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CAN FOOD AVAILABILITY AND ACCESSIBILITY RESULT IN BETTER FOOD UTILIZATION? A CROSS SECTIONAL STUDY ON FOOD SECURITY INDICATORS TO ADDRESS THE PERSISTENT UNDERNUTRITION IN RURAL VADODARA

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ABSTRACT: India could not solve the problem of chronic household food insecurity in about half of the population and it still has the second-highest estimated number of undernourished people in the world. Therefore this cross sectional study aimed to address the persistent undernutrition in rural Vadodara, western India by evaluating the association between various food security indicators. From *anganwadi centres* in four villages of Padra Taluka, rural Vadodara, all children (0-5y) with their mothers (n=160) were enrolled and status of household food security was assessed by personal interview of mothers using semi structured questionnaire and anthropometric measurement of mother-child pairs. Household dietary diversity was used as indicator of food availability, Income and road condition were used as indicators of food accessibility and nutritional status (height/age, weight/height, weight/age for children and BMI for mothers) was used as indicator of food utilization. Results revealed a poor picture of household food security due to low dietary diversity, less income, poor road condition and very high incidence of undernutrition. Statistical analysis in SPSS 23 software showed significant correlation between mothers' nutritional status and child's wasting. Household dietary diversity and family income significantly correlated with mother's nutritional status and child's weight for age but not with child's stunting and wasting. Therefore it can be concluded that improved food availability and accessibility can result in better food utilization. But other practices like child feeding, health care and hygiene need to be assessed which may affect the utilization of food even at better food availability and accessibility scenario.
Key words: Food security, dietary diversity, under nutrition, stunting, wasting

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INTRODUCTION

The National Family Health Survey (NFHS)-4 data for 15 States shows that 37 per cent of children under the age of five are stunted (low height for age); 22 per cent are wasted (low weight for height) while 34 per cent are under weight (low weight for age) (NFHS-4, 2014-15). Even though India has committed to meeting the Sustainable Development Goals (SDGs), children, who form a total of 36.6 per cent of India's total population, are left out in education, health, nutrition, safety and overall well-being due to the lack of emphasis on these particular sectors in the budget 2016-17. The Integrated Child Development Services (ICDS) scheme, the country's flagship intervention to improve child nutrition in India has seen a 7 per cent reduction in fund. A brief overview of the keywords in the finance minister's budget speech shows that while investment and growth were heavily mentioned, crucial aspects of development such as nutrition, ICDS (Integrated Child Development Services scheme), midday meals, the national food security act received no mention at all.

Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO policy brief, 2006). India was successful in achieving self-sufficiency by increasing its food production and improved its capacity to cope with year-to-year fluctuations in food production. But it could not solve the problem of chronic household food insecurity in about half of the population, particularly among the vulnerable groups of children, women and elderly from the lower half of the expenditure class (Reddy, 2002).

Dietary diversity is a qualitative measure of food consumption that reflects household access to a variety of foods, and is also a proxy for nutrient adequacy of the diet of individuals. Therefore dietary diversity can be an important indicator of household food availability (FAO, 2010). In case of household food accessibility physical and economic access to food can be assessed by family income, mother's individual income and road condition. Nutritional status of the population is the ideal measure of food utilization.

The aim of the present study was to address the persistent undernutrition of mothers and children by evaluating the association between various food security indicators in rural Vadodara.

Thus time to relook in holistic manner using indicators which are multifaceted. Status of food security need to be studied and relationship of the food security indicators need to be assessed in rural as well as urban areas to address the problem of undernutrition.

MATERIALS AND METHODS

Study setting and participants

It was a cross sectional study conducted for 6months at Ekalbara village of Padra taluka, rural Vadodara, western India. Four clusters of Ekalbara village were selected for the study location. All the children who were less than 5 years old along with their mothers were selected (N=160) as target group and enrolled in the study after giving consent.

Data collection and Processing

Data collection occurred in the year 2015 from July to December (6months duration). Mothers were interviewed personally using a pre-tested semi structured questionnaire to elicit data on food security.

Food availability status assessment

They were enquired about frequency of various foods consumption using a food frequency questionnaire to assess food availability. In the food frequency questionnaire 11 food groups (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) were included, each containing more than one food item. Mothers were asked about how frequently they consume each food item and marked accordingly. Food, which was consumed daily, twice a week or weekly considered as frequently consumed and rest not frequently consumed.HDDS was calculated for each mother-child pair using a revised version of FAO guidelines (FAO, 2010) which describe how to adapt and use the dietary diversity questionnaire and how to calculate each of the scores. The households who consume half or more than half of the foods frequently in each food group scored as 1 and others scored as 0. Household dietary diversity of Mother Child pair scoring ≥4 was considered positive and <4 was considered negative.

Food accessibility status assessment

Data regarding family income, mother's individual income and road condition of the village were collected to assess food accessibility (Both economical and physical access).

Food utilization status assessment

To assess food utilization anthropometric measurement (Height and weight) was taken for both mothers and children, BMI(Body Mass Index) of mothers were calculated and categorized using standard methods (WHO global database on BMI) and in case of children z-scores were calculated for weight/age, height/age and weight/height using WHO Anthro software (WHO, 2006).

Data management and Analysis

Collected and calculated data was entered in excel 2010 datasheet and SPSS23 datasheet and analysed to determine the survey results as per the objectives. Graphs and tables were made to show the results clearly for better understanding.

