

**LONGITUDINAL STUDIES ON GROWTH OF
0-3 YEAR CHILDREN**

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NUTRITIONAL STATUS OF PRE-SCHOOL CHILDREN

Pre-school children have been considered a nutritionally vulnerable segment of the population because in addition to meeting the requirement for basal metabolism and normal physical activity, their dietary intake has to meet the nutrient requirements for rapid growth.

Surveys carried out by the National Nutrition Monitoring Bureau in the seventies had shown that dietary intake of Indian children were lower as compared to the requirements and prevalence of under-nutrition in children especially 0-4 year children was high.

At that time poverty and food insecurity was a major factor responsible for low dietary intake.

Untreated repeated infections led to nutrient loss and deterioration in nutritional status of children

Poor knowledge regarding optimal feeding and caring practice in young children also contributed to the high prevalence of under-nutrition in under-five children

INTERVENTIONS TO IMPROVE CHILD NUTRITION

In 1975 ICDS programme was initiated with the objective of ensuring optimal child development

The nutrition component of ICDS aimed at improving the health and nutrition status of children by:

- enhancing the mother's ability to provide proper child care through health and nutrition education**
- co-ordinating with state health departments to ensure delivery of the required health inputs**
- weighing young children monthly and monitoring growth for early detection of under-nutrition and growth faltering**
- providing food supplementation to bridge the gap between actual dietary intake and nutritional requirement of children**

IMPLEMENTATION OF GROWTH MONITORING IN ICDS

Nutrition education and food supplementation components of ICDS have been operationalised with varying degree of compliance in different states

But growth monitoring could not be operationalised because of:

- lack of the accurate portable balances**
- lack of the card with growth chart for individual child**

Currently Mother Child Protection Card providing authentic pictorial nutrition and health education messages and WHO charts for growth monitoring is being provided to individual children

Data from NFHS 4 has shown that MCPC had been provided to over 80% of the mothers of children.

Accurate portable weighing balances are readily available.

It is easy to accurately measure the weight of the child carried by the mother, later weigh the mother alone and compute the baby's weight.

Therefore higher proportion of children are being weighed in ICDS and health settings

All these development have increased the feasibility of undertaking growth monitoring

NFI undertook mixed longitudinal study in under-three children from urban low middle income families to assess use of MCPC for nutrition and health education and growth monitoring.

ENROLMENT AND FOLLOW UP OF CHILDREN

NUMBER OF CHILDREN (AT ENROLMENT)

	2015	2016	2017	2018	2019	Total
No. of children 0-11 months	410	379	527	587	451	2354
No. of children 12-23 months	539	343	360	305	274	1821
No. of children 24-35 months	452	284	303	257	237	1533
Total no. of children 0-35 months	1401	1006	1190	1149	962	5708

TOTAL NO. OF VISITS

	2015	2016	2017	2018	2019	Total
Visit in 0-11 months of age	1320	1328	1646	2911	2082	9287
Visit in 12-23 months of age	3508	1980	1765	2601	2642	12496
Visit in 24-35 months of age	3382	1863	1469	2206	2176	11096
Visit in 0-35 months of age	8210	5171	4880	7718	6900	32879

In this mixed longitudinal study a total of 5708 children were enrolled and followed up over 32879 visits

The mean number of visits was 5.8 per child

Mean interval between consecutive visits was 45 days.

During the period between 2015 and 2019 there were 13 deaths among the children who were followed up

Number of visit per year in under-three children

Number of visit	Number of children	%
1	699	12.2
2	570	10.0
3	587	10.3
4	619	10.8
5	483	8.5
6	464	8.1
7	459	8.0
8	396	7.0
9	368	6.4
10	352	6.2
≥11	711	12.5
Total number of children	5708	

Efforts were made to follow children every month but it was difficult; data on WAZ in four or more consecutive visits was available only in 67.5% of children.

USING MCPC FOR NUTRITION AND HEALTH EDUCATION

IYCF - KEY FOR PREVENTING UNDER-NUTRITION

Integrated Child Development Services
National Rural Health Mission



1 to 2 years

Feeding



- ◆ Continue to offer a wide variety of foods including family foods, such as rice/ chappati, dark green leafy vegetables, orange & yellow fruits, pulses and milk products
- ◆ Feed the child about 5 times a day
- ◆ Feed from a separate bowl and monitor how much the child eats
- ◆ Sit with the child and help her finish the serving
- ◆ Continue breastfeeding upto 2 years or beyond

6 to 12 months

Feeding



- ◆ On completion of 6 months, start with small amounts of soft mashed cereal, dal, vegetables and fruits
- ◆ Increase the quantity, frequency and thickness of the food gradually
- ◆ Understand child's signals for hunger and respond accordingly
- ◆ Feed the child 4-5 times a day and continue breastfeeding

2 to 3 years

Feeding



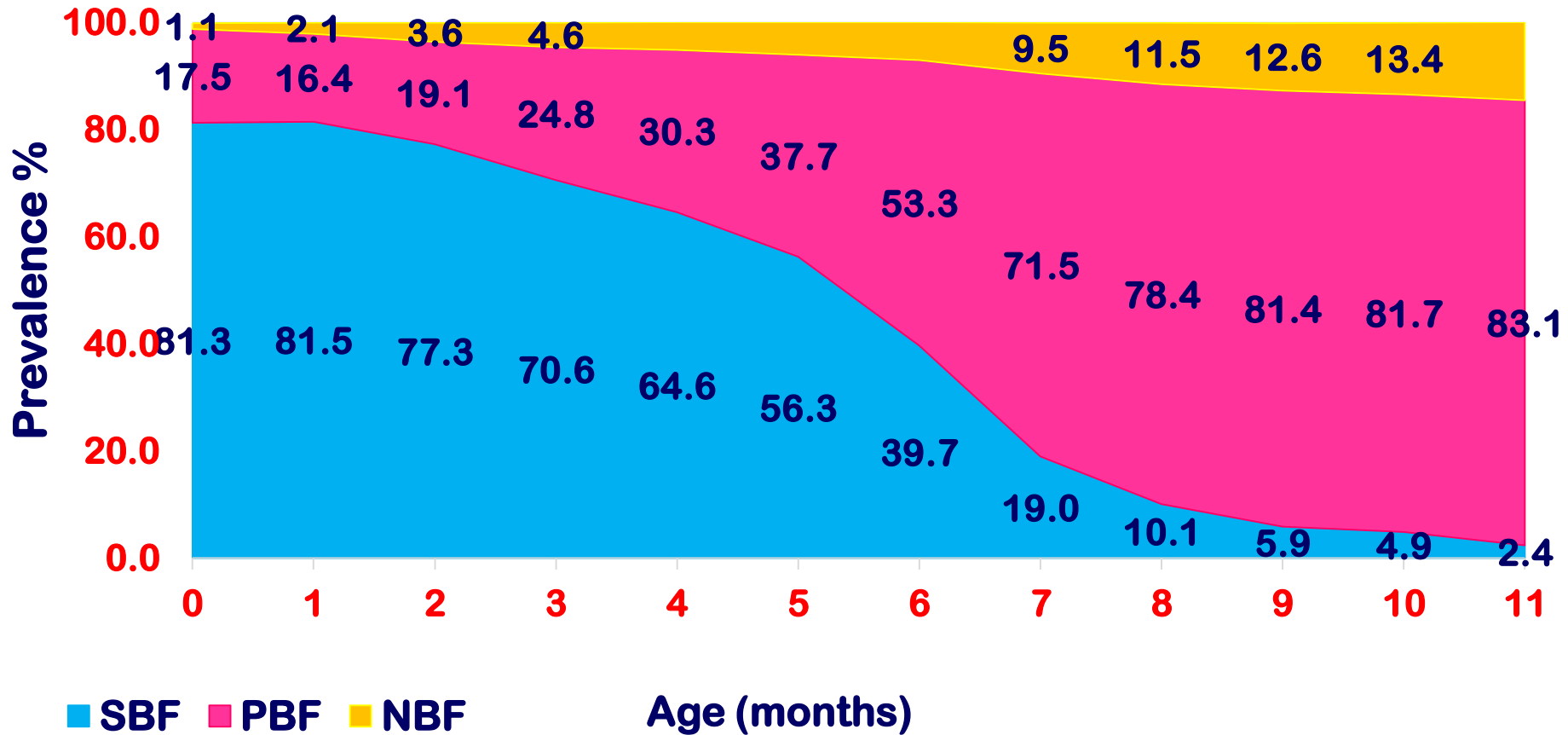
- ◆ Continue to feed family foods 5 times a day
- ◆ Help the child feed herself / himself
- ◆ Supervise feeding
- ◆ Ensure hand washing with soap before feeding

