CHAPTER 2: REVIEW OF LITERATURE

This chapter presents the literature reviewed in the area of undernutrition with special focus on children under two years, Optimal Infant and Young Child Feeding Practices, Growth Monitoring and Promotion and its role in prevention and cure of undernutrition and lastly national programs for prevention of undernutrition with special focused role of ICDS and their front line Anganwadi Workers (AWWs). The review is presented under the following heads:

A. Child Survival and Nutrition

1. Global Scenario

Approximately 10.8 million children under five years of age die each year globally, out of which 3.9 million are neonates. Further, as presented in Figure 1 the estimates for 2000 show that 38% of all deaths in children younger than age 5 years happen in the first month of life (Zupan and Aahman 2005). Two-thirds of infant deaths, i.e., about 120 million infants die during the first two months of life.

Figure 1: Causes of Mortality in Children under 5 years (2004)

Source: Black et al. 2008

In 2009, UNICEF reported 195 million stunted, 129 million underweight and 13% children under-five years as wasted in developing world (UNCIEF 2009). Although the prevalence’s of stunting and underweight among children under-five years of age worldwide have decreased since 1990, overall progress is insufficient and millions of children remain at risk. Globally, more than one quarter (26%) of children under 5
years of age were stunted in 2011 – roughly 165 million children worldwide (Figure 2). Further, an estimated 101 million children under 5 years of age were underweight, or approximately 16% of children under 5 (Figure 3). The children who suffer from wasting face a markedly increased risk of death. According to the latest available data, 52 million or 8% children under 5 years of age were moderately or severely wasted (Figure 4) and more than 29 million children under 5, an estimated 5%, suffered from severe wasting (UNICEF/WHO/WB 2012).

**Figure 2: Global Prevalence of Stunting: Percentage of Children under-5 years who are moderately or severely stunted**

Stunting prevalence is highest in sub-Saharan Africa and South Asia

![Stunting Map](source)

**Source:** UNICEF/WHO/WB 2012

**Figure 3: Underweight Prevalence: Percentage of Children under-5 years old who are moderately or severely underweight**

![Underweight Map](source)

**Source:** UNICEF/WHO/WB 2012
As a result globally, undernutrition contributes to nearly 35% i.e. three million deaths of children below five years of age (Black et al. 2008). Undernourished children who survive may become locked in a cycle of recurring illness and faltering growth, with irreversible damage to their development and cognitive abilities (Black et al. 2008). Malnutrition can start before birth and can persist throughout life. Many babies are born with low birth weight and micronutrient deficiencies. An estimated 3,564 of the world's children under 5 years of age die each day (1,301,000 each year*) from causes that are preventable by optimal breastfeeding. In addition, for every child who dies, hundreds of others are sick and miserable from illnesses preventable with optimal breastfeeding. These children are the world's future (Jones et al. 2003). Poor feeding practice during the first 2 years of life have immediate and often long term negative consequences on growth and development (AED 1999).

Shrimpton et al. 2001 showed that the mean weights start to falter at about 3 months of age and decline rapidly until about 12 months, with a markedly slower decline until about 18 to 19 months and a catch-up pattern after that. Growth faltering in weight for length/height is restricted to the first 15 months of life, followed by rapid improvement. For length/height for age faltering starts immediately afterward, lasting well into the third year. Thus they concluded that undernutrition patterns are similar globally. Most undernutrition happens in the first 2 years of life. After that it tracks at the same level. And much of this early damage is irreversible. Thus targeting children
either before birth or in the first 2 years of life is the “**WINDOW OF OPPORTUNITY**” to have an impact on undernutrition.

Further in 2010, Victora and Shrimpton *et al.* describing worldwide growth-faltering patterns by using the new World Health Organization (WHO) standards concluded that, the comparison of child growth patterns in 54 countries with WHO standards shows that growth faltering in early childhood is even more pronounced than suggested by previous analysis based on the National Center for Health Statistics reference. These findings confirm the need to scale up interventions during the window of opportunity defined by pregnancy and the first 2 years of life, including prevention of low birth weight and appropriate infant feeding practices.

2. **Indian Scenario**

Approximately 20% (Figure 5) of the world’s children are in India and yet there is disproportionate share of human development problems including a very high maternal and under 5 mortality (UNICEF 2007b).

![Figure 5: India’s Share of the Global Challenge](image)

**Source:** UNICEF 2007b. Countries with the largest numbers of children under five who are moderately or severely underweight, as a proportion of the developing world total (129 million children)

As mentioned in Figure 6, the prevalence of underweight among children is higher in Asia than in Africa. The rates are highest in Bangladesh, India, Timor-Leste and Yemen, with more than 40% of children underweight (UNICEF 2009).

The last National Family Health Survey-3 (NHFS-3) 2005-06 survey showed very high levels of malnutrition in India. As per NFHS-3, in India almost half of children under 5 years (48%) are stunted and 43% are underweight. Further, among children
under 3 years, 40.4% of children are underweight and 16% children are severely underweight and 22% are severely stunted (NFHS-3 2007). The NFHS-3 data for the state of Gujarat shows, 49.2% children under three years are stunted reflecting failure to receive adequate nutrition over a long period of time and also recurrent and chronic illnesses (NFHS-3 Gujarat 2008).

**Figure 6 : Contribution to the Underweight Burden**

*Note: Estimates are calculated using underweight prevalence according to the WHO Child Growth Standards and the number of children under 5 years old in 2008. Underweight prevalence estimates are based on data collected in 2003 or later with the exception of Pakistan (2001-2002). Source: UNICEF 2009 from MICS, DHS and other national surveys, 2003-2008*

3. **Etiology of Undernutrition**

Undernutrition often starts *in utero* and may extend throughout the life cycle. It also spans generations. Undernutrition occurs during pregnancy, childhood, and adolescence, and has a cumulative negative impact on the birth weight of future babies (Figure 7). A baby who has suffered intrauterine growth retardation (IUGR) as a foetus, is effectively born malnourished, and has a much higher risk of dying in infancy. Survivors are unlikely to catch up significantly on this lost growth and are more likely to experience developmental deficits. Moreover, the consequences of being born malnourished extend into adulthood. Strong epidemiological evidence suggests a link between maternal and early childhood undernutrition and increased adult risk of various chronic diseases.

According to UNICEF (1990) the synergistic interaction between the two immediate causes (inadequate dietary intake and disease) fuels a vicious cycle that accounts for much of the high morbidity and mortality in developing countries (Figure 8). The three groups of underlying factors are household food insecurity, inadequate maternal and child care, and poor health services in an unhealthy environment.
The link of inappropriate feeding practices and malnutrition has been long recognized and is a matter of serious concern. It has been suggested that the high prevalence...
rate of malnutrition among young children in India is not primarily caused by poverty, but rather relate to faulty infant feeding practices. Delayed initiation of breastfeeding, pre lacteal feeds, early introduction of top feeds and untimely and inadequate introduction of complementary feeds all lead to malnutrition (Ghosh 1997). Faulty feeding practices contribute to malnutrition through loss of breast milk and essential nutrients, infections and depriving the baby of care and stimulation. Such a situation calls for action and improving infant feeding practices offers one of the most practical solutions to help reduce malnutrition among young children (Gupta 2000).

4. Consequences of Undernutrition
The effect of undernutrition on young children (ages 0-8) can be devastating and enduring. It can impede behavioral and cognitive development, educability, and reproductive health, thereby undermining future work productivity. Malnourished children have delayed milestones and impaired cognitive development and are likely to be handicapped for life if an innovative approach is not adapted. Thus malnutrition impairs intelligence, strength, energy and productivity. A study by Government of India has established that the annual loss of productivity on account of malnutrition is of the order of more than Rs. 33,000 crores (BPNI and UNICEF 2003). Therefore, improvement in young children’s nutrition is desirable, not only for their expected positive impact on their physical growth, but also to reduce the risk and complications of infections and to maximize psychomotor development and school performance. Hence, appropriate feeding of children under two years is crucial for promoting health and preventing malnutrition (WHO 1995).

B. Optimal Infant and Young Child Feeding Practices
The UNICEF WHO Global strategy for Infant and Young Child Feeding, 2003 recommends:
- Initiation of breastfeeding immediately after birth, preferably within one hour.
- Exclusive breastfeeding for the first six months i.e., the infant receives only breast milk and nothing else, no other milk, food, drink or water.
- Appropriate and adequate complementary feeding from six months of age while continuing breastfeeding.
- Continued breastfeeding up to the age of two years or beyond.

The national guidelines on infant and young child feeding practices (IYCF) recommends; early initiation of breastfeeding (EIBF) within 1 hour of birth, exclusive breastfeeding (EBF) for the first six months of life, followed by continued breastfeeding for up to 2 years and beyond with adequate complementary food, as
the most appropriate feeding strategy for infants and young children (Tiwari et al. 2010). Translating the optimal IYCF practices to coverage of 90% is estimated to contribute to 19% reduction in the deaths of children under five years i.e., saving about 450,000 under five deaths in a country like India (Jones et al. 2003; BPNI Bulletin 2006). Therefore one of the fundamental priorities for improving the health and nutritional status of a child should be to achieve optimal feeding and caring practices for the child.

1. National Policy
The tenth five year plan has set specific nutrition goals for infant and young child feeding indicators with a view to bringing down the prevalence of underweight in children. Similarly, goals have been set for enhancing the infant feeding practices in the community. Even in 11th five year plan IYCF activities are under priority. The National Nutrition Policy adopted by the Government of India (GOI) under the aegis of the Department of Women and Child Development (DWCD) in 1993 laid due emphasis on nutrition and health education of mothers on IYCF and efforts to trigger appropriate behavioral changes among mothers were considered as direct interventions for reducing malnutrition in children.

Now with the adoption of the Global Strategy on IYCF by the 55th World Health Assembly in May 2002, and adoption of the Infant Milk Substitutes, Feeding Bottles and Infant Foods (Regulation of Production, Supply and Distribution) Amendment Act, 2003 by the Parliament in June 2003, the National guidelines on IYCF have been published by Ministry of HRD, DWCD, Food and Nutrition Board and GOI in 2004 and 2005 with following objectives:

✓ To advocate the cause of infant and young child nutrition and its improvement through optimal feeding practices nationwide,
✓ To disseminate widely the correct norms of breast-feeding and complementary feeding from policy making level to the public at large in different parts of the country in regional languages,
✓ To help plan efforts for raising awareness and increasing commitment of the concerned sectors of the Government, national organizations and professional groups for achieving optimal feeding practices for infants and young children,
✓ To achieve the national goals for IYCF practices set by the Planning Commission for the Tenth Five Year Plan so as to achieve reduction in malnutrition levels in children.
2. Optimal Breastfeeding

Breastfeeding is the normal way of providing young infants with the nutrients they need for healthy growth and development. Virtually all mothers can breastfeed, provided they have accurate information, and the support of their family, the health care system and society at large.

Breastfeeding has been traditionally accepted among Indian women since long and its usefulness has been realized in India for more than 2000 years. This has been mentioned in *Charak Samhita*.

Breastfeeding is an extension of maternal protection that transitions the young infant from the shelter of the in utero environment to life in the ex utero world with its variety of potentially harmful exposures. The promotion, protection, and support of breastfeeding are an exceptionally cost-effective strategy for improving child survival and reducing the burden of childhood disease, particularly in developing countries (Horton *et al.* 1996, Morrow *et al.* 1999, Sikorski *et al.* 2002, Black *et al.* 2003, Jones *et al.* 2003).

Scientific evidence has guided the development of international recommendations for optimal infant feeding practices, which include EBF for 6 months (breast milk only with no other liquids or foods given) and continued breastfeeding upto 2 years of age or beyond with timely addition of appropriate complementary foods. These recommendations were adopted following a systematic review of current scientific evidence on the optimal duration of EBF and an expert consultation on the subject (Butte *et al.* 2002, Kramer and Kakuma 2002, WHO, 2002). They are also included in UNICEF’s Facts for Life “Key Messages: What every family and community has a right to know about breastfeeding (UNICEF 2002)

- Breast milk alone is the only food and drink an infant needs for the first six months. No other food or drink, not even water, is usually needed during this period.
- There is a risk that a woman infected with HIV can pass the disease on to her infant through breastfeeding. Women who are infected or suspect that they may be infected should consult a trained health worker for testing, counselling and advice on how to reduce the risk of infecting the child.
- Newborn babies should be kept close to their mothers and begin breastfeeding within one hour of birth.
- Frequent breastfeeding causes more milk to be produced. Almost every mother’s can breastfeed successfully.
- Breastfeeding helps protect babies and young children against dangerous
Review of Literature

illnesses. It also creates a special bond between mother and child.

➢ Bottle-feeding can lead to illness and death. If a woman cannot breastfeed her infant, the baby should be fed breast milk or a breast milk substitute from an ordinary clean cup.

➢ From the age of six months, babies need a variety of additional foods, but breastfeeding should continue through the child’s second year and beyond.

➢ A woman employed away from her home can continue to breastfeed her child if she breastfeeds as often as possible when she is with the infant.

➢ Exclusive breastfeeding can give a woman more than 98% protection against pregnancy for six months after giving birth but only if her menstrual periods have not resumed, if her baby breastfeeds frequently day and night, and if the baby is not given any other food or drinks, or a pacifier or dummy.

