

Original Research Article

Effect of Community-Based Program for Promotion of Early Childhood Development on Nutritional Outcomes of Children with Severe Acute Malnutrition in 6-35 months of Age

Shemar H¹, Gupta SS², Raut AV³, Maliye C², Dambhare DG⁴, Garg BS⁵

¹Assistant Professor, Dept of Community Medicine, Dr PDMMC, Amravati, Maharashtra, India.

²Professor, ³Assistant Professor, ⁴Associate Professor, ⁵Secretary KHS (Sewagram) & Professor; Dept. of Community Medicine, MGIMS, Sewagram, Maharashtra, India.

Corresponding Author: Shemar H

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ABSTRACT

Objective: To study effect of a Community based program for promotion of Early Childhood Development (ECD) on physical growth of wasted children of 6-35months of age in rural area.

Materials and Methods: An observational study was conducted within setting of community-based program designed primarily to study the feasibility of delivery of ECD interventions at home and community level through frontline workers. One Primary Health Center (PHC), from three PHCs, under which the community-based ECD promotion activities were done, was included as ECD program area and a neighboring Primary Health Center similar to the intervention PHC was selected for comparison. All children 6-35 months old with wasting from the ECD program area and comparison PHC were identified and their anthropometric assessment was done at baseline and after one year of intervention to assess the effect of ECD interventions on nutritional outcomes among wasted children. Statistical analysis was done using EPI info version 7, WHO-Anthro and R software.

Results: At end of 1 year, there was significant difference in mean scores of ECD activity score in ECD program area as compared to comparison area. At baseline, 100% of study subjects were wasted (WHZ < -2SD) based on the inclusion criteria. In the ECD program area, the 73.2% of children moved to normal from wasted compared to 43.3% in control PHC. The proportion of children with severe wasting (WHZ < -3SD) declined from 23.0 % to 2.7% in ECD program area compared to decline from 19.6% to 10.9% in comparison PHC area.

Conclusions: The present study shows that Early Childhood Development interventions at community level delivered through frontline workers resulted in better nutritional outcomes for children with wasting.

Key words: Early Childhood Development, nutrition, Community-based program, malnutrition

INTRODUCTION

The first few years of life are critical both for a child's nutrition and for his/her physical, social, cognitive, and emotional development and the interventions during

this period has maximum impact. [1] The attachment between the child and mother plays a vital role in child's survival, growth and development. The infant's first line of defence is his/her smile which emerges

around 6 weeks and helps to build the attachment with caregiver. [2] Malnutrition reduces the emergence or frequency of these smiles and laughs which hampers the mother-child interaction and the child will be at greater risk of neglect and less responsive care. Child's behaviour has a serious impact on care that he/she receives, resulting in higher risk of malnutrition for difficult children. [3,4] If the activities aimed at improving child development are poor then it could lead to negative growth patterns for these children. Responsive care has an impact on play as well as feeding, particularly during complementary feeding. [5] The quality of care the primary caregiver provides, in terms of responsiveness to cues of child hunger and feeding, has shown to relate to children's nutrient intake from complementary foods. [5,6]

Studies found that a psychosocial intervention significantly affected psychological development, and that nutrition interventions significantly affect physical growth. [7] There is scientific basis for the effectiveness of interventions to promote growth and to promote psychological development, even under poor socio-economic and environmental conditions. [7]

Studies have shown that improvements in nutrition and psychosocial stimulation together have additive effects on growth and development of children. [7] India's main early child development intervention, the Integrated Child Development Services program [8] has been sustained for about 30 years and has been successful in many ways. However, it has not yet succeeded in making a significant dent in child malnutrition. Most children under three, the group that suffers most from malnutrition, are not reached, and most of their parents do not receive counseling on better feeding and child care practices. [2]

Moreover, strategies for empowering parents to provide psychosocial stimulus to young children have mostly been ignored under ICDS scheme. A necessary first step is to further develop and test a model that combines nutrition and psychosocial interventions.

A Community-based program is being implemented in 3 Primary Health Centre areas to test feasibility of empowering parents and other family members to provide psychosocial stimulus through Accredited Social Health Activist (ASHA) and Anganwadi workers (AWW). The strategies to empower parents on Early Childhood Development were developed under the program in consultation with important stakeholder at national level. The present study was conducted in this setting with the objective to assess the effect of this community based program on physical growth of children of 6-35 months age-group.

