METHODS AND MATERIALS

The present study **"Improving Food and Nutrition Security by Public-Private Partnership in rural households"** was undertaken to fulfil the following objectives:

OBJECTIVES

1. Situational analysis of the food and nutrition security status of the mother-child pairs in a rural setup
2. Identification of the positive deviant behaviors depending on 4 attributes (Household dietary diversity score, IYCN score and hygiene and sanitation score, weight for age score of children) and capacity building and infrastructure development to improve food and nutrition security through interventions as a part of public-private partnership.

STAKEHOLDERS INVOLVED IN THE STUDY:

- Department of Foods and Nutrition, Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda, Gujarat
- Department of Women and Child Development, Government of Gujarat
- Department of Health, Government of Gujarat
- Department of Agriculture, Government of Gujarat
- Collectorate office, rural Vadodara
- CSR cell of TSIPL (Transpek Silox Industries Private Limited), Vadodara

PERMISSIONS OBTAINED:

1. The administrative permissions were obtained from the stakeholders and village heads (sarpanch).
2. Permissions and consent were obtained from grass-root level workers (AWWs and ASHAs) to ensure their co-operation and support for the study.
3. Permissions and consent were also obtained from the mothers with less than 5 years old children, selected for the study and their family members after they were introduced about the study, its objectives, procedures and expected outcomes in simple understandable local language to ensure their active participation.

ETHICAL APPROVAL:

Ethical approval (Approval No: IECHR/2015/16) was granted by the ethical committee of Department of Foods and Nutrition, The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat**.**

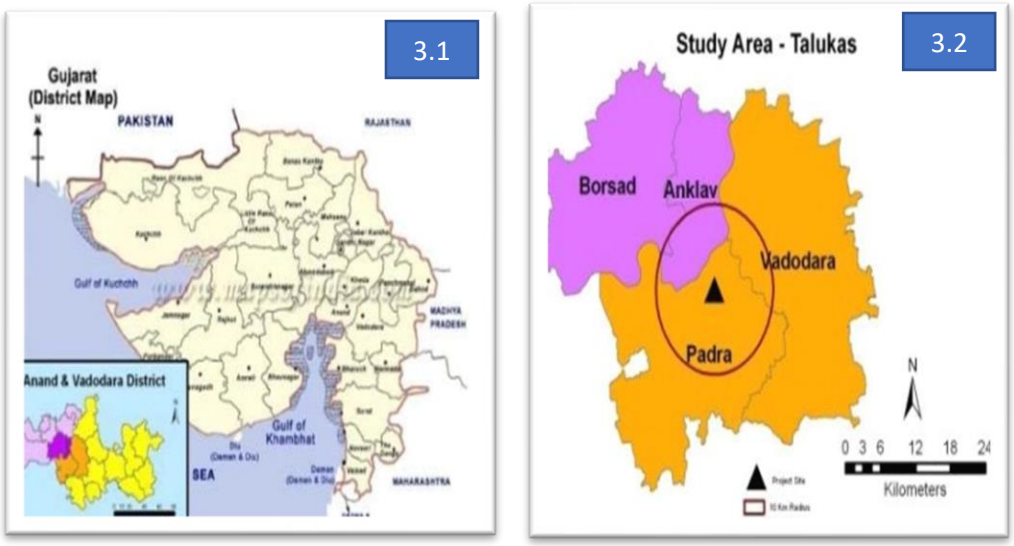
FUNDING:

This was a CSR project funded by Transpek Silox Industries Private limited (TSIPL), Vadodara under public-private partnership. University Grants Commission (UGC) also provided Junior research and senior research fellowship (JRF & SRF) to Ms. Chitrarpita Saha (PhD Scholar) who worked as a research fellow and involved in development of the proposal, study design, data collection, implementation of the study, data entry, data analysis, report writing and research publications.

STUDY AREA

Four village clusters (Valipura, Mota Ekalbara, Nana Ekalbara, Hynapura) of Ekalbara village, Padra Taluka, rural Vadodara, Gujarat, Western India (Figure 3.1) were selected as study area**.** It lies between latitudes 21° 45’ and 22° 45’ North and longitudes 72° 48’ and 74° 15’ East. About 68% of the total geographical area is under cultivation which emphasizes that the district is one of the important agriculture districts of Gujarat State.