Compliance with these recommendations has significant child health and nutritional benefits. The Bellagio Child Survival Study Group has identified optimal breastfeeding in the first year of life as one of the most important strategies for improving child survival (Black et al. 2003, Jones et al. 2003). Increasing optimal breastfeeding practices could save as many as 1.5 million infant lives every year; given the significant protection that breastfeeding provides infants against diarrheal disease, pneumonia, and neonatal sepsis (UNICEF 2002, Black et al. 2003, Jones et al. 2003). Improved breastfeeding practice can also have a positive effect on birth-spacing, which contributes to child survival (Labbok et al. 1997, Jones et al. 2003). Further, population-based studies in a number of developing countries have shown that the greatest risk of nutritional deficiency and growth retardation occurs in children between 3 and 15 months of age, associated with poor breastfeeding and complementary feeding practices (Shrimpton et al. 2001).

Benefits of breastfeeding for the infant

➢ Provides Optimal nutrition

Breast milk provides superior nutrition for optimum growth - Breast milk provides high quality nutrients that are easily digested and efficiently used by the baby’s body. Breast milk is a dynamic fluid that changes to meet the infant’s needs. Milk composition is influenced by the gestational age of the infant (preterm milk is different from full-term milk), stage of lactation (colostrum differs from transitional and mature milk, which continues to change as time goes by), and time frame of the feed (foremilk differs from hind milk, which has a higher fat content).

Further breast milk provides adequate water for hydration - Breast milk also
provides all the water a baby needs. There is no need for any additional liquid. Numerous studies indicate that, for infants’ breastfed exclusively and on demand, the water in the breast milk exceeds water requirements. The solute levels in the urine and blood of these infants – even those living in very hot, dry climates -- were within normal ranges, indicating adequate water intake.

**Colostrum** has special properties and is very important to the infant for a variety of developmental, digestive, and protective factors. Breast milk is normally the only food that infants need for the first 6 months of life. Safe and appropriate complementary foods should be given from the sixth month of life while breastfeeding continues. Breast milk continues to be an important source of energy and high quality nutrients through the second year of life and beyond.

- **Protective Effect of Breastfeeding on Infant Morbidity**

Breast milk is a living fluid that protects the baby against infection. During the first year of a baby’s life, because the immune system is not fully developed, the baby depends on mother’s milk to fight infections.

As presented in Table 1 breastfeeding reduces the risk of diarrhoea, respiratory infections and otitis media. Breastfeeding also has a protective effect on infant mortality specially related to diarrhoea and respiratory infections. It is generally agreed that allergies are less common in completely breastfed babies.

<table>
<thead>
<tr>
<th>Place and Reference</th>
<th>N</th>
<th>Findings</th>
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<tbody>
<tr>
<td><strong>Reduced risk of diarrhoea</strong></td>
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<tr>
<td>Philippines (Popkin et al. 1990)</td>
<td>3000 mother and infant pair</td>
<td>Artificially fed babies were up to 17 times more at risk of getting diarrhoea than EBF.</td>
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<tr>
<td>Dundee, Scotland (Howie et al. 1990)</td>
<td>750 mother and infant pair</td>
<td>Between 0 and 13 weeks of age, almost 20% of bottle-fed infants had diarrhoea as compared to only 3.6% of the breastfed infants.</td>
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<td>United States (Scariati et al. 1997)</td>
<td>1874 mother and infant pairs</td>
<td>Compared to non-breastfed infants, breastfeeding showed a protective effect against diarrhoeal disease (OR 1.8).</td>
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<tr>
<td><strong>Reduced risk of respiratory infection</strong></td>
<td></td>
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<tr>
<td>Dundee, Scotland (Howie et al. 1990)</td>
<td>750 mother and infant pair</td>
<td>Between 0 and 13 weeks of age, almost 39% of the bottle-fed infants had respiratory illness compared to only 23% of the breastfed infants.</td>
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<tr>
<td><strong>Reduced risk of otitis media</strong></td>
<td></td>
<td></td>
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<tr>
<td>Sweden (Aniansson et al.</td>
<td>400 New born</td>
<td>At one to three mo., 6% of the weaned infants had otitis media, compared to only 1% of the breastfed infants.</td>
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Review of Literature

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<tr>
<th>Place and Reference</th>
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<tr>
<td>1994)</td>
<td></td>
<td>breastfed infants.</td>
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<tr>
<td>United States (Scariati et al. 1997)</td>
<td>1743 mother infant pairs</td>
<td>Study found a protective effect against otitis media if infants were breastfed as compared to infants who were not breastfed. The risk diminished the more breast milk the infant drank (a dose response).</td>
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**Protective effects of breastfeeding on infant mortality**

**Diarrhoeal disease and respiratory infections**

| Latin America (Betran et al. 2001) |   | Artificially-fed infants 0-3 mo., were over 14 times more likely to die of diarrhoeal disease and 4 times more likely to die of acute respiratory infections than EBF. Artificially-fed infants’ 4-11 mo., were almost 2 times more likely to die of both diarrhoeal disease and acute respiratory infection than partially breastfed infants. |

**Breastfeeding reduces the risk of chronic disease**

**Lower risk of allergies**

| Sweden (Kull et al. 2002) | 4089 infant | EBF prevented children from having multiple allergic disease (OR (adj) = 0.7, 95% CI 0.5 to 0.9) during the first 2 years of life. |

**Lower risk of Obesity**

| Germany (Von et al. 1999) | 9357 Children aged 5 and 6 | After adjusting for potential confounding factors, breastfeeding remained a significant protective factor against the development of obesity (odds ratio 0.75, 95% CI 0.57 to 0.98) and being overweight (0.79, 0.68 to 0.93). |

> **Breastfeeding has psychosocial and developmental benefits**

Breastfeeding helps mother and baby to bond. Close contact right after delivery promotes development of a loving relationship between mother and baby. Babies cry less and mothers respond better to their babies’ needs.

The effects of breastfeeding and breast milk on infant and child development and IQ has been a subject of much interest in the scientific field and the findings over decades of research have found consistently better developmental outcomes and higher IQs if breastfed (Fergusson et al. 1982).

Long term study in Copenhagen found that duration of breastfeeding was associated with significantly higher IQ scores at 27.2 years. This study also found a positive dose effect (Mortensen et al. 2002).
Benefits of breastfeeding for the mother

- **Breastfeeding protects mother’s health**
The oxytocin released during breastfeeding helps the uterus to return to its previous size and helps to reduce postpartum bleeding. Early breastfeeding has a physiological effect on the uterus as well, causing it to contract. This action would also be useful for reduction in postpartum bleeding in women. Oxytocin is known to play a role in bonding and reduction in postpartum bleeding; it has been demonstrated that oxytocin levels increase during first 45 minutes and return to normal levels in 60 minutes (Nissen et al. 1995). It was found that suckling and hand touching by babies stimulates oxytocin release, which is significant for uterine contractions, milk ejection and mother-infant relationship (Matthiesen et al. 2001). Another study (Sobhy and Mohame 2004) demonstrated that early vs. late initiation was related to less vaginal bleeding postpartum, which calls for universal health care support to all mothers for ensuring breastfeeding within an hour of birth to provide benefits for both the mothers and children, as postpartum hemorrhage is a major problem that jeopardizes maternal health and its prevention can save mother’s lives through early breastfeeding.

- **Breastfeeding reduces the risk of breast and ovarian cancer in mothers**
A reanalysis of data from 47 epidemiological studies in 30 countries found that the relative risk of breast cancer decreased by 4.3% for every year of breastfeeding (Möller et al. 2002).

- **Breastfeeding delaying new pregnancies**
During the first six months after birth if a woman is amenorrheic and fully breastfeeding her infant, she has about 98% protections against another pregnancy. The longer the duration of breastfeeding, longer the duration of postpartum amenorrhoea, leading to longer birth intervals (Saadeh and Benbouzid 1990). Breastfeeding contributes to natural birth spacing, providing 30% more protection against pregnancy than all the organized family planning programmes in the developing world (Kleinman and Senanayake 1987).

Below is a list of differences in health outcome associated with method of infant feeding. The studies have all adjusted for social and economic variables. All were conducted in an industrialized setting.
**Artificially-fed babies are at greater risk of:**

- Gastro-intestinal infection
- Respiratory infections
- Necrotising enterocolitis and late onset sepsis in preterm babies
- Urinary tract infections
- Ear infections
- Allergic disease (eczema, asthma and wheezing)
- Type 1 and type 2 diabetes
- Obesity
- Childhood leukemia
- Sudden infant death - SIDS

**and breastfed babies may have better:**

- Neurological development
- Cholesterol levels
- Blood pressure

**Other studies of health and breastfeeding for the infant:**

- Cardiovascular disease in later life
- Childhood cancers
- Breastfeeding and HIV transmission
- Breastfeeding and dental health

**Women who breastfed are at lower risk of:**

- Breast cancer
- Ovarian cancer
- Hip fractures and reduced bone density

**Other potential protective effects of breastfeeding (more research needed): for the infant:**

- Multiple sclerosis
- Acute appendicitis
- Tonsillectomy
- Improved parenting
- Reduced child neglect/abuse

**for the mother:**

- Rheumatoid arthritis
- Maternal type 2 diabetes
- Postnatal depression


In low-income communities, the cost of cow’s milk or powdered milk, plus bottles, teats, and fuel for boiling water, can consume 25% to 50% of a family’s income (UNICEF/WHO/UNESCO/UNFPA 1993). It is now accepted that breastfeeding is the best feeding for human babies therefore, dated 19 September, 1983 the Ministry of Social Welfare, GOI has adapted the “Indian National code for Protection and Promotion of Breastfeeding” (Ministry of Social Welfare 1984).

**a) Timely Initiation of Breastfeeding**

The BFHI Global Criteria (2006) stated “Place babies in skin-to-skin contact with their mothers immediately following birth for at least an hour and encourage mothers to recognize when their babies are ready to breastfeed, offering help if needed” (UNICEF/WHO 2006).
Timely initiation of breastfeeding (TIBF) within one hour of birth is essential as it ensures that baby is immunized with 'live fluid' to sustain life. It has been observed that the suckling reflex of the newborn is at its height twenty to thirty minutes after birth (Pandit et al. 1994). If the infant is not fed then the reflex diminishes rapidly only to reappear adequately forty hours later (Arachavsky 1952). This may be called “The fourth stage of labour” which includes putting the baby to breast after birth and ensuring the intake of colostrum by the neonate. The exact time of initiation of breastfeeding has been suggested right from birth in the delivery room itself to within one hour after delivery. Also the antibody content of colostrum is at its maximum during the first twelve postpartum hours making it relevant (www.bpni.org 2007).

A recent study of more than 10,000 newborn babies from rural Ghana has shown that if all babies started breastfeeding within one hour, it would cut 22% of all neonatal deaths (Figure 9). This figure would rise to 41% if newborn babies of 2-28 days were counted. This effect was independent of the effect of EBF. The study estimates that, of the four million babies who die in the developing world each year in the first month of life, almost one million newborn children could be saved. The study has also shown that each day's delay in the start of breastfeeding led to a significant increase in deaths, such was the effect of pre-lacteal feeds i.e. giving other foods and fluids before beginning to breastfeed (Edmond et al. 2006).

Figure 9: Risk of neonatal mortality according to time of initiation of breastfeeding

![Risk of Death](chart.png)

<table>
<thead>
<tr>
<th>Risk of Death</th>
<th>Time of Initiation of Breastfeeding</th>
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<tbody>
<tr>
<td>0.7</td>
<td>Within 1 hour</td>
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<tr>
<td>1.2</td>
<td>From 1 hour to end of day 1</td>
</tr>
<tr>
<td>2.3</td>
<td>Day 2</td>
</tr>
<tr>
<td>2.6</td>
<td>Day 3</td>
</tr>
<tr>
<td>4.2</td>
<td>After day 3</td>
</tr>
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</table>

Source: Edmond et al. 2006

Early skin-to-skin contact and the opportunity to suckle within the first hour or so after birth are both important. Some contact cannot be avoided when attempting breastfeeding but contact itself does not necessarily result in immediate suckling. Mothers need to be supported for achieving both contact and suckling which are so closely interrelated. It has an important bearing on survival and development of babies. The infant who is in close contact with its mother can suckle when it shows
signs of readiness, such as suckling movements, which are often present during the first hour of birth (Gupta 2007). The effect of skin-to-skin and suckling contact immediately after birth increases the median duration of breastfeeding by 2 ½ months (de Château et al. 1977). The analysis of the following study has shown that those newborns who initiated breastfeeding within 1 hour were less likely to die of neonatal sepsis than those who didn't. Each day's delay in the start of breastfeeding led to a significant increase in the risk of infection deaths increased with increasing delay in initiation of breastfeeding; overall late initiation (after day 1) was associated with a 2.6 fold risk. Additionally, partial breastfeeding during first month was associated with a 5.7 fold adjusted risk of death as a result of infectious disease after adjusting with the effect of early breastfeeding. The authors concluded that breastfeeding promotion programs that focus on EIBF and EBF in the neonatal period could significantly reduce the burden of infectious disease-related mortality (Edmond et al. 2007). In a sample of Norwegian infants, 69% of those who were suckled at birth were still being nursed at the age of 3 month, compared to only 47% of those who were first suckled after six hours (Arentoft and Jensen 1983). Salariya et al. in 1978 also found that babies who were first fed within 30 minutes of birth were likely to remain breastfeeding for longer. Furthermore, the routine administration of prelacteal feeds interferes with both the mother’s confidence and hence the let-down reflex, and suckling stimulation and prolactin production, and it reduces protection from infection (Gillie 1976, Isenalumhe and Oviawe 1987, Jelliffe and Jelliffe 1983). Thus the above evidence clearly justifies greater action on the first ONE hour. Considering the evidence as vital, beginning breastfeeding within one hour must be considered as a vital first step towards ensuring EBF and should become a part of routine sub national, national and international reporting.

