

**CHILD DIARRHOEA AND ITS TREATMENT SEEKING BEHAVIOUR IN INDIA
WITH SPECIAL REFERENCE TO MADHYA PRADESH AND TAMIL NADU
USING NFHS-2 DATA**

*Dissertation submitted to Jawaharlal Nehru University
in partial fulfillment of the requirement for
the award of the degree of*

MASTER OF PHILOSOPHY

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2007



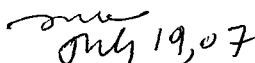
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CERTIFICATE

I, VIJYAM SINGH, certify that the dissertation entitled "CHILD DIARRHOEA AND ITS TREATMENT SEEKING BEHAVIOUR IN INDIA WITH SPECIAL REFERENCE TO MADHYA PRADESH AND TAMIL NADU USING NFHS -2 DATA" for the degree of MASTER OF PHILOSOPHY is my bonafide work and may be placed before the examiners for evaluation.



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Dedicated to:

My Dear Buaji and Fufaji

ACKNOWLEDGEMENT

First foremost I would like to thanks to my supervisor Prof. Murli Dhar Vemuri who has provided me the valuable suggestions and kind help at every step of my research. His consistent cooperation, patience, criticism, encouragement, support, and suggestions have helped in completing my work.

I am ever grateful to my Buaji and Fufaji. They have taught me to dream big in my life and always been a source of inspiration at each and every moment of my life.

I have no words to thank my dear friend Saurabh Sanel for his help, understanding, support, valuable time and well wishes in motivating me to achieve my target.

I would like to convey my special thanks to Central Library J.N.U, National Institute of Health and Family Welfare (NIHFW), for allowing me to consult the books, journals and reading materials of their institutes and libraries for my work.

I am thankful to Tamil Selvan sir for their help in completing my map work.

I am also grateful to my senior Swati Mondal and Preeti Lata for lending me a helping hand always as and when I needed.

Last but not least , I would like to thank my Parents, Shri Vijay Pal Singh, Rajni Singh and my dear Neelam didi, Satyam didi ,Anu didi , Manoram Bhaiya and all my family members for showering me with all their love, blessings and moral support through all the ups and downs of my life.

I am also grateful to my grandfather for his love and well wishes in my life.

VIJYAM SINGH

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CHAPTER 1

*"Let everyone remain happy; Let everyone be healthy and disease free.
May everyone progress on the path of spiritual enlightenment,
May no one suffer from sorrows."*

Upanishad

CHAPTER 1

INTRODUCTION

Diarrhoea is the second biggest killer of children in developing countries. Diarrhoea kills over 1 million children every year through dehydration and malnutrition. Children are more likely than adults to die from diarrhoea because they become dehydrated more quickly. Acute diarrhoea may be a harmless (though unpleasant) experience for adults, but it can be life threatening to babies and young children. This is because their smaller bodies are more vulnerable to dehydration. The majority of cases are caused by the contamination of food or water supplies, and infection often begins in the home (UNICEF 2003). A range of factors may make children more likely to contract diarrhoeal infections, from domestic hygiene to the health of the mother.

In India about one in every 200 children who contract diarrhoea will die from it, acute diarrhoeal disease is a leading cause of mortality and morbidity in infants and children. According to the National Family Health Survey-2 (1998-99), 19.2 percent children under the age of three suffered from diarrhoea during the reference period of two weeks prior to the survey (IIPS). A wide regional variation seen in the prevalence and treatment of diarrhoea among Indian States. As shown in table 1.1 the prevalence of child diarrhoea is high in Northern states such as Himachal Pradesh (28.6 Percent), Orissa (27.8 percent), Madhya Pradesh (23.5 percent), Uttar Pradesh (22.4 percent) and Rajasthan (19.3 percent). Table 1.1 show the prevalence of child diarrhoea is low in Southern states such as Kerala (11.5 percent), Karnataka (13.9 percent) and Tamil Nadu (14.4 percent). Table 1.1 show the medical treatment of child diarrhoea is low in BIMARUO states such as Orissa (47.1 percent), Rajasthan (58.3 percent) and Uttar Pradesh (62.4 percent) while the medical treatment of child diarrhoea is high Southern states of Kerala (77.2 percent), Tamil

Nadu (69.2 percent) and Karnataka (67.5 percent). Knowledge of ORS packets is almost universal in Mizoram (96 percent) Himachal Pradesh (93 percent) and Manipur (92 percent) and it also exceed 80 percent in Kerala, Goa, Tamil Nadu and Punjab.

Knowledge of two or more signs of diarrhoea requiring medical treatment is lowest in Rajasthan (18 percent), highest in Nagaland (63 percent) followed by Meghalya, Kerala and Tamil Nadu.

Table 1.1 show the percentage distribution for received any treatment for child diarrhoea in India. Received any treatment for child diarrhoea is high among northern states of Haryana (97 percent), Punjab (96.4 percent), Himachal (95 percent) and New Delhi (94 percent) and low in Nagaland (70.2 percent), Sikkim (77.2 percent), Rajasthan (77.3 percent), Madhya Pradesh (78.4 percent), Bihar (80 percent) and West Bengal (80 percent).

The percentage of children taken to a health facility provider when sick with diarrhoea is considerably higher in the northern states with the exception of Rajasthan. Kerala and Maharashtra also have relatively high percentage of children receiving medical attention when sick with diarrhoea. The northeastern and eastern states on the other hand have the lowest percentage of children taken to a health facility or provider for diarrhoea treatment.