MATERIALS AND METHODS

The current observational study was conducted within the settings of WHO-INTERVIDA Collaborative Project being implemented in Wardha district, Maharashtra. The study was carried out in villages of two Primary Health Centres, Kharangna Gode PHC taken as intervention area where psychosocial intervention was in place through the project, and Waifad PHC, a neighboring PHC with comparable socio-demographic profile as comparison area. The study was carried out from August 2012 to July 2013. The population of ECD program area was 34,769 and comparison area was 38,487. List of all children 6-35 months of age was collected from the anganwadi centres. Mothers along with their children were invited to the anganwadi centre and weight and height of the children was measured. Weight and height of the

child was recorded as per WHO growth standards. [9,10] Body weight was recorded by using Salter's weighing scale. Weighing scale was standardized and zero error was corrected every time the weight was measured. Children were weighed with minimum clothing. Recumbent length was measured for children less than 2 years of age and for children aged 2 years or more and who are able to stand, standing height was measured. Flexible tape was used for measurement. A wooden board was used for measuring length. Child was placed supine on the measuring board. The child's head was held in the Frankfort plane and gentle traction was applied to bring the head into contact with the fixed headboard. The examiner held the child's legs by placing one hand gently but firmly over the knees with the child's toes pointing directly upward. Gentle pressure to the legs was applied to prevent the knees from flexing. Crown heel length was measured.

Approximately 80% of the children were screened through this approach and for rest of the children anthropometric measurements done by Anganwadi worker during the monthly growth monitoring was used. Date of birth of the children was recorded from the immunization card and for those children whose immunization card was not available, date of birth was recorded from birth records maintained at anganwadi centre and Gram panchayat. For those whose birth records were not available, verbal information on date of birth was collected from caregiver. Using WHO-ANTHRO software, list of wasted children (WHZ<-2SD according to WHO growth standard) was generated. All children with wasting (WHZ<-2SD) and whose parent/mother consented for participation were selected to participate in the study.

ECD score was calculated by using the age appropriate activities given in

Mother and Child Protection card (MCPC). Children were divided into three groups viz. 6-11 months, 12-23 months, 24-35 months. There are a set of questions for each age group. The answer for each age group was measured in terms of 'yes' and 'no'. For each response of 'yes' a score 1 was given and for each response of 'no' a score of 0 was given. For each age group net ECD score was calculated by adding score of set of questions. The minimum score for each age group was 0 and maximum possible score was 4.

Interventions under WHO-INTERVIDA Collaborative Project:

The activities under this project are being implemented through ASHA and Anganwadi workers at village and community level. Anganwadi workers and ASHA were provided 3-days training using a package adapted from WHO/ UNICEF Care for Child Development (CCD) package. A Marathi version of counseling card based on CCD package and a toy kit was provided to all frontline workers for demonstration of play activities to the primary caregivers.

Under the project, ASHA is to pay home visits to every child below three years once every month. ASHA during their home visits meet the primary caregiver and try to assess the primary caregiver's interaction with the child and promote child development activities. Mother's groups formed in every village through Anganwadi workers were further strengthened. Regular meetings of these mothers' groups were conducted at the anganwadi centres and Anganwadi workers acted as a facilitator. Mothers were asked to come with their children in the meeting. Parenting workshops are conducted with aim to empower new/ future parents with appropriate knowledge and skills for child development, to improve understanding

between the mother and father on the issues related to care for child development and to provide a platform in the village where issues related to child care and development may be freely discussed.

Through these approaches the primary caregivers are encouraged to display love and affection to their child, to talk to them and engage them in age-appropriate play activities using home-made toys several times in a day. They also counseled fathers and other family members to provide quality time to their children and to support the primary caregiver.

Data Collection technique:

For each study subject, the mother was interviewed using a pre-designed pre-tested questionnaire. The information regarding socio-demographic characteristics of the child and Information about the age appropriate Early Child Development activities done by the mother was collected using the Mother and Child Protection Card. Nutritional status of the child was assessed with the help of anthropometric measurements using the newly developed WHO growth standards. All the interviews and anthropometric measurements were conducted by the investigator who was trained in the procedure.

