

## Follow-up Assessment of Under-nourished Children Under Integrated Child Development Services Scheme in Tapi District, India

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**Date of Submission:** Oct 09, 2012

**Date of Acceptance:** Mar 23, 2013

**How to cite this article:** Desai KT, Nayak SN, Pate PB, Modi BP, Gharat VV, Bansal R. Follow-up Assessment of Under-nourished Children Under Integrated Child Development Services Scheme in Tapi District, India. *Int J Prev Med* 2014;5:758-66.

### ABSTRACT

**Background:** India shares the largest burden of under-nutrition in world. The aim of this study was to conduct follow-up assessment of under-nourished children attending anganwadi center (AWC).

**Methods:** This was a retrospective cohort study conducted in 50 AWC of Tapi district. Total 529 children aged 1-6 years diagnosed as under-nourished before 1 year were included. Pre-structured questionnaire was used for present day assessment of these children followed by Epi-info mediated analysis.

**Results:** Children of literate mothers had higher weight gain. Ninety percent of children attended anganwadi regularly, however 25% of children dropped out for more than 1 month. In 1 year, growth had faltered in 20% children and was stagnant in 63% of them. Children who were treated for under-nutrition; that completed course at Child Development and Nutrition Center; and whose parents were counseled about the under-nourished status of child had higher weight gain than their counterparts.

**Conclusions:** Parents of under-nourished children must be counseled about the nutritional status of their child. In cases of under-nourished child, referral to higher center must be ensured by health worker. Supplementary feeding as a long-term solution to country's under-nutrition problem should be studied in detail with the alternative solutions.

**Keywords:** Anganwadi, follow-up, nutritional assessment, under-nourished children

### INTRODUCTION

Forty percent of the world's severely under-nourished under-five children live in India.<sup>[1-3]</sup> Major underlying causes for this under-nutrition are inadequate access to food, insufficient health services and unhealthful environment.<sup>[4]</sup>

Integrated Child Development Services (ICDS) scheme was launched in India in 1975 with a prime objective of improving the nutrition status of underprivileged children, by providing

supplementary nutrition, through the network of anganwadi centers (AWCs) and anganwadi workers (AWW).<sup>[5-7]</sup> The AWC is plainly a courtyard play center and the heart of ICDS.<sup>[8]</sup> It is the central point for the deliverance of ICDS services to children below 6 years of age, expecting women, lactating mothers and adolescent girls at community levels.<sup>[8]</sup> The existing population norm for AWC is: One AWC per 1000 population in rural and urban project and one AWC per 700 persons in the tribal project.<sup>[9]</sup> Each AWC is run by an AWW supported by a helper in integrated service delivery. Together AWW and AWC works for better linkages of the community with the health system; as well as escalating the capability of community and women, particularly mothers for childcare, survival, and development.<sup>[8]</sup>

As per the revised guidelines of the ICDS, supplementary nutrition worth 500 Kcal and 12-15 g of protein is distributed to all children of 6-72 months age.<sup>[7]</sup> Severely under-nourished children aged 6-72 months of age are provided additional 300 Kcal and 8-10 g of protein.<sup>[7]</sup> Moreover, growth monitoring and nutrition surveillance of these children is also carried out with the help of growth chart.<sup>[7]</sup> Growth chart is a vital appraisal tool for the evaluation of growth and development of child, which could be further used to detect early growth faltering and take preventive interventions accordingly.<sup>[10]</sup> Referral service for severely under-nourished children is also provided under the scheme.<sup>[7]</sup>

A new initiative in Gujarat for under-nourished children is setting up of child development and nutrition centers (CDNC).<sup>[11]</sup> Severely under-nourished (red category) child are referred to such centers for rehabilitation.<sup>[11]</sup> At such centers, mother and child stays together; the child is treated for infection if any and is provided nutritious dietary supplementation with active participation of mother.<sup>[11]</sup> Child is discharged from the center once he/she starts gaining weight.<sup>[11]</sup>

Despite being most widely studied program there are many controversies regarding benefits of ICDS. The present study was therefore undertaken with the objective of assessing the progress in growth of under-nourished children under ICDS and the factors associated with it in the Tapi district of Gujarat.

