# IMPROVING FOOD AND NUTRITION SECURITY BY PUBLIC-PRIVATE PARTNERSHIP IN RURAL HOUSEHOLDS

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## Introduction

Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life (FAO, 2009). India achieved Self-sufficiency in food production. Yet, problem of chronic household food insecurity still exists in about half of the population, particularly among the vulnerable groups of children and women from the lower half of the expenditure class (Radhakrishna &Reddy, 2002). Undernutrition status in India and Gujarat was alarming according to NFHS 4 and CNNS 2016-18 report. Therefore, imparting knowledge and information along with skills and self-regulatory activities through well designed model is the need of the hour. The socio-ecology model (SEM) of behaviour change helps to understand the dynamic interrelations among various personal and environmental factors that govern the lifelong course of human development at micro, meso, exo and macro level. A positive deviant approach can be used at micro and meso level, as these are workable in limited resources within similar setups in a community (Marsh & Schroeder, 2002; Sethi et al, 2003; Nambiar & Desai, 2012). At exo and macro level, the role of various stakeholders and partnerships will be critical. IFPRI recommended public–private investment in rural development that could reduce rural poverty and malnutrition, can foster structural transformation, and improve food security and nutrition (IFPRI, 2019). Therefore, multisectoral planning was introduced including positive deviance approach and public-private partnership to tackle food insecurity and make sustainable change in rural India.

## Objectives

The *broad objective* of the present study was to improve Food and Nutrition Security (FNS) in rural households with mother-child pairs using public private partnership. The *specific objectives* were 1) Situational analysis of the food and nutrition security of the mother-child pairs in a rural setup. 2). Identification of the positive deviant behaviors depending on 4 attributes (weight for age score of children, Household dietary diversity score, IYCN score and Hygiene and sanitation score) and capacity building and infrastructure development to improve food and nutrition security through interventions as a part of public-private partnership.

## Methodology

Based on the objectives, the study was conducted in two phases among 4 clusters selected purposively in rural Vadodara after necessary ethical clearance (IECHR/2015/16). *Phase I:* In this cross-sectional study, all households (HHs) in the study area with mother-child (<5y) pairs (n=160) registered in ICDS and all ICDS workers (n=3) were enrolled. Situational analysis of the food and nutrition security was done following IFPRI (2015) guidelines. Qualitative and quantitative tools such as semi-structured questionnaires, direct observations, food frequency questionnaire, anthropometric measurement and biochemical assessment were used for data collection using the indicators of availability, accessibility, affordability, utilization and stability. Major predictors of undernutrition were calculated using linear regression analysis. *Phase II*: In this case-control interventional community trial positive deviant behaviours (PDBs) were identified and mothers who scored positive in all four attributes a). Household Dietary Diversity (HDD) score (FAO, 2010), b) Infant and Young Child Nutrition (IYCN) score (UNICEF, 2013), c) Hygiene and Sanitation (H&S) score (UNICEF, 2013) and d) weight for age z score (WHO, 2006) of children, were used as change agents to sensitize the community regarding the identified PDBs in experimental group (n=96, 2 clusters). In control group (n=64, 2 clusters) no intervention carried out only existing government services were provided. One-year intervention trial included experience sharing and group discussion using electronic and print media, quiz and extempore competitions at micro and meso level. At the macro and exo levels intervention was done by the project partners (village level upgradation of roads, water, electricity, nutrition sensitive agriculture, sensitization of local community workers, plantation program, brainstorming session with local leaders, improving food aid through ICDS and skill development programs for empowering mothers). Post data collected in both experimental and control group to assess the impact of intervention. All data were entered in MS Excel and statistically analyzed using SPSS 23 software.

## Results

### Phase I

Results of Phase 1 highlighted gross food insecurity including 100% below poverty line (<$1.90/d/person) families, poor status of agriculture and food aid (supplementary food distribution coverage was not 100%) as well as poor utilization of food in the study area. Among 160 mother-child pairs, there were 60% Stunted (HAZ<-2SD), 36% wasted (WHZ<-2SD), 59% underweight (WAZ<-2SD), 20% MAM (WHZ<-2SD and >-3SD) and 16.88%

SAM (WHZ <-3SD) children, 54% underweight (BMI<18.9) and 80% anemic (Hb <12g/dL) mothers; poor household dietary diversity (56.88%), poor IYCN (51.3%) and Hygiene and sanitation practices (68.1%) were recorded which indicated urgent need of an integrated approach as the status was far away from WHO global targets and poorer than national and regional NFHS and CNNS data. Birth weight of child ($p<0.05$*), practice of giving water for 1st 6 moths ($p<0.01$**), poor intra household food distribution ($p<0.05$*), poor household dietary diversity ($p<0.05$*), poor family income ($p<0.05$*), untidy clothes ($p<0.05$*), and no exclusive breastfeeding practices ($p<0.05$*) were identified as predictors of undernutrition among children. Mother's nutritional status also significantly associated with child's wasting ($p<0.01$**) and household ($p<0.001$***), and women dietary diversity score ($p<0.001$***).