The diarrhoea is the highest among the children of age 1 year to 2 year age group because they are more vulnerable by nature (Barua, 1981). In case of sex, female child may get lesser care than male child. The higher birth order of child has more prevalence of diarrhoea. A mother with higher educational level is likely to have greater awareness about child health. Diarrhoea is water born diseases so the source of drinking water is an important factor for prevalence of diarrhoea. Currently, 1.1 million people lack safe drinking water and 2.6 billion lack basic sanitation. (Report on Global Sanitation, 2005).

TABLE. 1.1

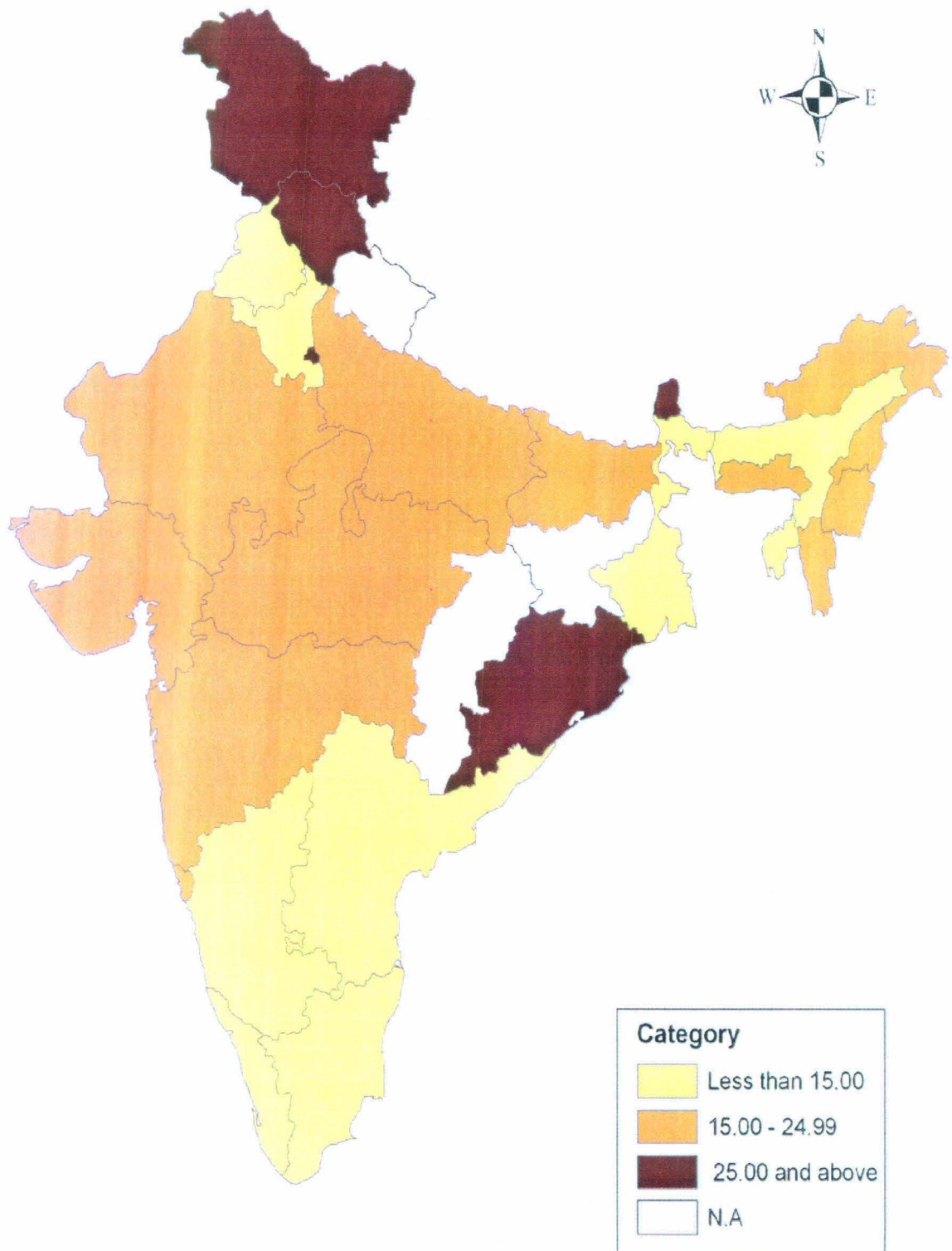
Percentage distribution of children(under age three years) classified according to prevalence, medical treatment and received any treatment for diarrhoea in India 1998-99

	Prevalence	Medical treatment	Any treatment
INDIA	19.6	62.8	87.67
Southern states			
Karnataka	13.9	67.5	89.3
Kerala	11.5	77.2	98.7
Tamil Nadu	14.4	69.2	88.6
Andhra Pradesh	14.5	69.6	90.5
Western states			
Maharashtra	23.5	79.5	91.1
Gujarat	19.4	63.4	83.1
Goa	18.5	66.1	88.1
Northern states			
Haryana	13.7	92.6	97.8
Himachal Pradesh	28.6	91	95.9
Punjab	9.9	90.4	96.4
New Delhi	29.9	80.7	94.4
J&K	32.3	81.1	94.1
Eastern states			
Assam	7.4	48	80
West Bengal	7.4	58	93.2
Arunachal	23	50.5	78.3
Manipur	16.4	44.8	87.6
Meghalaya	21.3	45.8	79
Mizoram	21.8	33.7	84.6
Nagaland	21.3	22.3	70.2
Sikkim	30.9	31.9	77.2
Tripura	10	62.5	96.9
Bimaru states			
Bihar	17.4	50.6	80
Madhya Pradesh	23.5	59.2	78.4
Orissa	27.8	47.1	85.8
Uttar pradesh	22.4	62.4	82.9
Rajasthan	19.3	58.3	77.3

