RESULTS AND DISCUSSIONS

Chapter IV

RESULTS AND DISCUSSION

This chapter presents the findings of the present research in accordance with the general objectives:

- To study Infant and Young Child Feeding (IYCF) and Care practices and resources available for Care, in relation to breastfeeding and complementary feeding practices in children 3-24 months, in rural Vadodara.
- To improve IYCF and Care practices for children 6-36 months through capacity building of local community groups i.e. *Bachat Mandals* or savings groups which are run by a local Non Governmental Organization (NGO).

Thus, presented below are findings of two interlinked research studies in accordance with two broad objectives given above. Study I formed the basis of the intervention and process-impact evaluation described in Study II. This chapter presents the results under the following sections:

Study I: Breastfeeding, Complementary Feeding and Care Practices in Rural Vadodara

- IYCF and Caregiving Awareness and Practices of the Mothers
    - Newborn feeding and breast feeding (BF)
    - Complementary feeding (CF)
    - Health related knowledge and practices
    - Feeding during and after illness
    - Hygiene care
- Resources Available to the Mother or Child Caregiver for Care
    - Economic resources: the socio-economic status of the family
    - Nutritional status and well being of mother
    - The role of mother in family decision making
    - Family support for child Care: role of grandmother
- Morbidity history of the children.
- Dietary intake of the children from complementary foods
    - Food intake and dietary diversity
    - Nutrient intake

- Nutritional status of the children
    - Weight-for-age, height-for-age and weight-for-height
- Association between Caregiving behaviours and dietary intake as well as nutritional status of the child.
- Association of resources of Caregiving with Caregiving and child's nutritional status

Study II: Community Based Intervention Through Capacity Building of Bachat Mandal Members

Process Evaluation of the Intervention

- Capacity building training of bachat mandal (BM) members.
- Feasibility and sustainability of the intervention NEC-BMM and NEC-DIR
    - Number and quality of home visits made
    - Reasons for frequent\infrequent home visits by BM members and support of NGO.

Impact Evaluation of the Intervention

- Mother's recall of NEC messages imparted.
- Change in IYCF and Care practices of mothers.
- Reasons underlying the specific behaviour changes (or lack of change).
- Change in morbidity profile of the children.
- Change in food intake of the children through complementary foods.
- Change in nutritional status of the children
    - Weight-for-age, height-for-age and weight-for-height.

Study: I Breastfeeding, Complementary Feeding and Care Practices in Rural Vadodara

IYCF and Caregiving: Awareness and Practices of Mothers

Given below are the IYCF and Caregiving knowledge and practices of the mothers in terms of newborn feeding and breastfeeding (initiation of BF, prelacteal feeding, colostrum feeding, water feeding, exclusive breastfeeding and top milk feeding), complementary feeding, active feeding[1], health, hygiene (personal hygiene of mother and child and hygiene of surrounding) and feeding during and after illness.

[1]Indicators of active feeding: feeding the child as frequently as needed, being alert to hunger cues of child, supporting and encouraging child to eat and feeding the child from separate plate. Presence of 3 or more of these indicators was categorized as active feeding.

Awareness and Practices Regarding Newborn Feeding and Breastfeeding

Table 4.1 shows knowledge and practices of the mothers in various aspects of new-born feeding and breastfeeding many of which were found to be inappropriate.

Table 4.1 Awareness and Practices of the Mothers Regarding Newborn Feeding and Breastfeeding

Item	Total		Boys		Girls	
	N=106		N=65		N=41	
	n	%	n	%	n	%
Child was given prelacteals						
▪ Yes	43	40.6	24	36.9	19	46.3
▪ No	63	59.4	41	63.1	22	53.7
Prelacteals given were						
▪ Patasa water	32	74.4	16	66.7	16	84.2
▪ Honey	4	9.3	2	8.3	2	10.5
▪ Jaggery water	5	11.6	4	16.7	1	5.3
Reasons for giving prelacteals						
▪ Initially no breastmilk and child is hungry	24	55.8	11	45.8	13	68.4
▪ Dirt in child's stomach is removed	5	11.6	4	16.7	1	5.3
▪ Family members told	4	9.3	4	16.7	0	0.0
▪ Child will not cry	5	11.6	2	8.3	3	15.8
Child was given Colostrum						
▪ Yes	53	50.0	36	55.4	17	41.5
▪ No	53	50.0	29	44.6	24	58.5
Colostrum is good for the child						
▪ Yes	30	28.3	20	30.8	10	24.4
▪ No	49	46.2	30	46.2	19	46.3
Reasons for believing colostrum to be good						
▪ Child becomes healthy	7	23.3	4	20.0	3	30.0
▪ Colostrum is energy dense	7	23.3	3	15.0	4	40.0
▪ Improves immunity	3	10.0	1	5.0	2	20.0
▪ ANM said	3	10.0	3	15.0	0	0.0
Reasons for believing colostrum to be bad						
▪ Unhealthy for child	23	46.9	14	46.7	9	47.4
▪ It is dirty	5	10.2	4	13.3	1	5.3
▪ Stale milk	8	16.3	3	10.0	5	26.3
▪ Others said so	5	10.2	2	6.7	3	15.8
Breast feeding was initiated how long after birth						
▪ ≤1 hour	11	10.4	8	12.3	3	7.3
▪ 2-5 hours	18	17.0	8	12.3	10	24.4
▪ 5-10 hours	9	8.5	6	9.2	3	7.3
▪ >10 hours	68	64.2	43	66.2	25	61.0

Table continued..

Item	Total		Boys		Girls	
	N=106		N=65		N=41	
	n	%	n	%	n	%
Duration of exclusive breastfeeding						
▪ ≤3 months	84	81.6	51	81.0	33	82.5
▪ 4-6 months	16	15.5	11	17.5	5	12.5
▪ >6 months	3	2.9	1	1.6	2	5.0
When does mother breastfeed her child						
▪ When the child cries	63	72.4	36	67.9	27	79.4
▪ Some fixed time	8	9.2	6	11.3	2	5.9
▪ When breast is full	3	3.4	2	3.8	1	2.9
▪ When mother thinks child is hungry	13	14.9	9	17.0	4	11.8
During breastfeeding to the child, the mother						
▪ Empties one breast before offering other	9	10.3	5	9.4	4	11.8
▪ Gives little milk from both breasts at each feed	78	89.7	48	90.6	30	88.2
Reasons for breastfeeding from both breasts at each feed						
▪ Child's hunger is satisfied	29	37.2	17	35.4	12	40.0
▪ Breast milk comes from both sides	11	14.1	6	12.5	5	16.7
▪ Both breasts become unequal size if breastmilk is given from one side	19	24.4	10	20.8	9	30.0
Age of initiating water feeding						
▪ ≤1 month	53	51.5	31	49.2	22	55.0
▪ 2-3 months	30	29.1	19	30.2	11	27.5
▪ >3 months	20	19.4	13	20.6	7	17.5
Reasons for initiating water feeding						
▪ Mouth will not get dry	81	78.6	48	76.2	33	82.5
▪ Doctor said so	6	5.8	4	6.3	2	5.0
Mother thinks there is water in breast milk						
▪ Yes	72	67.9	47	72.3	25	61.0
▪ No	16	15.1	9	13.8	7	17.1
Mother thinks her breast milk to be sufficient						
▪ Yes	56	64.4	30	56.6	26	76.5
▪ No	31	35.6	23	43.4	8	23.5

For simplicity, selected responses (more frequently occurring responses) are given in some sections hence the percentage may not add up to 100, Base N from which percentage values have been calculated varies and depends on presence of the practice.

Prelacteal feeding

As many as 41% of the mothers reported to feed prelacteals to the child immediately after birth. Fewer boys were given prelacteals than girls. The most common prelacteal fed was patasa water; some children were also fed jaggery water and honey. More than half of the mothers fed prelacteals as they believed that initially there was no breastmilk and child felt hungry. Few of the other reasons given were: 'Dirt in child's stomach is removed', 'Family members told us' and 'Child would not cry'.

Colostrum feeding

Only half the mothers fed colostrum to their child (**Table 4.1**). This was because only few mothers considered colostrum to be good for the child. More boys (55%) than girls (41%) were fed colostrum. The common reasons for believing colostrum to be beneficial were: *'Child becomes healthy'*, *'Colostrum gives energy'* and *'Protects against illness'*. On the other hand many mothers believed colostrum to be bad for the child as it was *'Unhealthy for the child'*; it was *'Dirty and stale milk'*.

Breastfeeding

Unfortunately, for most of the new borns (64%) breastfeeding was initiated as late as beyond 10 hours. Further, 82% of the children were exclusively breastfed (EBF) for only 3 months or less, much below the recommended age of 6 months.

At the time of the survey almost all the children were breastfeeding (82%) the proportion being more in children 3-11 months (97 %) as compared to 12-24 months (74 %) children. About 70% of the mother's breastfed the child when the child cried. Majority of the mothers fed the child a little from both breasts at each feed. The reasons cited were:

- '*Balaknu pet bharay chhe*' (Child's hunger is satisfied).
- '*Ek bajuthi dhavadaviae to chhati nani moti thai jay*' (Breasts will become small-big if we breastfeed from one side).
- '*Banne bajuthi dhavan aave chhe aetale*' (Because breast milk comes from both the sides).

Thus most of the children were unable to obtain the more nutritious hind milk.

Water feeding

As **Table 4.1** shows, half of the mothers initiated water feeding at a very young age of 1 month or less and 30% initiated water around 2-3 months. This was the major reason for low prevalence of exclusive breastfeeding (3 months or less). Water feeding was initiated earlier for girl children (55%) than boy children (49%). Most of the mothers had started giving water so that '*Balak nu modhu na sukaye*' (Child's mouth would not get dry). Surprisingly about 6% mothers reported that they had been advised by the doctor to feed water.

More than three fourth of the mothers believed that there is water in breast milk:

- '*Dhavan paani jevu deekaye che*' (Breast milk appears like water).
- '*Aapane pani piye aetale dhavanma pani hoy*' (Mother drinks water, so it comes in breast milk).

Yet, a majority of mothers had initiated early water feeding.

More than 60% mothers perceived their breast milk to be sufficient for the child and commonly reported reasons were:

- '*Balak radtu nathi*' (Child does not cry).
- '*Balak nu pet bharai jaye che*' (Child's hunger gets satisfied).

No significant differences were found between the newborn feeding knowledge and practices of mothers of boys or girls.

Breastfeeding observations

Table 4.2 reveals that from the 40 children observed to be breastfed, none of the mothers had washed their hands before feeding. More than half of the mothers breastfed the child from both breasts at each feed; the percentage of those having a girl child being higher than those having a boy child. The remaining 48% of the mothers emptied one breast before offering the other.

Very few mothers paid attention to the child during breastfeeding and checked if the child was suckling properly. Among these mothers the proportion of those having a girl child was higher than those having a boy child. The mothers might have been partly distracted by the presence of the observer.

Table 4.2 Major Highlights of Observations of Breast Feeding Episodes

Item	Total		Boys		Girls	
	N=40		N=26		N=14	
	n	%	n	%	n	%
Place of feeding						
▪ Inside the house	28	70.0	18	69.2	10	71.4
▪ Outside the house	12	30.0	8	30.8	4	28.6
Mother washed her hands before feeding						
▪ Yes	0	0.0	0	0.0	0	0.0
▪ No	40	100.0	26	100.0	14	100.0
Infant position during breastfeeding						
▪ Proper	29	72.5	18	69.2	11	78.6
▪ Improper	11	27.5	8	30.8	3	21.4
Infant was able to suckle properly						
▪ Yes	34	85.0	23	88.5	11	78.6
▪ No	6	15.0	3	11.5	3	21.4
Mother's position while feeding						
▪ Sitting	39	97.5	25	96.2	14	100.0
▪ Lying down	1	2.5	1	3.8	0	0.0
Mother breastfed from						
▪ Both breasts	21	52.5	12	46.2	9	64.3
▪ One breast during observation	19	47.5	14	53.8	5	35.7
Mother checked if child was suckling properly						
▪ Yes	9	22.5	7	26.9	2	14.3
▪ No	31	77.5	19	73.1	12	85.7

Top Milk Feeding Awareness and Practices

Table 4.3 indicates that about half of the children were fed top milk, mostly buffalo milk, once or twice a day. The reasons given for feeding top milk were:

- *'Dhavan ochu padtu hatu'* (Breast milk was inadequate).
- *'Balak khata shikhe'* (Child learns to eat).
- *'Balak tandurast bane'* (Child becomes healthy).

One third mothers had begun to give top milk to the child as early as 5 months or less. About one fourth children were fed top milk with bottle which might increase the risk for morbidities especially diarrhoea. Majority of the mothers (78%) believed breast milk to be better than top milk because:

- '*Mata je khayae dhavanmanthi balakne male*' (Whatever the mother eats is obtained by the child from the mother's milk).
- *'Upar na dudh thi balak beemar pade'* (Child may get ill by consuming top milk).
- '*Uparnu dudh pache na*' (Top milk is not easily digested).

Table 4.3 Awareness and Practices of the Mothers Regarding Top Milk Feeding

Item	Total		Boys		Girls	
	N = 106		N = 65		N = 41	
	n	%	n	%	n	%
Top milk given to the child						
▪ Yes	51	48.1	33	50.8	18	43.9
▪ No	55	51.9	32	49.2	23	56.1
Reasons for giving top milk						
▪ Child becomes healthy	4	7.8	3	9.1	1	5.6
▪ Inadequate breast milk	29	56.9	21	63.6	8	44.4
▪ Child learns to eat	6	11.8	3	9.1	3	16.7
Reasons for not giving top milk						
▪ Child does not drink it	13	23.6	9	28.1	4	17.4
▪ Mother thinks her milk is sufficient	10	18.2	3	9.4	7	30.4
▪ It may not be digested	19	34.5	11	34.4	8	34.8
Type of top milk given to the child						
▪ Buffalo	36	70.6	23	69.7	13	72.2
▪ Dairy	8	15.7	6	18.2	2	11.1
Age of initiating top milk						
▪ 0-5 months	17	33.3	10	30.3	7	38.9
▪ 6-11 months	11	21.6	10	30.3	1	5.6
▪ ≥12 months	23	45.1	13	39.4	10	55.6
Frequency of feeding						
▪ Once a day	14	27.5	7	21.2	7	38.9
▪ Twice a day	19	37.3	12	36.4	7	38.9
▪ More than two times	18	35.3	14	42.4	4	22.2
Mode of feeding						
▪ Cup / glass	28	54.9	19	57.6	9	50.0
▪ Bottle	13	25.5	10	30.3	3	16.7
▪ Saucer	7	13.7	3	9.1	4	22.2
Mother thinks which is better						
▪ Mother's milk	83	78.3	52	80.0	31	75.6
▪ Top milk	6	5.7	4	6.2	2	4.9
▪ Both	10	9.4	5	7.7	5	12.2
Reasons for believing mother's milk to be better						
▪ Whatever the mother eats is obtained by the child from the mother's milk	20	24.1	12	23.1	8	25.8
▪ Child may get ill by consuming top milk	17	20.5	12	23.1	5	16.1
▪ Top milk is difficult to digest by the child	11	13.3	6	11.5	5	16.1

For simplicity, selected responses (more frequently occurring responses) are given in some sections hence the percentage may not add up to 100, Base N from which percentage values have been calculated varies and depends on whether child is given top milk

As regards gender differences in feeding top milk (**Table 4.3**), more boy children (51%) than girl children (44%) were given top milk. However more girls were initiated top milk at an early age (5 months or less) than boys.

About half of the mothers did not feed top milk, the reasons were:

- *'Balak nathi peetu'* (Child does not drink).
- *'Maru dhavan purtu che'* (Mother thinks her milk is sufficient).

Complementary Feeding Awareness and Practices

Table 4.4 highlights the knowledge and practices of the mothers as regards various aspects of complementary feeding, many of which were found to be inappropriate.

Table 4.4 Awareness and Practices of the Mothers Regarding Complementary Feeding (CF)

Item	Total		Boys		Girls	
	N=106		N=65		N=41	
	n	%	n	%	n	%
Complementary foods given to the child						
▪ Yes	86	81.1	52	80.0	34	82.9
▪ No	20	18.9	13	20.0	7	17.1
Age of initiating CF						
▪ <6 months	16	18.6	7	13.5	9	26.5
▪ 6 months	17	19.8	8	15.4	9	26.5
▪ >6 months	53	61.6	37	71.2	16	47.1
Reasons for initiating CF						
▪ Perceived breast milk insufficiency	14	16.3	10	19.2	4	11.8
▪ Child is grown up	18	20.9	11	21.2	7	20.6
▪ Started sitting	13	15.1	6	11.5	7	20.6
▪ Child felt hungry	14	16.3	6	11.5	8	23.5
Benefits of CF						
▪ Child remains healthy	42	48.8	26	50.0	16	47.1
▪ Becomes playful	12	14.0	6	11.5	6	17.6
▪ Hunger is satisfied	19	22.1	8	42.1	11	16.4
Harmful effects of delayed initiation on child						
▪ No harmful effects	48	55.8	28	50.0	20	58.8
▪ Will become malnourished	14	16.3	8	15.4	6	17.6
▪ Will not learn to eat	19	22.1	12	23.1	8	23.5
Belief that child has a normal appetite						
▪ Yes	64	74.4	35	67.3	29	85.3
▪ No	17	19.8	14	26.9	3	8.8
Special foods prepared for the child						
▪ Yes	21	24.4	15	28.8	6	17.6
▪ No	65	75.6	37	71.2	28	82.4
Foods avoided for the child						
▪ Yes	37	43.0	24	46.2	13	38.2
▪ No	49	57.0	28	53.8	21	61.8

Table continued..

Item	Total		Boys		Girls	
	N=106		N=65		N=41	
	n	%	n	%	n	%
Types of foods avoided						
▪ Vegetables	15	40.5	12	50.0	3	23.1
▪ Fruits	19	51.4	13	54.2	6	46.2
Child is fed by						
▪ Himself/herself	42	48.8***	20	38.5	22	64.7*
▪ Mother	14	16.3***	8	15.4	6	17.6
▪ Himself/herself or mother, depending on type of food	30	34.9	24	46.2	6	17.6
Mothers feeding behaviour[$]						
▪ Forces the child to eat	6	7.0	4	7.7	2	5.9
▪ Encourages the child to finish meal	22	25.6	17	32.7	5	14.7
▪ Feeds the child on demand	63	73.3	36	69.2	27	79.4
▪ Gives food and leaves	35	40.7	18	34.6	17	50.0
▪ Sits with the child while feeding	11	12.8	7	13.5	4	11.8
Child eats with the family members						
▪ Yes	36	41.9	21	40.4	15	44.1
▪ No	26	30.2	18	34.6	8	23.5
▪ Sometimes	24	27.9	13	25.0	11	32.4
Whether child eats in separate vessel						
▪ Yes	70	81.4	40	76.9	30	88.2
▪ No	16	18.6	12	23.1	4	11.8
Age since child eats on own						
▪ <12mths	30	42.9	19	44.2	11	40.7
▪ ≥12mths	40	57.1	24	55.8	16	59.3
Mother practices active feeding[#]						
▪ Yes	30	34.9***	22	42.3	8	23.5
▪ No	56	65.1***	30	57.7	26	76.5

*p<0.05 (boys vs. girls), ***p<0.001, All other values:NS
For simplicity, selected responses (more frequently occurring responses) are given in some sections hence the percentage may not add up to 100, Base N from which percentage values have been calculated varies and depends on whether child is initiated CF,
[$]Multiple responses were obtained hence percentage exceeds 100,
[#]Indicators: feeding the child as frequently as needed, being alert to hunger cues of child, supporting and encouraging child to eat and feeding the child from separate plate. Presence of 3 or more of these indicators was categorized as active feeding.

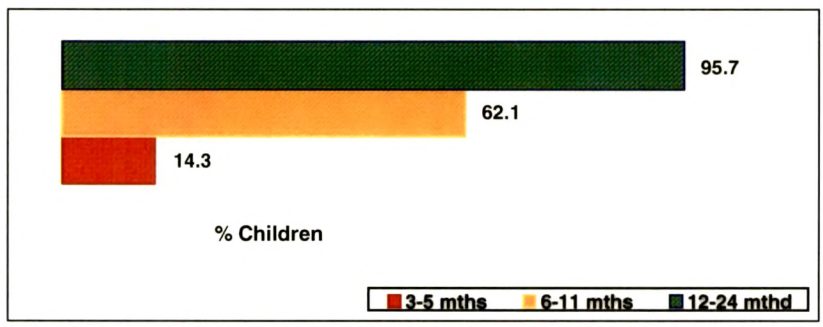
Initiation of complementary feeding

Unfortunately, for most of the children (62%), complementary feeding (CF) was initiated beyond the recommended age of 6 months; the delay being more for the boys (71%) as compared to girls (47%).

Most of the children were given complementary foods (*'rotli'*, *'khichadi'*, fruits, vegetables, biscuit and *'dal'*) at the time of the survey. As **Figure 4.1** shows, almost

all children beyond 12 months were fed complementary foods as compared to only 62% in 6-11 months age group. Further, in the youngest age group of 3-5 months when the child should only be on breast milk, one child (from total) was fed complementary foods.

Figure 4.1 Children Fed Complementary Foods in Different Age Groups (%)



P<0.001: 6-11 months vs. 12-24 months

Linking complementary feeding to health

The most common benefits of CF as told by the mothers were:

- *'Balak tandurast rahe'* (Child remains healthy).
- *'Balak amee rahe'* (Child's hunger is satisfied).

However, very few mothers believed that the child would become malnourished if there was late initiation of CF; more than half believing that there were no harmful effects of initiating CF beyond 6 months.

About three fourth mothers believed that their child had normal appetite and they reasoned that 'child ate well' (53%) and 'when hungry child himself/herself asked for food' (23%). Yet diet intake data (presented later) clearly revealed the highly inadequate intakes which were far below recommended amounts.

Dietary diversity and active feeding

Table 4.4 further reveals that very few children were given special foods like boiled whole pulses, *'sheera'* (sweet preparation of flour, clarified butter and sugar) and *'khichadi'* (cereal-pulse preparation). As many as 43% children were not fed certain

fruits (banana, guava) and vegetables (cluster beans, peas, drumstick, ladies finger). The main reason for avoiding these foods was the mothers belief that child would suffer from '*varadh*' (respiratory problem which could be similar to pneumonia). More boys (29%) than girls (18%) were fed special foods. At the same time they also faced more food avoidances (46%) than girls (38%).

As regards child feeding behaviours, a significant number of children ate food themselves (49%) as compared to the mother feeding the child (16%). More than 40% of the children were eating without assistance, on their own even before they were 12 months old. Few mothers encouraged the child to eat (26%), sat with the child during feeding (13%) and fed the child frequently as indicated by feeding the child only when he/she demanded for food (73%). Only a few mothers also tried to feed the child forcefully (7%). About 40% of the children fed alongwith their family. However, a positive finding was that majority of the children were reported to be fed from a separate plate. Thus overall a significant proportion of mothers did not practice active feeding behaviours.

As regards age wise differences, mothers gave special foods and at the same time avoided certain kinds of foods more for children less than 12 months (37% and 53%) as compared to those beyond one year (21% and 40%). Further, younger children were fed more frequently by their mothers as compared to older children ($p<0.001$). Perhaps mothers believed that after 1 year, a child was capable of eating by himself/herself. It was interesting to find that although higher percentage of older children (45%) tended to eat food with family members as compared to younger children (32%) relatively few of them were reported to share plate (16%) as compared to younger children (26%). Perhaps the reason for this was that many mothers of children less than one year of age believed that the child would not eat food and waste it if served in a separate plate.

Considering the gender differences in child feeding behaviours, boys were better off than girls. Fewer boys as compared to girls ($p<0.05$) were feeding on their own; more

mothers encouraged boy children to eat and sat with them during feeding as compared to girls. Active feeding behaviours were practiced more for boy children (42%) than girl children (24%).

Complementary feeding observations

Table 4.5 presents the findings of 13 complementary feeding episodes observed during the home visits for formative research. The children were being fed either a snack (biscuit or fruit) or fresh food (*'rotla'*, rice or anganwadi snack).

Table 4.5 Major Highlights of Observations of Complementary Feeding Episodes

Item	Total		Boys		Girls	
	N=13		N=9		N=4	
	n	%	n	%	n	%
Type of food fed to the child						
▪ Fresh food	5	38.5	3	33.3	2	50.0
▪ Snack	8	61.5	6	66.7	2	50.0
Active feeding practiced by mother						
▪ Food served in separate bowl	4	30.8	3	33.3	1	25.0
▪ Mother encouraged the child to eat	3	23.1	2	22.2	1	25.0
Passive feeding practiced by mother[$]						
▪ Child feed himself/herself	10	76.9	7	77.8	3	75.0
▪ Mother left the child alone	2	15.4	1	11.1	1	25.0
▪ Did not persuade the child to eat more	13	100.0	9	100.0	4	100.0
Hygiene practices during feeding						
▪ Mother washed child's hands before feeding	0	0.0	0	0.0	0	0.0
▪ Washed her hands before feeding	1	7.7	1	11.1	0	0.0
▪ Served food in a clean bowl	3	23.1	2	22.2	1	25.0

For simplicity, selected responses (more frequently occurring responses) are given in some sections hence the percentage may not add up to 100, [$]Multiple responses were obtained hence percentage exceeds 100

Contrary to the mother's interview responses, very few mothers were observed to serve food to the child in a separate bowl (in many cases handing food to the child in hand) nor did they encourage him/her to eat. Thus active feeding was rarely observed. In most of the feeding episodes the child fed himself/herself with no persuasion from the Caregiver to eat more.

Regarding following hygiene practices during feeding, only one mother had washed her hand before feeding and only three mothers had served food in a clean bowl Further, none of the mothers washed child's hand before offering food.

Passive Feeding...Child Left Alone to Eat

Sharma and Kanai, 2008

Health Related Awareness and Practices

Table 4.6 gives the awareness and practices of the mothers pertaining to child health.

The various ways in which mothers described a healthy child were:

- *'Balak jaadu hoye'* (Child is fat).
- *'Balak ramya kare'* (Child is playful).
- *'Sharir saaru dekhaye che'* (Child's body appears good).

While a weak and ill child was described as:

- *'Balak rame na, chanu manu padyu rahe'* (Child is not playful and remains inactive).
- *'Balak patlu hoye'* (Child has a thin body).
- *'Balak nu vajan ochu hoye'* (Child has low body weight).

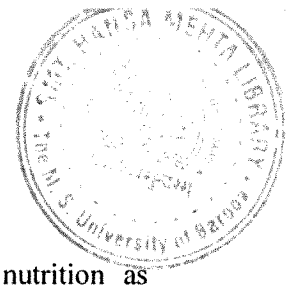
Nearly three fourth mothers perceived their child to be healthy as child was playful.

The other reasons given were:

- *'Balak barabar khaye che'* (Child eats well).
- *'Balak nu vajan barabar che'* (Child's weight is appropriate).

Regarding morbidity, most of the mothers attributed 'evil eye' to be the cause of childhood illness. Few mothers also believed that consumption of inappropriate food, seasonal changes and unhygienic conditions caused illness in child. While some mothers believed that illness is a normal part of development – most of these mothers had a girl child. Almost all the mothers reported to seek treatment for an ill child through a doctor. At the same time as many as 70% of the mothers also took the child to a faith healer especially for treatment of *'varadh'* (respiratory problem which could be similar to pneumonia).

Majority of the mothers associated child's diet with his health. More than one third of the mothers (38%) attributed food deficiency to be the cause of malnutrition. A similar proportion of mothers (36%) also gave illness and infection to be another cause; while few mothers related lack of Care to be the cause of malnutrition in the child. Age wise analysis revealed that food deficiency was considered as a cause of malnutrition significantly more for older children than younger children (3-11 months: 22%, 12-24 months: 46%, $p<0.05$). Further, a larger proportion of mothers of boy children



believed food deficiency and illness-infection as the causes of malnutrition as compared to mothers of girl children.

Table 4.6 Health Related Awareness and Practices of the Mothers

Item	Total		Boys		Girls	
	N=106		N=65		N=41	
	n	%	n	%	n	%
Description of a healthy child						
▪ Child is fat	39	36.8	23	35.4	16	39.0
▪ Is playful	27	25.5	19	29.2	8	19.5
▪ Appears good	24	22.6	14	21.5	10	24.4
Description of a weak and ill child						
▪ Child has a thin body	33	31.1	17	26.2	16	39.0
▪ Has low body weight	26	24.5	16	24.6	10	24.4
▪ Is not playful and lies down quietly	41	38.7	29	44.6	12	29.3
Mother perceives her child to be healthy						
▪ Yes	78	73.6	47	72.3	31	75.6
▪ No	28	24.4	18	27.7	10	24.4
Causes of childhood illness						
▪ Evil eye	76	71.7	47	72.3	29	70.7
▪ Inappropriate food	21	19.8	15	23.1	6	14.6
▪ Unhygienic conditions	14	13.2	8	12.3	6	14.6
▪ Seasonal change	17	16.0	7	10.8	10	24.4
▪ Illness is normal part of development	18	17.0	7	10.8	11	26.8*
Treatment for the sick child is through						
▪ Doctor	104	98.1	65	100.0	39	95.1
▪ Faith healer	74	69.8	45	69.2	29	70.7
▪ Home remedy	11	10.4	9	13.8	2	4.9
Child's diet is associated with his/her health						
▪ Yes	78	90.7	49	94.2	29	85.3
▪ No	4	4.7	1	1.9	3	8.8
Perceived causes of malnutrition						
▪ Food deficiency	40	37.7	26	40.0	14	34.1
▪ Illness and infection	38	35.8	26	40.0	12	29.3
▪ Lack of child Care	6	5.7	3	4.6	3	7.3
Anganwadi services are regularly used						
▪ Yes	90	84.9	55	84.6	35	85.4
▪ No	16	15.1	10	15.4	6	14.6
Anganwadi services used for the child						
▪ Supplementary foods	32	35.6	17	30.9	15	42.9
▪ Vaccination	66	73.3	42	76.4	24	68.6
▪ Preschool facility	10	11.1	8	14.5	2	5.7
▪ Growth monitoring	56	62.2	32	58.1	24	68.6

*p<0.05 (boys vs. girls), All other values: NS

In some sections, several responses are multiple responses hence % may exceed 100, For simplicity, selected responses (more frequently occurring responses) are given in some sections hence % may not add up to 100, Base N from which % values have been calculated varies and depends on presence of the practice

As regards use of anganwadi services for the child, majority of the mothers availed of them. Among various anganwadi services, the most commonly used were vaccination (73%) and growth monitoring (62%). Interestingly, supplementary food service and growth monitoring was used more for the girl child while vaccination service was used more for the boy child.

Feeding of the Child During Illness

Table 4.7 reveals the practices of the mothers in relation to breastfeeding and complementary feeding during child's illness and also during recovery.

About 40% of the mothers when ill reported to feed the child same as before because:

- *'Child is only on breast milk'.*
- *'Balak radya kare che, koina paase rahe nahi to dhavdavu pade'* (Child keeps crying, he/she cannot be pacified by anyone else so I have to breastfeed).

Also a similar proportion of mothers (38%) breastfed less than before giving the reason that *'Aapani bimari balakne lage'* (As I am ill, the child will also fall ill).

When the child was suffering from cold/fever or diarrhoea most of the mothers fed the child breast milk and complementary foods according to his/her demand. The various reasons cited were:

- *'Bimari maan balak nu modhu bagdi jaye ane khavanu saaru nathi lagtu'* (During illness child loses his/her taste senses so does not feel like eating).
- *'Balak ne bhuk nahi lagti'* (Child does not feel hungry).

Some mothers continued to feed breast milk and complementary foods same as before when child suffered from illness saying that *'Balak ne bhuk laage che'* (Child feels hungry).

Nearly half of the mothers (54%) reported to feed either special foods (fruits like banana and pomegranate) when child suffered from diarrhoea believing that: *'Jhada besi jaye'* (Diarrhoea is cured) or avoided certain 'harmful' foods (cereals, pulses and spicy food) so that child's diarrhoea would not aggravate further. Among these mothers proportion of those having younger children (3-11 months: 58%) was more ($p<0.05$) as compared to those with older children (12-24 months: 37%). Also gender

analysis revealed that significantly more boys than girls were either given special foods or not given 'harmful' foods ($p<0.05$) in case of diarrhoea.

Table 4.7 Practices Related to Feeding of the Child During Illness

Item	Total		Boys		Girls	
	N=106		N=65		N=41	
	n	%	n	%	n	%
Frequency of BF, when mother is ill						
▪ Same as before	35	40.2	22	41.5	13	38.2
▪ Less than before	33	37.9	21	39.6	12	35.3
▪ Stop breast feeding	10	11.5	5	9.4	5	14.7
▪ The amount child demands	4	4.6	3	5.7	1	2.9
Frequency of BF in cold and fever (child)						
▪ Same as before	10	11.5	5	9.4	5	14.7
▪ Less than before	5	5.7	4	7.5	1	2.9
▪ Stop breastfeeding	1	1.1	1	1.9	0	0.0
▪ The amount child demands	68	78.2	41	77.4	27	79.4
Frequency of BF in diarrhoea (child)						
▪ Same as before	20	23.0	9	17.0	11	32.4
▪ Less than before	4	4.6	4	7.5	0	0.0
▪ Stop breastfeeding	3	3.4	3	5.7	0	0.0
▪ The amount child demands	52	59.8	29	54.7	23	67.6
Frequency of CF in cold, fever (child)						
▪ Same as before	9	10.5	7	13.5	2	5.9
▪ Less than before	2	2.3	2	3.8	0	0
▪ Stop feeding	2	2.3	1	1.9	1	2.9
▪ The amount child demands	70	81.4	39	75.0	31	91.2
Frequency of CF in diarrhoea (child)						
▪ Same as before	16	18.6	11	21.2	5	14.7
▪ Less than before	4	4.7	3	5.8	1	2.9
▪ Stop feeding	4	4.7	3	5.8	1	2.9
▪ The amount child demands	56	65.1	30	57.7	26	76.5
Frequency of BF, during recovery						
▪ Same as before	76	87.4	43	81.1	33	97.1
▪ Less than before	3	3.4	2	3.8	1	2.9
▪ More than before	4	4.6	4	7.5	0	0.0
▪ The amount child demands	2	2.3	2	3.8	0	0.0
Frequency of CF, during recovery						
▪ Same as before	72	83.7	40	76.9	32	94.1*
▪ Less than before	1	1.2	0	0.0	1	2.9
▪ More than before	4	4.7	4	7.7	0	0.0
▪ The amount child demands	5	5.8	4	7.7	1	2.9

*$p<0.05$ (boys vs. girls), All other values:NS
Base N from which percentage values have been calculated varies and depends on whether child is breastfed or fed CF

While the child was in the recovery phase of illness, majority of the mothers fed the child 'same as before' believing that *'Bimari mati gaya pachi bhukh lage to pehla jevu khase'* (After illness is cured child's appetite becomes normal, so child will eat the same). Significantly more girl children were fed complementary foods 'same as before' as compared to boy children. While boys tended to be fed more than before or as they demanded

Hygiene Observations

The personal hygiene of the child, the mother as well as of the surrounding are presented in **Table 4.8**. Almost three fourths of the children had good personal hygiene as indicated by clean face, no discharge from eyes, nose and mouth and clean hair. Only about half of the children had clean hands and clothes and combed hair. Very few children had clean and cut nails; increasing the possibility of infection.

Table 4.8 Observation Data of Hygiene

Item	Total (N=106)		Boys (N=65)		Girls (N=41)	
	n	%	n	%	n	%
Personal hygiene of the child						
▪ Face clean	78	73.6	49	75.4	29	70.7
▪ No discharge from eyes	96	90.6	59	90.8	37	90.2
▪ No discharge from mouth	80	75.5	50	76.9	30	73.2
▪ No discharge from nose	76	71.7	50	76.9	26	63.4
▪ Hair neatly combed	60	56.6	37	56.9	23	56.1
▪ Hair clean	86	81.1	52	80.0	34	82.9
▪ Hands clean	67	63.2	38	58.5	29	70.7
▪ Nails cut short	37	34.9	23	35.4	14	34.1
▪ Nails clean	20	18.9	12	18.5	8	19.5
▪ Clothes clean	64	60.4	39	60.0	25	61.0
Personal hygiene of the mother						
▪ Face clean	99	93.4	63	96.9	36	87.8
▪ No discharge from eyes	103	97.2	65	100.0	38	92.7
▪ No discharge from nose	103	97.2	65	100.0	38	92.7
▪ Hair neatly combed	82	77.4	51	78.5	31	75.6
▪ Hair clean	96	90.6	59	90.8	37	90.2
▪ Hands clean	94	88.7	58	89.2	36	87.8
▪ Nails cut short	47	44.3	36	55.4	11	26.8**
▪ Nails clean	31	29.2	24	36.9	7	17.1*
▪ Clothes clean	91	85.8	58	89.2	33	80.5

Table continued..

Item	Total (N=106)		Boys (N=65)		Girls (N=41)	
	n	%	n	%	n	%
Hygiene of the surroundings						
▪ No stagnant water inside house	96	90.6	57	87.7	39	95.1
▪ No stagnant water/garbage outside house	75	70.8	43	66.2	32	78.0
▪ Water storage utensil is clean	101	95.3	63	96.9	38	92.7
▪ Water storage utensil is covered	99	93.4	62	95.4	37	90.2
▪ Water storage utensil is kept above floor level	83	78.3	48	73.8	35	85.4
▪ *'Doya'* (ladle) used for taking out water from vessel	29	27.4	15	23.1	14	34.1
▪ The floor is clean free from dust	65	61.3	40	61.5	25	61.0
▪ Proper cross ventilation in the house	36	34.0	17	26.2	19	46.3*
▪ Toilet facility within house/near veranda	45	42.5	24	36.9	21	51.2

Boys vs. girls: *p<0.05, **p<0.01, All other values: NS

As regards hygiene of mothers, most of them had good personal hygiene as indicated by clean face, no discharge from eyes and nose, clean hair, hands and clothes. However, similar to the children, very few mothers had clean and short nails (29% and 44%). This may increase the risk of food contamination during child feeding.

Table 4.9 Mean Hygiene Scores

Item	Maximum score	Total	Boys	Girls	3-11 mths	12-24 mths
		N = 106	N = 65	N = 41	N=36	N=70
Hygiene of child	10					
Mean score ± SE		6.3 ± 0.2	6.3 ± 0.3	6.2 ± 0.4	6.9 ± 0.4	5.9 ± 0.3
Median score		6.0	6.0	7.0	8.0	6.0
F statistic			**0.03** ^{NS}		**3.82** ^{NS}	
Hygiene of mother	9					
Mean score ± SE		7 ± 0.2	7.4 ± 0.2	6.5 ± 0.3	7.1 ± 0.3	7.0 ± 0.2
Median score		7.0	7.0	7.0	7.0	7.0
F statistic			**7.68***		**0.01** ^{NS}	
Hygiene of surrounding	9					
Mean score ± SE		5.9 ± 0.2	5.7 ± 0.2	6.3 ± 0.3	5.7 ± 0.3	6.1 ± 0.2
Median score		6.0	6.0	6.0	6.0	6.0
F statistic			**3.61** ^{NS}		**1.41** ^{NS}	

*p<0.05, NS: non significant

When the above hygiene observations were assigned scores and pooled (**Table 4.9**), it was evident from the mean and median scores that the personal hygiene of the children and mothers was overall inadequate though there was considerable variation seen. Younger children (3-11 months) had higher mean score than older children. Probably mothers of younger children paid more attention towards child Care. As regards gender differences, mothers of boy children had significantly higher mean hygiene scores (especially clean and cut nails) as compared to mothers of girl children.