MCPC contained authentic simple messages with pictures.

The messages were easy to understand and feasible to follow

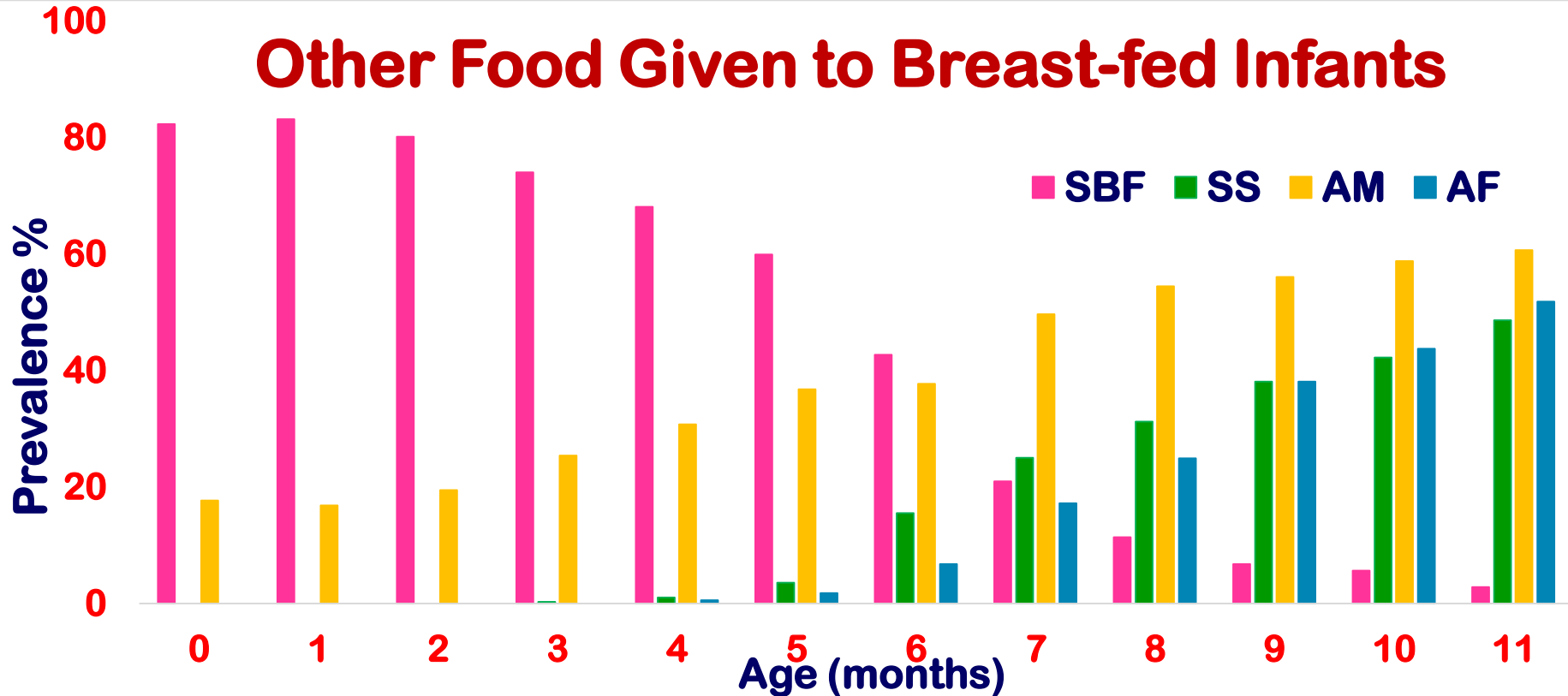
MCPC was used by all persons providing nutrition education to mothers and families with under-three children

Breastfeeding During Infancy



It was possible to bring about improvement in exclusive breast feeding rates by persistent and consistent inter-personal communication regarding benefits of exclusive breast-feeding by AWW, ANM, ASHA and research staff by using MCPC to authenticate their advice.