Tapi is a predominantly tribal district. Tribal population constitutes around 8% of

the population of India.<sup>[12]</sup> Tribal population has higher rates of under-nutrition because of dependence on agricultural practices for food supply, discrimination in terms of socio economic status as well as neglect in the national programs.<sup>[12]</sup> Assessment of nutritional status of children under ICDS is considered as a measure of effectiveness of the program and it is necessary for planners to understand the program and nutrition situation among the vulnerable tribal population of Tapi region. Hence, far adequate literature is not available from the region on the subject matter.

## METHODS

### Ethics

Informed oral consent was taken from the mothers of children who were examined. The study was conducted with priori permission from the Health and Family Welfare Department, Government of Gujarat.

### Study type

This was a retrospective cohort study where cohort of study participants was identified retrospectively from the AWC data and follow-up assessment of them was carried out up to the day of the survey.

### Study setting

Tapi is predominantly a tribal district of Southern Gujarat with agriculture being its principal economy. The study was conducted in 50 AWC under 25 primary health centers (PHC) of Tapi giving equal representation to each of its five blocks.

### Study period

February to March, 2012.

### Sampling design

There are a total of 30 PHCs in the Tapi District. Initially all the PHCs were decided to be included in the study. However, due to time constraint and certain national health program activities like Intensive Pulse Polio Immunization round and Mass Drug Administration for Filariasis, we were finally able to cover only 25 PHCs. Equal representations was given to all the five blocks of the district, selecting five PHCs from each block. In the

first phase of sampling, list of AWC was used as sampling frame for each PHC and two AWC from each PHC were selected using the simple random sampling (SRS), thus, total 50 AWC were selected. Under the ICDS scheme, growth chart registers are maintained for the growth monitoring of children attending the AWC. These growth charts are based on World Health Organization growth standards for weight for age for boys and girls. Three color coded categories are given in it: Green for normal, yellow for under-weight ( $-2$  SD to  $-3$  SD) and red for severely under-weight ( $< -3$  SD) child. For the second phase of sampling, list of all children aged one to five years, who were in red or yellow category of growth chart of AWC before 1 year, was prepared. The month of February 2011 was considered for selecting children before 1 year. For each selected AWC, on an average, ten under-nourished children of 1 to 5 years of age were selected randomly from the above list by SRS. In case the selected child was not available, next child in the list was taken. Thus total 529 children were covered in the study.

#### Data collection tool

A structured questionnaire was prepared after literature review and departmental discussion. The questionnaire was designed to assess the growth status of the children. Pretesting and piloting was carried out for checking practicability of the questionnaire and necessary corrections were made accordingly. Proper training of all interviewers was conducted before starting the data collection.

General information like age, sex, education status of parents as well as service utilization of AWC was assessed by personal interview of mothers. In case mother was not available, information was collected from any other available family member.

Current growth status of child including current weight (kg) and mid upper arm circumference (MUAC) (cm) was measured using standard technique. From the past records of growth chart plotting, other information like weight and category before 1 year was also collected.

#### Statistical study

Data entry was carried out in Microsoft Excel. Analysis was carried out to understand the advancement of growth status and factors

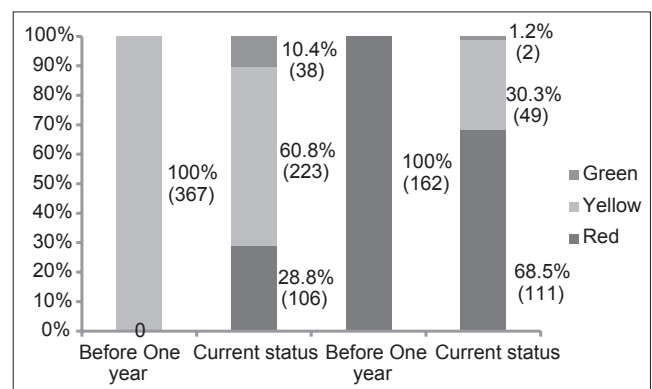
associated with it, using independent sample *t*-test using Epi info 2007.