Observation of hygiene in the house (**Table 4.8**) revealed that the water storage utensil was clean, covered and kept above floor level in majority of the houses. However, very few households had *'doya'* (ladle) for taking out water from vessel. This may lead to contamination of drinking water. Further very few houses had proper ventilation and only 61% houses had clean floors. Less than half households had toilet facility inside the house or in the courtyard and open defecation was common. The living condition of boys was better than girl children with significantly better cross ventilation. Insects like flies and mosquitoes were observed within and outside every house. Also the mean hygiene scores of the surrounding were found to be much below the maximum score (**Table 4.9**). Thus the observations highlight the need to improve certain hygiene practices for the child, mother and surrounding.

Discussion

The present data thus indicates that the IYCF and Care related awareness and practices of the mothers were found to be unsatisfactory in many instances and corroborated the unsatisfactory scenario seen in other regions of the country.

Newborn feeding and breastfeeding

Prelacteal feeding: Giving babies other fluid and milk before breastfeeding is initiated (known as giving prelacteal feeds) is a poor practice which contributes to loss of essential nutrition which breastmilk can provide and places babies at risk of illness and even death (PAHO/WHO 2003). In the present rural population prelacteals like *'patasa'* (sugar water) and *'jaggery water'* had been given to almost half of the

children (41%) of the children; more to girls than boys. The practice of feeding prelacteals like sugar, honey or jaggery water and glucose is widely prevalent in urban as well as rural India, ranging from 100% (Shariff and Farsana 1990, Mishra and Tandon 1997) to 36-42% (Parmar et al 2000, Kulkarni et al 2004).

Studies conducted in urban and rural Vadodara have found that 40-73% newborns were given prelacteals, mainly *'patasa'* water and honey. The main reasons given were: 'Initially no breast milk is produced and child is hungry', 'It inculcates *sanskar* (values) in the newborn' and 'It clears the dirt from the baby's stomach' (Sharma and Khandelwal 2002, Kanani and Gadre 2003, Sharma and Mishra 2004, Srivastava and Sandhu 2005).

Colostrum feeding: The feeding of colostrum, which is considered as the first level of immunization for the child due to its anti-infective properties, was reported to be practiced by only half of the mothers. Those who discarded colostrum stated reasons such as: 'colostrum was stale milk' or 'unhealthy for the child'.

Nearly two-thirds (63%) of women in India and a similar proportion in Gujarat (61%) squeeze the first milk (colostrum) from the breast before they begin breastfeeding. The custom of squeezing the first milk from the breast before breastfeeding a child is widely practised in India, but it is more common in rural areas and for children whose mothers are illiterate, scheduled-tribe children, children whose mothers work on the family farm or in a family business, children living in households with a low to medium standard of living, children born at home, and children born without the assistance of a health professional (NFHS– 2 1998-1999).

In urban and rural Vadodara only 61-64% mothers reported to feed colostrum. The reasons for not feeding colostrum were similar to the present study: 'It is stale/dirty' (Kanani and Gadre 2003, Srivastava and Sandhu 2005). However, Kanani and Katwala (2006) in urban Vadodara, reported a high prevalence of feeding colostrum to infants at 71% as the mothers perceived it to be beneficial for child; with more boys

than girls fed colostrum - similar to the findings of present study. A study in Chandigarh (Parmar et al 2000) and Mumbai (Kulkarni et al 2004) showed similar findings (82% and 95% respectively). Overall, an increasing trend of giving colostrum is being reported over the years.

Breastfeeding: Putting the baby to breast within an hour of birth (early initiation) is the first and foremost step to optimal breastfeeding. Early initiation of breastfeeding ensures availability of colostrum to the newborn and is associated with fewer breastfeeding problems and better mother-infant relationship (PAHO/WHO 2003). Dismally, more than half of the mothers initiated breastfeeding only after 10 hours of childbirth. Further, more than 80% of the children were exclusively breastfed for only 3 months or less mainly due to initiation of water feeding. More girls (55%) than boys (49%) were fed water as early as one month or less.

The NFHS–3 survey (2005-2006) in India has revealed that only 24% are initiated to breast feeding within one hour and 46% are exclusively breastfed for 0-5 months. Kulkarni et. al. (2004) studied breast feeding practices in an urban community of Navi Mumbai (122 mothers attending immunization clinic and having children up to 2 years of age) and reported that delayed initiation of breast feeding was highly practiced. A higher proportion of literate mothers initiated breastfeeding earlier, i.e. within 6 hours of delivery as compared to the illiterate ones.

As regards exclusive breastfeeding (EBF), poor prevalence rates are reported elsewhere in the country. EBF till 6 months is rare and is seen till about 4 months in about 50% of mothers or less.

Interviews with 354 lactating women from Maternal Child Health (MCH) centers (Delhi) revealed that only one fourth of the mothers practiced exclusive breast feeding (EBF) till 4 months and most of the mothers preferred to provide infants something additional besides breast milk. Initiation of breastfeeding was earlier among literate

mothers (within 6 hours of birth) as compared to illiterate mothers (Rasania et al 2003).

In Latur (Maharashtra), Kameswararao (2004) also reported a low prevalence of exclusive breastfeeding till 4 months in a sample of 65 urban mothers (49%) and 249 rural mothers (37%). Prevalence of '*almost exclusively breast fed infants*' (fed water, medicines, vitamins, tonics was comparatively high in total sample (60%). The author recommended need for intensifying IEC activities in programmes to increase exclusive breastfeeding practice.

In Gujarat state also a poor picture emerges, according to NFHS–3 survey (2005-2006). Only about 27% of the children received timely breastfeeding (urban: 30%, rural: 25%). Exclusive breastfeeding for 0-5 months was practiced for 48% children (urban: 47%, rural: 48%).

Breastfeeding observations: Very few mothers in present study paid attention to check whether the child was suckling properly. As compared to reported data, a higher proportion of mothers were observed to breastfeed from one breast, perhaps because many times breastfeeding was practised for very short duration, to pacify the child (token breastfeeding). No significant gender differences were found as regards newborn feeding awareness and practices of mothers.

Top milk feeding

About half of the present children were receiving top milk, which was initiated before six months by one third mothers, believing that their breast milk was inadequate for the child. Also one fourth children were bottle fed putting them at increased risk of infectious diseases.

Aneja et al (2001) in Delhi found that 80% children received top milk and 68% mothers had initiated top milk feeding before 6 months of age. Other studies in urban (n= 51 children, 6-18 months) and rural (n=40 children, 3-36 months) Vadodara

reported 49% and 20% children to receive top milk respectively, the reason being similar to the present study. Further, bottle feeding was uncommon (Kanani and Gupta 2002, Kanani and Gadre 2003). However, Rasania et al (2003) found a higher prevalence of bottle feeding (65.8%) in Delhi. Unfortunately prevalence of bottle feeding increased as literacy level increased.

Complementary feeding

Initiation of complementary feeding: After six months of age, an infant's requirements cannot be met with breast milk alone. There is worldwide consensus that complementary feeding should begin at six months of age. In the present study 62% mothers delayed initiation of complementary feeding beyond 6 months. Further, according to more than half of the mothers, there was no apparent harm to the child in delaying complementary foods. More boys than girls received complementary foods later than 6 months. Complementary feeding was initiated when the mothers felt that 'Breast milk was insufficient and child remained hungry' and 'Child had grown up'.

Yadav and Singh. (2004) studied 8000 mothers in Bihar and found that more than half of the mothers introduced supplement to their infants between 6-12 months. Cereal preparation and milk formed the major food item as supplementary/substitutes for children for breast milk. The main reasons for starting supplements were mother's insufficient milk, child's demand and that supplements are required for proper growth.

NFHS–3 (2005-2006) survey data of India as well as of Gujarat reveals delayed initiation of complementary foods. In India 56% (and a similar proportion in Gujarat; 57%) of breastfeeding children start consuming solid or mushy foods at the age of 6-9 months, the percentage being still lower for rural children (India 54%, Gujarat 51%). Thus, the above studies indicate that timely initiation of complementary feeding is negligible in the country as well as Gujarat. Similar findings are also observed in the present study.

Dietary diversity and active feeding: Only about one fourth children were given special foods (boiled whole pulses, *'shira'* and *'khichadi'*) and for many, food taboos were followed (avoiding certain fruits and vegetables) in the fear that the child would suffer from '*varadh*' (respiratory problem which could be similar to pneumonia). More boys as compared to girls were fed special foods and at the same time they did not receive certain foods compared to girls. Similar results were obtained with regard to children below 1 year and above 1 year of age.

With regard to feeding behaviours, unfortunately a significant proportion of mothers did not feed the child in an active and responsive manner. Further, younger children were fed more frequently by their mothers as compared to older children. Considering the gender differences, more boys were fed by the mother and in a responsive manner as compared to girls.

Complementary feeding behaviours have been studied in research conducted elsewhere. Brown et.al. (1992) in rural Bangladesh reported that traditionally the Bangladeshi women did not encourage their children to eat other foods until 18-24 months of age. Mothers restricted complementary foods, as they believed that food caused 'Stomach problems'. Small amounts of liquid and solid foods were offered to children in the first year of their life although these rarely included vegetables, fish and lentils. Gender discrimination against the girl child was not observed in the study. However, an earlier study in Bangladesh suggested mothers introduced food significantly earlier to girls, reflecting a less strict following of food taboos for girls as compared to boys (Zeitlin et al 1987).

There is inadequate reported data in literature regarding aspects of active feeding.
A study in rural Vietnam investigated styles of feeding among 40 mother-children (12 or 18 months) pairs. Caregivers provided physical help to eat nearly all of the time in the younger children, and about 70% of the time among 18 month olds. Positive Caregiver behaviours (non pressuring or forceful behaviours and positive vocalization) were significantly associated with higher child's acceptance of food (Ha et al 2002).

A review by Kanani et al (2005) reported that in the regions around urban Vadodara, special foods were made for 28-57% children. Active feeding of children while giving complementary foods was reported by a low percentage of women (14-35%). Less than half of the mothers encouraged the child to eat more. A few active feeding beahviours were found to be practiced more by mothers of boy children as compared to those with girls (feeding the child, encouraging to eat more), but these differences were not significant.

Complementary feeding observations: Observations of child feeding episodes also corroborated the above findings with most mothers feeding the child in a passive manner without persuading or encouraging child to eat. Further adequate hygiene of food was also absent (hand washing before feeding and feeding in clean utensils).

Health related awareness and practices

Majority of the mothers in this study perceived their child to be healthy. According to a significant proportion of mothers having girls (versus to those with boy child), illness was a normal part of development. In general food deficiency, illness and infection were reported as the common causes of malnutrition. However, importance of complementary foods for the health of the young child was not realized by many mothers.

In other similar studies in and around Vadodara, less than one-third mothers related child's health to weight or food intake of the child. Mothers gave varied responses based on the child's physical attributes (good body, thin body, and weak body), his activities (playfulness) and his behaviour (whether he laughs/cries often) (Kanani and Gupta 2002, Kanani and Gadre 2003, Kananai and Katwala 2006).

Feeding during illness

As regards breastfeeding and complementary feeding during illness, mothers did not attempt to increase child's food intake during diarrhoea mostly because *'Child does*

not feel hungry when ill'. Most mothers decreased the number of breastfeeds when mother was ill with a view, 'As *I am ill, the child will also fall ill'*.

Regarding food restriction in diarrhoea, about half of the mothers reported to either feed special foods (banana, pomegranate) to the child or avoid certain foods (cereals, pulses and spicy food) with a view that those foods either aided or aggravated recovery. This observation was significant for younger children (less than 1 year) and boy children.

During recovery from illness, only 4 mothers gave more frequency of breast feeds and more amount of complementary food to child, to help the child recover lost weight while majority of others reported to feed the child same as before.

Review of data in Vadodara region with respect to child feeding during illness and recovery has revealed that it was primarily child's demand for food that determined his/her intake of food (Kanani et al 2005). A study in west Java among children under 5 years found that mothers withheld certain foods during diarrhoea (28% oily foods, 17% hot, spicy food, 16% sour tasting foods) and offered more bland foods during illness (McDivitt and MCDowell 1989). In Vadodara Srivastava and Sandhu (2005) also reported avoidance of certain foods (44%) during child's (6-24 months) illness.

Hygiene observations

Hygiene observation scores revealed inadequate personal hygiene of the children (especially 12-24 months) and of mothers. Hygiene score of the house and surroundings was also poor with poor ventilation, absence of clean floor, presence of flies and in some cases, stagnant water and garbage outside house.

Various studies have highlighted the importance of hygiene for the health of the child. With dirty surroundings and large number of flies, contamination of food is more likely (Zaman et al 1993). It has been demonstrated that personal and domestic

hygiene, have strong protective effect against diarrhoeal incidence rates (Stanton and Clemens 1987 and Gorter et al 1998).

Summing up this section, a majority of the rural mothers in the study did not follow the optimal breastfeeding, complementary feeding and Caregiving practices which is unfortunate considering the time and resources spent on child care programs such as ICDS and by the several Non Governmental Organizations. A few gender differences were also evident pointing out to a subtle discrimination against the girl child.

The next section that follows presents the various resources required for Caregiving and IYCF, which were adequately available or not available to the rural mothers in this study.

Family Income and Environment, Mother's Health and Education are Some Important Resources Required for Caregiving.

Family Resources: the Socio - Economic Status of the Family

Table 4.10 presents an overview of the socio-economic characteristics of the families studied in rural area of Nandesari, in Vadodara district. All most all the mothers interviewed belonged to Hindu families. Nearly half of the families were joint, consisting of 5–7 members (44%) and or more (27%). Interestingly, majority of the girls as compared to relatively less boys belonged to larger families (>4 members) reflecting a desire for a male child and therefore more children. More than one third of the mothers were in the age group of 21–24 and some were younger than 21 years. However, majority fathers were more than 25 years of age. As regards education, most of the mothers were either illiterate or had only primary education. Fathers were better educated than mothers and only 4% were illiterate. The economic status of the families was poor with mean per capita income for most being either Rs. 201–500 or less than Rs. 200.

Most of the families had semi-pucca houses (with tinned shed roof and brick walls) and about half had two rooms or less (including kitchen). Water was available nearby from a common municipality tap and few even had tap in house. However around 60% families had no toilet facility. Half of the families disposed garbage just outside the

house while the other half used an empty pond or well. No significant gender differences were observed in the socio-economic status of the families.

In brief therefore, resources for adequate child Caregiving - sufficient family income, small family size, education of the mothers and clean hygienic environment - were not available to a majority of the families of the study.

Table 4.10 Socio - Economic Profile of the Mothers

Characteristics	Total		Boys		Girls	
	N=106		N=65		N=41	
	n	%	n	%	n	%
Religion						
▪ Hindu	105	99.1	64	98.5	41	100.0
▪ Christian	1	0.9	1	1.5	0	0.0
Type of family						
▪ Joint	69	65.1	38	58.5	31	75.6
▪ Nuclear	37	34.9	27	41.5	10	24.4
Total number of family members						
▪ ≤4	30	28.3	22	33.8	8	19.5
▪ 5-7	47	44.3	26	40.0	21	51.2
▪ >7	29	27.4	17	26.2	12	29.3
Child's age (months)						
▪ 3-5	7	6.6	6	9.2	1	2.4
▪ 6-11	29	27.4	15	23.1	14	34.1
▪ 12-24	70	66.0	44	67.7	26	63.4
Child's birth order						
▪ ≤2	78	73.6	48	73.8	30	73.2
▪ >2	28	26.4	17	26.2	11	26.8
Age of mother (years)						
▪ ≤20	12	11.3	7	10.8	5	12.2
▪ 21-24	42	39.6	28	43.1	14	34.1
▪ ≥25	52	49.1	30	46.2	22	53.7
Education of mother						
▪ Illiterate	32	30.2	18	27.7	14	34.1
▪ Primary school	40	37.7	28	43.1	12	29.3
▪ Secondary/Higher school	30	28.3	17	26.2	13	31.7
▪ Graduate	4	3.8	2	3.1	2	4.9
Age of father (years)						
▪ 21-24	24	22.6	15	23.1	9	22.0
▪ ≥25	82	77.4	50	76.9	32	78.0
Education of the father						
▪ Illiterate	4	3.8	4	6.2	0	0.0
▪ Primary	22	20.8	16	24.6	11	26.8
▪ Secondary/Higher school	65	61.3	39	60.0	26	63.4
▪ Graduate/Above	10	9.4	6	9.2	4	9.8

Table continued..

Characteristics	Total		Boys		Girls	
	N=106		N=65		N=41	
	n	%	n	%	n	%
Type of house						
▪ Pucca	32	30.2	16	24.6	16	39.0
▪ Semi-pucca	64	60.4	42	64.6	22	53.7
▪ Kuccha	10	9.4	7	10.8	3	7.3
Source of drinking water						
▪ Common municipal tap	67	63.2	41	63.1	26	63.4
▪ Tap in house	39	36.8	24	36.9	15	36.5
Toilet facility						
▪ Open defecation	65	61.3	44	67.7	21	51.2
▪ Common toilet	16	15.1	12	18.5	4	9.8
▪ Toilet within the house	25	23.6	9	13.8	16	39.0
Garbage disposal						
▪ Outside the house	53	50.0	30	46.2	23	56.1
▪ In a common dustbin	4	3.8	2	3.1	2	4.9
▪ In empty pond/well	49	46.2	33	50.8	16	39.0
Total family income per month (Rs.)						
▪ ≤2000	39	36.8	21	32.3	18	43.9
▪ 2001-5000	60	56.6	37	56.9	23	56.1
▪ ≥5001	7	6.6	7	10.8	0	0.0
Per capita income per month (Rs.)						
▪ <200	22	20.8	9	13.8	13	31.7
▪ 201-500	44	41.5	25	38.5	19	46.3
▪ 501-2000	40	37.7	31	47.7	9	22.0

No significant gender difference was found with regard to the above socio – economic characteristics profile of the children ($p>0.05$).

Nutritional Status and Well Being of the Mother

It is known that appropriate maternal health is a pre requisite for optimal child Care. Hence the nutritional status and well being of the mother were assessed the findings for which are given below.

Weight, height and Body Mass Index

Table 4.11 reveals that the mean weight, height and Body Mass Index (BMI) of the mothers was 42 kg, 150 cm and 19 respectively. Further **Table 4.12** shows that prevalence of under nutrition was high among mothers: 43% with weight <40kg and 58% with BMI <18.5. Few mothers also had height below 145 cm, which is the cutoff level for women at high risk of delivering low birth weight babies. Nutritional status of the mothers did not differ according to the age or sex of the child.

In a subsequent section resources for Caregiving including comparison of mothers nutritional status with child nutrition are presented.

Table 4.11 Anthropometric Measurements of the Mother of Index Child (N=106)

Characteristic	N	Mean ± SE		
		Weight (kg)	Height (cm)	Body Mass Index
Total	106	41.9 ± 0.6	149.9 ± 0.6	18.7 ± 0.3
Age of the child				
▪ 3-11 months	36	43.4 ± 1.0	151.2 ± 1.0	18.9 ± 0.4
▪ 12-24 months	70	41.3 ± 0.9	149.2 ± 0.7	18.5 ± 0.4
Sex of the child				
▪ Boys	65	42.2 ± 0.9	149.1 ± 0.6	18.9 ± 0.4
▪ Girls	41	41.7 ± 0.9	151.1 ± 0.9	18.3 ± 0.4

All the values: NS

Table 4.12 Malnutrition in the Mother of Index Child (N=106)

Characteristic	N	Weight <40 kg		Height <145 cm		BMI <18.5	
		n	%	n	%	n	%
Total	106	46	43.4	15	14.2	61	57.5
Age of the child							
▪ 3-11 months	36	12	33.3	4	11.1	18	50.0
▪ 12-24 months	70	34	48.6	11	15.7	43	61.4
Sex of the child							
▪ Boys	65	28	43.1	9	13.8	35	53.8
▪ Girls	41	18	43.9	6	14.6	26	63.4

All the values: NS

Reproductive history of the mothers

Almost half of the mothers were married at an early age of 16 years or less, one third were married at the age of 17-18 years (**Table 4.13**). Many mothers had their first child at the age of 20 years or even less. This indicates that women began with the responsibilities of child bearing at an early age thus compromising their nutritional status and limiting their ability for child Care. However it was encouraging to find that the child spacing was 2 years (22 %) and ≥3 years (40 %), which would give enough time to the mother to take Care of the younger child. There were no significant differences in reproductive history of the mothers with boys or girls.

Table 4.13 Reproductive History of the Mothers

Item	Total N=106		Boys N=65		Girls N=41	
	n	%	n	%	n	%
Age at marriage (years)						
▪ ≤16	50	47.2	28	43.1	22	53.7
▪ 17-18	36	34.0	25	38.5	11	26.8
▪ 19-20	15	14.2	10	15.4	5	12.2
▪ >20	5	4.7	2	3.1	3	7.3
Age at birth of first child (years)						
▪ ≤20	73	68.9	45	69.2	28	68.3
▪ 21-24	28	26.4	18	27.7	10	24.4
▪ ≥25	5	4.7	2	3.1	3	7.3
Birth interval between index child and previous child (years)						
▪ 1	9	8.5	6	9.2	3	7.3
▪ 2	23	21.7	17	26.2	6	14.6
▪ ≥3	42	39.6	24	36.9	18	43.9
▪ One child only	32	30.2	18	27.7	14	34.1

How healthy did the mothers perceive themselves to be?

As regards mother's beliefs about her own health (**Table 4.14**), a majority perceived themselves to be in good health. Yet 43% mothers also felt the need to improve their health.

Table 4.14 Mother's Perception Regarding Her Health and its Effect on Child Care

Beliefs	Total (N=106)		Boys (N=65)		Girls (N=41)	
	n	%	n	%	n	%
Mother perceives herself to be in good health						
▪ Yes	77	72.6	48	73.8	29	70.7
▪ No	27	25.5	17	26.2	10	24.4
▪ Don't know	2	1.9	0	0.0	2	4.9
Mother believes that her health affects her ability of child Care						
▪ Yes	68	64.2	45	69.2	23	56.1
▪ No	31	29.2	15	23.1	16	39.0
▪ Don't know	7	6.6	5	7.7	2	4.9
Mother feels the need to improve her health						
▪ Yes	46	43.4	26	40.0	20	48.8
▪ No	46	43.4	28	43.1	18	43.9
▪ Don't know	14	13.2	11	16.9	3	7.3
Mother would like to improve her health through[#]						
▪ Diet	12	26.1	8	30.8	4	20.0
▪ Medicine	21	45.7	14	53.8	7	35.0

[#] For simplicity, selected responses (more frequently occurring responses) are given in hence the percentage does not add up to 100

Further, many mothers believed that their health status affected their ability for child Care. In the words of a mother *'Tabiyat barabar na hoye to balak ni sarkhi kaadji na rakhi sakaye, kantaado aave'* (If our health is poor then it is not possible to take proper Care of the child, mother would feel lethargic). Thus mothers were aware about the implications of their health status on the upbringing and Care of the child.

Role of Mother in Family Decision - Making

Table 4.15 highlights the role of the mother in certain decisions related to food allocation and child Care within the family. Decision regarding what is to be cooked was taken primarily by grandmother (where ever present); otherwise by the mother. However serving of food at meal times was done only by the mother in almost all the families. Decision regarding the schooling of the children was taken by 29% of mothers; mother along with the father (35%) and the father alone (29%).

Table 4.15 Role of Child's Mother in Decision Making in the Family

Item	Total		Boys		Girls	
	N=106		N=65		N=41	
	n	%	n	%	n	%
Decision regarding what is to be cooked for the family						
▪ Self	60	56.6	39	60.0	21	51.2
▪ Mother-in-law	21	19.8	10	15.4	11	26.8
Decision regarding food distribution in the family						
▪ Self	87	82.1	53	81.5	34	82.9
Decision regarding the schooling of children						
▪ Self	17	29.3	12	31.6	5	25.0
▪ Self with husband	20	34.5	12	31.6	8	40.0
▪ Husband	17	29.3	12	31.6	5	25.0
Decision regarding major family purchases						
▪ Self with husband	44	41.5	30	46.2	14	34.1
▪ Husband	21	19.8	15	23.1	6	14.6
Decision regarding treatment of sick child						
▪ Self	20	18.9	12	18.5	8	19.5
▪ Self with husband	46	43.4	30	46.2	16	39.0

For simplicity, selected responses (more frequently occurring responses) are given in some sections hence the percentage may not add up to 100, Base N from which percentage values have been calculated varies and depends on presence of the practice

With regard to major family purchases the father also consulted the mother in 42% of the families. Similarly the father included the mother in decision regarding treatment

of child's illness (43%). As regards the influence of child's gender on mother's decision making, more mothers having a boy had a say in decision related to cooking, major purchases and schooling of children than those having a girl.

Family Support Received by the Mother for Child Care

The results below describe the support received by the mother from the family especially grandmother and husband towards house work and child Care. The breastfeeding and complementary feeding knowledge and behaviours, as well as nutritional status of children 3-24 months in all rural families where grandmothers were present (GMP, n=31) were compared with a matched group of 39 households, having children in the same age group with no grandmother present (GMA). Both GMP and GMA families were comparable for key socio – economic parameters like type of house, mean number of children, mean income and average educational levels of parents.

Did grandmother's presence influence mothers IYCF practices?

Table 4.16 compares the newborn feeding, breastfeeding and complementary feeding practices of the mothers in families where grandmothers were present (GMP) and where grandmothers were absent (GMA).

New born feeding and breastfeeding: A similar proportion of mothers in the two groups (GMP and GMA) had given prelacteals like 'patasa' (sugar water) and 'jaggery water' to the child. According to mothers, prelacteals were given as 'Initially no breast milk comes and child is hungry'. A slightly lower proportion of GMP mothers (45%) had given colostrum as compared to GMA (51%) mothers. Those who discarded colostrum (about half) stated reasons such as: 'Colostrum was stale milk', 'Unhealthy for the child' and also because others had advised them to discard colostrum. Overall, more than half of the mothers initiated breastfeeding only after 10 hours of childbirth in both groups.

For more than three fourth of the children in both groups, exclusive breastfeeding (EBF) was for less than 3 months, mainly due to initiation of water feeding.

Table 4.16 Practices of the Mother (With Grandmother Present and Grandmother absent) regarding IYCF

Practice	Grandmother present (GMP)						Grandmother absent (GMA)					
	Total N=31		Boys N=19		Girls N=12		Total N=39		Boys N=25		Girls N=14	
	n	%	n	%	n	%	n	%	n	%	n	%
Feeding prelacteals	13	41.9	5	26.3	8	66.7	15	38.5	11	44.0	4	28.6
Feeding colostrum	14	45.2	10	52.6	4	33.3	20	51.3	13	52.0	7	50.0
Initiation of breastfeeding (BF)												
▪ ≤1 hour	6	19.4	5	26.3	1	9.1	4	10.3	2	8.0	2	14.3
▪ 2-5 hours	6	19.4	4	21.1	2	16.7	6	15.4	2	8.0	4	28.6
▪ 6-10 hours	2	6.5	1	5.3	1	8.3	5	12.8	4	16.0	1	7.1
▪ >10 hours	17	55.0	9	47.4	8	66.7	24	61.5	17	68.2	7	50.0
Exclusive BF												
▪ ≤3 months	24	77.4	14	73.7	10	83.3	31	79.5	19	76.0	12	85.7
▪ 4-6 months	7	22.6	5	26.3	2	16.7	8	20.5	6	24.0	2	14.3
Age of initiating CF [@]												
▪ <6 months	6	22.0	4	23.5	2	20.0	5	16.1	3	15.8	2	16.7
▪ 6 months	4	14.8	3	17.6	1	10.0	11	35.5	6	31.6	5	41.7
▪ >6 months	17	63.0	10	58.8	7	70.0	15	48.4	10	52.6	5	41.7
Mother practices active feeding**,[#]												
▪ Yes	14	51.9	7	41.2	7	70.0	6	19.4	4	21.1	2	16.7
▪ No	13	48.1	10	58.8	3	30.0	25	80.6	15	78.9	10	83.3
On demand:												
▪ BF during diarrhoea	15	48.4	8	42.1	7	58.3	21	53.8	13	52.0	8	57.1
▪ CF during diarrhoea	18	58.0	12	70.6	6	60.0	17	54.8	9	47.4	8	66.7
Decrease BF during mothers illness	16	51.6	10	52.6	6	50.0	16	41.0	11	44.0	5	35.7
Anganwadi services used												
▪ Supplementary food**	14	82.4	8	72.7	6	100.0	8	32.0	4	25.0	4	44.4
▪ Growth monitoring	16	80.0	10	76.9	6	85.7	20	64.5	10	50.0	10	90.0
▪ Vaccination	11	55.0	7	53.8	4	57.1	18	58.1	11	55.0	7	63.6

**p<0.01: GMP vs. GMA, All other values GMP vs. GMA: NS, CF: complementary feeding

[@]The percentage may not add up to 100 because only selected responses (more frequent responses) are given, for clarity, Base N from which percentage values have been calculated varies and depends on presence of the practice, [#]Indicators: feeding the child as frequently as needed, being alert to hunger cues of child, supporting and encouraging child to eat and feeding the child from separate plate. Presence of 3 or more of these indicators was categorized as active feeding.

Sharma and Kanani, 2008

Do Grandmothers Make a Difference to What Young Children Eat?

Sharma and Kanai, 2008

Child was given water so that 'His/her mouth would not get dry' and '*Balak tandurast rahe*'(Child would remain healthy). Less than half of the mothers (42% GMP, 39% GMA) were giving top milk to the child. Most of the mothers believed that they were producing enough milk and mother's milk was the best for the child as according to them

- '*Mata je khayae dhavanmanthi balakne male*' (Whatever the mother eats is obtained by the child from the mother's milk).
- *'Dhavan thi balak tandurast rahe'* (Child remains healthy due to breast milk).
- '*Uparnu dudh pachwa maan mushkeli thaye*' (Top milk is difficult to digest).

Complementary feeding: Majority of the children (87% GMP, 80% GMA) -even those below 6 months of age- were reported to receive complementary foods at the time of the survey. **Table 4.16** reveals that initiation of complementary feeding was delayed beyond 6 months by more GMP mothers (63%) than GMA mothers (48%). Further, in many more GMP families (44%), initiation of CF was delayed beyond 9 months compared to only 19% GMA families. However, significantly more mothers in GMP group practiced active feeding[1] (52%) vs. GMA group (19%). Further, more GMA children (74%) were eating on their own at 12 months or less as compared to GMP children (67%).

Feeding during illness: As regards giving breast milk and complementary foods during illness, about half the mothers in both groups did not attempt to increase child's food intake during diarrhoea because

- *'Bimari maan balak ne bhuk nathi lagti'* (Child does not feel hungry when ill).
- *'Balak maan khavani shakti nathi hoti'* (Child does not have the strength to eat).

Regarding feeding child during mother's illness, **Table 4.16** further shows that about half of the GMP mothers and 41% GMA mothers when themselves ill, decreased the number of breastfeeds with a view that '*Aapani bimari balakne lage*' (As I am ill, the child will also fall ill) or '*Bimari maan ochu khaiye etle dhavan ochu aave*' (During illness mother eats less, so milk production decreases).

[1]Indicators of active feeding were: feeding the child as frequently as needed, being alert to hunger cues of child, supporting and encouraging child to eat and feeding the child from separate plate. Presence of 3 or more of these indicators was categorized as active feeding.

While the child is in the recovery phase of illness, majority of the mothers fed the child 'same as before' believing that '*Bimari mati gaya pachi moh saaru thaye ane bhukh ughde*' (After illness is cured child's taste senses improve and appetite becomes normal).

Awareness regarding child morbidity and health: Regarding morbidity, evil eye was attributed to be the most common cause for childhood illness more by GMP mothers (74%) than GMA mothers (64%). Above 60% of mothers in both groups tried to get rid of evil eye by going to the faith healer especially to cure symptoms similar to pneumonia 'varradh hankawa'. Further, less than 40% mothers in both groups could associate food deficiency or infection with malnutrition. Almost all the children were taken to the doctor for treatment during illness.

Utilization of Anganwadi services: When asked about use of anganwadi services, significant number of GMP mothers (82%) utilized supplementary food for the child from the anganwadi as compared to GMA mothers (32%). Also higher numbers of GMP children (80%) were taken for growth monitoring than GMA children (65%).
As regards gender differences, in both the groups, more boys were fed colostrum and exclusively breastfed for longer duration (beyond 3 months) as compared to girls. Also mothers, during their illness, decreased frequency of breastfeeding more for boys (53% GMP, 44% GMA) than for girls (50% GMP, 36% GMA). Among GMP group more girls were delayed initiation of breastfeeding (beyond 10 hours, after birth) and complementary feeding (beyond 6 months) as compared to boys. Though these gender differences existed they were not statistically significant.

Grandmother's knowledge regarding IYCF and support for child Care

Newborn feeding: Similar to the beliefs of mothers, most of the grandmothers believed in giving prelacteals after childbirth (**Table 4.17**). They believed that prelacteals remove dirt from child's stomach. More than 70% of grandmothers

believed in discarding colostrum ('It is unhealthy for the child') and in delayed initiation of breastfeeding (beyond 10 hours).

Table 4.17 Knowledge of Grandmother Regarding Infant and Young Child feeding and Support Given in Child Care

Item	Total N= 31		Boys N= 19		Girls N= 12	
	n	%	n	%	n	%
Feeding prelacteals is important						
▪ Yes	26	84.0	17	89.5	9	75.0
▪ No	5	16.0	2	10.5	3	25.0
Feeding colostrum is important						
▪ Yes	6	19.4	4	21.1	2	16.6
▪ No	24	77.4	15	78.9	9	75.0
Initiation of breastfeeding should be:						
▪ ≤1 hour	4	12.9	4	21.0	0	0.0
▪ 2-5 hours	1	3.2	1	5.3	0	0.0
▪ 6-10 hours	0	0.0	0	0.0	0	0.0
▪ >10 hours	26	83.9	14	73.7	12	100.0
Duration of EBF (without water or any other fluid) should be:						
▪ ≤3 months	19	61.3	11	57.9	8	66.7
▪ 4-6 months	12	38.7	8	42.1	4	33.3
Right age of initiating CF should be:						
▪ <6 month	8	25.8	5	26.3	3	25.0
▪ 6 months	6	19.4	4	21.1	2	16.6
▪ >6 months	17	54.8	10	52.6	7	58.3
Feeding behaviour should be:						
▪ Active	11	35.5	9	47.4	2	16.7
▪ Passive	20	64.5	10	52.6	10	83.3
Number of child Care tasks performed						
▪ 0-2	15	48.4	9	47.4	6	50.0
▪ 3-4	16	51.6	10	52.6	6	50.0
Number of house hold tasks performed						
▪ 0-2	27	87.1	16	84.2	11	91.7
▪ 3	4	12.9	3	15.8	1	8.3

The percentage may not add up to 100 because only selected responses (more frequent responses) are given, in the table, for clarity.

Complementary feeding and dietary diversity: More than half of the grandmothers (55%) believed in introduction of complementary feeding beyond the age of 6 months. According to them there were no harmful effects of delayed complementary feeding (41%).

Fruits, 'khichadi/dal-rice' (cereal pulse preparation) were mentioned as 'good foods' for a one year old child by 50% grandmothers, because, by consuming these foods

- *'Balak motu thaaye'* (Child would grow well).
- *'Balak ni unchai vadhe ane ae khata sheekhe'* (Child's height would increase and would learn to eat).

Very few grandmothers mentioned vegetables and milk as 'good foods'. The amount and frequency of complementary foods to be given to the child at different ages as mentioned by most of the grandmothers was inappropriate (for 6-9 month child: about 2-3 tsp food, twice a day or less; for child 10-24 months: about half a household cup/'katori' food, twice a day or less).

Only 36% grandmothers believed in active feeding behaviours and more of these were in families where boys were present (47%) than girls (17%).

Feeding during illness: Although 45% grandmothers believed that mother should not breastfeed the child during her own illness, they reported that in practice their grandchild breastfed as usual during mother's illness because 'Child feels hungry so has to be given breast milk'. During child's illness, grandmothers believed that the child should be given breast milk or top foods on demand because 'Child does not like anything else during illnesses but should not be force-fed.
Knowledge of the grandmothers was not significantly different for boy or girl children.

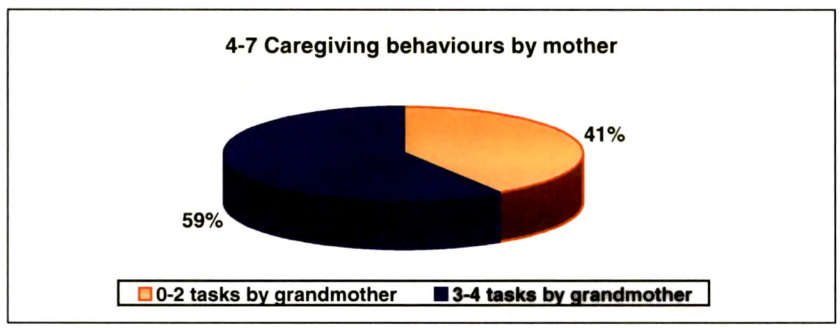
Support in child Care and house work: According to most of the grandmothers they helped the mother in child Care activities like playing with the child (81%), keeping the child clean (58%), feeding the child (58%), and putting the child to sleep (16%). Fewer grandmothers (16% to 58%) helped the mother with housework like purchase of household goods, cleaning house and fetching fodder or looking after cattle.

The Caregiving behaviours of the mothers were also studied in relation to the extent of help provided by the grandmother for child Care **(Figure 4.2 A and B)**. Those

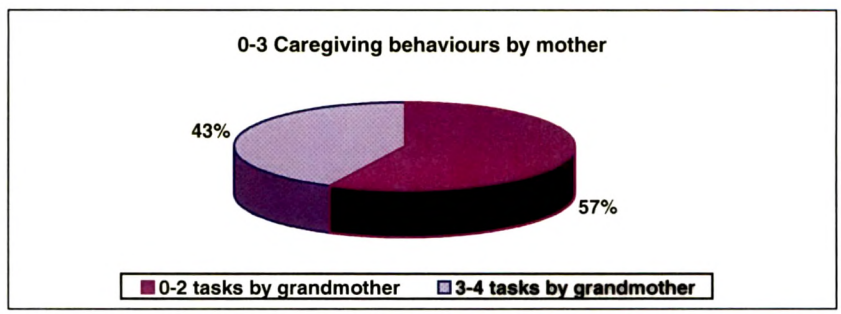
mothers who performed higher number of Caregiving behaviours (4-7) had higher proportion of grandmothers helping in 3-4 child Care and household tasks (59%) as compared to those mothers who performed fewer Caregiving behaviours (0-3). Thus more the grandmother's support in child Care activities, more were the number of Caregiving behaviours practiced by the mother (exclusive breastfeeding for 4-6 months, initiation of complementary feeding at 6 months, active feeding, not practicing food taboos, feeding the child same as before if child suffers from diarrhoea and using anganwadi services for the child).