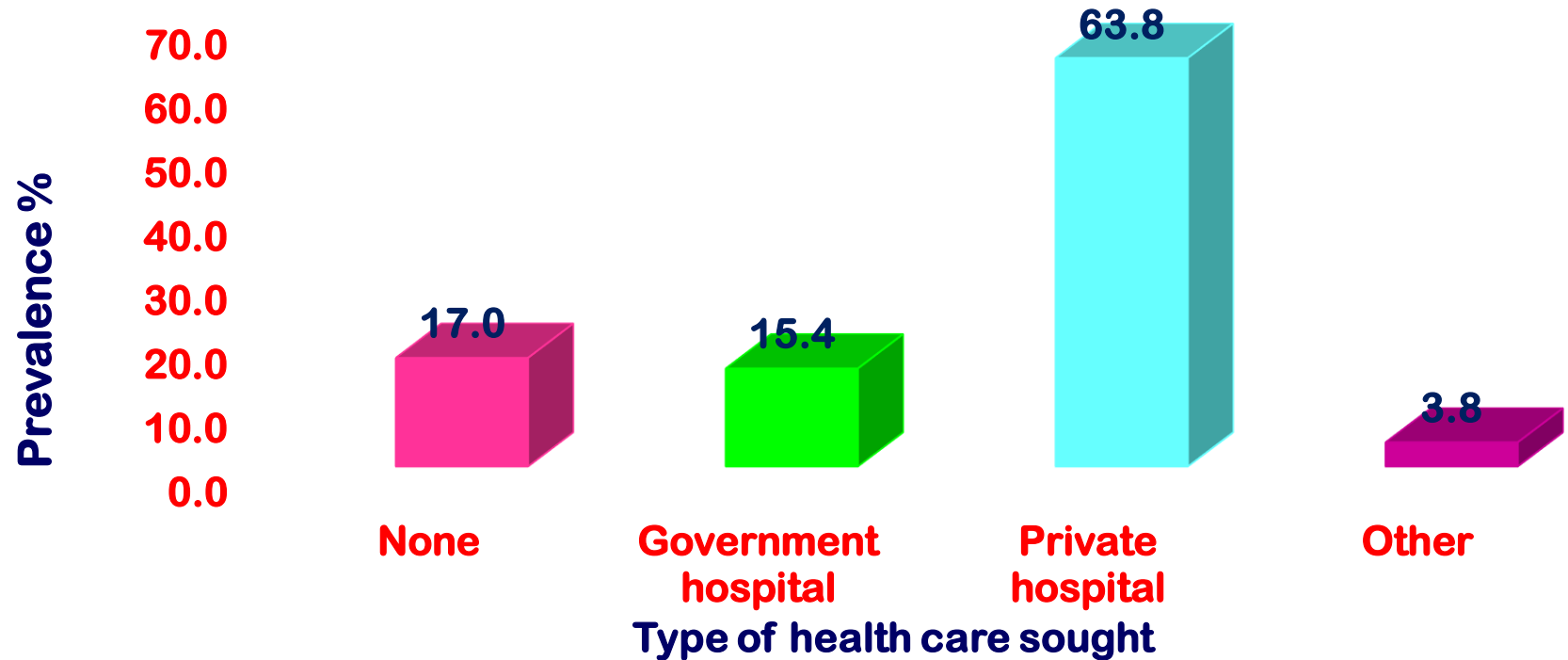
Other Food Given to Breast-fed Infants



Nutrition education that they should feed the infant with mashed freshly cooked mashed chappati with dal when adults are having their meal and biscuit/rusk or bread mashed in hot milk twice or thrice a day ensured that the infants do get 3- 5 freshly prepared semi-solid complementary feeds/day.

However vegetable/fruit intake was low because the consumption of vegetables by the family members was low.

HEALTH CARE SEEKING BEHAVIOUR



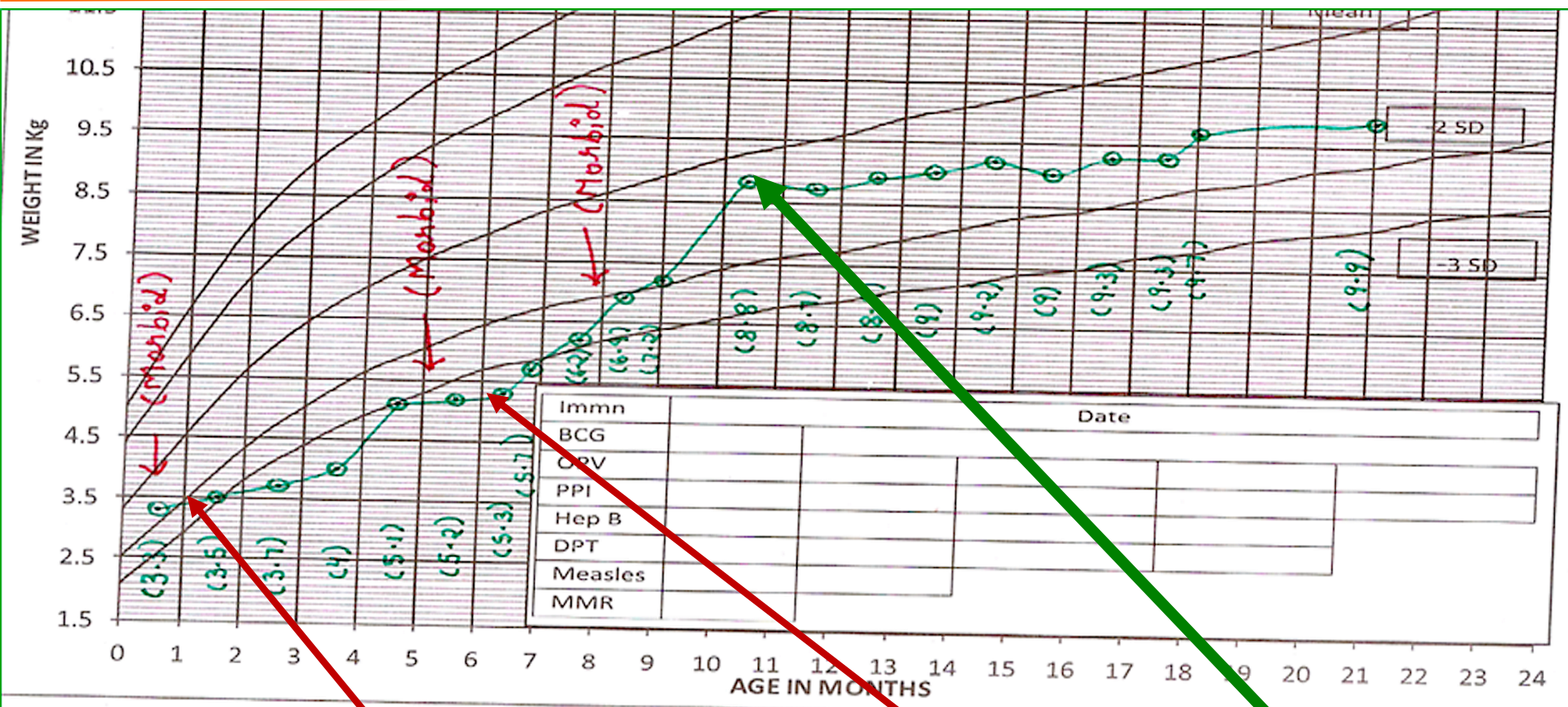
Prevalence of morbidity in these children varied depending upon the season and their age. Over all prevalence of morbidity was about 10%.

Health education on importance of seeking health care for illness and nutrition education on feeding during illness and convalescence was provided by all functionaries (ICDS, health and research). So this urban low middle income population learnt about importance of these.

They had ready affordable access to health care both in government and private sector.