Data analysis:

Data was entered using EPI-INFO program. Analysis was done using EPI-INFO version 3.4.3, WHO-Anthro ^[11] and R software. ^[12] Chi square test was used to identify the difference between socio-demographic characteristics of two areas. Scoring was done for Early Child Development activity. Indices (Z score for Weight for height, Weight for age, Height for age) of physical growth that describe the nutritional status of child were calculated using WHO-ANTHRO software. Mean Z scores were calculated for WHZ, WAZ,

HAZ. Difference in mean Z scores was analyzed by ANOVA.

Ethical considerations:

Ethical Clearance was obtained from Institutional Ethical Committee. Written informed consent was obtained from the primary caregiver. Children with severe wasting, stunting and underweight were referred to the nearest health facility for management. The medical personnel at health facility used to examine the child and would give appropriate medication and if required, children were referred to VCDC.

RESULTS

Study subjects comprised of a total of 224 wasted children of age group 6-35 months in ECD program area and 248 children in comparison area. Out of 248 wasted children in control area, 231 children were enrolled in the study as caregivers of other children refused to participate in the study and 224 children were enrolled in program area. 7 children in ECD program area and 12 children in comparison area were lost to follow up because of migration and complete data was not available for these children. 217 children in ECD program area and 219 children from comparison area were available for analysis. The Socio-demographic characteristics were comparable in ECD program and comparison area (Table1). The primary caretaker was mother in all cases in both the area.

The mean change in the ECD activity scores was 2.53 ± 0.72 , 1.18 ± 1.06 , 1.51 ± 0.80 in age group 6-11 months, 12-23 months, 24-35 months respectively in ECD program area as compared to 0.61 ± 0.78 , -0.06 ± 0.85 , 0.36 ± 0.52 in age group 6-11 months, 12-23 months, 24-36 months respectively in comparison area and the difference in mean change of ECD activity score in three age groups was found to be

statistically significant ($p < 0.001$) (Table2). It was observed that there was significant weight gain per month in ECD program area

(164 ± 49 grams) as compared to comparison area (118 ± 56 grams).

Table1: Sociodemographic profile of study subjects in ECD program area and comparison area.

Characteristics	ECD program area N=217 (%)	Comparison area N=219 (%)	P value*
Age of child			
6-11	44 (20.3)	26 (11.5)	0.06
12-23	124 (57.1)	140 (64.2)	
24-35	49 (20.3)	53 (24.3)	
Sex of child			
Male	88(40.6)	101 (45.1)	0.14
Female	129 (59.4)	118 (53.9)	
Socioeconomic status			
Above Poverty Line	171 (78.8)	169(77.2)	0.38
Below Poverty Line	46 (21.2)	50 (22.8)	
Type of family			
Nuclear	109 (50.2)	124 (56.6)	0.40
Joint	57 (26.3)	50(22.8)	
Extended family	51 (23.5)	45(20.5)	
Birth weight (kg)			
< 2.5	147(67.7)	144 (65.8)	0.36
≥ 2.5	70(32.3)	75 (34.2)	
Birth Order			
First	113 (52.1)	102 (47.6)	0.14
Second or higher	104 (47.9)	117(53.4)	
Education level			
Illiterate	5 (2.3)	6(2.7)	0.27
Primary	58(26.7)	78(35.6)	
High school	98(45.2)	93 (42.5)	
Senior Secondary	48(22.1)	36 (16.4)	
Graduate or postgraduate	8(3.7)	6 (2.7)	

Table2: Mean change in scores of Early Child Development Activity in ECD program area and comparison area.

Age Group at baseline (months)	ECD program Area			Comparison Area			P value*
	Baseline	Endline	Change	Baseline	Endline	Change	
	Mean± SD	Mean± SD	Mean± SD	Mean± SD	Mean± SD	Mean± SD	
6-11	0.93± 1.13	3.46± 0.50	2.53± 0.72	1.24± 0.59	1.85± 0.35	0.61± 0.78	<0.001
	12-23	1.24± 0.83	2.42± 0.64	1.18± 1.06	1.31± 0.66	1.25± 0.50	
24-35	1.14± 1.08	2.65± 0.69	1.51± 0.80	0.86± 0.59	1.22± 0.46	0.36± 0.52	