Ethical review

Ethical approval was obtained from the ethical committee of the Food and Nutrition Department of the university (Approval No: IECHR/2015/16). Local community leaders were informed about the aim and procedures of the study. All study participants gave their verbal consent to participate after the study objectives were explained to them.

RESULTS

Status of food security

Food availability: Among 160 mother-child pairs, 61% scored negative HDDS and only 38% scored positive which indicates majority of them did not frequently consume variety of foods from at least 4 food groups. Cereals (majorly bajra, rice and wheat), pulses (majorly tuver and mug) and some common vegetables (Potato, tomato, and onion) were mostly consumed by the population. Majority of the population were vegetarian consuming only basic staple foods along with very low and unsatisfactory consumption of milk products, green leafy vegetables, fruits, nuts and oilseeds. Frequent consumption of Green leafy vegetables recorded for only 34.4% households, frequent vegetable (other than GLVs) consumption was there at 68.8% households, and milk and milk products were frequently consumed by only 50% households. Therefore food availability in the form of quality and variety was not satisfactory in the area which needs to be improved through promotion of agriculture and dietary diversity.

Food accessibility: Family income of 55% mother-child pairs was less than or equal to 5000 Rupees which was responsible for poor food affordability. Mothers' individual income was also very low as only 8.8% mothers had some amount of income working as agricultural labour which ranges between 500-3000 and not at all sufficient. Road condition of all 4 villages was very poor, paved road was not available in most of the area which was an obstacle for physical access to food. Therefore, food accessibility of the area in the form of physical and economic access was very poor and needs to be improved through livelihood promotion, empowerment of women, income generation by collaborating with various NGOs and organizations as well as infrastructure development of the village.

Food utilization: In the study area 87 out of 160 mothers (54%) were underweight (as per WHO global database on BMI) (Table 6) whereas among 160 children 36% were wasted, 60% were stunted and 59% were underweight (as per WHO new child growth standards, 2006 with z score <-2SD). The poor nutritional status of mothers and children revealed that food is not getting utilized properly may be because of poor food availability and accessibility or may be due to some other factors which need to be assessed further.

Relationship between food security indicators

Dietary diversity and mother's nutritional status correlated significantly ($p<0.01$) as mothers who scored positive HDDS, among them only 12.5% were underweight, but who scored negative HDDS, among them 41.9% were underweight. Dietary diversity and child's weight for age also correlated significantly ($p<0.01$) whereas child's wasting and stunting did not show any significant correlation with dietary diversity (Table 1).

When individually frequency of vegetables and milk and milk products consumption were associated with nutritional status of mothers and children, vegetable consumption did not show any significant correlation with mother's and child's nutritional status (Table 2). But milk and milk products consumption showed significant correlation with mother's nutritional status and child' weight for age but not with child's stunting or wasting status (Table 3).

Mother's individual income significantly correlated with child's underweight(weight for age) and wasting (weight for height) status but it did not significantly correlated with mother's nutritional status (Table 4). This result reveals that if mothers started earning it will increase their economic access to food which will result in better nourishment of their children.Family income also showed significant correlation with child's weight for age (figure 1) but child's stunting and wasting status did not show any significant correlation with family income.

Table-1: Association between household dietary diversity and nutritional status

S. No	Nutritional status	Positive HDDS		Negative HDDS		*P* Chi-Square test
		N	%	N	%	
1	**Mother's nutritional status**					0.000**
a)	Not Underweight	41	25.6%	32	20.0%	
b)	Underweight	20	12.5%	67	41.9%	
2	**Child's weight for age**					0.002 **
a)	Not underweight	34	21.3%	31	19.4%	
b)	Underweight	27	16.9%	68	42.5%	
3	**Child's wasting**					0.400 NS
a)	Not wasted	41	25.6%	20	37.5%	
b)	Wasted	60	12.5%	39	24.4%	
4	**Child's stunting**					0.097 NS
a)	Not Stunted	29	18.1%	34	21.3%	
b)	Stunted	32	20.0%	65	40.6%	

NS Non significant ($p>0.05$). * indicates $p<0.05$ (significant); ** indicates $p<0.01$ (highly significant); *** indicates $p<0.001$ (very highly significant)

Table-2: Association between vegetables consumption and nutritional status

S. No	Nutritional status	Frequent Vegetable consumption		Non frequent vegetable consumption		*P* Chi-Square test
		N	%	N	%	
1	**Mother's nutritional status**					
a)	Not Underweight	51	31.9%	22	13.8%	0.781 NS
b)	Underweight	59	36.9%	28	17.5%	
2	**Child's weight for age**					
a)	Not underweight	42	26.3%	23	14.4%	0.351 NS
b)	Underweight	68	42.5%	27	16.9%	
3	**Child's wasting**					
a)	Not wasted	66	41.3%	35	21.9%	0.224 NS
b)	Wasted	44	27.5%	15	9.4%	
4	**Child's stunting**					
a)	Not Stunted	44	27.5%	19	11.9%	0.810 NS
b)	Stunted	66	41.3%	31	19.4%	

NS Non significant (p>0.05). * indicates p<0.05 (significant); ** indicates p<0.01 (highly significant); *** indicates p<0.001 (very highly significant)

Table-3: Association between milk and milk products consumption and nutritional status of mothers and children

