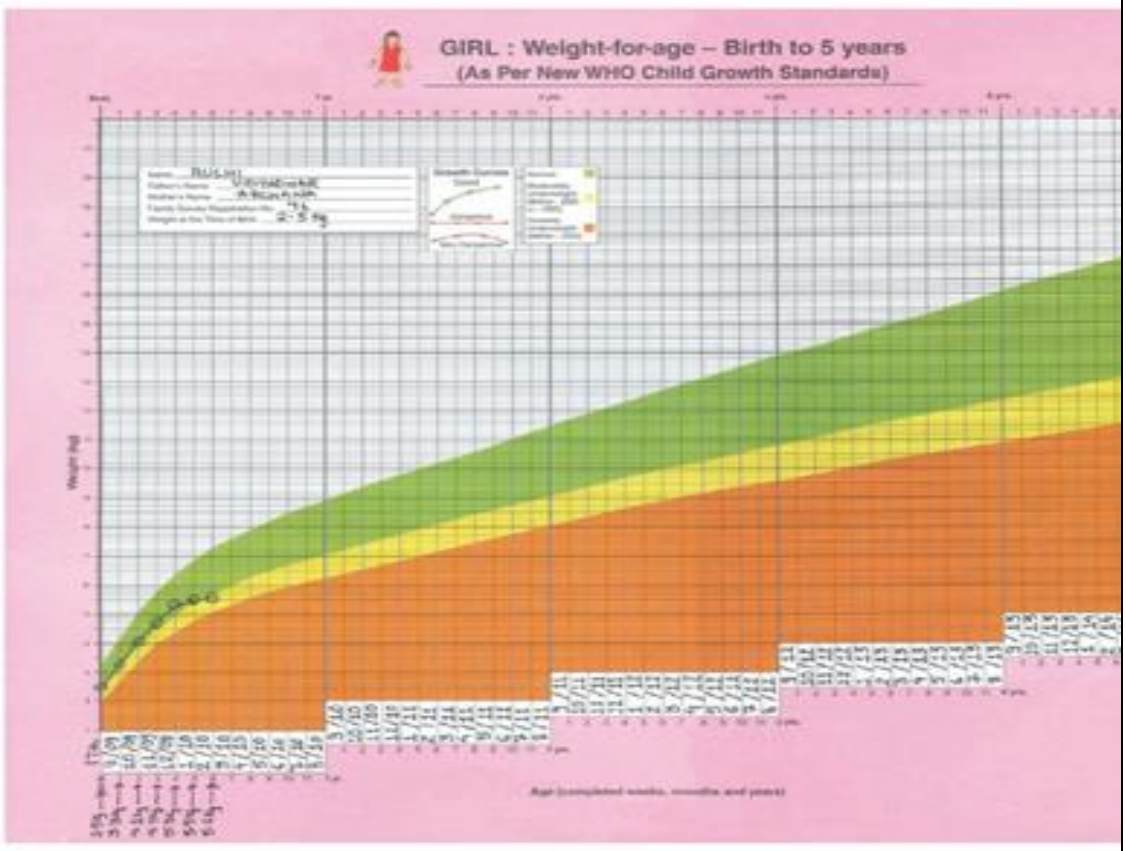
A. Background information			
	Name of the supervisor		
	Age		
	What is your educational level?	No formal education (0)……1	
		Primary (1-8)……2	
		Secondary (9-10)……3	
		Higher secondary (11-12)……4	
		Graduate and above (13+)……5	
		No response……9	
	What is your marital status?	Married……1	
		Widowed……2	
		Divorced……3	
		Separated……4	
		Deserted……5	
		Others (please specify)……98 _____	
		No response/ prefer not to say……99	
	How long have you been working as the LS in this cluster?		
	How many AWCs are covered by you?		
	What is the average distance (nearest to farthest) of the AWCs covered by you?		
	What are your key roles and responsibilities in delivering the ICDS services?		