As a result only 17% of the children who had morbidities did not seek health care; most of these had illness of less than 3 days duration

EFFECT OF MORBIDITY ON GROWTH



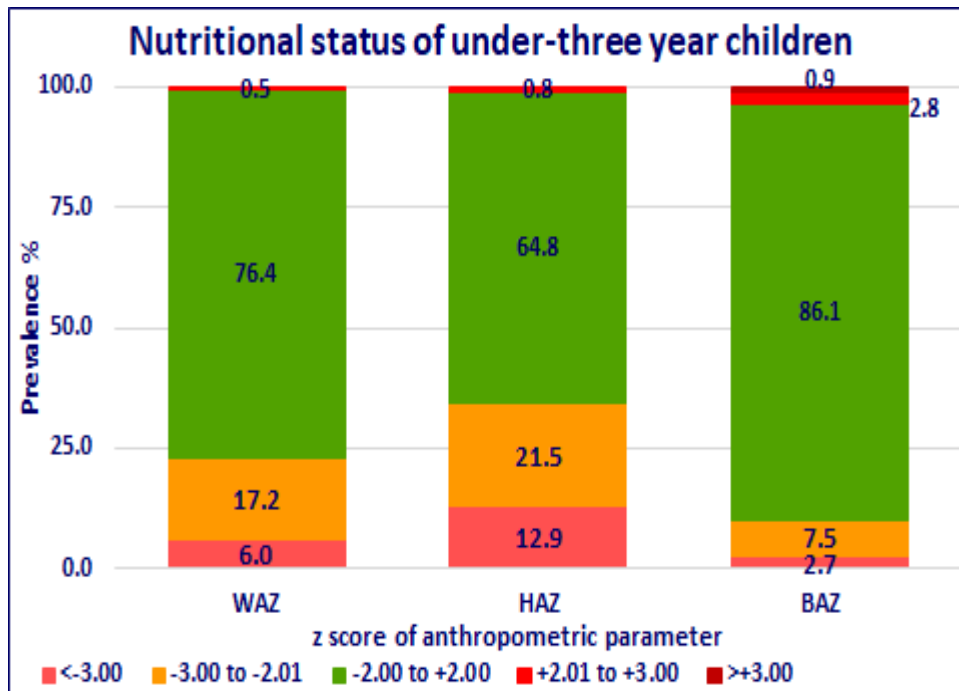
Using the plotting of weight for age in the MCPC growth chart It was possible to demonstrate that **morbidity** due to infection has an **adverse effect on growth**.

When health education on seeking optimal health care and nutrition education regarding feeding during illness and convalescence were followed, the impact of morbidity on infant growth can be minimised.

USE OF MCPC CARD FOR NUTRITION AND HEALTH EDUCATION

- **The anganwadi supervisors and workers understood the benefits of using MCPC for nutrition and health education.**
- **They willingly and effectively used the MCPC as a supportive tool during the nutrition and health education sessions with the mothers.**
- **Over years there was substantial improvement in the exclusive breast feeding in the first six months and introduction of semi-solid complementary feeds between 6-11 month.**

- **Health education emphasized on seeking health care when children fall ill.**
- **As access to health care was available and affordable, children with morbidity got the needed care.**
- **AWW and ANMs used the MCPC as a supportive tool for providing education on feeding during illness and convalescence**
- **The messages on feeding during illness and convalescence were feasible and were followed.**
- **As a result the adverse impact of illness on nutritional status was minimized**



Data from the study indicate that prevalence of under-nutrition (stunting 34.6%, underweight 23.1% and wasting 10.3%) was lower than the rates reported from Delhi in national surveys. The lower under-nutrition rates could at least in part be the result of health and nutrition education resulting in substantial improvement in IYCF and health care seeking practices.

WHO standards recommend that children with WAZ or BAZ between <-2 and -3 should be classified as moderately under-nourished and those with WAZ or BAZ <-3 should be classified as severely under-nourished.

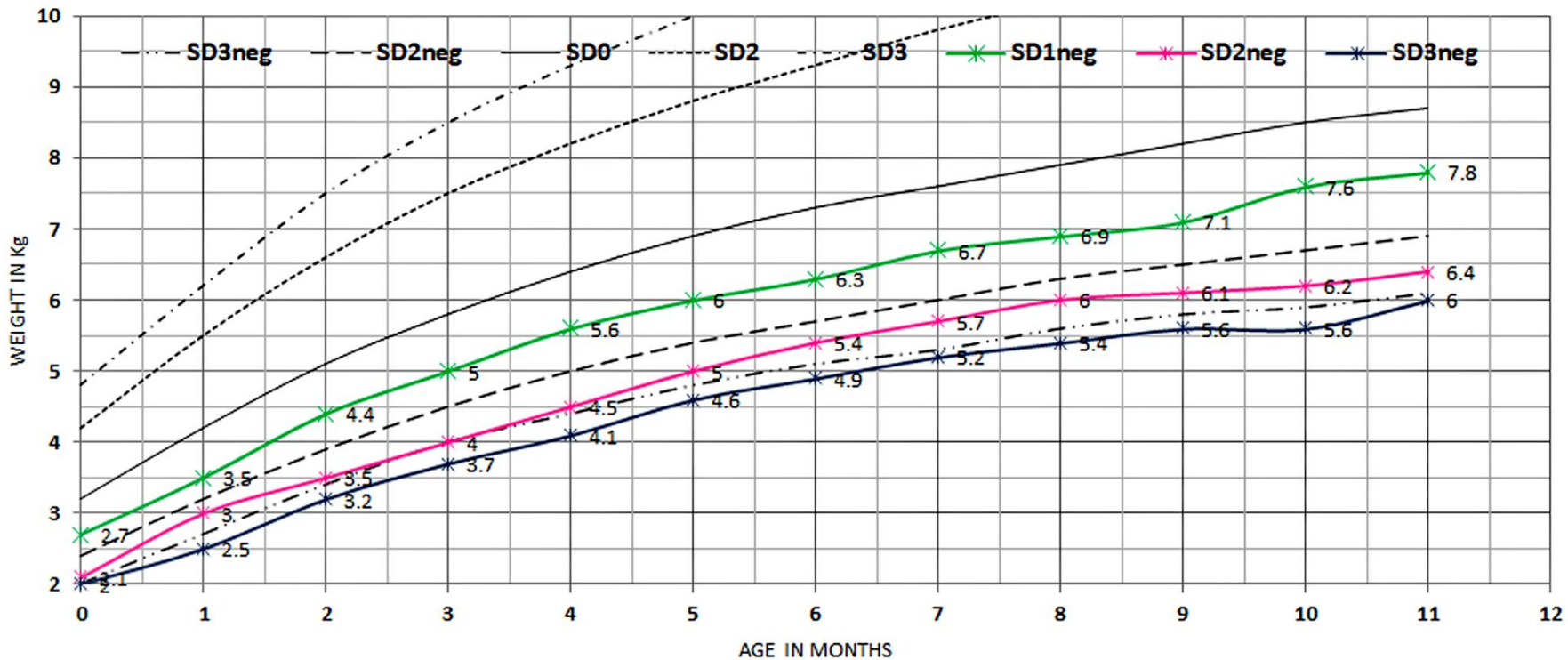
Prevalence of severe underweight (WAZ <-3) was 6.0%; prevalence of severe wasting (BAZ <-3) was 2.7%