According to IBFAN, the following factors affect women's decision to begin breastfeeding within one hour:

The misconception (which many doctors also believe) that the mother may not be able to produce adequate amounts of milk, lack of support from the health care system, societal norms, values and beliefs, parental or partners' attitude, women’s and communities’ knowledge, misconceptions about colostrum, inadequate skills/knowledge of frontline workers, ‘fixed' hospital routines like beginning with formula feeding at birth, or sugar/glucose water, which directly contributes to failure to begin breastfeeding within one hour (www.ibfanasia.org 2007).
The World Breastfeeding Week (WBW) 2007 aimed precisely towards TIBF, and also to raise public awareness of the benefits of this simple achievable practice on newborn and maternal health (IBFAN 2007). Thus, the IBFAN (2007) recommended building capacity of health workers to improve TIBF rates. To improve TIBF rates and thus survival of newborn babies, a high quality trained workforce is required. Most breastfeeding difficulties can be overcome if all the medical professionals and family level workers have the ‘duty’ and ‘capacity’ to assist all mothers at birth, in initiating breastfeeding early and follow upto support EBF. This is true for all births either at home or at the health facilities, both in public and private sector.

b) **Exclusive Breastfeeding for the First Six Months**

Breastfeeding provides the best possible start to life, a foundation for fulfilling rights of the children. The National Guideline on IYCF (2006) defines Exclusive Breastfeeding (EBF) as - the infant takes only breast milk and no additional food, water, or other fluids with the exception of medicines and vitamin or mineral drops (GOI 2006). The breast milk provides adequate water for hydration and this has been discussed under benefits of breastfeeding earlier in the review. Infants are as much as 25 times more likely to die from diarrhoea in the first six months of life, if not exclusively breast fed (Feachem and Koblensky 1983). Infants EBF for >=4 months have half the mean number of acute otitis media episodes of those not breastfed at all (Duncan et al. 1993). EBF infants have at least 2½ times fewer illness episodes than infants fed breast-milk substitutes (Chandra 1979). In the study by Kull et al. (2002) mentioned earlier, children exclusively breastfed for four months or more exhibited less asthma (7.7% vs. 12%), less atopic dermatitis (24% vs. 27%) and less allergic rhinitis (6.5% vs. 9%).

WHO recommends, mothers’ worldwide to EBF infants for the first six months to achieve optimal growth, development and health. Thereafter, they should be given nutritious complementary foods and continue breastfeeding upto two years of age or beyond.

The latest systematic review of the evidence on the above issue was published in 2009. The findings of the review, which included two controlled trials and 18 other studies conducted in both developed and developing countries, support current WHO recommendations (Kramer and Kakuma 2009).

The systematic review's findings suggest that EBF of infants with only breast milk, and no other foods or liquids, for six months has several advantages over EBF for 3-4 months followed by mixed breastfeeding. These advantages include a lower risk of
gastrointestinal infection for the baby, more rapid maternal weight loss after birth, and
delayed return of menstrual periods. No reduced risks of other infections or of allergic
diseases have been demonstrated. No adverse effects on growth have been
documented with EBF for six months. But a reduced level of iron has been observed
in some developing country settings (Kramer and Kakuma 2009).

c) **Ten Steps to Successful Breastfeeding**

The Baby-Friendly Hospital Initiative (BFHI) is a global effort by UNICEF and the
WHO to implement practices that protect, promote and support breastfeeding. It aims
to ensure that all maternities whether free standing or in a hospital, become centers
of breastfeeding support. Hospitals and maternity units set a powerful example for
new mothers.

The "Ten Steps to Successful Breastfeeding" are the foundation of BFHI and
summarize the maternity practices necessary to support breastfeeding. A maternity
facility can be designated 'baby-friendly' when it does not accept free or low-cost
breast milk substitutes, feeding bottles or teats, and has implemented these 10
specific steps to support successful breastfeeding.

The Ten Steps to Successful Breastfeeding states that every facility providing
maternity services and care for newborn infants should:

(i). **Have a written breastfeeding policy that is routinely communicated to all
    health care staff**

(ii). **Train all health care staff in skills necessary to implement this policy**

In several studies health professionals trained in breastfeeding counseling provided
counseling and/or trained support groups to assist mothers in a variety of
circumstances (prenatal, postnatal, after admission for diarrhoea). In each of the
studies (Figure 10) there was a significant increase in EBF, when compared to the
control group. All differences between intervention and control groups were
significant at p<0.001 (WHO/CAH. 2000).

(iii). **Inform all pregnant women about the benefits of breastfeeding**

Studies have shown that, antenatal care can significantly impact breastfeeding
practices related to colostrum feeding and early breastfeeding initiation (Nielsen et al.
1998). Guise et al. 2003 showed in a meta-analysis of studies of education and
support that antenatal education can lead to significant increases in initiation rates by
23% and duration of short-term breastfeeding (upto 3 mo.) by 39%.
(iv). **Help mothers initiate breastfeeding within a half-hour of birth**

Babies have a fundamental right to adequate nutrition and care, which includes the correct nutrition immediately after birth. Only breastfeeding within the first hour of birth ensures this right. To initiate breastfeeding within one hour, women need accurate information and assistance at the time of birth, especially to ensure that the baby is in the right suckling position. Health care providers have the responsibility to provide practical help and support both at home and in hospitals (both public/private). Women should have an entitlement to such a support, as without it they cannot help the baby realize its right to adequate nutrition and care.

(v). **Showing mothers how to breastfeed and how to maintain lactation, even if they should be separated from their infants**

Contrary to popular belief, attaching the baby on the breast is not an ability with which a mother is born; rather it is a learned skill which she must acquire by observation and experience (Woolridge 1986). The duration of breastfeeding almost double in a mother discharged from hospital with good technique or after 5-10 min of instruction/correction of faulty technique, compared to one discharged with uncorrected faulty breastfeeding technique (Righard and Alade 1992). Timely breastfeeding initiation occurred among 75% of women who were encouraged to breastfeed compared to only 43% who were not encouraged to breastfeed by a health professional (Lu et al. 2001).

(vi). **Giving newborn infants no food or drink other than breast milk unless medically indicated**

Water in breast milk exceeds the infant’s water requirements in normal conditions and is adequate for breastfed infants in hot, dry climates. Studies indicate that
healthy, exclusively breastfed infants in the first six months of life do not require additional fluids even in countries with extremely high temperatures and low humidity. Solute levels in the urine and blood of exclusively breastfed babies living in these conditions were within normal ranges, indicating adequate water intakes (WHO 1997a).

(vii). **Practicing rooming-in — allow mothers and infants to remain together - 24 hours a day**

Practicing rooming in reduces costs, requires minimal equipment, requires no additional personnel, reduces infection, helps establish and maintain breastfeeding and facilitates the bonding process.

(viii). **Encouraging breastfeeding on demand**

Breastfeeding should be encouraged whenever the baby or mother wants with no restrictions on the length or frequency of feeds. Yamauchi and Yamanouchi in 1990 demonstrated the positive impact of on-demand, frequent breastfeeding (number of times during the first 24 hours) on bilirubin levels of 6 day old full-term healthy infants. de Carvalho et al. in 1982 showed that the greater the frequency of feeds, the lower the level of serum bilirubin.

(ix). **Giving no artificial teats or pacifiers (also called dummies and soothers) to breastfeeding infants**

Both pacifiers and artificial teats can be harmful, by carrying infection, by reducing the time spent suckling at the breast and thereby interfering with demand feeding, and possibly by altering oral dynamics (WHO 1998b).

Victora et al. (1997) showed that intense pacifier users at 1 month (children who used the pacifiers during most of the day and at least until falling asleep) were four times more likely to stop breastfeeding at 6 months of age than non-users.

(x). **Fostering the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic**


The WHO Community-Based Strategies for Breastfeeding Promotion and Support in Developing Countries (WHO 2003) cites several reviews of the evidence for mother support. Sikorski et al. identified 20 trials of breastfeeding support in 10 countries.
which revealed a significant beneficial effect of breastfeeding support on any breastfeeding, with the greatest effect on EBF (Sikorski et al. 2002). Lay counsellors were found to be most effective in increasing the duration of EBF, and professional counsellors were most effective in extending the duration of any breastfeeding.

d) **Elements for Supporting a mother to breastfeed**

In 2008, the World Alliance for Breastfeeding Action (WABA) calls for increased support for mothers striving to achieve the gold standard of infant feeding: to breastfeed their babies exclusively for the first six months, and continue breastfeeding together with feeding other appropriate complementary foods, up to two years and beyond. 

*WBW 2008 uses 5 colored CIRCLES to represent the types of support a breastfeeding woman call upon for help and encouragement. Circles of Support overlap, interact, and strengthen each other, with centre circle as the focus.*

Women not only receive support from many sources; they actively secure support and provide it as well. Women are key players in all CIRCLES. Strong support in the outer circles creates a growing power in the centre that radiates out to the other circles of support. The strong network of mother-to-mother support organizations around the world, founded and maintained by women, are a vital demonstration of this concept. 

When all the Circles are strong and providing seamless mother support for breastfeeding, the result is truly empowering for future generations. The goal is that in whatever direction in the centre circle she turns, a mother receives positive and empathetic support for her breastfeeding experience.

“*Breastfeeding a baby is a community concern; a celebrative occasion – everyone has a role to make it successful. A breastfeeding friendly environment needs supportive people in every corner.*” – Negeya Sadig, Sudan from WBF 2008 Folder

e) **Breastfeeding Scenario**

- **India**

While breastfeeding is nearly universal in India, very few children are put to the breast immediately after birth. Only one-quarter of last-born children who were ever breastfed started breastfeeding within half an hour of birth, as is recommended, and almost half (45%) did not start breastfeeding within one day of birth. Most mothers (57%) gave their last-born child something to drink other than breast milk in the three
days after delivery. Only 69% of children under two months of age are Exclusively Breastfed. EBF drops to 51% at 2-3 months and 28% at 4-5 months of age. Overall, slightly less than half of children under six months of age are exclusively breastfed (NFHS-3 2007).

- **Gujarat**

Although breastfeeding is nearly universal in Gujarat, as per the District Level Household and Facility Survey (DLHS) – 3 2007-08 for Gujarat about half of women (48%) had initiated breastfeeding within one hour of child birth, which showed improvement as compared to the NFHS-3 results. More than three-fourth of the children (77.8%) were breastfed within 24 hours of birth. Further, the DLHS-3 results showed that 76% of children below 3 years were fed with colostrum and there was a small variation by residence (NFHS-3 2007 and DLHS-3 2010).

The proportion of youngest surviving child who had exclusively breastfed for 6 months was 41.6%, which was less compared to 48% reported by NFHS-3 (DLHS-3 2010 and NFHS-3 2007). Median duration of EBF of the youngest surviving child was 4.02 months (DLHS-3 2010).

Lastly, NFHS-3 reported that mothers in Gujarat breastfeed for an average of 23 months, which is only one month less than the minimum 24 months recommended by WHO for most children.

3. **Complementary Feeding**

When breast milk is no longer enough to meet the nutritional needs of the infant, complementary foods should be added to the diet of the child. The transition from EBF to family foods, referred to as complementary feeding (CF), typically covers the period from 6 to 18-24 months of age, and is a very vulnerable period.

It is estimated that over half of malnutrition occurs in families with adequate food (Rae 2006). Most incidents stunting and wasting (outside of famine situations) happens in first 2 years when children have high demand for nutrients and there are limitations in the quality and quantity of their diets, especially after the period of EBF (Shrimpton et al. 2001). Suboptimum CF is clearly a determinant of stunting, and improvements in most settings need to focus on both feeding frequency and energy density, and ensure an adequate quality diet, including sufficient micronutrients (Brown et al. 1998).

CF should be **timely**, meaning that all infants should start receiving foods in addition to breast milk from 6 months onwards. It should be **adequate**, meaning that the complementary foods should be given in amounts, frequency, consistency and using a variety of foods to cover the nutritional needs of the growing child while maintaining
breastfeeding. Foods should be prepared and given in a safe manner, meaning that measures are taken to minimize the risk of contamination with pathogens. And they should be given in a way that is appropriate, meaning that foods are of appropriate texture for the age of the child and applying responsive feeding following the principles of psycho-social care.

