BACKGROUND AND RATIONALE

The programme for control of diarrhoeal diseases was launched with great enthusiasm in India in the year 1987 a few years subsequent to the launching of the global diarrhoeal disease control programme. With the passage of time, when feedbacks indicated that the adoption of desired behaviours had not occurred there was an endeavour to reexamine the programme by several workers. This study is one such attempt.

A thorough examination of issues is possible only after a perusal of the work that has been done so far on the subject. The review of available literature raised several issues regarding the understanding of diarrhoea. The underlying section looks at different aspects of the disease and provides a basis for the conceptualization of the problem.

1.1 Definition of diarrhoea

The normal stooling pattern of an individual is dependent upon the food he eats and the levels of environmental contamination. Diarrhoea is the passage of liquid (loose or watery) stools. Earlier studies used a cut off of the passage of four or more liquid stools to define an episode of diarrhoea (Ghai 1988, Bhan 1989a). Most studies on childhood diarrhoea however, have defined an episode of illness as the passage of three or more liquid stools (Ghai 1969, Bhatnagar 1986). Others have included the passage of even one watery or bloody stool in the definition.
Definition of diarrhoea in early infancy

There is a great variability in the number of stools normally passed in the first three to four months of life especially in breast fed infants. The stools during this period also tend to be looser in consistency than at later ages. For these reasons it is usually in this age group that there is a discordance between the mothers and field workers diagnosis of diarrhoea.

Some studies have shown that the prevalence of diarrhoea when the mothers and field workers definitions are used in the same populations differs (Thomas 1989, Cogswell 1991). However, one study in Tanzania did not find significant differences in the mothers definition of diarrhoea and the use of clinical criteria (Killewo 1989).

The perception of what constitutes diarrhoea is therefore site and culture specific. For the purpose of determining how close this definition is to the truth, one approach could be to relate the definition to an association of stool pathogens in the area; this is difficult because pathogens remain unidentified in nearly 25 percent of cases. Besides, in India, excretion of pathogens in stools is common among children with no diarrhoeal symptoms (Ghai 1970) too. Another approach to tackling this issue would be relating it to the need for action as perceived by the mother and by health care experts.

The programme adopted the definition of 3 or more liquid stools to define diarrhoea to facilitate comparability of
epidemiological findings across cultures. This definition has not been empirically validated.

One recent study from Tanzania suggested that 92% of 630 suburban mothers of children aged under 5 would worry about diarrhoea and act only when the stool frequency was 6 or more liquid stools per 24 hours (Killewo 1989).

This has important programmatic implications. For example, using a definition of 3 or more liquid stools may underestimate mothers' response to diarrhoea in a setting where, in their perspective, diarrhoea is significant and action required only when 6 or more liquid stools are passed. Therefore, studies are required, to examine this issue in India. Further, the evaluation of ORT use rates need to be examined keeping in view the possible differences in mothers' and health care providers' perspective of what constitutes diarrhoea and significant diarrhoea, leading to action.

1.2 Etiology of diarrhoea

Several studies both hospital and prospective community based, have examined the possible microbial causes of diarrhoea at different ages of the child. In several studies only the identification of a particular agent was sought. In studies that have examined most, if not all agents in a community setting it was seen that for acute diarrhoea 20% of episodes were caused by Rotavirus, 20% by Enterotoxigenic Escherichia coli, 5-10% by V.cholerae, about 2-3% each by Shigella and Salmonella, 7-10% by

When only hospitalized cases with dehydration are considered then 35-40% cases are found to be associated with rotaviruses highlighting the importance of this organism (Bhan 1988) in severe diarrhoea. In about 30% episodes no organisms can be isolated.

1.3 Incidence of diarrhoea

Studies indicate that the incidence of diarrhoea in under fives in India, varies from 0.7 to as high as 8 episodes per child per year in different parts of the country with a median incidence between 2 and 3 episodes per child per year.

In an investigation of a community in Delhi Ghai et al (Ghai 1969) who defined diarrhoea as the passage of 3 or more liquid stools reported an incidence of 1.6 episodes per child per year among under fives. In another study (Deb 1983) of 383 children <5 yrs of age, in Calcutta slums an annual incidence of 1.1 episodes per child per year (definition of diarrhoea not mentioned) was reported.

During 1985 a multicentric study on the incidence and mortality from diarrhoeal diseases was organized by the National Institute of Communicable Diseases (Banerji 1988) in four metropolitan cities ie Calcutta, Bombay, Madras and Delhi, a few
urban areas Burdwan, Coimbatore and Hyderabad and several rural areas in Manipur, Kangra, UP and Nizamabad. This survey was conducted as per the survey design formulated by the WHO ie 30 clusters with 450 children each and the seasonal variation noted by conducting it in two distinct seasons ie pre and post monsoon when the incidence of diarrhoea cases varies widely. The annual episodes of diarrhoea per child per year varied from 0.7 in West Godawari in Andhra Pradesh to 8.5 in the tribal district of Manipur (median 3.0).

In a recent study conducted by the Ministry of Health in 6 states viz Haryana, Maharashtra, Orissa, Rajasthan, Tamilnadu and Uttar Pradesh, the thirty day prevalence rate ranged from 18.1 in Rajasthan to 10.4 in Haryana. The annual incidence (episodes/child/year) derived from these figures not taking the seasonal variations into account varied between 1.2 in Haryana to a maximum of 2.2 in Rajasthan. The diarrhoea point prevalence rate for the preceding 24 hour period varied from 5.5% to 2.9% being highest in Rajasthan and lowest in Haryana (MOHFW 1990).

In a study currently being conducted in an urban slum in Delhi (Bhan 1991, unpublished) using a definition of 3 or more loose stools and twice weekly surveillance an incidence of 2.7 episodes/child/3 months was obtained.

Clearly then, the figures obtained for incidence are influenced by how diarrhoea is defined, the definition of recovery used, in prevalence studies the season in which the study was conducted (the maximum number of cases occur from July to September
and the least during the winter months) and the frequency of conducting the household surveillance (greater the frequency more are the number of episodes identified).

In a recent nation wide survey conducted by the Indian Market Research Bureau (IMRB) and UNICEF on behalf of the Ministry of Health and Family Welfare (Vishwanathan 1990) a total of 9927 mothers (with at least one child <5 years) residing in 408 villages all over India were contacted. The prevalence of diarrhoea in the 11,050 children in the last two months was found to be 30.5% (average of states studied) for the North Zone (Haryana, HP, J & K, Rajasthan & UP), 71.25% for the East zone (Bihar, Orissa, West Bengal, Assam) 52.3% for the West zone (Gujarat, MP, Maharashtra) and 56.6% for the South zone (AP, Karnataka, Tamil Nadu). The study was done in February and the cool dry climate in the North zone and West zone may have accounted for the lower diarrhoea prevalence in these two regions.