S. No	Nutritional status	Frequent milk and milk products consumption		Non frequent milk and milk products consumption		*P* Chi-Square test
		N	%	N	%	
1	**Mother's nutritional status**					
a)	Not Underweight	50	31.3%	23	14.4%	0.000**
b)	Underweight	30	18.8%	57	35.6%	
2	**Child's weight for age**					
a)	Not underweight	44	27.5%	21	13.1%	0.000 **
b)	Underweight	36	22.5%	59	36.9%	
3	**Child's wasting**					
a)	Not wasted	56	35.0%	45	28.1%	0.071 NS
b)	Wasted	24	15.0%	35	21.9%	
4	**Child's stunting**					
a)	Not Stunted	34	21.3%	29	18.1%	0.418 NS
b)	Stunted	46	28.8%	51	31.9%	

NS Non significant (p>0.05). * indicates p<0.05 (significant); ** indicates p<0.01 (highly significant); *** indicates p<0.001 (very highly significant)

Table-4: Association between Mother's individual income and nutritional status

S. No	Nutritional status	Mother's individual income		No individual income of mother		*P* Chi-Square test
		N	%	N	%	
1	**Mother's nutritional status**					0.436NS
a)	Not Underweight	5	3.1%	68	42.5%	
b)	Underweight	9	5.6%	78	48.8%	
2	**Child's weight for age**					0.008**
a)	Not underweight	1	0.6%	64	40.0%	
b)	Underweight	13	8.1%	82	51.3%	
3	**Child's wasting**					0.026*
a)	Not wasted	5	3.1%	96	60.0%	
b)	Wasted	9	5.6%	50	31.3%	
4	**Child's stunting**					0.150NS
a)	Not Stunted	3	1.9%	60	37.5%	
b)	Stunted	11	6.9%	86	53.8%	

NS Non significant (p>0.05). * indicates p<0.05 (significant); ** indicates p<0.01 (highly significant); *** indicates p<0.001 (very highly significant)

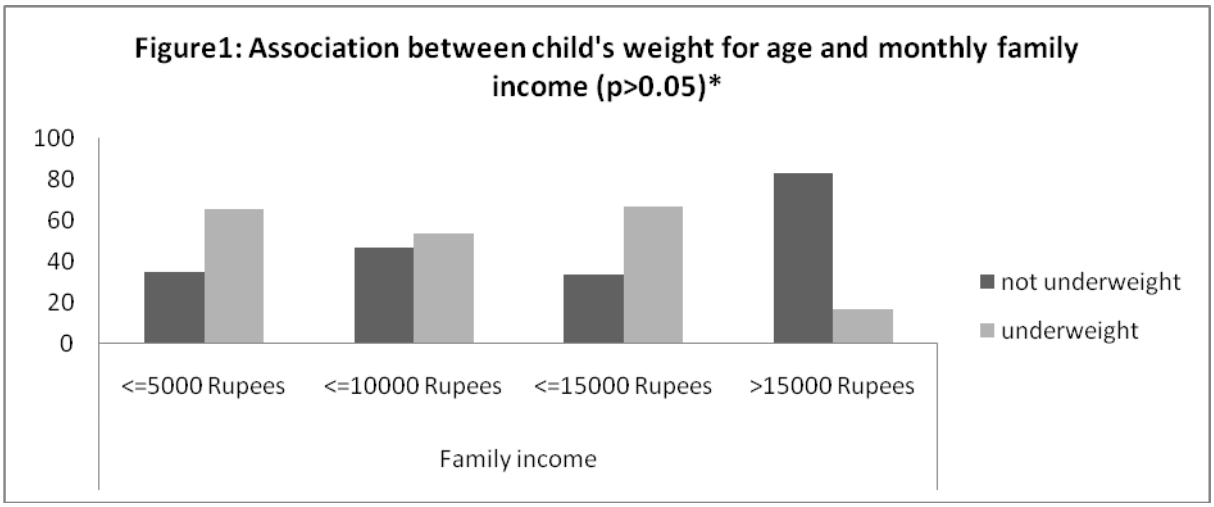

Figure-1: Association between child's weight for age and monthly family income (p>0.05)*

DISCUSSION

Present study indicated the need to improve food availability and accessibility to reduce the child undernutrition. However, the study highlights that though there can be adequate food purchasing power, awareness about dietary diversity for mother and child needs to be created. Several studies have highlighted the negative associations between food inflation and poor growth and mortality among neonates and young children (Fledderjohann et al, 2016), and positive associations between dietary diversity and child nutrition (Hatloy et al,2000). However, additional research is required to confirm and clarify relations between various dietary diversity indicators and nutrient intake, adequacy, and density, for children with differing dietary patterns (Arimond&Ruel, 2016).McDonald et al (2015) reported that the risk of maternal thinness, but not child undernutrition, increased as the severity of household food insecurity increased unlike the present study. Saaka& Osman (2013), recorded that the challenge to enhance dietary diversity can be met by improving nutritional security. Mishra & Raveendran,stated that the most important challenge is to increase the energy intake of the bottom 30% of the population and at the same time facilitate diet diversification to meet micronutrient deficiency. The food gap can be met from the existing food grain stocks in the medium term and by increasing their purchasing power in the long run through increasing job opportunities and can be rectified through supplementary nutrition and supply of fortified food by various food schemes initiated by the government. In the present study wasting and stunting did not show any significant correlation with food availability and accessibility.