The adequacy of CF (adequacy in short for timely, adequate, safe and appropriate) not only depends on the availability of a variety of foods in the household, but also on the feeding practices of caregivers. Feeding young infants requires active care and stimulation, where the caregiver is responsive to the child clues for hunger and also encourages the child to eat. This is also referred to as active or responsive feeding. WHO recommends that infants start receiving complementary foods at 6 months of age in addition to breast milk, initially 2-3 times a day between 6-8 months, increasing to 3-4 times daily between 9-11 months and 12-24 months with additional nutritious snacks offered 1-2 times per day, as desired. Research has shown that caregivers require skilled support to adequately feed their infants.

a) Guiding principles for complementary feeding of the breastfed child

The Guiding Principles for Complementary feeding of the Breastfed Child (2003) developed by the Pan American Health Organization (PAO), summarize the current scientific evidence for CF and are intended to guide policy and programmatic action at global, national and community levels (WHO/PAHO 2003), while the Guiding Principles for feeding the non-breastfed child 6-24 months of age (2005) provide guidance for feeding children who are not receiving breast-milk (WHO 2005). These guidelines can be used as the basis for developing recommendations on CF for breastfed children 6-23 months of age. The guiding principles not only set standards for practical dietary guidelines, they also discuss when, where and how young children should be fed. The guidelines are a result of several consultations and documents on CF, and represent state-of-the art knowledge on CF. Following are the Guiding Principles for Complementary Feeding of the Breastfed Child:

- **Duration of Exclusive Breastfeeding and Age of Introduction of Complementary Foods.**

  **Guideline:** Practice exclusive breastfeeding from birth to 6 months of age, and introduce complementary foods at 6 months of age (180 days) while continuing to breastfeed.

  **Scientific Rationale:** In May, 2001 the 54th World Health Assembly urged Member States to promote EBF for six months as a global public health recommendation.
(World Health Assembly Resolution 2001). This recommendation followed a report by a WHO Expert Consultation on the Optimal Duration of EBF (WHO 2001a), which considered the results of a systematic review of the evidence (Kramer and Kakuma 2002) and concluded that EBF for six months confers several benefits on the infant and the mother. The Expert Consultation concluded that the potential health benefits of waiting until six months to introduce other foods outweigh any potential risks.

After six months of age, however, it becomes increasingly difficult for breastfed infants to meet their nutrient needs from human milk alone (WHO/UNICEF 1998). Furthermore, most infants are developmentally ready for other foods at about six months (Naylor and Morrow 2001).

In environments where environmental sanitation is very poor, waiting until even later than 6 months to introduce complementary foods might reduce exposure to food-borne pathogens. However, because infants are beginning to actively explore their environment at this age, they will be exposed to microbial contaminants through soil, etc. even if they are not given complementary foods. Thus, the consensus was that six months is the appropriate age to introduce complementary foods.

- **Maintenance of Breastfeeding**

  **Guideline:** Continue frequent, on-demand breastfeeding until 2 years of age or beyond.

  **Scientific Rationale:** Breastfeeding continues to make an important nutritional contribution well beyond the first year of life. Breastfed children at 12-23 months of age whose intake is similar to the “average” amount of breast milk consumed at that age (about 550 g/d in developing countries; WHO/UNICEF 1998) receive 35-40% of total energy needs from breast milk (Dewey and Brown 2003). Because breast milk has a relatively high fat content compared to most complementary foods, breast milk is a key source of energy and essential fatty acids.

  In a study conducted in Gambia, it was estimated that breast milk provides 70% of vitamin A, 40% of calcium and 37% of riboflavin intake at 15-18 months of age (Prentice and Paul 1990). The nutritional impact of breastfeeding is most evident during periods of illness, when the child’s appetite for other foods decreases but breast milk intake is maintained (Brown et al. 1990). Breast milk thus plays a key role in preventing dehydration and providing the nutrients required for recovery from infections.

  Although the impact of breastfeeding past the first year of life on infant appetite and growth has been controversial (Caulfield et al. 1996, Habicht 2000), recent longitudinal studies demonstrate that in developing countries, a longer duration of
breastfeeding is associated with greater linear growth, when the data are analyzed appropriately to eliminate the influence of confounding variables and reverse causation (Onyango et al. 1999, Simondon et al., 2001).

- **Responsive Feeding.**

  **Guideline:** Practice responsive feeding, applying the principles of psychosocial care (Engle et al. 2000, Pelto et al. 2003). Specifically: a) feed infants directly and assist older children when they feed themselves, being sensitive to their hunger and satiety cues; b) feed slowly and patiently, and encourage children to eat, but do not force them; c) if children refuse many foods, experiment with different food combinations, tastes, textures and methods of encouragement; e) minimize distractions during meals if the child loses interest easily; f) remember that feeding times are periods of learning and love-talk to children during feeding, with eye to eye contact.

  **Scientific Rationale:** There is increasing recognition that optimal CF depends not only on what is fed, but also on how, when, where, and by whom the child is fed (Pelto et al. 2003). Several intervention studies that included feeding behaviors as part of the recommended practices have reported positive effects on child growth (Sternin et al. 1997, Creed de Kanashiro et al. 2001), but it is not possible to separate the influence of responsive feeding from that of the other changes that occurred in breastfeeding practices and the types of complementary foods offered

- **Safe Preparation and Storage of Complementary Foods.**

  **Guideline:** Practice good hygiene and proper food handling by a) washing caregivers’ and children’s hands before food preparation and eating, b) storing foods safely and serving foods immediately after preparation, c) using clean utensils to prepare and serve food, d) using clean cups and bowls when feeding children, and e) avoiding the use of feeding bottles, which are difficult to keep clean.

  **Scientific Rationale:** Attention to hygienic practices during food preparation and feeding is critical for prevention of gastrointestinal illness. The peak incidence of diarrheal disease is during the second half year of infancy, as the intake of complementary foods increases (Martinez et al. 1992).

Although there are significant barriers to compliance with the above recommendations in many settings (including lack of safe water and facilities for safe preparation and storage of food, and time constraints for the caregivers), carefully planned educational interventions can result in substantial improvement (Monte et al. 1997). In addition, use of fermented foods can reduce the risk of microbial contamination (Kimmons et al. 1999) and has the added advantage of improving nutrient content (WHO 1998a).
- **Amount of Complementary Food Needed.**

  **Guideline:** Start at 6 months of age with small amounts of food and increase the quantity as the child gets older, while maintaining frequent breastfeeding. The energy needs from complementary foods for infants with "average" breast milk intake in developing countries (WHO/UNICEF 1998) are approximately 200 kcal per day at 6-8 months of age, 300 kcal per day at 9-11 months of age, and 550 kcal per day at 12-23 months of age. In industrialized countries these estimates differ somewhat (130, 310 and 580 kcal/d at 6-8, 9-11 and 12-23 months, respectively) because of differences in average breast milk intake.

  **Scientific Rationale:** The above guideline is based on children receiving average amounts of breast milk at each age. If an infant is consuming more or less breast milk than the average, the amount needed from complementary foods will differ accordingly. In practice, caregivers will not know the precise amount of breast milk consumed, nor will they be measuring the energy content of complementary foods to be offered. Thus, the amount of food to be offered should be based on the principles of responsive feeding, while assuring that energy density and meal frequency are adequate to meet the child’s needs (i.e. principle 7).

  It is important not to be overly prescriptive about the amount of complementary foods to be consumed, recognizing that each child’s needs would vary due to differences in breast milk intake and variability in growth rate. Furthermore, children recovering from illness or living in environments where energy expenditure is high may require more energy (WHO/PAHO 2003).

- **Food Consistency.**

  **Guideline:** Gradually increase food consistency and variety as the infant gets older adapting to the infant’s requirements and abilities. Infants can eat pureed, mashed and semi-solid foods beginning at six months. By 8 months most infants can also eat "finger foods" (snacks that can be eaten by children alone). By 12 months, most children can eat the same types of foods as consumed by the rest of the family (keeping in mind the need for nutrient-dense foods, as explained in principle 8 below). Avoid foods that may cause choking (i.e., items that have a shape and/or consistency that may cause them to become lodged in the trachea, such as nuts, grapes, raw carrots).

  **Scientific Rationale:** The neuromuscular development of infants dictates the minimum age at which they can ingest particular types of foods (WHO/UNICEF 1998). Semi-solid or pureed foods are needed at first, until the ability for "munching" (up and down mandibular movements) or chewing (use of teeth) appears. The ages
listed above represent the usual capabilities of normal, healthy infants. When foods of inappropriate consistency are offered, the child may be unable to consume more than a trivial amount, or may take so long to eat that food intake is compromised. Evidence from several sources (Dewey and Brown 2003) indicates that by 12 months, most infants are able to consume “family foods” of a solid consistency, although many are still offered semi-solid foods (presumably because they can ingest them more efficiently, and thus less time for feeding is required of the caregiver). There is suggestive evidence of a “critical window” for introducing “lumpy” solid foods: if these are delayed beyond 10 months of age, it may increase the risk of feeding difficulties later on (Northstone et al. 2001). Thus, although it may save time to continue feeding semi-solid foods, for optimal child development it is advisable to gradually increase food consistency with age.

- **Meal Frequency and Energy Density.**

  **Guideline:** Increase the number of times that the child is fed complementary foods as he/she gets older. The appropriate number of feedings depends on the energy density of the local foods and the usual amounts consumed at each feeding. For the average healthy breastfed infant, meals of complementary foods should be provided 2-3 times per day at 6-8 months of age and 3-4 times per day at 9-11 months and 12-24 months of age, with additional nutritious snacks (such as a piece of fruit or bread or chapatti with nut paste) offered 1-2 times per day, as desired. Snacks are defined as foods eaten between meals-usually self-fed, convenient and easy to prepare. If energy density or amount of food per meal is low, or the child is no longer breastfed, more frequent meals may be required.

  **Scientific Rationale:** The above guideline is based on theoretical estimates of the number of feedings required, calculated from the energy needs from complementary foods, and assuming a gastric capacity of 30 g/kg body weight/d and a minimum energy density of complementary foods of 0.8 kcal/g (Dewey and Brown 2003). When energy density of the usual complementary foods is lesser than 0.8 kcal/g, or infants typically consume amounts that are less than the assumed gastric capacity at each meal, meal frequency would need to be higher than the values shown above. A meal frequency that is greater than necessary may lead to excessive displacement of breast milk. In Guatemala, a social marketing campaign to promote feeding complementary foods five times per day had the unintended consequence of reducing breastfeeding frequency in children 19-24 months of age (from an average of 6.9 day time feedings prior to the intervention, to 3.7 daytime feedings after the intervention, p=0.01; Rivera et al. 1998). In addition, preparing and feeding five
meals per day requires a considerable amount of time and effort by caregivers, which may prompt them to hold prepared food over from one meal to the next, thereby potentially increasing the risk of microbial contamination. These considerations should be borne in mind when developing messages regarding meal frequency. The use of 1 to 2 nutritious snacks per day, such as a piece of fruit or a piece of bread or chapatti with nut paste, will not require time for preparation and may also be less likely to displace breast milk.

- **Nutrient Content of Complementary Foods.**

  **Guideline:** Feed a variety of foods to ensure that nutrient needs are met. Meat, poultry, fish or eggs should be eaten daily, or as often as possible. Vegetarian diets cannot meet nutrient needs at this age unless nutrient supplements or fortified products are used (principle 9 scientific rational). Vitamin A-rich fruits and vegetables should be eaten daily. Provide diets with adequate fat content. Avoid giving drinks with low nutrient value, such as tea, coffee and sugary drinks such as soda. Limit the amount of juice offered so as to avoid displacing more nutrient-rich foods.

  **Scientific Rationale: Micronutrient content** - Because of the rapid rate of growth and development during the first two years of life, nutrient needs per unit body weight of infants and young children are very high. Recommended Nutrient Intake that needs to be supplied by complementary foods is 97% for iron, 86% for zinc, 81% for phosphorus, 76% for magnesium, 73% for sodium and 72% for calcium (Dewey 2001). Given a relatively small amount of complementary food that are consumed at 6-24 months the nutrient density (amount of each nutrient per 100 kcal of food) of complementary foods needs to be very high.

  In environments with poor sanitation, promotion of liquid milk products is risky because they are easily contaminated, especially when fed by bottle. Fresh, unheated cow's milk consumed prior to 12 months of age is also associated with fecal blood loss and lower iron status (Ziegler et al. 1990, Griffin and Abrams 2001). For these reasons it may be more appropriate during the first year of life to choose dairy products such as cheese, yogurt and dried milk (mixed with other foods, e.g. in a cooked porridge).

  **Fat content** - Fat is important in the diets of infants and young children because it provides essential fatty acids, facilitates absorption of fat soluble vitamins, and enhances dietary energy density and sensory qualities. Breast milk is generally a more abundant source of fat than most complementary foods. Thus, total fat intake usually decreases with age as the contribution of breast milk to total dietary energy declines. Although there is debate about the optimal amount of fat in the diets of
infants and young children, the range of 30-45% of total energy has been suggested (Dewey and Brown 2003, Bier et al. 1999) as a reasonable compromise between the risks of too little intake (such as inadequate essential fatty acids and low energy density) and excessive intake (thought to potentially increase the likelihood of childhood obesity and future cardiovascular disease, although the evidence on this point is limited, Milner and Allison 1999).