In a cross sectional study conducted in four Delhi slums during the peak diarrhoea months of May and June (Bhatnagar 1986) 963 children were surveyed. Of these, 20.5% had experienced diarrhoea during the past 2 weeks. Extrapolation of this data for the full year results in a mean incidence of eight episodes per child per year, which is almost four fold higher than the national average of about two.

The IMRB/UNICEF study also revealed that the estimated prevalence rates depend on whether the prevalence of diarrhoea was recorded on the day of the visit (when it was 12%) in the last 2
weeks (16%) and in the last 2 months (20%) ie longer the period of recall, lower was the prevalence. Accordingly, estimated annual rates based on prevalence on the day of interview, the past 2 weeks and past 2 months would be 8.7, 6.4 and 2.9 episodes per child per year respectively.

Therefore, although showing considerable variations, the estimated incidence rates based on prevalence studies and taking into account differences in methodology, are consistent with a national average of 2-3 episodes per child per year.

Age and Incidence

Several studies on the morbidity patterns of under fives have shown that diarrhoea morbidity rates decrease as the age of the child increases (Datta Banik 1969, Kamath 1969, Ghai 1970).

The study conducted in four urban slums of Delhi (Bhatnagar 1986) showed a higher incidence of diarrhoea in the younger age groups with children in the 7-12 month age group having an incidence of 13.6 episodes per child per year followed by 11.3 episodes per child per year in the age group 13-24 months.

Studies conducted in other developing countries have also demonstrated the same ie higher morbidity rates at lower ages barring the age group 0-6 months (Yu 1989, Olaiz Fernandez 1989). In Bangladesh the incidence was highest in children aged 2-11 months (Black 1982).

In a paper where 24 studies on diarrhoea morbidity and mortality published between 1955 and 1980 were reviewed, the
incidence of diarrhoea was found to be highest in children under 2 years of age (Snyder 1982). In studies where age groups were further delineated, median morbidity rates were highest in the 6-11 month age group.

**Sex and Incidence**

The majority of studies conducted in India have found no differences in the morbidity rates between males and females (Datta Banik 1969, Bhatnagar 1986, Bhan 1989a).

An occasional study has found a higher incidence in girls (Ghai 1970) or in boys (Khan 1990).

**Season and Incidence**

Acute diarrhoea was found to peak in the cold season (January) and during the rainy season (May to July) in South India (Kamath 1969). Ghai found that the incidence was maximum between April to September with peaks in April and August and an abrupt decline during the period October to March (Ghai 1969). In studies in villages in Haryana the incidence was found to be peak in April and July and was low during the period October to December (Bhan 1989a). Although very few studies have reported seasonality, in those reported the incidence of diarrhoea was found to be highest during the summer months.

The considerable variation in the incidence of diarrhoea in different studies needs to be explained. Overall, the incidence rates are lower when surveillance is conducted once fortnightly and
highest when it is once weekly. Rarely, has twice weekly surveillance been used as is usual for most recent international studies. Secondly, the incidence obtained directly or from two weekly recall data is higher in studies based in urban slum settings than in the rural areas. The much higher attack rates of 7-8 episodes per child per year in the urban slum situation are not surprising given the overcrowding, poor water and sanitation conditions in these areas.

Further, most prospective studies do not take into account the days when informants were not available for information on morbidity. This causes a bias towards an underestimation of diarrhoeal incidence.

The figures on incidence are also influenced by the definition of diarrhoea and its recovery used in the study and in prevalence studies the season in which the study was conducted. Although, of course, there may be genuine regional differences because of differences in the pattern of transmission of diarrhoea pathogens.

The low incidence found in the initial months of life is due to breast feeding being a protective factor against the disease (Victora 1987, Victora 1989). The peak attack rates at 7-18 months coincide with the ages at which weaning foods are introduced in that region.

1.4 Contribution of diarrhoea to mortality

In a study done in urban slums in Patna (Choudhary 1989) diarrhoea contributed to 8.8% deaths in infants and 37.5% deaths in
the age group 1-6 years. The mortality was higher in males than in females in infancy. Other factors associated with higher infant mortality were mothers age less than 20 and greater than 30, multiparity and illiteracy.

In another study in Gorakhpur (Singhal 1986) diarrhoea contributed to 36.3% deaths in infants and 50.2% deaths in the age group 1-6 years. The mortality was higher in poor socioeconomic groups in all age groups and children with grade III and IV malnutrition.

Overall, when major cause groups are considered the proportion of deaths caused by diarrhoea is 8.5% in infants (8.0 % in males and 9.5% in female) and 22.5% deaths (19.5% males and 26.3% female) in the 1-4 year age group (MOHFW 1989).

In the multicentric study conducted by the NICD (Banerji 1988) the diarrhoea associated mortality varied widely from 0.2 in some parts to 7.5 in others with a overall median case fatality rate of 3.2. The proportional diarrhoeal mortality varied from 15.7 to 80.4 (median of 31.4).

In a village in India, Bhan et al in a community based intervention study reported a case fatality rate of 1.13 in the villages where ORS was widely available and promoted and used in nearly 50% of the episodes, as compared to 3.24 in villages where ORS was neither available nor used. The higher figure in the non ORS group may also have been because the nearest treatment centre was about 2 kilometres away, unlike in the study village where it was located in the centre of the village (Bhan 1986)
When analyzed by the clinical types of diarrhoea the case fatality rate in the same study for acute watery diarrhoea was 0.56, for acute dysentery 2.07 and for all persistent diarrhoeas 13.95; it was 21.05 for dysenteric and 11.94 for non dysenteric persistent diarrhoea. Sixty five percent of the total episodes were dysenteric or persistent (Bhandari 1991). The cause specific mortality rate was found to be 5.6% for acute watery diarrhoea, 2.1% for acute dysentery and 2.8 for dysenteric persistent diarrhoea. It was 4.9% for all dysentery, 5.6 for non dysenteric persistent diarrhoea and 8.5% for all persistent diarrhoea.

In a recent multicentric study conducted by the WHO the clinical patterns of diarrhoeal deaths were studied (Victora 1991). Persistent diarrhoea was present in over 60% of infant diarrhoea deaths in Brazil. In Senegal acute watery cases were the leading type of fatal diarrhoea among under fives, while in Bangladesh dysentery deaths were the commonest.

