# RESEARCH PROPOSAL FOR MONITORING ANAEMIA RELATED INTERVENTIONS IN INFANTS AND YOUNG CHILDREN, ADOLESCENT GIRLS AND POSTPATUM WOMEN IN THE AJMER DISTRICT OF RAJASTHAN

**A Capstone Project Submitted to**
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**in partial fulfilment of the requirements for**
**the award of the degree of**
**Master of Public Health**

**By**
**Dr. Arpana Goswami**
**Cohort V (2017-19)**

**Under the guidance of**
**Dr. Tanjul Saxena**
Associate Professor
Institute of Health Research Management,
The IIHMR University, Jaipur, Rajasthan.

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## LIST OF ABBREVIATIONS

BP – Birth Package

CAPI – Computer Assisted Personal Interviewing

ENA – Emergency Nutrition Assessment

IFA – Iron and Folic acid

IYCF – Infant and Young Child Feeding

NFHS – National Family Health Survey

ODK – Open Data Kit

TOT – Training of Trainer

WIFA – Weekly supplementation of Iron and Folic acid

WHO – World Health Organization

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## ABSTRACT

India has one of the world's highest under nutrition rates. The National Family Health survey – 4 shows 38.4 percent of under-five children are stunted, 21 percent are wasted and 35.7 percent are underweight. Only 8.7 percent breastfeeding children of 6 to 23 months old receive an adequate diet. Around 58 percent of children are anaemic (Haemoglobin level below 11 g/dl). Importantly, micronutrient deficiencies are highly prevalent in India due to the poor quality of diet, parasitic infections and other factors. Around 53 percent women in India are anaemic.[1] Many studies have proven high prevalence of iron, folic acid and vitamin deficiencies leading to anaemia.[2] These deficiencies can lead to impaired cognitive development, poor physical growth, increased morbidity and decreased work productivity in adulthood. A large proportion of Indian children are affected by worm infestation, aggravating the incidence and prevalence of underweight and anaemia.[1]

One of the major concern is the nutritional need among adolescent girls (10 – 19 years of age) and pregnant and lactating mothers. Nutritional anaemia in adolescent girls can attribute to high MMR, high incidence of low birth weight babies, high perinatal mortality, foetal wastage and consequent high fertility rates.[3] Postpartum anaemia is associated with an impaired quality of life, emotional instability, and depression, reduced cognitive abilities and can lead to maternal mortality.[4] In India, anaemia is more prevalent in the state of Rajasthan. To prevent from anaemia, supplementation of iron and folic acid is promoted. It is very necessary to address this issue as this can complicate various succeeding stages. Many programs have been initiated by the Indian Government like Infant and Young Child Feeding Practices for children 6 – 23 months of age, Weekly supplementation of Iron and Folic acid for adolescent population 10 – 19 years of age and Iron and Folic acid micronutrient supplementation to pregnant and lactating mothers to promote the same.

Due to the devastating nutritional challenges, there is a need of performing midterm evaluations to verify the progress of the interventions. This proposal proposes to monitor the burden of anaemia evaluating post nutrition related interventions in infants and young children (6-23 months of age), adolescent females (10-19years old) and postpartum women (0-11 months with a live birth) in the Ajmer district of Rajasthan. The duration of the program will be 14 months including training for the surveyors and IT personnel, the survey, data analysis, interpretation and dissemination.

## APPROACH

Nutrition monitoring for infants and young children feeding practices (6 – 23 months old), WIFA supplementation in adolescent girls of 10 to 19 years of age and IFA supplementation in postpartum mothers (0-11 months with a live birth) is proposed to undertake considering the entire process of field work and data management in Ajmer district of Rajasthan. The population will be clustered in such a manner to minimize the geographical and socio-economic barrier and maximize the utilization of available resources to reduce time and cost and enhance the quality of data collection. The field operation will start simultaneously in all the villages of the district.

## RATIONALE

To estimate the burden of anaemia in infants and young children (6 – 23 months old), adolescent girls (10-19 years of age) and postpartum mothers (0-11 months with a live birth) covered under the three interventions Infant and Young Child Feeding, Weekly Iron and Folic acid Supplementation and IFA supplementation to lactating mothers respectively in the Ajmer district of Rajasthan among three different age groups. The information will help elucidate the major determinants of anaemia in children, young girls and pregnant and lactating mothers and evaluate the impact of the supplementation of

iron and folic acid provided through the aforesaid interventions . These findings are expected to serve as useful concurrent data for improving the current interventions as also feed into important new initiatives like Rashtriya Kishor Swasthya Karyakram, National Iron Plus Initiative amongst others and provide an unquestionable evidence base for advocacy, policy development and program design for prevention from anaemia with the Government of Rajasthan.

## INTRODUCTION

India is one of the leading country with most number of malnourished people; about 16 percent of its total population – 191 million people thereby making it a public health crisis.[5]

"In India, undernutrition levels have remained persistently high – especially in utero, in the early years of life, in adolescent girls and in women across the life cycle - especially in disadvantaged /excluded community groups and those living in areas or conditions of high nutritional vulnerability and multiple deprivations."[6] Around 35 percent of malnourished infants and 23 percent of the total malnourished people worldwide reside in India.[7] According to Global Nutrition Report 2016, out of 180 countries, India stands at 170$^{th}$ for the most number of anaemic women, 114$^{th}$ rank out of 132 countries for stunting in under five children and ranks 120$^{th}$ among 130 countries for underweight children.[8]

A critical window of opportunity exists to prevent malnutrition by taking care of children in the first twenty four months of their life, the girls during their adolescence period and pregnant and lactating mothers. The interventions at these stages can help to achieve optimal growth and development.[9] According to NFHS – 4, the highest number of malnourished women and children are from Rajasthan. For children under six months, only 58 percent are exclusively breastfed whereas only 28 percent infants are breastfed within first hour of their life. 34 percent of the children (6-23 months of age) are fed

according to the WHO recommended minimum number of meals per day and only 3 percent are fed as per all the three recommended practices. Considering the nutrition status of children, a large proportion are stunted and wasted. During the initial six months of life, 23 percent are stunted, 28 percent underweight and 31 percent are wasted. Though in comparison to NFHS -3, the proportion of children stunted and underweight decreased, there is an increase in the wasting (20 to 23 percent) among the children.[1]

One of the major concern for malnourishment in Rajasthan is anaemia. Anaemia is defined as "a reduction in haemoglobin concentration, red-cell count, or packed-cell volume below established cut-off levels."[10] It is a widely discussed public health challenge, especially among women and children. In children of 6 to 59 months of age, 27 percent are mildly anaemic, 31 percent are moderately anaemic and 2 percent have severe anaemia. Almost 53 percent children and 47 percent women in Rajasthan are suffering from some form of anaemia. The report on Disease Burden in India states that the major cause of YLDs (Years lived with disability) is due to Iron-deficiency anaemia in both the sexes. In 2016, one of the major cause of death in children between 0-14 age group was nutritional deficiencies (36.6 percent).[11,12]

Anaemia is not caused by just one factor but by multiple reasons like inadequate food intake, insufficient micronutrient consumption and poor dietary diversity. Also, there are many proximal causes such as indirect factors like poverty, inadequate sanitation, bad water supply, poor status of women and improper maternal and child health.[13] As the most common type of anaemia affecting the population is iron deficiency anaemia, targeting this anaemia can help to reduce the burden significantly.[14]