Source: IIPS, 2000

Fig. 1.1

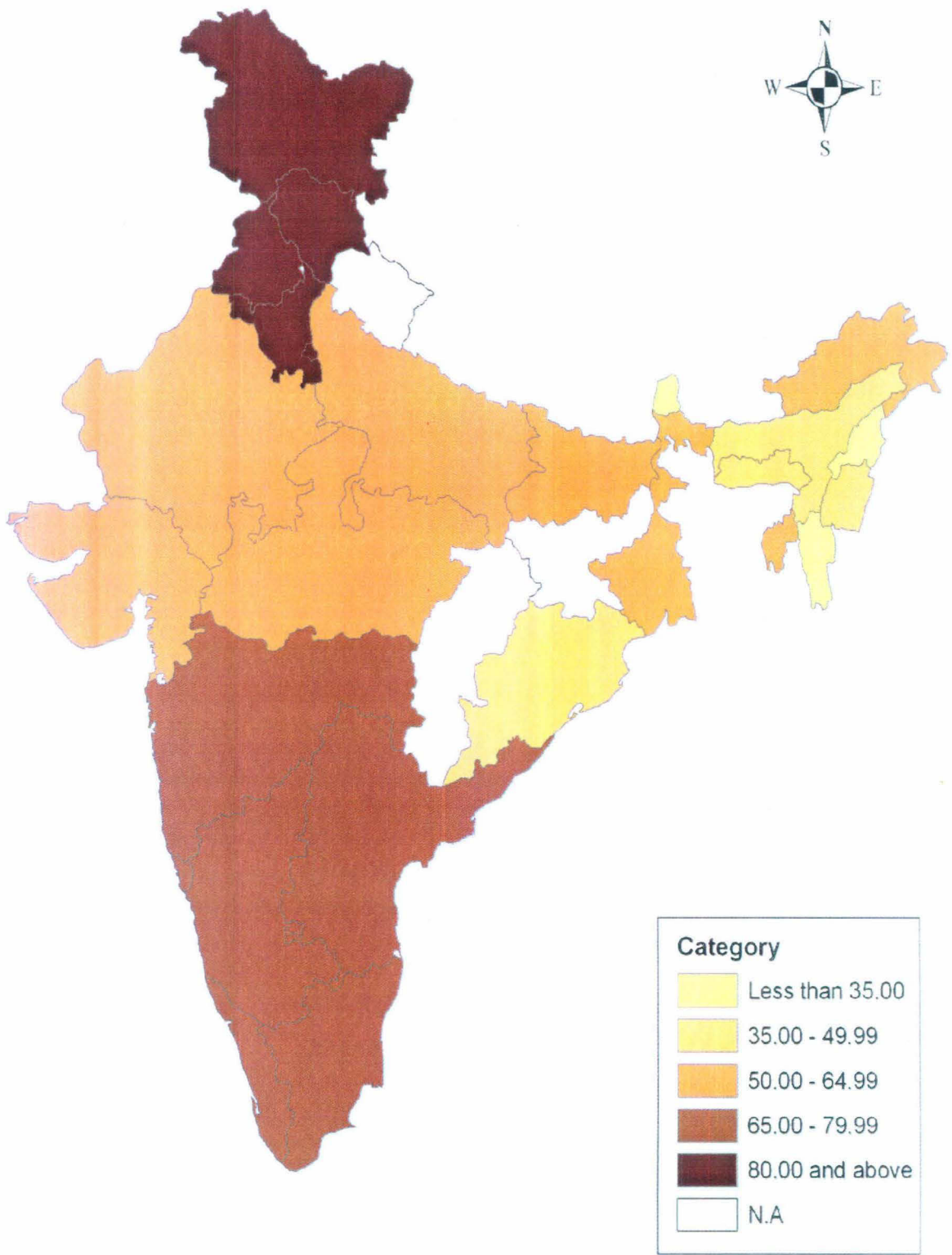
Spatial distribution of prevalence of child diarrhoea (under 3 years of age) in India on the basis of NFHS 1998-99



