CHAPTER 4: METHODS AND MATERIALS

The current chapter gives details about the methodology adopted for the study. It also discusses about the tools used for data collection and analytical framework used for the analysis of data.

The details of the study design, the tools and methods used for data collection, ethical aspects and statistical analysis are presented under the following sections:

A. Study Design
   1. Site of the Study
   2. Sample Selection
   3. Study phases

B. Tools and methods used for data collection
   1. Qualitative methods
      a) In-depth interviews
      b) Semi-Structured Interview
      c) Non-participant Direct observations
   2. Quantitative methods
      a) Anthropometric measurements

C. Ethical aspects and confidentiality

D. Statistical analysis

A. Study Design

The study was initiated after obtaining official permission from the ICDS District Program officer. The study was an operational research, with a focus on building the capacities of the Anganwadi workers (AWWs) of the ICDS on growth monitoring and promotion (GMP), and infant and young child feeding practices (IYFC) for children under two years of age.

1. Site of the Study

In April 2008, the ICDS program in Gujarat covered a population of around 3.89 crore having around 2.8 million beneficiaries (children under 6 years, pregnant women, lactating mothers and adolescent girls) through 44,179 operational Anganwadi Centers (AWCs). The State had 260 ICDS projects (193 rural, 52 tribal, and 15 urban), spread over 25 talukas of the state. Each project had approximately 3 to 5 ICDS Supervisors covering around 20-25 AWCs, each having a population of about 1000. For the current study, all children under 2 years of age in the Vadodara district
were the universe of study. The ICDS in the district of Vadodara covered a population of 2.3 million and around 0.16 million beneficiaries through 15 ICDS projects. One of the projects of Vadodara district was in Waghodia block, which covered a population of around 11,22,632 through 116 of 119 sanctioned AWC’s. Waghodia block was divided into 6 ICDS Supervisors groups know as ‘Seja’ (Sectors), falling under 2 Primary Health Centers. All Seja of Waghodia taluka formed the sampling frame. For the present study, two Seja with similar nutrition profile (27% and 28%), and weighing efficiency (90% and 92%) for children under three years as per the Monthly Progress Report (MPR) April 2008 were purposively selected as Intervention group (IG) and Control group (CG) respectively.

2. Sample Selection

The primary objective of this study was to measure the impact of capacity building on undernutrition prevalence and IYCF practices. All children under 2 years, approximately 750 per seja i.e. approximately 1500 children, at the time of survey (baseline and post capacity building) formed the main units of observation.

a) Primary Outcome Measure: IYCF Practices

For measuring the change in IYCF practices the sample size was calculated separately, to study the change in exclusive breastfeeding rates (EBF) from children under six months and to study the change in the three IYCF practices from children 6 to 23 months The percentage of children fed with the three appropriate IYCF practices was calculated on a basis similar to the National Family and Health Survey (NFHS)-3 i.e., breastfeeding status, the number of food groups and the number of times the child was fed during the day and night preceding the survey.

The initial proportion of EBF and IYCF practices was estimated from NFHS-3 (2005-06) prevalence for Gujarat. To measure 20% improvement in EBF (47.8% to 67.8%) and 15% improvement in IYCF practices (20.1% to 35.1%) at 80 power, 95% CI sample size required was 120 children under 6 months. and 170 children between 6 to 23 months i.e. total 290 children between 0 to 2 years (NHFS-3 2007 and Epi Info 6.04d). This included an additional 10% to take care of possible dropouts (incomplete information) from the study.

For obtaining a sample size of 120 children under 6 months, all the children under 6 months available at the time of survey were assessed. For getting a total sample size

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3 Age groups are described in intervals of months completed. For example, infants 0–5 months of age have completed 5 months but are less than 6 months (or 183 days) old.
of 170 children between 6 to 23 months, a random number list was generated using Epi Info 6.04d. In situations where the child was not available for anthropometric measurements and/or the mother was not available, the child as per the random number list was replaced for the interview by the next available child. Additionally a cohort of pregnant women in last trimester (7 to 9 mo. gestation) was enrolled at the baseline from both the Sejas. The nutrition status and feeding practices of the children born to the cohort of pregnant women enrolled at baseline was studied, covering around 55 pregnant women from each Seja.

b) **Secondary Outcome Measure: Undernutrition Prevalence**

All children under two years in the study population (~ 1500 children (~ 750 per Seja)) were studied for anthropometric measurements (Height, Weight and MUAC) during baseline and post data collection as secondary outcome measures.