Most of the severely under-nourished children were small statured children following their own low trajectory of growth or small children who were also moderately undernourished

Follow up of these severely undernourished children showed that majority followed their own low trajectory of growth but did not show further deterioration in their nutritional status

USING MCPC FOR TRACKING GROWTH

PLOTTING WEIGHT FOR AGE IN THE GROWTH CHART



- One of the most important contributions of plotting weight-for-age in the growth chart is identification of small children growing on their trajectory as normally growing children. Such children do not require any intervention.
- These form nearly one-fourth of all children. There will be substantial reduction in the work load of the AWW in trying to refer severely under-nourished children and monitor moderately undernourished children every month
- This is now well understood by health and ICDS functionaries.
- Mothers and families do understand and feel reassured by this.

CHANGES IN WEIGHT FOR AGE BETWEEN 3 CONSECUTIVE VISITS (NUMBER OF CHILDREN 3852)		
	Number of under 3 children	%
Persistent deterioration	169	4.4
Persistent improvement	133	3.5
Change not persistent between months	1788	46.4
No change	1762	45.7

During follow up an attempt was made to assess changes in weight for age (< 0.2 in WAZ) over time in children

Less than 5% children showed persistent deterioration (reduction in WAZ of >0.2 as compared to the earlier weight)

Less than 4% children showed persistent increase in WAZ scores (increase in WAZ of >0.2 as compared to the earlier weight)

Nearly half the children continued in their trajectory of growth.

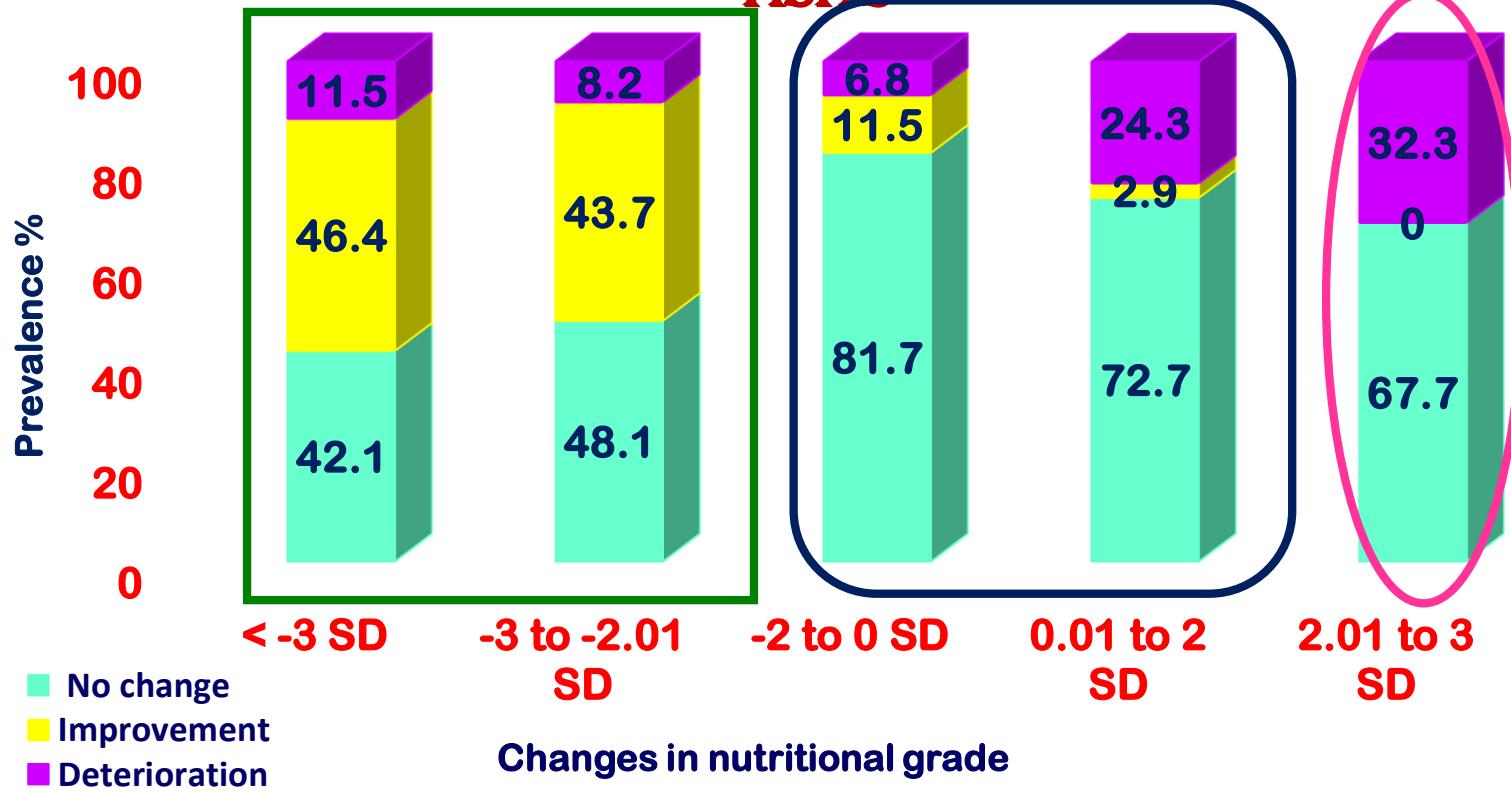
46.4% showed change (either increase or reduction in the WAZ score from the earlier WAZ) but these changes were transient and not persistent .

This implies that there was no progressive persistent deterioration in nutritional status of these children .

The major intervention in these children was nutrition and health education during monthly visits .

Apparently this was effective in preventing persistent deterioration in weight for age.