Source : IIPS 2000

Fig. 1.2

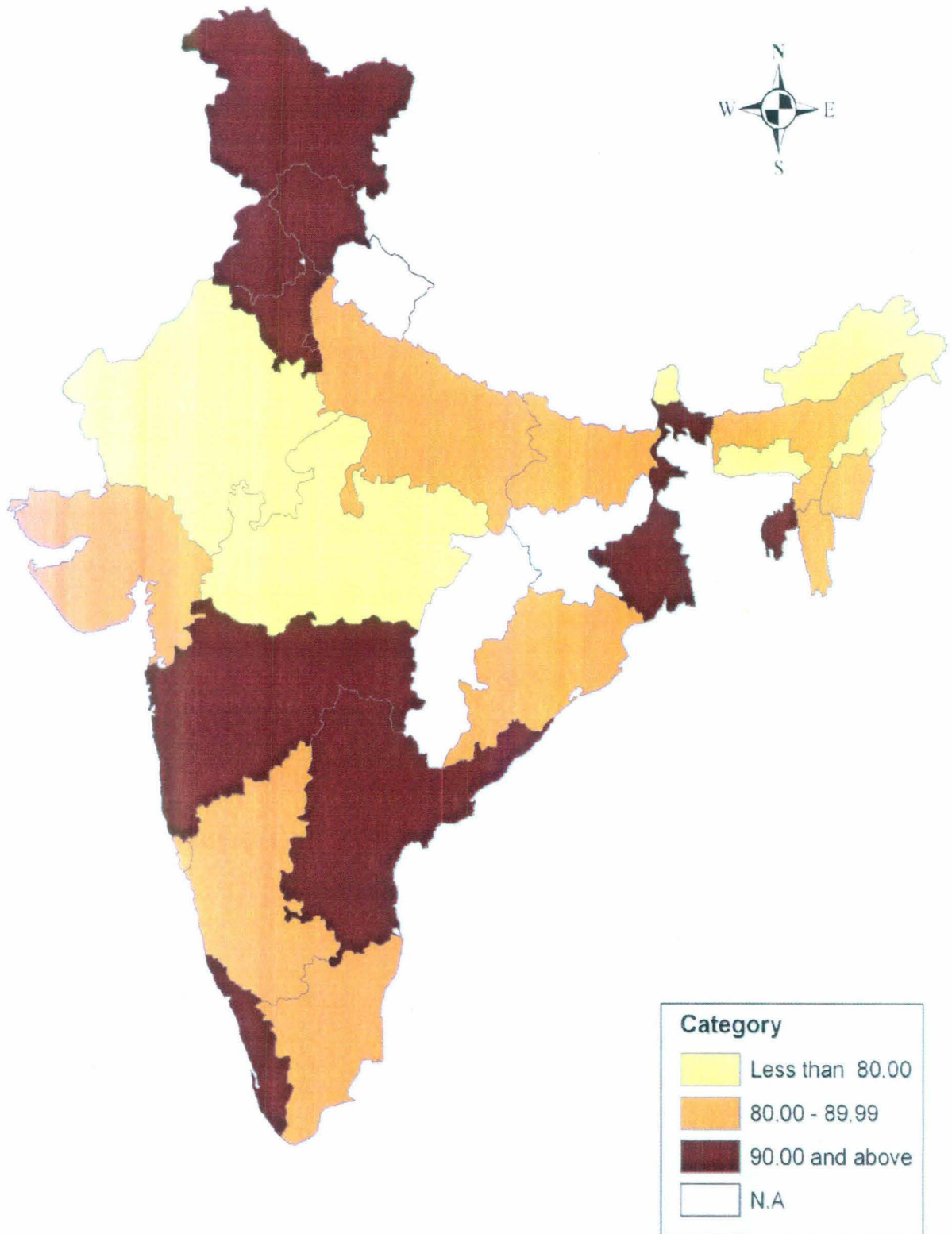
Spatial distribution of medical treatment for child diarrhoea (under 3 years of age) in India on the basis of NFHS 1998-99



Source : IIPS 2000

Fig. 1.3

Spatial distribution of received any treatment for child diarrhoea (under 3 years of age) in India on the basis of NFHS 1998-99



Source : IIPS 2000

Table 1.2

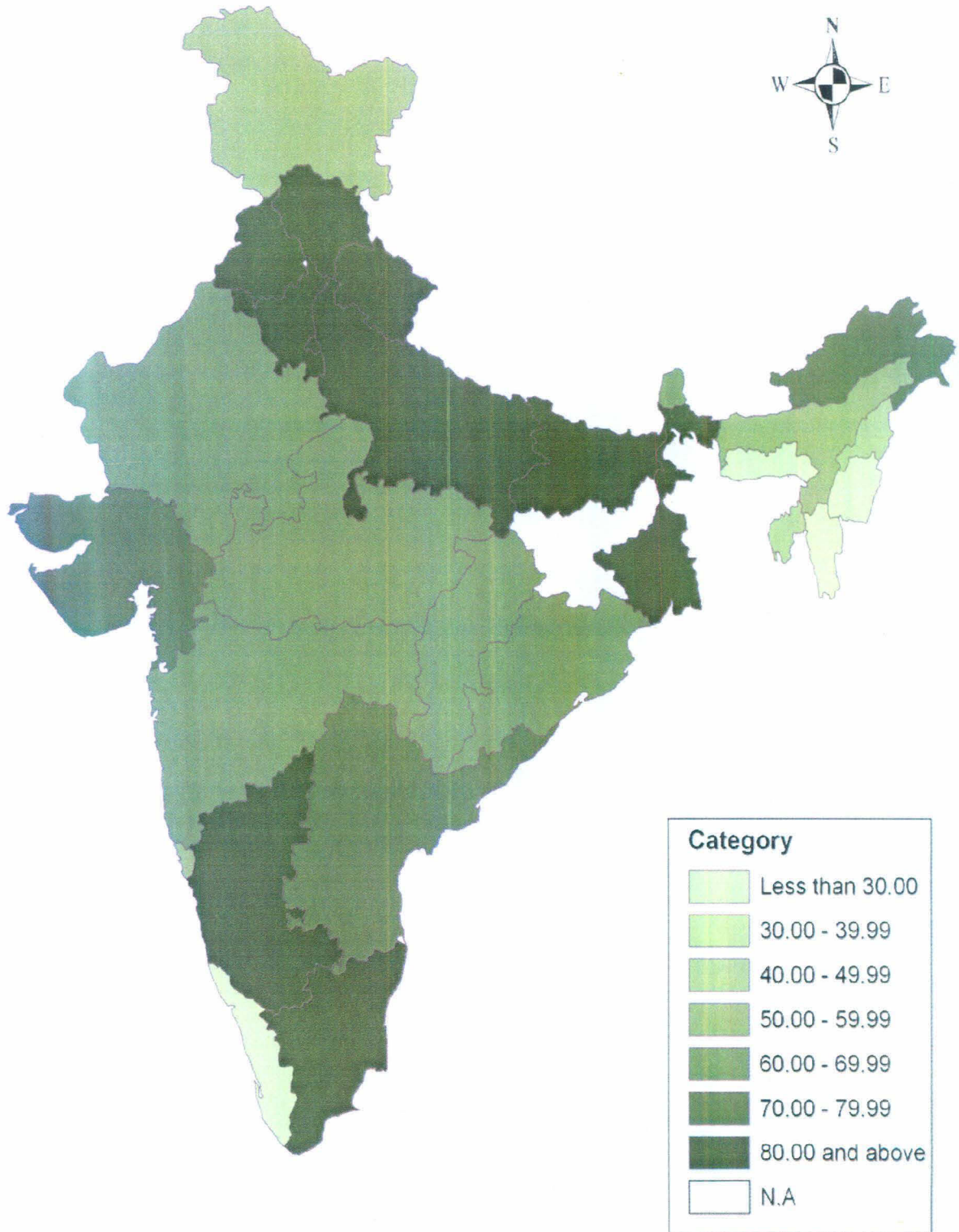
Percentage distribution of safe drinking water and adiquate sanitation in India,2001		
States	Safe drinking water	Sanitation
Andra Pradesh	76.9	18.1
Arunachal Pradesh	73.7	47.3
Assam	56.8	59.6
Bihar	86.1	13.9
Chattisgarh	66.2	5.2
Delhi	90.1	62.9
Goa	58.3	48.2
Gujrat	76.9	21.7
Haryana	81.1	28.7
Himachal Pradesh	87.5	27.7
Jammu & Kashmir	54.9	41.8
Jharkhand	35.5	6.6
Karnatka	80.5	17.4
Kerla	16.9	81.3
Madhya Pradesh	61.5	8.9
Maharastra	68.4	18.2
Manipur	29.3	77.5
Meghalaya	29.5	40.1
Mizoram	23.8	79.7
Nagaland	47.5	64.6
Orissa	62.9	7.7
Punjab	96.9	40.9
Rajasthan	60.4	14.6
Sikkim	67	59.6
Tamil Nadu	85.3	14.4
Tripura	45	77.9
Uttar Pradesh	85.5	19.2
Uttranchal	83	31.6
West Bengal	87	26.9