These data suggest that in several countries acute watery diarrhoea makes an important but lesser contribution than the 70% assumed by the programme previously. The implication of this finding is that these deaths may not be prevented by ORS.

1.5 Risk factors of diarrhoea morbidity

Factors which contribute to a high incidence of diarrhoea are lack of breast feeding, malnutrition, overcrowded conditions, poor sanitation, contaminated water and inadequate food and personal hygiene.
Socioeconomic determinants

Few Indian studies have examined the relationship between socioeconomic factors and diarrhoea incidence in children.

The ICMR study (Datta Banik 1969) found that diarrhoea morbidity and mortality rates increased from higher to lower socioeconomic status. The literacy level of the mother was found to be inversely associated with morbidity and mortality. When the literacy level was further graded it was found that as the literacy increased morbidity and mortality levels decreased. Ghai in his study of a village in Haryana found a higher incidence in economically backward scheduled caste and muslim families but the differences were not statistically significant. In the same study the average incidence of diarrhoea in families classified as 'poor' was 154.7 episodes per 100 children whereas in families considered 'better off', the incidence was 85 episodes per 100 children. Children from households with 'satisfactory' drainage had 125.8 episodes/100 child years and those with 'unsatisfactory' drainage had 141.2 episodes/100 child years. Overcrowding was also seen to be associated with a higher diarrhoea incidence. Children from homes which had 1-3 persons per room suffered from 108.6 episodes/100 child years. Those coming from homes with 4 inmates to a room had 125.8 episodes/100 child years and those from homes with 5 or more inmates in one room had an incidence of 149.8 episodes/100 child years (Ghai 1969).
In a study conducted in a poor socioeconomic setting in Karachi, Pakistan, mothers literacy rates were found to be risk factors of acute and persistent diarrhea (Badrudin 1991).

A case control study of risk factors for childhood diarrhea conducted in a rural area of Nicaragua also found that the mothers level of schooling was inversely correlated with the frequency of diarrhea in her children (Gorter 1991). There was also a significant association between the number of children under the age of five years living in the house and the incidence of diarrhea. These effects remained significant even after controlling for confounding variables by conditional logistic regression.

A study conducted in an urban setting in Dhaka, Bangladesh where children less than 6 years of age from 1921 families living in 51 clusters throughout Dhaka city were followed up for 3 1/2 months found that only low family income and living in a one room house were statistically associated with increased diarrhea. Low maternal education was not found to be associated with a higher risk of diarrhea (Stanton 1987a).

Overall, the review of literature in this area suggests that only few studies have obtained socioeconomic data on the populations covered or analyzed it in relation to the diarrhea burden. The few that have done so, have major problems. Several aspects of the data have not been presented completely making an interpretation of results difficult. The socioeconomic factors analyzed have been tackled in isolation and their linkages or
overlapping with other factors have not been examined. Also, the effect of confounding variables like age of the child or breast feeding status have rarely been studied.

Within these limitations, barring an occasional study that shows contradictory results, studies in India and other developing countries indicate that lower family income, maternal illiteracy, higher family size, over crowding and insanitary conditions are associated with a higher diarrhoeal burden.

**Breast feeding and risk of diarrhoea**

Studies in India and other developing countries have found higher diarrhoeal morbidity rates in infants receiving supplements in addition to breast milk compared to those exclusively breast fed (Ghai 1969, Kumar 1981, Bhatnagar 1986, Khan 1990, Badruddin 1991). In those not receiving any breast milk the incidence has been found to be still higher (Chitkara 1986).

Recent case control studies in Brazil (Victora 1987, Victora 1989) revealed that infants who received no breast milk were 14 times more likely to die of diarrhoea related illnesses than exclusively breast fed infants. Infants who received animal milks in addition to breast milk were four times more likely to die of diarrhoea related conditions than those exclusively breast fed. Even feeding with water, tea and juices in addition to breast milk was associated with an increased risk of diarrhoeal death.

A study conducted in Philippines (Popkin 1990) found that during the first 6 months of life exclusively breast fed infants had the lowest risk of diarrhoea; it was up to 17.3 times lower
than the other groups. Among 6 month old urban infants the risk of diarrhoea was 3.2 times higher in the breast fed and non nutritive liquids group; 10.6 times higher in the breast fed and nutritive liquids or foods group and 13.5 times higher in the non breast fed group than in the exclusively breast fed group. For the rural group the differences were smaller; the risk of diarrhoea was 2.2 times, 4.7 times and 4.7 times higher respectively for the three feeding groups. The higher relative risk of diarrhoea for infants in the urban as compared to rural areas suggested that poor urban environment was especially dangerous for children because of poor environmental conditions and lowered rates of breast feeding.

These results are also supported by those of a study done in Lima, Peru (Brown 1989) which showed a positive association between consumption of non nutritive waters and teas and an increased risk of diarrhoea during the first 6 months of life.

The protective effects of breast feeding appear to be related to the intrinsic anti infective properties of breast milk, reduced exposure to contaminated feeds and possibly improved nutritional status during the first few months of life. Data from Bangladesh suggest that continued breast feeding may protect against diarrhoeal morbidity and mortality well into the third year of life; the protection does not however, appear to continue after breast feeding ceases (Clemens 1986).

Surveys on infant feeding practices (Gopujkar 1984, Vishwanathan 1990) indicate that majority of neonates in India are initially breast fed. Although breast feeding is universal, the
period of exclusive breast feeding ie giving the infant no other fluids or food other than breast milk, is very short. Several additives like water, tea, tonics and juices are given to neonates and young infants in the belief that these make the child healthy, prevent illnesses like coughs, colds and diarrhoea and soothe an upset tummy.

Recent studies have shown (Almroth 1970, Almroth 1990, Sachdev 1991) that in contrast to what was believed in the past, infants who consumed enough breast milk do not need these fluids to satisfy their fluid requirements; even in hot and dry environments.

Through a number of studies have examined the relationship between feeding behaviour and the incidence of diarrhoea the data from India on these and on prevalent feeding behaviours in different regions is limited. Breast feeding was consistently found to protect against diarrhoea. In the first three months of life babies who were given supplements had a higher risk of developing the disease.

Little is known about the extent of feeding non milk additives to infants in the first few months of life in different situations in India. This problem is compounded by the fact that till recently the definition of ‘exclusively breast fed’ used in studies did not take into account the feeding of water and minute quantities of other fluids to the infant.

The few studies which have examined incidence of diarrhoea in relation to age suggest that although attack rates of diarrhoea peak between 7-12 months, high attack rates for the disease are
also observed in the first 6 months. If more studies confirmed that diarrhoea incidence rates were the same in the age group 0-2 months and 3-5 months (a fact that is as yet not well established in India as most studies do not give rates individually for these age groups) it would strongly indicate the need for an intervention on the promotion of exclusive breast feeding.