Glimpses of Gujarat State and the study area selected (image 3.1-3.2)



Based on the objectives the methodology has been discussed under the following 2 phases**:**

Phase I: Understanding the food and nutrition security status and predictors of undernutrition of the mother-child pairs in a rural setup

Phase II: Identification of positive deviant behaviors and promotion of mothers with identified PDBs– a community trial for improving food and nutrition security using public private partnership

PHASE I: UNDERSTANDING THE FOOD AND NUTRITION SECURITY STATUS AND PREDICTORS OF UNDERNUTRITION OF THE MOTHER-CHILD PAIRS IN A RURAL SETUP

Study Design

Cross sectional study

Study population

In phase I, status of food and nutrition security was assessed on the following population-

- Grass root level workers **(**Anganwadi workers)
- Mothers with children less than 5 years old

Sampling

Based on our CSR partner's purposive sampling selection, four village clusters (Valipura, Mota Ekalbara, Nana Ekalbara, Hynapura) in Ekalbara village, Padra taluka, rural Vadodara were selected as study area and blanket coverage was done while selecting the subjects for the study. All the households having children less than 5years (n=160) were identified and mother child pairs were enrolled for the study based on the following inclusion and exclusion criteria after giving their consent (annexure 1 & 2). Among 4 village clusters, there were 48 mother-child pairs in valipura (cluster 1), 48 in Mota Ekalbara (cluster 2), 34 in Nana Ekalbara (cluster 3) and 30 in Hynapura (cluster 4).

Inclusion and exclusion criteria

Inclusion Criteria

- Mothers with child < 5 y
- Resident of the village
- Willing to participate

Exclusion Criteria

- Mothers with child > 5 years
- Migrants
- Not willing to participate

All the ICDS workers (n=3) were also enrolled. In the study area, there were total 3 ICDS centers initially with 1 *anganwadi worker* each.

Section A: Assessment of natural and government eco-system

Data regarding natural eco-system were collected from previous records and by observation. Data regarding government services were collected from community workers worked under ICDS in the study area by personal interview using semi-structured questionnaire (annexure 3).

Section B: Background information and food and nutrition security assessment

Formative assessment

Background information about gender and age of the children, type and size of the family as well as obstetric history of the mothers were elicited by personal interviews using semi-structured questionnaire (annexure 4).

Food and nutrition security status assessment

The status of food and nutrition security was assessed using the following (Table 3.1) parameters (IFPRI, 2015).

Table 3.1: Parameters of Food and nutrition security assessed in the study

Food availability	Food accessibility	Food affordability	Food utilization
• Food aid • Agriculture • Livestock • Local Markets	• Road condition • Drinking water access	• Family Income • Per-capita income • Women's individual income	• Household dietary pattern and dietary diversity • Infant and Young Child Nutrition (IYCN) • Hygiene and sanitation practices • Nutritional status of mothers and children • Maternal anemia

Food stability is achieved when all the other parameters get accomplished.

Food availability assessment

Assessment of Food Aid (ICDS)

Data regarding implementation of the government scheme (ICDS) and availability of food (ICDS) were elicited from the grassroot level workers (AWWs and ASHA) and all mothers with children <5y enrolled in ICDS through personal interview using semi structured questionnaire (annexure 3 & 4) and focus group discussion.

Assessment of agricultural Practices

Data regarding agricultural practices in the households were elicited through Key informant Interviews with the HH heads using a semi structured questionnaire (annexure 4) and Focus group discussion with the farmers and women involved in farming.

Assessment of livestock and local markets

Data regarding livestock in the area or households and existence of local shops and markets and food available in those places were elicited through key informant interviews with the HHs heads using a semi structured questionnaire (annexure 4) as well as observation method.

Food accessibility and affordability assessment

Assessment of road condition, drinking water access and income

Food accessibility was assessed through eliciting data regarding socio-economic status of the family especially their income, road condition in the village and drinking water access through personal interview using semi-structured questionnaire (annexure 4) and observation.

Food utilization assessment

Assessment of Household dietary pattern and dietary diversity

Household dietary pattern was elicited by personal interviews using semi-structured questionnaire (annexure 4) on intra-household food distribution, consumption of breakfast and number of meals consumed each day.