3. **Study Phases**

The entire study was divided into following five phases.

**Phase I: Baseline Data Collection**

The objective of baseline data collection was to assess undernutrition prevalence and associated IYCF practices of care providers of children below 2 years, and to assess the knowledge and perceptions of AWWs and Supervisors with regard to GMP, and IYCF practices. For this the data was collected through house to house survey. Overall the baseline data collection consisted of three parts.

a) **Anthropometric Measurements: Children Under Two Years and Pregnant Women**

Through house to house survey all the children below 2 years in all the AWCs of both the Sejas’ were covered. The full name of child, date of birth, address (street and village name) along with anthropometric measurements (Height, Weight and MUAC) of all children under two years of age was noted. Additionally during the house to house survey pregnant women in last trimester of pregnancy were also enrolled into a cohort and anthropometric measurements, including height and weight, was taken and noted to correlate with pregnancy outcome.

b) **Knowledge Attitude and Practices of Care Providers of Children Under Two Years and Pregnant Women on IYCF and GMP**

During the house to house survey, a total of 290 care providers of children (U-2
years), selected as per random number generated using epi_info, were approached
for interview using pretested semi structured questionnaire (SSQ) (Annexure 1). The
interview lasted for around 20 to 25 minutes and covered questions related to various
indicators directly and indirectly related to undernutrition in children under two years
of age, GMP, IYCF practices and related ICDS services, as mentioned in Table 6:

Table 6: Indicators for Baseline Data Collections – Semi-structured
Interview

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Mothers of Children</th>
<th>Pregnant Women</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 to 6 mo.</td>
<td>6 to 12 mo.</td>
</tr>
<tr>
<td>Socio economic status</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>IYCF practices</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Receipt of counseling on Breastfeeding Practices</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Receipt of counseling on complementary feeding practices</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Knowledge on Breastfeeding Practices</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Knowledge on complementary feeding practices</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>ANC and delivery details of mothers</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Growth Monitoring and Promotion</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Disease profile</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Immunization Status</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Micronutrient Supplementation</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Service Utilization - MAMTA DAY</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Service Utilization - Supplementary Nutrition</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Sanitation and Hand-washing</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

c) Knowledge And Perceptions of Service Providers on IYCF Practices and GMP

Total 19 AWWs of IG, 17 AWWs of CG and their respective Supervisors (one each)
were evaluated for their knowledge and perceptions of IYCF and GMP using an open
dended questionnaire (Annexure 2).

Phase II: - Development of Training Module and Tools

For capacity building of ICDS AWWs the following tools were identified to be required
during intervention.
1. New born and Salter scale
2. MAMTA card (Health and Nutrition Card issued by ANM on registration of
pregnancy, covering all health and nutrition services from ANC to GMP till 3 years)

3. Community growth chart
4. Growth chart register
5. Flip charts on IYCF practices
6. Reference module on IYCF

The tools 1 to 4 were already provided by Health and ICDS department as a part of MAMTA DAY (Village Health and Nutrition Day - VHND). The flip charts (adapted from UNICEF flip chart) and training module were developed by the researcher. The training module was adapted in line with the BPNI training module for front line workers with inputs from IG Supervisor (Annexure 3).

The flip chart used by UNICEF in Valsad Gujarat, was pretested and modified as per AWWs requirement and given to all AWWs of IG (Annexure 4). It was ensured that all 6 tools were available with all AWWs of IG. The CG continued using the tools already available with them.

**Phase III: - Capacity Building of AWWs of IG on GMP and IYCF practices**

After the completion of baseline survey and development of training tools and material, the capacity building of AWWs of IG was planned, with the objective to build the capacity of AWWs on GMP and IYCF. The capacity building was conducted in two ways, first was a formal training addressing all AWWs of IG at the same time, and followed by on-the-job capacity building. The techniques used for capacity building were lectures, discussion and practical sessions, demonstrations and on-the-job training. Through role plays, discussion and on-the-job training, focus was to enhance the counseling skills of AWWs and prioritize the GMP and IYCF counseling on MAMTA DAY and during home visits. The AWWs were trained by researcher on when and how to counsel and what kind of messages to give to different beneficiaries and their family member depending on the duration of pregnancy, age of child and nutrition status of child. The AWWs were trained to focus counseling on the following areas for the respective age groups.