Promotion of exclusive breast feeding in the first 4-6 months of life and safe and effective weaning are interventions that have been proposed by the WHO for the reduction of diarrhoea incidence and mortality (Hogan 1991). However, the value of these has not been systematically evaluated in India as the true extent of the problem is unknown. It is unclear how commonly additives are used in the first three months of life in different settings; which foods are commonly used for infants in different cultures and if certain foods were promoted what is the likelihood of their being accepted by different populations. Beyond the age of 6 months what are the reasons for inadequate supplementation of breast milk. What are the independent contributions of income, the lack of knowledge about appropriate foods, social factors, constraints of mothers time and fuel for cooking, in different situations. A knowledge about these is critical before one can assess to what extent it is possible to promote adequate and safe weaning practices within the existing socioeconomic milieu.

**Inadequate food hygiene and risk of diarrhoea**

Most of the pathogenic organisms that cause diarrhoea are transmitted primarily or exclusively by the faecal oral route.
Faecal oral transmission may be water borne, food borne or directly through fingers, utensils or fomites.

Food hygiene includes those practices involved in the preparation, handling and storage of food that are known or expected to reduce the transmission of enteric pathogens. Some of the practices responsible for transmission of pathogens are improper holding temperature, inadequate cooking, poor personal hygiene of the food handler, contaminated equipment used for storing the food or during feeding the child and an unsafe source of food.

Several studies in developing countries have linked various food hygiene practices like contamination of raw food, utensils and water used in food preparation, undercooking, failure to reheat previously cooked food before consumption, long periods of storage of food at ambient temperatures (because of time constraints, fuel costs and fuel scarcity), contaminated hands of mothers and children while feeding with presence of indicator organisms in food (Rowland 1978, Black 1982, Black 1989). In Bangladesh it was also found that the frequency with which an individual child’s food was contaminated with E.coli was significantly related to his or her risk of ETEC associated diarrhoea (Black 1982).

Food hygiene is particularly important during the weaning period as an increased risk of diarrhoea has been observed with the introduction of weaning foods. Studies in several developing countries have also demonstrated the microbial contamination of traditional weaning foods (Rowland 1978, Black 1982).
Therefore, an improvement in hygiene and preparation and storage of foods fed to children could eliminate one important route of transmission of enteric pathogens.

Malnutrition and diarrhoea

A synergism between diarrhoeal diseases and malnutrition has been postulated for many years (Scrimshaw 1968). The evidence regarding the impact of antecedent malnutrition on childhood diarrhoea are somewhat conflicting.

Some studies have suggested an increased incidence of diarrhoea in malnourished compared to the well nourished (Gordon 1964, Ghai 1969, Ghai 1970, Trowbridge 1981). One study found a higher incidence in older children but not in those aged less than 36 months (James 1972). Another study found only wasting to be associated with a higher diarrhoea incidence (Tomkins 1981).

Studies in Sudan and Mexico have shown a higher incidence of diarrhoea even after adjusting for the potential confounding effects of age and socioeconomic factors (El Samani 1988, Sepulveda 1988).

Other studies (Black 1984b, Bhan 1986) have found no association between different grades of malnutrition and diarrhoea incidence.

On the other hand, studies have consistently demonstrated an increased severity of diarrhoea in the malnourished in terms of median duration of illness (James 1972, Tomkins 1981, Black 1984b), risk of persistence of acute diarrhoea (Bhandari 1989), stool

A study in three villages of Haryana (Bhandari 1991) found that there was a progressive increase in diarrhoea case fatality rates with increasing severity of malnutrition and this rate was 24 times higher in children with severe malnutrition (7.48%) compared to those normally nourished (0.31%).

To summarize, there is poor evidence that malnutrition increases diarrhoeal incidence but there is good evidence that it increases severity including the risk of death from diarrhoea. Partly, the differences in findings between studies may be related to differences in disease definitions, field surveillance methods and to the overall quality of the study.

However, more prospective studies are required which control for familial variations and socioeconomic and environmental variables. This is because both diarrhoea and malnutrition are associated with other factors like poverty (Wittman 1967) and it could be that children who were undernourished tended to come from more crowded, less educated, poorer (Gopalan 1989) and dirtier homes than other children and therefore experienced increased exposure to diarrhoea causing organisms and so a greater incidence. It is also possible that they received less adequate care when sick and thus had a longer duration of illness than other children. Majority of studies however, have not controlled for these factors.
Feeding practices, diarrhoea morbidity, physical growth and risk of diarrhoea

During the first four to six months of life nutritional needs are completely met by breast milk alone. Beyond this age complementary foods are required to be added to the diet (Puri 1976). In developing countries, weaning foods are usually based on locally available staple cereals, legumes and roots and fibers. However, the foods given to the child are usually low in energy and nutrient content, fed at long intervals and small amounts are given at each feed. The reasons for this may be limited availability of appropriate foods, time for preparation and feeding the infant and traditional beliefs regarding suitability of feeding certain foods (Leslie 1989).

A clear relationship has been shown to exist between the levels of energy and protein consumption and the rates of weight gain (Ashworth 1968, Olson 1975, Graham 1981). Studies have also shown that growth rate frequently falters in comparison to international standards from 6 months and this rate persists until 18-36 months of age. In a recently completed longitudinal study in a peri urban community in Peru dietary intakes averaged between 88% and 95% of recommended amounts during the first six months of life but declined to 77% to 82% thereafter (Creed 1990). The average weights of children were almost identical to the NCHS fiftieth percentile during the first semester, but fell progressively below the reference median in the second semester (Lopez de Romana 1989).

The dietary intake of children in this age group could be
increased in several ways; by increasing the frequency of feeding, the quantity of foods fed, by improving the nutrient density or by a combination of these options.

Infectious diseases are important determinants of growth and nutritional status of children in less developed countries (Martorell 1975, Rowland 1977, Black 1984a, Rowland 1988, Rohde 1988, Wittenberg 1989). The impact of infection on nutritional status has been attributed both the change in dietary intake due to anorexia, vomiting or deliberate withholding of food by the mother and to reduction in nutrient absorption and retention. However, the relative importance of these mechanisms has not been determined.