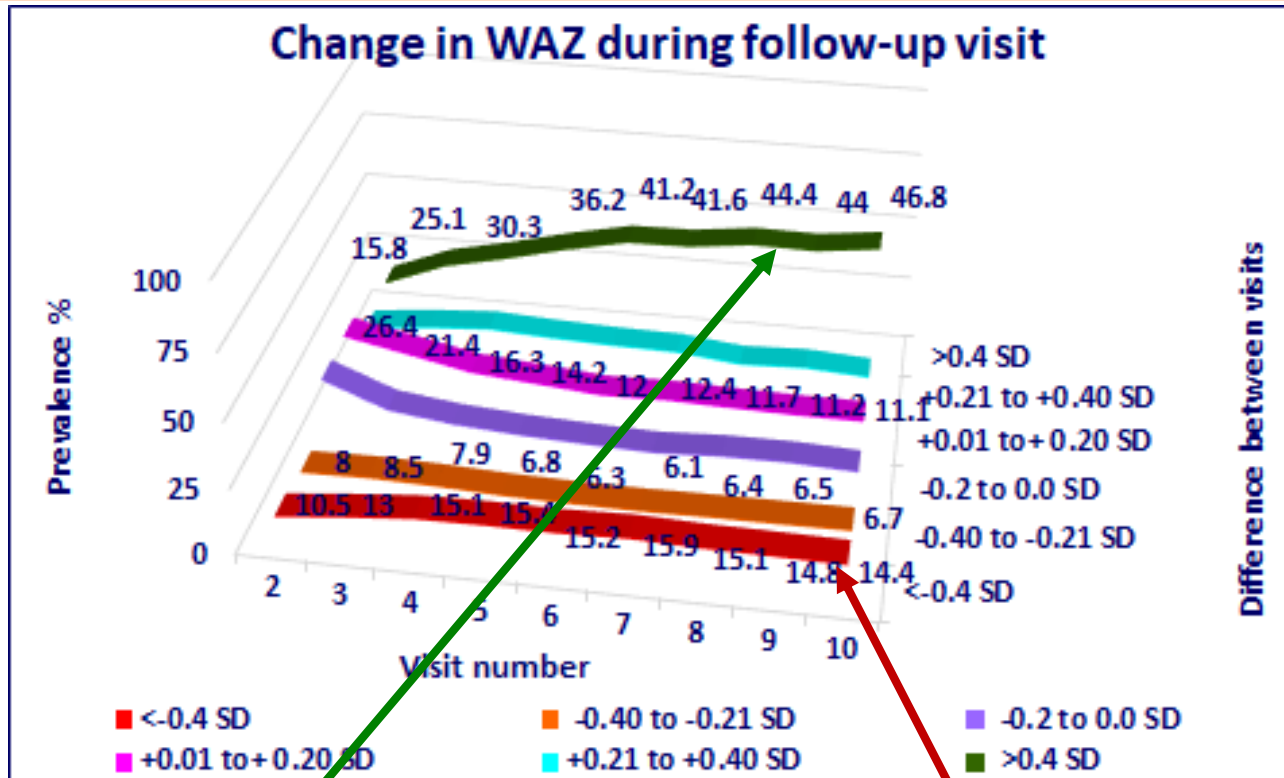
CHANGES IN NUTRITIONAL GRADE (WAZ) BETWEEN VISITS



Personalized counselling provided to mothers ensured :

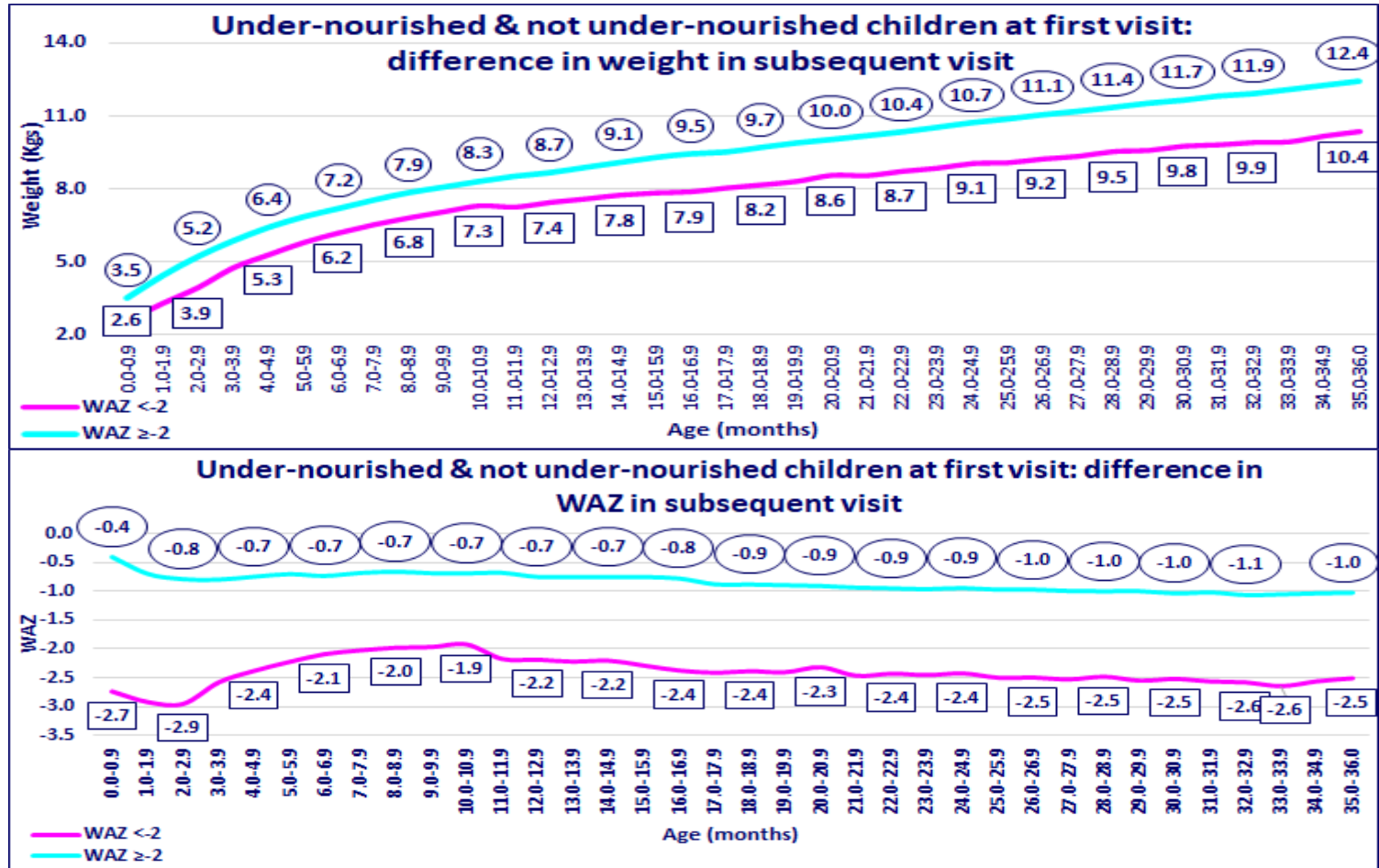
- reduction in under-nutrition in children who were initially moderately or severely under-nourished,
- over ¾ of normally nourished children remained normally nourished,
- a reduction in the over-nourished children.