Therefore, child care and feeding practices need to be assessed EBF for 6 months (Léon-Carvaet et al.2002), and continued for more than 1y was associated with a greater height-for-age Z score, and breast-feeding for > 18 months, in which food was introduced late in infancy, was associated with improved nutritional status as measured by standard anthropometric indicators. Therefore, nutrition-specific interventions, targeting immediate causes of undernutrition (inadequate dietary intake, poor feeding practices and high burden of disease) such as breastfeeding, complimentary feeding, micronutrient supplementation and home fortification, disease management, treatment of acute malnutrition and nutrition in emergencies need to be promoted. Along with this it is important that for these rural communities adequate leveraging of agriculture (nutrition specific), is also important for improving nutrition and health (IFPRI, 2015). Introducing several locally available foods such as moringa (Nambiar et al, 2003) along with nutrition communication (NC) is also beneficial (Imran et al, 2014). A positive deviant approach (Marsh & Schroeder, 2002; Sethi et al, 2003; (Nambiar & Desai, 2012)) can be used too, as these are workable in limited resources within similar setups in a community. In setups with meagre resources, a public private partnership (PPP) can also be a choice as it contributes to ownership along with development (IFAD and PPP, 2013).

CONCLUSION

Rural communities (mother-child pairs) are amidst plenty, yet poverty. Thus efforts to coordinate and netweork between several nutriton specific interventions need to be done in order to enhance their domestic production, dietary diversity, frequency of healthy food consumption, road condition, family income, and unawareness regarding proper food utilization which were majorly responsible for the poor undernutrition status. A large scale Agri-Nutri-Health promotion individually and through existing government programme is the need of the hour to improve food security in respect to address the persistent undernutrition.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

Contributions

CS took part in the collection, analysis and interpretation of the data presented in this article and drafting of the paper. VN led the conceptualisation, design, analysis and interpretation of the data and drafting.

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Identification of Positive Deviant Behaviours Regarding Infant and Young Child Feeding (IYCF) among Rural Mothers for Improving Child Health and Nutrition-A Cross Sectional Study

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ABSTRACT

Aims: The present study aimed to identify positive deviant behaviour (PDB) regarding IYCF practices among mothers and correlate with the nutritional status of children (<5y).

Methods: Cross sectional study conducted in 2 rural clusters of Vadodara district, Western India, covering all mothers with children (<5y), enrolled in the ongoing ICDS program. Data regarding IYCF practices based on UNICEF guidelines, were elicited by interviewing mothers using semi structured questionnaires, scored using a10-point scale, categorized as Positively Deviant (PD) (scored ≥6) and Negatively Deviant (ND) (scored<6) and correlated with the current nutritional status of children determined by anthropometric assessment.

Results: Overall poor IYCF practices were observed in the study area as incidence of timely initiation of breastfeeding was 48%, colostrum feeding 72%, exclusive breastfeeding (EBF) 32%, pre-lacteal, water and top milk feeding for 1st 6m 50%, 61% and 20% respectively, timely initiation of complementary feeding 64%, continued breast feeding upto 2 years 36%, breastfeeding during illness 88% and active feeding 37% only. Among 96 mothers, 47 **(**48**.**9**%)** were identified as positively deviant **(**PD**)** who practiced ≥6 PDBs**.** Incidence of child undernutrition was significantly ($p<0.05$) higher among ND mothers (44% wasted, 61% stunted, 61% underweight) as compared to PD mothers (40% wasted, 53% stunted 61% underweight)**.** EBF had the highest impact on PD score according to OR value at 95**%** CI**.**

Conclusion: Improving child nutrition using Positive deviance approach by mobilizing community mothers can be an effective, replicable and sustainable strategy if properly planned and implicated.

Keywords: *IYCF practices, Positive Deviant Behaviours, stunting, wasting*

BACKGROUND

Globally approximately 162 million children under the age of 5 years are affected by stunting and 52 million children are severely wasted **(**WHO, 2012**).** UNICEF 2013[1] report made it very clear that irrespective of the regions rural people in all over the world are much more affected by malnutrition than urban people**.**

Nearly half of the stunted children live in south Asia **(**WHO, 2012**)** and though India has made progress towards the international hunger targets, its progress in improving nutrition is unacceptably slow and it still has the second-highest estimated number **(**194**.**6millions**)** of undernourished people in the world **(**FAO 2015**).**

Many programs do not give sufficient attention to the constraints that can prevent caregivers from feeding their children properly, like beliefs that colostrum is bad for a new born baby, family pressures to feed water instead of exclusive breastfeeding, or a heavy workload

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that gives mothers little time to prepare appropriate and nutritious complementary foods (USAID). In India about 44.2% 0-23months children were breastfed within 1hr of birth, 65.1% 0-5months were exclusively breastfed, 47.1% 6-8months were fed complementary food.

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 by the wider community. Identification of positive deviant behaviour helps to understand the psychosocial environment that effects behaviour change and the valuable role of self-efficacious Positive deviant mothers/family members as counselors[2].

Therefore, the present study aimed to identify positive deviant behaviours (PDB) regarding Infant and Young Child Feeding (IYCF) among rural mothers for improving child health and nutrition.

MATERIALS AND METHOD

Ethical clearance: Ethical approval was obtained from the ethical committee of the Food and Nutrition Department of the university (Approval No: IECHR/2015/16). Local community leaders were informed about the aim and procedures of the study. All study participants gave their verbal consent to participate after the study objectives were explained to them.