Acute diarrhoea may have important adverse effects on the nutritional status of a child. In industrialized countries as children are well nourished and the incidence of diarrhoea is low children get enough time to achieve catch up growth between two episodes and thus overcome the detrimental effects of a diarrhoeal episode. On the other hand, in developing countries because of the high incidence rates of diarrhoea and deficient feeding there is less time for recovery and catch up growth between episodes and therefore there is a cumulative negative impact of several episodes which leads to growth faltering. The magnitude of diarrhoea induced growth faltering is not constant. Factors which are known to influence this include age (Martorell 1975), season, infectious etiology (Black 1984a), breast feeding status (Lopez de Romana 1989) and dietary intake.
During diarrhoea the usual nutritional requirements may be modified by catabolic processes (especially if the disease is accompanied by fever), by changes in physical activity as a result of the illness and by increased faecal excretion of endogenous nutrients. A greater proportion of the dietary intake may be non available for metabolism because of intestinal malabsorption. In addition, transient anorexia, vomiting and cultural beliefs regarding feeding during illness may prevent optimal dietary intake. Increased feeding during the latter stages of acute diarrhoea and following recovery may be an important means of compensating for nutritional needs that are not satisfied during illness (WHO 1984b).

The adverse effects of persistent or prolonged diarrhoea may be particularly severe either because of specific aspects of the pathophysiology of persistent diarrhoea or because of the greater number of days of illness imposed by this syndrome.

Recent data from trials conducted in Equador, Egypt and Peru as well as a community based intervention study in Columbia show that the adverse nutrition consequences of acute diarrhoea can be minimized or prevented by continuing to feed children a nutritionally balanced high energy diet and suggest that children with an adequate dietary intake may be resistant to diarrhoea related growth failure (Gazala 1988, Brown 1988).

Data from India although limited, have shown that during diarrhoea the feeding practices are deficient. It is therefore
important to determine the reasons for these practices before deciding how amenable they are to change.

**Water supply and environmental sanitation and risk of diarrhoea**

The role of transmission of diarrhoea organisms through faeces, contaminated water and food and by direct person to person contact is well established (Clemens 1987, Black 1989).

Several studies have shown a reduction in the incidence of diarrhoea after the provision of improved quality and quantity of water supply, sanitary latrines and of better hygiene practices like handwashing (Ghai 1969, Henry 1981, Khan 1982, Feachem 1984, Esrey 1985, Young 1987, Clemens 1987, Daniels 1990).

1.6 **Approaches to case management of diarrhoea**

**Oral Rehydration Therapy**

The concept of Oral Rehydration Therapy (ORT) includes prepackaged ORS and home prepared solutions.

The development of the oral rehydration salt mixture (ORS) followed the unique physiological observation in the early seventies (Schultz 1977) that glucose linked sodium absorption remains intact during acute diarrhoea of various etiologies. This ORS solution contains glucose (20g) and three salts; sodium chloride (3.5g), trisodium citrate dihydrate (2.9g) or sodium hydrogen carbonate (2.5g) and potassium chloride (1.5g) to be mixed in one litre of water. In physiological terms ORS appropriately replaces deficits and ongoing losses of sodium potassium,
bicarbonate, chloride and water in diarrhoeal stools and through vomitus.

Studies indicate that ORS in the composition recommended by the WHO for use in diarrhoea, possesses the following benefits. It is effective in combatting mild and moderate dehydration due to acute diarrhoea at all ages and of all etiologies under supervision in institutional settings (Deorari 1984, Bhan 1987). It was used successfully in 90% patients with acute diarrhoea who would have otherwise received intravenous fluids (Sack 1978). ORS is effective in maintaining hydration once dehydration has been corrected (Mahalanabis 1974, Sack 1978). In institutions where ORT was used as the principle form of treatment for cases of diarrhoea rather than I/V therapy, hospital case fatality rates came down by 40-50% (WHO 1984a) attributed to the diminution in the use of I/V therapy (that is, a lesser risk of sepsis and over hydration) and to the general improvement in care since ORT requires active participation by the family and health functionaries. ORT when administered at home early in the illness substantially reduces the number of visits to treatment facilities (WHO 1984a). With active feeding during diarrhoea and convalescence the weight loss associated with diarrhoea could be minimized by quick restoration of the child’s appetite. In a study in Bangladesh use of ORT was associated with reduction in hospital diarrhoeal admission rates by 30% (Chen 1980). ORT could prove to be a useful entry point for promotion of other interventions for achieving optimal child health. It was anticipated that this technological breakthrough if
applied throughout the health care system and in homes by family members could potentially prevent majority of diarrhoeal deaths.

Role of drugs

The recommendations with regard to drugs during acute diarrhoea are that antibiotics should be used only for dysentery and suspected cholera. In acute diarrhoea of any other etiology these are of no practical value. Antiparasitic drugs should be used only in confirmed amoebiasis and giardiasis. Antidiarrhoeal drugs and antiemetics should never be used as they are of no value and some are even dangerous (WHO 1990).

1.7 Programme for Control of Diarrhoeal Diseases.

The global Diarrhoeal Disease Control Programme (CDD) was launched in May 1978 as a part of the World Health Organizations' (WHO) commitment to primary health care and to the achievement of Health for All by the year 2000.

Within a few years of launching the global programme, national diarrhoeal disease control programmes had been initiated in 105 countries including India. The National Diarrhoeal Disease Programme is being implemented in the country with the immediate objectives of reducing mortality from acute diarrhoeal diseases as well as its associated ill effects particularly malnutrition and in the long term, reduce morbidity from acute diarrhoeal diseases in the total population and prevent and control diarrhoeal disease so that they are no longer a major public health problem (MOHFW 1987).
The programme defines correct case management of diarrhoea in the home as comprising of three elements; timely ORT using correctly prepared home fluids in increased volume, continued feeding in adequate quantity and correct treatment seeking behaviour outside the home (WHO 1984).

The scheme was approved in India and circulated to the states in the year 1987-88. The programme was implemented in ninety districts in each of the two years 1986-87 and 1987-88. A further 120 districts were added in 1988-89 the and the whole country was covered by 1989-90.

The CDD programmes are at various stages of implementation in different countries. The impact of the programme on mortality is available from a very few countries. Egypt and Bangladesh are countries where more concentrated effort has been made. In Bangladesh although the programme implementation was considered highly significant, there was no impact on diarrhoea related mortality (Rahman 1979). On the other hand the Egyptian programme claimed a significant decline in case fatality rates in a pilot evaluation (NDDCP 1988) but critical reviews have shown several methodological constraints and therefore these data cannot be accepted.