Source: Office of Registrar
General of India

(2001)

Fig. 1.4

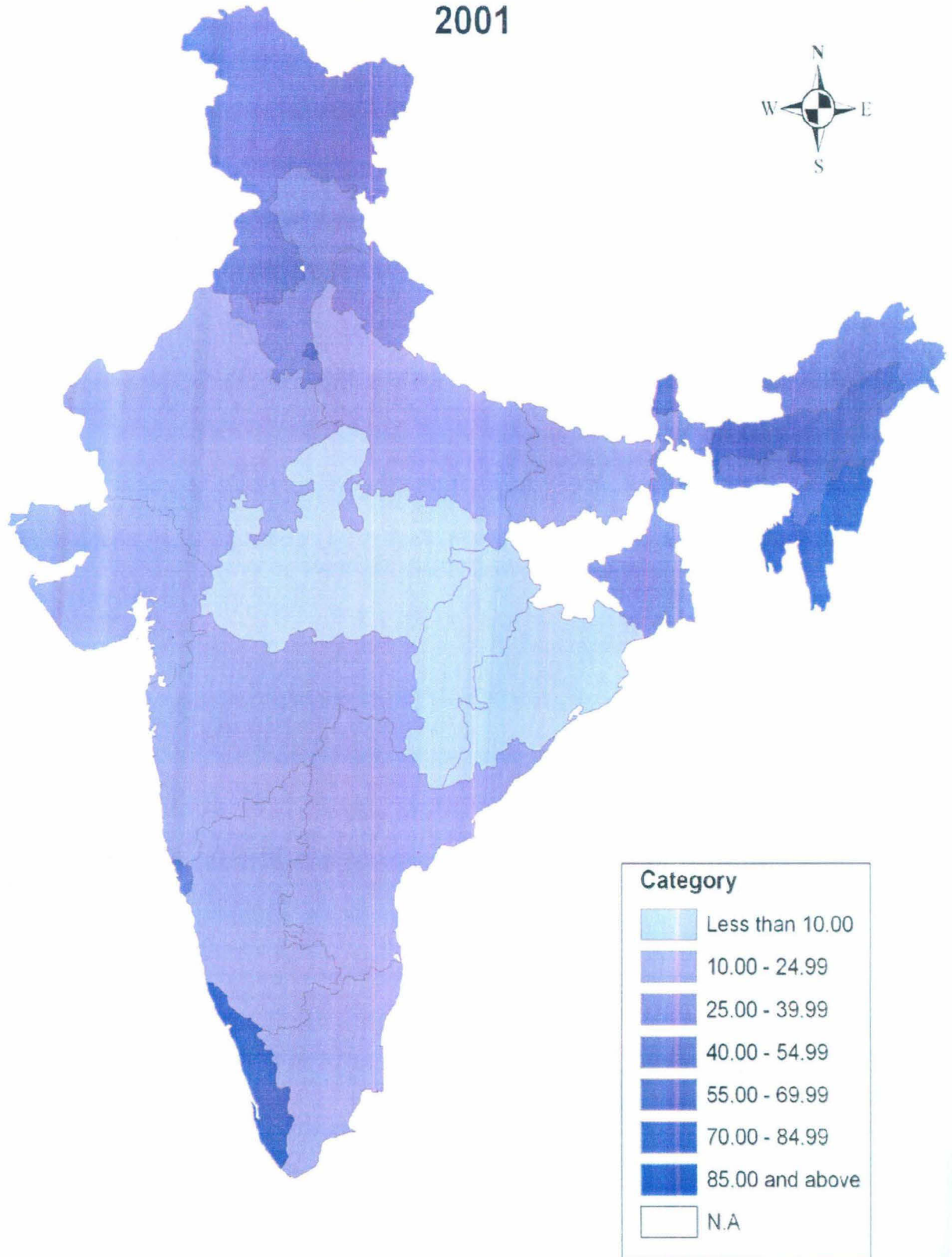
Spatial distribution of safe drinking water in India 2001