At baseline, 100% of study subjects were wasted ($WHZ < -2SD$) based on the inclusion criteria. In the ECD program area, the 73.2% of children moved to normal from wasted compared to 43.3% in control PHC. The proportion of children with severe wasting ($WHZ < -3SD$) declined from 23.0 % to 2.7% in ECD program area compared to decline from 19.6% to 10.9% in comparison PHC area.(Table3). The mean change in WHZ was -2.71 ± 0.49 and 0.63 ± 0.84 respectively in ECD program area

and comparison area and the difference was found to be statistically significant ($p < 0.001$). The change in mean Z scores for weight for age was 0.13 ± 0.62 and -0.24 ± 0.91 respectively and the difference was found to be statistically significant ($P < 0.001$). the mean change in Z score of Height for age was -1.24 ± 1.13 and -1.24 ± 0.91 respectively in ECD program area and comparison area and the difference was not statistically significant ($p > 0.05$) (Table4). Figure 1, 2, 3, shows the

distribution of Z scores for Weight for height, Height for age, Weight for age, respectively.

Table3: Underweight, Stunting and wasting at baseline and endline in program area and comparison area.

Indicators of Nutritional status	ECD program area			Comparison area			P value*
	Baseline N=217	Endline N=217	Change	Baseline N=219	Endline N=219	Change	
	Mean± SD	Mean± SD	Mean± SD	Mean± SD	Mean± SD	Mean± SD	
Weight for height Z score (WHZ)	-2.71± 0.49	-1.62± 0.66	1.09± 0.74	-2.75± 0.42	-2.12± 0.79	0.63± 0.84	<0.0001
Height for age Z score (HAZ)	-0.39± 1.63	-1.64± 0.90	-1.24± 1.13	-0.95± 1.45	-2.18± 0.97	-1.23± 1.49	>0.05
Weight for age Z score (WAZ)	-2.16± 0.81	-2.03± 0.61	0.13± 0.62	-2.45± 0.75	-2.69± 0.73	-0.24± 0.91	<0.0001

Table: 4 Difference in change in nutritional status of children in ECD program area and comparison areas.

Indicators of Nutritional status	ECD program area			Comparison area			P value*
	Baseline N=217	Endline N=219	Change	Baseline N=217	Endline N=219	Change	
	Mean± SD	Mean± SD	Mean± SD	Mean± SD	Mean± SD	Mean± SD	
Weight for height Z score (WHZ)	-2.71± 0.49	-1.62± 0.66	1.09± 0.74	-2.75± 0.42	-2.12± 0.79	0.63± 0.84	<0.0001
Height for age Z score (HAZ)	-0.39± 1.63	-1.64± 0.90	-1.24± 1.13	-0.95± 1.45	-2.18± 0.97	-1.23± 1.49	>0.05
Weight for age Z score (WAZ)	-2.16± 0.81	-2.03± 0.61	0.13± 0.62	-2.45± 0.75	-2.69± 0.73	-0.24± 0.91	<0.0001