- Pregnant women in 3rd trimester – Early Initiation of Breastfeeding (EIBF) and EBF
- Mothers with 0-3 months old child – EBF
- Mothers 4-6 months old child - EBF and initiation of CF on completion of 6 months.
- Mothers 7–12 months old child - CF and continuation of breastfeeding till 2 years of age and beyond.
Additionally the AWWs were also trained by researcher on, counseling of parents and care providers on use of ready-to-eat (RTE) take home food along with distribution the RTE packets on MAMTA DAY and during home visits.

a) **Formal Capacity Building – Group Training**

The first capacity building was group training held for three days. This was followed by capacity building in monthly review meeting through review, discussion and role play for the next 6 months. At the end of 6 months, half day reinforcement of the capacity building was conducted. The details about the capacity building attended by each AWW in the IG are presented in Annexure 5.

**Group Training:** This was held for three days, using lectures, discussion, demonstrations and practical sessions. The training was given by the researcher and the ICDS Supervisor. The topics covered during capacity building included the following:

- Diet during pregnancy and lactation
- Growth monitoring and promotion
- Infant and young child feeding practices
- Use of tools - Community growth chart, flip cards on IYCF and GMP tools
- Home visits of malnourished children
- Interpersonal communication (IPC) skills

**Monthly Review and Discussion:** During the monthly review meeting the researcher covered issues identified by Supervisor during routine visits and the researcher during field visit from on-the-job capacity building. Further, the queries and problem encountered by AWWs in counseling the mothers and care providers of children under two years on IYCF and conducting GMP activity were addressed. Further during the capacity building held with monthly review meeting, comprehensive and effective messages on IYCF and GMP were developed on the following (Annexure 6).

- EIBF and EBF– Pregnant women in last trimester and their family members
- EBF for first 6 months –parents and care providers of new born and children under 6 months
- Initiation of CF on completion of 6 months and continuation of breastfeeding till 2 years and beyond to the parents and care providers of children 7 months onward.

These messages were used by AWWs for counseling the pregnant women and mother of children under two years of age on GMP and IYCF. Eventually guidelines for MAMTA DAY and home visits with special focus on counseling on GMP and IYCF
were developed.

**Reinforcement of Capacity Building:** During the one day reinforcement of the capacity building, the guidelines for *MAMTA DAY* and home visits with special focus on counseling on GMP and IYCF (Annexure 7) were shared by the researcher with all AWWs.

The topics covered during capacity building included the following:

- Revision of plotting on *MAMTA* card and new growth chart register
- Revision of key action points with focus on IYCF and GMP on
  - *MAMTA DAY*
  - Home visit
  - Counseling of children above six months on breastfeeding and CF
- Role play on
  - Counseling of pregnant women on EIBF
  - Home visits of New born with focus on breastfeeding assessment and counseling
  - Growth monitoring and promotion on *MAMTA DAY* with *Balbhog* distribution
  - Counseling on initiation of CF and continuation of breastfeeding till 2 years
  - Home visits of malnourished children

This guideline was given to assist the AWWs to continue working with pregnant women and parents of children below 2 years of age on improving IYCF practices and prevention of undernutrition, under the guidance of their Supervisor thereafter.

**b) Hands-on Capacity Building - Individual On-the-Job Training**

For the hands-on capacity building of AWWs, the researcher ensured that at least one *MAMTA DAY* and one routine day of each AWW was attended. The approach was assisting AWWs to enhance their skills for effectively implementation of activities related to GMP and promoting of optimal IYCF practices. The hands-on capacity buildings of AWWs were conducted from June 2009 to November 2009. Overall, 17 *MAMTA DAYs* and 32 routine days of AWWs were observed by researcher in duration of 6 months (Annexure 5).

A pretested standard check list was used to note the observation during visit. At the end of the visit, the observations as well as the queries and problems of AWWs were discussed. Focus was on effectively improving the counseling skills of AWWs and the kind of messages which were to be given to the families. These messages would have an impact on knowledge, attitude and practices of parents related to IYCF practices and eventually nutrition status of the children under two years of age. All
the important issues identified during on-the-job capacity building were discussed by
the researcher with all AWWs during the capacity building meeting held with the
monthly review meeting.

The Supervisor was already trained by ICDS in 2007. Further the Supervisor actively
participated in tool and module development, as well as assisted in all the formal
capacity building. The Supervisor observed the AWWs counseling pregnant women
and parents of children under two years of age on IYCF and GMP, as well as
assisted them in improving their capacity with this regard. The Supervisor reported
22 field visits with special focus on capacity building of AWWs of different AWCs.