Study design: It was a cross sectional study conducted for 6months at Ekalbara village of Padra taluka, rural Vadodara, western India. Two clusters of Ekalbara village were selected for the study location. All the children who were less than 5 years old along with their mothers were selected (N=96) as target group and enrolled in the study after giving consent.

Experimental procedure: Data collection occurred in the year 2015 from July to December (6months duration). Mothers were interviewed personally using a pre-tested semi structured questionnaire to elicit data on IYCF practices. Details of IYCF practices were noted down as they align with current, age-specific feeding recommendations for young children (World Health Organization 2010).

Anthropometric measurement (Height and weight) of children was taken and z-scores were calculated for weight/age (Underweight), height/age (Stunting) and weight/height (Wasting) using WHO Anthro software (WHO, 2006).

Using the UNICEF guidelines for IYCF, the identification of the positive deviant behaviours was done. The mothers were scored using a 10 point scale, categorized as PD (≥6) and ND (<6) and correlated with nutritional status of their children

Statistical analysis: Collected and calculated data was entered in excel 2010 datasheet and SPSS23 datasheet and analysed to determine the survey results as per the objectives. Graphs and tables were made to show the results clearly for better understanding.

RESULTS

The study showed that the IYCF practices in the area were very poor and 48% positive deviant mothers were identified who practiced 6 or more than 6 positive IYCF practices.

Table 1: 10 ideal IYCF practices in the study area and their impact on overall IYCF score of PD and ND

Code No.	Criteria	N = 96	PD (≥6) = 47 ND (<6) = 49	N value	%	OR value at 95% CI
PDB1	Timely initiation of breastfeeding	46 (48%)	PD	32	68	5.33
			ND	29	29	
PDB2	Colostrum Feeding	69 (72%)	PD	41	87	5.12
			ND	28	57	
PDB3	No Pre-lacteal feeding of honey or patasa water	498 (50%)	PD	39	83	21.67
			ND	9	18	
PDB4	No Practice of providing water at 1st 6 months	37 (38.5%)	PD	35	74	68.54
			ND	2	4	

Contd…

PDB5	No Practice of providing top milk at 1st 6 months	76 (79%)	PD	45	96	13.06
			ND	31	63	
PDB6	Exclusive breastfeeding practice	31 (32%)	PD	31	66	100
			ND	0	0	
PDB7	Continued breastfeeding upto 2 years	35 (36.5%)	PD	23	49	2.95
			ND	12	24	
PDB8	Breastfeeding during illness	85 (88.5%)	PD	45	96	5.06
			ND	40	82	
PDB9	Timely initiation of complementary feeding	62 (64.5%)	PD	39	83	5.51
			ND	23	47	
PDB10	Active feeding	36 (37.5%)	PD	26	55	4.83
			ND	10	20	

Table 1 shows only 48% mothers initiated breastfeeding within 1 hour after birth. Colostrum feeding rate in the area was comparatively better as 71% mothers fed colostrum to their children after birth. Pre-lacteal feeding was carried out in case of 50% children; water and top milk were provided to 61% and 20% children respectively within 1st 6 months after birth. As a result only 32% children were exclusively breastfed which was not at all satisfactory. Only 36% mothers continued breastfeeding upto 2years and 64% mothers initiated complementary feeding after 6 months. Only 37% mothers practiced active feeding but the rate of breastfeeding during illness was quite high (88%). Table 1 also shows exclusive breastfeeding; practice of pre-lacteals and water feeding were main PDBs identified among PD mothers which had higher impact on the PD score according to their respective OR value at 95% confidence interval (CI). Therefore, these practices can be easily promoted through PD approach as they are the major PD behaviours present among the study population.

Figure 1

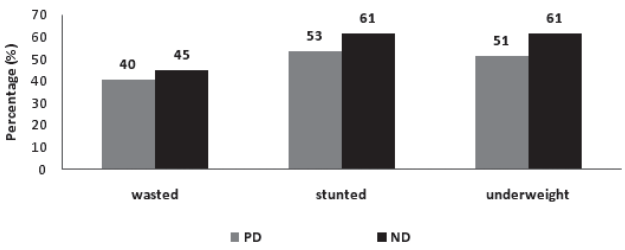

Figure 1: Incidence of child undernutrition among PD and ND groups

Figure 1 shows incidence of child undernutrition was higher among ND mothers (44% wasted, 61% stunted, 61% underweight) as compared to PD mothers (40% wasted, 53% stunted 61% underweight). Statistical analysis in SPSS23 software showed significant correlation between PD score and weight for age (Underweight status) of the children.

DISCUSSION

Previous studies in rural India, In villages of UP[2], West Bengal[3] , and Tamil Nadu[4], *positive deviance* and normal growth of children was enhanced under conditions of small family size (<5), parity below 3, family support to mother, timely initiation of breast feeding, higher frequency of breastfeeding.

Desirable IYCF practices such as frequent breast feeding, timely initiation of Complementary Food (CF), active feeding, giving foods of thicker consistency etc[5] are some major factors contributing better nutritional status.

Viewed collectively, available evidence shows that whether rural or urban, key child feeding and hygiene healthcare practices contributing to normal child growth are similar in most regions. Following the recommendations is not only important for child growth and development, but evidence from observational studies suggests that sub-optimal infant and young children feeding practices can increase the risk of morbidity and mortality in young children[6].