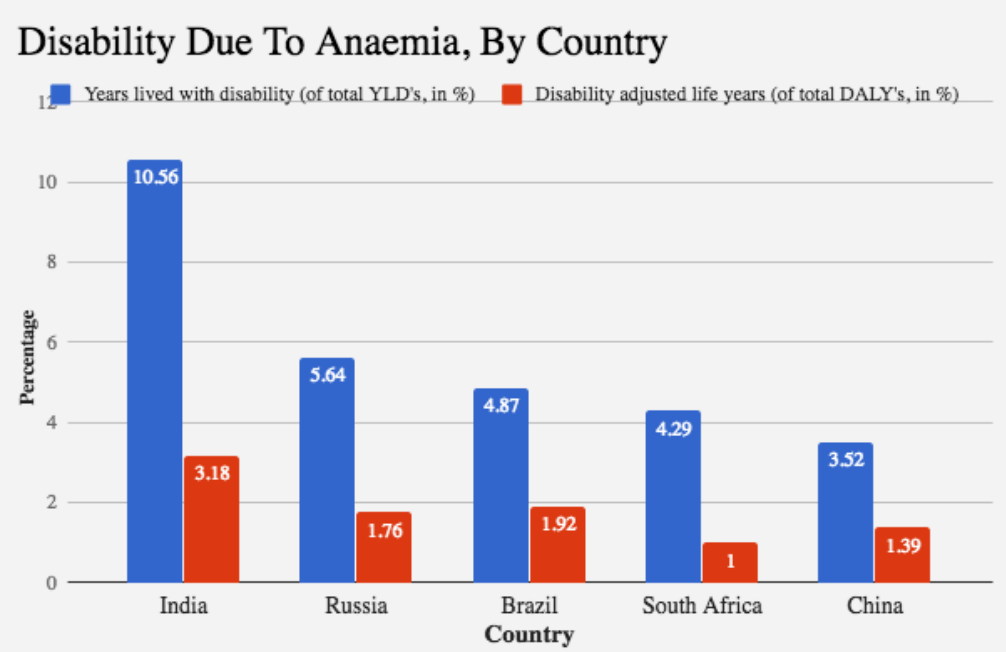



**Figure 1: Disability due to Anaemia, Country wise Source – Global Burden of Disease survey, 2015[8,12]**

Nutrition monitoring helps to assess the level of anaemia in the community, to measure its magnitude and distribution among the population and geographical areas.[15] It is a complex system which includes various coordinated activities thus providing data for the nutritional needs of a population. Further, it repeatedly collects and evaluate data related to the dietary intake and thus the nutritional status of the population.[16] The data collected on the nutritional status, dietary intake and various health indicators through a standardized means are valuable for decision making at all the levels – district, state and national. Continuous dietary and health trends monitoring helps in the decision making process for related program and policies.[17] The policies like food fortification, dietary guidance and tracking the improvements in the health status can thereby overcome the nutritional problems.[18] The sustainable development goals has a major component to be addressed on nutrition. Monitoring the nutritional status can help to achieve them.

To combat the high prevalence of anaemia, Government of India had introduced many interventions like Infant and Young Child Feeding, Weekly supplementation of Iron and Folic acid to adolescent population and Iron and Folic acid supplementation to

pregnant and lactating mothers. These interventions aim at the nutritional need of the population and aim to reduce the anaemia by targeting at the knowledge, attitude and practices or supplementation of the vital nutrients externally.

## INFANTS AND YOUNG CHILDREN FEEDING (IYCF)

Adequate nutrition at an early stage of life is very important as the years are crucial for growth and development of the child. Improper nutrition at this stage can lead to irreversible faltering in linear growth, micronutrient deficiencies and cognitive deficits along with a significant contribution to morbidity and mortality. These could result in long term consequences like impaired intellectual performance, reduced work capacity and increased risk of chronic diseases.[19] The prevalence of anaemia in children according to NFHS – 4 is 58.4 percent, around 10 percent decrease from the earlier decade (69.4 percent).[1] Though the number is quite big with 9 in 10 children of age 6-23 months consuming inadequate diet which increases the chances of anaemia. Breastmilk is the richest source of nutrition. Exclusive breastfeeding is advised up to 6 months of age. A transition period from exclusive breastfeeding to complementary feeding after six months is a vulnerable phase as this is the time when malnutrition begins to start in infants.[20] Globally, every fifth malnourished child is from India. NFHS – 4 data highlights the states with maximum number of malnourished children in the 6-23 months age group of which Rajasthan tops the list with only 3.4 percent children with adequate diet followed by Gujarat (5.2 percent), and Uttar Pradesh (5.3 percent). Puducherry (31 percent), Tamil Nadu (30.7 percent) and Meghalaya (23 percent) are amongst the states/union territories with highest level of adequate diet for the children between 6-23 months of age. Despite various interventions focussing on iron supplementation including Integrated Child Development Services scheme or increasing the budget three folds since 2015, Tamil

Nadu was the only state in India, to meet millennium development goal target with 67 percent reduction in infant mortality rate.[20]

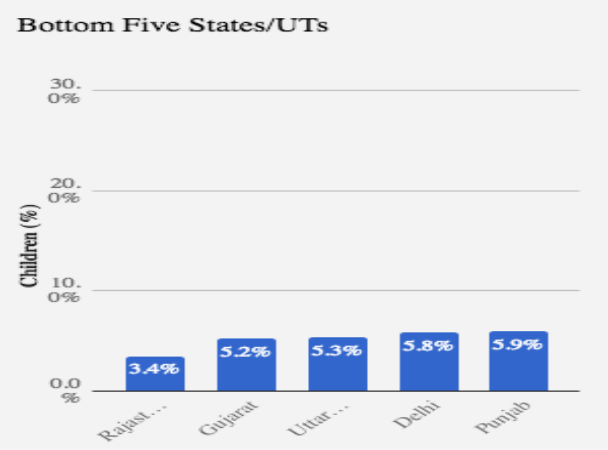



**Figure 2: Bottom five states/Union Territories with poor malnutrition status[20]**

Child Undernutrition has shown improvements over the last decade (Figure 3). The data for challenging states is promising and calls for focused interventions in the area for optimal results.[6]

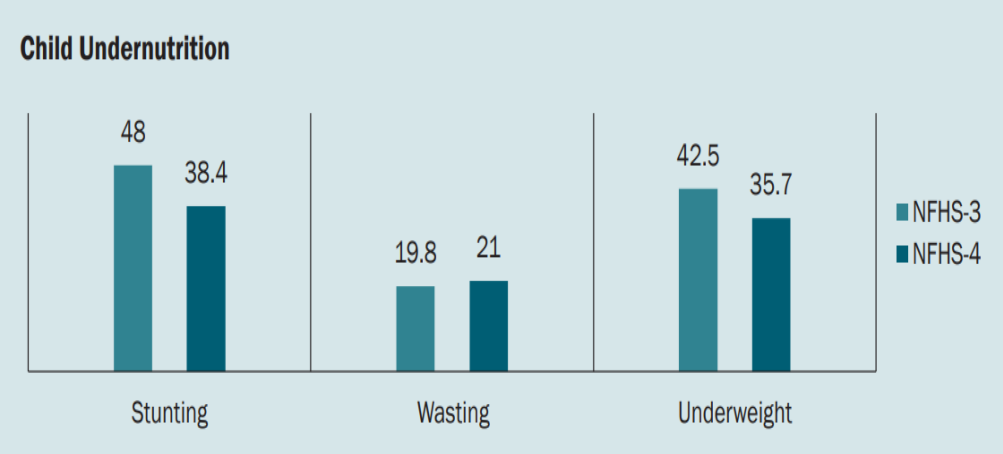



**Figure 3: Comparison in Child Undernutrition (NFHS-3 and NFHS-4)[6]**

Government had initiated the intervention for **Infant and Young Child Feeding practices** for children under 2 years of age targeting their nutritional need. The intervention aims at exclusive breastfeeding for children under 6 months followed by