**Phase IV: - Implementation by ICDS AWWs after Capacity Building**

With guidelines, flip charts and messages on GMP and IYCF practices shared during
the capacity building, the AWWs and ICDS Supervisor continued GMP and IYCF
counseling of care providers of children under two years of age and pregnant women
on **MAMTA DAY**, routine days and during home visits for a period of 6 months The
entire population under the ICDS AWCs of intervention group was thus covered for a
total period of 1 year including 6 months during capacity building and 6 months after
the last reinforcement of the capacity building.

**Phase V: - Assessing the Impact of the Capacity Building**

The impact assessment was planned with the following objectives

- To assess the impact of capacity building on knowledge and perceptions of **Anganwadi Workers'** with regard to GMP and IYCF practices.
- To assess impact of capacity building on undernutrition prevalence and IYCF
practices of care providers, of children under two years.

For the above objectives, the post data collection was planned on similar lines of
baseline data collection.

Additionally, other than the in-depth interviews of AWWs on knowledge and
perceptions like baseline, the concurrent assessments was also done to assess the
on-the-job GMP and IYCF counseling skills of AWWs of both the groups i.e. IG and
CG.

**Process Evaluation by Concurrent Assessment**

After the capacity building was completed, process evaluation of field practices
related to GMP and IYCF was planned through concurrent assessment for a period
of 6 months. In the concurrent assessment data was obtained using observations
and the monthly progress reports of the AWWs.
Observations: To assess on-the-job GMP and IYCF counseling skills of AWWs of both the groups during MAMTA DAYs, routine days and home visits, the AWCs were visited on MAMTA DAYs and routine days and the observations were noted using standardized checklist (Annexure 9 and Annexure 10).

Review of Monthly Progress Report of ICDS: The ICDS AWWs report the nutritional status of all children under 6 years in their monthly progress report (MPR). The data is reported separately for children 0 to 6 months, 7 to 12 months and 12 to 36 months. The data of all AWCs (19 IG +17 CG) was collected every month from April 2008 to April 2010. The data was primarily used for observing the change in weighing efficiency and change in nutritional status of children in the respective groups.

Post data collection

The post data collection was done using the baseline data collection format. Data were collected on anthropometric measurements of children and the IYCF practices and knowledge. The anthropometric measurements of mothers of children born to the pregnant women cohort were also taken.

Follow-up of children in PW cohort on completion of 1 year

The 3rd and final assessment for growth and feeding pattern of children born to the pregnant women cohort was done on completion of one year of age, using the same questionnaire used at baseline (Annexure 1).

The details of the experimental design of the study are presented in Figure 14.
**Methods and Materials**

### Figure 14: Experimental Design

Vadodara District (Waghodia Block)

Waghodia Block ICDS (6 Seja/Sector)

↓

2 Sejas purposively selected
Children 0-24 mo. (N=~1200)

**Intervention Group (AWC=19) (IG)**

**Control Group (AWC=17) (CG)**

**BASELINE DATA**

- **Anthropometric measurements** including Height, Weight and MUAC* – All children U-2 yrs (~ 600 per group) and PW in 3rd trimester ~ 55 per group
- **Semi Structured interview** for assessment of KAP on IYCF and GMP (Sub sample of 290 care providers of U-2 per group and all PW in 3rd trimester)
- **In depth Interview** for assessment of knowledge and perceptions of IYCF practices and GMP - all AWW and ICDS Supervisor = 19+17+2 =38

**Training Module and Tool development** - Reference module on IYCF and Flip charts on IYCF practice developed

**Capacity Building** - GMP and IYCF practices

- **Formal** capacity building – 3 days training + monthly review and discussion (6)
- **Hands-on** capacity building @ 2 per AWW including a MAMTA DAY and a routine day
- **Reinforcement** of capacity building - One

**Implementation by AWWs during and after capacity building**

GMP and IYCF counseling (MAMTA DAY, routine days and home visits) – 6 mo. during capacity building + 6 mo. post capacity building

**Process Evaluation by Concurrent Assessment**

- Observations during MAMTA DAY, routine days, home visits and monthly Seja meeting
- Review of MPR of ICDS for U-3 nutrition status and weighing efficiency

**Post Intervention data collection**

- Anthropometric measurements including Height, Weight and MUAC* – All children U-2 yrs (~ 600 per group) and mothers from PW cohort ~ 55 per group
- Semi Structure interview for assessment of KAP on IYCF and GMP (Sub sample of 290 care providers of U-2 per group and all care providers of children in PW cohort)
- In depth Interview for assessment of knowledge and perceptions of IYCF practices and GMP - all AWW and ICDS Supervisor = 18+17+2 =37

**Follow-up of children in PW cohort on completion of 1 year**

- Anthropometric measurements including Height, Weight and MUAC* – All children and mothers and assessment of IYCF practices
B. Tools and Methods Used For Data Collection

The Table 7 summarizes the quantitative and qualitative indicators and tools of data collection employed for the study. The tools employed for data collection were pre-tested in a similar rural setting before beginning the actual data collection.