"Dietary diversity represents the number of different foods or food groups consumed over a given reference period" (Hoddinott & Yohannes, 2002). Diet diversity scores are meaningful indicators of FNS for four reasons. First, dietary diversity scores correlate with measures of food consumption and are a good measure of household food access and caloric availability. Second, a varied diet is a worthy outcome in itself. Third, more diet variety is associated with a number of improved outcomes, particularly in birthweight (Rao et al., 2001), child anthropometric status (Hatloy et al., 2000), improved hemoglobin concentration (Bhargava et al. 2001), reduced risk of mortality from cardiovascular disease (Kant et al., 1995) and incidence of hypertension (Miller et al., 1992). Fourth, diet diversity scores can be collected through household surveys and can be used to examine FNS at individual and intrahousehold levels (Hoddinott & Yohannes, 2002).

In the present study**,** Household dietary diversity was estimated by a food frequency questionnaire (annexure 5) which included a list of common Western Indian foods in groups of 12 (cereals; pulses and legumes; roots and tubers; green leafy vegetables; other vegetables; fruits; nuts and oilseeds; milk and milk products; non vegetarian foods; fats and oil; and sugar; spices, condiments and beverages). Consumption patterns were recorded based on their intakes (daily, weekly, fortnightly, monthly, occasional or seasonal). Based on the data, Household Dietary Diversity Score (HDDS) was calculated for each mother-child pair using FAO guidelines (FAO, 2010) wherein the households which consumed at least 8 food groups daily (based on 50^{th} percentile) scored as positive and rest scored as negative indicating poor dietary diversity.

Assessment of Infant and Young Child Nutrition (IYCN)

Details of age-specific Infant and Young Child Nutrition (IYCN) practices as per the guidelines by UNICEF 2013, recorded with the help of a checklist using semi-structured questionnaire (annexure 4).

Assessment of hygiene and sanitation practices

Observations and personal interviews using semi-structured questionnaire (annexure 4) were also recorded to understand their hygiene and sanitation practices to overcome the discrepancies between the answers provided by the mothers as compared to their actual practice.

Nutritional status assessment of mothers and children

Anthropometric measurement was taken for both mothers and children (Height and weight). BMI of mothers were calculated and categorized using standard methods (BMI<18.5 identified as underweight, WHO, 2006) and in case of children z-scores were calculated for weight/age, height/age, weight/height, using WHO Anthro software and according to the z score (≤-2SD) children were identified as stunted, wasted and underweight (WHO, 2006). Severe acute malnourished or SAM (WHZ <-3SD), moderate acute malnourished of MAM (WHZ <-2SD-≥-3SD) and global acute malnourished or GAM children (both SAM and MAM) were also identified.

Stunting reflects chronic undernutrition during the most critical periods of growth and development in early life. It is defined as the percentage of children aged 0 to 59 months

whose height for age is below minus two standard deviations (moderate and severe stunting) and minus three standard deviations (severe stunting) from the median of the WHO Child Growth Standards (WHO, 2006). Underweight is a composite form of undernutrition that includes elements of stunting and wasting. It is defined as the percentage of children aged 0 to 59 months whose weight for age is below minus two standard deviations (moderate and severe underweight) and minus three standard deviations (severe underweight) from the median of the WHO Child Growth Standards (WHO, 2006). Wasting reflects acute undernutrition. It is defined as the percentage of children aged 0 to 59 months whose weight for height is below minus two standard deviations (moderate and severe wasting) and minus three standard deviations (severe wasting) from the median of the WHO Child Growth Standards (WHO, 2006). Low birthweight is defined as a weight of less than 2,500 grams at birth (WHO, 2006).

Assessment of maternal anemia

Biochemical assessment was done for both mothers and children by trained technicians from a reputed laboratory of Baroda. All necessary safety measures were taken during blood collection. Mothers whose Hb level was less than12g/dL, identified as anemic (WHO, 2006).

Section C: Evaluation of predictors of undernutrition

Predictors of undernutrition was assessed by statistical analysis using SPSS 23 software by chi square, correlation and simple linear regression method and tables and graphs were made in Microsoft excel.