GROWTH OF UNDER THREE CHILDREN



The data suggest that the repeated nutrition and health education during follow up visits might have enabled mothers to provide optimal care to their children, resulting

- in improvement in WAZ in nearly half of the children
- preventing deterioration in nutritional status (only 14% showed deterioration)

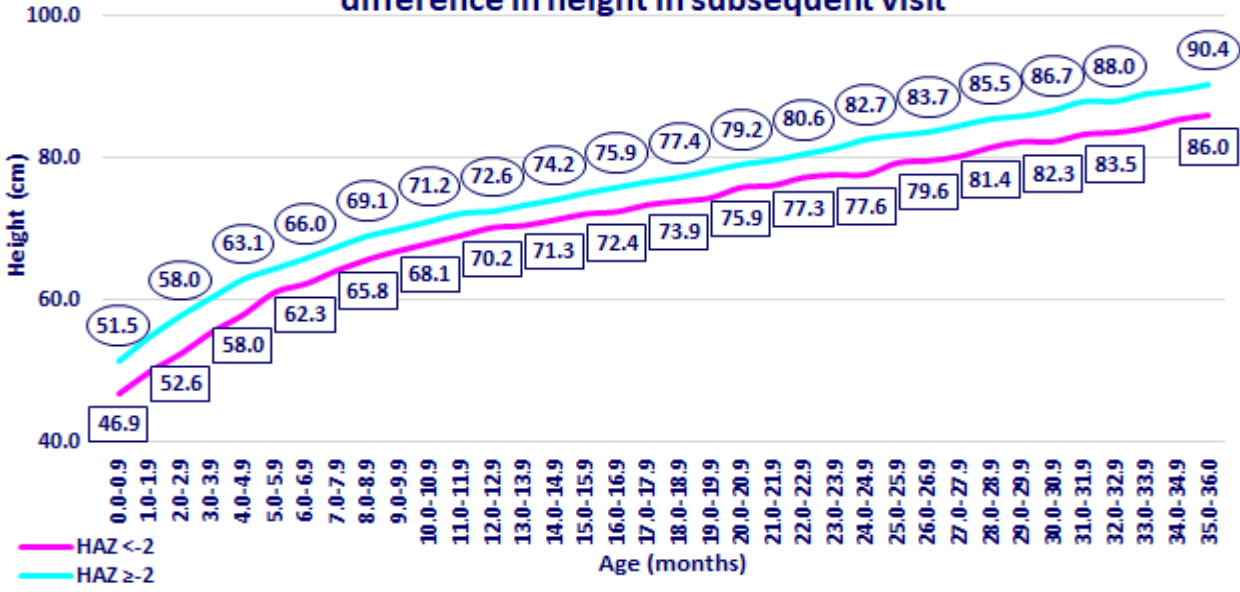


Children were classified on the basis of their WAZ score at enrolment as under-nourished and not under-nourished and their growth as assessed by weight for age and WAZ was monitored

The “under-nourished children” followed a lower trajectory of growth as compared to the “not under-nourished children”.

The magnitude of changes in WAZ with age were essentially comparable in the two groups; the under-nourished group did not show any greater reduction in WAZ for age as compared to “not under-nourished”.

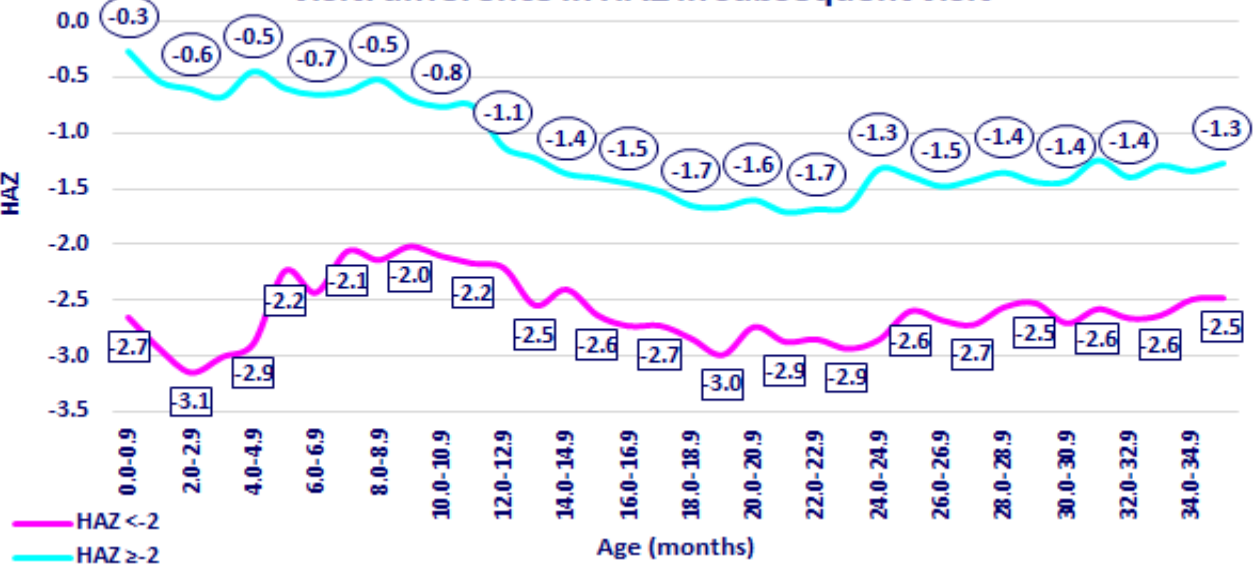
**Under-nourished & not under-nourished children at first visit:
difference in height in subsequent visit**



Children were classified on the basis of their HAZ score at enrolment as stunted and not stunted and their growth as assessed by height for age and HAZ for age was monitored