Source : Office of the Registrar General of India (ORG), 2001

Fig. 1.5

Spatial distribution of percentage of population using adequate sanitation in India 2001



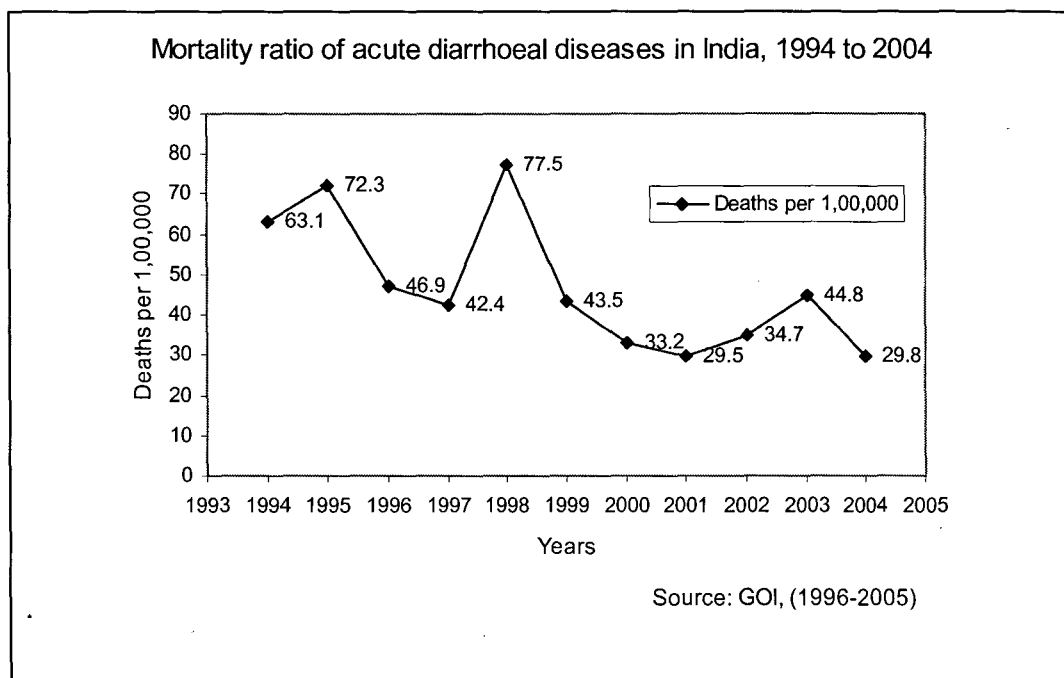
Source : Office of the Registrar General of India (ORG), 2001

Table 1.2 shows that percentage of safe drinking water is highest in Chandigarh (99 percent) but among bigger states West Bengal (87 percent) and Tamil Nadu (85 percent) shows high percentage. The percentage of safe drinking water is low in Madhya Pradesh (61.5 percent). The adequate sanitation among bigger states is lowest in Orissa (7.7 percent) followed by Madhya Pradesh (8.9 percent) and highest in Kerala (81 percent). Thus percentage shows that Madhya Pradesh has poor condition in terms of water and sanitation and Tamil Nadu have better condition.

According to WHO after neo natal (37 percent) and acute respiratory infection (19 percent), Diarrhoeal diseases contribute a large proportion (17 percent) in child mortality in India as per W.H.O report, 2005.

As shown in Fig 1.6 Mortality ratio of acute diarrhoeal diseases has decreased from 63.1 per 1,00,000 in 1994 to 29.8 per 1,00,000 in 2004 year. In 1998 death due to acute diarrhoea was highest (77.5 per 1,00,000) and after that mortality ratio is continuously decreasing.

Fig.1.6



The WHO initiated the diarrhoea disease control program in year 1980 in India when approximately 4.6 million children were dying each year of dehydration caused by diarrhoea. In 2000, there were about 21.2 lakh deaths and 59.7 million Diseases Associated Life Years (DALYs) lost due to diarrhoea. Thus diarrhoea continues to be a major health concern in developing countries, including India.

There are many methods for the treatment of diarrhoea. The mortality rate for children under five suffering from acute diarrhoea has fallen from 4.2 million deaths annually in 1970s to 1.6 million in 2002. Oral rehydration salt (ORS), Oral rehydration therapy (ORT), adopted by UNICEF in the late 1970s, have been successful in helping manage diarrhoea among children. It is estimated that in the 1990s more than 1 million deaths related to diarrhoea may have been prevented each year, largely attributable to the promotion and use of these therapies. Zinc supplementation for children also reduces the morbidity from diarrhoea.

1.1 CLASSIFICATION OF DIARRHOEA

According to Centre for disease control and prevention (2003) there are at least five types of diarrhoea: secretory diarrhoea, osmotic diarrhoea, motility-related diarrhoea, and inflammatory diarrhoea.

Secretory diarrhoea - Secretory diarrhoea means that there is an increase in the active secretion, or there is an inhibition of absorption. There is little to no structural damage. In this type of diarrhoea absorption process from intestine is inhibited and secretion of anions is stimulated due to cholera toxin. It is a major cause of secretory diarrhoea.

Osmotic diarrhoea - Osmotic diarrhoea occurs when there is a loss of water due to a heavy osmotic load. This type of diarrhoea is due to maldigestion (e.g., pancreatic disease). The nutrients are left in the intestine lumen which absorbs water into lumen by osmotic process.

Motility-related diarrhoea - Motility-related diarrhoea occurs when the motility of the gastrointestinal tract is abnormal. If the food moves too quickly, there is not enough contact time between the food and the membrane, meaning that there is not enough time for the nutrients and water to be absorbed.