## RESULTS

In current study, from the growth chart registers of AWC, total of 529 under-nourished children falling into red 162 (30.6%) and yellow 367 (69.4%) category before 1 year (February 2011) were included. Follow-up weighing and categorizing of the same children after 1 year showed that 39 (7.4%) were in green category, 273 (51.6%) were in yellow category and 217 (41%) were in red category. It was observed that 89 (16.9%) of the 529 children had shown improvement in their growth in 1 year, while 334 (63.1%) and 106 (20%) of the children had shown stagnancy and faltering in their growth respectively. Number of children migrating from yellow/red category to green, yellow, and red category in 1 year was as seen in Figure 1. Mean weight gain in 1 year for all under-nourished children was 1.7 ( $\pm 1.4$  SD) kg. There was no statistically significant difference between past and current weight in both yellow and red category children ( $P = 0.44$ ) [Table 1].

Moreover, looking at the growth chart it was evident that out of total 529 under-nourished children, only 114 (21.6%) children had fallen in to green category at any point of time during past 1 year. Only 19 (16.7%) out of 114 were able to maintain the green category up until the end of the year.

According to the current MUAC, 73 (13.9%) of the children were severely under-nourished (MUAC  $< 12.5$  cm), 242 (45.7%) were mild and moderately under-nourished



**Figure 1:** Categories of under nourished children: Present and before one year ( $n = 529$ )

**Table 1:** Association of demographic profile of under-nourished children with weight gain ( $n=529$ )

Variables ( $n$ )	Mean weight gain in one year (kg)	$\pm$ SD (kg)	Mean difference	CI lower	CI upper	$P$ value <sup>‡</sup>
Growth category of child before one year <sup>§</sup>						
Yellow (367)	1.7	1.5	0.1	-0.16	0.36	0.44
Red (162)	1.8	1.1				
Gender						
Male (257)	1.7	1.1	0.1	-0.15	0.35	0.42
Female (272)	1.8	1.7				
Age						
12-36 months (151)	2.0	1.2	0.4	0.13	0.67	0.004
37-60 months (378)	1.6	1.5				
Education of mother						
Illiterate (176)	1.5	1.0	0.3	0.04	0.55	0.02
Literate (353)	1.8	1.6				
Education of father						
Illiterate (140)	1.6	0.9	0.2	-0.06	0.46	0.14
Literate (389)	1.8	1.5				

SD=Standard deviation, CI=Confidence interval, <sup>‡</sup>Independent sample  $t$ -test applied, <sup>§</sup>Three color coded categories are given in the growth charts (based on World Health Organization growth standards for weight for age for boys and girls) maintained at the anganwadis: Green for normal, yellow for under-weight ( $-2$  SD to  $-3$  SD) and red for severely under-weight ( $< -3$  SD) child

(MUAC = 12.5-13.5 cm) and 214 (40.4%) were in normal grade (MUAC > 13.5 cm) (Kappa agreement for categorization of under-nutrition in to three categories between use of growth chart method and MUAC measurement was 0.029, [ $P = 0.20$ ]).

Out of total 529 under-nourished children, 257 (48.6%) were male and 272 (51.4%) were female. Gender-wise no difference in terms of mean weight gain in 1 year was seen between the two ( $P = 0.42$ ). Furthermore, in the study, 151 (28.5%) children were in one to 3 years and 378 (71.5%) in 3 to 6 years age group with mean weight gain in younger children higher than older children [ $P = 0.004$ , Table 1]. Around 140 (26.4%) fathers and 176 (33.3%) mothers of under-nourished children were illiterate with mean weight gain of children of illiterate mother being lower than literate mothers ( $P = 0.02$ ), though no such difference was seen with education level of fathers ( $P = 0.14$ ) [Table 1].

Majority 480 (90.7%) of 529 under-nourished children had regular attendance in AWC and only 49 (9.3%) children had irregular visits (absence in last 2 weeks). The major reasons for irregular visits given by mothers can be seen from Figure 2.

On checking for drop outs (weighing not carried out for 1 month or more in last year as seen from growth chart registers), one quarter

that is 132 (25%) of children had drop-outs. Major reasons for drop-out were family being out of station as stated by 78.2% mothers, irregular running of AWC as stated by 7.3% mothers, far away location of AWC from home as given by 5.5% mothers, consistently ill child as given by 3.6% mothers, no one to accompany child to AWC, no faith in AWC services and no felt need of AWC service as said by 1.8% mothers each. In 77 mothers there was no response regarding reason for dropout.