Table 7: Indicators and Tools for Data Collections:

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anthropometric measurements</strong></td>
<td>• Infant Weighing Scale and digital weight scale (Picture 6 and Picture 7: )</td>
</tr>
<tr>
<td>• Weight</td>
<td>• Length meter (Picture 8)</td>
</tr>
<tr>
<td>• Length</td>
<td>• MUAC tape (Picture 11)</td>
</tr>
<tr>
<td>• MUAC</td>
<td>• Height meter (Picture 9)</td>
</tr>
<tr>
<td>• Height of Pregnant and lactating women cohort</td>
<td></td>
</tr>
<tr>
<td><strong>Socio economic status. Drinking Water, Sanitation and Hand-washing</strong></td>
<td></td>
</tr>
<tr>
<td><strong>IYCF practices, Disease profile and Growth Monitoring and Promotion</strong></td>
<td>Pretested standardized semi structured questionnaire (Annexure 1)</td>
</tr>
<tr>
<td><strong>Immunization and Micronutrient Supplementation</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Service Utilization</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Knowledge of Lactating mothers (Under 1 year) and pregnant women on Breastfeeding Practices</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Knowledge of Mother of children under 2 years on complementary feeding practices</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Knowledge and Perceptions of AWWs on IYCF and GMP</strong></td>
<td>Pretested standardized in depth interview question guide (Annexure 2)</td>
</tr>
<tr>
<td><strong>Knowledge and Perceptions of Supervisors on IYCF and GMP</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Assess the AWWs' counseling on IYCF and GMP, on MAMTA DAY, during home visits and on routine days.</strong></td>
<td>Pretested standardized observation checklist (Annexure 9 and Annexure 10)</td>
</tr>
</tbody>
</table>

1. Qualitative methods

The qualitative methods used in the study included in-depth interviews, semi-structured interviews and non-participatory direct observations.

a) In-depth Interviews

**Principle:** The in-depth interview is a technique designed to elicit a vivid picture of the participant’s perspective on the research topic. During in-depth interviews, the
person being interviewed is considered the expert and the interviewer is considered the student (Milena 2007). It is a qualitative research method in which a researcher/interviewer gathers data about an individual’s perspectives on a specific topic(s) through a semi-structured exchange with the individual. The researcher’s interviewing techniques are motivated by the desire to learn everything the participant can share about the research topic. Researchers engage with participants by posing questions in a neutral manner, listening attentively to participants' responses, and asking follow-up questions and probes based on those responses. They do not lead participants according to any preconceived notions, nor do they encourage participants to provide particular answers by expressing approval or disapproval of what they say. In-depth interviews are usually conducted face-to-face and involve one interviewer and one participant (Mack 2005)

Method: The AWWs and ICDS Supervisors were interviewed in-depth using a question guide. The actual responses of the target groups were noted and for analysis, the responses were grouped into different categories and coded. The interview schedule for functionaries (Annexure 2) included questions related to their knowledge and perceptions of GMP and IYCF practices. The schedule included questions on 7 broad themes:

1) Profile of AWWs
2) Key IYCF practices
3) Breastfeeding
4) Complementary Feeding
5) Growth Monitoring and Promotion
6) Diet during Pregnancy and Lactation
7) Inter Personal Counseling

The questionnaire was prepared by using the standardized formats of the Breastfeeding Promotional Network of India (BPNI) for conducting in-depth interviews for community workers (BPNI). The terms and definitions for IYCF used were as per the National Guidelines on IYCF, 2nd edition (2006), Integrated Management of Neonatal and Childhood Illness (IMNCl) and National Family Health Survey (NFHS) III.

b) Semi Structured Interview

Principle: A semi-structured interview is carried out on the basis of a question guide that enlists questions regarding the topic that need to be covered. The researcher's queries follow a pre-determined pattern; however, the focus on the topic may shift
according to the responses of the informant (Bernard 1988). Some questions are structured and some are open ended.