Inflammatory diarrhoea - It can be caused by bacterial infections, viral infections, parasitic infections, or autoimmune problems such as inflammatory bowel disease.

Acute diarrhoea - This may be defined as diarrhoea that lasts less than three and a half weeks, and is also called enteritis. This can nearly always be presumed to be infective, although only in a minority of cases is this formally proven. With cases of acute diarrhoea, it is often reasonable to reassure a patient, ensure adequate fluid intake, and wait and see. In more severe cases, or where it is important to find the cause of the illness, stool cultures are instituted.

According to Health of Net Foundation (HON 2006), can be either short term (acute diarrhoea < four weeks) or long term (chronic diarrhoea > four weeks) in duration. It is usually short-lived (a few days) and many run its course without the need for medication. Acute diarrhoea is most often caused by infection and may also be a side effect of many different prescriptions or over the counter medications. Chronic diarrhoea on the other hand lasts for at least four weeks and may indicate a more serious problem that requires treatment.

1.2 CAUSES OF CHILD DIARRHOEA

Diarrhoea has many causes. It may be a symptom of disease or a side-effect of medicines and is often caused by contamination of food because of food hygiene problems. It can be made worse by eating certain foods, unsafe disposal of faeces, poor hygiene practices or a lack of clean drinking water, or when infants are not breastfed. Many people mistakenly believe that with diarrhoea they should stop eating and drinking and take medicines. However, reducing food intake may make the problem more serious.

Seven major causes of diarrhoea have been identified by U.S.A. Medical Practice Dietary Guideline (The Jackson Siegelbaum Gastroenterology 2006)

1. Food - Most people have certain foods that may cause diarrhoea. Many people are intolerant of milk and milk products so that even small amounts of the milk sugar lactose can cause diarrhoea. Large amounts of fatty foods cause the same problem in other people 2. Chemical Laxatives - Many people become dependent on laxatives early in life and use them on a daily basis may causes diarrhoea. 3. Prescription Drugs - In particular, antibiotics are known to cause diarrhoea, at times quite severe. Diarrhoea can develop up to one month after taking antibiotics. 4. Infection - There are many viruses and other infectious agents that find their way into our bodies. Some of these can infect the intestinal tract and cause diarrhoea. 5. Traveler's Diarrhoea - The cause of traveler's diarrhoea is a toxic bacteria called E. Coli. It most often occurs in developing countries where sanitation is not good. 6. Diseases - There are certain intestinal disorders that can cause chronic diarrhoea. These include ulcerative and microscopic colitis, Crohn's disease, diverticulosis, and even colon cancer. 7. Stress and Irritable Bowel Syndrome (IBS) - IBS is a problem that occurs when the intestines, especially the colon do not contract in a smooth, rhythmic manner. The contractions can be exaggerated in which case diarrhoea occurs or they may be sluggish and result in constipation.

National Council of Applied Economic Research, New Delhi (2000) under the auspices of the UNDP and the Indian Planning Commission-revealed marked differences between states in the incidence of diarrhoea among children and found that: Child diarrhoea could be explained by just three factors - water quality, hygiene, and anemic mothers.

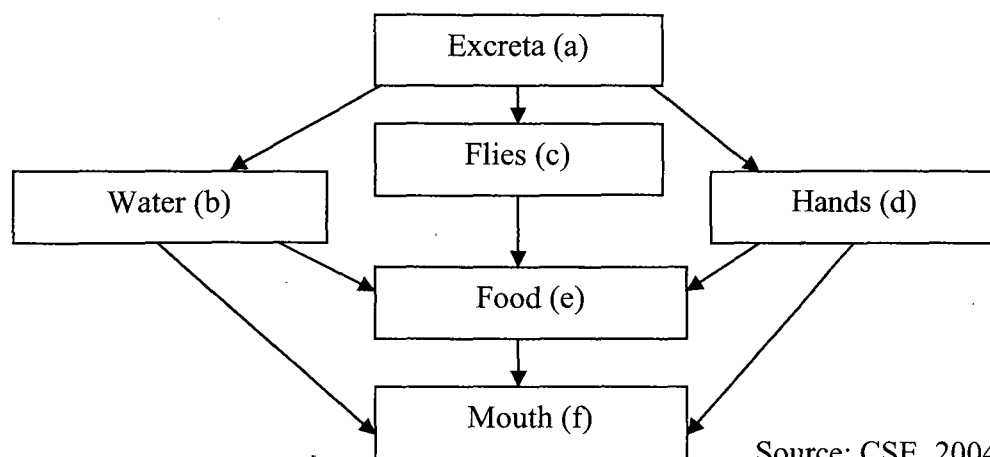
The National Digestive Diseases Information Clearinghouse (NDDIC) (2007), a few of the more common causes of diarrhoea is 1. Bacterial infections - Several types of bacteria consumed through contaminated food or water can cause diarrhoea. Common culprits include Campylobacter, Salmonella 2. Viral infections - Many viruses cause diarrhoea, including rotavirus, Norwalk virus, cytomegalovirus, herpes simplex virus, and viral hepatitis 3. Food intolerances - Some people are unable to

digest food components such as artificial sweeteners and lactose—the sugar found in milk. 4. Parasites - Parasites can enter the body through food or water and settle in the digestive system. Parasites that cause diarrhoea include Giardia lamblia and Cryptosporidium. 5. Reaction to medicines - Antibiotics, blood pressure medications, cancer drugs, and antacids containing magnesium can all cause diarrhoea. 6. Intestinal diseases - Inflammatory bowel disease, colitis, Crohn’s disease, and celiac disease often lead to diarrhoea.