Figure 4.2 Association of Grandmother's Support in Child Care with Caregiving by Mother

(A)



(B)

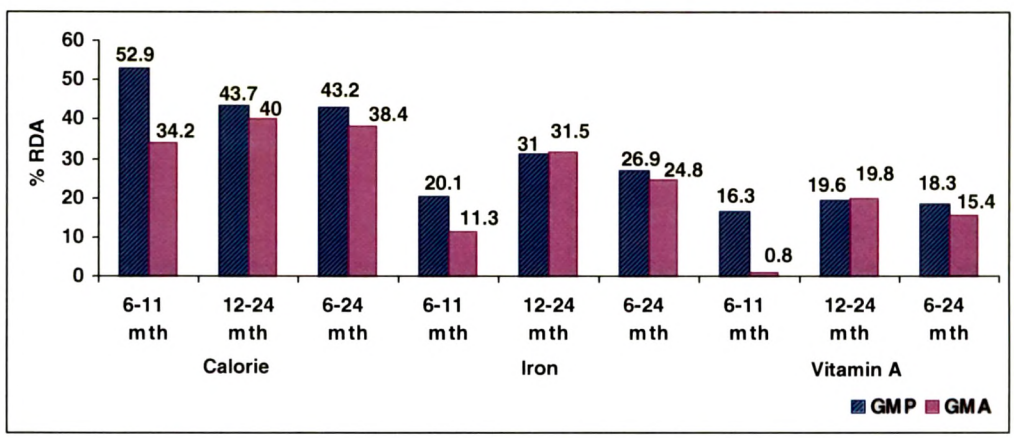


Nutrient intake among children with grandmother present and grandmother absent

Figure 4.3 shows that amount of nutrients consumed (macronutrients as well as micronutrients), was very inadequate for both the groups of children. However, among

the 6-11 month olds, the calorie, iron and vitamin A intake of the GMP children was higher as compared to GMA children. It was found that children in GMP group were consuming a higher amount of energy and micronutrient rich foods like 'bajra' (a millet), milk and 'bengal gram' than did GMA children.

Figure 4.3 Energy, Iron and Vitamin A Intake of Children With Grandmother Present (GMP) and Grandmother Absent (GMA) as Mean (%RDA)



Nutritional status of children with grandmother present and grandmother absent

Table 4.18 reveals that undernutrition (Weight-for-Age: WAZ below –2SD) and stunting (Height-for-Age: HAZ below –2SD) was high (>50%) in both GMP and GMA groups. Wasting was seen in thrice as many GMA children compared to GMP children. Also, prevalence of undernutrition and wasting tended to be higher in GMA children vs. GMP children for 12-24 months age group. Data is suggestive of the fact that grandmother's presence could play a role in preventing malnutrition in young children.Negligible gender differences were observed for all anthropometric indicators.

Support received by the mother from husband for child Care and house work

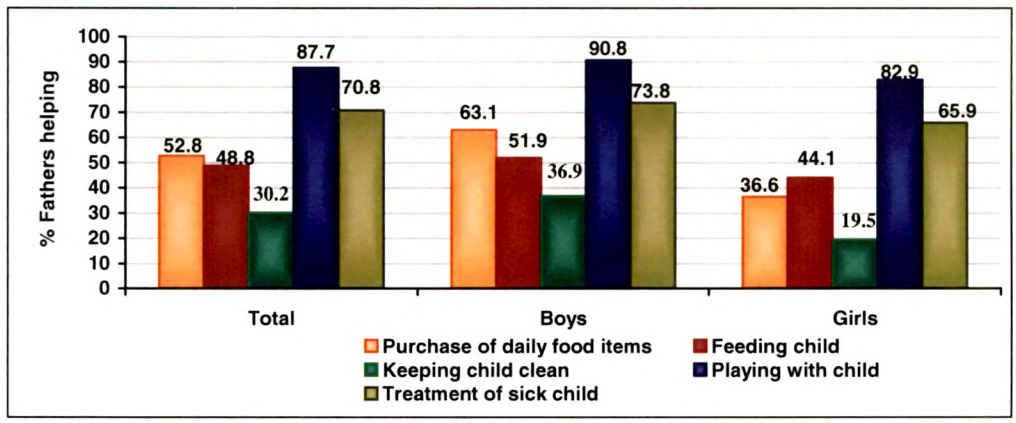
A majority of the women reported to receive help from the husband in child Care activities like playing with the child and taking the child to doctor when ill (**Figure 4.4**).

Table 4.18 Comparison of the Nutritional Status of Children with Grandmother Present and Grandmother Absent

Characteristics of the child	N	Weight-for-Age[1] Z score				Height-for-Age[1] Z score				Weight-for-Height[1] Z score			
		(<-2 SD)		(<-3 SD)		(<-2 SD)		(<-3 SD)		(<-2 SD)		(<-3 SD)	
		n	%	n	%	n	%	n	%	n	%	n	%
GMP[@]													
Total	**31**	**20**	**64.5**	**7**	**22.6**	**19**	**61.3**	**9**	**29.0**	**4**	**12.9**	**0**	**0.0**
Age of child (months)													
▪ 3-11	9	6	66.7	2	22.2	6	66.6	2	22.2	0	0.0	0	0.0
▪ 12-24	22	14	63.6	5	22.7	13	59.1	7	31.8	4	18.2*	0	0.0
Sex of the child													
▪ Boys	19	12	63.3	5	26.3	11	57.9	5	26.3	2	10.5	0	0.0
▪ Girls	12	8	66.6	2	16.7	9	75.0	4	33.3	2	16.6	0	0.0
GMA[#]													
Total	**39**	**22**	**56.5**	**13**	**33.4**	**17**	**43.6**	**8**	**20.5**	**13**	**33.3**	**2**	**5.2**
Age of child													
▪ 3-11	14	4	28.6	3	21.4	7	50.0	3	21.4	0	0.0	0	0.0
▪ 12-24	25	18	72.0	10	40.0	10	40.0	4	16.0	13	52.0*	2	8.0
Sex of the child													
▪ Boys	25	15	60.0	7	28.0	9	36.0	4	16.0	9	36.0	2	8.0
▪ Girls	14	7	49.9	6	42.8	8	57.1	4	28.5	4	28.5	0	0.0

*p<0.05, All other values GMP vs. GMA: NS
GMP[@]: Grandmother present, GMA[#]: Grandmother absent.
1: as %NCHS standards (1983)

Figure 4.4 Husband's Support for Child Care and House Work



However, husbands' help was relatively less in tasks like purchase of daily food items, in feeding the child and keeping the child clean. Overall, more than half of the husbands helped in 3 or less of household and child Care tasks and only 34% helped in 4-5 tasks. Further, a significantly higher proportion of husbands with boy child helped the mother in 4-5 tasks out of 5 as compared to those with girl child (45 % vs. 17%, $p<0.01$).

Overall, almost three fourth of the mothers reported that they got adequate family support (especially husband, mother-in-law) for child Care.

Influences on Mother's Decision Regarding IYCF

Table 4.19 highlights various influences within and outside the family that affected child feeding practices by mother. Mothers received advice to feed prelacteals to the child from their own mothers (42%), ANM (26%) and mother-in-law (14%). Only a few mother-in-laws advised their daughter-in-laws to initiate the good practice of feeding colostrum as compared to higher percentage who advised for the inappropriate practice of feeding prelacteals to child. However, according to the mothers decision regarding initiation of breastfeeding, water feeding, top milk and complementary feeding were taken mainly by them. Although mother-in-laws did not emerge as the major source of recommending IYCF practices, according to majority of the mothers family elders were their source of knowledge about child feeding practices.

Table 4.19 Advice Received by Mother Regarding IYCF

Item	Total		Boys		Girls	
	N = 106		N = 65		N = 41	
	n	%	n	%	n	%
Mother was advised to give prelacteals by						
▪ MIL	6	14.0	3	12.5	3	15.8
▪ Mother	18	41.9	9	37.5	9	47.4
▪ Dai/ANM	11	25.5	7	29.16	4	21.05
Mother was advised to feed colostrum by						
▪ Self	8	15.1	4	11.1	4	23.5
▪ MIL	4	7.5	4	11.1	0	0.0
▪ Doctor	7	13.2	5	13.9	2	11.9
▪ Nurse	16	30.18	12	33.3	4	23.5
Mother was advised to initiate breastfeeding at certain interval by						
▪ Self	37	34.9	20	30.8	17	41.5
▪ Doctor	25	23.6	15	23.1	10	24.4
▪ ANM/nurse	20	18.9	13	20.0	7	17.1
Mother was advised to initiate water feeding at certain age by						
▪ Self	60	58.3	37	58.7	23	57.5
▪ MIL	13	12.6	10	15.9	3	7.5
▪ Doctor	9	8.7	3	4.8	6	15.0
Mother was advised to feed top milk by						
▪ Self	37	72.5	24	72.7	13	72.2
▪ MIL	5	9.8	3	9.1	2	11.1
Mother was advised to initiate CF by						
▪ Self	61	70.9	33	63.5	28	82.4
▪ MIL	8	9.3	6	11.5	2	5.9
Mother's source of knowledge about child feeding practices						
▪ Elders	42	48.8	24	36.9	18	43.9
▪ Doctor	11	12.8	5	7.7	6	14.6
▪ Friends	14	16.3	11	16.9	3	7.3

Selected responses (more frequently occurring responses) are given hence % may not add up to 100, Base N from which percentage values have been calculated varies and depends on presence of the practice

Other Factors Influencing IYCF Practices

Besides grandmother's support, **Table 4.20** presents some other factors significantly influencing child Care practices in the pooled sample of GMP and GMA children ($p<0.05$):

- Delayed initiation of complementary feeding seen in larger vs. smaller family (≤6 members: 87%, >6 members: 13%).

Table 4.20 Various Factors Influencing IYCF Practices Among Children (Pooled Data of Children with Grandmother Present and Grandmother Absent)

Item	IYCF practices (N=70)											
	Not feeding prelacteals (N=42)		Feeding colostrum (N=34)		EBF 4-6 mths (N=15)		CF at 6 mths (N=15)		Active feeding (N=20)		CF same as before when child is ill (N=11)	
	n	%	n	%	n	%	n	%	n	%	n	%
Family members (number)												
▪ ≤6	28	66.7	22	64.7	8	53.3	13	86.7*	14	70.0	9	81.8
▪ >6	14	33.2	12	35.3	7	46.7	2	13.3*	6	30.0	2	18.2
Per capita income (Rs)												
▪ ≤200	7	16.7	9	26.5	2	13.3	2	13.3	6	30.0	3	27.3
▪ >200	35	83.3	25	73.5	13	86.7	13	86.7	14	70.0	8	72.7
Mother's education (yrs)												
▪ <5	18	42.9	14	41.2	11	73.3*	3	20.0	5	25.0	1	9.1*
▪ ≥5	24	57.1	20	58.8	4	26.7*	12	80.0	15	75.0	10	90.9*
Mother's BMI												
▪ <18.5	22	52.4	20	58.8	9	60.0	11	73.3	13	65.0	6	54.5
▪ ≥18.5	20	47.6	14	41.2	6	40.0	4	26.7	7	35.0	5	45.5
Father's education (yrs)												
▪ ≤7	15	35.7	8	23.5*	6	40.0	4	26.7	6	30.0	3	27.3
▪ >7	27	64.3	26	76.5*	9	60.0	11	73.3	14	70.0	8	72.7
Parity												
▪ First	7	16.7	7	20.6	1	6.7	2	13.3	7	35.0	4	36.4
▪ Other	35	83.3	27	79.4	14	93.3	13	86.7	13	65.0	7	63.6
Sex of child												
▪ Boy	28	66.7	23	67.6	11	73.0	9	60.0	11	55.0	6	54.5
▪ Girl	14	33.3	11	32.4	4	26.7	6	40.0	9	45.0	5	45.5

*Mother's education vs. EBF and CF same as before when child is ill: $p<0.05$,
*Father's education vs. feeding colostrum: $p<0.05$
*Number of family members vs. initiating CF at 6 months: $p<0.05$, All other values: NS
Base N from which percentage values have been calculated varies and depends on presence of the practice

- Educated mothers tended to not withhold complementary foods and continued normal feeding practices during diarrhoea episode vs. less educated mothers (≥5 years education: 91%, <5 years education: 9%).
- Families with educated fathers had a positive effect on feeding colostrum.
- Surprisingly, less educated mothers showed higher prevalence of exclusive breastfeeding (4-6 months) compared to better educated mothers (<5 years education: 73%, ≥5 years education: 27%).

Other factors (e.g. per-capita income, body mass index of mother, birth order and sex of child) were not found to have a significant association with the indicators of child feeding and child Care, in this sample.

Discussion

The present data thus shows that the resources available to the mother for Care giving, the **socio-economic resources** were inadequate in terms of living conditions, education and income of the family, which is also reported in other regions.

Mother's nutritional status and reproductive health

Good nutritional status of the mother is important for child Care and this relationship was also acknowledged by the mothers in present study. Unfortunately, most of the mothers were undernourished in terms of underweight (43%) and below normal BMI (57%). This prevalence of low BMI (<18.5) among the study women is more than the NFHS -3 survey (2005-2006) data of India (39%) as well as Gujarat (42%). Another study in rural Vadodara also reported 62% mothers (children 3-36 months) having BMI<18.5 (Kanani and Gadre 2003).

Early marriages were common in the present study, with 47% reporting marriage at 16 years or less. However, more than half mothers reported their first pregnancy at 20 years or less. Similarly findings have been reported in the NFHS–3 survey (2005-2006) in rural India and Gujarat with 52% and 38% women being married by 18 years and median age at birth of first child being 19 and 20 years respectively. A study carried out in families with children 6-36 months in rural Vadodara also reported early

age of marriages (16 years or less: 57%) and child births (less than 18 years: 40%) (Kanani and Gadre 2003). Early marriages and early pregnancy may compromise the ability of the mother to give adequate Care to the child, which is required to achieve optimal health.

Mother's role in decision making

As regards decision making in the family, most of the mothers had a major say in decision related to family meals (if the grandmother was not present) and food distribution in the family. Decisions related to schooling of the children, family purchases and treatment for ill child were taken by a similar percentage of either father alone or in consultation with mother. Mothers of boy children had greater say in decision related to family meals, major purchases and schooling of children. Kanani and Gadre in 2003 reported similar results in rural Vadodara, here mother-in-law and father-in-law had a say in decisions related to household purchases. Another study carried out in urban Vadodara slums (Kanani and Gupta 2001) indicated that most urban women themselves (70-80%) decided about family meals, this percentage is more than the rural study. However, other decisions were jointly taken by the women and other family members even in urban area. They also reported that mothers of boy children in both rural and urban areas had a greater say in decisions regarding schooling of children, major family purchases and treatment of child's illness. In rural Chad, 74% mothers were involved (alone or with another family member usually father) in decisions regarding child's feeding (Begin et al 1999). In Haiti majority of women (with children 6-47 months) indicated that they were involved in most household decisions, such as child rearing and buying important items for the household. Further, a majority reported freedom to make a number of purchasing decisions, especially those related to daily food purchases and small items for themselves. Fewer women, however, indicated having the freedom to buy clothes or medicines for themselves and their children (Menon et al 2003).

Even in female headed households (husband away for work) in rural (n=6 villages) western Kenya, women had less control over household purchases and the absent

husband continued to make many of the financial decisions. However, women had day-to-day autonomy in decisions making, which might influence their children (6-36 months) (Onyango et al. 1994).

Grandmother's support to mother for child care and house work

The present study revealed that unfortunately a large proportion of rural mothers irrespective of grandmother's presence did not practice desirable child feeding behaviours. However, a few IYCF practices were more likely to be followed if grandmother was present.

Family support (especially from elderly female relatives like the grandmother of the child) is believed to be important for enabling the mother to follow the recommended IYCF practices. The presence of the grandmothers in this study appeared to significantly favour some desirable practices such as active feeding of complementary foods (52% GMP vs. 19% GMA children) and utilization of anganwadi services (88% GMP vs. 32% GMA children). Infact it was observed that most of the grandmothers helped the mother more in child Care activities and less in household work (playing with the child, keeping the child clean and feeding him/her). An important trend seen was that more the number of tasks in which the grandmother helped the mother, more were the child caring behaviours practiced by the mothers. This could be one reason why calorie intake of the 6-11 month olds (the group being initiated to CF) was higher in GMP group, as seen earlier.

The unsatisfactory IYCF practices which appeared to be encouraged in grandmother's presence were feeding prelacteals, delaying the initiation of complementary foods and decreasing breastfeeding during mother's illness. A likely reason was that most grandmothers themselves believed in the deleterious practices. Further, our observations showed that even in the presence of the grandmother, the parents themselves had a significant say in several areas of decision making on child Care and child feeding. Similar to present findings, according to another study of grandmothers in Vadodara most grandmothers had inadequate child feeding knowledge and thought

that prelacteal feeding was necessary for the child, water feeding should be initiated by 1-3 months, child should not be breastfed during mother's illness and most also reported passive feeding behaviours. However, grandmothers were of immense help with regard to child Care activities (Kanani and Gadre 2003).

The influence of grandmothers on child Care and nutritional status varies among different cultural settings. In rural Bolivia, the attitudes of the infant's grandmother towards breastfeeding did not influence the infant feeding pattern (Ludvigsson 2003). In contrast, Asian-Indian American mothers relied more on support of the grandmother for feeding during the infant's first 6 months of life (Kannan et al 1999). Preliminary findings of an intervention study carried out by Christian Children's Fund (international NGO) with the Ministry of Health in two rural districts in the Thies region in Senegal revealed that grandmothers supervised all maternal and child health practices within the family and were directly involved in caring for young children on a daily basis (Aubel 2002).

In another study on infants (upto 24 months age) of low income adolescent African-American mothers, maternal grandmother's advice on feeding played a dominant role in deciding what the infant should eat and the timing of introduction of solid foods. Reasons given for this included a desire to avoid confrontation and a belief that their mothers knew more than they did (Bentley et al 1999). In rural Chad more than half of the mothers (having children 12-71 months) were helped usually in preparation of meals; fetching water or wood were other activities where some help was received (Begin et al 1999).

Nutritional status and diet intake of children with grandmother present and absent: Overall, in this research, grandmother's presence did not influence the nutritional status and diet intake of the children as both GMP and GMA children were undernourished (WAZ < –2SD: 64% GMP, 56% GMA; HAZ <-2SD: 61% GMP, 44% GMA) and under fed (median calorie intake as % RDA: 36% GMP, 35% GMA). Also there was no significant association between the number of child Care tasks performed

by grandmother and child's nutritional status (WAZ, HAZ) as well as calorie intake. However, Begin et al (1999) reported that Caregivers in rural Chad who received more help (atleast 2 tasks) to accomplish their domestic or productive tasks had taller children (p=0.008); the number of tasks for which Caregivers received assistance was more important than the task itself. Further, seeking older women's advice during child's illness also had positive influence on child height-for-age.

In Jamaica (Kerr et al 1978) and Nigeria (Morley et al 1968), Caregivers who received less support from the family had malnourished children than Caregivers who received assistance. A study in 2 villages of Gambia revealed that presence of maternal grandmother had beneficial effects on child's (0-59 months) nutritional status and mortality. However paternal grandmothers and male kin had negligible impact. Children without maternal grandmothers were 1.7 times more likely to die than children with maternal grandmothers. The absence of a maternal grandmother resulted in lower anthropometric status of children (height, weight and haemoglobin), especially around the time of complementary feeding (Sear et al 2000). However, Hill & Hurtado (1996) found no difference in child survival rates between children with or without grandmothers. According to Begin et al (1999) family or social support may provide some buffer mechanisms against adverse conditions usually associated with child malnutrition.

In addition to grandmother's presence other socio-demographic factors like family size, mother and father's education also significantly influenced Caregiving behaviours. like feeding colostrum, exclusive breastfeeding, initiation of complementary feeding and feeding during illness.

Husband's support to the mother

Majority of fathers played with their children and took the child for treatment when ill. But only around half the fathers helped in feeding the child and purchase of household items. Fewer fathers helped the mother in more child Care and household tasks (34%: 4-5 tasks), help being more where boy child was present. Similar results

were reported in urban and rural studies carried out in families with young children (3-36 months) in Vadodara (Kanani and Gupta 2001, Kanani and Gadre 2002).

Summing up the above sections, family support, especially the grandmother's role appears to be important for child malnutrition control and needs further study.

Prevalence of Morbidity Among the Children

Table 4.21 gives the morbidity profile of the children. More than half of the children had suffered from some form of illness; two weeks prior to the interview. Among these children the proportion of boys (65%) was higher than girls (51%). The most common illness was cold/cough (73%), followed by fever (38%) and diarrhoea (25%). The prevalence of diarrhoea was least as compared to other illnesses, however, more than three fourth of the mothers perceived it to be severe. For curing of their child's illness a majority of the mothers had reportedly sought treatment from the doctor. Some mothers had also tried home remedy especially for diarrhoea.

According to the mothers, above half of the children experienced morbidity during teething and in majority of cases it was a combination of diarrhoea/vomiting and fever. Few of the superstitious mothers had tied a black thread ('*Dant patta*') to the child as a cure for illness during teething. Most mothers considered illness during teething (especially diarrhoea) to be a normal part of development of a child.

Table 4.21 Morbidity History of the Child

Item	Total N = 106		Boys N = 65		Girls N = 41	
	n	%	n	%	n	%
The child fell ill during previous 15 days						
▪ Yes	63	59.4	42	64.6	21	51.2
▪ No	43	40.6	23	35.4	20	48.8
If yes, type of illness						
▪ Fever	24	38.1	15	35.7	9	42.9
▪ Cold/cough	46	73.0	33	78.6	13	61.9
▪ Diarrhoea	16	25.4	9	21.4	7	33.3
Perceived severity of fever						
▪ Severe	12	50.0	8	53.3	4	44.4
▪ Not severe	12	50.0	7	46.7	5	55.6
Perceived severity of cold/ cough						
▪ Severe	26	56.5	19	57.6	7	53.8
▪ Not severe	20	43.5	14	42.4	6	46.2
Perceived severity of diarrhoea						
▪ Severe	12	75.0	8	88.9	4	57.1
▪ Not severe	4	25.0	1	11.1	3	42.9
Treatment given: Doctor's medicine						
▪ Fever	22	91.7	13	86.7	9	100
▪ Cold/cough	35	76.1	26	78.8	9	69.2
▪ Diarrhoea	11	68.8	8	88.9	3	42.9
Child experienced illness during teething						
▪ Yes	51	56.0	32	58.2	19	52.8
▪ No	40	44.0	23	41.8	17	47.2
Type of illness during teething:						
▪ Diarrhoea/ vomiting	40	78.4	23	71.9	17	89.5
▪ Fever	11	21.6	9	28.1	2	10.5
▪ Cold	4	7.8	3	9.4	1	5.3
Treatment given in illness during teething						
▪ Taken to doctor	35	68.6	22	68.8	13	68.4
▪ Tied black thread	13	25.5	2	33.3	11	24.4
▪ No treatment	9	17.6	6	18.8	3	15.8

In some sections, several responses are multiple responses hence the percentage may exceed 100, Base N from which percentage values have been calculated varies and depends on presence of the illness.

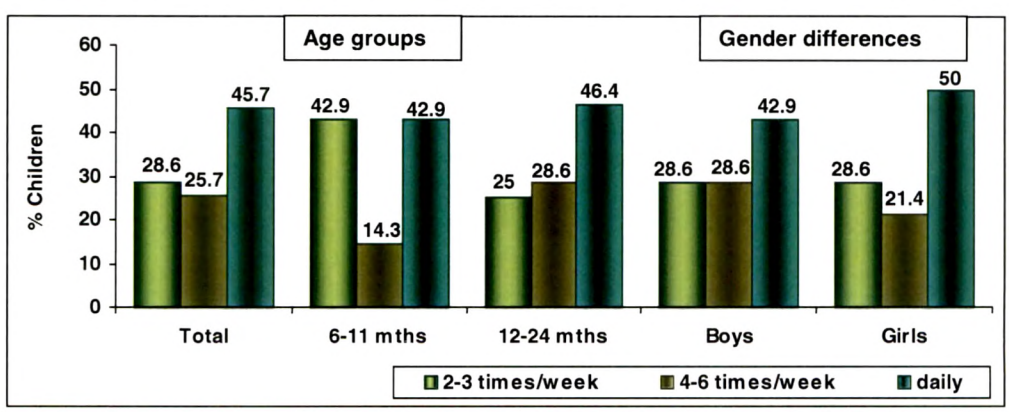
Dietary and Nutrient Intake of the Children

The intake of complementary foods in terms of frequency and mean intake of various food groups and nutrient intake from the 24-hour dietary recall are presented below. As explained in methods and material chapter, this data, was collected from half of the children (n=53) from the total sample and compared with the appropriate RDAs as already described.

Frequency of Intake of Protective Foods

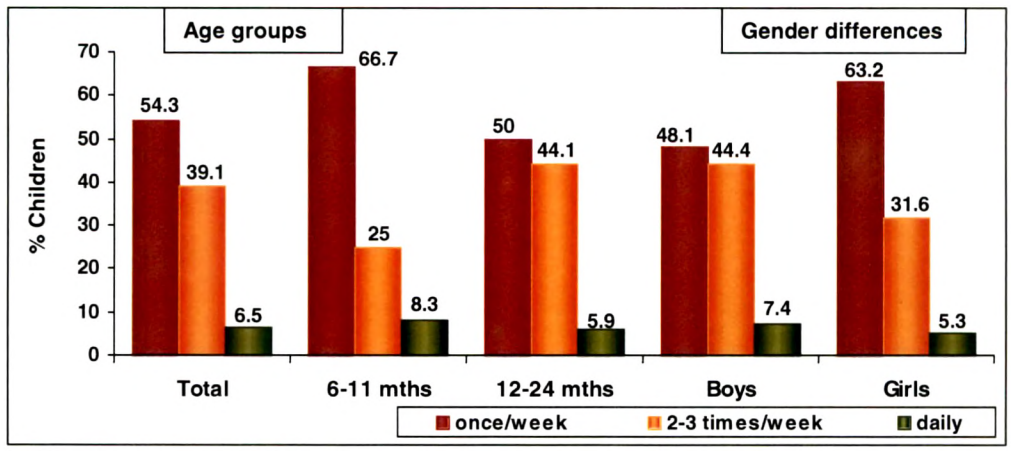
Only two third mothers reported to feed vegetables to the children. Among these the percentage of the children 12-24 months old (72%), was higher than children 6-11 months old (50%). It has been stated earlier that mothers avoided giving certain vegetables to their children fearing it would cause *'varadh'* (respiratory problem which could be similar to pneumonia). Only about half the children had daily intake of vegetables and the remaining consumed vegetables less frequently (**Figure 4.5**). Higher proportion of children in the younger age group (6-11 months) had the lowest frequency of vegetable intake i.e. only 2-3 times/week as compared to children in older age group (12-24 months). One possible reason for this age wise difference could be higher avoidance of certain fruits and vegetables for the younger children as compared to the older children, which has been reported earlier. As regards gender differences, more girls than boys had daily vegetable intake but the differences were not significant.

Figure 4.5 Frequency of Intake of Vegetables Among the Children (N=53)



The proportion of children fed fruits at 87%, was better than vegetable intake data. However, as **Figure 4.6** indicates, the frequency of consumption was poor, as more than half of the children consumed fruits only once a week and very few had daily fruit intake. As regards age wise and gender differences, younger children and girls consumed fruits less frequently as compared to older children and boys respectively. However these differences were insignificant.

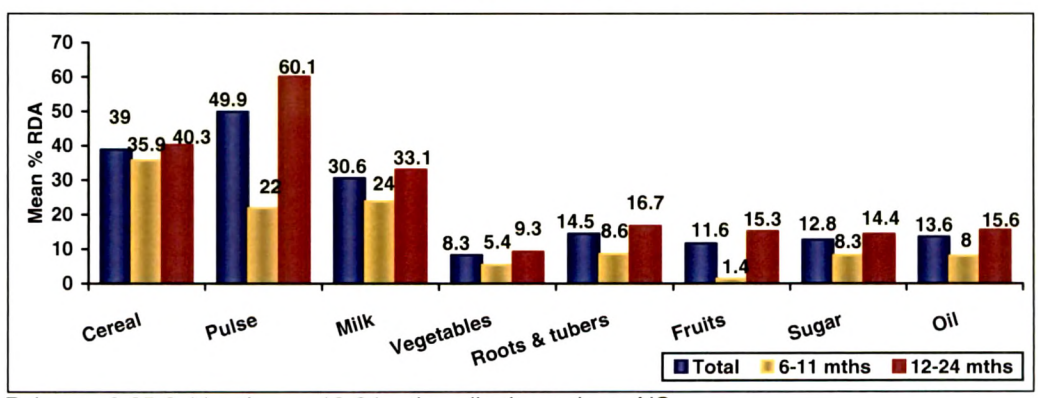
Figure 4.6 Frequency of Intake of Fruits Among the Children (N=53)



Mean Food Intake

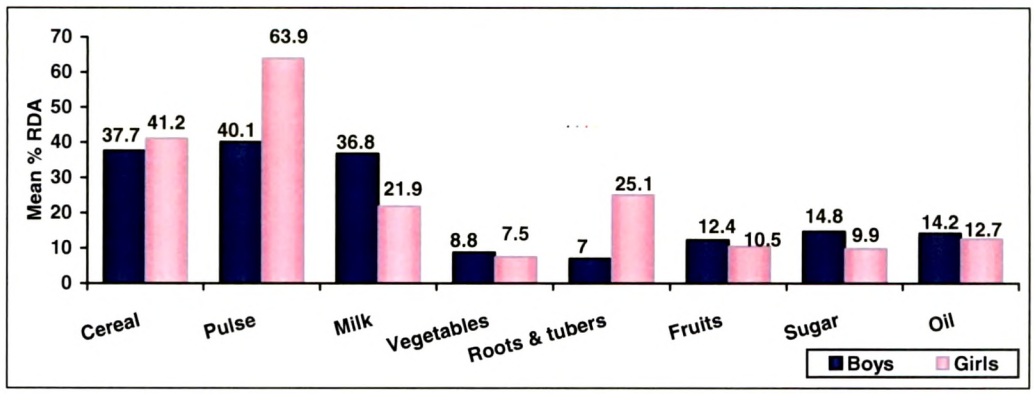
The mean dietary intake of various food groups as % RDA, is presented in **Figure 4.7**. The intake of various food groups met less than 50% of the RDA, except for pulse intake. Cereal and milk intake was only about one third of the RDA and pulse intake was just about 50% RDA. The intake of vegetable, roots – tubers, fruits, sugar and oil was dismally i.e. less than 20%. While not much age difference was seen for the other foods, for pulse the intake of older children (12-24 months) was significantly higher than younger children (6-11 months).

Figure 4.7 Intake of Various Food Groups Among the Children (N=53) as Mean %RDA



Pulse: p<0.05 6-11 mths vs. 12-24 mths, all other values: NS

Figure 4.8 Intake of Various Food Groups Among Boys (N=31) and Girls (N=22) as Mean %RDA



The consumption of various foods did not vary significantly among boys and girls though a trend of higher pulse intake by girls was seen (**Figure 4.8**).

Nutrient Intake

Table 4.22 summarizes the mean intake of selected nutrients. The mean intake of calories was found to be low (about 60% of RDA) suggesting that inadequate amount of complementary foods was consumed. However, the protein intake was found to be higher. The mean intake of calcium and iron was low, meeting about one fourth and one-third the RDA. Intake of vitamin A and C was the most deficient (only 11% and 18% of RDA). The poor intake of micronutrients was probably due to the deficient intake of fruits and vegetables as indicated earlier (**Figure 4.7**).

The older children (12-24 months) were consuming significantly higher amount of many nutrients than younger children (6-11 months) and the intake as percent RDA was also higher compared to the younger children. Boys had higher intake of vitamin A and vitamin C (% RDA) as compared to girls but the gender differences were not significant (**Table 4.23**).

The mean and median values for many nutrients differ for many nutrients indicating wide variations in complementary food intake and possibly inaccurate recall by the

mothers. Nevertheless, the overall trend clearly reveals the extremely inadequate quantity and quality of complementary food consumed by the young children.

Table 4.22 Mean Nutrient Intake of the Children

Nutrient	Total (N=53)		Age of the children				t value
			6-11 months (N=14)		12-24 months (N=39)		
	Mean ± SE	Median	Mean ± SE	Median	Mean ± SE	Median	
Energy (Kcal)	350.1 ± 32.3	346.0	150.1 ± 37.8	105.0	416.7 ± 35.3	393.0	4.1***
Protein (gm)	9.1 ± 0.9	7.0	4.8 ± 1.3	2.5	10.8 ± 1.8	9.0	3.25**
Calcium (gm)	113.6 ± 15.6	80.0	66.4 ± 29.7	14.0	130.6 ± 17.8	107.0	1.85^{NS}
Iron (mg)	2.6 ± 0.2	2.0	1.5 ± 0.2	1.0	3.1 ± 0.3	3.0	3.08**
Vitamin A (µg)	44.2 ± 8.6	27.5	48.0 ± 18.7	48.0	43.4 ± 9.7	43.4	0.20^{NS}
Vitamin C (mg)	6.1 ± 1.3	3.0	3.0 ± 1.0	2.0	6.7 ± 1.6	3.0	1.02^{NS}
Mean Nutrient Intake (% RDA)							
Energy	57.6 ± 5.1	44.0	55.3 ± 2.6	35.0	58.4 ± 5.5	46.0	0.26^{NS}
Protein	70.3 ± 7.0	61.0	51.0 ±13.6	29.0	78.0 ± 7.9	64.0	1.76^{NS}
Calcium	25.1 ± 3.4	19.0	16.7 ± 7.4	4.0	28.1 ± 3.7	22.5	1.50^{NS}
Iron	33.9 ± 3.7	28.0	16.0 ±2.5	14.0	40.7 ± 4.6	34.0	3.21*
Vitamin A	11.1 ± 2.1	7.0	12.1 ± 4.7	9.0	10.8 ± 2.4	7.0	0.22^{NS}
Vitamin C	17.6 ± 3.7	9.5	9.2 ± 3.4	5.0	19.2 ± 4.4	11.0	0.99^{NS}

*p<0.05, **p<0.01, ***p<0.001, NS: non significant

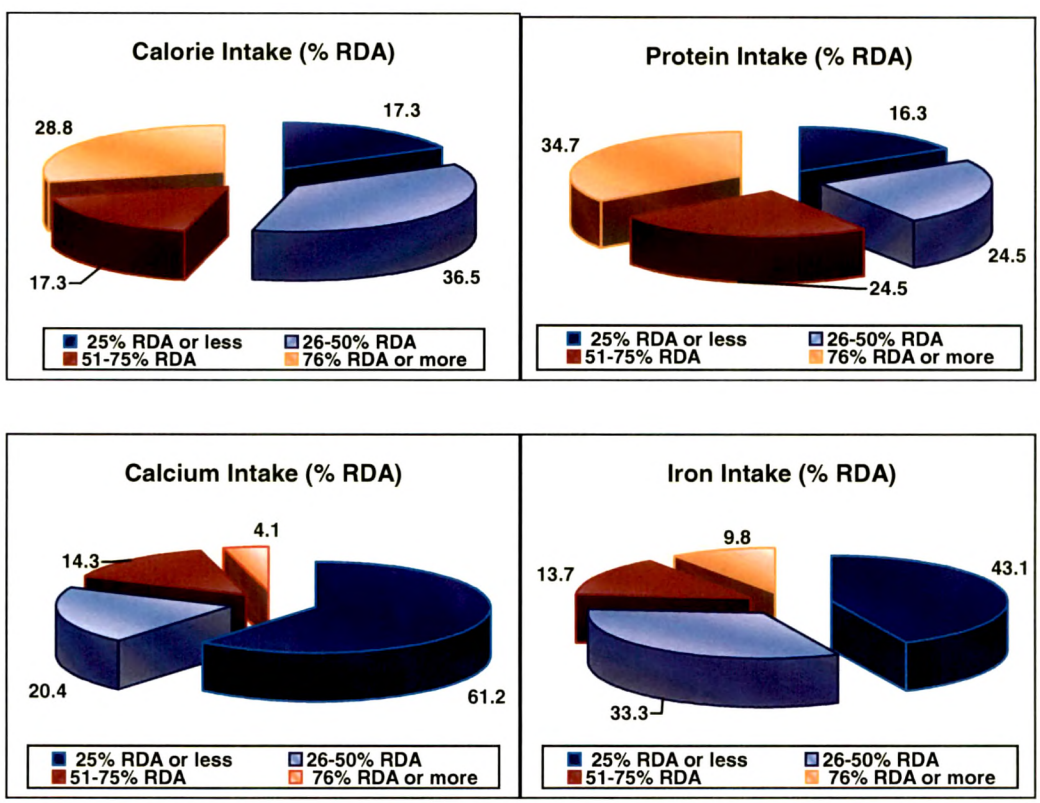
Table 4.23 Mean Nutrient Intake of Boys and Girls

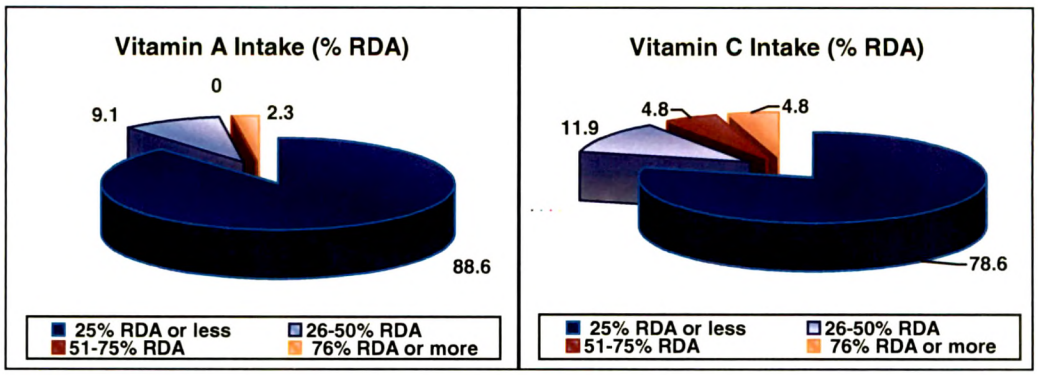
Nutrient	Boys (N=31)			Girls (N=22)		
	Mean	SE	Median	Mean	SE	Median
Energy (Kcal)	365.2	± 48.2	321.5	329.5	± 39.6	375.0
Protein (gm)	8.7	± 1.2	7.0	9.5	± 1.4	9.0
Calcium (gm)	109.0	± 18.3	96.0	119.1	± 27.1	70.0
Iron (mg)	2.7	± 0.3	2.5	2.6	± 0.4	2.0
Vitamin A (µg)	49.9	± 12.9	28.0	34.3	± 6.9	25.0
Vitamin C (mg)	7.7	± 2.2	4.0	3.9	± 1.1	2.0
Mean Nutrient Intake (% RDA)						
Energy	56.0	± 7.1	45.0	59.9	± 7.4	35.0
Protein	66.2	± 8.9	62.5	75.7	± 11.5	56.0
Calcium	24.3	± 4.1	20.0	26.0	± 5.7	17.0
Iron	32.7	± 4.7	27.5	35.6	± 6.1	28.0
Vitamin A	12.5	± 3.2	7.0	8.5	± 1.7	6.5
Vitamin C	21.8	± 5.9	13.0	11.9	± 3.4	5.5

The Nutrient Intake at Various Levels of Recommended Dietary Allowances

Figure 4.9 presents the intake of various nutrients at various levels of RDA. The calorie intake of above one third children was between 26-50% RDA. As regards protein intake, 16% of the children met between 25% of the RDA or less and another one fourth met 26-50% of the RDA. For calcium and iron, only upto one fourth the RDA was met. Further, the intake of vitamin A and C was poor (≤25% RDA) by a majority of the children.

Figure 4.9 Percent Children Who Met Various Level of % RDA (N=53)





Nutritional Status of the Children

Presented below are the results of the nutritional status of the children expressed in terms of mean weight and height measurements, prevalence of malnutrition by IAP classification and weight-for-age, height-for-age and weight-for-height z scores.