**Method:** The mothers/care providers of children under two years (0-23 mo.) and pregnant women (enrolled at baseline) were interviewed using a semi structured question guide.

The questionnaire was prepared by using the standardized formats of the Breastfeeding Promotional Network of India (BPNI) for conducting in-depth interviews. The terms and definitions for IYCF used were as per the National Guidelines on IYCF, 2nd edition (2006), IMNCI and NFHS-3.

On completion of anthropometric measurements of the child, the investigator started the interview of all pregnant women in last trimester and randomly sampled mothers of children under two years of age. The interview started with a brief introduction of the interviewer, objective of the study, time required for the interview and an oral consent of the interviewee.

The interview schedule for pregnant women and mothers of children under two years of age (Annexure 1) and the women enrolled in the pregnant women cohort included questions which can be divided into the following 6 categories.

**Socio-Economic Status**

At first information on the socio-economic background was collected, which included information regarding mothers'/pregnant women's age, caste religion, education, occupation, income (mother and family). This was followed by collection of information on IYCF practices and receipt of counseling.

**Receipt of Counseling on IYCF and GMP during Pregnancy and Post Delivery**

The ANC, delivery and post natal care details was collected only for the mothers of children below one year of age. The objective was to identify the sources of counseling about early initiation of breastfeeding (EIBF) during pregnancy and EBF, prelacteal feeding and bottle feeding post delivery.

The sources of counseling on the CF practices and GMP were collected from all the mothers of children under two years of age covered in the interview.

**IYCF practices of the children (0-23 months)**

Along with the information on counseling, the data on IYCF practices of the children under two years was also collected. The data on the IYCF practices collected included information regarding EIBF, prelacteal feeding, feeding problems, EBF, duration of breastfeeding, bottle feeding, initiation of CF, consistency, frequency, quantity and type of CF, hand-washing during feeding, as well as availability,
accessibility, advocacy and utilization of the supplementary food provided by ICDS AWCs.

**Knowledge, Attitude and Practices on IYCF and GMP**

After the assessment of IYCF practices, the knowledge, attitude and practices (KAP) of mothers on IYCF and GMP was assessed. For assessing the KAP, all mothers of children under two years of age were assessed for GMP and CF, whereas the KAP on EIBF was assessed on pregnant women and EBF was assessed on pregnant women cohort and lactating mothers with children below 1 year.

**ICDS Service utilization**

The utilization of various services of the integrated child development services (ICDS) scheme for women and children with reference to GMP and IYCF was assessed. The major program covered with this regard were

- **MAMTA DAY** with focus on GMP and counseling on IYCF
- Supplementary Nutrition Program (SNP) with regard to the availability, accessibility, advocacy and utilization of the supplementary food especially *Balbhog* for children 6 to 36 months old provided by ICDS AWCs.

**Factors Affecting Health and Nutritional Status of Children**

During the interview, information was collected on the factors which may have a direct impact on the nutritional status of children below 2 years. This included information on morbidity profile, immunization, micronutrient supplementation, consumption of iodized salt, drinking water sources and storage and hygiene and sanitation. The interviewer observed the site of storage of drinking water and recorded into the questionnaire, similarly salt used in the last cooking was tested using a salt testing kit for iodine estimation.

Undernourished children are sensitive to certain infections and thus morbidity data was collected for correct interpretation of the change in the levels of these parameters. Data on the morbidity profile was collected using a reference period of 15 days during the baseline and post data collections (Annexure 1).

The terms for infectious episodic morbidities were explained if not understood as follows:

- **Diarrhea** Defined as passing of more than three loose stools in a day.
- **Cold** Characterized by running nose or blocked nose.
- **Cough** Based on subject’s history.

In the morbidity profile, information about kind and sources of treatment, breastfeeding, ORS was also gathered.
c) Non-participant Direct observations

**Principle:** Observations are based on examining an object, an individual, a group of people or an event, using all the senses. Carefully observing behavior and events helps to obtain valuable non-verbal cues as to what is actually occurring compared to what is being said (Bernard 1988). Lack of correlation between reported and actual practices may be revealed through direct observations (Kashyap 1990).

**Method:** In the present study direct observations were used to assess the AWWs’ counseling on IYCF and GMP in all the AWCs, on *MAMTA DAY*, during home visits and on a regular day. A pre coded observation checklist was used to guide and record the observations (Annexure 9 and Annexure 10).