**Beverages with low nutrient value** - Tea and coffee contain compounds that can interfere with iron absorption (Allen and Ahluwalia 1997), and thus are not recommended for young children. Sugary drinks, such as soda, should be avoided because they contribute little other than energy, and thereby decrease the child’s appetite for more nutritious foods. Excessive juice consumption can also decrease the child’s appetite for other foods, and may cause loose stools. For this reason, the American Academy of Pediatrics (1998) recommends no more than 240 ml of fruit juice per day. Studies in the U.S. have linked excess fruit juice consumption to failure to thrive (Smith and Lifshitz 1994) and to short stature and obesity (Dennison et al. 1997), although such outcomes have not been consistently observed (Skinner et al. 1999).

- **Use of Vitamin-Mineral Supplements or Fortified Products for Infant and Mother.**

  **Guideline:** Use fortified complementary foods or vitamin-mineral supplements for the infant, as needed. In some populations, breastfeeding mothers may also need vitamin mineral supplements or fortified products, both for their own health and to ensure normal concentrations of certain nutrients (particularly vitamins) in their breast milk.

  **Scientific Rationale:** Unfortified complementary foods that are predominantly plant-based generally provide insufficient amounts of certain key nutrients (particularly iron, zinc and calcium) to meet the recommended nutrient intakes during the age range of 6-24 months (WHO/UNICEF 1998, Gibson et al. 1998, Dewey and Brown 2003). Inclusion of animal-source foods can meet the gap in some cases, but this increases the cost and thus may not be practical for the lowest income groups. Furthermore, the amounts of animal-source foods that can feasibly be consumed by infants (e.g., at 6-12 mo.) are generally insufficient to meet the gaps in iron, calcium and sometimes zinc (WHO/UNICEF 1998). Gibson et al. (1998) evaluated 23 different complementary food mixtures used in developing countries, some of which included animal-source foods. None of them achieved the desired iron density and few achieved the desired calcium or zinc density.
• **Feeding During and After Illness.**

**Guideline:** Increase fluid intake during illness, including more frequent breastfeeding, and encourage the child to eat soft, varied, appetizing, favorite foods. After illness, give food more often than usual and encourage the child to eat more.

**Scientific Rationale:** During illness, the need for fluids is often higher than normal. Sick children appear to prefer breast milk to other foods (Brown *et al.* 1990), so continued, frequent breastfeeding during illness is advisable. Even though appetite may be reduced, continued consumption of complementary foods is recommended to maintain nutrient intake and enhance recovery (Brown 2001). After illness, the child needs greater nutrient intake to make up for nutrient losses during the illness and allow for catch-up growth. Extra food is needed until the child has regained any weight lost and is growing well again.

**b) Guiding principles Feeding non-breastfed children 6–23 months of age**

Sometimes young children between the ages of 6 months and 2 years are not breastfed. Reasons include when their mother is unavailable, or has died, or is HIV-positive. These children need extra food to compensate for not receiving breast milk, which can provide one half of their energy and nutrient needs from 6 to 12 months, and one-third of their needs from 12-23 months (WHO 2005). To feed children aged 6-23 months satisfactorily, all the principles of safe, adequate CF apply, as described for the breastfed children. However, to cover the requirements that would otherwise be covered by breast milk, a child needs to be fed a larger quantity of the foods containing high-quality nutrients. This can be achieved by giving the child:

- **Extra meals,** to help ensure that sufficient amounts of energy and nutrients are eaten - non-breastfed children need to eat meals 4-5 times per day with additional nutritional snacks 1-2 times per day as desired.

- **Meals of greater energy density,** to help ensure that sufficient energy is consumed - Foods of thick consistency or with some added fat, help to ensure an adequate intake of energy for a child.

- **Larger quantities of foods of animal origin** to help ensure that enough nutrients are eaten. Some meat, poultry or fish should be eaten every day to ensure that the child gets enough iron and other nutrients. Dairy products are important to provide calcium. A child needs 200-400 ml of milk or yoghurt every day if other animal source foods are eaten, or 300-500 ml per day if no other animal source
foods are eaten.

- **Vegetable foods** - The child should be given pulses daily to help provide iron and vitamins, with Vitamin-c rich foods to help iron absorption. The child should also be given orange and yellow fruits and dark-green leafy vegetables to provide vitamin A and other vitamins.

- **Nutrient supplements**, if foods of animal origin are not available - If the child receives no foods of animal origin, then it is necessary to give vitamin and mineral supplements to ensure sufficient intake, particularly of iron, zinc, calcium and vitamin B12.

c) **Complementary Feeding Scenario**

WHO offers three recommendations for infant and young child feeding (IYCF) practices for children 6-23 months old: continued breastfeeding or feeding with appropriate calcium-rich foods if not breastfed; feeding solid or semi-solid food for a minimum number of times per day according to age and breastfeeding status; and, including foods from a minimum number of food groups per day according to breastfeeding status.

- **India**

According to NFHS-3 report, in India, CF is started in 19% at 4 to 5 months which increased to 55% at 6 to 8 months of age. The most common types of solid or semi solid foods fed to both breastfeeding and non-breastfeeding children comprised of grains, fruits and vegetables. Milk and Milk products (86%) and foods made with oil or ghee were less commonly given to young children. 35.8% of the male children and 34.8% of female children were receiving appropriate number of food groups. 43.4% were receiving feeding in required frequency. 41.3% and 41.6% male and female children were given feeds minimum number of times respectively. However, only 21% were fed appropriately according to all three recommended IYCF practices (NFHS-3 2007).

A study by Ghosh et al. (1976) studied the traditional patterns of weaning food in different parts of India. They stated that when weaning starts, traditional economy and local availability seems to determine the choice of food. In Tamilnadu and Kerala “Tropical, Banana, Ragi and Kanji” is given. In Andhra Pradesh boiled polished rice is given. Dal or rice gruel is also given with Ghee. Biscuits are used in almost all parts of India. In Calcutta, rice Kanji is usually the first non-milk food. In Bombay, rice gruel is often the first food. In Rajasthan, preparation made from Jawar and Bajara flour...
are used; “Churi” is prepared in Punjab.

- Gujarat

In Gujarat, only 42% children aged 6-23 months were fed the recommended minimum times per day and 34% were fed from the minimum number of food groups. Overall, only one in five (21%) were fed according to all three IYCF recommended practices (NFHS-3 2007).

As per the District Level Household and Facility Survey (DLHS)–3 2007-08 for Gujarat, for those children who had started food supplementation while still breastfeeding, the median age in months at the time of other fluids, semi-solid food and solid food supplementation were 6.2 months, 8.3 months and 11.3 months respectively (DLHS-3 2010).

A study conducted by National Nutrition Monitoring Bureau (NNMB) for nine states including Gujarat showed that, although consumption of protein and calories is highest in Gujarat State, consumption of food inadequate in both protein and calories is 30% in 1-3 years group and 22% in 4-6 years age group children in Gujarat (NNMB 2006). Further there was a wide gap in consumption of food against RDA (ICMR) among 1-3 years. Gap in Gujarat is the widest in Milk consumption in the age group of 1-3 years (Figure 11). Vital calorie consumption is only ~ 45% against RDA (Figure 11).

![Figure 11: Consumption Pattern of 1-3 years in Gujarat (NNMB 04-05)](image)

This is because the cereals form a large proportion of food that meets most of the protein requirements but not the calories. Consumption of micronutrients like iron and Vitamin-A is extremely poor (NNMB 2006). There is a deficit of over 500 calories in the intakes of 1-3 years old and about 700 calorie among the 3-6 years old. There are bound to be additional multiple vitamin and mineral deficiencies when there is a
55% deficit in calories (NNMB 2006).

Pant and Chothia (1990) assessed the knowledge of mothers of the high income group of urban Baroda, related to breastfeeding and weaning. Results indicated that top feeding and solid supplements were initiated at 4-6 months mainly commercial baby foods were used for weaning. Most mothers avoided ‘dals’ for the child because these were believed to be difficult to digest and produce gas in child’s stomach.

4. **Infant and young child feeding counseling**

Infant and young child feeding counseling is the process by which a health worker can support mothers and babies to implement good feeding practices and help them overcome difficulties (WHO 2009).

a) **Infant and Young Child Feeding Counseling Skills**

Details of infant and young child feeding counseling depend on the child’s age and the mother’s circumstances. Generally, a health worker should:

**Use Good Communication and Support Skills:**

If a health care worker is to effectively counsel a mother or other caregiver, he or she should have good communication skills.

There are two groups of skills, also refer Box 1 (WHO 2009).

**Box 1: Communication and support skills**

**Listening and learning**

- Use helpful non-verbal communication.
- Ask open questions.
- Use responses and gestures which show interest.
- Reflect back what the mother says.
- Empathize – show that you understand how she feels.
- Avoid words which sound judging.

**Building confidence and giving support**

- Accept what a mother thinks and feels.
- Recognize and praise what a mother and infant are doing right.
- Give practical help.
- Give a little, relevant information.
- Use simple language.
- Make one or two suggestions (e.g. small “do-able” actions), not commands.

**Source**: WHO 2009

- **Listening and learning skills** helps to encourage a mother to talk about her
situation and how she feels in her own way, and helps to pay attention to what she is saying.

- **Building confidence and giving support skills** helps to give mother information and suggest what she might do in her situation, so that she can decide for herself what to do. Supporting a mother is more useful than giving direct advice which she may not be able to follow.

**Assess the situation**

**Assess the child’s growth**

Assessing a child’s growth provides important information on the adequacy of the child’s nutritional status and health. There are several measures to assess growth, including weight-for-age, weight-for-height, and height-for-age. Currently the new WHO growth standards (Onis 2006), are the standard for measuring nutritional status, and been used by health workers in countries like India. It is recommended to use separate standards for boys and girls.

When counseling on IYCF, it is important to understand growth charts. If growth is not recorded correctly, and charts are not interpreted accurately, incorrect information can be given to a mother, leading to worry or loss of confidence.

- **Take a feeding history**

During any contact with a mother and child, it is important to ask how feeding is progressing. Simple open questions can generate a great deal of information.

- **Observe Mother How She Breastfeed**

At all contacts with lactating mothers of infants under 2 months of age it is important to observe mother how she breastfeed. After the age of 2 months, observation may be included only if a mother has any feeding difficulty or if the infant has growth faltering or low weight-for-age.

To initiate an observation the health worker may

- Ask mother whether she could offer her baby the breast and to breastfeed in her usual way.
- Try to observe a complete feed, to see how long the baby suckles for, and if he or she releases the breast by him- or herself.

If the mother has obvious difficulties, it may be appropriate to interrupt the feed in order to help her to improve positioning and attachment while the baby is still hungry. The health workers may use standardized breastfeed observation job aid as a tool (Box 2) to assist in observing a breastfeed (WHO 2009).
Box 2: Feeding History Job Aid, children 6–23 months

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the child still breastfed?</td>
<td>- How many times per day? Day and night?</td>
</tr>
<tr>
<td></td>
<td>- If using expressed breastmilk how is the milk stored and given?</td>
</tr>
<tr>
<td>What other foods is the child receiving?</td>
<td>- How many meals and snacks each day?</td>
</tr>
<tr>
<td></td>
<td>- How much food at each meal?</td>
</tr>
<tr>
<td></td>
<td>- What is the consistency of the main meals?</td>
</tr>
<tr>
<td></td>
<td>- Do meals include: animal-source foods, dairy products, dark green vegetables or red or orange fruits or vegetables, pulses (beans, lentils, peas, nuts), oil?</td>
</tr>
<tr>
<td></td>
<td>- Who helps the child to eat?</td>
</tr>
<tr>
<td></td>
<td>- What bowl does the child get food from (his or her own bowl, or the family pot)?</td>
</tr>
<tr>
<td></td>
<td>- Is the child given any vitamin or mineral supplements?</td>
</tr>
<tr>
<td></td>
<td>- How does the child eat during sickness?</td>
</tr>
</tbody>
</table>

Assess the health of the child and the mother.

Assessing the health of the child

During counseling on feeding it is important to assess the health status of the child using the systematic approach described in the IMCI guidelines (WHO 1997b, WHO 2001b), and manage the child accordingly.

Assessing the health of the mother

During counseling on feeding it is also important to enquire about the mother’s own health status, her mental health, her social situation and her employment. These are all factors that will affect her ability to care for her young child.

Manage problems and supporting good practices:

The results of the assessment are used to classify the mother and baby according to their situation and to decide on management. Figure 12, summarizes three categories of actions that may be required, namely:

a) Refer the mother and child if needed

b) Help the mother with feeding difficulties or poor practices

c) Support good feeding practices

Further,

d) Counsel the mother on her own health, nutrition and family planning.
Counseling on feeding also provides a unique opportunity to counsel mothers about their own nutrition and to ensure that they are fully informed and able to access family planning. If the mother is taking medication, there is only rarely a reason to advise her to stop breastfeeding.

**Follow-up**

Follow-up and continuing care of all children is important, whether they have feeding difficulties or not, in order to support good practices, prevent difficulties and manage difficulties if they arise. Follow-up may take place at a health facility or on a home visit.
visits.

b) **Impact of Infant and young child feeding Counseling**

The Cochrane Review evaluated 34 trials from 14 countries for effects on the duration of any breastfeeding (both partial and exclusive) and EBF alone. The review found that all forms of support, professional and lay, analyzed together, significantly extended the duration of any breastfeeding, and had an even greater effect on the duration of EBF (Britton *et al.* 2007).