Table 3.2 describes the tools and techniques used in Phase I of the study.

Table 3.2: Phase I Tools and Technique (Annexure 3,4, & 5)

PARAMETERS	TOOLS	TECHNIQUE	Reference
Assessment of ICDS services (Infrastructure, current implementation of services, knowledge of functionaries)	Semi-structured questionnaire	➢ Personal Interview with AWWs	WCD, 2013
Assessment of agricultural practices, Food aid, livestock, local markets and shops to understand food availability	Semi-structured questionnaire	➢ Personal Interview with mothers ➢ Focus group discussion with mothers ➢ Direct observation	FAO, 2010 WCD, 2013
Assessment of income to understand food affordability; road condition and drinking water access to understand food accessibility	Semi structured questionnaire	➢ Personal Interview ➢ Observation	IFPRI, 2015
Assessment of dietary diversity and diet pattern to understand food utilization	Food frequency questionnaire Semi-structured questionnaire	➢ Personal Interview with enrolled mothers ➢ Participatory observation ➢ Focus group discussion	FAO, 2010
Assessment of IYCN and hygiene & sanitation practice to understand food utilization	Semi-structured questionnaire	➢ Personal Interview with enrolled mothers ➢ Participatory observation	UNICEF, 2013
Assessment of nutritional status of the mother-child pairs to understand food utilization	Weighing scale, measuring tape	➢ Anthropometric assessment (height & weight) carried out by standard methods ➢ HAZ, WHZ, WAZ scores were calculated using WHO anthro software and BMI using WHO guidelines ➢ stunting (HAZ≤-2SD), wasting (WHZ≤-2SD), underweight (WAZ≤-2SD) status of children and undernutrition of mothers (BMI<18.9) determined	WHO, 2006
Assessment of maternal anaemia to understand food utilization	Biochemical assessment tools	➢ blood was collected by trained technicians, hb level assessed at reputed laboratory of Baroda and maternal anemia determined (Hb<12g/dL)	WHO, 2006

Primary Outcome

- Understanding the service delivery and utilization of the existing food aid
- Understanding agricultural practices, livestock and market availability in study area
- Understanding the physical and economic accessibility of the households
- Understanding household dietary diversity, IYCN, hygiene and sanitation practices
- Nutritional status of the mother-child pairs
- Understanding the predictors of undernutrition

Secondary Outcome

Assessment of the Food and Nutrition Security (FNS) of the households with the help of indicators listed by IFPRI, 2015.

Experimental design of phase 1 explained below (Figure 3.2).

Figure 3.1: Phase I Experimental Design

Glimpses of phase I data collection (Image 3.3-3.13)

PHASE II: IDENTIFICATION OF POSITIVE DEVIANT BEHAVIORS (PDBS) AND PROMOTION OF MOTHERS WITH IDENTIFIED PDBS– A COMMUNITY TRIAL FOR IMPROVING FOOD AND NUTRITION SECURITY USING PUBLIC PRIVATE PARTNERSHIP

It is often seen that in communities there are a few 'deviant' individuals whose uncommon behaviors or practices enable them to outperform their neighbors with whom they share the same resources. Identification of these "positive deviants" can be crucial to bring sustainable change as their behaviors are likely to be affordable and acceptable and sustainable by the wider community because their peers are already practicing them (Sethi et al., 2003). Promotion of those identified positive deviant behaviors using the deviant individuals as change agents were carried out to improve food and nutrition security using public-private partnership in the present study.

Study Design

It was a case-control study where two clusters (Cluster 1 and Cluster 2) were selected as case (provided all the existing government services along with intervention at micro, meso, exo and macro level) and other two (Cluster 3 and Cluster 4) were selected as control (provided all the existing government services only and no intervention was carried out).

Study population

Intervention for 1 year carried out in the case or experimental group promoting PD mothers (n=13, 5 in cluster 1 and 8 in cluster 2) as change agents to ND mothers (n=83, 43 in cluster 1 and 40 in cluster 2) to improve diet, IYCN, hygiene and sanitation and nutritional status at micro and meso level and large scale infrastructure, agriculture, food aid development at exo and macro level as a part of public-private partnership. Impact was assessed among all the mothers in all four clusters.