2. Quantitative methods

The quantitative methods used anthropometric measurement of children under two years and women enrolled in the pregnant women cohort.

a) Anthropometric Measurements

Anthropometry is the study and technique of taking body measurements. It is used widely to measure the nutritional status of individuals or populations.

**Principle:** The physical dimensions of the body are markedly influenced by nutrition. Nutritional assessment is concerned with the measurement of the variations of the physical dimensions, at different age levels and degrees of nutrition. Selected body measurements provided valuable information concerning certain types of undernutrition in which body size and gross body composition are affected (Gibson 1989)

In the current study, anthropometric measurements included height, weight and mid-upper arm circumference (MUAC) measurements of all children below 2 years of age. The MUAC measurement was taken for children above 6 months only. Additionally height and weight measurement of women enrolled at baseline in the pregnant women cohort was also taken.

**Weight**

- **Principle**

Weight is a key anthropometric measurement of body mass. Weight is the single most widely used measurement for the assessment of nutritional status. This is in large part due to the relative ease of measurement and the obvious relationship of
the weight to food intake, absorption and utilizations. Empirical studies have consistently demonstrated the utility of body weight. A low weight measurement can be the result either of a recent acute episode of nutritional inadequacy or chronic malnutrition (Jellifee 1966).

**Method**

The pregnant women (enrolled at the time of baseline) and children (above one year of age who could stand properly on their own) were weighed barefoot on a UNICEF mother/child electronic scale (Picture 6).

UNICEF Electronic Scale was manufactured by SECA and is a floor scale for weighing children as well as adults (capacity 150 kg). Weighing capacity from 1 kg to 150 kg in 100 g divisions, accuracy +/- 100 g. Weight of adult on scale can be stored (tarred) in memory, allowing the weight of baby or small child held by adult to show on scale indicator. The portable scale, weighing 4 kg, includes a solar cell on-switch (light sensitivity 15 lux) and is powered by a long-life lithium battery good for one million weighing cycles. The major advantage is that it has a microcomputer chip so that it can adjust itself to zero and weighs people quickly and accurately.

While taking the weight measurements, the clothing on the child’s body was kept minimal. It was also ensured that the scale was not over-heated in the sun and was placed on an even surface enabling the reading to be clear. The subjects were asked to stand straight on the scale without touching anything and look straight ahead. The scale was checked for accuracy before and after every reading and the weight measurement was recorded to the nearest 0.1kg.

The weight of children less than 1 year was taken using an infant weighing scale (Picture 7). It was ensured that the infant was wearing minimal clothing while taking the weight. The infants were placed on the scale in the manner that they do not touch
any support. The weight was then taken to the nearest 100 gm. Reading was taken twice and the scale was recalibrated to zero before each measurement to ensure accuracy.

**Height/Length**

- **Principle**

The height of an individual is made up of the sum of four compartments: legs, pelvis, spine and skull. While, for detailed studies of body proportions, all of these measurement are required in field nutritional anthropometry usually only the total height (or length) is measured (Jelliffe 1966). The extent of height deficit in relation to age as compared to regional standards may be regarded as a measure of the duration of malnutrition. A given deficit in height may represent a short period of growth failure at an earlier age or a longer period of growth failure at a later age. Height measurements of all the pregnant women (3rd trimester) enrolled in the cohort.
Methods and Materials

at baseline were taken using a flexible, non-stretchable height meter (Picture 9). The height meter was kept vertically on a smooth wall of the AWC or house in the community perpendicular to the ground, ensuring that the floor was smooth. The subject was asked to stand erect with the shoulders, hips and heels touching the wall and with no footwear, heels together and looking straight ahead. The head was held comfortably erect, arms hanging loosely by the sides. A thin smooth scale was held on top of the subject's head in the center, crushing the hair at the right angles to the tape and the height of the subject was read from the lower edge of the ruler to the nearest 0.1 cm. The heights were taken twice at baseline and post delivery and the average of both the measurement was taken.

**Mid-Upper Arm Circumference (MUAC)**

- **Principle**

Measurements of the mid-upper arm appear to be most useful in practice. This region is easily accessible, even when a young child sitting in front of the examiner on his mother’s lap. Also, in kwashiorkor the upper arm is not usually clinically oedematous, while it has been shown that the mid-upper arm is markedly wasted in this condition (Jelliffe 1966).

Mid-Upper Arm Circumference (MUAC) is relatively easy to measure and a good predictor of immediate risk of death. It is used for rapid screening of acute malnutrition from the 6-59 months age range (MUAC overestimates rates of malnutrition in the 6-12 months age group).