An intervention study in India, Bhanderi *et al.* (2003) in Haryana, assessed the feasibility, effectiveness and safety of an educational intervention to promote EBF for 6 months, and showed that promotion of EBF until age 6 months in a developing country through existing primary health-care services is feasible, reduces the risk of diarrhea, and does not lead to growth faltering.

The effects on linear growth seem to be best with interventions that use specific educational messages e.g., on consumption of animal-source foods, emphasize energy density of the diet, and, in areas with food insecurity or low consumption of sources of micronutrients, provide food supplements with micronutrient fortification (Dewey *et al.* 2008, Penny *et al.* 2005).

Improvement of CF through strategies such as counseling about nutrition for populations which are food secure and nutrition counseling, food supplements, conditional cash transfers or a combination of these, in food-insecure populations could substantially reduce stunting and related burden of disease (Bhutta *et al.* 2008). Other studies have also shown a positive impact of counselling on IYCF practices. Some of these have been summarized in Table 2.

<table>
<thead>
<tr>
<th>Study</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guise <em>et al.</em> 2003</td>
<td>The effectiveness of primary care-based interventions to promote breastfeeding: Systematic evidence review and meta-analysis</td>
</tr>
<tr>
<td>Haider <em>et al.</em> 2002</td>
<td>Training peer counsellors to promote and support EBF in Bangladesh</td>
</tr>
<tr>
<td>Lu <em>et al.</em> 2001</td>
<td>Provider encouragement of breastfeeding: Evidence from a national survey in US</td>
</tr>
</tbody>
</table>
Review of Literature

<table>
<thead>
<tr>
<th>Study</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morrow et al. 1999</td>
<td>Efficacy of home-based peer counselling to promote exclusive breastfeeding: a randomised controlled trial (Mexico City) At 3 mo., post partum, EBF was practiced by 67% of six-visit, 50% of three-visit, and 12% of control mothers (intervention groups vs. controls, p&lt;0.001; six-visit vs. three-visit, p=0.02). Duration of breastfeeding was significantly (p=0.02) longer in intervention groups than in controls, and fewer intervention than control infants had an episode of diarrhoea (12% vs. 26%, p=0.03).</td>
</tr>
</tbody>
</table>

5. Support for mothers in the community

Health workers do not always have the opportunity to ensure that mothers successfully establish breastfeeding. Mothers may give birth at home, or they may be discharged from a maternity facility within a day or so after delivery. Difficulties may arise in the first few weeks with breastfeeding, and later on when complementary foods are needed. Illness of infants and young children is often associated with poor feeding. Families and friends are usually a mother’s main source of advice about feeding her children, but this advice is sometimes fraught by misconceptions.

Mothers need continuing support to maintain exclusive and continued breastfeeding, to implement other methods of infant feeding when breastfeeding is not possible, and to establish adequate CF when the child is 6 months of age and older (Aidam et al. 2005). If a child becomes ill, the mother may require skilled support from a health worker to continue feeding her child. This support can be provided by trained personnel in the community, and in various other settings, such as a primary care facility or a pediatric department in a hospital.

There should be no missed opportunities for supporting feeding in any contact that a mother and child have with the health system, whether it involves doctors, midwives, nurses or community health workers. Lay or peer counselors who have the skills and knowledge to support optimal infant and young child feeding can also contribute to improved feeding practices (Haider et al. 2000). Collectively, all these providers should ensure a continuum of care from pregnancy through the postnatal period into early childhood. When they help a mother, they should also talk to other family members, showing respect for their ideas, and helping them to understand advice on optimal feeding. In addition, they can share information and create awareness about the importance of appropriate infant and young child feeding through other channels, for example, by involving school children or extension workers from other sectors.

This multi-pronged approach to promote and support infant and young child feeding
has been shown to be effective in many settings (WHO 2003). Box 3 summarizes key points of contact that mothers might have with a health worker who is knowledgeable and skilled to support her in practicing appropriate infant and young child feeding. Mothers who are not breastfeeding also need help with infant feeding at these times, and many of the skills needed by health workers to support them are similar.

**Box 3: Key points of contact to support optimal feeding practices**

- During antenatal care
- At the time of childbirth and in the immediate postpartum period
- In the postnatal period:
  - For healthy term babies on day 2–3, day 5–7, and around 3–4 weeks
  - For low-birth-weight babies more frequently: on day 2, day 3, day 5–7, day 14, and day 28
- At 6 weeks post partum for all mothers and babies
- During immunization contacts
- During well-baby clinics and/or growth assessment visits
- During sick child visits and their follow-up

C. **Growth Monitoring and Promotion**

The growth of a child is an indication of the state of his/her health, nutrition and well being and hence growth monitoring is a pillar of health care in children. Growth monitoring (GM) is the process of following the growth rate of a child in comparison to a standard by periodic anthropometric measurements in order to assess growth adequacy and identify faltering at early stages. Assessing growth allows capturing growth faltering before the child reaches the status of undernutrition (UNICEF 2008).

![Graph showing growth monitoring over 1 to 3 years](image)

Growth monitoring is a screening tool to diagnose nutritional, chronic systemic and endocrine disease at an early state. It has been suggested that growth monitoring...
has the potential for significant impact on mortality even in the absence of nutrition supplementation or education (Garner et al. 2000). Monitoring the growth of a child usually requires taking the same measurements at regular intervals and seeing how they change. A single measurement only indicates the child's size at that moment; it does not give any information about whether a child's size or weight is increasing, staying the same, or declining. Careful repeated measurements and comparisons with previous measurements are necessary because most children will continue to grow a little, unless they are very ill, and it is easy to mistake some growth for adequate growth.

**Growth monitoring and promotion (GMP)** is thus a prevention activity that uses growth monitoring, i.e. measuring and interpreting growth, to facilitate communication and interaction with caregiver and to generate adequate action to promote child growth through:

- Increased caregiver's awareness about child growth
- Improved caring practices
- Increased demand for other services, as needed (UNICEF 2008).

GMP is widely used as a community based tool for child survival. The use of growth monitoring extends beyond problem detection; it has been used to provide a basis for communicating with mothers on child health and nutrition by stimulating the thinking about the causes of poor growth and malnutrition (ACC/SCN 1990).

**a) Process**

The GMP process includes three stages: i) measuring and interpreting growth adequacy, ii) analysis of the reasons for adequate or inadequate growth, and iii) counseling; which corresponds to the triple-A approach i.e., Assessment, Analysis and Action (UNICEF 2007a).

Growth monitoring is used to initiate communication with mothers and care givers concerning child health and nutrition, and to stimulate thinking about the causes of poor growth and malnutrition. This in turn led to action at the level of the household and of the community itself (Beaton et al. 1990).

Thus, as presented in Figure 13, effective GMP program should ensure, early detection of growth faltering, appropriate counseling and increase contact with health services, leading to improved nutritional status and reduced morbidity and mortality (UNICEF 2008).

The quality of implementation of GMP depends on five main activities linked with it which are (1) weighing accurately; (2) plotting on a growth chart; (3) interpreting the
growth curve; (4) discussing options with the care giver and agreeing on future action; and (5) evaluating the child’s response (Ashworth et al. 2008).

**Figure 13: Conceptual Frame work for an Effective GMP Program**

b) **Objectives of Growth Monitoring and Promotion**

The main aims of growth monitoring, as originally conceived, are to (Ashworth et al. 2008);

1. **Provide a diagnostic tool** for health and nutrition surveillance of individual children and to instigate effective action in response to growth faltering.

2. **Teach** mothers, families and health workers how diet and illness can affect child growth and thereby stimulate individual initiative and improved practices.

3. **Provide regular contact** with primary health-care services, and thereby facilitate their utilization.

The underlying logic is that if growth faltering is detected early and is made *visible* to health workers and families, then families can respond by changing their child-care practices, provided they are offered proper motivation, given clear, feasible alternatives, and given a role in deciding what practices they will try to change (Griffiths 1981).

Subsequent objectives of growth monitoring that have developed include:

4. **Community mobilization**: Growth monitoring can serve as an entry point for community mobilization and social action, especially when growth monitoring data are aggregated and used for community-level assessment and analysis of child malnutrition. The premise is that caregivers’ participation in growth monitoring will lead to increased awareness of factors that detrimentally affect children’s health and that they will influence community leaders and citizens to take collective and effective
action to address underlying socio-economic causes of poor health and promote social and economic equity. This is in keeping with the Alma Ata Declaration of 1978 which emphasizes the need for community and individual participation in primary health care.

(5) **Targeting supplementary feeding:** The weight chart is widely used to determine eligibility for entry to supplementary feeding programmes. The criterion is usually a weight-for-age below one of the reference curves on the weight chart, equivalent to ‘moderate’ underweight. This invariably shifts the focus of growth monitoring towards identifying children who meet this criterion, rather than intervening at the first sign of growth faltering. Consequently no action is taken until the child is significantly underweight. As health workers choose who should receive assistance, the collaborative involvement of families in decision making is lost, as well as any educational benefit of regular growth monitoring. Using weight charts in this way is thus contrary to the precept of growth monitoring. Anecdotal reports suggest that once enrolled in supplementary feeding programmes and approaching the exit criterion, some children may be purposely underfed so as to remain beneficiaries. Although supplementary feeding programmes may have their place in offsetting food shortage, growth faltering is often the result of poor feeding practices, which can still prevail even among beneficiaries of food distribution programmes.

(6) **Reporting prevalence of underweight:** Governments and agencies may require health workers to provide information on the extent of underweight in their locality, or the number of children failing to grow in a given month. Currently over 50% of countries transfer information obtained from growth monitoring to higher levels (de Onis *et al.* 2004). In some countries time-consuming procedures are devised, with information systems spanning village, district, provincial and national levels. In Vietnam, for example, it takes several days each month at district level to collect and aggregate village data in order to report to higher authorities the prevalence of underweight and coverage of child weighing (Shrimpton 2003). Weights may be recorded in logbooks and never plotted, and the growth chart may be used simply to determine if a child is underweight, sometimes at a later date instead of in the mother’s presence. Thus, the promotive aims of growth monitoring are surrendered. Furthermore, the information submitted may not permit meaningful analysis and interpretation so that even the nutrition status surveillance objective may not be achieved.
c) **Benefits of Growth Monitoring and Growth Promotion**

The Growth monitoring program offers many benefits in strengthening preventive health program. Some of which are as follow (Ashworth et al. 2008);

- Small expenditure per child
- Best general index of the health of an individual child

The main anticipated benefits in developing countries are:

- Reductions in undernutrition, morbidity and mortality among young children. The regular measurement helps early detection of malnutrition associated with diarrhoea, and other illnesses, when remedial action is relatively easy.

Linked benefits are;

- Early intervention when growth faltering is more easily remedied
- Improved knowledge about the effect of diet and illness on growth
- Families motivated and enabled to take effective action
- Nutrition and health counseling tailored to individual needs
- Opportunity to assess remedial actions
- Greater self-reliance and self-esteem
- Greater utilization of preventive health-care services
- Fewer referrals for curative care; cost savings, and
- Communities mobilized to address underlying socio-economic causes of poor health.

d) **Issues with Growth Monitoring and Promotion**

However, there are also some problems associated with growth monitoring like

- Lack of understanding on the part of health workers about the role of growth monitoring; many existing training methods only look at teaching the skills of growth chart completion or checking it for errors;
- Lack of involvement of mothers in monitoring the growth and development of their children;
- Lack of commitment of senior health personnel to the monitoring of children's growth and development;
- Lack of planning and facilities when children with growth faltering are detected.

Even though simple in concept there are abundant difficulties with GMP and, as a result only 20% (35/178) countries contacted in 1998–2000 reported having no problems with the use of growth charts (de Onis et al. 2004) which is similar to the proportion (22%) reported in 1978 among health personnel contacted in 50 countries
The GMP issues with ICDS of India are no different than this. In an evaluation of 3704 rural children whose mothers were largely illiterate, analysis of covariance was used to control for socio-economic status and other programme services, and showed that growth monitoring did not have an impact on weight-for-age or morbidity (Gopaldas et al. 1990).

e) Importance of Counseling and Training in Growth Monitoring and Promotion

It is important to underscore that GMP without proper tailored counseling is not recommended. Counseling aides should include generic algorithms addressing assessment, analysis and action, with specific advice for different situations, linked to individual counseling tools to address each specific situation. The algorithms and counseling cards will need to be tailored to country contexts and based on formative research results. Counseling aides should include clear principles of effective counseling and negotiation. Importance of developing counseling skills should be emphasized. Training should include role play and practical sessions and should be followed up by regular coaching; mentoring and support to ensure good counseling skills are developed and applied. There needs to be a tool to record the negotiated decisions, actual implementation by the caretaker and subsequent follow up. Supportive supervision of counselors is crucial. For sustainability, it is suggested to have individuals tasked by the national structures to perform this function (UNICEF 2008).

In Jamaica (Alderman et al. 1978) and Tamil Nadu (George et al. 1993), where intensive nutrition counseling was associated with improved nutritional status, health workers were trained for 8 weeks and Supervisory visits were frequent. Training and supervision were also emphasized in the projects in Nigeria (Cunningham 1978) and Narangwal (Kielmann et al. 1978).