In Nigeria a nation wide execution of the CDD began in 1986. An evaluation of the efficacy of the CDD programme in reducing morbidity and mortality from diarrhoeal diseases was conducted by analyzing community based CDD survey data (Babaniyi 1991). The results revealed minimal but insignificant impact on diarrhoeal
disease incidence and diarrhoea treatment practices in Nigeria from 1986 to 1989. Other indicators like diarrhoea admission rates, proportion of deaths due to diarrhoea in hospitals and decreased duration of hospital stay leading to increased availability of hospital beds revealed some indirect gains of the programme.

A controlled study in two villages in rural Bangla Desh (Rahman 1979) demonstrated that in the village using ORT the case fatality rate for diarrhoeal diseases was reduced by approximately 85% as compared to the control villages but the overall mortality impact in the villages was negligible that is, deaths due to acute diarrhoeal dehydration were averted but overall there was no improvement in child survival. Also, some studies have shown a decline in diarrhoeal mortality over a short period but in these studies children have not been followed up later to determine if there was a long term impact (Mobarrak 1980). In another study carried out in Egypt (Tekse 1982) all mothers in the study group were visited at home and along with health education given ORS packets. Subsequent surveillance for all child deaths and diarrhoea associated deaths in the study and control villages showed no impact on diarrhoea or overall death rates.

Hospital based studies in Lesotho (Hatch 1990) and in Malawi have shown a decrease in hospitalization rates due to diarrhoea and a reduction in the number of pediatric deaths associated with diarrhoeal disease as a consequence of the programme.

The discovery of ORS was considered important because acute dehydrating diarrhoea was thought to be responsible for 70% of
child deaths associated with diarrhoea (WHO/UNICEF 1985) and as I/V fluids were not accessible in most parts of the country ORS was thought to be the answer as it could readily be made available in peripheral parts.

Data (Black 1982, Bhan 1986, Fauveau 1990, Bhandari 1991) from Bangladesh and north India suggest that nearly half the diarrhoea deaths in children occur due to dysentery and prolonged diarrhoea with malnutrition as the common denominator.

These data suggest that the impact of an ORT programme on overall diarrhoea mortality rates in an area will therefore depend on the proportion of diarrhoea deaths that are caused by acute watery episodes rather than dysenteric or chronic episodes. Where this proportion is high ORT impact on diarrhoea mortality may be high and conversely where low, this impact will only be modest.

At the time of initiation of the programme it was believed that diarrhoea made a significant contribution to the development of malnutrition and that control of the disease would lead to a reduction in the prevalence of childhood malnutrition. A recent review of several community based studies which examined the relationship between diarrhoea and malnutrition seemed to indicate that although the hypothesis that malnutrition predisposed to diarrhoea was largely true the inverse was not clear (Briend 1991).

Some studies had examined the effect of diarrhoea on nutritional status over short time intervals and it could not be determined whether diarrhoea induced growth faltering was transient or sustained. In other studies where this effect had been examined
over longer periods it could not be shown clearly that diarrhoea preceded malnutrition. Also, inconsistencies between studies and lack of evidence supporting a biologically plausible mechanism resulted in the question still remaining unsolved. Studies in India have also failed to demonstrate an impact of the programme on nutritional status (Ghai 1988, Walia 1989) although one study revealed some positive nutritional gains when a subgroup of malnourished children was analyzed (Deb 1983).

These findings can be explained by the fact that ORT itself only corrects salt and water losses and would therefore not be expected to produce nutritional benefits. Even if it is conceded that by limiting the nutritional damage during an acute watery episode, ORT might reduce the severity and duration of subsequent episodes, when the determinants of childhood malnutrition are considered this contribution can only be minimal. It therefore, seems unlikely that ORT will be beneficial until the social and economic factors leading to malnutrition are addressed concurrently.

Thus, if ORT does not contribute to improved nutritional status, a proportion of deaths prevented by avoidance of dehydration may in reality be a shift in the cause of deaths or in their timing. A vital question therefore is whether an ORT programme would actually improve child survival. These studies seem to suggest that the benefits of ORT in terms of improved child survival or an improved quality of life are limited. This is because in populations with high child mortality there are multiple
risk factors that lead to deaths and preventing or controlling a single disease is unlikely to have a long term impact on child survival.

Evaluation of the CDD programme in several countries shows that the practices desired to be promoted have not been adopted so far and it is unlikely that there has been any significant impact. Studies in India reveal that even several years after initiation of the programme awareness and use rates of ORT still remain low. In a survey which included a representative sample from all over India only 16.7% mothers interviewed were aware about solutions to be given to a child with diarrhoea. The highest awareness was recorded for the state of Kerala where it was 47% (Vishwanathan 1990).

In the year 1989 a study was conducted by the Government of India to review the ongoing programme of ORT in the country. In order to obtain a countrywide picture the study was taken up in six selected states representative of different cultures. The ORS use rate was highest in Haryana (50%) and lowest in Rajasthan (27.1%). The SSS use rates were highest in Orissa (48.7%) and lowest in Tamil Nadu (12.8%). The ORT use rate defined as the percentage of children with diarrhoea in the last 24 hours given either ORS or SSS ranged from 61.4% in Maharashtra to 36% in Rajasthan. Increased fluids were used in the maximum of 11.6 episodes in Haryana and 1.5% episodes in Tamil Nadu (MOHFW 1990).

The reasons for this lack of impact could be several. Firstly, as discussed, there is now evidence that some of the basic assumptions underlying the programme may not be correct. Secondly,
the programme content may not be appropriate or consonant with the perceptions, needs and situation of the people and thirdly the implementation of the programme itself may have problems.

A contributory factor for a weak programme could also be its hasty initiation and lack of consensus on treatment recommendations. There are those who believe that it should be freely available while others believe that it should only be available in health facilities supervised by medical personnel. Above all, it was largely initiated on the basis of CDD experience elsewhere with little epidemiological exploration in India especially its socioeconomic basis (WHO 1986).

This itself indicates that the assumption at the operational level ie that diarrhoea and its health seeking behaviour can be tackled independently of the socioeconomic context seems problematic. If there is a possibility to change some aspects of diarrhoea related behaviour then these must be clearly identified within each socioeconomic context and be explicitly delineated from such behaviour that is difficult to change within that context. It also needs to be said, that certain contextual changes in themselves may be critical in improving behaviour such as water supply, sanitation facilities etc.
1.8 Studies on Diarrhoea and its Management in a Social and Cultural Context

Subsequent to launching the programme, several studies have shown that there are culture specific explanatory models including taxonomies for childhood diarrhoeal disease.