Sampling

All the mother-child pairs who were assessed in phase I were assessed again after intervention. Only mother-child pairs who were not available in the study area for post data assessment were removed as drop outs.

Section A: Identification of Positive Deviant Behaviors (PDBs) and enrollment of mothers with PDBs as change agents

In the present study, mother-child pairs were categorized into two groups: Group I PDB mothers (mothers having PDBs) who had normal children (WAZ>-2SD), scoring positive in Infant and Young Child Nutrition (IYCN) score, Household Dietary Diversity Score (HDDS) and Hygiene and Sanitation Score (HSS); and rest as Group II NDB mothers (mothers having negative deviant behaviors).

Household dietary diversity score card (Based on FAO guidelines, 2010)

Mothers whose households consume more than 8 food groups (based on 50^{th} percentile) among the selected 12 food groups scored positive in household dietary diversity score card and rest scored negative. 12 food groups were cereals; pulses; green leafy vegetables; roots and tubers; other vegetables; fruits; nuts and oilseeds; milk and milk products; non vegetarian foods; fats and oil; sugar; spices, condiments and beverages.

Infant and young child nutrition score card (Based on UNICEF guidelines, 2013)

Breastfeeding and appropriate complementary feeding are essential to ensure healthy growth of infants and young children (LéonCarva et al. 2002). Appropriate complementary feeding has the potential to prevent 6% of all under 5 deaths, particularly in the developing world (Lutter, 2003). Therefore, UNICEF suggested 10 ideal IYCN practices which accomplished the need of appropriate breastfeeding and complementary feeding and ensure child's growth. Mothers who practiced at least 6 among 10 ideal IYCN practices (based on 50^{th} percentile), scored positive in IYCN score card and rest scored negative. The 10 ideal IYCN practices listed in table 3.3.

Table 3.3: Infant and Young Child Nutrition (IYCN) score card

Serial No	Practices
1	Timely initiation of breastfeeding (Within 1 hour after birth)
2	Colostrum feeding after birth
3	No Prelacteal feeding within 1st 6 months after birth
4	No water feeding within 1st 6 months after birth
5	No top milk feeding within 1st 6 months after birth
6	Exclusive breastfeeding for 1st 6 months after birth
7	Continued breastfeeding upto 2 years after birth
8	Breastfeeding during illness
9	Timely initiation of complementary feeding (after completion of 6th month)
10	Active feeding or proper feeding monitoring

Hygiene and Sanitation Score card (Based on UNICEF guidelines, 2013)

Improving water, sanitation and hygiene as well as housing and access to and use of health services can promote healthy environment and reduce the prevalence of infectious diseases and key interventions implemented at scale can reduce undernutrition (Guerrant et al, 2008). Therefore, UNICEF prepared guidelines regarding few hygiene and sanitation practices which are essential to maintain quality of life. Mothers who practices at least 5 among 8 selected hygiene and sanitation practices (based on 50th percentile) in the present study, scored positive in hygiene and sanitation score card and rest scored negative. The 8 good practices listed in table 3.4.

Table 3.4: Hygiene and Sanitation Score Card

Serial No	Practices
1	Use of soap
2	Handwash with soap during food handling
3	Purification of drinking water
4	Cleanliness of nails of children
5	Cleanliness of clothes of children
6	Practice of wearing footwear (children)
7	Practice of wearing footwear (Mothers)
8	Storage of cooked food (Covered)

Weight for age score card (based on WHO guidelines)

Mothers having children with weight for age more than -2SD scored positive in weight for age score card and rest scored negative.

Section B: Capacity building at micro and meso level promoting positive deviant mothers as change agents and infrastructure development and awareness campaign at exo and macro level as part of public-private partnership

Capacity building is the process by which individuals and organizations obtain, improve and retain the skills, knowledge, tools, equipment and other resources needed to do their jobs competently (Potter & Brough, 2004). Community capacity building is a conceptual approach toward social, behavioral change and leads to infrastructure development. It focuses on understanding the obstacles that inhibit people, governments, international organizations and non-governmental organizations (NGOs) from realizing the development goals that will allow them to achieve sustainable results (Martha, 2011). Community capacity building often refers to strengthening the skills and competencies of people and communities in small businesses and local grassroot

movements in order to achieve their goals and overcome particular issues that may cause exclusion (Paul, 2018).