Inadequate training of health workers, especially in equipping and enabling them to provide effective counseling, contributes to poor quality of implementation (Ashworth et al. 2008). Among various studies reviewed, there is a notable difference in the training of health workers. Little time was spent training in the poorly performing programmes – 3 days in BRAC (Karim et al. 1994) and no growth-monitoring training for AWWs in some projects in ICDS (Kapil et al. 1996). In contrast, those with good outcomes spent a considerable time training and supervising their health workers.

In Madagascar and Senegal (Marek et al. 1999), performance was closely
supervised: the indicators used were: (1) percentage of cohort children weighed monthly; (2) percentage of cohort caregivers attending weekly education sessions; and (3) percentage of cohort children who are malnourished. In Senegal, if performance targets were not met, the Supervisor was dismissed after a warning period.

Ideally, the counseling should address the specific needs of each mother and her child, which is impossible if health workers lack the necessary knowledge, skills and insight to analyse the situation and deduce appropriate action. In a survey of training courses in Lusaka, weighing, plotting and interpreting the growth curve were adequately taught, but none taught counseling or follow-up action (Msefula 1993). Too often there is insufficient investment in nutrition training. In the IMCI training, the nutrition component is sometimes reduced or not attempted because of time constraints, and so IMCI clinic staff may not be equipped for growth promotion.

Key messages (Ashworth et al. 2008);

- To be effective in reducing child malnutrition and mortality, growth monitoring must be accompanied by community-based health and nutrition interventions
- Growth monitoring and promotion programmes should prioritize infants and children aged 0–18 mo. and utilize all child health contacts for nutrition counselling
- Training, supervision and support for health workers must be improved if they are to be effective counsellors in growth promotion programmes
- Impact is dependent on coverage, intensity of contact, health worker performance, and adequacy of resources.

f) Country Experience

Indonesia
In Indonesia 2.5 million infants and young children are being weighed regularly at the traditional monthly meetings of village women. The results are entered on growth charts kept by the mothers themselves (UNICEF 1985).

Thailand
A programme based on the home use of growth charts by parents in several villages, helped to eliminate completely third degree malnutrition and reduce second degree malnutrition by 44% during 1981-1982, even though no additional food was provided.
Review of Literature

(J Hendrata and Johnston 1978).

Jamaica

A systematic programme to improve the health and growth of over 6,000 young children using growth charts, immunization and nutrition education and milk supplements, resulted in a 40 per cent decline in the prevalence of malnutrition and a 60 per cent fall in infant mortality provided (Hendrata and Johnston 1978, Ashworth and Feachem 1986).

To conclude, the practical benefits of growth monitoring in promoting better nutritional status and child health are wholly dependent on effective follow-up action being taken by mothers and health workers. Thus growth monitoring program should ensure:

 ✓ Motivating mothers and enabled to acquire the necessary skills and resources to take required action
 ✓ Culturally appropriate advice should be given to mothers and care givers ensuring the local availability of resources
 ✓ Basic health services must be readily available, including the provision of vaccines, drugs and oral rehydration fluids.

Experience suggests that growth monitoring programmes are not always fulfilling these prerequisites and consequently are not achieving the desired impact on child health. It is feared that this could lead to a backlash of disillusionment with growth monitoring per se and it is therefore urged that growth monitoring should not be instituted unless the proper infrastructure is in place to permit effective follow-up action (Ashworth and Feachem 1986).

g) Growth Measurements and Indicators

Various body measurements are used to assess growth. Some are easier to use, more accurate and more useful than others. Growth measures are usually compared to a reference population. Western standards are usually used for comparison, such as Tanner and Boston, or the National Centre for Health Statistics (NCHS). WHO has recently brought out growth standards for children upto 19 years of age; that are currently in use.

There are three main anthropometric indicators for assessing the nutritional status of preschool children, weight for age, weight for height and height for age. The indicator used in the Integrated Child Development Services (ICDS) scheme is weight for age.
D. India’s Integrated Child Development Services Program

The National Policy on Children in August 1974 of Government of India declared children as, "supremely important asset". This was followed by the launch of the scheme programme entitled Integrated Child Development Services (ICDS) scheme in 33 blocks of the country on 2nd October 1975. The programme aimed at providing an integrated package of services in a convergent manner for the holistic development of children in the country. Today, ICDS is the foremost symbol of India’s commitment to her children – India’s response to the challenge of providing pre-school education on one hand and breaking the vicious cycle of malnutrition, morbidity, reduced learning capacity, productivity and mortality, on the other. The ICDS programme provides integrated services of health, nutrition and early childhood education, with the following objectives:

- Improve the nutritional and health status of children in the age-group 0-6 years;
- Lay the foundation for proper psychological, physical and social development of the child;
- Reduce the incidence of mortality, morbidity, malnutrition and school dropout;
- Achieve effective co-ordination of policy and implementation amongst the various departments to promote child development; and
- Enhance the capability of the mother to look after the normal health and nutritional needs of the child through proper nutrition and health education.

The ICDS programme provides services through community-based workers, referred as Anganwadi workers (AWWs) and Anganwadi helpers. The services are provided from a centre called the ‘Anganwadi’ which means “a courtyard play centre” which is located within the village itself. One AWW is appointed for 1000 population. For every 20-25 AWWs, there is an ICDS Supervisor. About 3-5 “ICDS Supervisors”, appointed per ICDS project, cover a population of about a block. These Supervisors report to a project officer referred to as “Child Development Project Officers (CDPOs)”. A package of the following six services is provided under the ICDS Project:

(http://wcd.nic.in/icds.htm)

i. Supplementary nutrition,

ii. Immunization,

iii. Health check-up,

iv. Referral services,

v. Pre-school non-formal education and

vi. Nutrition and health education.
The three services namely immunization, health check-up and referral are delivered through public health infrastructure viz. Health Sub Centers, Primary or Community Health Centers under the Department of Health and Family Welfare. Table 3 presents an overview of the services and target groups identified for each of the services as well as the target group. The services is expected to be universal and extended to all beneficiaries, irrespective of the income of the family.

<table>
<thead>
<tr>
<th>Services</th>
<th>Target Group</th>
<th>Services Provided By</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplementary Nutrition</td>
<td>Children below 6 years; pregnant and lactating mothers</td>
<td>Anganwadi Workers (AWW)** and Anganwadi Helper (AWH)**</td>
</tr>
<tr>
<td>Immunization*</td>
<td></td>
<td>Auxiliary Nurse Midwife (ANM)# / Medical Officer (MO) #</td>
</tr>
<tr>
<td>Health Check-ups*</td>
<td></td>
<td>ANM / MO / AWW</td>
</tr>
<tr>
<td>Referral</td>
<td></td>
<td>AWW / ANM / MO</td>
</tr>
<tr>
<td>Pre-School Education</td>
<td>Children 3-6 years</td>
<td>AWW</td>
</tr>
<tr>
<td>Nutrition and Health Education</td>
<td>Women (15-45 years)</td>
<td>AWW / ANM / MO</td>
</tr>
</tbody>
</table>

*ICDS workers, # health workers * AWW assists ANM in identifying and mobilizing

ICDS is a centrally sponsored scheme wherein GOI provides 90% of the total programme cost to the state/UTs except the entire cost of supplementary food. Since 2009, the central and state government shares the cost of supplementary food in the ratio of 50:50. The Ministry of Women and Child at the central level is in-charge of the ICDS, while the basic responsibility for implementing the programme rests with the DWCD of the state government.

1. The ICDS Programme in Gujarat State

a) Profile of Gujarat state

The state has a population of 50,67,1017 and 26 administrative districts, 336 blocks (rural=233, urban=23 and tribal=80) and 18,618 villages (http://www.gujaratindia.com). Twelve districts are tribal with over 70% population being tribal and contributing to approximately 18% of the total population of the state. The ICDS scheme was launched in Gujarat in 1975 in Chhota Udeipur block of Baroda district. By 1978-80, 1205 AWCs were sanctioned. Upto 2003, Gujarat was the only state in the country with the state Health department being responsible for the implementation of health as well as ICDS programme. With such an administrative arrangement, effective coordination of the two programmes was
reported. Since 2003, the ICDS programme is managed by the DWCD and covers 5.2 million beneficiaries (children below 6 years, pregnant women, lactating mothers and adolescent girls) through 49,338 operational Anganwadi centers (as on March 2011).

b) **Supplementary Nutrition Program Support**

The Supplementary Nutrition Program (SNP) food is supplied to children in two forms - Energy dense micronutrient fortified extruded blended food (*Balbhog*) as Take Home Ration (THR) to children 6 months to 3 years (7 packets per month) and hot cooked meals for older children 3 to 6 years.

**Balbhog for children 6 months to 3 years**

*Balbhog* is a comprehensive supplement that has potential to fulfill significant part of child’s nutritional needs for optimal growth. *Balbhog*, a Micronutrient Fortified Extruded Fortified Blended Food product – (EFBF), is made out of wheat, bengal gram, edible oil, sugar and defatted soybean with addition of selected micronutrients.

The Table 4 presents the compositions and Nutrient Content of *Balbhog* per daily portion of 125 grams which is provided to every child between 6 months to 3 years. Daily intake of *Balbhog* provides 33% of the recommended allowance (RDA) of calories, about 50% RDA of proteins and around 60% RDA of iron. *Balbhog* when consumed, in addition to food provided at home, results in ensuring adequate intake of various essential nutrients.

*Balbhog* has good flavor and pleasant smell. The product has been found to be suitable, palatable, acceptable, culturally by all blocks and districts of Gujarat. Different flavors, such as banana and vanilla, are used every three months. Shelf life is minimum 4 months under normal condition.

*Balbhog* is delivered in 500 gm packets. Seven packets per child per month are given to a child 6 months to 3 years. Additionally underweight children 3 to 6 years are also supplied 4 packets per month free of cost on the MAMTA DAY (Village Health and Nutrition). At the AWCs, for ensuring timely initiation and optimum complimentary feeding, *Balbhog* is advised to be distributed weekly. Mother is expected to collect weekly ration of THR in easy to carry packets of *Balbhog* and are encouraged to
prepare THR food as per the taste of a child.

**Table 4: Composition and Nutrient Contents of Balbhog * Supplied by ICDS**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Ingredients</th>
<th>Per 125 gm</th>
<th>Micronutrient Fortification</th>
<th>Balbhog (125 gram)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wheat</td>
<td>50 gm</td>
<td>Protein (gram)</td>
<td>12 - 15</td>
</tr>
<tr>
<td>2</td>
<td>Bengal Gram</td>
<td>15 gm</td>
<td>Calories (Kcal)</td>
<td>500</td>
</tr>
<tr>
<td>3</td>
<td>Defatted Soybean</td>
<td>10 gm</td>
<td>Iron (mg)</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>Edible Oil</td>
<td>15 gm</td>
<td>Vitamin A (mcg)</td>
<td>200</td>
</tr>
<tr>
<td>5</td>
<td>Sugar</td>
<td>35 gm</td>
<td>Calcium (mg)</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Thiamine (mg)</td>
<td>0.30</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Riboflavin (mg)</td>
<td>0.35</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Niacin (mg)</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Vitamin C (mg)</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Free Folic Acid (mcg)</td>
<td>15</td>
</tr>
</tbody>
</table>


The ICDS functionaries have been trained on significance and preparation of food items from Balbhog for young children. Mothers are briefed on the usage of Balbhog to facilitate mothers to feed their children any time of the day.

c) **MAMTA Abhiyan (Malnutrition Assessment and Monitoring to Act) - Initiative by Government of Gujarat, Health and ICDS Department**

Followed by a state level symposium on Malnutrition held in May 2006, the State Government launched “MAMTA (Malnutrition Assessment and Monitoring to Act) ABHIYAN” on 25th July 2006. The strategy of MAMTA Abhiyan is a joint initiative of ICDS and Health (RCH) sector. The four components include:

- **MAMTA Divas** (Village Health and Nutrition Day-VHND)
- **MAMTA Mulakat** (postnatal care home visit)
- **MAMTA Sandarbh** (referral and services)
• **MAMTA Nondh (Record and Reports)**

**MAMTA Divas**

*MAMTA Divas*, also known as “Village Health and Nutrition Day”, is the key activity of *MAMTA Abhiyan* which is observed on the fixed day of immunization sessions across the state. A comprehensive package of maternal and child services ranging from immunization, antenatal care (ANC) services including hemoglobin testing, growth monitoring, free supply of 1.5 kg of iodized salt are provided on this day which is jointly organized by Health workers, ICDS workers, various village volunteers like Gram Mitra, ASHA, Members of Mahila Mandal, Sarpanch, local NGOs etc. The *MAMTA DAY* focuses on quality services, behavior change and community participation and social mobilization. For appropriate implementation of these activities, block level joint training of Health and ICDS functionaries is organized.

The major focus of *MAMTA DAY* (VHND) is GMP and counseling on IYCF practices which are expected to bring about change into the IYCF practices of parents and caregivers and eventually prevention and reduction in malnutrition.