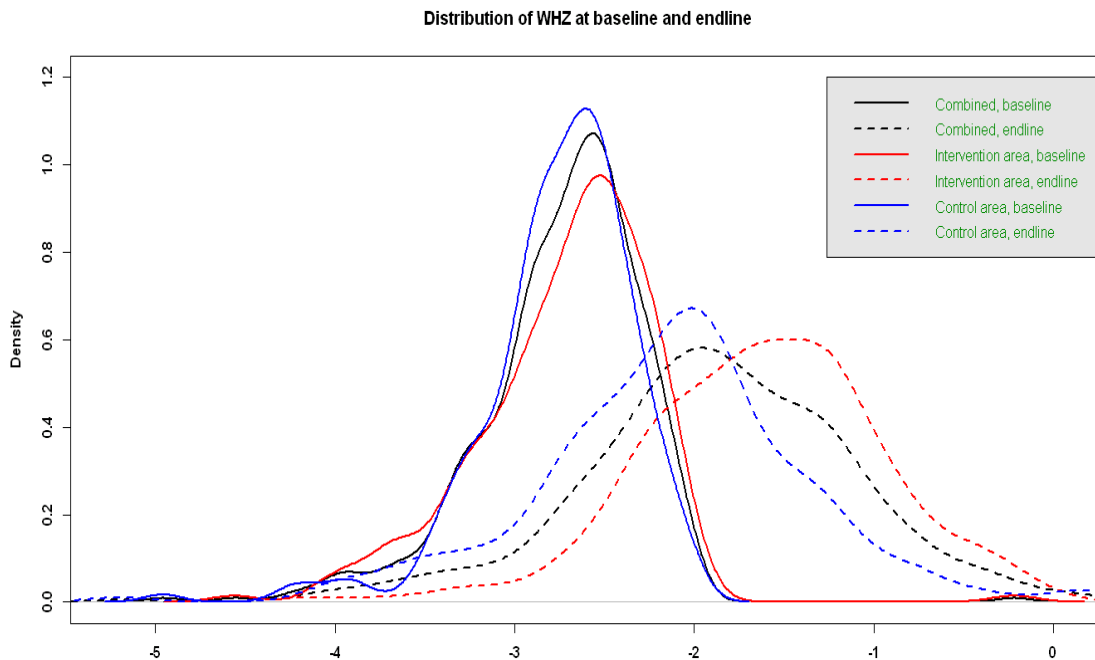


Figure 1. Distribution of Weight for height Z scores at baseline and endline

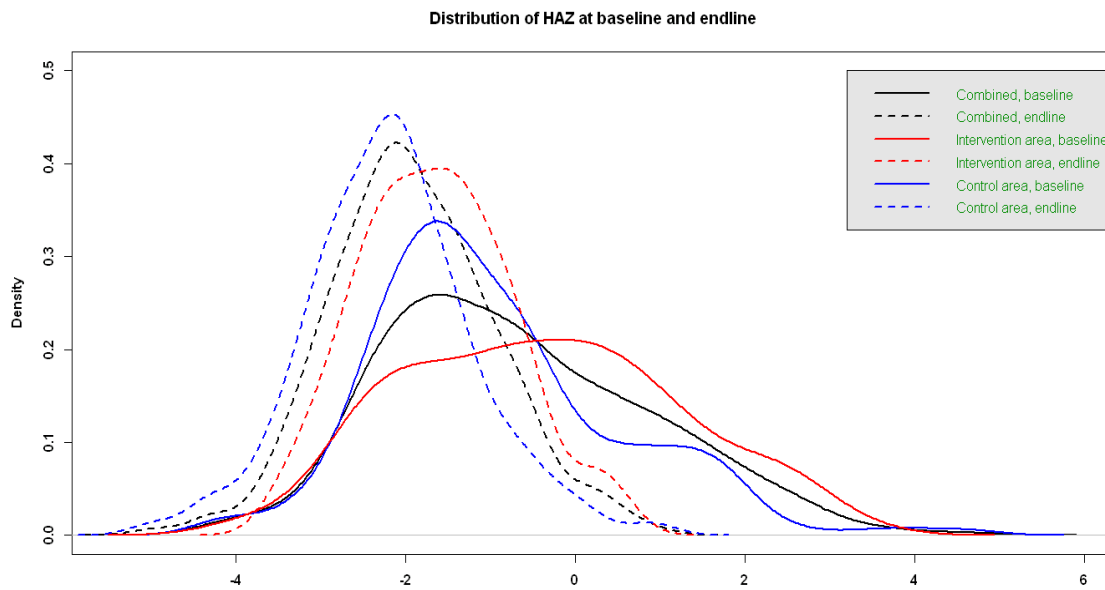


Figure 2. Distribution of Height for Age Z scores at baseline and endline

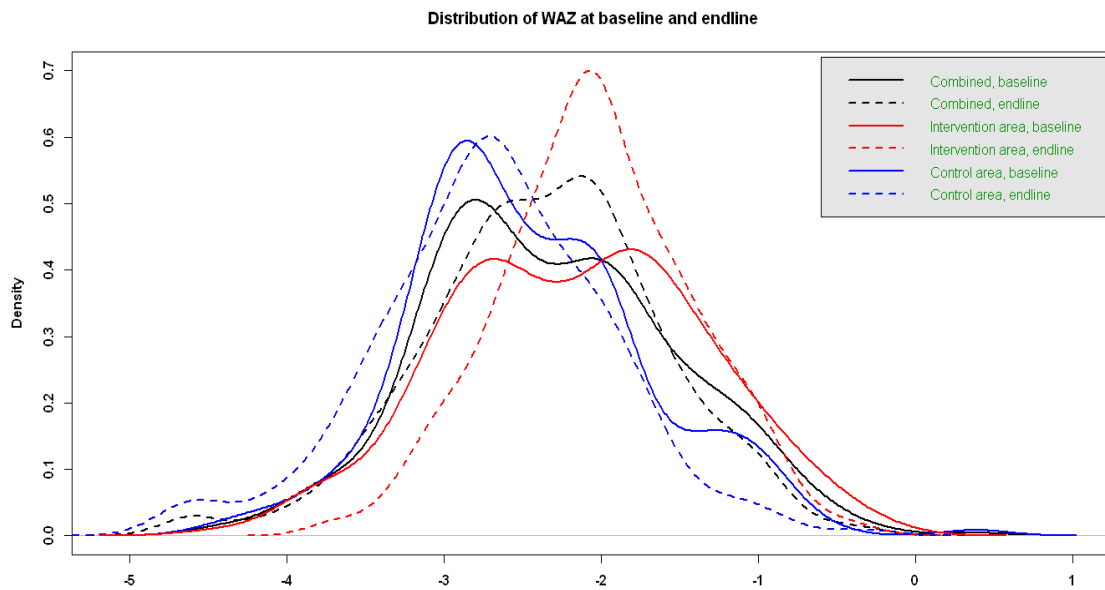


Figure 3. Distribution of Weight for age Z scores at baseline and endline

DISCUSSION

A community-based program which was designed to test feasibility of empowering parents and other family members to provide psychosocial stimulus resulted in better nutritional outcomes.

Significant difference ($p < 0.001$) in mean change of Z scores for Weight for height, Weight for age was observed but

there was no significant difference in mean Z scores for Height for age. Height for age is an indicator of chronic malnutrition and the duration of intervention was less so this could be a reason for non significant change in Height for age Z scores. Super et al showed that the children whose mother had been given tutoring in cognitive and social stimulation showed an average growth

advantage over comparisons about three-quarters as great as those whose families had been given food. [13] Differences were observed between two groups at 6 months in terms of infant physical development in the study by Cooper et al. [14] The infants in the intervention group were significantly heavier ($p=0.001$), and their weights were less variable than those of comparison group infants. Height also differed significantly between two groups ($p=0.02$), with infants in intervention group being taller than those in comparison group and this was not found in our study.

The present study showed significant change in the mean scores of ECD activity across all age groups ($p<0.001$) which suggests that the intervention helped mothers to be responsive towards child care and this finding was consistent with the results of other studies. [14-20] This finding is encouraging as it suggests that interventions helped to improve the interactions between primary caregiver and the child and this is important for low and middle income countries as mothers/primary caregiver of malnourished children belonging to low socioeconomic status are relatively less sensitive towards their child's needs, less involved and emotionally responsive and less engaged in interaction with children as compared to caregivers of adequately nourished children.