**Phase II**

Phase II results revealed that using HDD score card, 43.1% mothers, using IYCN score card, 48.8% (78) mothers, using hygiene and sanitation score card, 31.9% (51) mothers, and using weight for age score card, 40.6% (65) mothers were identified with PDB among 160 mothers. Overall, in 4 clusters, total 15 mothers were identified with PDB who scored positive in all the four attributes assessed. Only 13 mothers with PDBs were available in experimental group for positive deviant behavior promotion as change agents. Exclusive breastfeeding for 1st 6 months, colostrum feeding, no use of pre-lacteals, pulses, legumes, vegetables, milk and milk products consumption, cleanliness of clothes of children were determined as most followed positive behaviors present in the study area with highest OR values among the mother child pairs. Post 1-year interventions at micro and meso level using PDA, there was significant ($p<0.001$***) improvement in parameters of food utilization such as breakfast consumption (21.7%), drumstick leaves consumption (76%), intra household food distribution (33.3%), overall IYCN(43.7%) and hygiene and sanitation practices(45.8%) as well as significant ($p<0.01$**) reduction in wasted children (13.3%), underweight children (13.3%), and underweight mothers (20.4%) in experimental ND group (n=83). At macro and exo level large scale intervention using public-private partnership improved food availability. Agricultural practices were improved by promoting kitchen garden and encouraging drumstick cultivation which increased by 22.9% ($p<0.001$***). Food aid was improved by increasing the no of ICDS centers (2 new AWCs), consumption of supplementary nutrition (35.4% , $p<0.001$***). Road and drinking water access improved and solar street lights were installed to improve food accessibility, Smokeless chulhas were distributed to reduce fuel cost and increase food affordability. Skill development program for women started to generate income and empower

women. After intervention in the experimental group wasting reduced by 17.7% ($p<0.01$**) as compared to only 5.8% ($p<0.05$*) reduction in control group, underweight reduced by 6.25% ($p<0.01$**) in experimental group whereas in control group it increased by 7.69%. Stunting though increased by 5.21% in the experimental group, the increase rate was much higher in the control group (11.54%)**.** Stunting could not be reduced just after intervention as its a result of chronic undernutrition. All the severely undernourished children were provided referral services. Mothers' undernutrition reduced by 17.7% in experimental group ($p<0.01$**) whereas in control group it even increased.

**Conclusion**

Inequalities represented by gross food and nutrition insecurity despite abundance of agricultural produce in the rural area calls for urgent measures at multiple stakeholder levels. Positive deviance approach (PDA) using mothers who outperformed their neighbors in healthy practices and had healthier children in similar community settings can be a powerful, low lost, acceptable approach for improving child health and nutrition in rural communities which have a very distinctive anthropological behavior. Involvement of community leader and workers and private organization in the area through public-private partnership can be an effective step towards improving persistent undernutrition and food and nutrition security and achieving the sustainable development goals.

**Recommendations**

1. Soil testing and phytoremediation for restoration of heavy metal contaminated site to improve the scenario of agricultural practices in the village.
2. Encouraging in cultivation of locally available low cost green leafy vegetables and monitoring the agricultural practices in the area.
3. Appointment of positive deviant mothers or adolescent girls in the village who will continue the individual house to house counselling and sensitization program regarding healthy eating, care, feeding and hygiene practices and will make the program sustainable.
4. Operational research for all developmental government schemes and programs (functioning and gaps) need to be done (ICDS, MDM, PDS, MNREGA, JSY etc.) and should be strengthened through various strategies.
5. Promoting livelihood practices among women to empower them and make them self-sufficient.

6. Improvement of infrastructure of village including road, drinking water services, health center and schools as well as *anganwadi center*.
7. Beautification of the village to attract tourism by creating gardens, parks as well as promoting hygiene by providing big dustbins in the strategic points.

**Scope pf future research**

1. A longitudinal study to understand the impact of intervention using public-private partnership on food and nutrition security of rural households and especially stunting trend of children can be carried out.
2. The study can be further carried out in tribal areas and urban slums of Gujarat and other parts of the country for understanding the impact of positive deviance approach using public-private partnership on food and nutrition security and maternal and child nutrition.
3. Adolescent girls, pregnant and lactating mothers as well as older population can be covered in further research and positive deviance approach using public-private partnership can be applied to them.
4. A policy to consistently identify and promote positively deviant individuals and include them in existing government programs to empower the community should be formed, implemented and rigorous monitoring should be done.
5. PDS (Public distribution system) can be thoroughly assessed as well as other existing national and regional government programs in form of food aid to understand food security.
6. Intervention program by behavior change using positive deviance approach can be carried out for longer period including pre-natal counselling, counselling immediately after birth and counselling regarding feeding patterns of the infants till one or two years.
7. Collaborating with other various public and private partners including other government sectors and non-governmental organizations further research can be carried out to improve food and nutrition security.

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