Table 4.24 Weight and Height of the Children Compared with the NCHS[1] Standard

Characte-ristic	N	Weight (kgs)			Height (cms)		
		Mean ± SE	Median	% NCHS Standard Mean ± SE	Mean ± SE	Median	% NCHS Standard Mean ± SE
Total	102	7.9 ± 0.2	7.7	77.8 ± 1.4	71.8 ± 0.6	71.3	92.3 ±0.5
Age (months)							
▪ 3–11	35	7.0 ± 0.2	7.0	85.2 ± 2.5	65.5 ± 0.6	65.5	94.4 ±0.8
▪ 12–24	67	8.4 ± 0.2	8.5	73.9 ± 1.4	75.0 ± 0.6	75.0	91.2 ±0.6
t value		5.1***		4.2***	9.7***		2.9**
Sex							
▪ Boys	64	8.2 ± 0.2	8.0	78.8 ± 1.7	72.7 ± 0.8	73.0	92.6 ±0.6
▪ Girls	38	7.4 ± 0.2	7.5	76.1 ± 2.3	70.1 ± 1.0	70.0	91.8 ±0.9
t vlaue		2.9**		0.9^{NS}	1.9^{NS}		0.8^{NS}

**p<0.01, ***p<0.001, NS: non significant, 1: National Center for Health Statistics (1983)

Mean Weight and Height

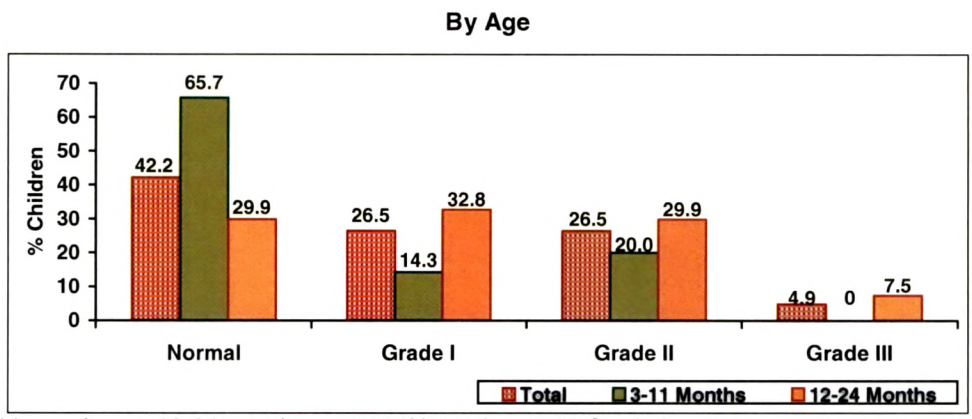
Table 4.24 summarizes the weight and height data of the children. The mean weight of the children was 78% of the NCHS standards and the mean height was meeting more than 90% of the standards. With increase in age, the prevalence of malnutrition increased; older children having significantly lower mean weight and height (as

compared to the standards) than younger children. As regards gender differences, boys were better nourished than girls having significantly higher mean weight than girls.

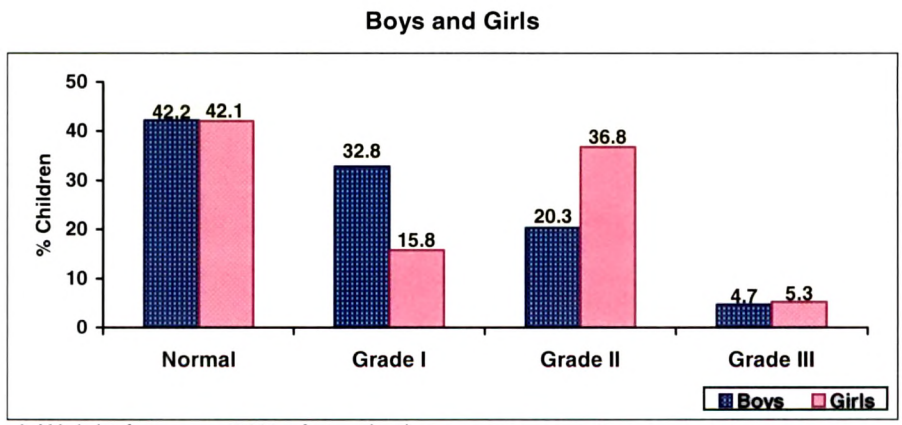
Prevalence of Malnutrition by IAP Classification

Figure 4.10 presents the grading of malnutrition based on the IAP classification. Unfortunately only 42% of the children were normal by weight-for-age. Among the undernourished, a similar proportion of children (26 %) were in grade I and grade II while very few children were in grade III of malnutrition (5 %).

Figure 4.10 Grading of Malnutrition Based on Weight-for-Age IAP Classification[1] (N=102)



3-11 months vs. 12-24 months: p<0.001Normal, p<0.05 Grade I



[1]Normal: Weight-for-age > 80% of standard
Grade I: Weight-for-age 71-80% of standard
Grade II: Weight-for- age 61-70% of standard
Grade III: Weight-for- age 51-60% of standard

Prevalence of underweight was higher among the older children as indicated by significantly lower proportion of older children in normal grade (30%) as compared to younger children (66%). This indicates deterioration of nutritional status as child entered first and second year of life. Although more girls were in grade II and III of malnutrition as compared to boys, the differences were insignificant.

Weight-for-Age (WAZ) Z score

As **Table 4.25** reveals, more than half of the children were malnourished as analyzed by Weight-for-Age Z scores (WAZ< -2SD). Further, severe undernutrition (WAZ <-3SD) was present in more than one fourth of the children.

With the increase in age the prevalence and severity of undernutrition increased significantly. No significant gender differences were obtained. However, in the severe malnutrition (WAZ <-3SD) category, a higher number of girls were seen as compared to boys.

Table 4.25 Nutritional Status of Children by Weight-for-Age[1] (WAZ) Z Score Values (N=102)

Characteristic of the Child	Malnourished				Normal	
	WAZ (<-2 SD)		WAZ (<-3 SD)		WAZ (≥-2 SD)	
	n	%	n	%	n	%
Total	62	60.8	27	26.5	40	39.2
Age of the child (months)						
▪ 3-11 (N = 35)	12	34.3	4	11.4	23	65.7
▪ 12-24 (N = 67)	50	74.6	23	34.3	17	25.4
Chi-square	13.3**		6.2*		15.7***	
Sex of the child						
▪ Male (N = 64)	40	62.5	14	21.9	24	37.5
▪ Female (N = 38)	22	57.9	13	34.2	16	42.1
Chi-square	0.2[NS]		1.9[NS]		0.2[NS]	

*p<0.05, **p<0.01, ***p<0.001, NS: non significant
1: as %NCHS standards (1983)

Height-for-Age (HAZ) Z score

Table 4.26 indicates that more than half of the children were stunted (HAZ< -2SD) and almost one fourth suffered from severe stunting (HAZ <-3SD). Significantly more older children (12-24 months) were stunted as compared to younger children (3-11 months).

Twice the number of girl children (34%) were severely stunted (HAZ <-3SD) than boys (17%); though this difference was insignificant, perhaps because of the small sample size.

Table 4.26 Nutritional Status of Children by Height-for-Age[1] (HAZ) Z Score Values (N=102)

Characteristic of the Child	Malnourished				Normal	
	HAZ (<-2 SD)		HAZ (<-3 SD)		HAZ (≥-2 SD)	
	n	%	n	%	n	%
Total	55	53.9	24	23.5	47	46.1
Age of the child (months)						
▪ 3-11 (N = 35)	14	40.0	6	17.1	21	60.0
▪ 12-24 (N = 67)	41	61.2	18	26.9	26	38.8
Chi-square	4.16*		2.08 NS		4.16*	
Sex of the child						
▪ Male (N = 64)	34	53.1	11	17.2	30	46.9
▪ Female (N = 38)	21	55.3	13	34.2	17	44.7
Chi-square	0.04 NS		3.84 NS		0.04 NS	

*p<0.05, NS: non significant, 1: as %NCHS standards (1983)

Weight-for-Height (WHZ) Z score

Considering the prevalence of wasting (WHZ), about one fifth (22%) children were wasted (**Table 4.27**). The older children were almost six times more wasted as compared to younger children (WHZ <-2 SD: 31% vs. 6%). On comparing girls and boys, a similar prevalence was seen in nutritional status by WHZ.

Table 4.27 Nutritional Status of Children by Weight-for-Height[1] (WHZ) Z Score Values (N=102)

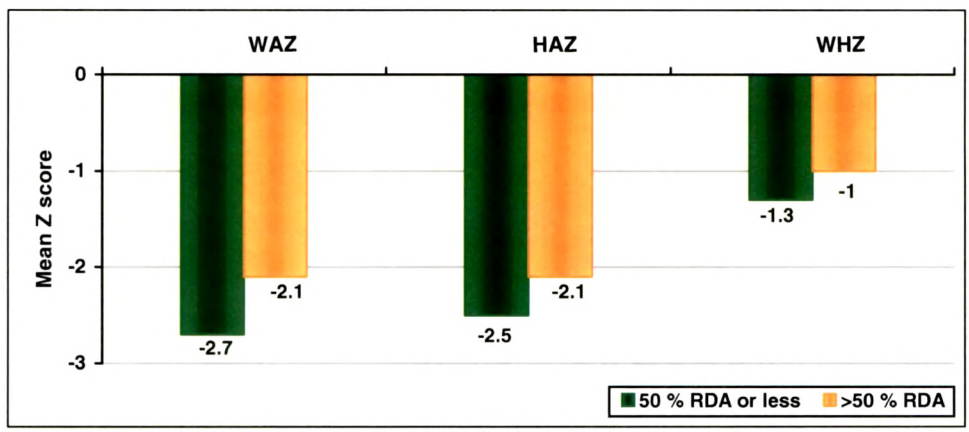
Characteristic of the Child	Malnourished				Normal	
	WHZ (<-2 SD)		WHZ (<-3 SD)		WHZ (≥-2 SD)	
	n	%	n	%	n	%
Total	23	22.5	4	3.9	79	77.5
Age of the child (months)						
▪ 3-11 (N = 35)	2	5.7	0	0.0	33	94.3
▪ 12-24 (N = 67)	21	31.3	4	6.0	46	68.6
Chi-square	8.7**		0.8		9.4**	
Sex of the child						
▪ Male (N = 64)	16	25.0	4	6.3	48	75.0
▪ Female (N = 38)	7	18.4	0	0.0	31	81.6
Chi-square	0.6 NS		1.1 NS		0.6 NS	

**p<0.01, NS: non significant, 1: as %NCHS standards (1983)

Relationship Between Child's Calorie Intake and Nutritional Status

Figure 4.11 establishes the importance of adequate food intake towards improved nutritional status of the child. Those children whose calorie intake was higher (> 50% of RDA) had significantly lower underweight (expressed by mean weight-for-age z scores) as compared to those who had lower calorie intake (≤ 50% of RDA). A similar relationship with calorie intake was observed for stunting and wasting; however, it was not significant.

Figure 4.11 Mean WAZ[1], HAZ[2] and WHZ[3] Z Scores of Children with Different Levels of Calorie Intake (N=50)



1: weight-for-age, 2: height-for-age, 3: weight-for-height
WAZ: p<0.05 ≤ 50% RDA vs. > 50% RDA, for HAZ and WHZ the relation is non significant

Do the Caregiving Behaviours Have an Influence on Child's Nutrient Intake?

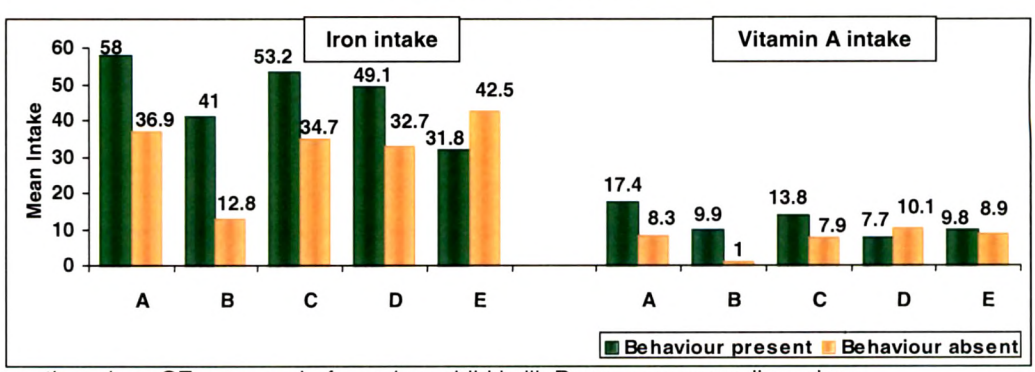
As **Table 4.28** shows, comparisons were also made between Caregiving behaviours and child's calorie intake (proportion meeting ≤50% RDA and >50% RDA) as well as micronutrient intake (mean iron and vitamin A intake). A higher intake of calories was significantly associated with the practice of giving special foods to the child. Other Caregiving behaviours did not significantly influence child's nutrient intake. This is perhaps because of the large variation in the amount of food offered to the children by the mothers and also methodological problems as regards measuring the correct amount of food given by the mother and consumed by the child.

Table 4.28 Association of Mother's Caregiving Behaviours with Child's Nutrient Intake

Caregiving Behaviour	Calorie intake			
	≤ 50% RDA		> 50% RDA	
	(N=28)		(N=25)	
	n	%	n	%
Mother gives complementary foods same as before when child is ill				
▪ Yes	1	3.6	4	16.0
▪ No	27	96.4	21	84.0
Uses anganwadi services				
▪ Yes	24	85.7	25	100.0
▪ No	4	14.3	0	0.0
Initiated CF at 6 months				
▪ Yes	8	28.6	3	12.0
▪ No	20	71.4	22	88.0
Gives special foods to child **				
▪ Yes	3	10.7	9	36.0
▪ No	25	89.3	16	64.0
Avoids certain foods to child				
▪ Yes	9	32.1	11	44.0
▪ No	19	67.9	14	56.0
Practices active feeding				
▪ Yes	10	35.7	8	32.0
▪ No	18	64.3	17	68.0

** giving special foods vs. calorie intake: p<0.01, all other Caregiving behaviours vs. nutrient intake: non significant association

Figure 4.12 Association of Mother's Caregiving Behaviours with Child's Micronutrient Intake



A: mother gives CF same as before when child is ill, B: uses anganwadi services,
C: gives special foods to child, D: avoids certain foods to child, E: practices active feeding

Similarly, **Figure 4.12** shows the comparison between Caregiving behaviours and child's micronutrient intake (mean iron and vitamin A intake). A trend was seen that

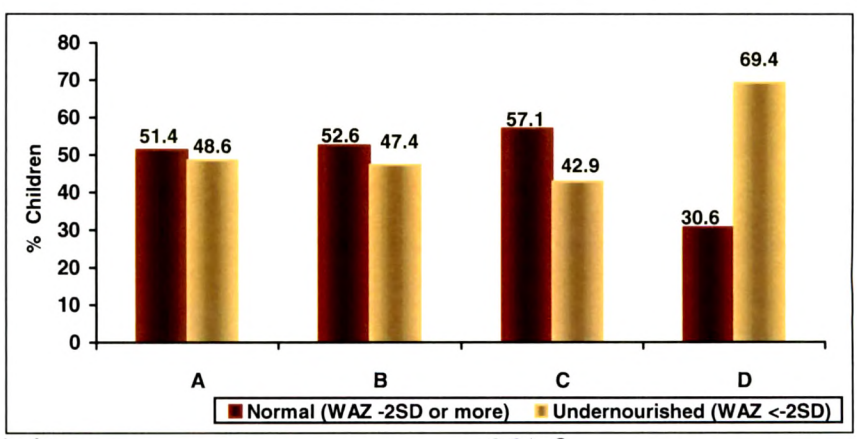
most of the positive Care practices were associated with higher mean intake of iron as well as Vitamin A as compared to the intake when inappropriate Care behaviours were present; though it was not significant

Do the Caregiving Behaviours Have an Influence on Child's Nutritional Status?

Figure 4.13 studies the association between Caregiving beahviours and child's nutritional status by comparing the proportion of mothers practicing the Caregiving behaviours between two groups- the group with normal nutrition status versus the undernourished group (by weight-for-age z score). A significantly higher proportion of children tended to have normal nutritional status if mother fed special foods to the child.

Other Caregiving beahviours did not show a significant relationship with weight-for-age. Nevertheless, it was observed that with higher proportion of positive Caregiving behaviours child's nutritional status was better.

Figure 4.13 Association of Mother's Caregiving Behaviours with Child's WAZ[1] Z Score



1:weight-for-age
A: mother breastfeeds the child same as before when ill,
B: mother breastfeeds the child same as before when child is ill
p<0.01: C
C: mother gives special foods to child
D: mother avoids certain foods to the child

Do the Resources of Care Have an Influence on Caregiving Behaviours and Child's Nutritional Status?

Table 4.29 presents the relationship between selected resources of Caregiving with mother's Caregiving behaviours and child's nutritional status (weight-for-age Z score and IAP classification).

Caregiving Behaviours

There was no significant relationship between mother's education and BMI with Caregiving behaviours of mothers. However, a non significant trend was seen that as the mothers decision making role, fathers education and help in household and child Care increased, the number of positive Caregiving behaviours also increased. Further in nuclear families mothers practiced more Caregiving behaviours as compared to joint families. It has also been reported earlier in **Table 4.20** that family size significantly influenced an important Caregiving behaviour: initiation of complementary feeding at 6 months.

Child's Nutritional Status

It was found that mothers with higher education and better BMI had a higher proportion of normal children than undernourished (by IAP classification). Similarly father's education was also positively linked with the nutritional status of the child.

The above results cumulatively indicate that mother's selected Caregiving behaviours (giving special foods to the child); positively influenced child's nutritional status and calorie intake. Further, positive Caregiving behaviours in turn appear to be significantly influenced by mother's education and nutritional status, as well as family support such as father's help, mother's freedom at decision making. This underlines the importance of strengthening the resources for Caregiving in particular mother's nutritional status and family support in order to increase Care behaviours and inturn child's nutritional status.

Table 4.29 Association of Selected Resources of Caregiving with Caregiving and Child's Nutritional Status

Resources of Caregiving	No. of Caregiving behaviours practiced by mothers (N=106)				Nutritional status by Weight-for-Age (N=102)							
					Z Score[1]				IAP Classification[2]			
	0-4 (N=74)		5-8 (N=32)		Normal (N=40)		Undern-ourished (N=62)		Normal (N=43)		Undern-ourished (N=59)	
	n	%	n	%	n	%	n	%	n	%	n	%
Mother's education (completed years)												
▪ ≤7	49	68.1	23	31.9	23	33.8	45	66.2	23	33.8*	45	66.2*
▪ >7	25	73.5	9	26.5	17	50.0	17	50.0	20	58.8*	14	41.2*
Mother's BMI												
Mean ± SE	18.9 ±0.4		18.1 ±0.4		19.5 ±0.5*		18.0 ±0.3*		19.5 ±0.5*		18.0 ±0.3*	
Mother has a say in decision making in family (no. of decisions)												
▪ 0 – 2	31	77.5	9	22.5	16	41.0	23	58.9	17	43.6	22	56.4
▪ 3 – 5	43	65.2	23	34.8	24	38.1	39	61.9	26	41.3	37	58.7
Father's education (completed years)												
▪ ≤7	24	77.4	7	22.6	10	34.5	19	65.5	10	34.5	19	65.5
▪ >7	50	66.7	25	33.3	30	41.1	43	58.9	33	45.2	40	54.8
Father helps in household tasks and/ child care												
▪ 0 – 2 tasks	29	74.4	10	25.6	19	50.0	19	50.0	19	50.0	19	50.0
▪ 3 – 5 tasks	45	67.2	22	32.8	21	32.8	43	67.2	24	37.5	40	62.5
Family type												
▪ Joint	50	72.5	19	27.5	26	39.4	40	60.6	29	43.9	37	56.1
▪ Nuclear	24	64.9	13	35.1	14	38.9	22	61.1	14	38.9	22	61.1

Z Score[1]
Normal: weight-for-age ≥ -2 SD, Undernourished: weight-for-age < -2 SD
IAP Classification[2]
Normal: weight-for-age > 80% of NCHS standard (median),
Undernourished: weight-for-age ≤80% of NCHS standard (median)
*Mother's education vs. weight-for-age (IAP classification): p<0.05
**Mother's BMI vs. weight-for-age (IAP classification and Z score): p<0.01

Discussion

This study thus highlights, the unsatisfactory nutritional status and diet intake of the children which is linked to poor Caregiving.

Prevalence of morbidity

The incidence of morbidity was high with more than half of the children reported to be suffering from some form of illness (cold/cough, fever, diarrhoea); 15 days prior to the interview. Among these children the proportion of boys was higher than girls. Most of the children were taken to the doctor for treatment. NFHS-3, India survey (2005-2006) is available and indicated that the prevalence of three most important childhood illnesses - acute respiratory infection (ART), fever and diarrhoea (past 2 weeks) was 6%, 15% and 9% respectively with about two third children being taken to health facility. In the case of diarrhoea, recommended guidelines like ORT, increased fluid intake and continued feeding was followed for very few children.

Rao et al (2000) in a longitudinal study of preschool children (n=845, 0-5 years) from slum communities in Pune, reported that gastrointestinal illness and fever contributed to half of total morbidity. Further morbidity was generally higher in rainy season and was associated with wasting and not stunting. Higher morbidity affected significantly growth velocities in weight throughout pre-school age. It has also been found that during illness, infants themselves limit food intake, possibly because of anorexia from infections (Molla et al 1983). Thus frequent incidence of morbidity can have detrimental effects on the food intake as well as growth of the children.

Dietary intake

Contrary to the recommendations of feeding vegetables and fruits to the child daily, the frequency of consumption of these protective foods was found to be very low. The mean intake of almost all food groups met less than half of the RDA; intake of vegetables and fruits being very low. The amount of different foods consumed by the older children was more than that in younger children, especially pulse intake. This deficient intake of different food groups was reflected in the mean nutrient intake of

the children who consumed inadequate amount of calories (<60% of RDA), calcium (25% of RDA), iron (34% RDA) and especially vitamin A and vitamin C (11% and 18% of RDA). Girls and boys did not differ as regards amount of foods and nutrients consumed.

Results regarding food and nutrient intake of the young children in the present study are similar to findings of studies carried out in different parts of the country. These have reported marked deficits in nutrient intake, particularly the energy and iron intake, compared to RDA's in early childhood years (NNMB 1991, ICMR 1977).

A study in poor community of North-East Delhi, investigating the dietary intake of 545 children (9-36 months) from 41 anganwadis of Delhi, found that the intake of cereals, pulses, roots, green leafy vegetables, other vegetables, fruits, sugar, fats and oils was grossly inadequate. The nutrient intake for energy and iron was 56% and 45% of the RDA. There was no significant difference in the food intake of boys and girls and also among children at 9-12 months and 13-24 months of age (Kapur et al 2005).

The diet of 150 rural preschool children (1-3 years) in Punjab was found to be imbalanced with plenty intake of milk – milk products and low intake of cereals, pulses and green leafy vegetables. While the intake of protein and fat was one and a half to two times of RDA (due to high milk – milk products intake) the intake of iron, ascorbic acid and niacin was inadequate (Grover and Singh 2006).

As regards influence of food intake on child's nutritional status, higher calorie intake was associated with better nutritional status as expressed by mean weight-for-age, height-for-age and weight-for-height z scores. The study of 9-36 months children in Delhi by Kapur et al (2005) reported low intake for most nutrients in the undernourished/ stunted group as compared to those in normal group with significant differences in the energy intake ($p<0.05$). Similar results were reported with regard to adequacy of energy, protein and calcium and degree of undernourishment among preschool children from rural areas of Mysore (A Jyothi et al 2005).

Nutritional status

More than half of the children in this study were underweight (weight-for-age <-2 SD) and stunted (height-for-age <-2 SD) and about one fourth were wasted (weight-for-height <-2 SD) indicating the poor state of nutritional status of the children.

Prevalence of malnutrition increased significantly with the increasing age from 3-11 months to 12-24 months. As regards gender differences, boys had significantly better mean weights than girls. Severe malnutrition was more in girls than boys.

In India almost half of the children under three years of age (46%) are underweight and 38% are stunted. Wasting is also quite evident, affecting 19% of children. In Gujarat, the prevalence of underweight (47%) stunting (42%) and wasting (17%) among children under 3 years is as high as the national average (NFHS-3, 2005-2006). While in rural Gujarat, nutritional status of children (below 3 years) by the same indicators is somewhat higher than the overall state figures (underweight 50%, stunting 46% and wasting 18%).

Studies have also noted that proportion of children who are undernourished increases rapidly with the child's age through age 12–23 months (Rao et al 2000, NFHS-2 1998-1999, Saxena et al 1997); perhaps because of cumulative detrimental effect of poor diets and infections. There are marginal differences between girls and boys as regards nutritional status (NFHS-3 2005-2006). In this study however, girls tended to be more malnourished than boys.

A multi indicator cluster survey carried out in urban slums of Vadodara (2001) revealed that 49% of the children under five years were stunted and 17% were wasted. The prevalence of malnutrition by above indicators was higher among the children in the present study.

Association of Caregiving behaviours with child's nutritional status and nutrient intake

Many Caregiving behaviours in this study were positively associated with child's weight-for-age. Some behaviours like giving special foods to the child significantly influenced adequate nutritional status of the children as well as intake of calories. Similar relationships have been observed elsewhere.

In Bangladesh important Caregiving behaviours contributing to positive nutrition deviance (best growth) among children 6-18 months were: feeding colostrum, introduction of complementary food after four months, including food items from family pot and preparing food items specially for the child (Range et al 1997).

Aneja et al (2001) in slum communities of Delhi found a positive relation between mean weights of children (n=114, 6-<12 months, attending MCH clinic) and desirable breastfeeding and complementary feeding practices of mother like feeding of colostrum, exclusive breastfeeding (6 months), timely introduction of semi-solid and solid foods, non dilution of top milk and avoiding bottle feeding.

Studies in urban Vadodara have also reported that Caregiving behaviours (continued breastfeeding and active feeding) were significantly associated with higher calorie intake (Kanani and Gupta 2002). Further a significantly higher proportion of children tended to be better nourished (by weight-for-age) if mother currently breastfed the child, practiced active feeding, made use of anganwadi services (Kanani and Gupta 2002, Srivastava and Sandhu 2005).

Association of resources of Caregiving with Caregiving and child's nutritional status

It was found here that mother's years of education and BMI was significantly associated with child's weight-for-age. This reveals the importance of mother's knowledge and nutritional status in better nourishment of children. A trend was seen that with presence of nuclear families, greater role of mother in decision making and

higher education of fathers and help in household and child Care, the number of desirable Caregiving behaviours increased.

Other studies have also reported a link between maternal and social characteristics and child's nutritional status.

Maternal education has shown to significantly influence child weight-for-age especially in households with minimum level of resources (Ruel et al 1999 and Reed et al 1996). A cross-sectional study conducted on rural children (n=260, 1-5 years) Andhra Pradesh found that father's literacy was significantly associated with positive-deviance in the developmental status of girls possibly because they did not discriminate between boys and girls and facilitated the provision of food and other benefits. Whereas amongst boys, belonging to a nuclear family was significantly associated with positive-deviance in the developmental status (Aruna et al 2001).

In rural Chad, maternal height showed some association with child's (12-71 months) height-for-age but it was not significant (Begin et al 1999). However, in Gujarat, maternal weight, height and weight for height were significantly related to weight for age of infants (0-6 months) (Christian et al 1989).

Thus the results of situational analysis clearly indicate the need for improving infant and young child feeding and Care practices, which in turn would help to achieve better nutritional status of young children in rural Vadodara. Further the role of various influencing factors like family support and maternal nutrition on Caregiving needs to be further understood in the Indian context.

Study II: Community Based Intervention Through Capacity Building of Bachat Mandal Members

Process Evaluation of the Intervention

The intervention to enhance IYCF practices among children 6-36 months of age through a microcredit or *bachat mandal* (BM) group was carried out with the support of a local non governmental organization (NGO), in one purposively selected village where the BM was actively working. In another randomly selected village, a parallel comparable intervention was carried out through direct contact of investigator with village households through home visits. A third randomly selected village served as the control. Detailed description of the intervention is given in 'Methods and Materials' chapter. This section presents the results of process evaluation of intervention – **from the perspective of the bachat mandal members who were the change agents**. The results are presented with regard to:

- Capacity building training of BM members-improvement in their knowledge
- Strengths and weakness of Nutrition Education Communication (NEC) carried out by BM members through home visits.
- Efforts made to further improve their performance through guided practice.
- The number and quality of home visits made by BM members as well as the accuracy of filling checklist given (monitoring).

Capacity Building Training of BM Members-Improvement in Their Knowledge

The Capacity building training i.e. NEC-BMM was carried out for the 9 volunteer BM members (3 sessions of 2-3 hours per session) to enhance skills for effective home visit counseling i.e. communicating the Infant And Young Child Feeding (IYCF) messages using the flash cards as visual aids. All the BM members had either primary, secondary or higher secondary education; were married (except 2) and their age ranged from 18-27 years.

Feedback from the BM members immediately after the training session revealed that

Capacity Building Training of *Bachat Mandal* Members – Use of Flash Cards

Interactive Sessions: Group Discussion and Demonstration

Role - Play by *Bachat Mandal* Members Using Flash Cards

Sharma and Kanai, 2008

the communication of the session was audible and clear, the messages were easy to understand and the visual aids (flash cards) used were easily visible to all the participants.

After the capacity building training from among the 9 members trained more than 50% BM members (4 or more) showed an improvement in awareness regarding the desirable complementary feeding practices in terms of quantity and frequency of feeding according to child's age, active feeding behaviours, dietary diversity, food safety and hygiene.

Even after four months of intervention the retention of most NEC messages was seen among >50% of the BM members. Messages related to active feeding, feeding of protective foods and hygiene practices for the child were correctly recollected alongwith the reasons for the specific behaviours. However, few BM members remembered the correct quantities of complementary foods for children in different age groups. Infact the message recall was more accurate and complete after 4 months of intervention as compared to immediately after the NEC session, perhaps because of the refresher training session after 1 month of intervention, constant guidance and support given to BM members as well as repeated home visits by them which strengthened the message retention.

Guided Practice-Supervising Initial Home Visits

After the training of the BM members, the researcher accompanied each of them during their initial home visit for on-site observation and training to further improve their communication skills.

Table 4.30 reveals some plus points of these initial observations of home visits. A few BM members (n=3) had used the flash cards as recommended. One BM member was efficient in filling the checklist completely and accurately as well as in communicating the messages effectively with relevant explanations. Despite their limitations of time some BM members were sincere and willing to improve their performance (n=4). A

few BM members (n=2) had tried out innovations on their own such as using household measures to explain quantities of complementary foods for the child and using local examples to convince the mothers (e.g. healthy feeding practices of a neighbourhood mother with a healthy child).

Table 4.30 Home Visits by Bachat Mandal (BM) Members: Positive and Negative Observations

Positive aspects observed	Freq*	Drawbacks observed	Freq*
▪ Filled the checklist correctly and completely	+	▪ There was confusion in filling the checklist as regards amount and frequency of food intake by children in respective age groups	++
		▪ Recorded some responses incorrectly i.e. 'Yes' instead of 'No'	++
		▪ While enquiring about the present IYCF behaviours of the mothers, the BM members asked leading questions	+++
▪ Explained the message on the FC@ fluently, completely and properly	+	▪ BM members were not well versed with the flash cards as well as the messages on the back of FC	+++
▪ Had shown the FC to the mother properly	+	▪ Instead of explaining the message to the mother and showing her the FC, they just read the message from the FC	+++
▪ Gave reasons and benefits of following a particular behaviour	+	▪ Did not stress adequately on the importance of a particular behaviour but only asked mothers to practice the behaviours	+++
▪ Recited slogans for each message	+	▪ Did not read the slogans on FC	+++
▪ BM members said that they had good rapport with the mothers i.e. they listened to them (as they knew each other)	+		
▪ BM member was enthusiastic and sincere about the work	+	▪ BM member seemed to lack sincerity in carrying out the home visit: a vendor selling ornaments came and so she got busy in that and the home visit got delayed.	+

Freq*(frequency): ≤ 3 members: +; 4-5 members: + +; ≥ 6 members: + + +, Total N= 9
@FC: flash card

The lacunae were many. Checklists had been provided to the BM members to record the home visit with the aim of monitoring number of home visits made; messages given to mother, recall of messages by mother in subsequent visits; whether mother

made the recommended behaviour change. Even though the checklist was simple and short, more than half of the BM members had difficulty in filling it correctly (n=7). Some asked leading questions (suggesting answers) while recording the current IYCF practices (n=6), for example: *'Do you give 1 or 2 katories (cup) of food to the child'? rather than 'How many katories of food do you give'?* Many were not familiar with the flash cards\messages and therefore read out the messages directly from the flash card and did not hold the flash card properly (n=6). Some did not adequately explain the messages (especially benefits) to the mothers and did not convince her for behaviour change (n=8). None of the BM members, except for one, recited slogans (given behind each flash card for each message) to the mother, which would help in better retention of the message. These shortcomings were addressed through guided practice wherein again the correct communication methods and checklist recording process were demonstrated to them. Thereafter follow up weekly meetings were conducted with BM members to monitor the progress of home visits and completion of checklists given to them.

Refresher Training

A refresher training session was held with all the BM members over one day, after one month of the intervention. This consisted of:

- Discussing the problem areas in conducting the home visits which were: lack of regular home visits, not showing the flash cards to the mothers and poor explanation of the messages, filling the checklist incompletely and incorrectly (especially amount of complementary foods consumed by the child).
- Reinforcing the communication process: The communication aspect of all the NEC messages was covered by the researcher followed by a practice session by BM members.

This helped to further strengthen the performance of BM members in terms of effective and regular home visits, communication skills and correct recording procedures. This session was also addressed by the supervisor (NGO staff) of the BM members who emphasized the importance of their work.

Monetary Incentives

All through the intervention the NGO was continuously consulted regarding improving effectiveness and implementation of intervention, specially the performance of BM members. After one month it was suggested that, as is the norm followed in other programs of the NGO, a modest monetary incentive if given to BM members for this additional work, might result in improved performance. Thus it was decided to give incentive of Rs. 30 every month to BM members if they covered more than half of the expected home visits for that month and Rs. 15 if they covered 50% or fewer than the expected home visits. However, post intervention it was observed that this monetary incentive did not influence the performance of the BM members; those members who were less motivated as compared to others continued to remain so.

Community Contact by NGO

When a few BM members reported that some mothers were not interested in listening to them and were not taking them seriously; the NGO staff talked to the rural women during their field visits to sensitize them about the benefits of the work of the BM members especially for improving growth and health of their children. Their work was also publicly acknowledged and appreciated in community events. A role-play communicating the appropriate IYCF practices and their importance was also enacted by the BM members in the village *anganwadi centre* (place of delivery of Government ICDS services) where all the village women with children 6-24 months were invited.

Number of Home Visits Made

At the end of 3 months, the average number of home visits carried out by the trained BM members in NEC-BMM village (mean 8 visits) was similar to the number carried out by the investigator in NEC-DIR village (mean 7 visits). Many enthusiastic BM members (n=5) conducted over 9 home visits. While the reason for not conducting home visit in NEC-DIR was unavailability of the mothers, the major additional reason as given by some BM members was related to their lack of motivation or time:

- *'Mara ghar maan bahu kaam hata etle mulakaat maate nathi gayi'* (I had lot of housework so I did not go for home visit).

- *'Polio na rasikaran maate madad karavti hati etle mulakat nathi* lidhi' (I was helping in the polio campaign so I did not go for home visit).
- *'Hun mandi hati ane pachi ek lagan maan pan javanu hatu'* (I was ill and then had a marriage to attend).

Mother's Feedback to Validate the Home Visits by BM Members

In order to validate the performance of BM members, the researcher randomly interviewed around half of the mothers (n=19) under BM member (in the absence of the BM member) and the mother was asked about the messages she received from them (**Table 4.31**). This data was collected two months after beginning of the intervention.

Table 4.31 Validation of the Home Visits by BM Members: Feedback[1] from Mothers

Expected tasks by BM members	Reported feedback from mothers (N=19)		
	Item	n	%
Minimum 8 home visits/mother over 2 months	≤3 home visits/mother	3	15.8
	4-5 home visits/mother	11	57.9
	>5 home visits/mother	1	5.3
	Does not remember	4	21.1
The relevant messages are imparted during home visit	Yes all messages	13	68.4
	Most messages	6	31.6
The messages are explained adequately	Yes	18	94.7
	No	1	5.3
Flash cards are shown to mother during every home visit	Yes	11	57.9
	No (only once)	6	31.6
	Does not remember	2	10.5
All relevant flash cards are used properly to explain the messages	Yes	11	57.9
	Some	8	42.1
Checklist is filled during every home visit	Yes	13	68.4
	No	1	5.3
	Does not remember	5	26.3

1: feed back from mothers was obtained two months after beginning of intervention

According to 58% of the mothers about 50% of the expected home visits were made by the BM members to their home. A few mentioned that the BM members visited them fortnightly. According to most of the mothers all the relevant messages had been imparted to them and almost all understood them well. In the words of one mother: *'Ben aave, 15-20 minute bese ane samjhave'* (The BM member comes, sits for 15-20 minutes and explains).

As regards use of flash cards about half (58%) had been shown all the relevant flash cards on every home visit and few mothers reported seeing it only once. Regarding filling of checklist, more than two third mothers recalled that the BM member filled the checklist during the homevisit. To quote:

- *'Pehla puche ane lakhe pachi samjhave'* (First she asks and writes down, then she explains).

However one mother reported that the BM member did not do so.

- *'Pehla lakhta hata aa time nathi lakhyu'* (Earlier she wrote but this time she did not write).

Box 4.1 Did the BM members convey the IYCF messages? Voices of some mothers..

YES

- *'Ben ae kidhu phad thi balak nu sharir saaru thay, tandurust thay'.*
  The BM member told that fruits make the child's body healthy.
- *'Pehla asre khavanu aapti hati pachi ben ni shikhaman pachi pryatna karyun, emne kidhu ke thodu patavi ne khavdavu pade'.*
  Before I use to give only approximate quantity of food to the child then after the BM member's education I tried, she told me that you have to encourage the child to eat.
- *'Aam to hun bhaneli chun to mane khabar che pan avun koi samjhave to apan ne vadhare dhyan maan ave'.*
  I am educated so I know everything but if some one explains like this then we understand better.
- *'Haath dhoiye sabu ghasi ne. Jem-jem jaaheraat thai to ame karva lagya. Ben apda balak na saara maate kahe che. Balak ne lilotri shaak khavdaviye che ane pehla karta khorak vadhyo, ben ae sikhvadiyun hatu'.*
  We wash hands with soap. As we came to know we started following the advice. The BM member advises for the good of our children. As told to us by the BM member, we feed green leafy vegetables to the child and his food intake has increased as compared to before.

NO

- *'Ben Khaali puche jem hun kahu chu avu karo cho? Rasta maan male to bi kai nahi kehta'.*
  The BM member just asks that do you do as I say! Even if she meets in the way she does not say anything.
- *'Ben jarik var bese pachi jati rahe. Mane pan ghar nu kaam hoye che'.*
  The BM member sits for few minutes and then goes away. I also have housework.

Thus on an average more than half of the BM members made the expected home visit of one visit per week/mother. It was also encouraging to know that the messages had been communicated properly to the mothers (a few examples have been given in **Box 4.1** above).