Bentley (Bentley 1987) found that women in three villages of Haryana recognized five common types of diarrhoea; 'khooni dast' 'pani dast' 'phate phate', 'hare' and 'peele'. In the nationwide study conducted by the Indian Market Research Bureau (Vishwanathan 1990) mothers in each region of India recognized different names for diarrhoea. A total of 53 names in 14 languages were recorded. The causes of diarrhoea were believed to be related to food, the physical condition of the child, climatic conditions and to a lesser extent supernatural forces. A study in Rohtak (Sood 1990) revealed that the commonly perceived causes were eruption of teeth, eating of mud, worm infestation, change of climate, poor personal hygiene and changes in diet.

Studies in other countries also reveal a similar pattern. In Ethiopia (Sircar 1988) mothers believed that diarrhoea was caused by the will of God (33.1%) by sorcery (11.5%), poor sanitation (29.5%), faulty feeding habits (9.2%), worms (5.6%), rainy season (5.1%) and unknown causes (6). In Nepal (Stapleton 1989) teething (75%), cold food (57.5%), stale food (52.5%), hot food (41%) and dirty water (38%) were reported as common causes of diarrhoea.

The importance of determining the taxonomies and perceived causation of diarrhoea is because these affect the choice of
diarrhoea management; in several communities diarrhoea perceived to be caused by 'teething' does not receive any treatment. Similarly, diarrhoea perceived to be caused by supernatural forces will tend to be treated by an exorcist rather than by a health care provider.

**Oral Rehydration Therapy**

Studies have also indicated that many mothers although possessing knowledge about ORT do not use it during diarrhoea. In the IMRB study (Vishwanathan 1990) 52% of users of ORT expected that it would stop loose motions. In a Haryana village, 81% of mothers who had previously used ORT and did not intend to use it again were dissatisfied because it did not stop the diarrhoea (Bentley 1987). Coreil et al found that the use of ORT was determined by mothers beliefs about how it worked ie whether it cured or replenished fluids (Coreil 1988). In a study in Ethiopia 81.2% mothers who used ORT believed that it would stop diarrhoea (Sircar 1988).

Where knowledge exists but behaviours have not been adopted a successful adoption could have perhaps, been achieved if before initiating the programme, research had first defined the existing practices of mothers with regard to fluids during an episode of diarrhoea. Whether fluids were commonly increased, decreased or withheld during the illness, and the types of fluids likely to be acceptable for a child with acute diarrhoea. Were there locally available fluids in communities that mothers perceived to be
beneficial and that could be promoted with a little modification for use as ORT.

Studies have also indicated problems associated with attempts to communicate the concept of dehydration. Some workers have hypothesized that satisfaction with ORT would be enhanced and that coverage rates would increase if its function in preventing and treating dehydration could be accurately conveyed. Given this, an increase in correct usage would follow. The support for this view is limited. In a study of an Indian village, Bentley found that 41% of ORS users who understood its rehydration function were more than twice as likely to perceive it as helpful and were more likely to give ORS immediately (Bentley 1987). Yet, further analysis of the data showed that awareness of fatality from diarrhoea and maternal education were more powerfully associated with prompt treatment than knowledge about dehydration. Coreil and Genece failed to find any correlation between perceived mode of action of ORT and perceived efficacy (Coreil 1988). No matter what Haitian respondents thought the purpose of ORT was (ie to replace water loss, cure diarrhoea or prevent dehydration) they were equally likely to describe ORT as effective. Moreover, those who perceived its rehydration function tended to delay longer in initiating therapy than those who believed in its curative powers; they tended to wait until they assumed that significant water loss had occurred or until some signs of dehydration were actually present.

Perceived severity was also mentioned in explanations of ORT compliance in literature. To demonstrate how this could affect
treatment decisions Chowdhury et al reported that although SSS was used in only 4-10% of diarrhoea episodes in Bangladesh, when diarrhoeal episodes classified as severe were considered SSS was found to have been used in 26-52% of them (Chowdhury 1988).

It is possible that these failures can be traced to culturally inappropriate strategies used in introducing the concept of dehydration. Societies possess elaborate taxonomies of diarrhoeal disease and the use of solutions may seem appropriate for only some which may or may not include acute watery diarrhoea. Another problem is posed by beliefs about etiology of certain types of diarrhoeal disease; certain types may not require any treatment or may not be amenable to cure and in these ORT is not likely to be used.

Health Seeking Behaviour

Similarly, prior to initiation of the programme knowledge on treatment practices in and outside the home was scanty. Studies on current practices of diarrhoea management have revealed that a large number of pharmaceutical agents of doubtful or no value and which are potentially toxic, are widely used.

In three villages in Haryana, it was found that antibiotic medications were used in more than 80% of diarrhoeal episodes (Bentley 1987). A recent survey conducted in the East Godavari district of Andhra Pradesh (Patnaik 1990) showed that as high as 68.5% of children received antibiotics during diarrhoeal episodes.
Several problems are associated with this misuse of medications; adverse reactions are common and extensive use of antimicrobials contributes to widespread antibiotic resistance. An additional 'side effect' is their high cost. Most important of all is the fact that the inappropriate use of drugs often delays or replaces appropriate diarrhoea management. This raises issues about accessibility, quality of sources, professional proficiency and the role of private practitioners and hospitals.

Treatment seeking may also be affected by the perceived etiology of diarrhoea eg in several settings 'teething' diarrhoea is not perceived to require any treatment. It could also be linked to the perceived severity of diarrhoea; a study found that medical treatment tended to be sought more often when the episode was prolonged (Bentley 1988).

Feeding During Diarrhoea

One of the recommendations of the programme is that appropriate feeding be continued during diarrhoea. The assumption underlying this message is that mothers withhold food during illness. Some studies have shown that mothers restricted food intake during diarrhoea (Khan 1986, Gazala 1989, Stapleton 1989) but the majority indicated that instead there was a shift in diets from those perceived to be 'harmful' to those 'beneficial' (Bentley 1987, Vishwanathan 1990).

Mothers in Bangladesh, Nepal and a number of other countries reported continuing breast feeding during diarrhoeal episodes
(Green 1986, Nichter 1988, Stapleton 1989). In Indonesia mothers breast fed children even more frequently during diarrhoeal episodes. In a recent study conducted by the Government of India continued breast feeding rates ranged between 98.9% in the state of Rajasthan to a minimum of 87% in Haryana. Continued feeding rates ranged from 68.4% in Rajasthan to 25.8% in Orissa (MOHFW 1990).

Most of the studies done were self reports and for dietary practices these have been shown to be particularly unreliable. There are examples of regions where mothers reported altering the diet of children during diarrhoeal episodes but actually did not do so as carefully designed dietary recall and observational studies confirmed. This was seen in Peru where a dietary recall study showed little actual change in the types or amounts of food given (Huffman 1991).