In the present study, capacity building and infrastructure development carried out at micro, meso, exo and macro level which are four well defined systems through which behavior change interventions are carried out.

Micro system is the closest layer to the child and contains the structures with which the child has direct contact such as family, school, neighborhood or childcare environments. Bi-directional influence at this level is the strongest and has greatest impact on the child (Berk, 2000; Rogoff, 2003).

Meso system moves beyond the dyad or two-party relation and connects two or more systems in which a child and his family lives. (Swick & Williams, 2006; Bronfenbrenner, 1979).

Exo system defines the larger social system in which the child does not directly function but impact the child's development by interacting with some structure in his/her microsystem for example school, peers, neighbors, communities, local politics and industry (Berk, 2000; Bronfenbrenner, 1994).

Macro system composed of cultural values, customs, and laws and refers to the overall patterns of ideology and organization that characterize a given society or social group (Berk, 2000).

Positively deviant (PD) mothers, identified in earlier section were promoted as change agents to improve household dietary pattern, IYCN practices and hygiene and sanitation practices of ND mothers at micro and meso level through community mobilization using methods like group discussion, lecture, demonstration using various NHE (Nutrition Health Education) material. The experience sharing videos of PD mothers were also used for further individual and group counselling in various parts of the study area to sensitize the mothers regarding various indicators of food and nutrition security and improve nutritional status of mother child pairs.

Intervention activities in detail are described in table 3.5 and table 3.6.

Table 3.5: Intervention activities planned at micro and meso level

Activities	Type of session	No of session	Target group	Tools used
Promotion of PD mothers (group discussion, lecture, experience sharing) using NHE to sensitize regarding healthy diet and low cost GLV consumption, IYCN practices, hygiene and sanitation practices	Group	18	Mothers and HH members	Charts, Posters
Group counselling on healthy diet and dietary pattern, IYCN practices, hygiene and sanitation practices	Group	30	Mothers and HH members	Charts, posters, Videos of PD mothers, realistic photographs
Extempore competition promoting PD mothers on following topics: • Healthy diet • Handwash • Health and hygiene	Group	4	Mothers	Rewards, charts
Quiz competition promoting PD mothers on following topics: • Breastfeeding • Complementary feeding	Group	2	Mothers	Rewards
House to house individual counselling on healthy diet, IYCN, hygiene and sanitation	Individual	96*3	mothers	Charts, posters, realistic photographs, videos of PD mothers

Table 3.6: Intervention activities planned at exo and macro level

Activities	Type of session	No of session	Target group	Tools and technique used
Empowerment of ICDS workers to improve food aid and food availability	Group	4	Anganwadi workers	Charts, posters, photogrphs, videos, power point presentation
Infrastructure development of ICDS centres to improve food availability and accessibility	-	-	Village heads, CSR of private company	Power point presentation slides
Empowerment of the beneficiaries of ICDS regarding the utilization of the existing food aid	Group	10	Mothers and their HH members	Charts, posters, banners, street play, videos
Drumstick plantation program to improve food availability	Group	10	Mothers,HH members involved in farming	Drumstick seeds, saplings
Promotion of kitchen garden and distribution of neem and drumstick plants	Groups	10	Mothers and HH members	Charts, posters
Distribution of bananas and biscuits through ICDS centres	-	-	children	-
Improvement of roads and solar light installation	-	-	Sarpanch, CSR or private company	Demonstration, power point presentations
Training to make solar cooker and solar bulbs	Group	2	villagers	demonstrations
Smokeless chulha distribution program	Group	2	villagers	-
Initiatives to improve drinking water access	-	-	sarpanch	meeting
Women empowerment by skill development to generate income	Group	10	Mothers and other women	Demonstration, training

Nutrition Health Education (NHE)

Nutrition education is a process of translating the nutrition related knowledge to various groups of people using a combination of methods from the fields of education and communication. Therefore, understanding the audience and the context of their behavior helps in developing effective nutrition education programs (Contento, 2011). In the present study, nutrition education was planned to promote positive deviant behaviors to improve food and nutrition security through PD mothers.