Did the BM Members Fill the Checklist Accurately?

To further validate the recording system of the BM members, the IYCF behaviours of mothers recorded by them in the checklist were compared with those recorded by the investigator through direct contact with around half of the mothers (n=19, after two months of intervention) (**Table 4.32**). It was encouraging to find that most of the BM members had filled the checklist completely and correctly for atleast 7 of 12 visits and one member had done so for *all* the visits.

Table 4.32 Validating the Findings of BM Members: Comparing Feedback of Mothers Regarding IYCF and Care Giving Behaviours Followed by Them During Intervention with those reported by BM Members

Behaviour	Change in mother's behaviour reported by NEC-BMM ≥ 50% (N= 32)		Mother's responses (N=19)	
	n	%	n	%
Frequency of complementary feeding				
▪ Child fed more number of times than before	31	96.9	17	89.5
▪ Child fed according to recommended frequency	26	81.3	13	68.4
Quantity of complementary feeding				
▪ Child fed more than before	26	81.3	15	79.4
▪ Child fed according to recommended amount	26	81.3	1	5.3**
Child is fed vegetables	31	96.9	16	84.2
Child is fed fruits	31	96.9	18	94.7
Child is fed actively	32	100.0	17	89.5
Child's as well as mother's hands are washed with soap after child defecates	31	96.9	16	84.2
Child's as well as mothers hands are washed before feeding the child	31	96.9	12	63.2*
Child is fed fresh and covered food	32	100.0	17	89.5

Significant difference (behaviours reported by NEC-BMM vs. mothers responses): **p<0.01, *p<0.05, all the other values: NS

Table 4.32 reveals that there was no significant difference between the proportion of

mothers following the positive IYCF practices as reported by BM members in comparison to those reported by mothers to the investigator. Only for the practice of 'feeding recommended amount of complementary foods' and 'following hand washing with soap before child feeding' the percentage reported by BM members was significantly higher than those reported by mother.

The sections of checklist that were filled relatively easily related to: intake of fruits and vegetables by the child, washing hands with soap after child defecation and before feeding (mother and child). Most of the BM members had difficulty in recording those sections of the checklist, which dealt with intake of complementary foods by the child (according to age) (Annexure10). The initial, supervisory visit with BM members had revealed that most of them committed mistakes in recording the amount of food consumed by the child. Although they had been given refresher training to strengthen the quality of home visits, probably more efforts would be needed to strengthen this aspect.

Discussion

The capacity building training and process evaluation of this intervention and subsequent refresher traing were successful in improving the knowledge of the BM members regarding IYCF and Care with the messages being well retained even four months after the intervention. Other studies involving training of community based volunteers/ change agents have reported positive findings and have highlighted the important aspects (related to process of intervention) which were successful and those less successful.

Capacity building training and reinforcement for improvemenet in knowledge

Haldar et al (2001) reported that in a rural area of West Bengal 34 community influencers were trained for improved IYCF awareness through lecture, group discussions, question answer session and hand-on–training at frequent intervals over a period of 3 months. They reported that besides the initial training, successive reinforcement trainings were able to improve the community influencer's knowledge

significantly regarding infant feeding practices. Also, pre to post training, the mean score of knowledge significantly increased. The authors recommended the need for instituting training and its reinforcement for generating human resources on health care from within the community.

Another study in Brazil aimed to assess the impact on child growth (n=424 children <18 months) of the nutrition-counseling component of the Integrated Management of Childhood Illnesses (IMCI) strategy (Santos et al 2001). For this doctors from government health centers received 20 hour training in nutrition counseling related to IYCF. After training, doctors in the intervention group (n=17) on average, correctly answered 83% questions related to nutritional counseling as compared to 68% doctors in control group (n=16) ($p<0.05$).

The Linkages project (2002, 2006) in Madagascar involved community-based volunteers, among them members of women's Groups (including members of micro credit), to disseminate messages related to breastfeeding and child nutrition with the use of IEC materials through home visits, educational sessions at the community health center and national or commune-sponsored health/nutrition events. Here also improvement in knowledge of members of women's groups was found 6 months post-training, but the knowledge on BF of members of women's groups was relatively lower than health workers. Hence it was suggested that community members might need more continuous training than health workers.

Motivation of workers and monetary incentives

The findings of woman's group based Linkages project (2002) in Madagascar indicated that the community based volunteers were successful in reinforcing nutrition messages locally and became a local neighborhood resource for health and nutrition information. Many employed innovative strategies to better promote nutrition messages. However, certain activities within the commune and neighborhood levels tended to be sporadic or diminish over time. The problems encountered were perception of volunteers that they seldom got the recognition, respect, or support from

their community, and lack of time. Thus some volunteers stopped conducting home visits and group sessions. The report further discussed that although compensation is frequently cited as the major cause of diminished motivation of the nutrition volunteers, this issue should be examined within the context of other factors such as no follow-up, volunteer fatigue, and the prevailing community attitude. For nutrition volunteers to do their work well, they need to be consistently supervised, compensated, and respected. In this Vadodara study one of the reasons for not conducting home visits was lack of time and mother's lack of interest. Monetary incentive did not seem to influence the BM member's performance; it was more related to their sincerity and NGO support and recognition. NGO made efforts to encourage the BM members and sensitize the community towards the benefits of their work

Monitoring and supervision

In Haryana in India, Government AWWs and ANMs with the support of an NGO were trained to counsel on locally developed complementary feeding recommendations in the intervention communities through monthly home visits. Subsequently, monthly meetings were conducted by the AWWs and ANMs for community representatives; who in turn held monthly neighborhood meetings and conducted group activities through women's groups. The intervention delivery was monitored by the local authorities at the monthly reviews of health - and nutrition related activities and they gave feedback to the workers. Results showed that at the 9-month visit, a higher proportion of infants in the intervention (vs. controls) had one or more of the following contacts in the last 3 months: home visits by Anganwadi workers (67 vs. 31%; $p<0.001$), attendance at weighing sessions (47 vs. 1%; $p<0.001$), immunization sessions (77 vs. 85%). Higher proportion of caretakers in the intervention communities spontaneously recalled being counseled on optimal complementary feeding practices as compared to those in control (Bhandari et al 2004).

Monitoring was an important feature of another successful community based intervention in two rural community development blocks (152 villages) of Agra

district in Uttar Pradesh. The women community volunteers were followed up initially at monthly basis and then every 3 months for reviewing their activities and solving their problems. Pictorial management information system (MIS) format was used by the community volunteers to report the activities undertaken by them and events occurring in their cluster (Nandan 2004). In the present intervention simple checklists provided to the BM members helped in monitoring their performance i.e. regularity of home visits and messages conveyed to the mothers.

In China a year-long rural community-based pilot nutrition education intervention mobilized and trained village nutrition educators (local women's affairs officials or village doctors already functioning in the village, n=24 for 24 villages) to make monthly growth monitoring and complementary feeding counseling visits to all pregnant women, and families with infants born during the intervention in the study villages (Guldan et al 2000). At the end of the intervention, 60% of the mothers said that they were visited once per month by the nutrition educator. Although significant improvements in infant feeding practices were documented, certain shortcomings were also present. There was lack of direct contact with the village educators, which led to weak supervision of the township and village educators. As a result the counseling was often too didactic and did not stimulate the mothers' interest as much as was originally planned. The authors concluded that effective training emphasizing counseling techniques and incentives for village level nutrition educators as well as stronger supervision of their work are crucial to the improvement of infant feeding in the village households in particular how to effectively reach mothers and enable them to understand and adapt the new behaviours.

The performance of the BM members in the present study was continuously monitored and supervised so as to ensure optimal delivery of the intervention as well to solve problems encountered by them in carrying out the home visits. Attempts were also made to keep the BM members motivated and they were also offered constant guidance and support by the NGO.

Impact Evaluation of the Intervention

This section presents the results of the impact of the intervention in terms of Nutrition Education Communication (NEC) messages remembered and benefits of the intervention as perceived by the mothers. The change in knowledge and practices of mothers related to IYCF and reasons favouring as well as inhibiting change in practice, change in diet intake, morbidity profile and nutritional status of the children (6-36 months) in the intervention (NEC-BMM and NEC-DIR) and control villages are given. Impact evaluation of the intervention in relation to number of home visits has also been presented.

In view of the fact that the intervention strategies were similar in NEC-BMM and NEC-DIR village and of similar duration, the findings of impact given below also present the pooled data of both intervention villages (intervention group) NEC-BMM and NEC-DIR vs. control group.

NEC Message Recall of the Mothers

Post NEC, the mean recall of messages out of 8 messages by the mothers was high overall (6) and similar in NEC-BMM (5) and NEC-DIR (7) suggesting that the messages had been well retained by the mothers. Further, a majority remembered 6 or more messages, which was significant in NEC-DIR as compared to NEC-BMM ($p<0.05$). Messages related to appropriate frequency and quantity of complementary foods were remembered by fewer mothers in NEC-BMM as compared to NEC-DIR **(Table 4.33)**.

Overall, the mothers found the messages as well as the home visits to be beneficial (84%). More than 70% mothers in NEC-BMM and almost all mothers in NEC-DIR village stated that the home visits by the BM member in NEC-BMM village and by the investigator in NEC-DIR village had benefitted them and their child. The most beneficial messages according to the mothers were 'feeding appropriate quantity of complementary foods' and 'hygiene'.

As stated by them,

- *'Vadhare khavdavanu'* (Feed the child more quantity of food).
- *'Loti pachi ane jamadta pehla balak ane matana haath saabu thi dhova'* (Mother's as well as child's hands should be washed with soap after she cleans the child after he/she defecates and before feeding the child).

Table 4.33 NEC Messages Recalled and Benefits Perceived by Mothers

Item	Intervention group (N=62)		NEC-BMM (N=32)		NEC-DIR (N=30)	
	n	%	n	%	n	%
Recall of NEC messages by mothers (out of 8 messages)						
▪ ≤2	7	11.3	6	18.8	1	3.3
▪ 3-5	11	17.7	7	21.9	4	13.3
▪ ≥6	44	70.9	19	59.4	25	83.3*
Mean ± SE	6.14 ± 0.29		5.68 ± 0.47^{NS}		6.63 ± 0.31^{NS}	
NEC messages were beneficial	52	83.9	23	71.9	29	96.7
Most beneficial messages according to mothers#						
▪ Increasing the quantity of complementary feeding	33	63.5	14	60.9	19	65.5
▪ Washing mothers and child's hands after child defecates and before feeding	21	40.4	11	47.8	10	34.5
Home visits were beneficial	52	83.9	25	78.1	27	90.0
Reasons for reporting home visits as beneficial#						
▪ Child has become healthy	39	75.0	22	88.0	17	63.0
▪ Child's food intake has increased	32	61.5	15	60.0	17	63.0
▪ Child has recently not suffered from illness	25	48.1	12	48.0	13	48.1
▪ Child's weight has increased	25	48.1	16	64.0	9	33.3
Number of benefits experienced from the home visits, for child's health						
▪ ≤2	15	28.8	7	28.0	8	29.6
▪ 3-5	33	63.5	17	68.0	18	62.1
▪ ≥6	4	7.7	1	4.0	3	11.1

Significant difference (NEC-BMM vs. NEC-DIR): *p<0.05, All other values: NS
#Some responses are multiple responses hence the percentage may exceed 100

Almost 60% mothers in both NEC-BMM and NEC-DIR villages reported to experience as many as 3-5 benefits of home visits.

The most common benefits of the education given during home visits, as reported by the mothers were:

- *'Sharir pakdai gayu che, shakti aavi che'* (The child has become healthy, child has got strength/ become strong).
- *'Khoraak vadhyo che, khava sheekhyo'* (Child's food intake has increased, child has learnt to eat).
- *'Beemar nathi thayo, taav jhada nathi thaya'* (Child has not fallen ill, has not suffered from fever or diarrhoea).
- *'Vajan vadhyo che'* (Child's weight has increased).

Box 4.2 The Positive Impact of Home-Visits, Voices of Few Mothers...

- *'Pehla bahu bimar thay das divas maan, haave nathi thato. Varsh maan chalto pan thai gayo. Beejo to dodh varsh maan pan naa chaalyo. Khava nu pan shikhi gayo, patai patai ne'*
  Earlier he fell ill often within 10 days, now he does not fall ill. He has also started walking in the first year. His other sibling had not started walking even at one and half years. He has also learnt to eat by being encouraged to eat.
- *'Pehla dudh eklo pito hato pachi ben e kidhu to khavdavanu pryatna karyu dudh ochu karyu to khava lagyo. Haave badhu khaye che. Sej vajan vadhyu. Hamna bimar nathi thayo. Khava nu vadhiyun che. Aju baju vada kahe che pehla karta body maan saro dekhay che'*
  Earlier he drank only milk then BM member advised me, so I tried to feed him, I gave him less milk and so he started eating. Now he eats everything. His weight has increased a little. Now he does not fall ill. His food intake has increased. Neighbours say that now his body looks good.
- *'Pehla hendto nato pehla badha khavdava mate naa kahe, kahe pet motu thay etle hende na. Pan pachi apva nu sharu karyun. Haave dharaiye ne khaye, rame che. Tandurusti vadhi, vajan vadhyu, avu lage che ke sharir jarik takat vadu dekhaye che'.*
  Earlier he was not walking. Everyone told me not to feed him, they said his stomach would get big and so he would not walk. But then I began to give food. Now he eats well, he plays. His health has improved, weight has increased, it seems that his body has become a little strong.
- *'Pehla kevi hati tame joi hati. Khali 6 kilo wajan hatu. Hamnaa 8 kilo thay gayu chhe. Ame thodu dhyan rakhiye to saru thaye. Pehla kaam maan vadhare dhyan hatu, chokra ne khavu hoye to khaye. Pehla T.V. maan vadhare dhyan hato chokra ene mede rakhadta hoye. Pachi magaj maan badhu avyun tame kidhu to. Chokri saras thai. Chokra nahi to amari jem thaaat'.*
  Earlier you had seen how she was. Her weight was only 6 kg. Now it has become 8 kg. It is good if we pay little attention. Earlier I paid more attention in house work and let children eat if they wanted to. I was more interested in watching TV and children use to roam around on their own. Then I understood everything once you told me so. Now my daughter has become healthy. Otherwise children would have become like us!

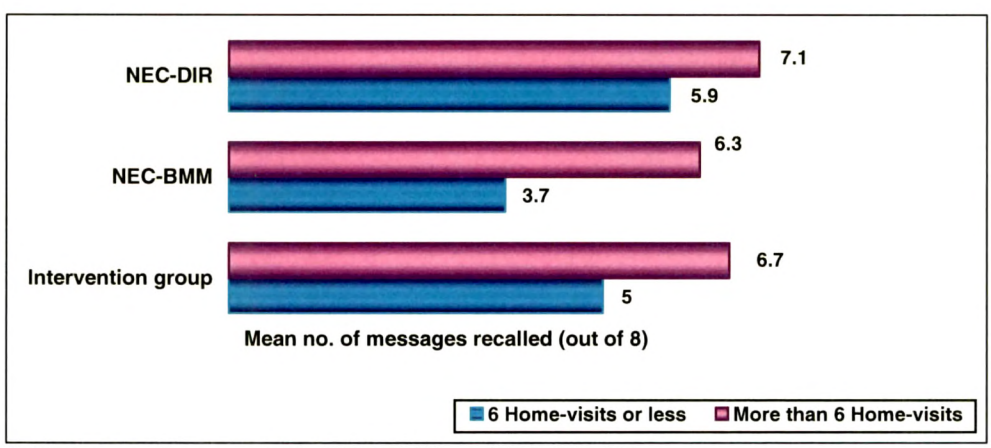
Box 4.2 continued...

- *'Pehla hun chokra ne rotlo apti na hati pan tamara avya pachi hun ene shak, phad ane rotlu apu chun. Dukan thi bhungda ane aavi badhi vastu hamna nathi khavdavti'.*
  Earlier I was not feeding *'rotla'* to my son but after you came I give him vegetables, fruits and *'rotla'*. I have stopped purchasing and feeding things like *'bhungra'* (a fried snack made of gram flour, popular among children).

Was Message Recall Influenced by Number of Home Visits?

Figure 4.14 reveals that on an average mothers recalled more messages if more than 6 home visits were made compared to 6 home visits or less. This trend was significant in overall intervention group as well as NEC-BMM village. Thus with higher contact, the mothers were exposed to the messages more often, resulting in higher message retention.

Figure 4.14 Association of Number of Home Visits with Messages Recalled by the Mothers in Intervention Villages



p<0.05: Intervention, p<0.05: NEC-BMM, NEC-DIR: NS

Change in IYCF Awareness and Practices of Mothers

Despite the limitations as regards the frequency and quantity of home visits by BM members, nevertheless, regular contacts with mothers were found to be effective. Post NEC, there was an improvement in most of the reported knowledge and practices of mothers regarding complementary feeding (CF) in the intervention group as well as

each intervention village as compared to the control group. These results have been highlighted in **Table 4.34,Table 4.35** and **Table 4.36.**

Table 4.34 Change in Awareness-Practices of Mothers Regarding Complementary Feeding and their Benefits: Comparing Intervention and Control Groups

Item	Intervention group (N = 62)				Control (N = 30)			
	Pre		Post		Pre		Post	
	n	%	n	%	n	%	n	%
Child grows well if CF is initiated at 6 mnths	6	10.9	15	24.2	4	13.8	3	10.0
Child will become malnourished if CF is delayed beyond 6 mths	7	12.7	19	30.6*	3	10.3	6	20.0
Mother practices active feeding#	27	49.1	47	75.8**	7	24.1	9	30.0
Special foods made for the child	7	12.7	43	69.4***	16	55.2	5	16.7**
Foods avoided for the child	30	54.5	7	11.3***	16	55.2	15	50
Child is fed fruits	37	67.3	60	96.8***	23	79.3	24	80
Child becomes healthy if fed fruits	4	108	28	46.7***	7	30.4	8	33.3
Frequency of feeding fruits								
▪ ≤ 1 time/week	8	21.6	8	13.3	9	39.1	5	20.8
▪ 2-3 times/week	29	78.3	20	33.3***	11	47.8	18	75.0
▪ > 3 times/week	0	0.0	32	53.3***	3	13.0	1	4.2
Child is fed vegetables	25	45.5	50	80.6***	12	41.4	21	70.0*
Frequency of feeding vegetables								
▪ ≤ 1 time/week	2	8.0	4	8.0	0	0.0	0	0
▪ 2-3 times/week	15	60.0	21	42.0	5	41.6	10	47.6
▪ > 3 times/week	8	32.0	25	50.0	7	58.3	11	52.4

Significant difference (pre to post within each group): *p<0.05, **p<0.01, ***p<0.001, All other values: NS

#Indicators: feeding the child as frequently as needed, being alert to hunger cues of child, supporting and encouraging child to eat and feeding the child from separate plate. Presence of 3 or more of these indicators was categorized as active feeding.

Base N from which percentage values have been calculated varies and depends on presence of the practice

Linking complementary feeding to health

Intervention vs. control group: **Table 4.34** compares the pooled intervention groups with the control. A higher proportion of mothers in the intervention group reported various benefits of initiating complementary foods at 6 months as compared to control.

Table 4.35 Change in Awareness-Practices of Mothers Regarding Complementary Feeding

Item	NEC-BMM (N = 32)				NEC-DIR (N = 30)				Control (N = 30)			
	Pre		Post		Pre		Post		Pre		Post	
	n	%	n	%	n	%	n	%	n	%	n	%
Initiation of Complementary Feeding (CF)												
Benefits of initiating CF at 6 months												
▪ Child grows well	3	9.7	10	31.3*	3	12.5	5	16.7	4	13.8	3	10.0
▪ Remains healthy	15	48.4	20	62.5	13	54.2	22	73.3	12	41.4	15	50.0
▪ Hunger is satisfied	4	12.9	4	12.5	4	16.7	3	10.0	4	13.8	1	3.3
Harmful effects of delayed initiation on child												
▪ No harmful effects	14	45.2	5	35.7	11	45.8	3	10.0**	22	75.9	20	66.7
▪ Will become malnourished	6	19.4	4	33.3	1	4.2	15	50.0***	3	10.3	6	20.0
▪ Will fall ill	0	0.0	4	33.3	1	4.2	3	10.0	1	3.4	1	3.3
Mother practises active feeding[#]	16	51.6	24	75.0	11	45.8	23	76.7*	7	24.1	9	30.0
Type of Complementary Foods												
Special foods prepared for the child	6	19.4	18	56.3**	1	4.2	25	83.3***	16	55.2	5	16.7**
Foods avoided for the child	20	64.5	5	15.6***	10	41.6	2	6.7**	16	55.2	15	50
Not fed family food	21	67.7	15	46.9	17	70.8	14	46.7	21	72.4	13	43.3
Type of food cooked in the family but not fed to the child												
▪ Vegetable	16	76.2	12	80.0	11	64.7	11	78.6	21	100.0	12	92.3
Child not fed family food (vegetable) because child finds it spicy	10	62.5	8	53.3	5	45.5	0	0	12	57.1	5	41.7

Significant difference (pre to post within each group): *p<0.05, **p<0.01, ***p<0.001, All other values: NS
Base N from which percentage values have been calculated varies and depends on whether child is fed CF,
Some responses are multiple responses hence % may exceed 100,
Selected responses (more frequently occurring responses) given in some sections hence % may not add to 100
[#]Indicators: feeding the child as frequently as needed, being alert to hunger cues of child, supporting and encouraging child to eat and feeding the child from separate plate. Presence of 3 or more of these indicators was categorized as active feeding.

At the same time, post NEC most mothers in intervention group believed that child would become malnourished if complementary feeding was not initiated at 6 months ($p<0.05$) while majority mothers in control perceived no apparent harm in late initiation of complementary feeding.

Comparing intervention villages: In both the intervened villages (**Table 4.35**) there was a significant increase in the mothers who believed that child grows well if complementary feeding is initiated at 6 months (NEC-BMM $p<0.05$) and that child would become malnourished if complementary feeding (CF) was not initiated at 6 months (NEC-DIR $p<0.001$).

Active feeding[1] and dietary diversity

Intervention vs. control group: Compared to pre-post change in control group a significantly higher proportion of mothers (from pre to post) in the intervention group reported a favourable change in IYCF knowledge and practices in terms practising active feeding, making special foods for the child, reducing food taboos, giving more frequently protective foods like fruits (**Table 4.34**).

Comparing intervention villages-active feeding[1]: As regards feeding behaviours in NEC-BMM and NEC-DIR, most mothers practised passive feeding before the intervention; they did not encourage the child to eat and were not even aware regarding the amount of food consumed by the child. To quote: *'Ame kaam maan na janiye ketlu khaye chhhe'* (We are busy with work and don't know what the child eats), *'Khavu hoye atlu khaye'* (S/he eats as much as s/he wants to eat), *'Badhani saathe khaye, judi thali maan na khaye'* (Child eats along with everyone, does not eat in separate plate) (**Table 4.35**).

[1]Indicators of active feeding: feeding the child as frequently as needed, being alert to hunger cues of child, supporting and encouraging child to eat and feeding the child from separate plate. Presence of 3 or more of these indicators was categorized as active feeding.

More Mother s Actively Fed Child Post Intervention

Passive Feeding Continues in Control Village

Sharma and Kanai, 2008

Table 4.36 Change in Awareness-Practices Of Mothers Regarding Intake of Protective Foods

Item	NEC-BMM (N = 32)				NEC-DIR (N = 30)				Control (N = 30)			
	Pre		Post		Pre		Post		Pre		Post	
	n	%	n	%	n	%	n	%	n	%	n	%
Child is fed fruits	22	71.0	31	96.9**	15	62.5	29	96.7**	23	79.3	24	80
Reasons for feeding fruits												
▪ We purchase fruits	5	22.7	11	35.5	10	66.7	2	6.9	4	17.4	2	8.3
▪ Child becomes healthy	3	13.6	10	32.3	1	6.7	18	62.1***	7	30.4	8	33.3
▪ Child gets vitamin;blood becomes healthy	3	13.6	7	22.3	1	6.7	12	41.4*	7	30.4	6	25.0
Reasons for not feeding fruits												
▪ Do not have money	5	55.6	1	100.0	4	44.4	1	100.0	3	50.0	5	83.3
▪ Difficult to digest	4	44.4	0	0.0	2	22.2	1	100.0	0	0.0	1	16.7
Frequency of feeding fruits												
▪ Once a week	5	22.7	7	22.6	3	20.0	1	3.4	9	39.1	5	20.8
▪ 2-3 times/week	17	77.3	8	25.8***	12	80.0	12	41.4*	11	47.8	18	75.0
▪ > 3 times/week	0	0.0	16	51.6***	0	0.0	16	55.2***	3	13.0	1	4.2
Child is fed vegetables	14	45.2	24	75.0*	11	45.8	26	86.7**	12	41.4	21	70.0*
Reasons for feeding vegetables												
▪ Child becomes healthy	5	35.7	11	45.8	0	0.0	6	23.1	0	0.0	4	19
▪ Child eats because it is cooked at home	2	14.3	7	29.2	6	54.6	4	15.4	5	41.7	11	52.4
▪ Blood becomes healthy	2	14.3	9	37.5	1	9.1	9	34.6	1	8.3	2	9.5
▪ Hair becomes healthy	0	0.0	2	8.3	0	0.0	4	15.4	0	0.0	0	0.0
▪ Child becomes intelligent	0	0.0	1	4.2	0	0.0	2	7.7	0	0.0	1	4.8
Reasons for not feeding vegetables												
▪ Child finds spicy	11	64.7	6	75.0	5	38.5	0	0.0	12	70.6	8	88.9
▪ Child does not eat	6	46.2	0	0.0	6	46.2	3	75.0	5	29.4	3	33.3
Frequency of feeding vegetables												
▪ Once a week	2	14.3	2	8.3	0	0.0	2	7.7	0	0.0	0	0.0
▪ 2-3 times/week	5	35.7	13	54.2	10	90.9	8	30.8***	5	41.6	10	47.6
▪ > 3 times/week	7	50.0	9	37.5	1	9.1	16	61.5*	7	58.3	11	52.4

Significant difference (pre to post within each group): *p<0.05, **p<0.01, ***p<0.001, All other values: NS,
Base N from which % values are calculated varies & depends on presence of practice, Some responses are multiple responses hence % may exceed 100, Selected responses (more frequently occurring responses) given in some sections hence % may not add to 100

But after the intervention more than 70% of the mothers in both intervention villages were practising active feeding as compared to only 30% in control.

The rise in active feeding practices was significant in NEC-DIR village. A higher proportion of mothers began to give special foods like *'sheera' and 'rab'* (sweet preparation of flour, clarified butter and sugar) to the child (NEC-BMM $p<0.01$, NEC-DIR $p<0.001$). The reasons given were that they were now aware that child would become healthy if given diverse foods and because they had been advised to do so by the BM members or by the investigator. As compared to the increase in the intervention villages, in the control village there was a significant decrease in the mothers who gave special foods to the child perhaps because the child had grown older.

Box 4.3 Change in Child Feeding Behaviours Requires Persistent Efforts
Notes from the Field

In NEC-DIR village during second home-visit to Prajwala's home (Prajwala is 20 months of age), his mother complained that though she had been counseled to give more food to Prajwala, he did not eat much. She reasoned that the child had been operated a few weeks ago (minor surgery) and so his appetite must have decreased. However, the child was observed to eat a *'papad'* (sun dried and fried snack made from pulses flour) from the pile of *'papads'*, which had been laid out for drying. At that time the mother was asked to give some food to the child as he seemed to be hungry and might eat. Prajwala's mother was also reminded to wash her hands with soap before feeding as she had not done so. It was observed that Prajwala ate atleast $3/4^{th}$ katori of rice and dal.

Finally the mother agreed to feed the child by herself even if he did not ask for food and she also agreed to wash her and his hands with soap before feeding.

Comparing intervention villages-feeding protective foods: Prior to NEC many mothers believed that consumption of vegetables and fruits by child could cause *'varadh'* (respiratory problem which could be similar to pnuemonia) and that these foods would be difficult to digest by the child. Post intervention, a significantly lower proportion of mothers in both NEC-BMM) and NEC-DIR village reported avoidance of vegetables and certain fruits (banana, green coconut and guava) to the child (**Table 4.36**). After

Complementary Feeding Requires Persistence and Patience

Passive Feeding in Unhealthy Conditions – Cause for Morbidity?

Sharma and Kanai, 2008

the intervention there was an increase in the proportion of mothers who gave family foods to the child. In general, the consumption of vegetables increased among the children in all the three villages, but the frequency of vegetable consumption post NEC was higher among the intervention villages vs. the control. Mothers in NEC-BMM and NEC-DIR villages were able to link vegetable consumption with child's health, and one-third could state benefits of vegetable consumption (which had been conveyed to them during NEC), such as:

- *'Lohi sudhare'* (Blood becomes healthy).
- *'Baal acche hote hain'* (Child's hair becomes healthy).
- *'Gyan accha milta hai'* (Child's intelligence is improved).
- *'Aankh nu teej vadhe'* (Child's eyes become healthy).

In contrast to this, around half of the mothers in control village fed vegetables to the child because *'Chokru khaye'* (Child ate it) or *'Ghar ma bane che etle apu chu'* (It is cooked at home so I give).

There was an improvement in fruit consumption in both intervention villages with a significant shift towards consumption more than 3 times/week, compared to 2-3 times/week. The major reasons given for feeding fruits were that: child would become healthy and s/he would get vitamins by consuming fruits. In the words of a mother, *'Bacche ko phal kilana acha hota hai sharir mein shakti ati hain ankho mein roshni ati hai. Hum na khay likin bacchon ko khilate hain'* (It is beneficial to feed fruits to the child, body's strength increases, eyes glow. We might not eat ourselves but we feed fruits to the children). After the intervention only one mother in both NEC-BMM and NEC-DIR group reported that she avoided fruits to the child because she could not afford to buy them. However, vegetables cooked for family continued to be the most common food avoided by some, the reason being *'Child finds it spicy'*.

Hygiene practices

A higher proportion of mothers in the intervention group as well as NEC-BMM and NEC-DIR reported increase in the hygiene practices post intervention. The practices which showed highest change were: mother washing her own as well as child's hands with soap after disposing off child's feces or before feeding child; and covering food

Table 4.37 Change in Hygiene Behaviours of Mothers

Behaviour	Intervention group (N=62)		NEC-BMM (N=32)		NEC-DIR (N=30)		Control (N=30)	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Hygiene practices for child								
▪ After child defecates mother cleans her own and child's hands with soap	21 (33.9)	49 (79.0***)	12 (37.5)	22 (68.8*)	9 (30.0)	27 (90.0***)	13 (43.3)	10 (33.3)
Hygiene practices while feeding child@								
▪ Before feeding child, mother washes her own and child's hands with soap	3 (5.5)	33 (53.2***)	2 (6.5)	11 (34.4**)	1 (4.2)	22 (73.3***)	3 (10.3)	1 (3.3)
▪ Mother feeds fresh food to child	16 (29.1)	15 (24.2)	8 (25.8)	6 (18.8)	8 (33.3)	9 (30.0)	5 (17.2)	7 (23.3)
▪ Mother covers cooked food	4 (7.3)	45 (72.6***)	4 (12.9)	25 (78.1***)	0 (0.0)	20 (66.6***)	1 (3.4)	1 (3.3)

Significant difference (pre to post within each group): *p<0.05, **p<0.01, ***p<0.001, All other values: NS
Some responses are multiple responses hence % may exceed 100,
Selected responses (more frequently occurring responses) are given in some sections hence % may not add up to 100
@ Percentage values were calculated only for those children consuming complementary foods pre and post intervention

(**Table 4.37**). Relatively fewer mothers fed fresh food to the child. In the control village hygiene practices remained unchanged and dismally poor.

Intervention vs. Control: Change in Practice Scores

Selected IYCF practices of the mothers were assigned individual scores for the intervention and control groups. Further, a composite score (pooling the scores of selected practices) of IYCF practices was also calculated (Methods and Materials Chapter). Higher the score more were the number of favourable practices being followed.

Table 4.38 Change in Practice Scores of Mothers: Comparing Intervention and Control Groups

Scores	N	Mean score ± SE		Mean difference ± SE	F statistic I vs. C#
		Pre	Post		
Frequency of feeding fruits@	Maximum score: 3				
▪ Intervention	55	1.2 ± 0.1	2.2 ± 0.1	1.0 ± 0.1	18.86***
▪ Control	29	1.4 ± 0.2	1.4 ± 0.2	0.0 ± 0.2	
Frequency of feeding vegetables@	Maximum score: 3				
▪ Intervention	55	1.0 ± 0.1	2.0 ± 0.1	1.0 ± 0.2	0.41^{NS}
▪ Control	29	1.1 ± 0.2	1.8 ± 0.2	0.7 ± 0.2	
Hand washing after child defecation	Maximum score: 1				
▪ Intervention	62	0.3 ± 0.1	0.8 ± 0.1	0.5 ± 0.1	16.2***
▪ Control	30	0.4 ± 0.1	0.3 ± 0.1	-0.1 ± 0.1	
Hygiene practices while feeding@	Maximum score: 2				
▪ Intervention	55	0.2 ± 0.1	1.0 ± 0.1	0.8 ± 0.1	21.95***
▪ Control	29	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0	
IYCF score@	Maximum score: 11				
▪ Intervention	55	3.4 ± 0.3	7.4 ± 0.3	4.0 ± 0.4	30.18***
▪ Control	29	3.4 ± 0.4	4.2 ± 0.3	0.8 ± 0.3	

***p<0.001, NS: non significant
 # I: Intervention, C: Control
@ Scores were calculated only for those children consuming complementary foods both pre and post intervention

As **table 4.38** indicates, the intervention group had a significantly higher score compared to control group as regards greater frequency of fruit consumption, hand washing after child defecation and while feeding child, and composite IYCF practices.

Comparing the Intervention Villages: Change in Practice Scores

Table 4.39 shows that children in both NEC-BMM and NEC-DIR village had significantly higher mean scores (vs. control) as regards all practices reported except for increased frequency of feeding vegetables where NEC-BMM children were comparable to control.

Table 4.39 Change in Practice Scores of Mothers

Scores	Mean score ± SE		Mean difference ± SE	F statistic		
	Pre	Post		A vs. C	B vs. C	A vs. B
Frequency of feeding fruits@ (Maximum score: 3)						
▪ NEC-BMM (N=31)	1.3 ± 0.2	2.1 ± 0.2	0.8 ± 0.2	6.5*	28.7***	3.4*
▪ NEC-DIR (N=24)	1.1 ± 0.8	2.4 ± 0.1	1.3 ± 0.2			
▪ Control (N=29)	1.4 ± 0.2	1.4 ± 0.2	0.0 ± 0.2			
Frequency of feeding vegetables@ (Maximum score: 3)						
▪ NEC-BMM (N=31)	1.1 ± 0.2	1.7 ± 0.2	0.6 ± 0.3	0.1^{NS}	3.2*	3.0^{NS}
▪ NEC-DIR (N=24)	0.9 ±0.2	2.2 ± 0.2	1.3 ± 0.2			
▪ Control (N=29)	1.1 ± 0.2	1.8 ± 0.2	0.7 ± 0.2			
Hand washing after child defecation (Maximum score: 1)						
▪ NEC-BMM (N=32)	0.4 ± 0.1	0.7 ± 0.1	0.3 ± 0.1	6.7*	23.8***	3.1^{NS}
▪ NEC-DIR (N=30)	0.3 ± 0.1	0.9 ± 0.1	0.6 ± 0.1			
▪ Control (N=30)	0.4 ± 0.1	0.3 ± 0.1	-0.1 ± 0.1			
Hygiene practices while feeding@ (Maximum score: 2)						
▪ NEC-BMM (N=31)	0.2 ± 0.1	0.8 ± 0.2	0.6 ± 0.2	9.3**	47.9***	5.8*
▪ NEC-DIR (N=24)	0.1 ± 0.1	1.2 ± 0.2	1.1 ± 0.2			
▪ Control (N=29)	0.0 ± 0.0	0.0 ± 0.0	0.0 ± 0.0			
IYCF score@ (Maximum score: 11)						
▪ NEC-BMM (N=31)	3.6 ± 0.3	6.8 ± 0.5	3.2 ± 0.6	12.3***	73.1***	6.5*
▪ NEC-DIR (N=24)	3.3 ± 0.4	8.4 ± 0.4	5.1 ± 0.4			
▪ Control (N=29)	3.4 ± 0.4	4.2 ± 0.3	0.8 ± 0.3			

*p<0.05, **p<0.01, ***p<0.001, NS: non significant
A: NEC-BMM, B: NEC-DIR, C: Control
@ Scores were calculated only for those children consuming complementary foods both pre and post intervention

Gender differences were not seen in the above data, except that post intervention, boys in NEC-BMM had significantly higher mean score of vegetable intake as compared to girls; not seen in NEC-DIR and Control.

When the hygiene practices were assigned scores, the mean difference pre to post intervention was significant for both NEC-BMM and NEC-DIR villages as compared

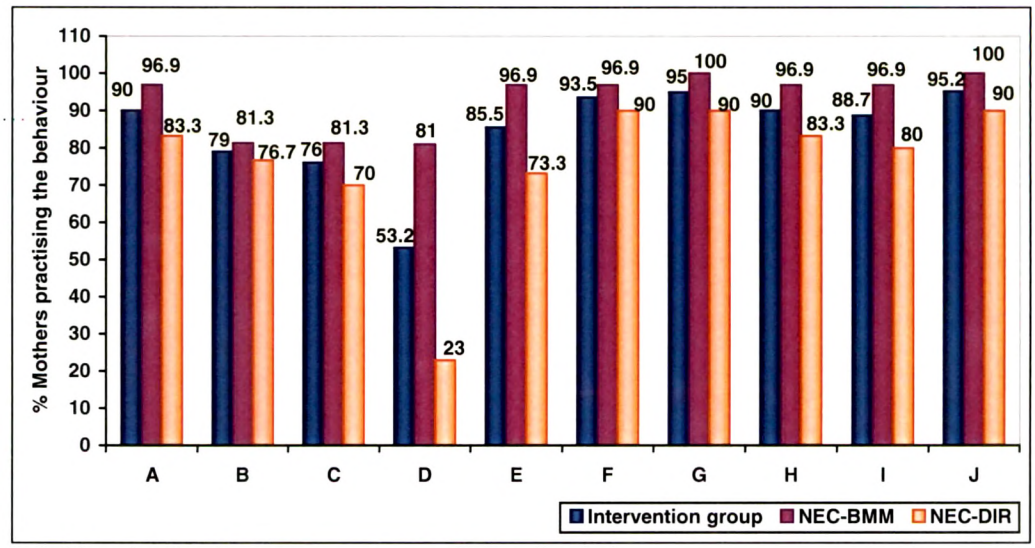
to control village (**Table 4.39**). Across the groups, the mean difference in pre to post hygiene scores while feeding the child was higher for girls in intervention group as compared to control ($p<0.05$). However, within the groups there was no significant gender difference.

For the **composite score of IYCF practices**, mean change from pre to post intervention in both NEC-DIR and NEC-BMM was significantly better than in control. On comparing the two intervention villages, the mean change in scores in NEC-DIR was significantly higher than in NEC-BMM (**Table 4.39**). Both girls and boys in NEC-DIR village had significantly higher composite IYCF scores than their counterparts in control. While in NEC-BMM only for boys, the scores were significantly higher than the control. Greater care for girl child was evident in NEC-DIR village compared to NEC-BMM village.

Were The Positive Behaviours Followed in a Sustained Manner?