Another study done in Indonesia stated that PDA could be a community based solution to improve child's nutritional status. Nutritional surveys are needed to identify most significant malnutrition determinants to

see adoption of new behaviours and sustainability of outcomes[7]. Study done in rural Uttar Pradesh, India stated using PD helps in promoting indigenous positive correlates of child growth by using community wisdom through people who promote positive practices in concern with technical interventions[8].

Considering the programmatic applications of the findings of this study and make the approach sustainable and replicable, CDPO, supervisors, Anganwadi workers and other grass-root level community workers need to be sensitized so that they can promote the identified positive deviant behaviours among the negatively deviant households. Our previous study suggested that it is necessary to make the community mothers and other family members of a child to understand the direct correlation of wrong IYCF practices with occurrence of infectious diseases and rapid growth faltering of their children[9].

CONCLUSION

Promotion of PDBs can be crucial to bring sustainable change as these behaviours are likely to be affordable and acceptable by the wider community. Interaction of similar cohorts is important for promotion of PDBs. Positive deviance behaviours regarding quality and quantity of complementary foods, dietary diversity, sanitation and hygiene, quality of care, health care access and stimulations for various domains of development are also need to be identified and promoted. Service, delivery and utilization of the existing government programme need to be studied and empowerment of community workers has to be initiated to bring a sustainable change in the situation

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Conflicts of Interest: The authors declare that they have no conflicts of interest.

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Original Article

Relationships between Positive Deviant Behaviors and Children of Normal Growth Pattern in Poorly Resourced Rural Communities

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Abstract

Background: Promotion of positive deviant behaviors (PDBs) can be crucial to bring sustainable change as these behaviors are likely to be affordable and acceptable by the wider community. **Objectives:** The objective of this study was to assess if any PDBs exist among poorly resourced rural mothers with young children near Vadodara. **Materials and Methods:** Mothers of children <5 years (n = 160) were enrolled from four rural clusters near Vadodara based on their current growth status (weight-for-age) and were categorized as PD (n = 65) and negative deviant (ND; n = 95), as per the WHO Anthro Software. Personal interviews were conducted through household (HH) visits using a semistructured questionnaire. Data were elicited on HH socioeconomic status, infant and young child feeding practices, diet pattern, and hygiene–sanitation practices. HH dietary diversity score was calculated individually after collecting data through food frequency questionnaire. **Results:** Mothers had several significant PDBs (P < 0.05), PD group vs. ND group, less use prelacteals to children (53% vs. 71%) and had more exclusive breastfeeding rates (44% vs. 26%), provided cleaner clothing to children (52% vs. 28%), had sufficient intra-HH food distribution (30% vs. 18%), and scored better in dietary diversity at HH level (52% vs. 28%). **Conclusions:** PDBs and normal growth patterns do exist in poorly resourced areas, and these mothers can be used as "change agents" by the practicing pediatricians of rural communities for improving child health and nutrition.

Keywords: Change agents, child feeding, positive deviant behaviors, undernutrition, young children

Introduction

Worldwide, there are several strategies and attempts that are being made to change the scenario of childhood undernutrition (162 million under 5 years were stunted, 52 million were severely wasted according to global nutrition report 2016). The outcome of these strategies varies from region to region and from various setups (urban, rural, or tribal) depending on the cultural practices of the community, especially their EMIC views. UNICEF (2013) reported that irrespective of the regions rural people in all over the world are much more affected by malnutrition than urban people**.** According to RSOC (Rapid Survey of Children) 2013–2014, in Gujarat, one of the most economically strong states of India, was still a cause of alarm, as 33.5% are underweight, 41.8% are stunted, and 18.7% are wasted.

Several reports have identified inadequate feeding practices, poor hygiene and sanitation practices, poor utilization of resources, and incorrect dietary pattern as some significant reasons for the poor nutritional status of the children in India.[1-3] However, amidst these poor habits and customs, there are also a few "deviant" individuals whose uncommon behaviors or practices enable them to outperform their neighbors with whom they share the same resources, and identification of them can be crucial to bring a sustainable change as their behaviors are likely to be affordable and acceptable by the wider community.[4] Positive deviance is a way of addressing childhood malnutrition by learning from scaling up what is working rather than what is not working,[5]

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to develop policies and programs that help transfer positive practices to the malnourished.[6]

There is a dearth of data on positive deviant behaviors among mothers of poorly resourced rural communities and its relationship with birth outcomes. The present study aimed to compare the positive deviant behaviors (PDBs) among poorly resourced rural households (HHs) of <5-year-old normal weight-for-age (WAZ >-2 standard deviation [SD]) children with those of HHs having undernourished children (WAZ ≤-2 SD) in the same age group (the WHO classification, 2010) in Western India.

Materials and Methods

Study setting and participants

This was an exploratory study, wherein four clusters with similar cultural backgrounds were purposively selected from a block of rural Vadodara, Western India. All HHs with children <5 years were enrolled with the help of the local government's Integrated Child Development Services (ICDS)-run Anganwadi center (n = 160).

Categorization of positive deviant/negative deviant based on anthropometric assessments

Anthropometric indices of the children (weight and height) were collected using standard procedures (WHO 2006). WAZ of the children was computed using the WHO Anthro software (2010), and based on their Z–scores, they were categorized into two groups: Group I with HHs having normal children (WAZ >-2 SD), named as positively deviant group and Group II with HHs having undernourished children (WAZ ≤-2 SD), named as negatively deviant group.