**Picture 3: MAMTA DAY Celebration in a Village of Gujarat**

For promotion of maternal child care practices, including growth monitoring, the following two important tools are used on *MAMTA DAY*;

**MAMTA Card**

It is a comprehensive tool for recording; reporting and tracking of health care service utilization from pregnancy to child immunization (Picture 4:). It is also an IEC tool providing information on danger signs of pregnancy and early childhood care during pregnancy and childbirth as well as measures to be undertaken for a healthy motherhood and healthy child. For monitoring of child growth and malnutrition reduction, it

**Picture 4: MAMTA Card**
has a very important component of growth monitoring chart along with messages on IYCF. A section on maternal weight record is also included in the MAMTA card.

**Community Growth Monitoring**

The key focus of MAMTA DAY is to monitor nutritional status of children below 3 years of age and adequate dialogue with the mothers and care givers on IYCF for improved child care behaviors. Besides individual growth monitoring and counseling, community growth monitoring activity is conducted quarterly on MAMTA DAY. A growth chart (Picture 5) with weight-for-age of community children is plotted and used for discussion with mothers and community members. The major objective of community growth monitoring is to:

- Create awareness among community leaders on situation of undernutrition in children in their area
- Initiate discussion on infant and young child feeding practices among parents and care givers
- Generate support for mothers and children from family and community.

Community Growth Monitoring aims to change the way parents and the community perceives the nutritional status of their children and shift the focus towards a scientific way of monitoring child growth. Such regular growth monitoring exercise also provides an opportunity for interaction with caregivers on various health and nutrition issues.

**MAMTA Sandarbh (Referral)**

Referral services are provided through one MAMTA referral centre developed in each block. Services of pediatrician who has been commissioned on a call basis are available on a fixed day mostly Thursday. Children with acute and chronic illnesses are screened and taken care at this centre.

**MAMTA Mulakaat (Visit)**

Three post natal visits are conducted by ICDS/health worker on days 1, 3 and 7 after birth of a child. Mothers are supplemented with postnatal vitamin-A supplement (2 lakh IU) on the first visit and provided counseling on child care and EBF on all the three visits.
MAMTA Nondh (Record)
This pertains to actions taken on specific days for updating records of the activities undertaken under MAMTA Abhiyan. Data is compiled and block-wise data is reviewed for actions with special focus on poor performing blocks.

d) Integrated Management of Neonatal care and Childhood illnesses

Gujarat is the first state in India to scale up Integrated Management of Neonatal care and Childhood illnesses (IMNCI) implementation to the entire state. The objectives of the IMNCI are to reduce morbidity and mortality among under five children i.e. reduce NMR, IMR, U5MR, prevent morbidity, prevent case fatality from diarrhea, pneumonia, and malaria. IMNCI also stresses on growth monitoring of below five children and promotion of appropriate breastfeeding and CF practices to prevent malnutrition.

2. Child Nutrition in ICDS

The ICDS program is potentially well-poised to address some of the underlying causes of persistent undernutrition, identified in the framework in Figure 8.

Table 5: Range of Services Offered by ICDS to Children Under Six Years

<table>
<thead>
<tr>
<th>Health check-ups and treatment</th>
<th>Children Under 6 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health check-ups by AWW, ANM, LHV</td>
<td>Health check-ups by AWW, ANM, LHV</td>
</tr>
<tr>
<td>Treatment of diarrhoea</td>
<td>Treatment of diarrhoea</td>
</tr>
<tr>
<td>De-worming</td>
<td>De-worming</td>
</tr>
<tr>
<td>Basic treatment of minor ailments</td>
<td>Basic treatment of minor ailments</td>
</tr>
<tr>
<td>Referral of more severe illnesses</td>
<td>Referral of more severe illnesses</td>
</tr>
<tr>
<td>Growth Monitoring</td>
<td>Growth Monitoring</td>
</tr>
<tr>
<td>Monthly weighing of under threes</td>
<td>Monthly weighing of under threes</td>
</tr>
<tr>
<td>Quarterly weighing of 3-6 years old</td>
<td>Quarterly weighing of 3-6 years old</td>
</tr>
<tr>
<td>Weight recorded on growth card</td>
<td>Weight recorded on growth card</td>
</tr>
<tr>
<td>Immunization</td>
<td>Immunization</td>
</tr>
<tr>
<td>Immunization against poliomyelitis, diphtheria, pertusis, tetanus, tuberculosis and measles.</td>
<td>Immunization against poliomyelitis, diphtheria, pertusis, tetanus, tuberculosis and measles.</td>
</tr>
<tr>
<td>Micronutrient supplementation</td>
<td>Micronutrient supplementation</td>
</tr>
<tr>
<td>IFA and Vitamin A supplementation for malnourished children</td>
<td>IFA and Vitamin A supplementation for malnourished children</td>
</tr>
<tr>
<td>Supplemental Nutrition</td>
<td>Supplemental Nutrition</td>
</tr>
<tr>
<td>Hot meal or ready-to-eat snack providing 300 calories and 8-10g protein.</td>
<td>Hot meal or ready-to-eat snack providing 300 calories and 8-10g protein.</td>
</tr>
<tr>
<td>Double Rations for malnourished children</td>
<td>Double Rations for malnourished children</td>
</tr>
<tr>
<td>Preschool education</td>
<td>Preschool education</td>
</tr>
<tr>
<td>Early childhood care and preschool education (ECCE) consisting of “early stimulation” of under threes and education “through the medium of play” for children aged 3-6 years</td>
<td>Early childhood care and preschool education (ECCE) consisting of “early stimulation” of under threes and education “through the medium of play” for children aged 3-6 years</td>
</tr>
</tbody>
</table>


Note: In practice, not all of these services are necessarily provided at every AWC

The program adopts a multi-sectoral approach to child well-being, incorporating health, education and nutrition interventions (Table 5), and is implemented through a network of Anganwadi centers (AWCs) at the community level. The Department of DWCD emphasis on a “life-cycle approach”, meaning that malnutrition is fought
through interventions targeted at unmarried adolescent girls, pregnant women, mothers and children aged 0 to 6 years.

However, while ICDS has the potential to address many of the underlying causes of malnutrition, there are a number of mismatches between design and implementation within the program (especially with respect to targeting), as well as some serious problems with the quality of implementation.

The ICDS program has been the subject of a large volume of research. Most evaluations have focused on the quality of infrastructure and inputs, and the execution of activities. There have been few rigorous evaluations of the program’s impact on nutritional status or health behaviors, partly because there are few sources of data that permit the comparison of outcomes among recipients and non-recipients of the program. Consequently, many authors have been unable to use the statistically rigorous methodologies that would enable them to draw more reliable conclusions about the impact of ICDS. As a result, some studies have found that the program is associated with improvements in nutritional status, while other studies have failed to find a positive effect.

The major national-level study of program impact (NIPCCD 1992) found that the prevalence of underweight was lower among children in areas with the ICDS program in place than elsewhere, for both children under-three and children aged 3 to 6 years, but given the sample sizes of the control and treatment groups both these differences are statistically insignificant (Lokshin et al. 2005).

Three studies estimate the association between having an AWC in a village and the likelihood that a child is underweight, and find little or no association between the presence of an ICDS center and child nutritional status. Using multivariate analysis of the 1992/93 NFHS data, the World Bank estimates that, for boys, having a local ICDS center is associated with a 5% reduction in the likelihood of being underweight, but that there is no significant association for girls (Deolalikar 2005). Using both the 1992/93 and the 1998/99 NFHS data, Lokshin et al. (2005) find that the program appears to have a significant and positive effect on nutritional outcomes. However, on more rigorous exploration, using propensity score matching techniques, they found little significant effect when children in ICDS villages are compared with children with similar demographic, household and were village characteristics in non-ICDS villages.

In a multivariate model of cross-sectional data collected in Kerala, Rajasthan and

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2 The prevalence of underweight was 29.2% where the program was in place, compared with 32.3% elsewhere
Uttar Pradesh between 2000 and 2002, Bredenkamp and Akin (2004) found that children who lived in villages with AWC were not significantly less likely to be underweight or ill than other children. When using data on actual attendance at AWCs in six states, it was found that only Kerala was this significantly associated with better nutritional status.

3. **Feeding and Caring Practices in ICDS**

ICDS appears to have had little success in encouraging mothers to adopt appropriate child care and feeding behaviours (including practices related to breastfeeding, weaning and diet) that have the potential to improve child growth and health outcomes. Data from Kerala, Maharashtra, Rajasthan and Uttar Pradesh yield very little evidence that these healthy behaviours are more common in villages with AWCs than without AWCs (Bredenkamp and Akin 2004). The AWW should devote much more of her time and energy to communicating the importance of EBF and, later, adding semi-solid complementary food three to four times a day in appropriate quantities thereafter (Ghosh 2004).

**Growth Monitoring and Promotion in ICDS**

There have been marked improvements in anthropometric status since 1975, which have been attributed to the ICDS programme (Kapil and Pradhan 1999), but these might reflect a secular trend. Comparisons of ICDS and non-ICDS blocks show statistically significant differences in moderate and severe malnutrition, although the differences from a public health perspective are small, the proportions <75% weight-for-age being 27% and 30% for ICDS and non-ICDS blocks respectively (Avsm et al. 1995).

Growth monitoring activities are hampered by poor access to appropriate equipment, such as weighing scales, growth cards and wall or book charts. Often the equipment is nominally present, but not of sufficient quantity or quality. AWCs in Kerala and Madhya Pradesh, while also experiencing equipment shortages, are generally better-equipped than those in the other three states i.e. Maharashtra, Uttar Pradesh and Chattisgarh. Even in AWCs with working scales, many AWWs report that they do not weigh young children (under three) every month. In all states, growth-monitoring performance appears to be superior in tribal areas, where children are weighed with greater frequency, and AWCs in urban and tribal areas are better-equipped with weighing equipment than rural AWCs.

Even with regular weighing, growth monitoring is effective only if accompanied by communication for behavior change that results in improved growth of the malnourished child. Previous studies of ICDS have noted that this does not often
occur, perhaps because many AWWs are not fully competent with respect to the interpretation of growth cards/curves (Gopalan 1992) or because AWWs fail to effectively communicate the meaning of children’s growth patterns to mothers (Vasundhara and Harish 1993). Indeed, the ICDS III baseline/ICDS II end line survey reveals a very large discrepancy between the child’s measured weight and the mother’s subjective assessment of her child’s growth status: in Kerala, all mothers think that their children are experiencing normal growth, and in Uttar Pradesh where underweight prevalence in the ICDS III baseline/ICDS II end line sample is 46%, 94% of women describe their children’s nutritional status as “normal” (Bredenkamp and Akin 2004). NFHS-3 showed that mothers of only half of the children age 0-59 months who were weighed received counseling services from an AWC after their child was weighed (NFHS-3 2007).

E. Research Question

Child malnutrition is mostly the result of inappropriate infant and young child feeding and caring practices, and has its origins almost entirely during the first two years of life (Shrimpton et al. 2001).

GMP alone is not sufficient to address undernutrition at the community level, and it addresses only a narrow range of the causes of undernutrition. To address the problem of undernutrition, comprehensive nutrition programs should be implemented based on causal analysis within the nutrition conceptual framework, where GMP can serve as a platform for these programs.

The persistent high levels of child undernutrition in India are the consequences of a complex interaction of basic, underlying and immediate factors (see, for example, the theoretical frameworks of Mosley and Chen 1984 and UNICEF 1990). While any single intervention cannot address such a complexity of determinants, India depends heavily on the package of services provided by Integrated Child Development Services (ICDS) to address the problem of undernutrition to addressing the immediate causes of undernutrition, namely, inadequate dietary intake and childhood infection. It is a well-designed intervention and is an appropriate response to the problem of undernutrition in India (Gragnolati et al. 2006).

Educating mothers on correct breastfeeding practices and child nutrition in the community is one of the components of the ICDS programme in India, in which the ICDS AWWs and their Supervisors needs to play vital role, to promote community based optimal IYCF practices.

Weaknesses in ICDS programme delivery, including incorrect weighing and plotting
(Kapil et al. 1996), failure to identify children with growth-faltering and lack of nutrition counseling, have been reported (Lalitha and Standley 1988, Gopaldas et al. 1990) and might explain the programme’s lack of impact. Also participating children tended to be older than 18 months and thus had passed the critical period when interventions to prevent growth faltering are most effective (Shrimpton et al. 2001).

The 11th Five-Year Plan paper on “Strategies for Children under six” states that; “an essential element for securing better operational results is better capacity building. Training, both initial (“pre-service”) as well as ongoing (“in-service”), is usually recognized as an important component of programme implementation. The current training system appears to be quite divorced from field reality and practitioner experience. Building more lively and effective training programmes, linked with ground realities, would require building crucial linkages between training, programme implementation and review, and child development knowledge and practice” (GOI 2007).

In Gujarat, the major focus of MAMTA DAY (VHND) is growth monitoring and promotion, and counseling on IYCF which is expected to bring about change in the IYCF practices of parents and caregiver and eventually reduction in malnutrition. The ICDS AWWs plays a vital role in this effort to prevent and reduce undernutrition.

The study aimed at answering the following research question; whether capacity building of ICDS functionaries, on growth monitoring and promotion, and infant and young child feeding practices can bring about a required change in the infant and young child feeding practices of parents and care providers, and eventually a reduction in undernutrition among children under two years of age?

The next chapter (chapter 3) describes the scope of investigation based on the review of literature and research question.