complementary feeding up to 2 years of life. There was an increase in the early breastfeeding initiation rate from 23.4 to 41.6 percent. But there was a decrease in the proportion of children (6-8 months) receiving solid or semi-solid food and breastmilk (52.6 to 42.7 percent). The recent evidences have proved that around 156,000 child deaths could be averted only by universalization of optimal breastfeeding practices in India. It was also found that cognitive losses due to not breastfeeding can have an impact on the earning potential and could result into a loss of almost Rs.4300 crores annually in India. The suboptimal practices of Infant and Young Child feeding is of great concern.[6] According to NFHS – 4 data, only 3.4 percent of children age 6-23 months receive an adequate diet in Rajasthan. This number falls to 0.6 percent in the district of Ajmer.[1]

## WEEKLY IRON AND FOLIC ACID SUPPLEMENTATION

According to WHO, there are almost no countries where anaemia is not at least a mild public health problem in adolescent females. But in India, the threat is at a great level (Figure 4)[21]

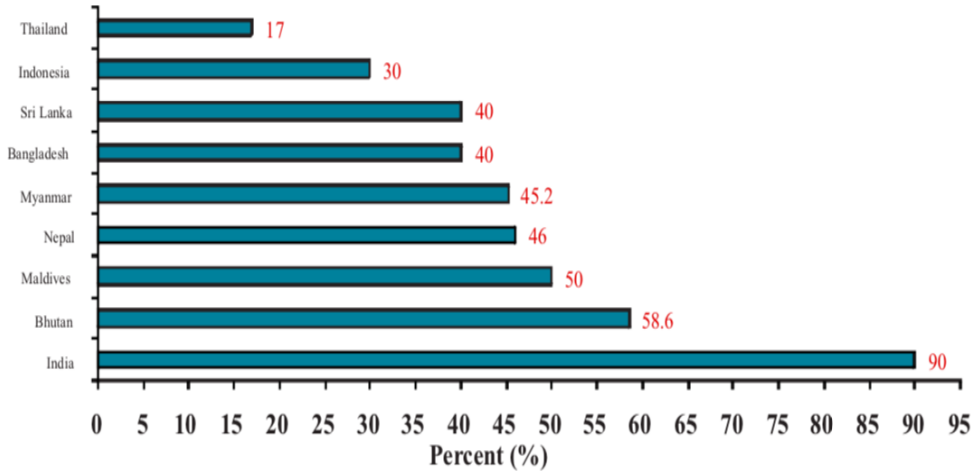



**Figure 4: Burden of anaemia in adolescent females in South East Asian Countries[21]**

There are specific nutritional needs required for the growth and development for the adolescent girls. They are the future mothers, thus they contribute heavily to the nutritional status of the population.[22] Nutritional anaemia is one of the common reasons

for morbidity in adolescent and young female population in India constituting almost 56 percent of the adolescent female population.[23] The major deficiencies found at this stage are the micronutrient deficiencies. Many evidences shows that anaemia in pregnant women can be controlled by achieving satisfactory iron status in their adolescent stage.[24] Weekly supplementation of iron and folic acid (WIFA) acts as a preventive measure against anaemia. Studies shows that WIFA is effective in controlling the nutritional status in adolescent girls.[25] Long term absorption in iron deficient population helps to demonstrates a more efficient, sustained absorption from weekly supplementation.[23] UNICEF and the Ministry of Health and Family Welfare have started to create awareness to bridge the gap and reduce malnourishment in this age group and help to end the intergenerational cycle of anaemia.[26]

Government of India introduced an intervention of Weekly Iron and Folic acid supplementation in 2012. This program was initiated on July 25$^{th}$ 2013 in the state of Rajasthan. The program targeted at the adolescent girls and boys enrolled in the government/government aided municipal schools (6$^{th}$ to 12$^{th}$ class) and through anganwadi workers, the program reached adolescent girls not enrolled in school (10 – 19 years). The intervention aimed to boost the iron level in adolescents and reduce anaemia by 20-30 percent which contributes to maternal death, low birth weight and neural tube defects caused by the deficiency of iron and folic acid.[27]

Prevalence of anaemia in adolescent girls varies from 34.5 to 65.5 percent depending on the quality and quantity of food available.[23] Developing countries have a considerable proportion of vulnerable group of adolescent girls who are traditionally married at a young age and thus exposed to a high risk of reproductive morbidity and mortality. Anaemia in adolescent girls is high due to many contributing factors like poverty, inadequate diet, worm infestations, and frequent attacks of malaria in presence of poor access of health services.

## IFA MICRONUTRIENT SUPPLEMENTATION

Inadequate nutrition intake during pregnancy and after child birth affects not only the child but also the woman. Over and under nutrition during postpartum is critical for the health of the woman. Mothers with BMI < 18.5kg/$m^2$ are more likely to have undernourished children.[28] About 800 women globally die every day due to preventable causes relating to pregnancy and childbirth of which 20 percent are from India.[29] The women who survives is mostly malnourished and needs appropriate care and attention.

Postpartum anaemia is one of the leading cause of maternal morbidity, mortality and other complications related to future pregnancy.[30] In developing countries, the prevalence of postpartum anaemia is around 50 to 80 percent.[31] Postpartum anaemia in India accounts for almost 30 percent of maternal deaths.[32] In a survey conducted in a northern part of India, around 70 percent postpartum women were found to be anaemic of which 29.8 percent women became anaemic after delivery.[33] Postpartum anaemia causes postnatal depression, delayed wound healing, increased susceptibility to ductitis, urinary tract infections, mastitis, fatigue and exhaustion, insufficient and reduced milk quality and low immunity.[32] To avert this, Government of India started with iron and folic acid supplementation to all pregnant and lactating mothers to help in preventing anaemia (iron deficient or others) and increasing the haemoglobin level.[34] Antenatal supplementation of IFA has proven to be effective in reducing low birth weight, preterm birth and anaemia associated with high risk of perinatal and maternal mortality. IFA supplements during postpartum period has also shown significant effect in preventing anaemia. The recommended dose of IFA is 180 tablets (60 mg iron and 400mcg folic acid).[35] NFHS – 4 indicates that in Rajasthan, the mothers who consumed IFA tablets for 100 days or more when they were pregnant was only 17.3 percent while the number was merely 9 percent in the Ajmer district.[1] Thus, the initiative did not yield the desired

reduction in Iron Deficiency Anaemia nationally (56.5 to 53 percent). This suboptimum reduction is highly concerning.[10]

## PROBLEM STATEMENT

### OVERVIEW

Nutrition monitoring helps to measure the progress of the nutrition related interventions. It also determines whether the expected goals and objectives have been achieved.[36] Monitoring can provide accurate information about the dietary and nutritional status of the population and conditions that can have an effect on them along with the relationship between the health of an individual and the diet being consumed.[37] An effective nutrition monitoring system can determine the burden of nutrition-related diseases by tracking the changes in the pattern of food system. Tracking can also help to assess area-wise nutrition policies and programs. It is important for any nutrition monitoring system to have the following characteristics[37]:

- A person responsible for coordinating the activities
- Filter and discard the unnecessary data
- Address every component while monitoring like food production, distribution, intake (food and nutrient), nutritional status and related health outcomes
- Timely analysis and interpretation of the data
- Dissemination of the information after the interpretation
- Feedback mechanisms for decision-making
- Practical and cost-effective

## RESEARCH QUESTION

1. Is there a positive impact of Nutrition Programs in improving the anemia indicators significantly?

2. What are the gaps in the implementation of the nutrition programs?

## HYPOTHESIS

$H_0$: The interventions IYCN, WIFA and IFA Supplementation has resulted in no improvement of anemia indicators (Haemoglobin) post NFHS 4

$H_1$: IYCN has resulted in improvement of anemia indicators (Haemoglobin) of infants and young children (6 – 23 months of age)

$H_2$: WIFA has resulted in improvement of anemia indicators (Haemoglobin) of adolescent females (10 -19 years of age)

$H_3$: IFA Supplementation has resulted in improvement of anemia indicators (Haemoglobin) of postpartum women (0 – 11 months with a live birth)

Hypotheses 1, 2 and 3 will be approached by comparing the prevalence rate of NFHS – 4 and the study will find out whether a significant difference is noted after monitoring the implementation. Independent t test will be utilized for testing the result of the intervention.

## OBJECTIVES

1. To estimate the prevalence of anemia in the Ajmer district of Rajasthan for infants and young children (6 to 23 months of age), adolescent girls (10 to19 years of age) and postpartum mothers (0-11 months postpartum with a live birth) by monitoring the interventions.
2. To assess the knowledge, attitude and practices relating to the factors that influences the nutrition status of the population
3. To propose strategies for strengthening Monitoring of Nutrition programmes based on objectives 1 and 2

# RESEARCH METHODOLOGY

***Type of Study:*** Exploratory Descriptive

***Area and Coverage***

The study will be conducted in the district of Ajmer in Rajasthan, India

To achieve the desirable objectives, the study will be both qualitative and quantitative including

- Review of the literature to assess the burden of malnutrition in the district
- Focus group discussions
- In-depth interviews of the study participants
- A quantitative survey

***Target Population***

The study to be conducted is a descriptive study targeted at:

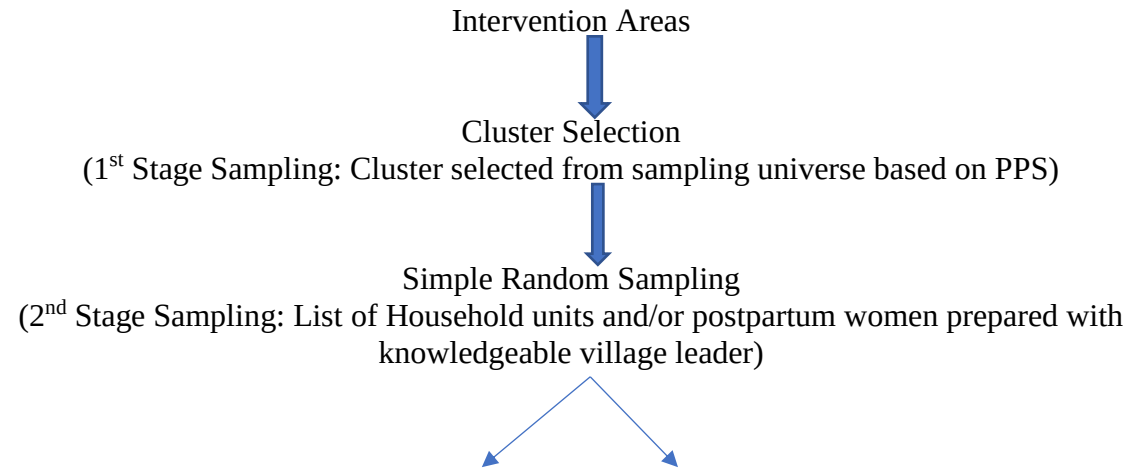
- Infants and children 6-23 months of age (Infant and Young Child Feeding)
- Adolescent girls aged 10-19 years (Weekly Iron Folic Acid Supplementation)
- Women [0-11 months postpartum with a live birth INTERVENTION (IFA and Birth Package)]
- Facilities and providers

***Respondents for the Study***

| **Intervention** | **Respondent** |
|---|---|
| Weekly IFA supplementation among adolescent girls | Combined sample of :<br>a. Adolescent girls (10 to 19 years) in schools<br>b. Adolescent girls (10 to 19 years) out of schools |
| Daily IFA supplementation for pregnant women | a. 0 to 5 months post-partum mothers<br>b. Currently Pregnant women (in 2nd and 3rd trimester) |
| BP/ IYCF | a. Mothers of 0 to 5 months infants (EBF)<br>b. Mothers of 6 to 23 months infants/ children |

**Table 1: Respondents of the proposed study**

**SAMPLE DESIGN**




**Target Groups:**
Children aged 6-23 months
Adolescent girls aged 10-19 years

**Target Groups:**
Women 0-11 months postpartum who had a live birth

## POPULATION AND STUDY SAMPLE

The following indicators will be measured:

***Adolescent girls aged 10-19 years: Weekly iron and folic acid supplementation (WIFA)***

- Weekly iron and folic acid supplement use
- Access to WIFA: through schools / out of school
- Related knowledge, attitudes and practices, and sources of information

***Infant and young children feeding (IYCF): Percent of children aged 6- 23 months:***

- Minimum acceptable diet (dietary diversity and frequency of meals)
- Related knowledge, attitudes and practices, and sources of information

***Women [0-11 months postpartum with a live birth INTERVENTION: Maternal and neonatal care iron and folic acid supplementation (IFA), and birth package (BP)***

- ANC by skilled health provider, any or ≤4 times during recent pregnancy

- IFA supplements in the recent pregnancy, receipt or consumption of 100+ IFA
- Initiation of breastfeeding within 1 hour of delivery
- Exclusive breastfeeding during first 6 months of life
- Post-natal care

***Facilities and providers – convenience sample of facilities in each cluster selected for each of above Related Interventions: IFA, BP, WIFA, IYCN***

- Stocks and supplies according to above interventions
- Related knowledge, attitudes and practices, and sources of information

No exclusion criteria for these target groups beyond those already described.

**SURVEY TOOL:**

a. Questionnaire – The questionnaire will be in both Hindi and English consisting of the questions relevant for the intervention. The questions would be both open and close ended. To survey the caregivers of the children 6-23 months of age, 24 hour recall method will be used.
b. Data collection – ODK software

The data will be uploaded daily or within 1-2 days of data collection.