Both in NEC-BMM and NEC-DIR a checklist was maintained to record messages given and practices being followed by mothers in each visit. On analyzing checklist data it was observed that most of the mothers in the overall intervention group and also in NEC-BMM and NEC-DIR reported following positive practices 50% or more of the times visited. The percentage was higher in NEC-BMM as compared to NEC-DIR. With regard to frequency and amount of complementary foods fed, though an increase from baseline was reported, the increase to *recommended* frequency and amount was seen in fewer mothers as compared to other behaviours (**Figure 4.15**); only about half of the mothers in intervention group fed complementary foods according to the suggested amounts. Further within intervention villages significantly more mothers in NEC-BMM gave recommended amount of complementary foods to the child as compared to those in NEC-DIR.

Figure 4.15 Proportion of Mothers Reporting Positive IYCF Practices[@] in the Two Intervention Groups



A: More feeding frequency
B: Recommended frequency of CF
C: More quantity of CF
D: Recommended quantity of CF
E: Feeding vegetables
F: Feeding fruits
G: Active feeding
H: Hand washing with soap after child defecation
I: Hand washing with soap before child feeding
J: Fresh & covered food

[@] Positive IYCF practices were present in ≥ 50% of the home visits
D: p<0.001 NEC-BMM vs. NEC-DIR

Table 4.40 indicates that, age wise; more than three fourth of the older (13-36 months) as well as younger children (6-12 months) in the overall intervention group were fed suggested frequency of complementary foods. However, as regards feeding suggested quantity of complementary foods, the proportion was significantly higher among younger children. Intake of fruits and vegetables was similar (> 90%) in NEC-BMM. However the consumption was more among older children than younger children in NEC-DIR group. With respect to active feeding and washing mother's as well as child's hands after child defecation, the behaviour was practised more for children in younger age group as compared to older children in the intervention group as well as NEC-DIR group. The reason for this could be that the mothers of older children might not have perceived the behaviours to be important, as the child was older.

Table 4.40 Mothers Reporting Positive IYCF Practices@ in Different Age Groups

Behaviour	Intervention group		NEC-BMM		NEC-DIR	
	N=62		N=32		N= 30	
	n	%	n	%	n	%
Child fed more number of times than before						
▪ 6-12 months	14	100.0	5	100.0	9	100.0
▪ 13-36 months	42	87.5	26	96.3	16	76.2
Child fed according to recommended frequency						
▪ 6-12 months	11	78.6	4	80.0	7	77.7
▪ 13-36 months	38	79.2	22	68.8	16	76.2
Child fed more than before						
▪ 6-12 months	11	78.6	5	100.0	6	66.7
▪ 13-36 months	36	75.0	21	77.8	15	71.4
Child fed according to recommended amount						
▪ 6-12 months	14	100.0	11	40.0	3	33.3
▪ 13-36 months	19	39.4***	15	55.6	4	19.0
Child is fed vegetables						
▪ 6-12 months	10	71.4	5	100.0	5	55.6
▪ 13-36 months	43	89.6	26	96.3	17	81.0
Child is fed fruits						
▪ 6-12 months	13	92.9	5	100.0	8	89.0
▪ 13-36 months	45	93.8	26	96.3	19	90.5
Child is fed actively						
▪ 6-12 months	14	100.0	5	100.0	9	100.0
▪ 13-36 months	45	93.8	27	100.0	18	85.7
Hand washing with soap after child defecation						
▪ 6-12 months	14	100.0	5	100.0	9	100.0
▪ 13-36 months	42	87.5	26	96.3	16	76.2
Hand washing with soap before child feeding						
▪ 6-12 months	12	85.7	5	100.0	7	77.8
▪ 13-36 months	43	89.6	26	96.3	17	81.0
Child is fed fresh and covered food						
▪ 6-12 months	13	92.9	5	100.0	8	88.9
▪ 13-36 months	46	95.8	27	100.0	19	90.5

Significant difference (6-12mths vs. 13-36 mths within each group): ***p<0.001, all other values: NS

@ Positive IYCF practices were present in ≥ 50% of the home visits

Were Mothers Observed to Practise Good IYCF Beahviours?

Direct observations regarding food intake by child (NEC-DIR) were made all through the intervention period **(Table 4.41)**.

Most of the positive IYCF observations were with regard to feeding behaviours. It was encouraging to note that almost all mothers did not show annoyance or irritability and were more patient during child feeding, they served food to the child in a separate plate and in clean surrounding. Further, almost half were receiving diversified diet. The observations indicating unfavourable feeding practices were: very few children were fed appropriate amount of complementary food, few children were observed to be fed fruits (20%) and vegetables (11%). About two third of the children ate by themselves without mother/family member's assistance. Further, when the child was feeding almost none of the mothers checked on the child or encouraged him/her to eat.

Table 4.41 Direct Observations Regarding the Positive as Well as Negative IYCF Behaviours of the Mothers in NEC-DIR (N=45 Observations of Feeding Episodes)

Positive observation	N	%	Negative observation	N	%
Child fed in separate plate	43	95.6	Child fed from same plate	2	4.4
Mother not annoyed or irritated while feeding	42	93.3	Mother annoyed or irritated while feeding	3	6.7
Child ate food in clean surrounding	34	75.6	Child ate food in unhygienic condition	11	24.4
Given variety of foods (for e.g. milk, snacks)	19	42.2	Not given any variety in food	26	57.8
Mother or family member fed the child	16	35.6	Child ate by self	29	64.4
Fed fruits	9	20.0	Not fed fruits	36	80.0
Fed vegetables	5	11.1	Not fed vegetables	40	88.9
Child fed recommended amount of complementary food	4	8.9	Child fed less than recommended amount of CF	41	91.1
Mother encouraged the child to eat	3	6.7	Mother did not pay attention and encourage the child to eat	42	93.3

However, the interview data of mothers in NEC-DIR as presented earlier in **Figure 4.15** revealed a contrasting picture with majority of the mothers reporting positive practices with regard to feeding protective foods to child (vegetables, fruits) and sitting with the child during feeding (active feeding). The only exception was for feeding recommended amount of complementary foods where lower proportion of mothers reported to follow it (23%). A limitation of the observation data is that it was carried out only in NEC-DIR village since the investigator was constantly visiting that village.

Table 4.42 Change in Awareness of Mothers Regarding Child Health

Item	Intervention group (N=62)				NEC-BMM (N=32)				NEC-DIR (N=30)				Control (N=30)			
	Pre		Post		Pre		Post		Pre		Post		Pre		Post	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Child is healthy	48	77.4	50	80.6	28	87.5	29	90.6	20	66.7	21	70.0	26	86.7	27	90.0
Reasons for being healthy																
• Child is playful	30	62.5	25	50.0	18	64.3	13	44.8	12	60.0	12	57.1	18	69.2	20	74.1
• Did not fall ill	10	20.8	13	26.0	5	17.9	9	31.0	5	25.0	4	19.0	6	23.1	5	18.5
• Eats properly	2	4.2	12	24.0	1	3.6	7	24.1	1	5.0	5	23.8	1	3.8	6	22.2
Reasons for being unhealthy																
• Child often falls ill	2	14.3	2	16.7	2	50.0	0	0.0	0	0.0	2	22.2	0	0.0	0	0.0
• Weight has reduced	0	0.0	7	58.3	0	0.0	3	100.0	0	0.0	4	44.4	1	33.3	1	33.3
• Child is sick	3	21.4	4	33.3	1	25.0	1	33.3	2	20.0	3	33.3	2	66.7	1	33.3
Appropriate diet is must for child to be healthy	50	80.6	62	100.0***	27	84.4	32	100.0	23	76.7	30	100.0*	26	86.7	27	90.0
Causes of malnutrition																
• Food deficiency	22	35.5	48	77.4***	14	43.8	22	68.8*	8	26.7	26	86.7***	12	40.0	15	50.0
• Illness and infection	19	30.6	21	33.7	5	15.6	9	28.1	14	46.7	12	40.0	11	36.7	5	16.7
• Unhygienic environment	1	1.6	10	16.1**	0	0.0	1	1.0	1	3.3	9	30.0*	0	0.0	0	0.0

Significant difference (pre to post within each group): *p<0.05, **p<0.01, ***p<0.001, All other values: NS

Base N from which percentage values have been calculated varies and depends on presence of the practice, Some responses are multiple responses hence % may exceed 100,

Selected responses (more frequently occurring responses) are given in some sections hence % may not add up to 100

Change in awareness of the mothers regarding child health

As **Table 4.42** indicates more than three fourth mothers in the intervention villages as well as Control believed their child to be healthy. The common reasons given for this were:

- '*Ramya kare akho divas*' (Child plays whole day).
- '*Bimar nathi thayo, jhada nathi thaya*' (Child has not fallen sick, has not got diarrhoea).
- 'Khaye peeve' (Child eats properly).

A few mothers believed that their child was not healthy because

- '*Thoda thoda divase bimaar tahi jaaye che*' (Child falls ill frequently).
- '*Kamjor thayi, vajan pehla jeevu che*' (Child has become weak, her weight has not increased).

Post intervention the increase in proportion of mothers believing that appropriate diet is necessary for child's health was higher in the overall intervention group and similarly in NEC-BMM and NEC-DIR village ($p<0.05$) as compared to Control. This is further illustrated by the voices of many mothers in NEC-BMM (59.4%) and NEC-DIR villages (73%): '*Jeevu khoraak etlu chokru habdu thaye*' (Depending on the diet the child becomes more healthy).

NEC messages had significant influence on the mother's understanding of the causes of malnutrition in intervention group, NEC-BMM and NEC-DIR villages as compared to the Control. This is evident from the fact that a significantly higher number of women in intervention villages reported food deficiency and unhygienic environment to be the causes of malnutrition.

Did Number of Home Visits Affect IYCF Practices – Ongoing Monitoring (Checklist Data)

Overall the intervention was more effective in terms of more mothers reporting most positive IYCF behaviours 50% or more of the time when they were visited regularly that is more than 6 times out of 12; as compared to those visited 6 times or less. However, significantly more mothers reported feeding complementary foods according to recommended quantity even with less home visits as compared to those mothers visited more often.

Table 4.43 Effect of Number of Home-visits on Change in IYCF Practices of Mothers

Practice[#]	Intervention group (N= 62)				NEC-BMM (N= 32)				NEC-DIR (N= 30)			
	≤ 6 Home-visits[@] N= 19		>6 Home-visits N=43		≤ 6 Home-visits N= 8		>6 Home-visits N= 24		≤ 6 Home-visits N= 11		>6 Home-visits N= 19	
	n	%	n	%	n	%	n	%	n	%	n	%
Child fed more number of times than before	15	78.9	42	97.7	7	87.5	24	100.0	8	72.7	18	94.7
Is fed according to recommended frequency	14	73.7	38	88.4	7	87.5	19	79.2	7	63.6	19	100.0
Is fed more than before (amount)	14	73.7	34	79.1	7	87.5	19	79.2	7	63.6	15	78.9
Is fed according to recommended amount	12	63.2	13	30.2*	7	87.5	11	45.8	5	45.5	2	10.5
Is fed vegetables	14	73.7	39	90.7	7	87.5	22	91.6	7	63.6	17	89.5
Is fed fruits	16	84.2	42	97.7	8	100.0	23	95.8	8	72.7	19	100.0
Is fed actively	18	94.7	43	100.0	8	100.0	24	100.0	10	90.9	19	100.0
Child's and mother's hands washed with soap after child defecates	15	78.9	43	100.0	7	87.5	24	100.0	8	72.7	19	100.0
Child's and mothers hands washed before feeding the child	14	73.7	41	95.3	7	87.5	24	100.0	7	63.6	17	89.5
Is fed fresh and covered food	16	84.2	43	100.0	8	100.0	24	100.0	8	72.7	19	100.0

Significant difference (between home visits within each group): *p<0.05, All other values: NS

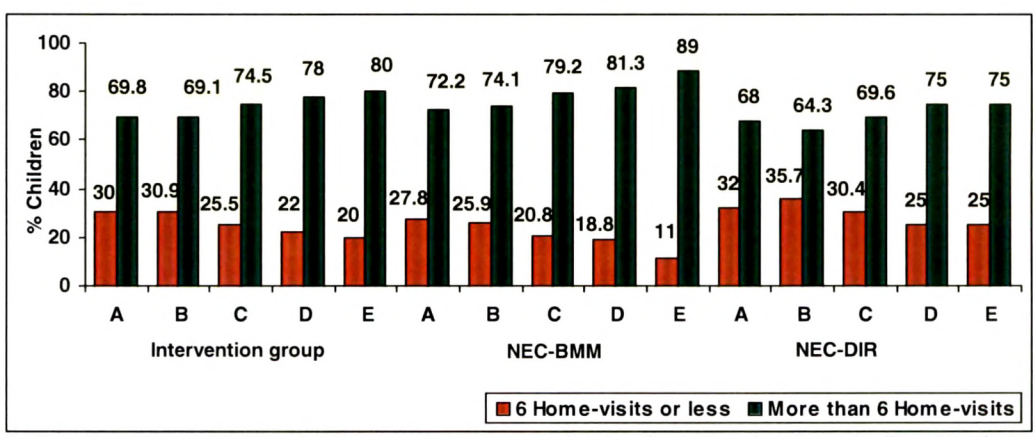
[@] Total planned home-visits=12, # Positive IYCF practices were present in ≥ 50% of the home visits

In case of both NEC-BMM and NEC-DIR, most positive behaviours were reported by more than 90% mothers when more than 6 home visits were made while the proportion was lower with 6 home visits or less (NEC-BMM: >80% and NEC-DIR: >70%). This indicates that regularity of home visits is important to ensure behaviour change. Nevertheless, in NEC-BMM, even with less number of home visits (≤ 6/12), a positive change was recorded in most of the behaviours (**Table 4.43**).

Association of Frequency of Home Visits With Complementary Feeding and Hygiene Behaviours of the Mothers: Post NEC Interview Data

As seen in **Figure 4.16 and 4.17**, for the overall intervention group higher the frequency of home visits, higher was the proportion of mothers who reported following the positive complementary feeding as well as hygiene behaviours.

Figure 4.16 Association of Number of Home Visits with Complementary Feeding Practices of the Mothers (Post NEC)

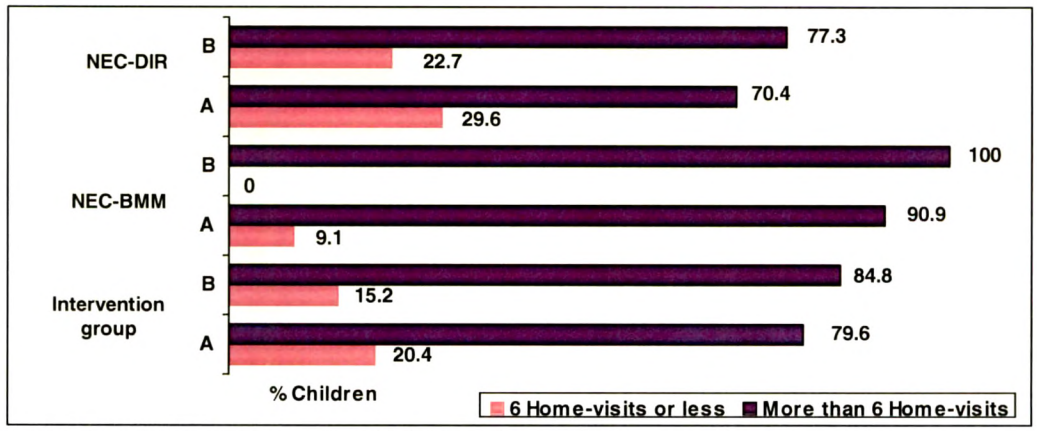


A: Feeding special foods, B: Not avoiding certain foods, C: Active feeding, D: Feeding fruits ≥ 3 times/week, E: Feeding vegetables ≥3times/week
NEC-BMM: p<0.01 A, B, C & p<0.01 D; NEC-DIR: p<0.05 A, B & p<0.01 C, D, E
Intervention group: p<0.001 all indicators

In both NEC-BMM and NEC-DIR villages, those mothers who were visited more often (> 6/12 home visits) had significantly higher proportion of complementary feeding and hygiene behaviours: feeding special foods, not avoiding foods, active feeding, increased frequency of fruit and vegetable to child, washing mother as well as

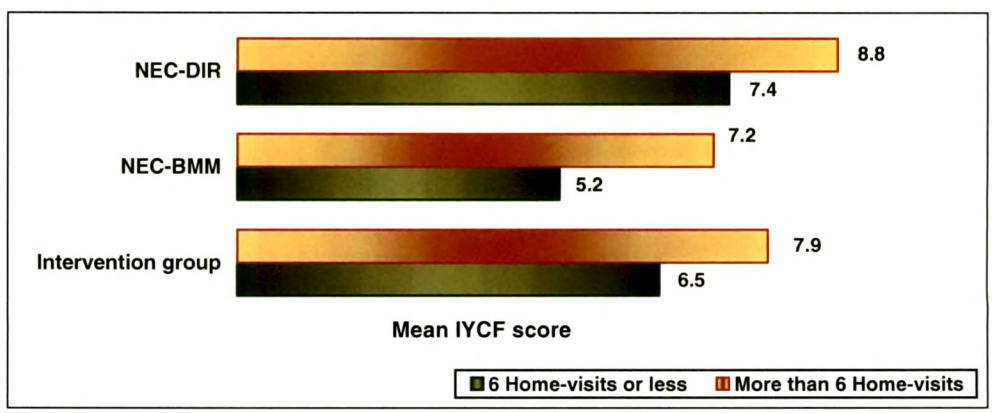
child's hands with soap after child defecation and before feeding; as compared to those who were visited less often (≤ 6/12 home visits).

Figure 4.17 Association of Number of Home Visits with Hygiene Practices of the Mothers (Post NEC)



A: Hand washing with soap after child defecation
B: Hand washing with soap before child feeding
NEC-BMM: p<0.01 A, p<0.05 B; NEC-DIR: p<0.05 A & B,
Intervention group: p<0.001 A & B

Figure 4.18 Association of Number of Home Visits with IYCF Scores of the Mothers in Intervention Villages



p<0.05: Intervention group

On an average, composite IYCF score of the mothers (post intervention) was significantly higher with more than 6 home visits as compared to the score with 6 or fewer homes visits (8 vs. 6). Even in individual intervention villages (NEC-BMM and NEC-DIR) similar findings were obtained (**Figure 4.18**). These and other similar

results given above with respect to effect of frequency of home visits, reiterate that sustained contact is required for significant behaviour change.

Reasons for a Positive Change in Feeding Behaviour

Based on the verbatim statements of the respondents, **Table 4.44** depicts the major reasons which are likely to have influenced a positive change in feeding behaviours. These were: mother's willingness to adopt new practices like feeding a higher quantity of food, making special foods for the child; the support of family members (especially husband) for example in purchasing fruits for the child.

Table 4.44 A Matrix Showing Reasons Behind Positive and Negative Change in Feeding Behaviours

Reasons for positive change	Frequency of responses[@]	Reasons for negative change	Frequency of responses[@]
Quantity of complementary foods			
▪ Feeding child more quantity of food than before	+	▪ Morbidity of child	+ + +
▪ Positive family support	+	▪ Poor appetite of child	+ + +
		▪ Irritability of child	+ + +
		▪ Displacement of wholesome foods with water and biscuits	+ +
		▪ Child wants only breast milk	+ +
		▪ Lack of family support	+
Active feeding			
▪ Paying attention to child while feeding	+ +	▪ Feeding child forcefully or with anger	+ +
▪ Feeding child in company of others.	+		
▪ Making special foods for the child	+ + +		
Feeding protective foods			
▪ Father purchasing fruits despite cost	+ + +	▪ Child finds vegetable spicy	+ +
▪ Purchasing fruits rather than less nutritious items	+	▪ Fruits and vegetables are expensive	+ +
▪ Keeping aside boiled, less spicy vegetables for child	+ +	▪ Child dislikes taste	+ +

Table continued..

Reasons for positive change	Frequency of responses@	Reasons for negative change	Frequency of responses@
Hygiene			
▪ Soap is available hence used	++	▪ Lethargy-disinclination to fetch soap to wash hands	+++
▪ Family elders insist on washing hands with soap	+	▪ Forget to use soap	++
▪ Mother likes child to appear clean	++	▪ Mother believes that water alone is enough.	+
		▪ Family elders believe washing hands is not required	+
		▪ No time to reheat food	+

@: + <40%, ++ 40-60%, +++ >60%

To quote the mothers:

- *'Hun vadhaare aapun ane ae bi maange chhe'* (I give more quantity of food and child also asks for it).
- *'Kaam to aakha divas hoye pan ene khavdava maate to ene saathe besvu pade ne'* (House work continues entire day but to feed him I have to sit with him).
- *'Balak khatar shaak baafi kadhiye chhe/modhu shaak kaadhiye'* (I boil vegetable for the child/ keep aside vegetable without adding chillies).
- *'Kulfi mein 1-1 rupiya kharch karne se accha hai ki bacche ke liye kela laun'* (Rather than spending 1-1 rupee in ice-candy it is better that I get banana for the child).
- *'Uske papa ko pata chala ki phal khilane ko kaha hai to raat mein hi sab le kar aaye'* (When her father came to know that I have been told to feed fruits to her, he got fruits in the night itself).
- *'Balak nu sandaas saaf karu to mara sasra mara ane aena haath sabu thi dhovanu kahe chhe'* (After I clean child's feases my father-in-law asks me to wash child's as well as my hands with soap).

'Sabu to chaluj che nahvanu ke kapda dhovanu' (Soap is always available either bathing soap or one used for washing clothes).

Reasons for Lack of Change in Feeding Behaviour

The likely deterrent factors obstructing positive beahviour change were mainly child related factors such as dislike by child towards certain foods, poor appetite and irritability (**Table 4.44**). These factors were associated with illness episodes of the child in a few cases. The refusal of child to take food resulted in some mothers (40-60%) feeding the child with force or anger. However, to overcome these factors

patience and persistent efforts to feed child would be required. Other reasons were mother's lethargy ('I do not feel like'); her not being convinced to change a particular practice (washing hands with soap), lack of family support and economic constraints.

Box 4.4 Factors Impeding Behaviour Change, Voices Of Few Mothers...

- *'Ae nathi khato to apde shun kariye? Bahu kakratiyo chhe'*
- If he does not eat what can we do? He gets easily irritated.
- *'Mando thayi gayo, etle khaye na, dhaave na, paatdu thayi gayo'.*
  Child has become ill, so does not eat, does not breastfeed, has become weak.
- *'Biscuit vadhare khaye chhe elte khato nathi. Jo hun biscuit nahi aapun to ena pappa mane vadh se'.*
  He (child) eats more biscuit and so does not eat. If I do not give biscuit then his father would scold me.
- *'Gussa ata hai, marti hun. Muh se thuk deta hai, dudh to bar-bar nahi desakte. Dar batati hun, par nahi khata'.*
  I get angry, I beat him. He spits the food out of mouth, I cannot give him milk frequently. I scold him but he does not eat.
- *'Mara sasu ena mate kai vastu banawa na de, kahe ke monghvari chhe'.*
  My mother-in- law does not allow me to make special foods for the child; she says it would be costly.
- *'Shaak nathi laya, vadhare shaak nathi lavta mongha hoye'.*
  We did not get vegetables, it is costly.
- *'Ghadi-ghadi saabu kaun laave'?*
  Who will fetch soap again and again to wash hands?
- *'Sirf paani se haath dhoti hun, paani se saaf ho jate hain'.*
  I wash hands only with water, they become clean with water.
- Grandmother: 'H*ath saaf hoye chhe. Kai naa thaye. Dad maan rame, kai naa thaye. City wada ne badhu thaye ahin avu nathi'*
  The child's hands are clean. Nothing would happen. The child plays in mud. Children in city have problems; here it is not like that.
- *'Hun ekli chokri nu ketlu dhyan rakhu? Ketlu ramadu? Ana papa galat habit maan avi gaya.. Pehla to ae ghare rahe, chokri ne ramade, paan haave to ae nahi sudhre emnu tension chhe pachi chokra ne rakho, ghar nu kaam karo, ketlu kaam karvanu"*?
  How much can I alone care for my daughter? How much can I play with her? Her father has got into bad company. Earlier he stayed at home, played with our daughter, but now he will not change, I have his tension and then I also have to take care of the child, do housework, how much can I work?

Box 4.4 Continued..

- *'Chokara karta kutra (pet) vahla ena pappa ne. Pehla ena pappa nu sachvanu pachi balak nu sachvanu. Ena pappa chokra mate kai kaam na kare, kahe tarej mota karvanu. Maro chokro mama ne tyan saaru thai ne aave. Tyan bhains chhe, tyan mane koi tension nathi ke chokara shun khaye. Nani, nana khavdave, beeja chokra jode vadhare khaye'.*
  His father is more fond of the pet dog than the children. First I have to take care of my husband and then children. My husband does not do any work for the children; he says you only have to take care of them. My son returns healthy from his maternal uncle's house. There they have buffalo, over there I have no tension of what children eat. Child's grandparents (maternal) feed him, child also eats more in other children's company.
- *'Kone khabar khaadu ke nahi. Amne ketlu kaam hoye, mein pan savar thi nathi khadu. Baaju maan lagan chhe, papdi venva jaavu chhe'.*
  Who knows whether the child has eaten or not. We have so much work; I have also not eaten from the morning. There is a wedding at my neighbours place, I have to go there to help in making *'papdi'* (fried snack made of rice flour).
- *'Mag nathi baafya. Khaali ena mate shun karvanu? Lagan nu time chhe. Maari mummy maandi chhe to emnu bi dhyan rakhvu pade chhe'.*
  I did not boil whole green gram (pulse) for the child. What is the need to make especially for her? It is marriage season. My mother is also ill so I also have to take care of her too.

Effect of Various Socio-Economic Factors on Practice Scores of Mothers in Intervention Group

As **Figure 4.19** shows, the IYCF practice scores for the child were higher with higher percapita income of family (≥ 500 Rs.), higher education of mother (>7 years) and higher education of father (>8 years). While the score of the practice of hand washing after child defecation was positively influenced if the percapita income was high and if the mother was older (**Figure 4.20**). Other socio-economic variables such as type of family (joint vs. nuclear), child's birth order (first vs. second or higher) and sex of the child (boy vs. girl) showed no trend as regards IYCF or hygiene practices.

Figure 4.19 Association of Various Socio-Economic Factors (Resources of Caregiving) with IYCF Practice Scores in the Intervention Group (N=62)

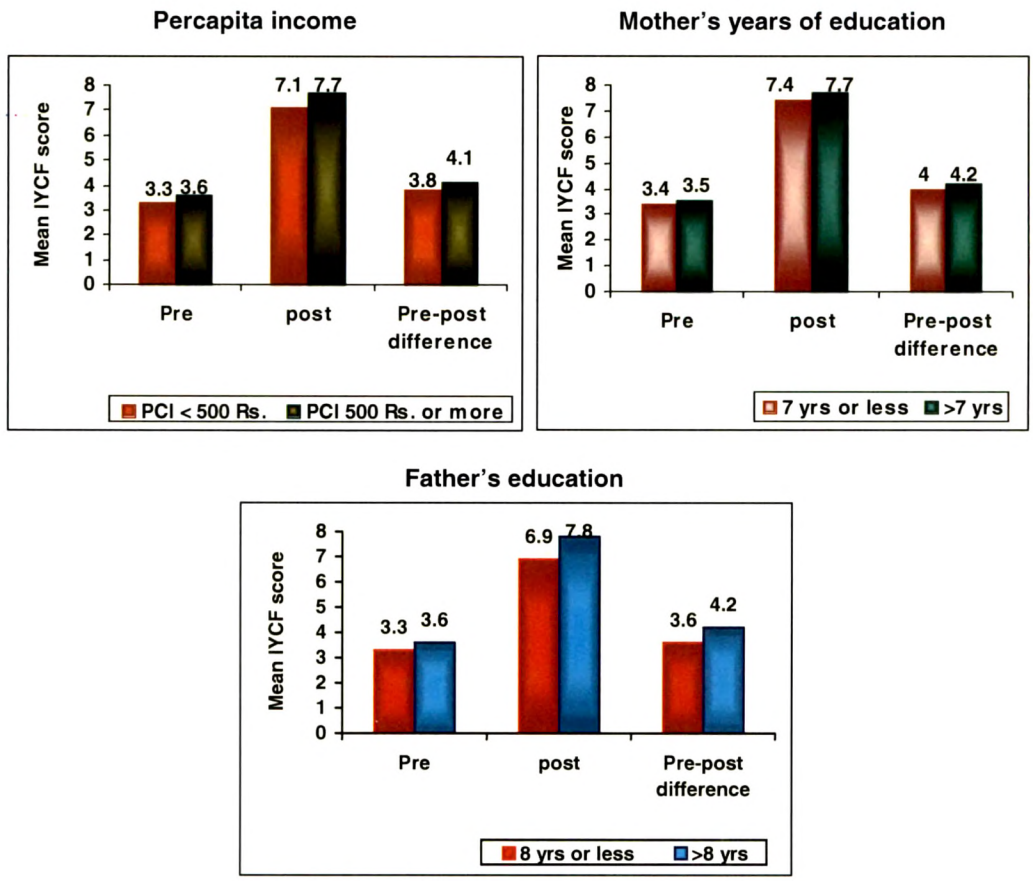
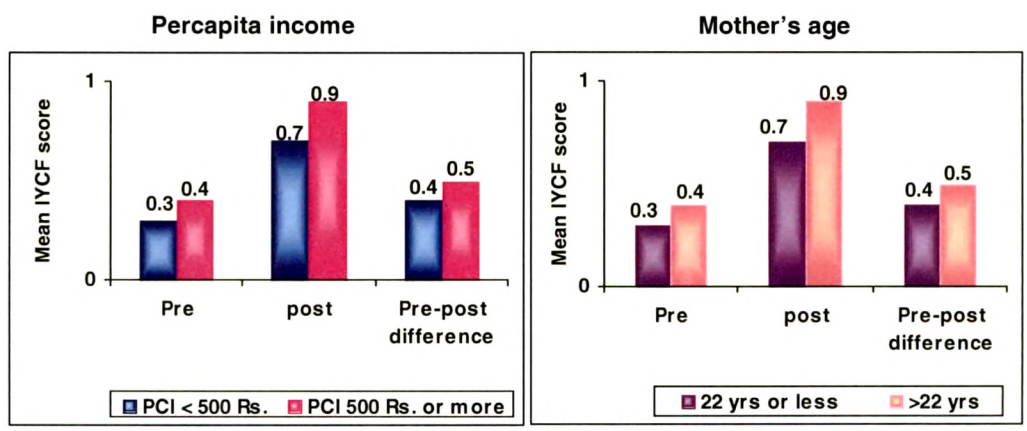


Figure 4.20 Association of Various Socio-Economic Factors (Resources of Caregiving) with Score of Hand Washing After Child Defecation: Intervention Group (N=62)



Discussion

Overall, the intervention group showed remarkable improvement in the perceptions and behaviours of mothers related to IYCF as compared to control. Mothers in the intervention villages were able to recall most of the NEC messages. The positive change in knowledge and practice scores in NEC-DIR was somewhat better than in NEC-BMM. However, even in the NEC-BMM, involving the local community woman's groups towards behaviour change/nutrition education communication for improved IYCF and Care practices proved to be a useful strategy. Higher the number of home visits, more significant was the impact on IYCF practices. The observation data also confirmed the presence of several favourable practices; though the proportion observed was less as compared to the reported data. Further, only a few mothers were observed to feed appropriate quantity of food to the child.

Several studies appear in literature which have documented the significant and positive impact of well designed and well implemented NEC intervention to improve complementary feeding and these are summarized in **Table 4.45**. It is clearly evident that the mobilization of community volunteers undertaken in various studies was successful in significantly improving breastfeeding, complementary feeding, growth monitoring and health care practices in the intervened families having children below two years. The major factors contributing to impact were delivery of specific and simple yet reason/benefit based messages which included benefits, regularity of contact with the mother through home visits or community based sessions, a family or community based approach rather than a narrow focus on severely malnourished, implementing a judicious mix of interventions including health services, effective training and monitoring support, selection of local, socially aware women as Change Agents and support from the Government health–nutrition functionaries.

Table 4.45 Community Based NEC Interventions: Impact on Child Feeding Knowledge- Practices and Care

Author and year	Place	Nature of intervention	Key findings
The Linkages project, 2002 & 2006	Madagascar	Utilization of trained community-based volunteers-members of Women's Groups (including members of micro credit) to: ▪ Disseminate messages related to breastfeeding - child nutrition with the use of IEC materials through home visits ▪ Conduct educational sessions at the community health center, participate in national or commune-sponsored health/nutrition events, and promote Essential Nutrition Actions (ENA) in their daily activities (n=4300 women representing 259 different groups in 2 provinces).	▪ Community based women volunteers successful in reinforcing nutrition messages locally. ▪ Positive behaviour changes among mothers seen regarding infant feeding practices: reduction in the percentage of mothers giving their infants complementary foods prior to 6 months, increased dietary diversity in terms of higher consumption of recommended foods like fish/shellfish, fruits/vegetables and oils/fats ($p<0.01$). ▪ Feeding frequency remained low. ▪ Significantly more children (84% vs 78%) had their hands washed before eating, but the use of soap much lower.
Guldan et al, 2000	China	▪ A year-long rural community-based pilot nutrition education intervention (n =250 infants each in Education and Control groups) undertaken in four rural townships. ▪ Village nutrition educators trained and mobilized to make monthly growth monitoring and complementary feeding counseling visits to all pregnant women, and families with infants born during the intervention in the study villages.	▪ A majority (64%) women stated visits. ▪ The Education group (E) mothers showed significantly higher nutrition knowledge and better reported infant feeding practices than their Control (C) group counterparts: giving fruits and eggs, daily rice porridge, fish/meat broth after 6 months. ▪ Significantly more education group mothers than control mentioned these foods as those which would help the child to grow well. ▪ Mothers in the E group reported to feed their infants (7–9 months) significantly ($p<0.05$) more times than the mothers of the C group infants (1.6 ± 1.3 times vs. 1.3 ± 1.1 times). ▪ Hygiene practices reportedly improved in E group.

Table continued...

Author and year	Place	Nature of intervention	Key findings
Bhandari et al, 2004	Haryana, India	▪ Community based study cluster randomized controlled trial carried out in 8 communities : 4 received the intervention (developed through formative research) and the other 4 no specific feeding intervention ▪ Health - nutrition workers in the intervention communities trained to counsel on locally developed complementary feeding recommendations through monthly home visits, monthly meetings conducted by the ANMs for community representatives; who in turn held monthly neighborhood meetings and conducted group activities through women's groups.	▪ Higher proportion of caretakers in the intervention communities spontaneously recalled being counseled on optimal complementary feeding practices as compared to those in control. ▪ An increase in intake of certain complementary foods (milk based gruels or cereal-pulse mixes and recommended snacks), active feeding (feeding with love and affection, trying repeatedly if the child did not eat, making the child sit in the mother's lap and feeding the child with other family members) and hygiene practices (washing own and child's hands before feeding, P<0.0001 at 18 months).
Nandan, 2004	Agra, India	▪ Training of 831 socially aware women (Bal Poshan Mitra 'BPM') from 152 villages backed by community support system in two rural community development blocks (as part of a larger community mobilization program). ▪ The BPM's followed up initially at monthly basis and then every 3 months for reviewing their activities and solving their problems. ▪ The BPM's concentrated their activities on 'at risk' families (pregnant and lactating women, children <2 years and severely malnourished children <5 years) and promoted specific beahviour changes at community level through counseling.	▪ Since the messages came from a member of a community, the message too was easily accepted ▪ The BPM's able to successfully improve maternal and child health and nutrition practices. ▪ Conclusion: sustainability of social change is more likely if individuals and communities which are most affected participate in the process, own the process of communication and be owners of their own change
Kilaru et al, 2005	Karnataka, India	▪ Monthly nutrition education in 11 randomly and 2 purposively selected villages delivered by locally trained counsellors targeted at Caregivers of infants aged 5-11 months (n=173 intervention, 69 control).	▪ Significant differences observed in the feeding of bananas, with intervention infants being more likely to eat these (33%) compared to non-intervention infants (4%).

Table continued...

Author and year	Place	Nature of intervention	Key findings
		▪ The key counseling messages included in the study focused on: preparation and use of developmentally appropriate local foods; appropriate feeding frequency; gradually increasing food diversity; complementary feeding followed by breastfeeding and avoidance of feeding bottles.	▪ Intervention infants significantly more likely to be fed at least four times in a day in addition to breast milk (78% versus 51%) and to receive foods from at least five different food groups (42% versus 19%) in comparison to non intervention infants
Sethi et.al, 2003	Delhi, India	▪ Nutrition education to mothers in slums (n=35 with infants 5-19 months) over two months to improve infant feeding practices. ▪ Based on the lacunae emerging from the formative research.	▪ The post nutrition-education results revealed an improved awareness about infant feeding among mothers. ▪ An improvement seen in variety, quantity and consistency of the complementary foods fed. ▪ Conclusion: nutrition education programs of shorter duration using a 'communication mix' of channels, with repeated reinforcement, could bring about improvement not only in awareness but also in infant feeding practices.
Kapur et al, 2003	Delhi, India	▪ A community-based, randomized trial carried out in an urban slum to compare the effect of nutrition education and/or weekly iron supplementation for 4months on iron status of children (9-36 months) assigned to 4 groups (Group 1: nutrition education, Group 2: supplementation with 20 mg elemental iron, Group 3: nutrition education with supplementation, Group 4: placebo & control). ▪ The messgages in nutritoin education pacakage: healthy child feeding practices (EBF; timely introduction of CF; appropriate consistency, quality and quantity of CF, feeding family foods, hygiene regarding child feeding) and Iron deficiency anemia – causes, symptoms and prevention (through diet).	▪ The nutrition education group and nutrition education cum supplementation group mothers showed significantly higher nurtrition knowledge scores $p < 0.001$). ▪ The specific beliefs that showed improvement ($p<0.001$) in nutrition education group related to: EBF for 4-6 months, feeding children 4-5 times a day, providing variety of foods in the child's diet, putting the child on to the family food by one year, reducing the milk intake and giving more solid food. ▪ Recommendation: dietary diversification through nutrition education & dietary iron availability through fortification on long term basis would possibly control moderate to severe anemia in growing children.

Table continued...

Author and year	Place	Nature of intervention	Key findings
Brown et al, 1992	Bangladesh	▪ Volunteers (n=8) taught complementary feeding (home demonstrations of recipes, ways of enriching meals, feeding vegetables and fruits) to rural families of 62 breast-fed infants aged 6-12 months.	▪ Messages persuasive and memorable. ▪ Mothers in the intervention group offered more quantity of foods, more frequently and energetically. Higher proportion of intervention children were eating fish, vegetables and oil as compared to control. ▪ Recommendation: incorporating nutrition messages in other development programs like income generation may enhance the impact of the education.
Roy et al, 2005	Bangladesh	▪ Intervention for reducing the extent of malnutrition (6-24 months moderately malnourished children) and to change behaviour of mothers relating to child-feeding practices, Caregiving, and health-seeking practices under the Bangladesh Integrated Nutrition Project (BINP). ▪ The study groups (n=94 each group) comprised mothers receiving: intensive nutrition education (food security, caring practices, and disease control) twice a week for three months (INE group), same nutrition education and additional supplementary feeding to their children (INE+SF group) and nutrition education from the community nutrition promoters twice a month according to the standard routine service of BINP (comparison group).	▪ After three months of intervention and six months of observation the use of separate feed plate, frequency of feeding, and cooking of additional complementary feeds improved significantly in the INE and INE+SF groups compared to the comparison group. Mothers began to feed foods like oil and eggs, which were earlier considered too strong, gas producing, and indigestible for young children. ▪ The intervention messages were not generalized but specific, 'oversimplified health-education' messages were less effective. ▪ Conclusion: nutrition education can be an effective means of behaviour change and reducing moderate malnutrition in children. It should be scaled up in communities and should involve the community to build culturally-based skills for long term nutrition goals. However, it needs to be considered that success was achieved through intensive work by well-trained health assistants.