Household practices related to child health and nutrition

In-depth interviews at HH level were conducted to understand the socioeconomic status, age-specific infant and young child feeding (IYCF) practices, HH diet pattern, and hygiene and sanitation practices as per the guidelines by the World Health Organization using semistructured questionnaire, focus group discussion, and direct observation.

Household dietary diversity score calculation

HH dietary diversity was estimated by a food frequency questionnaire which included a list of common Western Indian foods in groups of 11 (cereals, pulses and legumes, roots and tubers, green leafy vegetables, other vegetables, fruits, nuts and oilseeds, milk and milk products, nonvegetarian foods, fats and oil, and sugar). Consumption patterns were recorded based on their intakes (daily, weekly, fortnightly, monthly, occasional, or seasonal). Based on the data, HH Dietary Diversity Score (HDDS) was calculated for each mother–child pair using a revised version of FAO guidelines,[7] wherein the households (HHs) which consumed half or more than half of the foods frequently in each food group scored as 1 and others scored as 0. The HHSs which had a HDDS ≥4 (i.e., consumption of four or more food groups per day) were considered positive and HHs with a score <4 were grouped as negative.

Data management and analysis

All data were entered in Microsoft Excel 2010 and analyzed using statistical software (SPSS23), whereas anthropometric data were calculated at the WHO Anthro software for WAZ analysis. Comparison between PD and ND groups was done using Chi-square test.

Ethical approval

Ethical approval was obtained from the Ethical Committee of the Food and Nutrition Department of the University (Approval No: IECHR/2015/16). Local community leaders were informed about the aim and procedures of the study. All the study participants gave their verbal consent to participate after the study objectives were explained to them.

Results

Categorization of positive deviant/negative deviant groups based on anthropometric indices

Among 160 children, only 40% (n = 65) were normal as per (WAZ >-2 SD) and categorized as PD group, and 60% (n = 95) were undernourished children (WAZ <-2 SD) and categorized as negative deviant group (ND group).

Birth weight and age of positive deviant/negative deviant groups

Birth weight was a major predictor of PD children (only 12% were <2.5 kg at birth vs. 25% LBW in ND group) [Figure 1], which corroborates with the findings that limited resources in poor communities may lead to chronic undernutrition during pregnancy and may result in poor birth outcomes.

In the ND group, 54.73% were >2 years versus 45.25% who were <2 years, while 6.31% were <6 months of age indicating the onset of undernourishment due to chronic energy deprivation. In the PD group, 40% were >2 years and a majority of 60% were <2 years [Table 1], revealing that undernutrition rate is higher among older children who do not depend on breastfeeding anymore and who require diversified diet and healthy diet pattern.

Socioeconomic status of positive deviant/negative deviant groups

Result reveals that among 65 PD children 53.8% were boys as compared to 50.5% in ND group, which indicates that undernutrition was prevalent in both the genders. Type of family had no positive influence on nutritional status of children as almost equal percentage of children belonged to joint family (69% PD

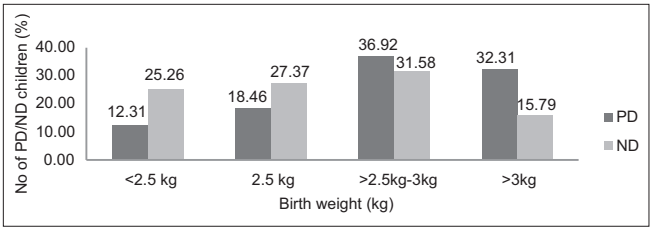

Figure 1: Birth weight versus child undernutrition ($P < 0.05$)*

Table 1: Infant and young child feeding practices of mothers having <5 year-old-children: Comparing positive deviant with negative deviant children

IYCF indicators	PD, *n* (%)	ND, *n* (%)	*P**
Practice of prelacteals			
Yes	35 (53.85)	68 (71.58)	0.021
No	30 (46.15)	27 (28.42)	
Practice of giving water in the first 6 months			
Yes	32 (49.23)	66 (69.47)	0.010
No	33 (50.77)	29 (30.53)	
Exclusive breastfeeding			
Yes	29 (44.61)	25 (26.31)	0.016
No	36 (55.38)	70 (73.68)	
Knowledge and practice regarding ORS			
Not aware	40 (61.54)	71 (74.74)	0.040
Aware but do not know how to prepare	7 (10.77)	2 (2.1)	
Aware and know how to prepare	18 (27.69)	22 (23.16)	

*Chi-square test. PD: Positive Deviant - Normal Children, ND: Negative Deviant - Underweight Children, ORS: Oral rehydration salts, IYCF: Infant and young child feeding

and 68% ND). However, children from the family having 5 or <5 members were more prone to be malnourished (ND, 47.3%). Although the percentage of illiterate parents was more among ND children (11.5% mothers and 9.4% fathers) than PD children (9.2% mothers and 4.6% fathers), parent's educational status had no significant correlation with child undernutrition in the present study. Percentage of unemployed fathers was higher among ND. There was also poor status of agricultural practices in the area due to pollution caused by nearby industries which deteriorated the soil quality and resulted in less family income due to agriculture and indirectly leading to food insecurity and poor child nutrition. Family income of majority (61%) of ND children was ≤5000 rupees as compared to 47% PD children, indicating that family income can contribute to better nutritional status of the child as it increases the affordability of nutritious food.