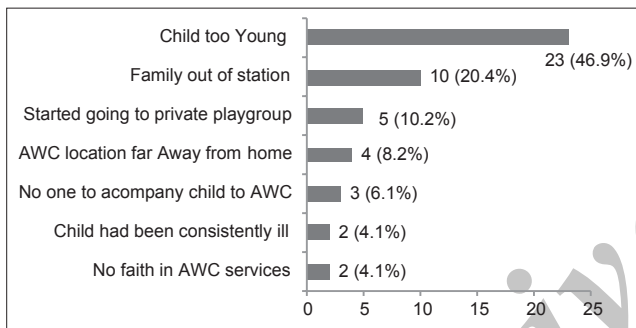
Most of the 516 (97.5%) children were eating supplementary meals given from AWC. Major reasons for not eating supplementary feed in rest 13 (2.5%) children were: Bad taste of food for 46.2%, not aware about the AWC services for 7.7%, family being out of station for 7.7%, and child's unwillingness to attend AWC for 7.7% mothers. In three children there was no response. As seen from Table 2, mean weight gain was not found to be associated with regularity in AWC visit ( $P = 0.99$ ), drop-outs ( $P = 0.99$ ) or eating supplementary feeding given from AWC ( $P = 0.61$ ).

On observing growth chart registers at AWC, 519 (98.1%) children's weight was plotted regularly, i.e., monthly. One important finding is that almost 120 (22.7%) parents were not explained about their child's under-nourished

**Table 2:** Association of ICDS services utilization indicators by under-nourished children with weight gain ( $n=529$ )

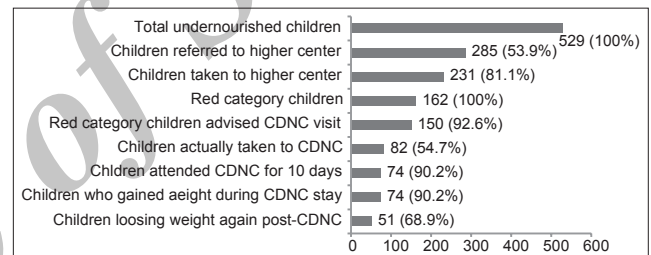
Variables ( $n$ )	Mean weight gain in one year (kg)	$\pm$ SD (kg)	Mean difference	CI lower	CI upper	$P$ value <sup>‡</sup>
AWC visit by child						
Regular (480)	1.7	1.4	0.0	-0.40	0.40	0.99
Irregular (49)	1.7	0.9				
Dropout of one month or more from AWC						
Yes (132)	1.7	1.1	0.0	-0.28	0.28	0.99
No (397)	1.7	1.5				
Child eating Supplementary feeding						
Yes (516)	1.7	1.4	0.2	-0.57	0.97	0.61
No (13)	1.9	0.8				
Parents explained category of their under-nourished child						
Yes (409)	2.1	2.1	0.5	0.11	0.89	0.01
No (120)	1.6	1.1				

ICDS=Integrated child development services, AWC=Anganwadi centers, SD=Standard deviation, CI=Confidence interval, <sup>‡</sup>Independent sample  $t$ -test applied

**Figure 2:** Self-reported reasons given by mothers for irregular visit of their under nourished children to AWC ( $n = 49$ )

status and category by AWW. Children whose parents were explained about their child's nutrition status had gained higher mean weight than their counterparts ( $P = 0.01$ ).

As seen from Figure 3, only half of the children 285 (53.9%) were referred to higher health facility for treatment of under-nourishment by AWW, from which 231 (81%) were actually taken to higher health facility by the parents. As seen from Table 3 mean weight gain of children who were taken to higher centers ( $P = 0.03$ ) and treated for under-nutrition ( $P = 0.009$ ) was higher than others. Out of total 162 red category children before 1 year, 150 (92.6%) children were advised to visit CDNC by AWW [Figure 3]. Average weight gain during CDNC visit was 0.7 (SD =  $\pm 0.5$ ) kg. There was no difference in weight gain between CDNC attendees and non-attendees ( $P = 0.11$ ) [Table 3].