Table continued...

Author and year	Place	Nature of intervention	Key findings
Penny et al 2005 and Robert et al, 2006	Peru	▪ A cluster-randomized trial of an educational intervention in a poor peri urban area to enhance the quality and coverage of existing nutrition education in six government health facilities compared with six control facilities ▪ A birth cohort of 187 infants from the catchment areas of intervention centers and 190 from control areas enrolled and followed up to 18 months. ▪ The key messages of nutrition education: feeding thick food preparation, including special foods and active feeding.	▪ Positive changes in practices of mothers among intervention as compared to control: feeding nutrient-dense thick foods at lunch at 6 months (p=0·03), recall of three important foods and encouraging child to eat in case of reduced appetite. ▪ The degree of Caregiver exposure to the intervention linked to number of key messages recalled and improved feeding behaviours. Caregiver message recall associated with improved feeding behaviour (p< 0.001).
Hotz and Gibson, 2005	Malawi, Africa	▪ Specific, locally adapted complementary feeding practices promoted among mothers with children 6-23 months in 3 intervention and 1 control community (increasing energy density of food, methods to increase bioavailability of iron and zinc, enrichment of complementary food with energy and nutrient dense foods and active feeding). ▪ Trained community Health Committee members and local Health Surveillance Assistants disseminated the nutrition messages through group sessions and follow up home visits.	▪ Nutrition education resulted in adoption of the feeding messages (10-25%) by intervention mothers leading to improved complementary feeding practices and quality of complementary foods (significantly more animal protein was consumed in intervention than control group).

Reasons for behaviour change: in the present research, mother's verbatim statements revealed the reasons behind the favourable change in IYCF practices: mothers acceptance and incorporation of the messages, family support especially from the father. The reasons for lack of change were linked to child's illness and irritability, lack of family support, mother's indifference towards the importance of practice and poor economic status. In other intervention studies the reasons reported for not following the complementary feeding messages promoted were: time limitations of the agriculturally involved mothers, influence of widespread beliefs about infants being too small to digest the recommended foods and a belief that 'child does not like the food' (Guldan et al 2000) and 'the child refused to have more food' (Brown et al 1992).

As regards gender differences, both boys and girls in this study benefited from the intervention except for a few indicators: for example scores indicating hygiene during child feeding were significantly higher for girls in intervention vs. control which was not so for the boys. Secondly the overall complementary feeding practices significantly improved for both boys and girls in NEC-DIR indicating gender sensitivity whereas the impact was significant only for boys in NEC-BMM indicating that the BM members were not sufficiently gender sensitized and did not perhaps encourage mothers to take better care of their girl children. Studies by Brown et al (1992) in Bangladesh and Bhandari et al (2004) in Haryana among children 6-18 months found no significant gender differences in complementary feeding. Whereas in a study in rural Karnataka intervention girls (aged 5-11 months) were more likely to report at least 4 of the 6 positive feeding behaviours than non-intervention girls (Kilaru et al 2005).

Summing up the above section, BM members appeared to be effective change agents for improving child feeding, hygiene and Care behaviours in their neighbourhood women and such micro-credit groups need to be mobilized in programs to reduce malnutrition.

Table 4.46 Morbidity History of the Child: Comparing the Intervention Groups

Item	Intervention group (N=62)				NEC-BMM (N=32)				NEC-DIR (N=30)				Control (N=30)			
	Pre		Post		Pre		Post		Pre		Post		Pre		Post	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Child fell ill (last 15 days)																
▪ Yes	37	59.7	25	40.3	17	53.1	9	28.1*	20	66.7	16	53.3	18	60.0	17	56.7
▪ No	25	40.3	37	59.7	15	46.9	23	71.9	10	33.3	14	46.7	12	40.0	13	43.3
Type of illness																
▪ Fever	14	37.8	12	48.0	4	23.5	5	55.6	10	50.0	7	43.8	9	52.9	6	35.3
▪ Cold/cough	29	78.4	8	32.0***	15	88.2	3	33.3*	14	70.0	5	31.3*	14	84.2	14	82.4
▪ Diarrhoea	4	10.8	11	44.0**	1	5.9	3	33.3	3	15.0	8	50.0	3	17.6	2	11.8
Mother thinks fever was																
▪ Severe	6	42.9	5	41.7	1	25.0	1	20.0	5	50.0	4	57.1	4	44.4	2	33.3
▪ Not severe	8	57.1	7	58.3	3	75.0	4	80.0	5	50.0	3	42.9	5	55.6	4	66.7
Mother thinks cold/cough was																
▪ Severe	12	41.4	4	50.0	5	33.3	2	66.7	7	50.0	2	40.0	5	35.7	5	35.7
▪ Not severe	17	58.6	4	50.0	10	66.7	1	33.3	7	50.0	3	60.0	9	64.3	9	64.3
Mother thinks diarrhoea was																
▪ Severe	2	50.0	6	54.5	0	0.0	1	33.3	2	66.7	5	62.5	1	33.3	2	100.0
▪ Not severe	2	50.0	5	45.5	1	100.0	2	66.7	1	33.3	3	37.5	2	66.7	0	0.0
Treatment given:Doctor's medicine																
▪ Fever	11	78.6	5	41.7	3	75.0	1	20.0	8	80.0	4	57.1	7	77.8	6	100.0
▪ Cold/cough	12	41.4	4	50.0	4	26.7	0	0.0	8	57.1	4	80.0	11	78.6	10	71.4
▪ Diarrhoea	1	25.0	7	63.6	0	0.0	0	0.0	1	33.3	7	87.5	3	100.0	2	100.0

Significant difference (pre to post within each group): *p<0.05, **p<0.01, ***p<0.001, Base N from which percentage values have been calculated varies and depends on presence of illness, Some responses are multiple responses hence % may exceed 100

Change in Prevalence of Morbidity

As **Table 4.46** indicates, post intervention child morbidity (past 15 days) declined by 20% in intervention group while the fall was only by 3% in control; the decline being significant in NEC-BMM as compared to the control. Morbidity episodes among children in NEC-DIR village also reduced after intervention but this decrease was not significant perhaps because the environment surrounding the village in NEC-DIR intervention was unsatisfactory; with an open gutter passing outside the houses in the village. Fever, cold and diarrhoea were the most common illnesses among the children. Incidence of cold decreased significantly among both intervention groups (from pre to post). However, the prevalence of diarrhoea increased significantly in the intervention group (NEC-BMM and NEC-DIR) post intervention while in control there was a small decrease. One reason could be *increase* in unsafe food intake of the intervened children (if proper food safety was not maintained). Mothers may have started giving more food to children after receiving NEC but may not have taken due precautions to ensure food safety.

As regards treatment seeking behaviour, most of the children were taken to the doctor during illness.

Studies have suggested that mild diarrhoea is more common in children eating more complementary foods (Manjrekar et al 1985). Children in both intervention villages had better intake of complementary foods than control thus leading to higher occurrence of diarrhoea, perhaps because of unsafe feeding practices. This might have further compromised the nutritional status in terms of weight gain in the children in NEC-BMM and NEC-DIR.

Change in Food Intake of the Children

This section gives the results of the impact of the intervention with regard to change in consumption of various foods groups as well as intake of nutrients (mean % RDA) among the children in intervention and control villages. This information had been elicited from a 24-hour dietary recall (previous day) both pre and post intervention. The actual intake of various food groups and nutrients by the children has been compared with appropriate recommended dietary allowances (RDA) as mentioned earlier.

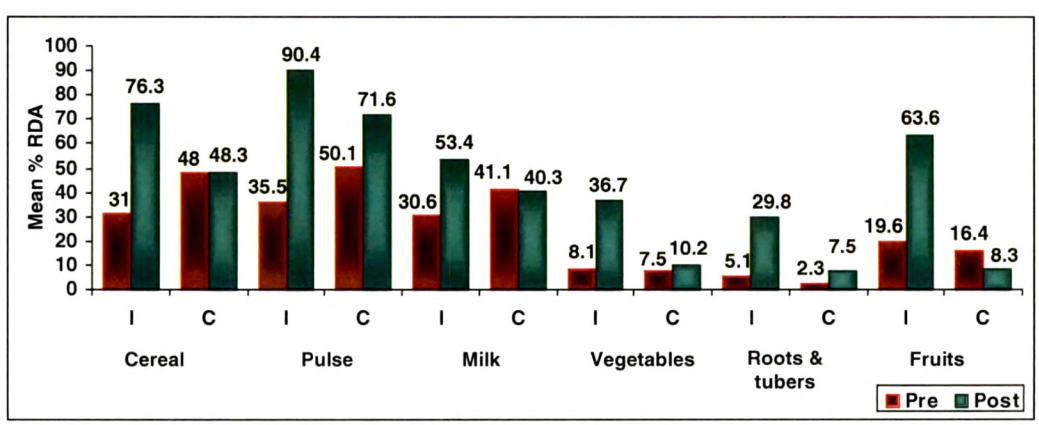
Intake of different food groups

Intervention vs. Control group: **Figure 4.21 A** and **B** show that post NEC, while there was a significant increase in the mean intake as % RDA for all the food groups in the intervention group, there was no significant increase in the control group. For vegetables, roots – tubers, fruits, oil and sugar the consumption remained relatively low as compared to other foods both pre and post intervention.

Comparing intervention groups: As **Figure 4.22** indicates, post NEC, intake of cereal, pulse and milk – milk products increased significantly in both NEC-BMM (A) and NEC-DIR (B). About 51-96% of the RDA was met post intervention. The control village showed negligible change.

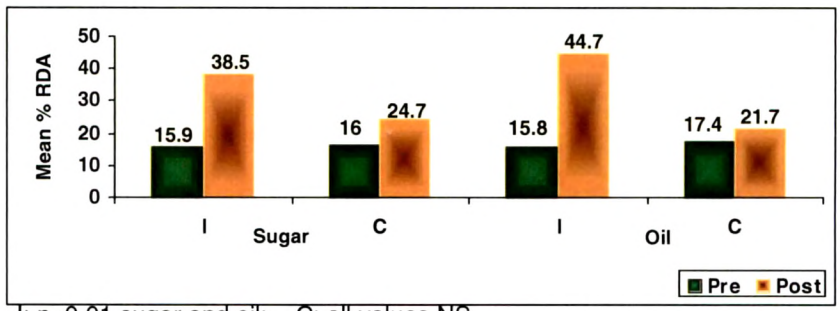
Figure 4.21 Change in Intake of Food groups (Mean % RDA): Comparing Intervention (I) and Control (C) Groups

(A)



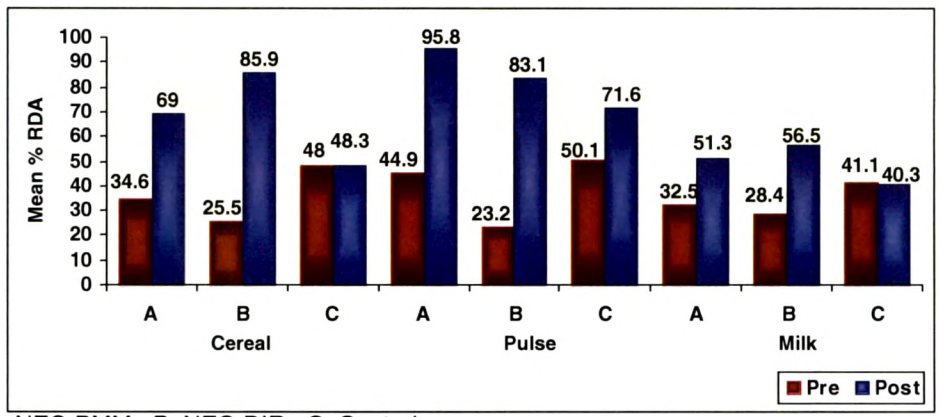
I: p<0.001cereal, pulse, milk, roots & tubers, p<0.01 vegetables, p<0.05 fruits
C: all values NS

(B)



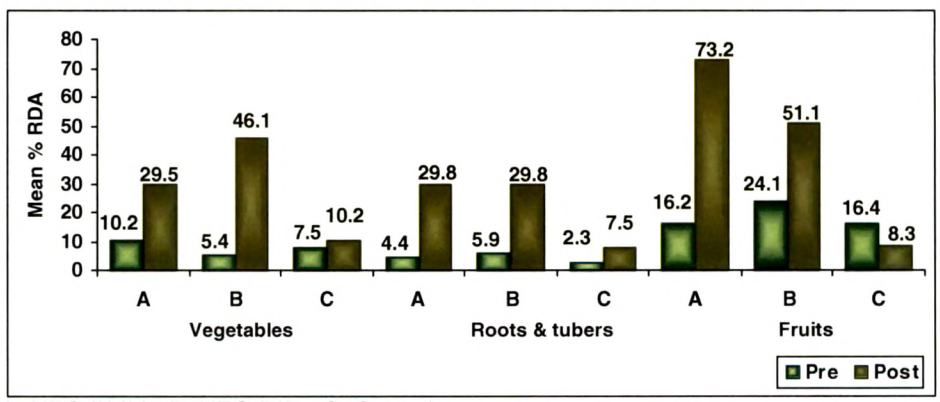
I: p<0.01 sugar and oil; C: all values NS

Figure 4.22 Change in Intake of Cereal, Pulse and Milk (Mean % RDA)



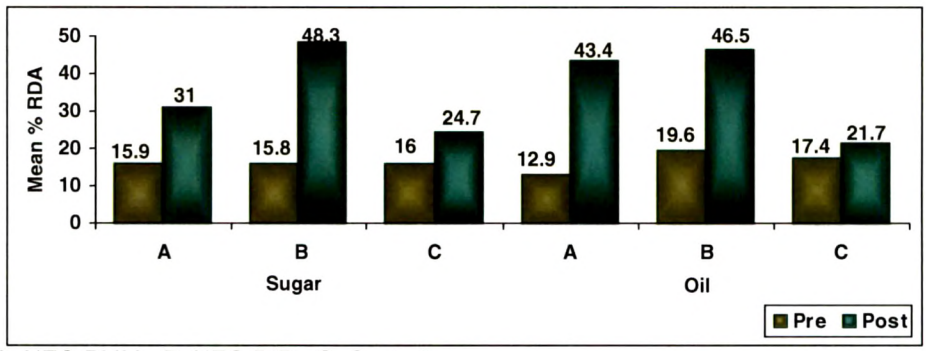
A: NEC-BMM, B: NEC-DIR, C: Control
Cereal: p<0.001 A, p<0.001 B, Pulse: p<0.01 A, p<0.001 B, C: all values NS
Milk: p<0.05 A, p<0.01 B,

Figure 4.23 Change in Intake of Vegetables and Fruits (Mean % RDA)



A: NEC-BMM, B: NEC-DIR, C: Control
Vegetables: p<0.05 B Fruits: p<0.05 A C: all values NS
Roots & tubers: p<0.01 A & B

Figure 4.24 Change in Intake of Sugar and Oil (Mean % RDA)



A: NEC-BMM, B: NEC-DIR, C: Control
Sugar: p<0.05 A, p<0.001 B Oil: p<0.001 A, p<0.01 B C: all values NS

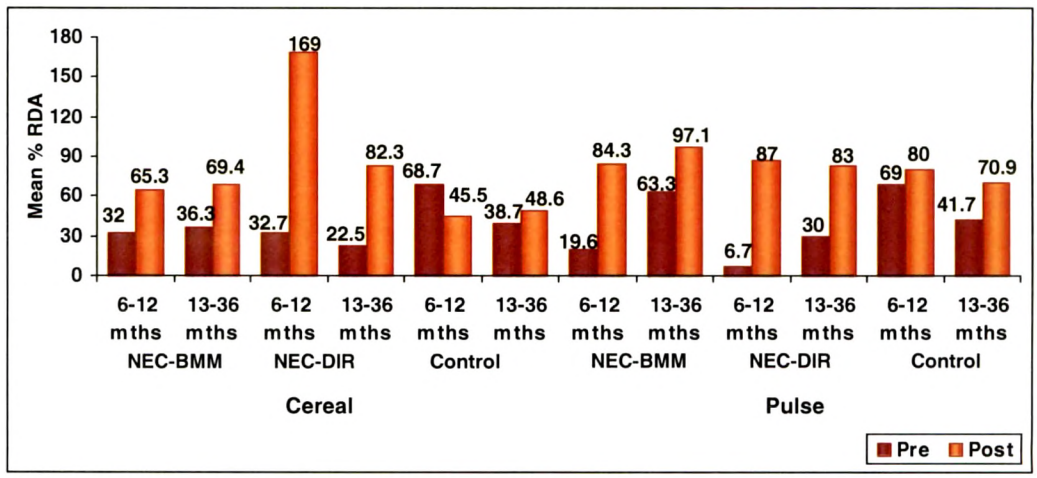
Figure 4.23 and 4.24 continue to show a similar trend. In both NEC-BMM (A) and NEC-DIR (B) groups, the mean intake of vegetables, roots – tubers, fruits, oil and sugar increased significantly while control group continued to show similar intake from pre to post intervention.

Despite increase in intake, post intervention, intake of most food groups continued to be below 50% of the RDA.

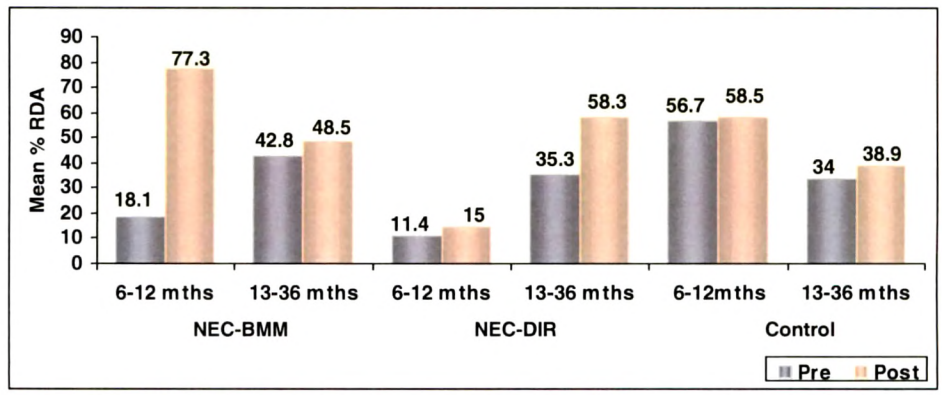
Figure 4.25 compares the younger (6-12 months) and older children (13-36 months) with regard to impact on intake of various food groups as mean percent of the recommended values (RDA). The trend seen for most food groups was that younger children seem to benefit more from the intervention, since pre to post change is more marked among them as compared to the older children. This indicates the importance of initiating intervention as soon as the child reaches age of initiation of complementary feeding i.e. 6 months. The difference in impact (pre to post improvement) was more evident for cereal, pulse, milk – milk products, sugar and oil. However, the exception was for change in intake of fruits and vegetables where older children had greater improvement; infact for younger children in NEC-DIR either the intake remained unchanged after intervention or showed a decline. As regards control village, pre to post, intake of all the food groups either showed a marginal increase or showed deterioration.

Figure 4.25 Change in Intake of Various Food Groups (Mean % RDA) in Younger and Older Children

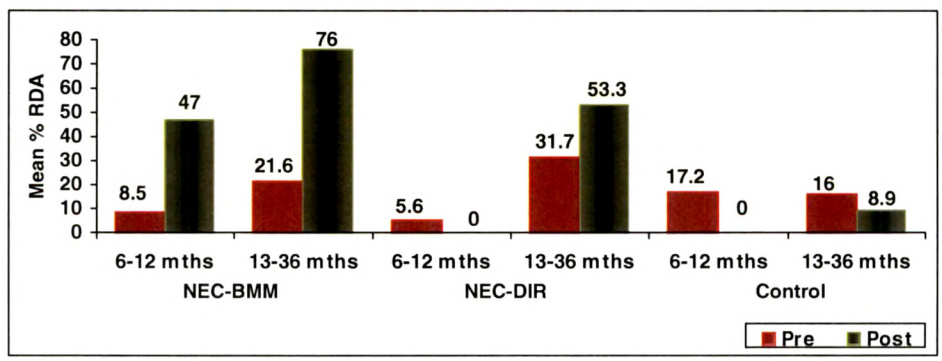
Cereal and Pulse



Milk and Milk products



Fruits



Sharma and Kanani, 2008

Vegetables and roots – tubers

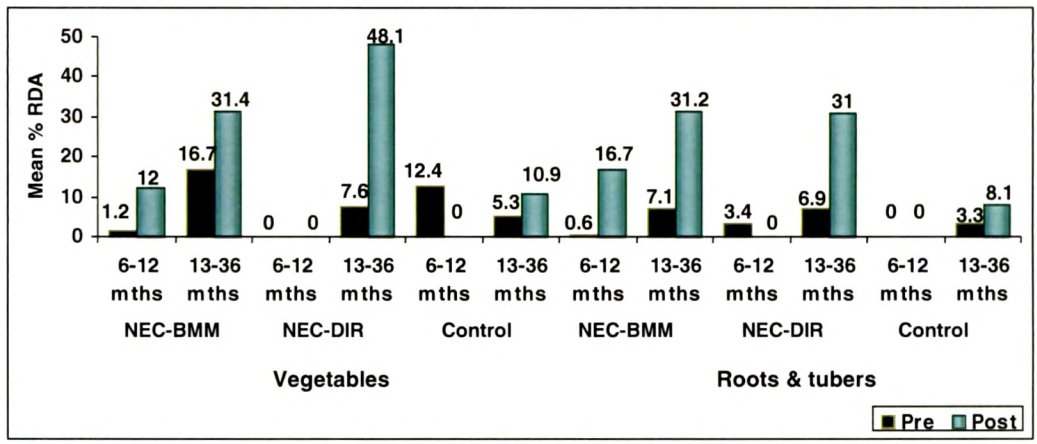
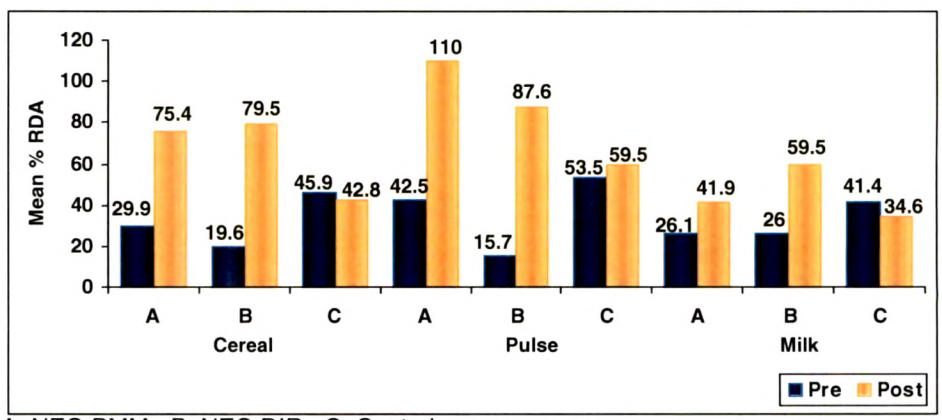


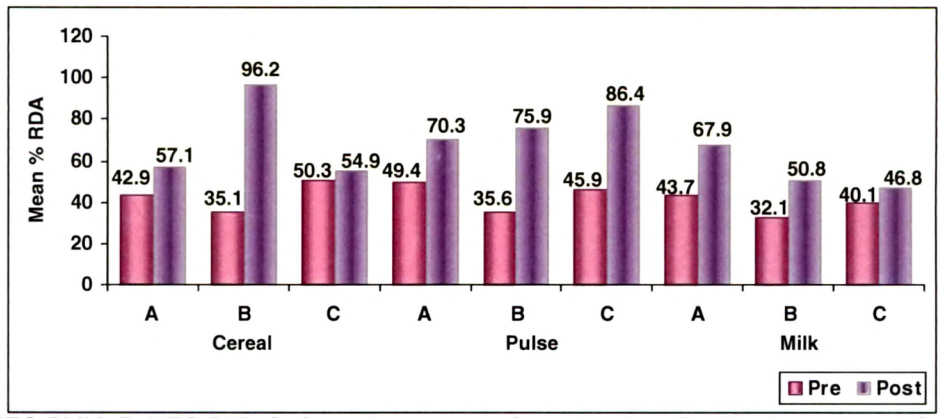
Figure 4.26 Change in Intake of Various Food Groups (Mean % RDA) in Boys and Girls

Boys **Cereal, pulse and milk & milk products**



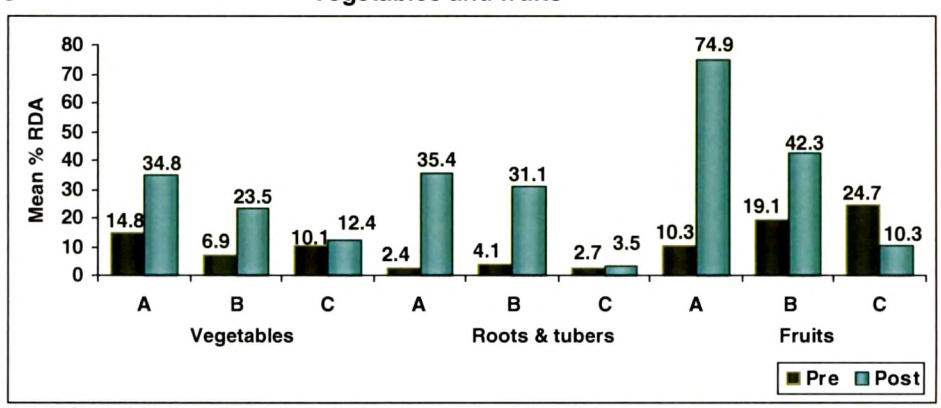
A: NEC-BMM, B: NEC-DIR, C: Control
Cereal: p<0.001 A, p<0.001 B Milk: p<0.05 B C: all values NS
Pulse: p<0.05 A, p<0.001 B

Girls



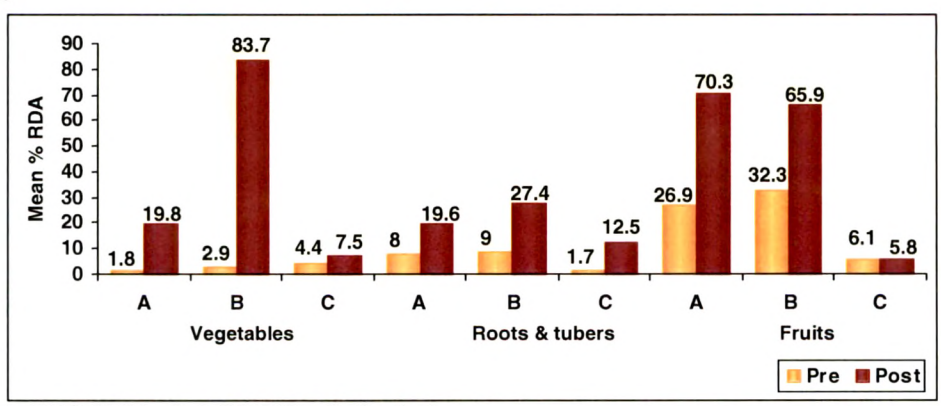
A: NEC-BMM, B: NEC-DIR, C: Control Cereal: p<0.01 B, All other values: NS

Boys **Vegetables and fruits**



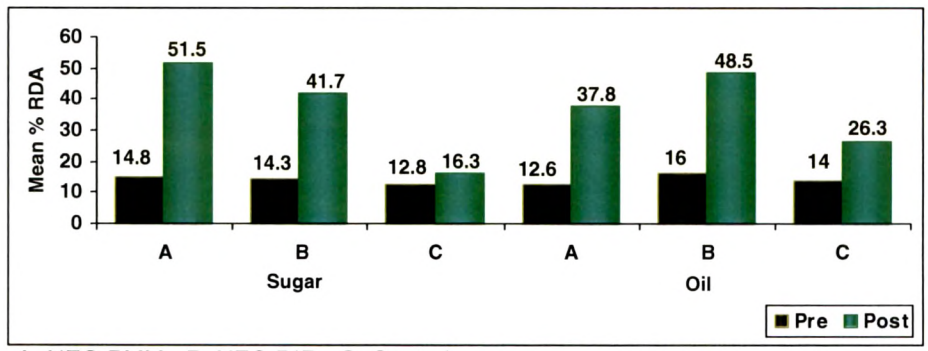
A: NEC-BMM, B: NEC-DIR, C: Control
Vegetables: p<0.05 B Fruits: p<0.05 A All other values: NS
Roots & tubers: p<0.05 A & B

Girls



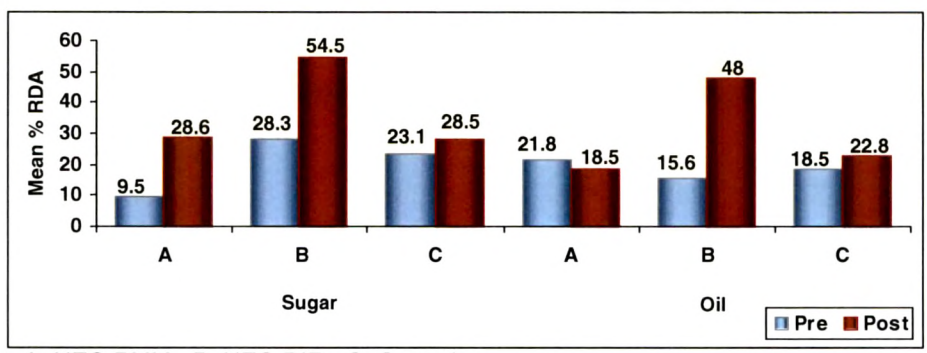
A: NEC-BMM, B: NEC-DIR, C: Control
Vegetables: p<0.05 B Fruits: p<0.05 A All other values: NS
Roots & tubers: <0.05 A & B

Boys **Sugar and oil**



A: NEC-BMM, B: NEC-DIR, C: Control
Sugar: p<0.01 A, p<0.001 B Oil: p<0.05 A, B & C All other values: NS

Girls



A: NEC-BMM, B: NEC-DIR, C: Control;
Oil: p<0.01 B All other values: NS

Gender differences: Comparing boys and girls in the intervention group, no consistent trends were observed as regards intake of different foods. **Figure 4.26** presents the food group intake among boys and girls in each intervention village and control. In NEC-BMM the intake of most of the food groups (cereal, pulse, roots – tubers, fruits and sugar) improved markedly for boys and not so much for girls. The intake of milk and vegetables remained the same among both sexes while that for oil improved among boys and showed no improvement in girls. However in NEC-DIR only the intake of pulse and roots – tubers was markedly more for boys than for girls. Intake of cereal, milk – milk products, sugar and oil showed similar improvement among both boys and girls. Further, consumption of vegetables and fruits showed prominent increase in girls and less for boys. Thus as regards intake of food groups, girls were better off in NEC-DIR than NEC-BMM perhaps because the investigator brought to attention of mother the neglect of the girl child which may not have been adequately

done by BM members in the NEC-BMM village. For control village, intake of the food groups either showed a negligible improvement from pre to post or showed deterioration among both boys and girls.

Nutrient intake

Intervention vs. Control groups: Comparing the intervention and control groups (**Table 4.47**) pre to post intervention, there was a significant increase in the consumption of energy, protein as well as vitamins and minerals (calcium, iron, vitamin A and vitamin C) expressed as percent RDA in intervention group. In control group, in contrast there was a negligible change in intake of nutrients; infact energy intake decreased. Post NEC, children in intervention group consumed above 70% of the RDA of all nutrients. However, the RDA met for micronutrients, especially vitamin A and C continued to be poor. One reason is continued poor intake of fruits and vegetables as seen earlier.

Table 4.47 Change in Nutrient Intake of the Children (Mean % RDA ± SE): Comparing Intervention and Control Groups

Nutrient	Intervention Group (N=55)			Control Group (N=29)		
	Pre	Post	t value	Pre	Post	t value
Energy (Kcal)	54.72 ± 5.1	98.76 ± 7.1	5.62***	80.41 ± 12.7	65.44 ± 8.3	2.08^{NS}
Protein (gm)	67.85 ± 7.1	141.63± 9.8	6.42***	95.48 ± 13.1	100.24 ± 12	0.50^{NS}
Calcium (gm)	37.16 ± 5.0	80.03 ± 11.4	3.81***	44.44 ± 8.9	43.89 ± 7.6	0.09^{NS}
Iron (mg)	33.12 ± 3.4	72.61 ± 6.4	5.82***	40.48 ± 4.3	50.31 ± 5.7	1.47^{NS}
Vitamin A (µg)	8.7 ± 1.2	27.09 ± 4.4	4.19***	10.79 ± 2.0	11.17 ± 2.0	0.09^{NS}
Vitamin C (mg)	19.61 ± 5.6	42.05 ± 6.2	2.74*	13.13 ± 3.2	16.17 ± 5.6	0.25^{NS}

*p<0.05, ***p<0.001, NS: non significant

As regards the gender differences (**Table 4.48**), boys showed significant improvement in the intake of all the nutrients from pre to post intervention. Similar results were obtained for girls except that the intake of vitamin C did not change significantly. However intake of most nutrients was better in girls as compared to boys both pre and

post intervention. In control village there were no significant differences from pre to post in boys and girls.

Table 4.48 Change in Nutrient Intake in Boys and Girls: Comparing Intervention and Control Groups (Mean % RDA ± SE)

Nutrient	Mean % RDA ± SE					
	Energy (Kcal)	Protein (gm)	Calcium (gm)	Iron (mg)	Vitamin A (µg)	Vitamin C (mg)
Intervention group						
Boys (N=35)						
Pre	49.82 ± 5.9	61.20 ± 8.8	34.85 ± 6.1	31.98 ± 4.1	7.82 ± 1.5	15.65 ± 5.3
Post	96.22 ± 9.0	136.60 ± 11.6	83.00 ± 16.5	69.88 ± 8.2	26.31 ± 5.5	39.62 ± 6.9
t value	4.53***	5.40***	2.82*	4.61***	3.29**	2.67*
Girls (N=20)						
Pre	63.30 ± 9.2	79.50 ± 11.7	41.20 ± 8.9	35.10 ± 6.2	10.30 ± 2.16	26.55 ± 12.2
Post	103.20 ± 11.5	150.45 ± 17.9	74.85 ± 12.8	77.40 ± 10.3	28.45 ± 7.31	46.30 ± 12.1
t value	3.25**	3.45**	3.98**	3.48**	2.54*	1.20^{NS}
Control group						
Boys (N=16)						
Pre	76.62 ± 17.4	91.37 ± 17.5	46.43 ± 11.4	38.43 ± 7	11.00 ± 2.6	12.37 ± 4.1
Post	61.62 ± 10.7	90.56 ± 14.1	37.68 ± 6.8	45.56 ± 6.8	10.00 ± 1.7	16.31 ± 8.4
t value	1.52^{NS}	0.06^{NS}	0.89^{NS}	0.83^{NS}	0.85^{NS}	0.41^{NS}
Girls (N=13)						
Pre	85.07 ± 5.4	100.53 ± 5.7	42.00 ± 4.1	43.00 ± 1.2	10.53 ± 0.9	14.07 ± 4.2
Post	70.15 ± 3.6	112.15 ± 5.7	51.53 ± 4.1	56.15 ± 2.7	12.61 ± 3.4	16.00 ± 5.9
t value	1.36^{NS}	0.81^{NS}	1.84^{NS}	1.21^{NS}	1.47^{NS}	0.20^{NS}

*p<0.05, **p<0.01, ***p<0.001, NS: non significant

Comparing intervention groups: **Table 4.49** reveals that in NEC-BMM and NEC- DIR, pre to post intervention, there was significant rise in the intake of energy as well as protein and close to or above 100% of the RDA was met for these nutrients. Further there was also a significant increase in the consumption of calcium and iron (72-85% of RDA) in both the villages. However, as seen earlier, the intake of vitamin A and vitamin C, inspite of showing a marked increase pre to post intervention; continued to remain much below the recommended allowances.

Table 4.49 Change in Nutrient Intake of the Children (Mean % RDA ± SE)

Nutrient	N	Pre	Post	t value
NEC-BMM	31			
Energy (Kcal)		61.45 ± 7.1	95.06 ± 9.7	3.22**
Protein (gm)		75.48 ± 10.3	137.67 ± 12.4	3.96***
Calcium (gm)		39.0 ± 6.4	85.03 ± 18.2	2.51*
Iron (mg)		34.71 ± 4.3	73.0 ± 9.4	3.98***
Vitamin A (μg)		8.45 ± 1.5	30.41 ± 6.1	3.68**
Vitamin C (mg)		20.54 ± 6.8	48.58 ± 9.9	2.35*
NEC-DIR	24			
Energy (Kcal)		46.04 ± 4.8	103.54 ± 1.9	4.99***
Protein (gm)		58.0 ± 9.2	146.75 ± 2.9	5.31***
Calcium (gm)		34.79 ± 8.2	73.58 ± 2.1	3.62**
Iron (mg)		31.06 ± 5.7	72.12 ± 1.5	4.29***
Vitamin A (μg)		9.08 ± 2.2	22.79 ± 1.1	2.13*
Vitamin C (mg)		18.41 ± 9.5	33.62 ± 1.0	1.41^{NS}
Control	29			
Energy (Kcal)		80.41 ± 12.8	65.44 ± 1.5	2.08^{NS}
Protein (gm)		95.48 ± 13.1	100.24 ± 2.1	0.50^{NS}
Calcium (gm)		44.44 ± 8.9	43.89 ± 1.4	0.09^{NS}
Iron (mg)		40.48 ± 4.3	50.31 ± 1.0	1.47^{NS}
Vitamin A (μg)		10.79 ± 2.0	11.17 ± 0.3	0.09^{NS}
Vitamin C (mg)		13.13 ± 3.2	16.17 ± 1.0	0.25^{NS}

*p<0.05, **p<0.01, ***p<0.001, NS: non significant

As regards gender differences, in NEC-BMM there was a significant increase in nutrient intake of boys (from pre to post) while for girls the increase was not significant except for calcium (**Table 4.50**). Whereas in NEC-DIR both boys and girls had significantly higher intakes; girls having better intakes than boys for all nutrients except calcium and vitamin A. Perhaps because, as pointed out earlier, the investigator brought to attention of the mothers the neglect of the girl child in NEC-DIR which might not have been done by BM members in NEC-BMM.