B. Understanding of local health and nutrition context			
What are the common illnesses among children in your village? (List a few) (probe: diahhorea, fever, cough and cold, anaemia, etc)			
Is anaemia a common problem among women, children and adolescent?	Women	Yes…1	
		No…2	
		Don't know…3	
	Adolescents	Yes…1	
		No…2	
		Don't know…3	
	Children	Yes…1	
		No…2	
		Don't know…3	
Is malnutrition a common problem among women, children and adolescent?	Women	Yes…1	
		No…2	
		Don't know…3	
	Adolescents	Yes…1	
		No…2	
		Don't know…3	
	Children	Yes…1	
		No…2	
		Don't know…3	
Is the VHSND session regularly organised in all the village covered by you?	Yes…..1		
	No……2		
	No response/prefer not to say…99		
If yes, what are the services delivered at VHSND?			
Do you attend VHSND sessions?	Yes…..1		
	No……2		
	No response/prefer not to say…99		
What is your role in VHSND session?			

C. Knowledge regarding Anganwadi services and functioning	
What are the key services delivered at the Anganwadi centre?	For children-
	For adolescents-
	For Pregnant Women and Lactating mothers
How many registers are maintained at the AWC?	

Are all the registers properly maintained and updated in all the centres	Yes…..1	
	No……2	
	No response/prefer not to say…99	
Any issues faced by the AWW in maintaining the registers at the centres? List		
What is the process of raising requisition for monthly supplies?		
How much is taken in processing the requisition at the block level?		
Does the AWC receives the monthly supplies on time?	Yes…..1	
	No……2	
	No response/prefer not to say…99	
If no, reasons		

D. Knowledge and skills of Lady Supervisor	
85.	Explain the growth curve shown in the following growth chart.



For the following questions in this section, put a 1 against the given options it corresponds the response; put a zero if it is not included in the response. Wherever options are not provided, please note the actual response.

86.	A 5-month pregnant woman aged 26 years has been experiencing severe headaches, nausea and generalized odema since last week, what advice would you give her? [PROBE: both urgent and convenience basis]	Immediate referral to SHC/PHC/CHC/DH	
		Immediate Referral to private facility	
		Referral to SHC/PHC/CHC/DH at woman's convenience	
		Referral to private facility at woman's convenience	
		Ensure regular ANC checkups	
		Motivate for institutional delivery	
		Notify ANM / HW	
		Others; specify	
87.	A 22-year old pregnant woman is unwilling to go for an institutional delivery and has decided to have a home delivery; What are the six cleans to be followed for a safe home delivery?	Ensure Clean hands	
		Ensure Clean surface	
		Ensure Clean new blade	
		Ensure Clean cord tie	
		Ensure Clean cord stump	
		Ensure Clean cloth	
		Other (Specify)	
		Don't know	
88.	What advice would you give to mother for newborn care?	Counsel for colostrum feeding	
		Early initiation of breast feeding	
		Advise for keeping the baby warm	
		Advise on immunization of the child	
		Advise on birth registration	
		Not to give immediate bath to the new born	
		Advise on exclusive breast feeding for 6 months	
		Weighing of the child	
		Don't know	
		Others (Specify)	
89.	How many TT to be given to a woman who is pregnant for 1st time?		
90.	What all should a new born be given along with breastmilk from the time of birth till 6 months of age?	Water	
		Dal and rice	
		Jaggery or sugar Water	
		Honey water	
		Bottle milk	

		All of the above	
		None of the above	
		Nothing except breast milk	
91.	How soon after birth should breast feeding be initiated?	Within half hour of birth	
		After mother has taken proper rest and nutritious diet	
		Three days after birth	
		Within 1 hour of birth	
		Four hours after the birth	
		Don't know	
92.	What do you think about adding fat or oil to the diet of a 1-year old child?	Not desirable	
		Highly desirable	
		Desirable but cannot be done	
		Don't know	
93.	For how many months should the mother exclusively breastfeed the child?	2	
		4	
		6	
		12	
		Don't know	
94.	Which activities do you advise for promotion of optimal infant and young child feeding practices?	No pre-lacteal feeding	
		Colostrum feeding and initiation of breastfeeding within one hour of birth	
		Exclusive breast feeding for six months	
		Timely initiation of complimentary feeding after 6 months	
		Continued breastfeeding up to two years	
		Breastfeeding even during illness	
		Ensure registration of child at AWC for growth monitoring and supplementary food	
		Others, specify_____ _	
95.	1-year old child is passing frequent watery stools and has not been	Continue feeding the child	
		Give ORS	

	passing much urine. She is also very lethargic; What advice would you give to the mother?	Give extra fluids (dal water etc)	
		Advice boiled water for drinking	
		Immediate Referral to nearby public health facility	
		Immediate referral to the private provider	
		Referral after some time	
		Others (Specify)	
		Don't know	
96.	What would you advise to prevent recurrent diarrhea?	Promotion of hand washing before cooking and feeding the child	
		Reduce the amount of sweets / sugar in the child diet	
		Keeping surroundings clean	
		Bathing the child daily	
97.	How do you tell the mother to prepare ORS at home? List the steps in order		