**EQUIPMENT FOR ANALYSIS OF PRIMARY INDICATORS**

- ODK Collect is a mobile device application used to collect survey data through digitally formatted questionnaires. Questionnaires will be translated into ODK format for use on smartphones or tablets
- Data uploads: Data connection cards/ communications for uploads to the survey's cloud server

**SOFTWARE FOR DATA ANALYSIS**

ENA for SMART to select survey clusters and EpiInfo for the analysis of additional variables. If additional statistical tests are required during data analyses then other software packages will be used, and these may be open source software

## SAMPLE SIZE AND SELECTION OF SAMPLE

Sample size for each of the target group are calculated using the prevalence in the national surveys (NFHS – 4) and census data (2011-12). Indicators used in calculation of sample size are –

***1. Iron and/or Folic Acid supplementation and Birth Package (IFA/BP)***

a. Percent of women [0-11 months post-partum] with a live birth who consumed at least 100 iron-folic acid supplements during pregnancy; or

b. Percent of women [0-11 months post-partum] with a live birth who have received ANC by skilled health provider at least 4 times during pregnancy; or

c. Percent of infants 0-5 months who are exclusively breastfed

***2. Weekly Iron and/or Folic Acid supplementation (WIFA)***

a. Percent of adolescent girls (10-19 years) who receive at least 12 WIFA supplements in 6 month period; or

b. Percent of adolescent girls aged 10-19 years who attend school but not currently pregnant

***3. Infant and Young Child Nutrition (IYCN)***

a. Percent of infants 0-5 months who are exclusively breastfed

b. Percent of children 6-23 months who reported initiation of breastfeeding within 24 hours of birth

c. Percent of children 6-23 months who consumed a minimum acceptable diet the day prior to the survey

## ASSUMPTIONS MADE IN SAMPLE SIZE CALCULATION

***Design Effect:*** As the nutrition outcomes create relatively low design effects,[38] 2 is taken as the value of design effect that will inflate the sample size to compensate between the clusters for likely heterogeneity.

***Average Household Size:*** Based on National Family Health Survey – 4; Rajasthan (4.9)[1]

***Percentage of Target Group:*** Based on National Family Health Survey – 4; Rajasthan and Census 2011-12[39]

***Non-respondent rates:*** 10 percent will be used as the non-respondent rate that are expected to reach the desired number of respondents, assuming some are lost due to refusal, inaccessibility, security reasons, absentees, etc.

The sample size is calculated using the following formula:

$$n_i = \frac{t^2 \times (p) \times (1- p)}{d^2 \times DEFF}$$

$n_i$ = sample size in terms of individuals, $n_{ic}$ = children, $n_{ia}$ = adolescent girls,

$n_{ippw}$ = postpartum women

t = constant (1.96)

p = expected prevalence (fraction of 1)

d = relative desired precision (5 percent)

DEFF = design effect for cluster surveys (2)

**Sample Size for Women [0-11 months postpartum with a live birth]**

***Parameters for women 0-11 months post-partum with live births***

Estimated prevalence - women receiving ANC by skilled health provider at least 4 times during pregnancy (percent)

Target Population = percentage of women aged 15-49 years who have received ANC by skilled health provider at least 4 times during pregnancy (NFHS -4)

$$\text{Sample size} = \frac{t^2 \times (p) \times (1- p)}{d^2 \times \text{DEFF}}$$

p = 9.7 percent (NFHS – 4)

Sample size = 269

$$\text{Total house-holds to be interviewed} = \frac{n}{(\text{HH size} \times p)} \times \frac{1}{1 - \text{percent refusals}}$$

HH size = Average household size = 4.9 (NFHS - 4)

Total households to be interviewed = 629

**Sample Size for adolescent girls aged 10-19 years**

***Parameters for adolescent girls aged 10-19 years***

Estimated Prevalence of weekly iron and/or folic acid supplementation (percent)

Target Population = percentage of female adolescents aged 10-19 years

$$\text{Sample size} = \frac{t^2 \times (p) \times (1- p)}{d^2 \times \text{DEFF}}$$

p = 10.33 percent (Census 2011)

Sample size = 354

$$\text{Total house-holds to be interviewed} = \frac{n}{(\text{HH size} \times p)} \times \frac{1}{1 - \text{percent refusals}}$$

HH size = Average household size = 4.9 (NFHS - 4)

Total households to be interviewed = 604

**Sample Size for children 6-23 months**

***Parameters for children 6-23 months***

Estimate prevalence of children 6-23 months who reported initiation of breastfeeding within 24 hours of birth

Target Population = 30 percent of the country percentage for children under 5 years

$$\text{Sample size} = \frac{t^2 \times (p) \times (1- p)}{d^2 \times \text{DEFF}}$$

p = 10 percent (Census 2011)

Sample size = 277

$$\text{Total house-holds to be interviewed} = \frac{n}{(\text{HH size} \times p)} \times \frac{1}{1 - \text{percent refusals}}$$

Total households to be interviewed = 628

## SOURCES OF DATA

Primary and Secondary data

Primary data will be collected by surveying the target population. Secondary data will be collected from the hospital records for the information on birth packages utilised, type of service provided, total number of malnourished children registered, number of pregnant women receiving ANC by skilled birth attendant, total number of cases of IFA supplementation to adolescents and IFA and Calcium supplementation to pregnant and lactating mothers.

## OPERATIONAL APPROACH

The entire approach is divided into three phases: Planning, Data Collection and Data Analysis and Management. All the activities in the three phases are planned in a sequential manner to ensure the quality of data and minimize non-sampling errors.

Planning – This phase will involve 2 major activities. Training the human resource for mapping and listing and for the household survey. For this, there would be a session on training of the trainers for mapping and listing and conducting the household survey. After the training of the trainers for mapping and listing and conducting the household

survey, they will be recruited for training the mappers and listers and the household surveyors respectively. For mapping and house listing, the investigators will prepare a final version of house listing sheet and share with the lead agency. After confirmation, the sheets will be translated in both Hindi and English. The next activity will be initiation of training sessions for the mappers and listers. For the survey, list of PSUs to be surveyed will be made. The trainers will prepare final version of questionnaires in English and Hindi. The trainers will recruit the investigators required to conduct the survey.

***Recruitment for Mapping and House listing***

Mapping and House listing allows us to prepare a map of every PSU and allocate them a specific number. This will help in systematically surveying every PSU. For surveying the households, the name of the head of the member will be mentioned in the house listing. The household listing would provide up-to-date location and layout sketch maps of each selected PSU, and number to each structure and households within the structure. Large sample villages (usually more than 250 households) will be segmented. Each household listing team will have one lister and one mapper. This operation will be carried out at least fifteen days in advance of the actual survey.

The recruitment of mappers and house listers will be done based on relevant survey experience. The sample size in all the three categories will be listed and a layout will be prepared for the same. The house listing will be used as a sampling frame for selecting the PSU from the households. The mapping and listing of one PSU will take almost two days. A total of 538 team days will be required to cover 269 PSUs for postpartum women (0-11 months with a live birth), 708 team days to cover 354 PSUs for adolescent girls (10-19 years old) and 554 team days to cover 277 PSUs for infants and young children (6-23 months of age). A team of 10 mapping and house listing teams will be sent to complete the exercise within a period of two months. Additionally, a field

supervisor each will be employed for all the three target populations to ensure quality of mapping and house listing, manage logistics and other issues. The mapping and listing exercise will be completed before beginning the field work. The exercise will be started simultaneously for all the indicators and will require 60 days. Each team will have one mapper and one lister. For every category of target population, there will be one supervisor to coordinate and supervise the field work. An extra (10 percent) persons will be recruited for mapping and house listing training considering the dropouts. All the staff would be working five days a week for 8 hours.

| | **Number of Teams** | **Total number of days for mapping and House listing** |
|---|---|---|
| **Women [0-11 months postpartum with a live birth]** | 10 | 60 |
| **Adolescent girls aged 10-19 years** | 10 | 60 |
| **Children 6-23 months old** | 10 | 60 |

**Table 2: Total number of team and days required for Mapping and House Listing**

***Household Selection and Field Work***

Once mapping and house listing are done, all the information will be entered in excel sheet from listing sheet. This will allow in selecting the sample. After the final samples are selected, the information will be uploaded in CAPI.