Table 4.50 Change in Nutrient Intake in Boys and Girls (Mean % RDA)

Nutrient	Mean % RDA ± SE					
	Energy (Kcal)	Protein (gm)	Calcium (gm)	Iron (mg)	Vitamin A (µg)	Vitamin C (mg)
NEC-BMM						
Boys (N=20)						
Pre	55.55 ± 7.9	69.40 ± 13.6	35.35 ± 8.4	35.80 ± 6.0	6.75 ± 1.7	19.70 ± 8.9
Post	98.45 ± 12.5	141.25 ± 15.2	89.55 ± 27.2	77.25 ± 12.4	26.25 ± 6.7	46.15 ± 10.4
t value	2.97*	3.45**	1.95 NS	3.27**	3.05*	1.80 NS
Girls (N=11)						
Pre	72.18 ± 13.6	86.54 ± 15.3	45.63 ± 9.8	32.72 ± 5.4	11.54 ± 2.6	22.09 ± 10.4
Post	88.90 ± 15.6	131.18 ± 22.1	76.81 ± 15.2	65.27 ± 14.6	38.00 ± 12.2	53.00 ± 21.5
t value	1.32 NS	1.92 NS	2.62*	2.18 NS	2.11 NS	1.44 NS
NEC-DIR						
Boys (N=15)						
Pre	42.20 ± 8.8	50.26 ± 9.4	34.20 ± 9.2	26.90 ± 5.1	9.26 ± 2.8	10.26 ± 3.2
Post	93.26 ± 13.4	130.40 ± 18.5	74.26 ± 13.9	60.06 ± 9.7	26.40 ± 9.6	30.93 ± 8.3
t value	3.48**	4.50***	2.55*	3.52**	1.67 NS	2.49*
Girls (N=9)						
Pre	52.44 ± 11.9	70.88 ± 18.9	35.77 ± 16.4	38.00 ± 12.5	8.77 ± 3.7	32.00 ± 24.9
Post	120.66 ± 16.1	174.00 ± 28.8	72.44 ± 22.6	92.22 ± 13.8	16.77 ± 4.9	38.11 ± 7.2
t value	3.55**	3.0*	2.90*	2.68*	3.17*	0.23 NS
Control						
Boys (N=16)						
Pre	76.62 ± 17.4	91.37 ± 17.5	46.43 ± 11.4	38.43 ± 7	11.00 ± 2.6	12.37 ± 4.1
Post	61.62 ± 10.7	90.56 ± 14.1	37.68 ± 6.8	45.56 ± 6.8	10.00 ± 1.7	16.31 ± 8.4
t value	1.52 NS	0.06 NS	0.89 NS	0.83 NS	0.85 NS	0.41 NS
Girls (N=13)						
Pre	85.07 ± 19.4	100.53 ± 20.4	42.00 ± 14.8	43.00 ± 4.3	10.53 ± 3.4	14.07 ± 5.2
Post	70.15 ± 13.2	112.15 ± 20.5	51.53 ± 14.9	56.15 ± 9.6	12.61 ± 4.2	16.00 ± 7.3
t value	1.36 NS	0.81 NS	1.84 NS	1.21 NS	1.47 NS	0.20 NS

*p<0.05, **p<0.01, ***p<0.001, NS: non significant

Discussion

Overall the food intake of the children in intervention villages (expressed as mean %RDA) improved post intervention as compared to no significant change in the control village. The intake of cereals and pulses was closest to the recommendations followed by milk and fruits. Despite increase in intake, post intervention, intake of vegetables, roots – tubers, sugar and oil continued to be below 50% of the RDA in both intervention villages. *As regards nutrient intake*, the mean intake as %RDA for nutrients improved markedly in NEC-BMM as well as NEC-DIR; not seen in control. However micronutrient consumption remained low in the intervention villages, perhaps due to continued poor intake of vegetables and fruits. *As regards gender differences*, boys showed better improvement in intake of various foods as compared to girls in NEC-BMM; while girls showed similar improvement as boys in NEC-DIR. Similarly in NEC-BMM the nutrient intake of boys (from pre to post) increased significantly while for girls the increase was not significant. Whereas in NEC-DIR, both boys and girls had significantly higher intakes; girls having better intakes than boys for most nutrients. The reason for this finding could be the investigator's efforts at gender sensitization in the NEC-DIR village – encouraging better care of the girl child. This may not have been addressed by BM members in the NEC-BMM village.

The above findings suggest that, the intervention involving women members of *bachat mandals* as change agents was successful in encouraging families to feed more (amount and variety) of complementary foods to their children; but more gender sensitization of change agents is required to ensure equal benefit to both girls and boys.

In India as well as other Asian countries, various community level IYCF interventions have demonstrated the positive impact on diet intake of the children. As part of a community educational intervention in rural Haryana, health-nutrition workers in the intervention communities counseled mothers of newborns (552 in 4 communities) on complementary feeding recommendations and followed up every 3 months till the age of 18 months (infant) while the control group received no counseling (n=473 infants in

4 communities). The energy intakes (P <0.001) were found to be higher in the intervention communities at 9 and 18 months of age due to increased intake of milk, other foods and the addition of extra oil to the food in the intervention communities at both 9 and 18 months of age. There was no interaction of gender with the overall energy intake at 9 or 18 months. However, the difference between the intervention and control groups in energy intake from milk at 18 month of age was greater for boys (505 ± 283 vs. 297 ± 178 kJ) than girls (458 ± 273 vs. 320 ± 162 kJ) (Bhandari et al 2004).

In a study carried out in urban slums of Delhi, nutritional counseling significantly improved non-breast milk energy intakes in intervention group infants (n=104) in comparison to the control group (n= 104 children where home visits were made to ascertain morbidity and no counseling was given). The average increase ranged from 280 to 752 kJ/d at different measurement points during the study (Bhandari et al 2001).

Another intervention study using monthly nutrition education delivered by locally trained counsellors targeted Caregivers of infants aged 5-11 months (n = 69 intervention and 69 control) in rural Karnataka. Comparison of outcomes revealed that intervention infants were significantly more likely to receive foods from at least five different food groups (dairy, cereal, protein, fruit, vegetables, oil and fat, sugar and savory snacks) in comparison to non intervention infants (42% versus 19%). According to the authors, their findings supported other evidence suggesting significant scope for improving feeding behaviour and growth through counselling and education (Kilaru et al 2005).

In rural Bangladesh, a community-based weaning intervention used volunteers (n=8) to teach complementary feeding to families of 6-12 months infants (n=62) (Brown et al 1992). Over 5 months from baseline to final evaluation, treatment children consumed a significantly greater percent of their energy and protein requirements from complementary foods than did control subjects. In fact the energy and protein

adequacy of food decreased in control children. Female children fared better than boys in the protein adequacy of their diets. No significant differences were noted between the treatment and control groups for vitamin A and iron adequacy of the diets. Further, greater proportion of treatment children consumed foods from all food groups at the final measurement as compared to control. These findings are similar to that of the present study. Further, in the present study also girls in NEC-DIR had better protein adequacy than boys.

An educational intervention was carried out in a poor periurban area of Peru to enhance the quality and coverage of existing nutrition education in six government health facilities and was compared with six control facilities (Penny et al 2005). From the catchment areas of intervention centers 187 infants and from control areas 190 infants were enrolled and followed up to 18 months. Fewer children in intervention (I) vs. control (C) showed nutrient deficits:

	Energy: at 8 months	Iron: at 8 months	Zinc
I	18%	91%	77%
C	27%	96%	87%

Calcium intake from complementary foods was also significantly higher at 18 months in the intervention group than in controls (mean 526 mg/day vs. 393 mg/day $p<0.05$). Children assigned to the intervention group had significantly higher intakes of energy from animal sources than did those assigned to the control groups at age 15 months and 18 months.

Another similar successful nutrition education intervention in Brazil involved nutrition counseling by trained doctors to mothers visiting health centers (n=424 children <18 months). Children in the intervention group were found to consume more mean energy (280.7 kJ more) and protein (4.3 gm more) and had higher zinc intake (10%) than those in the control group (Santos et al 2001).

Trained community health workers disseminated complementary feeding messages to mothers (children 6-23 months: three intervention and one control community) through group sessions and follow up home visits in rural Malawi in central Africa (Hotz and Gibson 2005). The intakes of energy, animal protein, niacin, riboflavin, calcium, iron and zinc (but not vitamin A), were significantly greater in the intervention compared to control group ($p<0.05$). The adequacy of nutrient intakes tended to be greater among children 12-23 months of age than among 9-11 months, with the exception of energy and calcium intakes.

Change in Nutritional Status of the Children

This section presents the impact of the intervention in terms of gain in weight and height and change in prevalence of undernutrition among the children.

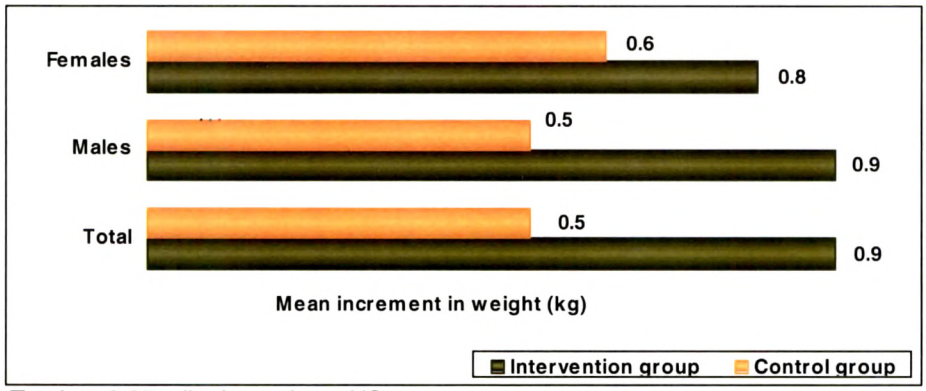
Mean increment in weight and height

At the outset it may be noted that the pre intervention mean values of weight-for-age, height-for-age and weight-for-height were not significantly different between the experimental and control groups despite the fact that control group values tended to be slightly higher at baseline vs. the intervention groups. Further, the focus of impact analysis is on changes that have occurred in the intervention and control groups.

Weight

Intervention vs. Control group: As **Figure 4.27** shows, the mean increment in weight of the children in the intervention groups (0.9 kg) was significantly higher than in control group (0.5 kg). Similarly the mean weight gain of the boys and girls (from pre to post), considered separately was also higher in the intervention group as compared to control, however, it was not significant, perhaps because of small sample size.

Figure 4.27 Mean Increment in the Weight of the Children: Comparing Intervention and Control Groups



Total: p<0.05, all other values: NS

Comparing intervention groups: **Table 4.51** shows that, post NEC the mean increment in weight of children in NEC-BMM and NEC-DIR was higher than in control village, the weight gain being significant in NEC-DIR. Gender differences were not significant except that boys in NEC-DIR had better weight gain as compared to those in control.

Table 4.51 Mean Increment in the Weight (kg) of the Children

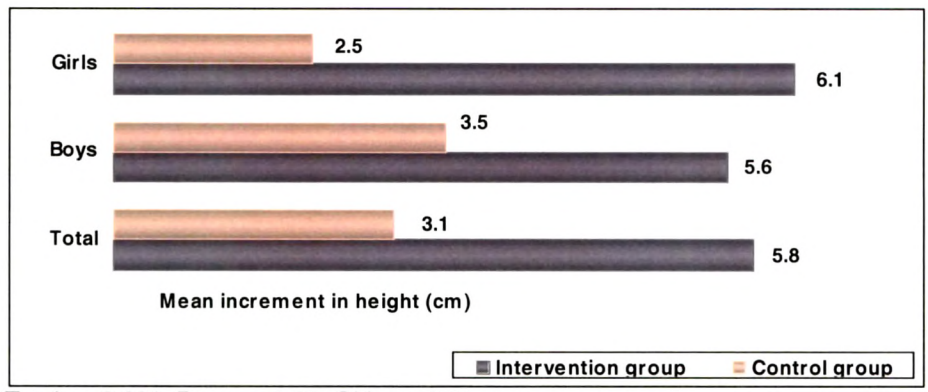
Study groups	N	Mean ± SE		Mean difference ± SE
		Pre	Post	
NEC-BMM (A)				
▪ Total	32	7.6 ± 0.2	8.3 ± 0.2	0.7 ± 0.1
▪ Boys	21	7.9 ± 0.2	8.6 ± 0.2	0.7 ± 0.1
▪ Girls	11	7.0 ± 0.4	7.8 ± 0.4	0.8 ± 0.1
NEC-DIR (B)				
▪ Total	30	7.6 ± 0.2	8.6 ± 0.2	1.0 ± 0.1*
▪ Boys	19	7.7 ± 0.2	8.8 ± 0.2	1.1 ± 0.6*
▪ Girls	11	7.5 ± 0.4	8.4 ± 0.3	0.9 ± 0.2
Control (C)				
▪ Total	30	8.1 ± 0.3	8.6 ± 0.3	0.5 ± 0.1
▪ Boys	17	8.4 ± 0.3	8.9 ± 0.3	0.5 ± 0.2
▪ Girls	13	8.0 ± 0.4	8.3 ± 0.4	0.6 ± 0.2

*B vs. C: significant p<0.05, All other pre vs. post difference between A, B and C are non significant

Height

Intervention vs. Control group: **Figure 4.28** compares the intervention and control groups. The mean increment in height of the children in intervention group was twice as much than that in control group ($p<0.001$). Further, looking at gender differences, both boys as well as girls in the intervention group had significantly higher mean increments in height as compared to control group.

Figure 4.28 Mean Increment in the Height of the Children: Comparing Intervention and Control Groups



Total: $p<0.001$, Boys: $p<0.05$, Girls: $p<0.01$

Table 4.52 Mean Increment in the Height (cm) of the Children

Study groups	N	Mean ± SE		Mean difference ± SE
		Pre	Post	
NEC-BMM (A)				
▪ Total	32	69.9 ± 1.2	72.5 ± 1.0	5.6 ± 0.5***
▪ Boys	21	70.6 ± 1.6	76.4 ± 1.3	5.8 ± 0.6*
▪ Girls	11	68.4 ± 1.9	73.7 ± 1.6	5.3 ± 0.7**
NEC-DIR (B)				
▪ Total	30	70.6 ± 1.2	76.5 ± 1.1	5.9 ± 0.5***
▪ Boys	19	70.6 ± 1.3	75.9 ± 1.5	5.3 ± 0.6*
▪ Girls	11	70.6 ± 2.3	77.5 ± 1.6	6.9 ± 1.1**
Control (C)				
▪ Total	30	72.1 ± 1.4	75.1 ± 1.3	3.1 ± 0.4
▪ Boys	17	73.3 ± 1.5	76.7 ± 1.3	3.5 ± 0.5
▪ Girls	13	70.5 ± 2.6	73.0 ± 2.5	2.5 ± 0.5

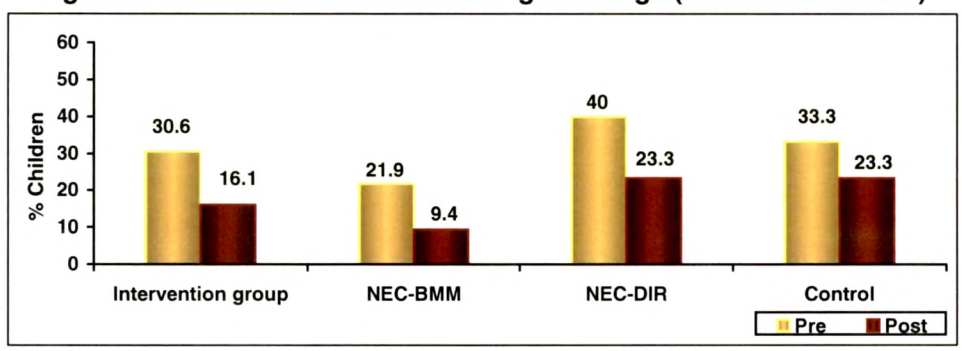
***A vs. C & B vs. C: $p<0.001$ for total
*A vs. C & B vs. C: $p<0.05$ for boys
**A vs. C & B vs. C: $p<0.01$ for girls
All pre vs. post difference between A & B are non significant

Comparing intervention groups: After the intervention the mean increment in height of the children in NEC-BMM (5.6 cm) and NEC-DIR (5.9 cm) was significantly higher than that in control (**Table 4.52**). This increase in height was similar in both the intervention villages. Further, the mean increment in height of boys and girls in the two intervention villages was significantly higher than their counterparts in control. Thus, linear growth seemed to be better enhanced from intervention compared to weight.

Weight-for-age as % standard (W-A)

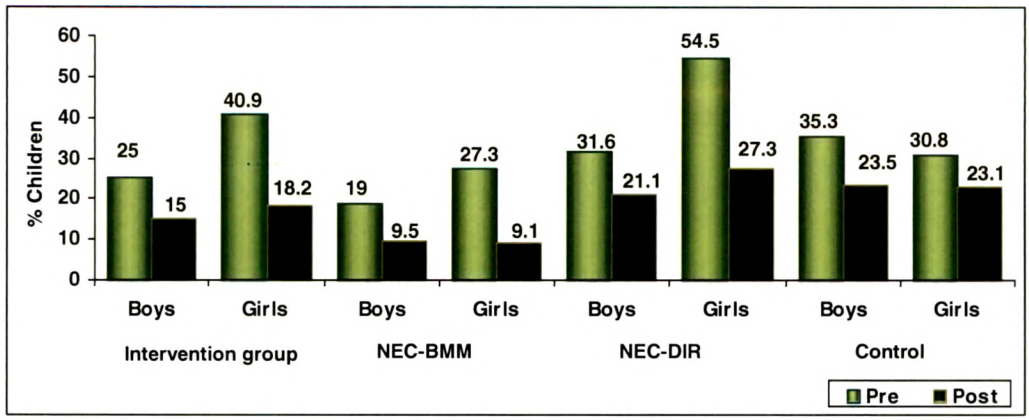
Figure **4.29** shows the change in the percentage of children who had normal W-A (% standard) i.e. who met ≥ 80% of standard for weight-for-age. Pre intervention, about 40% of the children in all the intervention villages as well as control had normal weight (W-A ≥ 80% of the standard). Post intervention this percentage declined by more than half in the pooled as well as individual intervention villages. On the other hand, in control the decline was less.

Figure 4.29 Children with Normal Weight-for-Age (≥ 80% of Standard)



Regarding gender differences, although before intervention more girls in the intervention villages had normal weight than boys, post NEC the decline of normal weight children was higher among girls (almost 20% points) as compared to the decline in boys (by 10% points) (**Figure 4.30**). In the control village the proportion of children with normal weight was similar among both sexes for both pre to post intervention

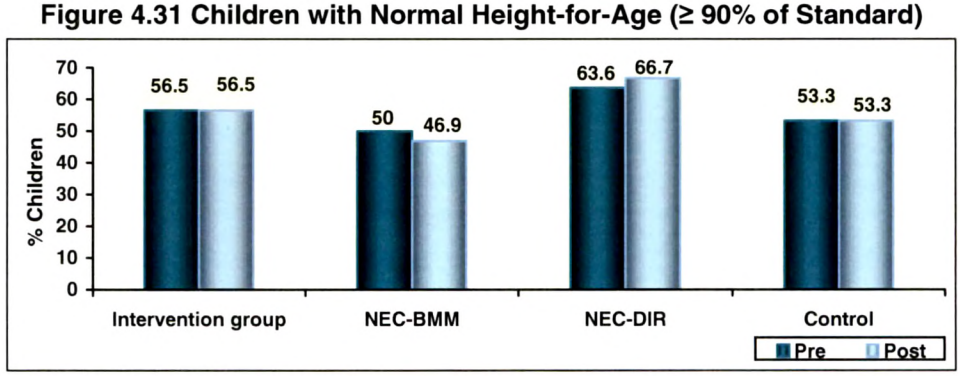
Figure 4.30 Boys and Girls with Normal Weight-for-Age (≥ 80% of Standard)



Height-for-age as % standard (H-A)

Figure 4.31 presents the change in nutritional status of the children in intervention groups, based on H-A ≥ 90% of standard. Considering the pooled intervention group, only half of the children had normal height (H-A ≥ 90% of standard) and this prevalence was constant from pre to post intervention. Only in NEC-DIR village the proportion of children who were not stunted increased while there was a slight decrease in NEC-BMM, and no change in control.

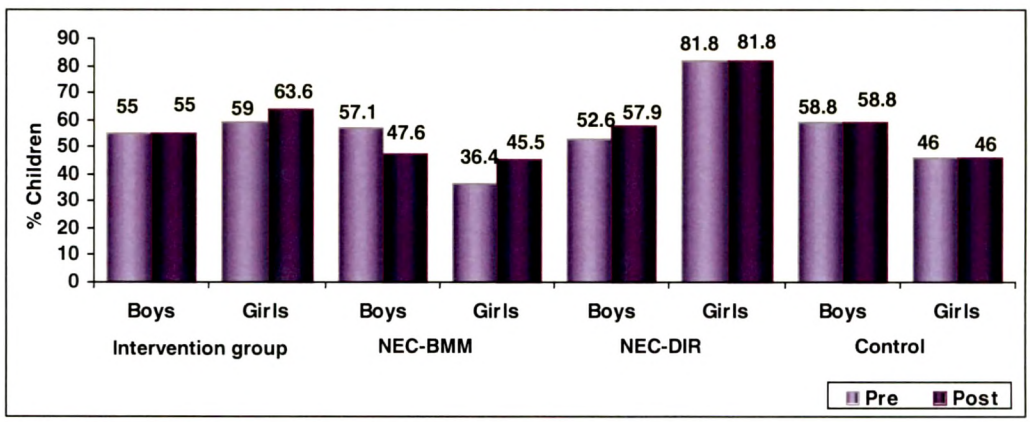
Figure 4.31 Children with Normal Height-for-Age (≥ 90% of Standard)



Regarding gender differences, it was interesting to note that post NEC more girls attained normal height while the percentage remained the same among boys in intervention group (**Figure 4.32**). In NEC-BMM even with a decrease in proportion of boys with HAZ ≥ 90% post intervention, boys continued to have lower prevalence of stunting as compared to girls. However, in NEC-DIR a contrasting trend was observed

with girls being better off than boys both pre and post intervention. While in control the children with H-A ≥ 90% remained unchanged in both sexes. The gender differences were found to be statistically insignificant.

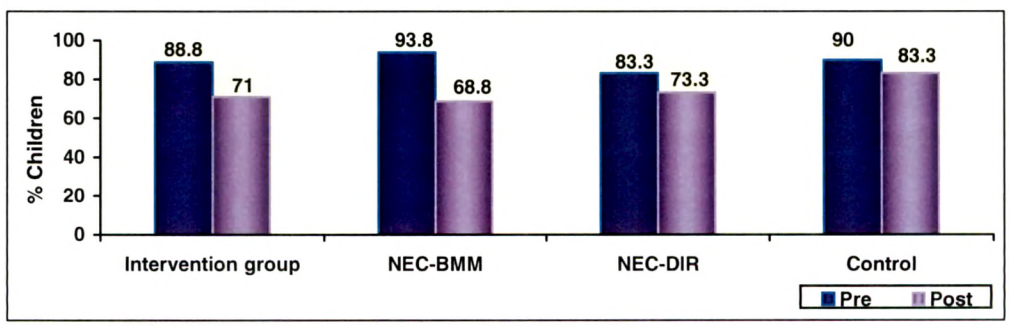
Figure 4.32 Boys and Girls with Normal Height-for-Age (≥ 90% of Standard)



Weight-for-height as % standard (W-H)

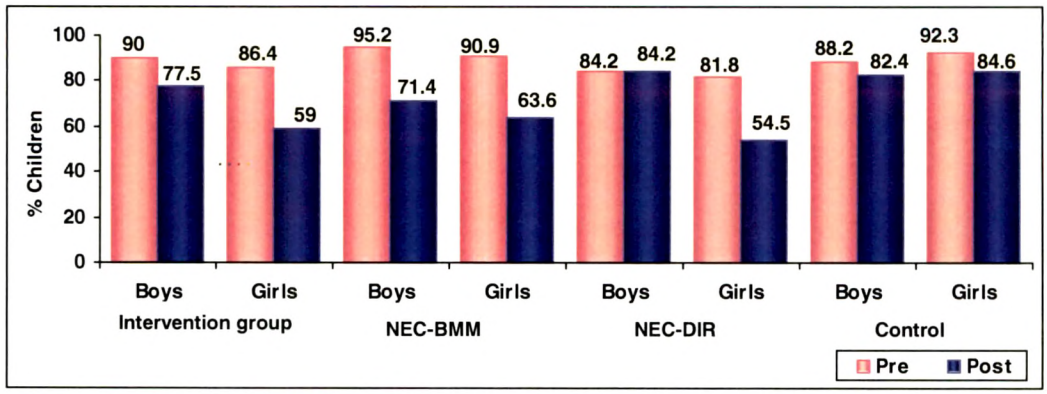
Considering the nutritional status of the children as measured by W-H, pre NEC, a majority of the children were not wasted with W-H ≥ 80% of the standard (**Figure 4.33**) for the pooled intervention group as well as individual villages: NEC-BMM and NEC-DIR. However pre to post intervention this proportion declined among all the villages especially in NEC-BMM. The only exception was among boys in NEC-DIR where the prevalence of normal W-H remained the same (84 %) from pre to post intervention (**Figure 4.34**).

Figure 4.33 Children with Normal Weight-for-Height (≥ 80% of Standard)



p<0.01: NEC-BMM Total

Figure 4.34 Boys and Girls with Normal Weight-for-Height (≥ 80% of Standard)



Weight-for -age Z scores (WAZ)

Intervention vs. Control group: **Table 4.53** indicates that before the intervention two third children in the intervention group and control group were underweight (WAZ<-2 SD); post intervention there was an insignificant rise in this prevalence among both the groups.

Table 4.53 Change in Nutritional Status of Children by Weight-for-Age[1] (WAZ) Z Score Values

Z score	Intervention group (N=62)		NEC-BMM (N=32)		NEC-DIR (N=30)		Control (N=30)	
	n	%	n	%	n	%	n	%
WAZ								
<-2 SD								
▪ Pre	41	66.1	24	75.0	17	56.7	18	60.0
▪ Post	50	80.6	28	87.5	22	73.3	23	76.7
<-3 SD								
▪ Pre	19	30.6	9	28.1	10	33.3	9	30.0
▪ Post	28	45.2	17	53.1*	11	36.7	10	33.3
≥-2 SD								
▪ Pre	21	33.9	8	25.0	13	43.3	12	40.0
▪ Post	12	19.4	4	12.5	8	26.6	7	23.3

Significant difference (pre to post within each group): *p<0.05, All other values: NS
1: as %NCHS standards (1983)

Comparing intervention groups: As evident from **Table 4.53** pre intervention, there was a high prevalence of underweight among children in all the 3 villages, with NEC-BMM having higher proportion of children with WAZ<-2 SD. Unfortunately, post intervention this prevalence of low weight for age showed a rise albeit

insignificant. However severe underweight (WAZ<-3 SD) increased significantly in NEC-BMM.

Height-for-age Z scores (HAZ)

Intervention vs. Control group: **Table 4.54** reveals the stunting prevalence of the children in intervention group and control group as assessed by Height-for-Age Z scores. In both the groups about two third of the children were stunted (HAZ<-2 SD) and about one third were severely stunted (HAZ<-3 SD) both before and after the intervention.

Comparing intervention groups: The proportion of children with severe stunting decreased by 3 and 7 percentage points in NEC-BMM and NEC-DIR whereas it increased by 4 percentage points in the control village (**Table 4.54**). However, majority children in NEC-BMM (81%), NEC-DIR (53%) and control (68%) continued to have HAZ<-2 post intervention, showing a slight rise from pre intervention.

Table 4.54 Change in Nutritional Status of Children by Height-for-Age[1] (HAZ) Z Score Values

Z score	Intervention group (N=62)		NEC-BMM (N=32)		NEC-DIR (N=30)		Control (N=30)	
	n	%	n	%	n	%	n	%
HAZ								
<-2 SD								
▪ Pre	39	62.9	24	75.0	15	50.0	19	63.3
▪ Post	42	67.7	26	81.3	16	53.3	20	66.7
<-3 SD								
▪ Pre	23	37.1	14	43.8	9	30.0	10	33.3
▪ Post	20	32.3	13	40.6	7	23.3	11	36.7
≥-2 SD								
▪ Pre	23	37.1	8	25.0	15	50.0	11	36.7
▪ Post	20	32.3	6	18.8	14	46.6	10	33.3

1: as %NCHS standards (1983)

Weight-for-height Z scores (WHZ)

Intervention vs. Control group: The prevalence of wasting (WHZ<-2 SD) increased post intervention, in both intervention group and control (**Table 4.55**).

Comparing intervention groups: As **Table 4.55** indicates prevalence of wasting increased significantly from pre to post intervention in NEC-BMM. In case of NEC-DIR village although the prevalence of wasting was higher (WHZ<-2SD: 30%) than in NEC-BMM village, post intervention it decreased to 27%. In Control village there was an increase in children with WHZ<-2 SD, post intervention.

Table 4.55 Change in Nutritional Status of Children by Weight-for-Height[1] (WHZ) Z Score Values

Z score	Intervention group (N=62)		NEC-BMM (N=32)		NEC-DIR (N=30)		Control (N=30)	
	n	%	n	%	n	%	n	%
WHZ								
<-2 SD								
▪ Pre	13	20.9	4	12.5	9	30.0	5	16.7
▪ Post	19	30.6	11	34.4*	8	26.7	6	20.0
<-3 SD								
▪ Pre	3	4.8	1	3.1	2	6.7	1	3.3
▪ Post	2	3.2	1	3.1	1	3.3	1	3.3
≥-2 SD								
▪ Pre	49	79.0	28	87.5	21	70.0	25	83.3
▪ Post	43	69.4	21	65.6	22	73.3	24	80.0

Significant difference (pre to post within each group): *p<0.05, All other values: NS
1: as %NCHS standards (1983)

Comparing age-wise and gender differences in Z scores

Younger vs. older children: Because of the small sample sizes the data are not shown in the tables; however a clear trend was seen wherein the older children (13-36 months) were clearly more underweight, stunted and wasted compared to younger children (6-12 months). Further, deterioration in nutritional status was also more evident compared to the younger children.

Gender: There was no clear trend according to gender as regards prevalence of underweight, stunting and wasting nor was the change in nutritional status significantly varying between boys and girls.

Why did the prevalence of malnutrition increase despite the intervention?

Considering the fact that there was a positive change in both knowledge and behaviour among the mothers in intervened villages as regards child feeding and Care, one needs to reflect why nutritional status did not improve in the children. The various possibilities are discussed in the next section.

Discussion

In this study, although the mean gains in terms of weight-for-age, height-for-age and weight-for-height in the children in the intervention villages improved significantly compared to the control values, the nutritional status as measured by percent standard values and Z scores, did not show any improvement post intervention. Infact there was an insignificant increase in malnutrition as judged by weight-for-age, height-for-age and weight-for-height. However, an encouraging observation was that the prevalence of severe stunting decreased from pre to post intervention in both NEC-BMM and NEC-DIR while there was an increase in control village. In general, younger children were less wasted and stunted than older children. No significant gender differences emerged as regards WAZ, HAZ and WHZ.

According to Sahn et al (1981) interventions have found a major impact on stunting but no impact on wasting among stunted child populations.

The six-year Linkages project (2002, 2006) in Madagascar as described earlier, utilized community-based volunteers; among them members of women's groups (including members of micro credit groups), to disseminate messages related to breastfeeding and child nutrition through home visits, educational sessions at the community health center and national or commune-sponsored health/nutrition events. An improvement was seen in the nutritional status of the children (6-24) with declining stunting levels, from 49% to 45% (from 2004 to 2005). There was an increase in severe underweight, from 5% to 9% ($p<0.05$) in the same year.

Table 4.56 Community Based NEC Interventions: Impact on Stunting More Evident Than Impact on Underweight

Author and year	Place	Nature of intervention	Key findings
Bhandari et al, 2004	Haryana, India	▪ Cluster randomized controlled trial carried out in 8 communities, 4 receiving the intervention (developed through formative research) and the other 4 no specific feeding intervention. ▪ Health - nutrition workers in the intervention communities trained to counsel on locally developed complementary feeding recommendations through various channels including home visits and group activities through women's groups. ▪ All newborns (552 in intervention and 473 in control groups) followed every 3 months to the age of 18 months.	Education group (E) vs. Control (C) group: ▪ Mean length gain: Small but significant effect on length gain in the E group as compared to C group. ▪ The effect was greater in the subgroup of boys. ▪ The proportion of children with Height-for-Age Z-score less than -2 SD did not differ between the 2 groups. ▪ Weight gain was not affected.
Bhandari et al, 2001	Delhi	▪ Controlled trial in urban slums, 418 infants 4 months of age individually randomized to one of the four groups and followed until 12 months of age. ▪ The first group: received a milk-based cereal and nutritional counseling and twice-weekly home visits for morbidity ascertainment ▪ The second group: monthly nutritional counseling alone and twice-weekly home visits for morbidity ascertainment. ▪ One control group: only twice-weekly home visits for morbidity ascertainment (visitation group) ▪ The fourth group: received no intervention.	▪ Weight increment: No significant benefit in the nutritional counseling group vs. visitation and the no intervention groups (WHZ≤-2: 12.4% vs. 15.4 and 16.1). ▪ The nutritional counseling group gained 90 gm more weight than did the visitation group during the entire study. ▪ Length increment: No significant benefit in the nutritional counseling group vs. visitation and the no intervention groups (HAZ≤-2: 63.9% vs. 75.8% and 74.2%).

Table continued...

Guldan et al, 2000	China	▪ A year long community-based pilot nutrition education intervention aimed to improve infant growth by monthly growth monitoring and complementary feeding counseling visits by trained village nutrition educators to families with infants born during the intervention (n=250 infants each in Education and Control groups).	Education group (E) vs. Control (C) group: ▪ Underweight (WAZ<-2): significantly lower in E group but only at 12 months. ▪ Stunting (HAZ<-2): significantly lower in E group but only at 12 months. ▪ Wasting (WHZ): no significant differences
Penny et al, 2005 and Robert et al, 2006	Peru	▪ Staff of six government health facilities trained for enhanced quality and coverage of existing nutrition education and compared with six control facilities. ▪ A birth cohort of 187 infants from the catchment areas of intervention centers and 190 from control areas enrolled and followed up to 18 months.	Education group (E) vs. Control (C) group: ▪ Stunting at 18 months (HAZ<-2SD): 5% E group vs. 16% C group. ▪ Adjusted mean changes in weight gain, length gain, and *Z* scores: significantly better in the E group vs. C group.

Other international and national community based intervention studies as highlighted in **Table 4.56** have shown relatively more impact on stunting than underweight reduction. One explanation given for effect on length gain was that **hygiene promotion** was a part of the intervention and improving hygiene and sanitation has been reported to improve linear growth (Esrey et al 1992). This points out to the importance of morbidity control for improving nutritional status through hygiene behaviours and better treatment seeking for illness. According to Bhandari et al (2004) in the Haryana study, the improvement in physical growth was less than that expected considering the substantial increases in energy intakes. The possible factors stated for limited effect of the intervention on physical growth were: low consumption of foods of animal origin, gender-related differences as regards impact and the inability to reach some households repeatedly, or not at all. According to the authors it was also conceivable that intrauterine development due to maternal malnutrition or other stresses may have effects on growth in postnatal life, which was not easily reversible. In the present study also, a similar trend was observed with significant improvement in nutrient intake but lack of positive impact on growth of children, though severe stunting did decline. Children in the present study were also consuming a predominantly cereal based diet with less than recommended amount of milk intake and limited animal protein.

Guldan et al (2000) reported in the China study that improved infant-feeding practices, may soften the sharp deterioration in nutritional status but may not promote catch-up growth to international norms unless the **socio-economic conditions** are improved.

On the other hand, many interventions have documented impact on weight and height gains

Table 4.57 summarizes the studies showing significant impact on malnutrition reduction. For example, Kilaru et al and Roy et al (2005) documented the impact of nutrition education given to mothers on body weight gain and reduction in underweight prevalence.

Table 4.57 Community Based NEC Interventions: Impact on Child Growth

Author and year	Place	Nature of intervention	Key findings
Brown et al, 1992	Bangladesh	▪ Community volunteers (n=8) counseled families of 6-12 months infants (n=62) regarding complementary feeding.	Education group (E) vs. Control (C) group: ▪ WAZ: Over 5 months, E group children gained on average 460 gm more in WAZ than the C group children and were 0.5kg heavier at final measure ($p<0.001$). ▪ Percent median WAZ (WAPM): WAPM of E group held steady at 76% of the reference (National Center for Health Statistics), vs. drop in WAPM of control subjects from 78% to 72%. ▪ Severe malnutrition (WAZ <-3): 5% in the E group vs. 26% in the C group. ▪ Gender differences in growth: not significant ▪ Morbidity: average number of days per month that children were ill (diarrhoea, respiratory illness or fever) similar for E and C groups.
Kilaru et al, 2005	Karnataka, India	▪ Monthly nutrition education delivered by locally trained counsellors targeted at Caregivers of infants aged 5-11 months in 11 randomly and 2 purposively selected villages.	▪ Weight velocity: Statistically significant improvement for E group girls vs. C group girls. ▪ Conclusion: Nutrition education can improve growth in poor households, and may be especially effective in regions where girls are socially discriminated against.

Table continued...

Author and year	Place	Nature of intervention	Key findings
Roy et al, 2005	Bangladesh	▪ Prospective randomized trial among moderately malnourished children in rural Bangladesh under the Bangladesh Integrated Nutrition Project (BINP). ▪ Included two intervention groups (n=94 each group). In one group: mothers received intensive nutrition education (INE). Another group: mothers receiving same nutrition education and additional supplementary feeding to their children in (INE+SF). Control group: Mothers received nutrition education from the community nutrition promoters twice a month according to the standard routine service of BINP.	▪ Underweight: Weight-for-Age median (>75% of median of the NCHS standard) improved in INE and INE+SF groups as compared to control (37% and 47% vs. 18%, $p<0.001$). ▪ Body-weight gain: Positively associated with frequency of feeding recommended foods i.e. *'khichuri'* (cereal-pulse preparation), egg, and potato ($p<0.05$).

Interventions often protect young children from deterioration in nutritional status. Thus while they may not improve they do not worsen like the controls do. Brown et al (1992) reported steady WAZ values in experimental group while a drop was seen in control group frequency (**Table 4.57**).

One factor influencing impact is the duration and intensity of nutrition education. In the Bangladesh study it was concluded that **intensive nutrition education** significantly improved the status of moderately malnourished children with or without supplementary feeding (Roy et al 2005). In the Peru study a birth cohort was followed for a long period of 18 months (Penny et al 2005).

Morbidity could be a major factor which dilutes positive impact of nutrition education interventions. This observation is supported by the fact that in a Brazilian study (explained earlier) where the nutrition intervention focused on treatment seeking at health facilities, children 1 year of age or more had significantly improved weight gain and a positive but non significant improvement in length was seen as compared to control (Santos et al 2001). In the present study a greater focus on health care seeking behaviours and illness management may have resulted in a positive impact on nutritional status. Prevalence of morbidity especially diarrhoea continued to be high in the intervention villages in this study. The reason for this could be perhaps lack of environmental hygiene, with an open gutter passing outside the houses in one of the intervention village. In addition, considering the increase in food intake of the children in intervention villages, food safety issues need to be addressed and examined further.

Thus, viewed together, the available studies suggest that the impact of educational interventions on weight and height gains may vary depending on several factors such as the baseline characteristics of the participants, nature, duration and intensity of nutrition education and the environment (in particular hygiene).

Summing up: The results suggest that members of local women's savings groups can become effective Change Agents in their community by giving them adequate training in the required communication skills, helping them to integrate nutrition and child Care messages as part of their routine work, and through supportive supervision. However, even if impact in feeding and Caregiving beahviours does occur, nutritional status may not significantly improve unless due attention is paid to personal and environmental hygiene; effective management of illnesses among children including boys and girls without gender discrimination. In view of this, the recent national program: Integrated Management of Neonatal and Child Illnesses (IMNCI), assumes great importance for the control of malnutrition in children. It is encouraging that the IMNCI strategy has a major child feeding and nutrition component alongwith illness management and effective client counseling methods.

Government efforts will not be adequate unless voluntary organizations and society at large address the issue of child malnutrition with a sense of urgency. Voluntary organizations need to play a greater role in seriously focusing on empowering communities through effective nutrition and health education, communication services.