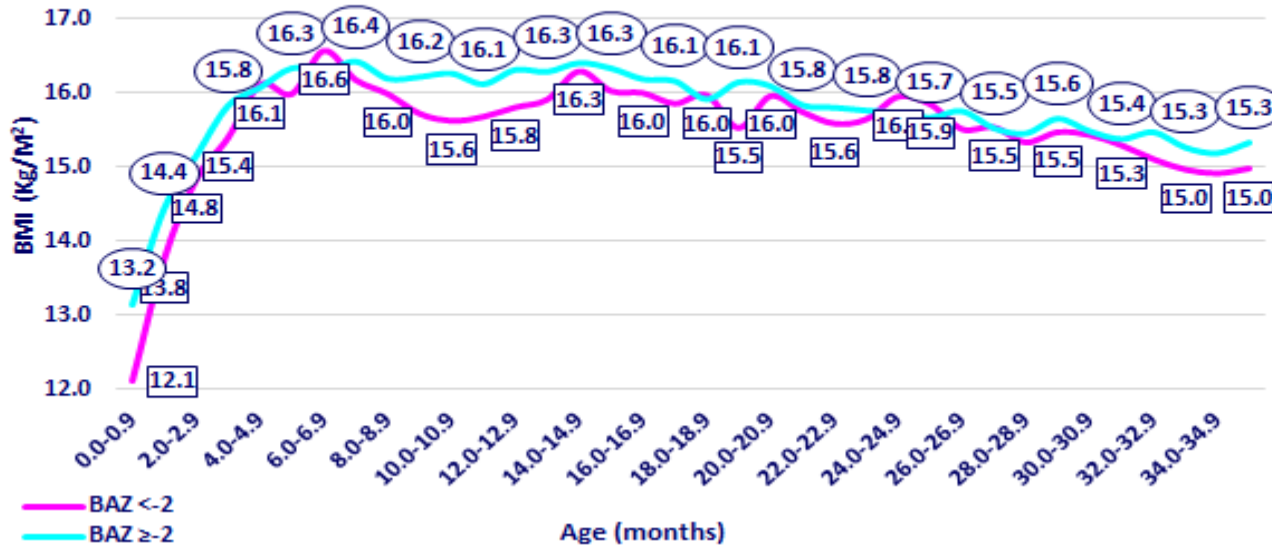
The stunted children followed a lower trajectory as compared to the non stunted children.

**Under-nourished & not under-nourished children at first visit:
difference in HAZ in subsequent visit**



The magnitude of changes in HAZ with age were essentially comparable in the two groups; the stunted group did not show any greater reduction in HAZ for age as compared to “not stunted”

Under-nourished & not under-nourished children at first visit: difference in BMI in subsequent visit

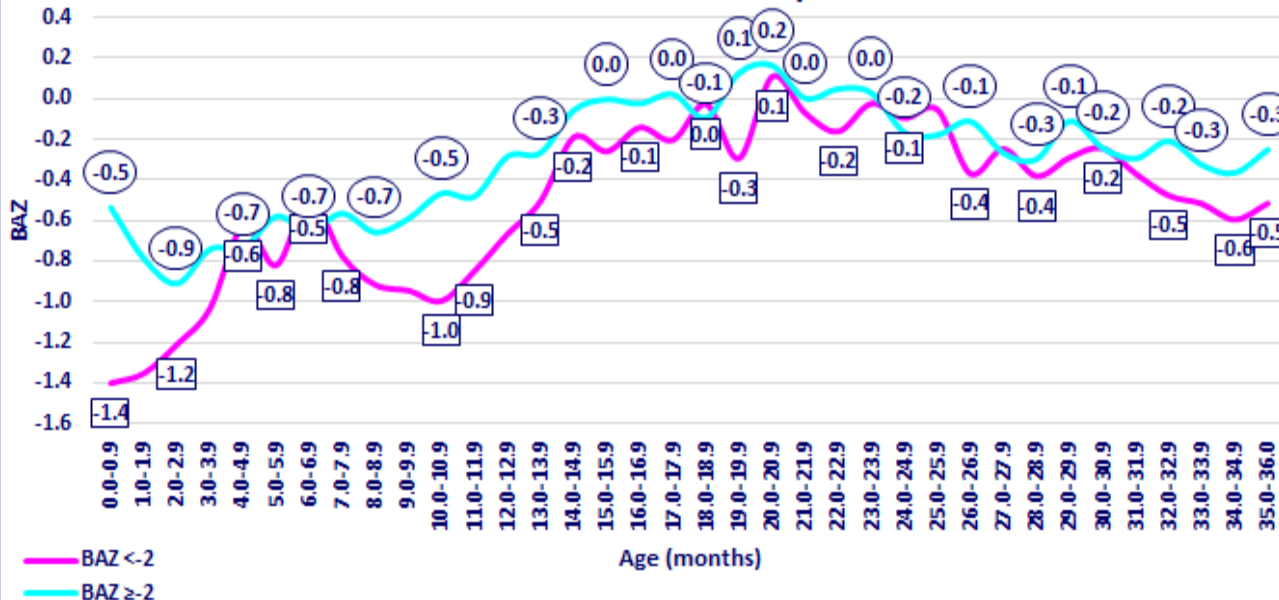


Children were classified on the basis of their BAZ score at enrolment as wasted and not wasted and their growth as assessed by BMI for age and BAZ for age was monitored

The wasted children followed a slightly lower trajectory as compared to the non wasted children.

The changes in BAZ with age were comparable in the two groups; the wasted group did not show any greater reduction in BAZ for age as compared to “not wasted”

Under-nourished & not under-nourished children at first visit: difference in BAZ in subsequent visit



USE OF MCPC CARD FOR GROWTH MONITORING

- Weighing children accurately is possible in home and anganwadi settings.
- All AWW and ANMS had received training in plotting weight for age in the MCPC growth chart and knew that the growth chart is a very good tool to clearly show any in change in trajectory of growth
- Monthly weighing of all children in 0-3 year age group was not possible; in most ICDS settings less than half the children were weighed.
- They thought that growth monitoring was possible only if the child is weighed every month and followed for three consecutive months.
- As the growth trajectory is given in the WHO growth chart, there is no need to watch for dip in growth to continue for three consecutive months
- The fact that current weight of the child can be compared to the earlier weights by plotting both in weight for age chart to assess whether there has been any change in trajectory of weight for age chart was not understood clearly
- They did plot the weight for age in the WHO growth chart to check what is happening if they saw in the MPR register that a specific child's weight was not increasing or falling below the previous weight

- **The anganwadi workers have to maintain MPR register for their records and also to send the reports**
- **Plotting weight for age in the MCPC growth chart was felt as an addition to their work load**
- **They knew that dip in growth trajectory did not happen in all children with wrong IYCF or morbidity.**
- **They provided nutrition and health education when there was morbidity, wrong IYCF or dip in weight below trajectory**
- **They felt that if all women had the MCPC growth chart, they may point out that their child was growing normally despite wrong IYCF or morbidity and may not be willing to accept and follow the nutrition education message to correct the feeding and caring practices**

TAKE HOME MESSAGES

- **Weighing is a feasible & accurate method of monitoring growth in infants.**
- **Attempt should be made to prevent increase in underweight rates between 3 and 12 months by appropriate nutrition and health interventions.**
- **This may reduce some of the increase in stunting rates in 12-23 months.**
- **There was a progressive reduction in wasting rates between 12 and 24 months due to increase in stunting rates.**
- **This should not be interpreted as improvement in nutritional status.**
- **Weighing is accurate, feasible and easy to interpret with the help of the growth chart in MCPC**
- **Length and height measurements are difficult in the first two years and there can be inaccuracies**
- **Use weight for age plotted on the growth chart as the primary indicator for monitoring growth**
- **Any deviation from trajectory needs careful monitoring and if needed examination by health professionals**

THANK YOU