Child feeding practices of positive deviant/negative deviant groups

Among 65 PD children, 73.8% were initiated breastfeeding within 1 day after birth compared to 65.2% ND children [Table 1]. Although the incidence of colostrum feeding was higher among ND children (68.42% ND and 61.5% PD), practice of giving prelacteals ($P < 0.05$), water ($P < 0.01$), and top milk within the first 6 months was higher among ND children (71.5%, 69.4%, and 20%, respectively) compared to PD children (53.8%, 49.2%, and 13.8%, respectively). ND mother said – "I breastfed the child for exclusive breastfeeding practice within the first 6 months after birth was significantly ($P < 0.05$) higher among PD children (44.6% PD, 26.3% ND)." This result signifies that even though initial child feeding practices were followed as per standard guidelines, child can still become undernourished at a later age if other important positive child feeding behaviors such as exclusive breastfeeding (EBF) (not providing any kind of prelacteals water or food) for the first 6 months are not practiced appropriately.

Other child feeding practices such as continued breastfeeding up to 2 years, breastfeeding during illness, and practice of initiation of complementary feeding after 6 months were satisfactory for both PD and ND groups, and packaged food consumption was higher among both the groups. Among 160 children, mothers of 74.7% ND children were not at all aware of oral rehydration salt (ORS) treatment compared to 61.5% PD children ($P < 0.05$). Therefore, proper knowledge regarding ORSs and its practice during diarrheal infection can create a difference in child nutrition as incidence of frequent diarrheal infection leads to weight reduction and poor nutritional status.

Household dietary pattern of positive deviant/negative deviant groups

There was a significant difference observed ($P < 0.05$) in intra-HH food distribution and HH dietary diversity. Only men were fed well in the majority of ND HHs (PD 4.61% and ND 11.5%). Consumption of breakfast was poor in both PD and ND groups as only tea or very little snacks were consumed in the majority of the HHs. Four meals were consumed in higher percentage of PD HHs (PD 30.7% and ND 22%). HDDS was significantly correlated ($P < 0.01$) with child undernutrition as higher percentage of PD children (52.3%) scored positive DDS compared to ND children (28.4%).

Hygiene and sanitation practices of positive deviant/negative deviant groups

As regards hygiene and sanitation practices, significant difference ($P < 0.01$) was observed in case of cleanliness of clothes. Clothes were dirty (42%) and very dirty (25%) for majority of ND children as compared to PD children (30.7% and 16.9%, respectively). Practice of hand wash with soap during food handling (PD 49% and ND 35%) and presence of sanitary latrine with water facility (PD 29% and ND 17%) were higher among PD children. Clean nails were observed among 46% PD children as compared to only 31% ND children. This result reveals that hygiene and sanitation practices may affect child undernutrition, and in the present study cleanliness of clothes significantly contributing child nutritional status and hence need to be promoted through PD mothers.

Discussion

Our study highlights several PDB in these marginalized communities, indicating that amidst the poor resources, these "deviant" practices such as desirable IYCF behaviors, especially EBF practices, no practice of prelacteals, no practice of giving water in the first 6 months, and knowledge and practice of ORS treatment during diarrheal infections exist leading to normal growth patterns of children. Intra-HH food distribution, HH dietary diversity, and clean clothing were some other factors identified which are likely to have

contributed to the better nutritional status (higher WAZ) seen in PD children.

Previous studies in rural India, in villages of UP,[4] West Bengal,[8] and Tamil Nadu[9] have stated that positive deviance and normal growth of children were enhanced under conditions of small family size <5, parity below 3, family support to mother, timely initiation of breastfeeding, and higher frequency of breastfeeding. Studies in urban slums have indicated HH factors such as smaller family size, higher maternal literacy, lower parity of child, better environmental hygiene, fewer morbidity episodes (mainly diarrhea), and desirable IYCF practices such as frequent breastfeeding, timely initiation of complementary food, active feeding, and giving foods of thicker consistency.[10] Thus, whether rural or urban, several "deviant" behaviors exist.[11]

Another important factor recorded in our study was adequate dietary diversity score at HH level which is a major factor to affect child nutrition in poor communities. Therefore, efforts should also be made to improve the variety of staple food production and use of locally available indigenous foods or their biofortification[12] along with nutrition communication.[13] Nutrition education based on positive deviance approach and supplementary nutrition helps to improve the nutritional status of the Anganwadi children[14] and PDA could be a community-based solution to improve child's nutritional status. Nutritional surveys are needed to identify most significant malnutrition determinants to see adoption of new behaviors and sustainability of outcomes,[15] and such promotion of indigenous positive correlates of child growth and community wisdom through people who promote positive practices can be done.[16,17]

At programmatic level, grassroot-level workers of government programs such as ICDS need to focus on adolescent girls, pregnant, and lactating mothers and make regular home visits. Services such as iron–folic acid tablet distribution and antenatal care of pregnant mothers were available, but still low birth weight rate was quite high in the study area.[18] PDBs regarding health-care practices and ICDS utilization were not assessed in the present study, which is one of the limitations of the study and is highly recommended in future studies as such evaluations can identify gaps and plan nutrition health education.[19]

Conclusions

Practicing health-care workers including practicing pediatricians should encourage these "deviant" behaviors of the mothers amidst poor habits and customs which enable them to outperform their neighbors with whom they share the same resources.

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Conflicts of interest

There are no conflicts of interest.

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