E. Training and Capacity building			
	Did you receive induction training?	Yes……..1	
		No…….2	
		No response/ prefer not to say……..99	
	If yes, what were the key topics covered during the induction trainings? List a few		
	Was the induction training useful in carrying out the role of lady supervisor?	Yes……..1	
		No…….2	
		No response/ prefer not to say……..99	
	Did you ever receive any refresher training?	Yes……..1	
		No…….2	
		No response/ prefer not to say……..99	
	When did you receive your last refresher training?		
	What were the themes of the last refresher trainings?		
		Useful…….1	

	Have these training helped you supervise the AWW and ensure effective service delivery at the AWCs?	Useful to limited extent…….2 Not at all useful…….3 Cannot say……..4	
	What additional training is needed to help you in better service delivery?		

F. Monitoring and supervision			
	On an average how many visits to each centre do you undertake every month?		
	How do you plan the monitoring visits? (probe: any reference to data, random)		
	What are the specific tasks undertaken by you during the visits?		
	In your opinion, what skill and capacity gaps have you observed among the AWW?		
	What support has been provided by you to support/upgrade the skills?		
	In your opinion, is there any coordination issues observed among the FLWs?	Yes……1 No……..2 No response/prefer not to say…99	
	Do you provide support to the AWW to develop village health plan? If yes, how		
	How do you provide continued education to the AWWs on Nutrition and Health?		
	How do you ensure proper storage and distribution of Supplementary nutrition and other kits and equipment in AWCs?		
	How do you ensure on job and refresher training of the AWW?		
	How do you ensure availability of supplies at the AWCs?		
	What activities are conducted for promotion of IYCF practices?		

	What IEC activities are conducted in your area to prevent malnutrition?	
	Did you facilitate any such activities and campaigns in the previous quarter? If yes, provide details	
	Are all the AWCs in your area adequately equipped to cater the needs of community?	
	Which Anganwadi centres are poor performing? Why?	

G. Challenges and recommendations		
	What are the major reasons for poor utilisation of the ICDS services in your area?	
	What challenges do you face in maintaining the physical facilities in AWCs?	
	What challenges do you face in coordinating with the AWW?	
	What challenges do you face in coordinating with the CDPO?	
	What are the challenges faced in monitoring, reporting and providing supportive supervision to the AWW?	
	Recommendations for increasing community participation and utilisation of ICDS services	
	What are your recommendations for improving the health and nutritional status of women and children in your cluster?	
	What are your recommendations for improving the AWCs functioning?	

Annexure 11: CDPO KII Tool

Name of the CDPO: **Date of interview:**

1. How long have you been working as the CDPO in this block?
2. What are your key roles and responsibilities?
3. What job trainings have you received since you started working as CDPO?
4. How were these trainings helpful?
5. What is the nutritional state of women and children in your block?
6. How do you address the challenge of malnutrition in your block?
7. How do you ensure quality in service delivery in your area?
8. What strategies are undertaken to strengthen the knowledge and skills of the LS and AWWs in your area?
9. Are all the AWCs in your area adequately equipped to cater the needs of community?
10. What are the major challenges in implementation of ICDS services?
11. What challenges do you encounter in co-ordinating with the district for supplies and equipments in the AWC?
12. How do you ensure convergence of different departments?
13. What are the major gaps and challenges at facility level in addressing the nutritional requirements of the children as reported by the AWW and LS?
14. What are the various strategies for monitoring and reviewing the implementation of ICDS services in your area?
15. What are the challenges faced in ensuring adequate functioning of the AWCs?
16. What are your recommendations for improving the health and nutritional status of women and children in your block?
17. What are your recommendations for improving the AWCs functioning?