The nutrition and health education materials were developed and imparted through innovative communication strategies using various forms of media such as electronic and print supported by hand-on learning activities.

Electronic media

Interventions using electronic media, like slide and multimedia presentations complemented with rigorous behavioral change interventions can improve health and safety behaviors in young persons (Hieftje et al, 2013). Power point presentation was developed as electronic media for imparting information and knowledge to mothers in individual and group level. Also, videos were made where PD mothers shared their experiences and positive practices in detail.

Print media

It is one of the oldest and most popular forms of methods used for disseminating information as it can reach a wider target audience, are user friendly, handy, and attractive. Posters, charts and banners (Image 3.14-3.23) were used as a form of print media for reinforcing the messages regarding healthy diet, IYCN and hygiene and sanitation practices.

Hands-on learning activities

Quiz and extempore competitions, demonstrations and exhibitions as well as street plays were conducted. Focused group discussion was carried out to assess their ability to enact on the imparted knowledge.

At exo and macro level, ICDS workers were empowered and trained and Infrastructure of ICDS improved. Beneficiaries were counselled regarding utilization of the food aid. Drumstick seed distribution and drumstick plantation program were carried out and Kitchen garden was promoted. Roads were improved, solar lights were installed in the roads. Training was given to make solar cookers and smokeless chulhas were also distributed.

Impact assessment

Impact was assessed on both PD and ND groups as well as case and control clusters to assess the post intervention changes. Personal interview using Semi-structured questionnaire (annexure 6), direct observation and anthropometric assessment were carried out for impact assessment.

Glimpses of the NHE materials developed and adopted from various organizations (image 3.14-3.22)

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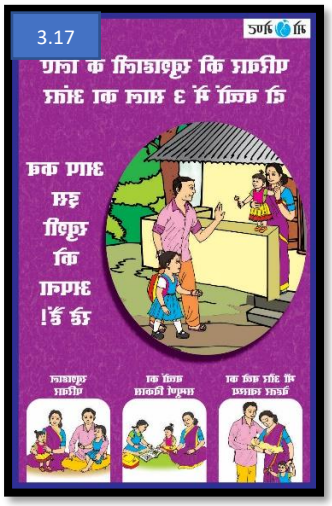

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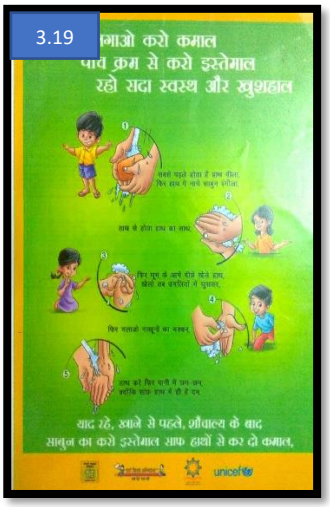

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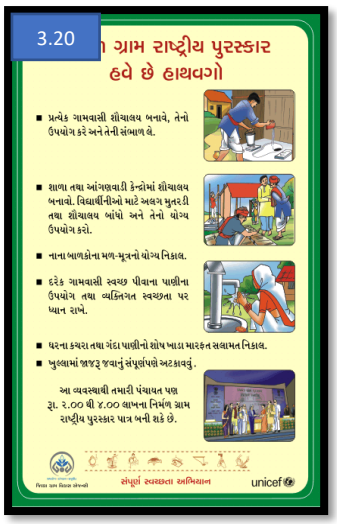

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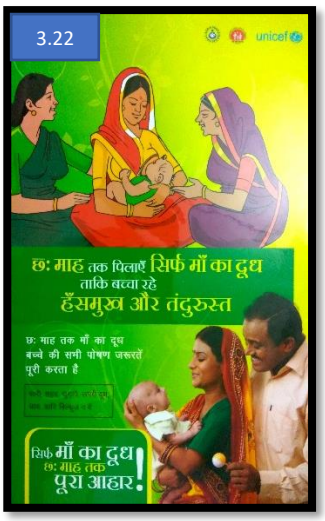


Following tools and technique were used for intervention and impact assessment (Table3.7) in phase II.