- **Procedure**

MUAC is the circumference of the left upper arm measured in centimeters. The point is between the tip of the acromial process of the scapula (shoulder) and the olecranon process of the ulna (elbow). Arm circumference is measured with special circumference measuring tapes or circumference insertion tapes. The MUAC tape (Picture 11) used in the current study was a flexible, fiberglass, non-stretchable tape. The steps in measuring mid-upper arm using a MUAC tape are detailed in Picture 10. The child and accompanied care provider were asked to sit down whenever possible. Very young children were held by their mother/care providers during this procedure. The mother was asked to remove clothing that may cover the child’s left arm. For calculating the midpoint of the child’s left upper arm, first the tip of the child’s shoulder (acromial process of the scapula) with finger tips was located. The child elbow was bent to make a right angle. A tape at zero was placed, on the tip of the shoulder and pulled straight down past the tip of the elbow (olecranon process of the
ulna). The number at the tip of the elbow to the nearest centimeter was noted. The number was divided by two to estimate the midpoint. The midpoint with marked with a pen on the arm. The child’s arm was straightened and the tape was wrapped around the arm at midpoint. It was ensured that the numbers were right side up and the tape was flat around the skin. The tension of the tape on the child’s arm was examined to ensure that the tape had the proper tension and was not too tight or too loose. The measurements were recorded to the nearest 0.1 cm. The tape was then removed from the child’s arm.

![Picture 10: Steps in Child Mid-Upper Arm Circumference Measurement (UN, 1986)](image128x250.png)

![Picture 11: MUAC tape use for Mid-Upper Arm Measurement](image404x252.png)

C. Ethical Aspects and Confidentiality

The study had received ethical approval (F.C.Sc/FND/ME/89 DT 20.9.2011) from the Department of Foods and Nutrition, The M S University of Baroda, ethical review committee.

For each study subject and service provider (AWW and Supervisor), informed oral
consent was taken prior to initiation of data collection. Only those beneficiaries and functionaries willing to participate in the study were included in the sample. Few children found critically ill were advised to take appropriate treatment and excluded from the study.

The AWWs of CG were trained on GMP and IYCF with similar guidelines after completion of data collection.

D. Statistical Analysis

- The Z-scores of anthropometric data was calculated using the new international reference population released by the WHO (Onis 2006) and accepted by the Government of India.
- The risk ratio and risk difference estimate of all anthropometric parameters post capacity building, were calculated within the intervention and control group.
- The anthropometric measurements and data from in-depth interview of children under two years were entered into Epi Info 6.04d. The data entered was analyzed using the SPSS version 10, Microsoft Excel 2007 and Epi Info 6.04d.
- Frequency and percentages were calculated for all parameters that were expressed in categories.
- Mean and standard deviation were calculated for all parameters that were expressed numerically.
- Chi-square test was used to assess the difference between the frequency distributions.
- Corrected chi-square was used, to asses’ pre and post difference within the group since, the study population was not static.
- Independent ‘t’ test and paired ‘t’ test was used to compare differences between the means.
- Correlation coefficients were computed between indicators of nutritional status and IYCF practices and other parameters of interest.
- Stepwise multiple regression analysis was done to identify independent variables that had a significant role in influencing the four dependent variables (weight-for-age, height-for-age, weight-for-height and MUACZ).
- The in-depth interview schedule of AWWs and Supervisors was entered into excel sheet. One vertical column represented one interviewee. The entire interview was divided into 7 themes and 24 indicators. Each question within a theme was graded based on the correctness of the response.
  - The responses were quantified into number and percent score wherever
possible and presented in tabular form. For this the entire interview was scored, 1 point (score) per AWW for each preferred response e.g. in the question 2 (Annexure 2) *what do you mean by optimum infant and young child feeding? List four key IYCF practices?* The question was rated on total 4 marks, since there were 4 important aspects to be covered.

- Further, mean scores were calculated for all indicators taking mean of all responses of all AWWs. Negative marking was done only in CF section while assessing knowledge and perceptions about type and consistency of food. These were only when AWWs listed thin liquid foods as CF.
- Independent t-test was applied for pre and post mean scores between IG and CG, whereas paired t-test was applied within IG and CG mean score, pre and post capacity building.
- At the time of post data collection one AWW of IG had resigned. Hence the post data tabulation was done considering 18 AWWs, pre and post for IG.