Recent studies have shown that it is probably anorexia that led to an inadequate intake of food and mothers actually increased efforts to feed their children during diarrhoeal illness (Bentley 1992 in press).

Where feeding practices during diarrhoea are found to be inappropriate as in countries like India, the reasons underlying these practices are complex. Studies do not focus on many of them ie whether these are due to lack of purchasing power, to access to food, to knowledge of what and how much to feed at different ages, interactions of nutrition and infection or to cultural factors. Also, the focus on feeding during diarrhoea without taking into account the practices before the child developed the disease and
without acknowledging the factors that led to these deficient practices would probably result in the continuation of the existing practices when a simplistic programme message to continue feeding was imparted.

Other factors that could affect diarrhoea management practices could be the characteristics of the child. Studies in some countries have shown that child caretakers were more likely to bring male children to a health centre (Escobar 1983, Ravindran 1986). In Bangladesh it was seen that small boys were preferentially taken for treatment and this bias increased with increasing distance from the health centre. However, it was not known whether this was because boys suffered from more diarrhoea, more were vulnerable to the disease or due to a son preference. In Brazil (Scheper-Hughes 1988) it was found that mothers preferred children who were more active and animated irrespective of gender. In another study (Stanton 1987a) treatment was sought for all children from multiple sources and not seeking treatment was related more to external situational factors than preference for a particular child.

Seasonal factors could also interfere with the treatment of an ill child especially in regions where women worked in the fields and the harvesting time coincided with the peak diarrhoeal season.

In developing countries, where women in rural areas may work on agricultural land or in urban areas where women work as domestic help, lack of time has been shown to act as an impediment to appropriate diarrhoea management practices (Leslie 1989).
The status of women in general and especially their status in their married homes would also affect child rearing practices. Women who have little power in their homes may be unable to make decisions about their children's medical treatment as this may depend on other family members with different priorities.

Limitations of the studies done

Majority of these studies have been surveys which have major limitations in understanding patterns of practice. While surveys provide measures of awareness about programmatic recommendations and the expressed attitudes to them, they relate incompletely to actual behaviour. Surveys give data on what people say and not exactly on what they do. There is therefore the likelihood of respondents reconstructing events in accordance with idealized or general behaviours rather than what they actually did at a given time. Studies have shown poor correspondence between KAP responses and observed behaviour (Stanton 1987b) the discordance resulting from people reporting what they define as correct behaviour while observations confirmed incorrect behaviours.

The majority of studies have ignored the economic and cultural context of the population in which these were conducted. Environmental variables like water supply and sanitation which have a strong bearing on practice have been partially or completely overlooked; if they have been acknowledged then the linkages and overlap between these variables have been missed.
Where different patterns of behaviour were obtained their socioeconomic background was not questioned. In the majority, only what was done was asked for and so the programme basis was never questioned.

Overall, few studies have been done particularly in India and especially in settings such as the one proposed.

Types of studies needed

Studies are needed which examine why people do as they do. As human behaviour cannot be interpreted in isolation from the environment it is critical that these studies understand the socioeconomic context in which the behaviours occur. Once the reasons for people's actions are understood in entirety studies should then identify which of the inappropriate actions are amenable to change. Some behaviour changes could be possible to introduce within the same context and would therefore be amenable to change while others that are rooted in the context would not be.

Research is therefore needed which focusses on the broader social context of diarrhoea, on social factors hypothesized to have an impact on the case management of diarrhoea in the home. These would include in addition to those already mentioned, issues like factors of seasonality, women's time and availability of work, infant feeding practices etc.

Few studies have focussed on the various factors which constrain or facilitate the correct utilization of ORT, correct
treatment seeking behaviour and appropriate child feeding practices.

It needs to be understood how people perceive ORT and its effects and how this influences their utilization of it. Research is also needed to understand better, the determinants of correct use of ORT in the home including variations in practice due to situational constraints. At present, it is unclear whether medically accurate models of dehydration, simpler models of fluid replacement or alleviation of symptoms will offer the strongest motivation for ORT use and support ORT coverage. The observations on patterns of use would be enhanced if coupled with qualitative research on the factors inhibiting use of ORT. Emphasis should also be given to non users and the factors underlying non use and sporadic use.

One of the most fundamental gaps involves health seeking behaviour for diarrhoeal disease. It is critical to understand how caretakers target specific episodes of their child's diarrhoea for certain types of treatment. This would involve determining the cultural thresholds or trigger points for identifying an episode as 'serious' and requiring treatment and how these diagnostic criteria are associated with different patterns in treatment seeking. Also, what are the factors that support preferences for inappropriate treatment regimes, those affecting choice of treatment like the perceived severity of illness, previous knowledge about the illness and possible remedies, factors associated with a treatment choice, treatment cost and resources to meet it or a recent experience with
a given treatment. In order to better understand the patterns in treatment seeking, studies could include a decision making component and this would reveal the factors implicated in choices between treatment alternatives and would be useful in regions with pluralistic health care systems.

Studies are needed on the patterns of feeding infants and children during and after diarrhoea episodes. There is a need for descriptive and context sensitive studies coupled with observations of behaviour in the home. Wherever, foods are available in the home an improvement in practices requires developing messages for instructing families. To be able to develop these, knowledge of weaning foods actually available, acceptability of these foods and foods currently in use along with their frequency of feeding, nutrient densities etc are critical. It is also important to know how often situational constraints like fuel scarcity, cost and mothers time act as barriers to optimal feeding practices in urban and rural situations. Wide gaps in knowledge exist in these spheres, especially in India. As all these practices are culture specific regional differences also need to be taken into account.

A possible site for one such study could be an urban slum as these are fast emerging as areas of importance from a social, economic and public health perspective. Increasingly, a larger number of people are leaving their villages as there are no means of subsistence in villages and migrating to nearby towns.

Studies on slums are important for several reasons. It is envisaged that 40% of the urban population will be residing in
slums by the end of the century (Ministry of Urban Development 1988). As people in these areas live in close proximity under unhygienic conditions the morbidity and mortality rates are very high (Bhatnagar 1986, Biswas 1991).

Although slums are in the city and therefore near sources of health care it is essential to determine whether this population actually has access to health care or whether a separate model needs to be designed for them. This is particularly important because the primary health care system was evolved with the rural population in mind and would perhaps need modification after the needs of this population are assessed.

A study on the inhabitants of slums is interesting from another perspective; the people in these areas are culturally unique. Coming from a rural background they have been exposed to urban environment and mass media and this may have led to changes in their life styles including health seeking behaviour.