Table 3.7: Phase II Tools and Technique (annexure 6)

ACTIVITY	TOOLS	TECHNIQUE
Intervention to improve household diet pattern and dietary diversity, IYCN practices, hygiene and sanitation practices at micro and meso level	Realistic photographs, videos, charts, posters	➢ Demonstration ➢ Individual and group counselling ➢ Group discussion ➢ lecture
Intervention to improve infrastructure and make awareness campaign regarding food aid, agriculture, roads, income at exo and macro level	Chart, poster, banners, plants, saplings, seeds	➢ Meeting ➢ Counselling ➢ Group discussion ➢ Street play ➢ Plantation program
Qualitative impact assessment regarding improvement of knowledge and practices (following FAO 2010 and UNICEF 2013 guidelines)	Semi structured questionnaire (annexure 6)	➢ Personal interview
Growth monitoring (quantitative impact assessment) following WHO 2006 guidelines	Weighing machine, measuring tape	➢ Anthropometric measurement

Primary Outcome

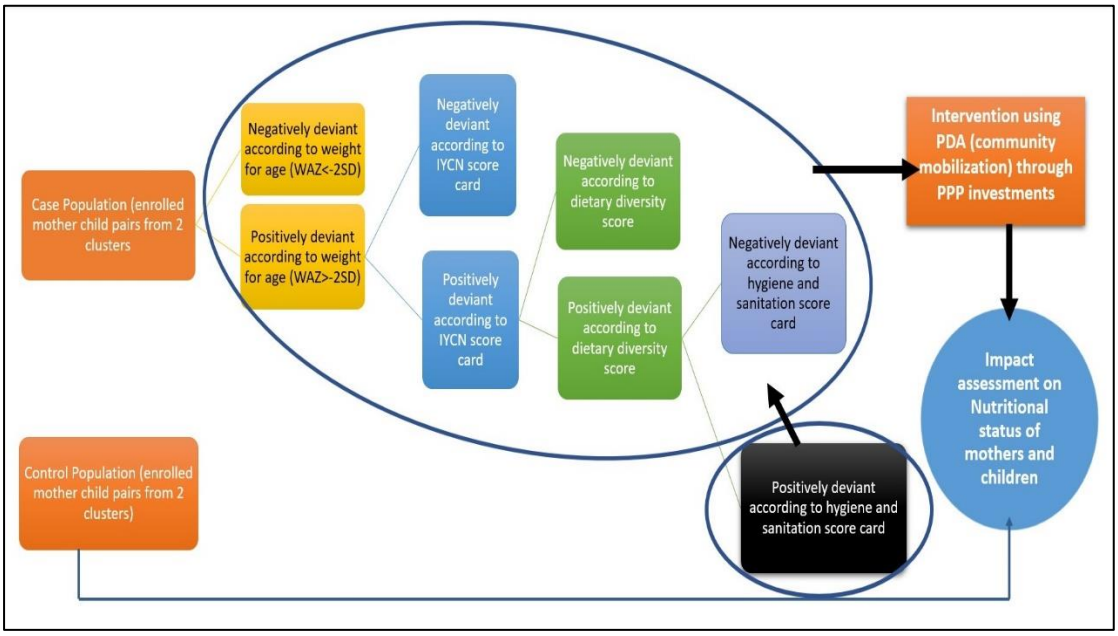
- Identification of positive deviant behaviors present in the study area among enrolled mothers.
- Capacity building of the community mothers using the identified PD mothers as change agents regarding healthy food consumption and diet diversity, IYCN and hygiene and sanitation practices at micro and meso level.
- Post intervention improvement in nutritional status of mother-child pairs.
- Improvement in agriculture, income generating skills, infrastructure of existing food aid, roads, drinking water facilities etc at exo and macro level through PPP investments.

Secondary Outcome

- Improved food availability, accessibility, affordability, utilization and stability, therefore overall food and nutrition security in the study area.

Experimental design of phase 2 explained below (Figure 3.2)

Figure 3.2: Phase II Experimental Design



DATA ANALYSIS & MONITORING

- Daily records and questionnaires were cross checked for missing data and was updated.
- All anthropometry data of children below 5 years was done using WHO Anthro Software.
- The anthropometry data of mothers was categorized based on Asia-pacific classification as well as WHO classification.
- All data was entered in MS excel and transported to SPSS software for statistical analysis.