The total number of surveying team will be 5 per target population. The household survey will consists of 7 members per survey team, comprising of 3 females, 1 male, 2 health investigators and 1 supervisor. This will include 1 team leader and 2 enumerators. The team leader will be responsible for the application of methodology and for administering the questions to the caregiver. One enumerator will be in charge of the scale and of taking the weight while the other will be in charge of the height board and of taking height. The enumerators will be assigned their work after the training. Every enumerator of the team will have a specific role to be performed. Every team will consists of one

local doctor as according to the Ministry of Public Health regulations, only doctors are allowed to manipulate the blood samples. The doctor will be involved in collection of blood sample. One enumerator will handle Sahli type haemoglobinometer for checking the haemoglobin level. The team leader will be well-versed with statistics, public health and epidemiology with a strong on-field experience. The enumerator will have a lower profile, i.e. basic math, logical and strong communication skills. For health investigators surveying anthropometric measurements, it will be necessary to have a background of general nursing, diploma in lab technology with relevant experience of working in hospitals. Additionally, a Research Officer will be posted as field coordinator to coordinate the activities and supervise field operations.

The total number of days required to do the survey involves five working hours in a week. 10 percent extra investigators will be recruited considering the dropout during training and fieldwork.

| | **Total number of Households to be surveyed** | **Number of teams** | **Total number of days to complete the survey** |
|---|---|---|---|
| **Women [0-11 months postpartum with a live birth]** | 629 | 5 | 30 |
| **Adolescent girls aged 10-19 years** | 604 | 5 | 25 |
| **Children 6-23 months old** | 628 | 5 | 30 |

**Table 3: Total number of team and days require for the survey**

***Recruitment of Research Officer***

One IT staff will be recruited as the head of operations for a period 6 months. To enter the information pertaining to residential households from mapping listing it is proposed to recruit 9 research officers for 120 days.

***Training of Trainers (TOT)***

**a. Training of Trainers (TOT) for mapping and house listing**

The training will include class room sessions, segmentation exercises, procedures for mapping and house listing. The core motive of this training is to give the trainers field practice to be able to conduct activities appropriately. The training will take place for 3 days.

**b. Training of Trainers (TOT) for Household survey**

The entire duration of the training program will be of 10 days. The program will explain the participants the objective of the study, the various aspects of the survey, questionnaires used in the survey, data collection methods, informed consent and other ethical guidelines, and field supervision and guidelines for training staff. The classroom sessions will focus at every minute detail of the survey. The trainees will be asked to conduct a mock survey after the training. This will be followed by feedback on all the aspects that needs to be worked upon. They will be taught the usage of anthropometric instruments. Every step of the procedure will be explained to them in detail. As the collection of data is via ODK software, special experts will be called upon to teach them the usage of ODK. After the lecture, they would be divided into groups and asked to perform the entry using ODK.

**c. Training of Trainers (TOT) for computer staff with CAPI**

A person with background of data management will be trained in CS PRO data entry packaging, CAPI, coding, machine editing, analysis of data collected via ODK and overall data management. The training session will be conducted for 15 days.

**d. Training of Trainers (TOT) for Anthropometric Measurements**

This training will teach ways to take anthropometric measurements and the various related ethical issues. The training will take place for a duration of 3 days.

***Training of Field Staff***

**a. Training of Mapper and listers**

The trainers trained for mapping and house listing will impart their knowledge to the field mappers and listers. The training period will be of 3 days. The trainer will be selection via a practical exam. One training session will have around 15 participants. The total number of mappers and listers to be trained will be 30.

**b. Training of Investigators**

The training of investigators (both male and female) would be divided into parts. First 15 days training will be provided to the interviewers and the supervisors. They would be explained the guidelines to be performed unconditionally. The session will be conducted in the local language (preferably Hindi). It would include a discussion of all the questions to be asked and its relevance. This will be done in the first 3 days of the training followed by mock interviews and practice sessions. Experts will be called upon to deliver a lecture explaining why the target groups of selected and the importance of nutrition. The participants would be given field practice for 3 days. During this period, they will be assessed on their interviewing and interpersonal skills. They will also be trained to collect data from the health facilities. This training will be for a period of 2 days. They will be taught the interviewing methods for the providers and the questionnaires will be discussed. This will also be followed by mock interviews in actual facility setting with a feedback by the trainers. After the training program, 15 best performing participants will be selected and would be made team leaders. They would receive an additional 1 day training explaining them their roles and duties to be imparted. 1 day training will be given to the supervisors to explain them their role in the survey. The total investigators to be trained will be 60.

**c. Training of Doctor**

One doctor would be required at every team. As the doctor is already trained, only 1

day training will be provided explaining them their duties and responsibilities. The total number of doctors to be trained will be 15 considering 10 percent of attrition.

**d. Training of health Investigators (Anthropometric)**

30 investigators will be trained for anthropometric measurements. The training will take place for 15 days. They will be trained to measure the weight and height of the children between 6-23 months of age and adolescent girls 10-19 years old. Also, 1 day training session will include collection of blood in Sahli's haemoglobinometer followed by hands on by every participant. Emphasis will also be given on informed consent procedures and on the ethical collection of Anthropometric measurements. The training will have classroom sessions followed by practice sessions in schools and communities.

## Data Collection –

Based on the sample size and the households to be surveyed, random sampling will be done.

The data will be collected via two-stage sampling design to randomly select households and survey the subjects of respective interventions from Ajmer district of Rajasthan.

***Random selection of the clusters:***

The entire population of the Ajmer district is to be divided into small distinct geographic areas. The population size of Ajmer is 2,584,913 (Census 2011-12). The total number of villages in Ajmer is 1111. So, the approximate population size of the village is 2327. The clusters will be then selected through ENA software using probability proportional to population size (PPS). Random selection of households will be done within the clusters using systematic random sampling. The names of all the villages will be then entered under the geographical unit along with the corresponding population size. ENA gives the total number of clusters in each village to be sampled. One cluster will be

of about 250 households of which at least 22 households will have 11 adolescents to be interviewed. According to the validated recommendation for cluster survey, at least 30 clusters are required to get the representative estimates (4 Sampling Methods and Sample size calculation for the SMART methodology).[40] The questionnaires will be used for the survey. To interview postpartum women of 0-11 months who had a live birth, the clusters are house listed and the respondents would be surveyed based on systematic random sampling. A minimum of 12 surveys per cluster will be done. In case, the cluster for adolescent girls, caregivers for 6-23 months of age and postpartum women is same, the house-listing will be done for the whole cluster and accordingly three sampling frames would be generated and the respondents will be selected by systematic random sampling. The house listing and selection of the sample will be done by head of the team along with the village leader.