We may postulate that the quality of mother-child interactions helped mothers understand the cues of child hunger and thus these improved mother-child interactions helped not only in child development but also helped in improving the nutritional status of children.

One of the limitations of the present study is that the intervention gradually scaled up in the ECD program area. Training of the Anganwadi workers and ASHA was conducted following the baseline survey.

Intensity of ECD interventions accelerated gradually and stabilized only after six months of start of the study.

The ECD interventions are still continuing under the project and, therefore, the study provides an opportunity to further follow-up the cohort of children in intervention and comparison area to see the long term effects of ECD intervention and collateral benefits of ECD interventions of child feeding practices.

Irrespective of the limitation, the findings of the study are promising. The present study shows that the interventions aimed for improving the Early Childhood Development activities through community workers appeared to be beneficial for the quality of mother-child interaction and it had a positive impact on child's physical growth.

The findings of the present study, supported by the findings of the other studies, [13-16] suggest that the ECD interventions can help in improving the nutritional status of malnourished children (especially acute malnutrition). India's efforts to tackle challenges of malnutrition have, in the past, focused primarily on distributing supplementary foods under the longstanding Integrated Child Development Services (ICDS) program. ICDS services have expanded rapidly nationwide, they have largely targeted children between 3-6 years of age, by which time malnutrition has already set in. The government of India has recently restructured the ICDS with emphasis on 0-3 years age group. The effective implementation of 'adapted version of Care for Child Development Package for India' through ICDS would offer vital opportunities to address the problems of malnutrition and promote physical growth of children.

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