**Figure 3:** Referral, compliance and outcome of under nourished children to health facilities ( $n = 529$ )

## DISCUSSION

Out of all the under-nourished children, more than three-fourth of the children in yellow/red category had not come into the green category even a single time during the 1 year. Besides, in 1 year, growth faltered in one-fifth children and remained stagnant in three-fifth children despite being covered under the ICDS. A number of previous studies have also questioned the actual impact of ICDS on nutrition of children due to major implementation problems such as inadequately trained, supervised and supported AWW; erratic provision of food supplies, and leakage in food procurement; poor quality bad taste food; and poorly targeted food supplementation not confined to under-nourished children.<sup>[13,14]</sup> Furthermore, the highly focused approach of the program on the supplementary nutrition leads to neglect of other important interventions for reducing childhood under-nutrition like environment hygiene which directly curtails

**Table 3:** Association of referral of under-nourished children with weight gain ( $n=529$ )

Variables ( $n$ )	Mean weight gain in one year in kg	$\pm$ SD (kg)	Mean difference	CI lower	CI upper	$P$ value <sup>‡</sup>
Under-nourished child referred and taken to higher health facility						
Yes (231)	1.9	1.7	0.3	0.03	0.56	0.03
No (298)	1.6	0.9				
Treated for under-nutrition at higher health facility						
Yes (225)	1.9	1.7	0.3	0.07	0.52	0.009
No (304)	1.6	0.9				
Under-nourished child referred and taken to CDNC (Red category <sup>#</sup> only)						
Yes (82)	1.3	0.8	0.2	-0.05	0.45	0.11
No (80)	1.5	0.8				
Child attended CDNC for ten complete days						
Yes (74)	1.3	0.8	1.4	-0.66	3.46	0.18
No (8)	2.7	2.9 <sup>§</sup>				

SD=Standard deviation, CI=Confidence interval, <sup>‡</sup>Independent sample  $t$ -test applied, <sup>§</sup>SD more than mean weight gain indicates weight loss in some cases, <sup>#</sup>Three color coded categories are given in the growth charts (based on World Health Organization growth standards for weight for age for boys and girls) maintained at the anganwadis: Green for normal, yellow for under-weight ( $-2$  SD to  $-3$  SD) and red for severely under-weight ( $< -3$  SD) child, CDNC=Child development and nutrition centers

the exposure to the disease, hence breaking the vicious cycle of infection, and under-nutrition.<sup>[15]</sup> The objectives of the ICDS program to enhance the capability of the mother and family to look after the health and nutrition needs of the child through community interaction as well as nutrition and health education, also remains largely unfulfilled.<sup>[15-17]</sup>

One more finding is that more than one fourth of the mothers of under-nourished children were illiterate with mean weight gain of these children lesser than their counterparts. Another national level survey has shown the share of under-weight boys amongst mothers with no education of 54%, compared with 32% among mothers with secondary or higher levels of education.<sup>[14]</sup> An ICDS study from Rohtak have also reported significant association between under-weight and maternal education of primary or less ( $P < 0.001$ ).<sup>[17]</sup> In the present study, no association was found between father's education and mean weight gain. This could be explained by the fact that in typical Indian family the child rearing is solely the mother's responsibility while the father remains busy in outdoor activities. Second point is that in present study almost equal representation was found of boys and girls among under-nourished children with no difference amongst them in

mean weight gain in 1 year; whereas Kumar *et al.* as well as Bhalani and Kotecha. had found the condition unfavorable to girls due to societal and cultural propagated gender discrimination.<sup>[18,19]</sup> Mean weight gain was also found to be higher for younger children, which could be explained by physiological slow down of growth by increasing age. In healthy children in normal circumstances weight increases by seven kg during 1<sup>st</sup> year, 2.5 kg during 2<sup>nd</sup> year and 2 kg/year afterwards.<sup>[20]</sup>

Though, more than 90% surveyed children attend AWC regularly which indicates a very good utilization of services, 25% of surveyed children reported to drop-out for more than 1 month during last 1 year in the study. The important reason stated for the same, was that the AWC runs irregularly and they have lost the faith in AWC. This indicates poor rapport of AWWs among the community in general and mothers in particular, which can be fatal for any program. Moreover, another major reason stated by mothers for irregular visits to AWC was that child is too young. This is supported by the fact that under the ICDS mothers are permitted to take the supplementary food of their small children at home and so children under 3 years rarely attend the centers. Some parents also stated being out of station as a reason for

non attendance. This is supported by the fact that Tapi is a rural district where many parents migrate in sugarcane farm seasonally for harvesting and young children of theirs usually accompany them. Another valuable reason given by some mothers was, far away location of AWC from home, which should not be overlooked.