Reserve clusters: The ENA software automatically assigns reserve clusters to the sampling frame. It is calculated as 30 percent + 1 Cluster. The reserve clusters are supposed to be visited when

a. 10 percent or more of the number of clusters allocated are unable to be reached
b. The final sample size calculated is less than 80 percent of the required number

For assessing the effect of weekly supplementation of IFA, during the survey haemoglobin level will be collected by the doctor. Haemoglobin level of 10 – 11 gm percent will be mild anaemia, 7 – 9.9 gm percent will be moderate anaemia and Haemoglobin level < 7will be severe anaemia.

| Interventions | Number of sample clusters | Minimum number of subjects | Sampling unit | Total number of selected clusters | Data Collection Days |
|---|---|---|---|---|---|
| WIFA | 30 | 354 | Households | 3 | 30 |
| IYCF | 30 | 277 | Households | 3 | 30 |
| IFA/BP | 30 | 269 | Households/Person | 3 | 30 |

**Table 4: Types of Interventions, total number of subjects involved, number of clusters and data collection days**

## Data Analysis and Management:

This phase involves editing and coding of open ended questions. The research officer, once all the survey process is done will check for any incomplete data. If the officer needs some clarification, supervisors will be approached. All the data from the ODK will be entered into the excel sheet. The anthropometrical data will be copied to ENA from SMART for interpretation. The final check report of the nutritional anthropometry will be presented in the forms of tables and graphs. The child related and household variables will be analysed using Epi Info. Epi Info will have frequencies and cross-tabulations that will generate percentages, means and standard deviations. All the significance will be defined as $p < 0.05$. For IYCF indicators to assess breast feeding and complementary feeding, WHO recommended guidelines will be used (WHO 2008). For calculating minimum acceptable diet, both minimum dietary diversity and minimum meal frequency will be considered. Minimum dietary diversity includes consumption of grains, roots or tubers, legumes and nuts, flesh foods, dairy products, fruits and vegetables. Minimum meal frequency will be calculated by measuring the consumption of solid, semi-solid or soft food by a child. Combining these two will give minimum acceptable diet. This will be analysed against WHO recommended standards (WHO 2008). For WIFA in adolescent females, once all the entry has been achieved via ODK, it will be cross verified for data entry error and completeness. The data cleaning and analysis will be done using Epi Info. Similarly, all the information obtained related to postpartum mothers either through household surveys or through facilities/providers will be analysed via Epi Info. The data will be statistically analysed using Independent test to see whether any significant improvement has occurred in the status of anaemia in the target population. Once all these data are processed, a clear picture will be formed and this will help in assessing the impact of the intervention. The data analysis and management will require 3 months; considering the public holidays and 10 percent staff attrition.

## DISSEMINATION

The dissemination strategy will be feedbacking the results of the survey to the study participants. This will be done through press releases, campaigns, scientific conferences in the surveyed area. The results will be shared with the village political leaders and community health workers to get their support for the intervention.

## ETHICS AND HUMAN SUBJECTS ISSUES

Ethical approval will be obtained by the IRB. All interviews will be conducted using internationally recognized procedures for informed consent and according to the locally accepted ethical protocols for surveys that include human subjects. Enumerators will be trained and supervisors will ensure these protocols are followed by all survey personnel to ensure justice, equity and beneficence as well as maintaining full confidentiality of all collected data. Interviews will only continue once the respondent is aware of the survey, provided willing consent and continues to be a willing participant of the survey. All enumerators will sign documents confirming their understanding of these requirements and willingness to follow these protocols.

Consent will be obtained from the respondent of legal age (i.e. woman 18-45 years) and an additional assent will be obtained from adolescents who are interviewed but are not yet of legal age

## STRENGTHS AND LIMITATIONS OF THE STUDY

The study may have some of the limitations like unwillingness of the study participants to be a part of the study, inappropriate data handling, issues with anthropometric measurements and its interpretation and inability to maintain consistency of indicators.

But at the same time, the study will help to assess the nutritional status of the target population along with assessment of effect of weekly supplementation of iron and folic acid among the adolescent girls, breastfeeding pattern in children of 6 to 23 months of age and the nutritional status of postpartum women (IFA supplementation and birth package). Following are the strengths and limitations of the methods used for data collection in the study.

| | Methods | Strengths | Limitations |
|---|---|---|---|
| Food consumption record | Objective observation by trained staff at the household level | Ease of application among those with low literacy or those who prepare most meals at home | Individual dietary consumption not accurate; Not suitable among those frequently eat outside the home |
| 24-Hour dietary recall and Dietary History Record | Subjective measure using open and closed ended questionnaires administered by a trained interviewer | Provides detailed usual dietary intake data; relatively small respondent burden (literacy not required) | Possible recall bias; trained interviewer required; possible interviewer bias; expensive and time-consuming; multiple days required to assess usual intake; possible changes to diet if repeated measures |
| Food frequency questionnaire | Subjective measure using a predefined, interviewer-administered format | Assesses usual dietary intake simply; cost-effective and time-saving; suitable for epidemiological studies | Specific to study groups and research aims; chances of recall bias requires accurate evaluation of developed questionnaires |

**Table 5: Strengths and Limitations of the proposed study**

| | TIME IN MONTHS | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| **Planning** | | | | | | | | | | | | | | |
| Contract signing | | | | | | | | | | | | | | |
| Methodology sharing and discussing with every stakeholder involved | | | | | | | | | | | | | | |
| Letter of Approval for conducting the survey | | | | | | | | | | | | | | |
| Preparing list of Equipments to be used in the training | | | | | | | | | | | | | | |
| Final Version of house listing sheet prepared | | | | | | | | | | | | | | |
| Preparing final list of PSUs | | | | | | | | | | | | | | |
| Final version of Questionnaires to be used in the survey | | | | | | | | | | | | | | |
| Recruitment of mappers and house listers | | | | | | | | | | | | | | |
| Recruitment of household Investigators | | | | | | | | | | | | | | |
| TOT for Mapping and House Listing | | | | | | | | | | | | | | |
| TOT for Household surveys | | | | | | | | | | | | | | |
| TOT for Computer Staff | | | | | | | | | | | | | | |
| TOT for Anthropometric Measurements | | | | | | | | | | | | | | |
| Training of Mappers and Listers | | | | | | | | | | | | | | |
| Training of Household investigators | | | | | | | | | | | | | | |
| Training of Health Investigators | | | | | | | | | | | | | | |
| Training of Doctors | | | | | | | | | | | | | | |
| **Data Collection** | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Planning of field work for mappers and house listers | | | | | | | | | | | | | | |
| Mapping and House listing | | | | | | | | | | | | | | |
| Data Entry for Mapping and House listing | | | | | | | | | | | | | | |
| Monitoring and Evaluation | | | | | | | | | | | | | | |
| Planning of field work for household investigators | | | | | | | | | | | | | | |
| Conducting Household Survey | | | | | | | | | | | | | | |
| Reports from the lab for the blood samples sent | | | | | | | | | | | | | | |
| Feedback to the investigators related to questionnaires filled | | | | | | | | | | | | | | |
| Monitoring | | | | | | | | | | | | | | |
| Evaluation (Preparation of report relating to the field work | | | | | | | | | | | | | | |
| **Data Management and Analysis** | | | | | | | | | | | | | | |
| Data transfer | | | | | | | | | | | | | | |
| Editing and coding of open ended questions | | | | | | | | | | | | | | |
| Data Analysis | | | | | | | | | | | | | | |
| Dissemination | | | | | | | | | | | | | | |