Important point is that similar to present study one another study also did not found any association between nutritional status of children and duration of stay at AWC ( $P = 0.56$ ). The same study also showed overall percentage of deterioration (14-21%) in nutritional status among the children under ICDS twice that of improvement (5-12%). However, one finding of that Karnataka based study of greater improvement for children with baseline higher grade of under-nutrition was in contrast to present study.<sup>[18]</sup>

In current study, around three quarter mothers were explained about the under-nutrition status of their child and hence they were aware about the same. In another study for evaluating ICDS, awareness about current status of child was found in 70% mothers, which is similar to present study.<sup>[15]</sup> Overall in the study, children whose parents were aware about their child's under-nutrition status had higher average weight gain, which is similar to Abbi *et al.*'s findings.<sup>[21]</sup> This highlights the fact that, in addition to mere weighing of child, information of parents about their child's progress in terms of weight gain and proper counseling on how to improve and maintain their child's nutrition is more helpful in overall weight gain.

In current study, more than 90% of the children referred by AWW to CDNC had attended CDNC for the complete 10 days and most of these children gained weight during their CDNC stay. This finding supports the beneficial effect of CDNC. However, more than two-third of them lost weight again in their follow-up visits post CDNC stay. This exposed the actuality that proper attention was not given to nutrition of the child in follow-up, which reversed the benefit gained from CDNC. This is also the reason why at the end of 1 year no difference in mean weight gain was found between CDNC attendees and non attendees.

The higher mean weight gain was found in children who were referred and treated for under-nutrition in current study; which emphasis the importance of referral of all under-nourished children to community health center or other

higher facilities. Follow-up on whether the child parents actually take the child to referral center is also needed to be kept by AWW.

MUAC in place of weight for age is widely used in population surveys to check nutritional status of under-five children because of its feasibility. Attempt to check kappa agreement between MUAC and weight for age based classification of under-nutrition was made in current study. However, no agreement was found between two. There is also lack of clarity regarding the appropriate cut-off for MUAC to detect under-nutrition. One Zimbabwe based study using 15.5 cm as cut-off found to perform it poorly in comparison to other standard indices for detecting under-nutrition.<sup>[22]</sup> Further research to check for validity and reliability of MUAC, as well as standardizing appropriate cut off to achieve maximum sensitivity and specificity for detecting under-nutrition, needs to be carried out in large sample.

#### Limitations of present study and further research

Overall the current study shows important finding from the under studied tribal region in the area of under-nutrition, though it fails to take into consideration important confounders such as immunization, peri natal conditions, breast feeding, and other co-morbid conditions like diarrhea. This is the limitation of present study. In the background of knowledge gained from the current study regarding growth flustering of children despite attending AWC, further operational research from the region is needed in areas of strengthening ICDS services; exact caloric content of food given to the children with respect to their requirement at AWC; role of parental awareness; role of under-nutrition treatment; CDNC visit; and interventions to maintain the weight gained in CDNC.

## CONCLUSIONS

More than three quarter under-nourished children have shown either growth stagnation or faltering at the end of 1 year despite attending AWC. This indicates the need of early identification and special nutritional care of yellow/red category children as early as possible by the AWW along with strengthening of ICDS services. Literate mothers as well as parents who were counseled about the nutritional status of their child are better off in

taking appropriate care of their under-nourished child. Hence, regular weighing and plotting in growth chart for each child must be done and this information must be shared by the AWW to the parents. Improvement in taste of supplementary foods may be helpful to increase its consumption by children. Referral to the higher center in case of under-nourished children must be ensured by AWW. Follow-up must be taken regarding whether the child was actually taken to the referred health facility, since it was found to be an important contributing factor in improving growth status of these children. Additionally, AWW should also follow-up children attending CDNC and should ensure that they avail services of AWC once they return back to their home. This is an important step to prevent re-slipping of child towards red category. Supplementary feeding as a long run solution to country's under-nutrition problem and its actual benefits should be studied in detail with alternative innovative solutions.

## ACKNOWLEDGMENTS

The study was funded by Health and Family Welfare Department; Government of Gujarat. There is no other support to be acknowledged.

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**Source of Support:** The Health and Family Welfare Department, Govt. of Gujarat for support, **Conflict of Interest:** None declared.

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