**Table 6: Timeline for the proposed study**

## FINANCIAL BUDGET

| Sr. No | Particulars | Unit | No. of Units | Unit Size | Per Unit Cost in INR | Total in INR |
|---|---|---|---|---|---|---|
| | | | | | | |
| 1 | **REMUNERATION OF THE STUDY TEAM** | | | | | |
| a | Project Manager | Month | 2 | 14 | 35000 | 980000 |
| b | Trainers | Day | 6 | 60 | 1500 | 540000 |
| c | Research officer | Month | 9 | 4 | 30000 | 1080000 |
| | Sub Total | | | | | 2600000 |
| | | | | | | |
| 2 | **DATA COLLECTION** | | | | | |
| a | Survey Supervisors | Month | 15 | 1 | 15000 | 225000 |
| b | Mappers and Listers | Month | 30 | 2 | 10000 | 600000 |
| c | Interviewers | Month | 25 | 1 | 10000 | 250000 |
| d | Doctors | Month | 15 | 1 | 30000 | 450000 |
| e | Team Leaders | Month | 25 | 1 | 12000 | 300000 |
| | Sub Total | | | | | 1825000 |
| | | | | | | |
| 3 | **TRAINING COST** | | | | | |
| a | Training Hall | No | 1 | 4 | 5000 | 20000 |
| b | Training Food | No | 120 | 12 | 150 | 216000 |
| c | Stationary | LS | LS | LS | 8000 | 8000 |
| d | Paper Questionnaire (Print/Xerox) | No | 1000 | 1 | 10 | 10000 |
| e | Travel and Per diem for the consultant | No | 1 | 3 | 12000 | 36000 |
| f | Travel of Investigator during training | LS | LS | LS | 20000 | 20000 |
| g | Dissemination | LS | 1 | 1 | 30000 | 30000 |
| | Sub Total | | | | | 340000 |
| | | | | | | |
| 4 | **TRAVEL, TRANSPORTATION (Vehicle Expenses/ Local Conveyance)** | | | | | |
| a | Local Conveyance for field work | Month | LS | LS | 20000 | 20000 |
| b | Local Conveyance for Professional Staff | Month | LS | LS | 20000 | 20000 |
| c | Local Conveyance for Field Researchers | Month | LS | LS | 25000 | 25000 |
| | Sub Total | | | | | 65000 |
| | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 5 | **COST OF SURVEY IMPLEMENTATION** | | | | | |
| a | Pilot test in the field | LS | LS | 1 | 8000 | 8000 |
| b | Vehicle for the survey | No | 15 | 90 | 1000 | 1350000 |
| c | Equipment Cost | No | LS | LS | 30000 | 30000 |
| d | Communication Cost | LS | 1 | 1 | 20000 | 20000 |
| e | Calculation of Nutrient Value from the raw food | | 1 | 30 | 1000 | 30000 |
| | Sub Total | | | | | 1438000 |
| | | | | | | |
| 6 | **RESEARCH TOOL DEVELOPMENT** | | | | | |
| a | IRB Approval fees | LS | LS | LS | 3000 | 3000 |
| b | Pretesting of the tools | No | LS | LS | 15000 | 15000 |
| c | Translation of Tools | No | LS | LS | 15000 | 15000 |
| d | Hiring of TAB and Development of software (CAPI/ ODK Collect) | No | LS | LS | 50000 | 50000 |
| | Sub Total | | | | | 83000 |
| | | | | | | |
| 7 | **LAB CHARGES** | LS | LS | LS | 35000 | 35000 |
| | | | | | | |
| 8 | **MISCELLANEOUS** | LS | LS | LS | 10000 | 10000 |
| | | | | | | |
| 9 | **TOTAL COST** | | | | | 6396000 |
| | | | | | | |
| 10 | **MANAGEMENT COST (10%)** | | | | | 639600 |
| | | | | | | |
| 11 | **GST (@18%)** | | | | | 1151280 |
| | | | | | | |
| | **GRAND TOTAL** | | | | | **8186880** |

**Table 7: Budgeting of the proposed study**

Cost per sample size = 7817 (INR)

Cost per Household = 3780 (INR)

Cost per month = 502542 (INR)

## QUALITY ASSURANCE PLAN

All measures would be taken to ensure that the quality is maintained at all the stages of the survey. All the following measures will be considered for the same.

a. Interview of the trainers, mappers and house listers and the surveyors – The interview would be conducted by the project manager and the research officer. Care would be taken to consider localites for the survey well versed with the local language.
b. Cross-checking the questionnaire – The trainers will check the questionnaire before the survey. Also, the filled-in questionnaires will be checked by the supervisor for all the details to ensure minimum wastage and discard of the questionnaire.
c. Monitoring of the survey – The research officers will monitor the collected data to ensure quality
d. Use of Dictaphone and Transcription – While interviewing the participants, the survey would be recorded as well as noted to avoid missing the important details.
e. Checking the functionality of the software regularly – As the data would be collected via the ODK software, it would be checked regularly to avoid virus corruption.
f. Data entry and Processing – The data would be entered by the research officer and analysed using EpiInfo
g. Monitoring – Research officers will be available onsite along with frequent visits of the program managers to ensure the quality.
h. Evaluation Team – This will comprise of staff with experience in conducting the survey. The research officer will be selected with some prior experience in the similar field. The data collection will be done under the direct supervision of the research officer.

## MONITORING AND EVALUATION

Monitoring and Evaluation will help to provide strong and evidence based data about the burden of anaemia in infants and young children, adolescent females and postpartum women. They

will help to assess the diverge range of interventions being implemented. It forms the basis of strengthening and understanding the many multi-layered factors underlying the burden of anaemia. The survey will be monitored and evaluated considering the various indicators ( Table 8) for all the three target population. This will be helpful in evaluating the success and challenges of the survey.

**Table 8: Monitoring and Evaluation matrix for the survey**

| | | | |
|---|---|---|---|
| **Goal** | Sustainable improvement in the nutrition status of children 6 -23 months old | Sustainable improvement in the status of anaemia in adolescent females 10-19 years of age | Sustainable improvement in the status of anaemia in postpartum women (0-11 months) with a live birth |
| **Indicator** | a. Proportion of children 6-23 months who are malnourished(stunted, wasted or underweight)<br>b. Proportion of children receiving adequate diet | Proportion of adolescent females 10-19 years of age on weekly iron and folic acid supplementation | a. Proportion of postpartum women who have consumed 100+ iron and folic acid supplementations during pregnancy<br>b. Proportion of women who had at least 4 ANC visits with a skilled attendant |
| **Numerator** | a. Number of malnourished children 6-23 months old (stunted, wasted or underweight)<br>b. Number of children receiving adequate diet (6-23 months old) | Number of adolescent females 10 -19 years of age on weekly supplementation of iron and folic acid | a. Number of postpartum women who had consumed 100+ iron and folic acid supplements during pregnancy<br>b. Number of women who had received at least 4 ANC visits with a skilled attendant |
| **Denominator** | a. Total number of 6-23 months old interviewed<br>b. Total number of children interviewed (6-23 months old) | Total number of adolescent females 10 – 19 years of age interviewed | a. Total number of postpartum women being interviewed<br>b. Total number of postpartum women being interviewed |
| **Source of data** | Survey | Survey | Survey |
| **Method of data collection** | Household Interview | Household Interview | Household Interview |
| **Frequency of data collection** | Once | Once | Once |
| **Who is responsible** | Household Surveyors | Household Surveyors | Household Surveyors |
| **Who will use data** | Research Officer, Project Manager | Research Officer, Project Manager | Research Officer, Project Manager |

# CONCLUSION

The available evidence suggests that anaemia is one of the biggest public health threat today, especially in infants and young children, adolescent females and pregnant and postpartum mothers. The presence of anaemia at these phases is intergenerational. Many policies and interventions have aimed at this problem but it is important to monitor the burden of the disease periodically. The proposed monitoring will help to survey the population and understand the variations and trends of anaemia after the implementation of nutrition related interventions in the Ajmer district of Rajasthan.

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