According to UNICEF (2003) the main cause of diarrhoea in developing countries is contaminated water and a lack of sanitation. Diarrhoea related dehydration is the leading cause of death in children under the age of five and annually an estimated five million children die from it. Besides death, diarrhoea is also the most common cause of child malnutrition, permanently impairing mental and physical development.

According to Atanu Sarkar in his book “Water Borne Diseases in India Environmental Health and Policy Perspective” (2007) causes of diarrhoea has been shown in the given framework:

Fig. 1.7 The faecal-oral route and disease transmission-



Improve excreta disposal leads to contaminated water; improve excreta disposal leads to flies and other insect to contact with faecal matters, hands get in touch with micro-organism and remain on surface due to improve hygiene practice or due to

poor water supply, contaminated water transmits micro-organism to food, when flies sit on food, food become source of infection, while handling unclean hands transmit micro-organisms to food and if water and food is contaminated that would be consumed and diarrhoea can occur in this situation.

The causes of diarrhoea have been described in below table by Chen and Linclon (1983).

Table1.3

Cause	Example
Viral infections	Rotavirus, Norwalk virus
Bacterial infections	E. coli, Vibrio cholerae, Campylobacter, Shigella
Parasites	Giardia, Entamoeba
Helminths (intestinal worms)	Strongyloides
Allergic	Lactose intolerance, celiac sprue, medication side effects
Autoimmune	Ulcerative colitis, Crohn's disease
Malabsorptive	Pancreatic deficiency, biliary disease
Nutritional	Zinc deficiency, vitamin A deficiency, enteral feedings consisting of liquid nutritional formulas delivered straight to the bowels
Functional	Irritable bowel syndrome, short bowel syndrome, cancer

1.3 SYMPTOMS OF DIARRHOEA

When a person has diarrhoea, (s) he has loose, liquid stools, an urgent need to use the bathroom, and increased frequency of bowel movements. He may experience abdominal cramps or pain, rectal pain, bloating, gas, nausea, or vomiting. He may have leakage of stool between bowel movements and may develop a fever or has blood or flecks of mucus in the stool. If diarrhoea persists for more than a few days, as in cases of chronic diarrhoea, he may lose appetite and lose weight. Symptoms appear within 4 to 48 hours after exposure to contaminated food or water, and are most severe during the first 24 hours.

A person may lose too much liquid from his body because of diarrhoea and vomiting and may become dehydrated. Signs of dehydration include dry mouth, excessive

thirst, dry eyes, and infrequent urination. Dehydration is the most serious consequence of diarrhoea.

The symptoms of acute diarrhoea in infants include loose stools that occur more than once after each feeding. Older children may have watery, loose stools; fever; abdominal cramps; nausea and vomiting; loss of appetite; weight loss; and dehydration. Infants and children can become dehydrated quickly, often within a matter of several hours. The symptoms of traveler's diarrhoea are the same as those of diarrhoea contracted at home: The signs of chronic diarrhoea are usually similar to those of acute diarrhoea; the distinction lies in the duration of the condition. Chronic diarrhoea is usually described as lasting at least two to four weeks, while acute diarrhoea normally clears up in a few days.

1.4 TREATMENT OF DIARRHOEA

Most diarrhoea can be treated at home, following the simple instructions. If it lasts for more than three days, if fever develops, blood appears in the stool, or feel weak it is necessary to seek advice from Health worker. Prevention is better than cure. Many cases of diarrhoea can be prevented by following the rules

1. Diarrhoea kills children by draining liquid from the body, thus dehydrating the child. As soon as diarrhoea starts, it is necessary that the child has to be given extra fluids as well as Regular foods and fluids.
2. If diarrhoea is severe a person should take immediate help from a trained Health worker is needed.
3. Breastfeeding can reduce the severity and frequency of child diarrhoea.
4. A child with diarrhoea needs to continue eating regularly. While recovering from diarrhoea, the child needs at least an extra meal every day for at least two weeks.
5. If the child is dehydrated with severe or persistent diarrhoea, only oral rehydration solution or medicines recommended by a trained health worker should be used.
6. To prevent diarrhoea hygienic condition should be better; all faeces should be disposed of in a latrine or toilet or buried because unhygienic condition are one of major cause of diarrhoea.

7. Good hygiene practices protect against diarrhoea. Hands should be thoroughly washed with soap and water or ash and water after contact with faeces, and before touching Food or feeding children.

General recommendations. More intake of liquid is good for health in diarrhoea. Drink more than eight cups of fluid, particularly water, per day. It is also good to take fluid in other forms to replace the salts that have been lost and provide energy. Some suggestions are given below for easily digested foods and drinks that will help to rehydrate the body and provide salts, energy and vitamins

Recommended foods and drinks. 1. Drink soups, fruit juices diluted with water or oral rehydration solution. 2. Eat soft, mashed, moist foods 3. To replace lost minerals, eat soft vegetables and fruit, particularly bananas, mangoes, papaya, watermelon, pumpkins, squash, potatoes and carrots. 4. Eat refined foods (soluble fibers) such as white rice, maize meals, white bread, noodles and potatoes. 5. Peel and cook vegetables and fruit so they can be better tolerated. 6. Eat food warm, rather than very hot or very cold. 7. Eat small, frequent meals.

Foods and drinks to limit or avoid. Some foods can make diarrhoea worse. 1. Fats can make diarrhoea worse and cause nausea. 2. Green, unripe and acidic vegetables and fruit such as tomatoes, pineapple and citrus fruit sometimes may not be tolerated. 3. Milk sometimes may not be tolerated 4. Coffee, tea and alcohol can worsen dehydration. 5. Very spicy foods such as chilies and pepper may sometimes make diarrhoea worse. 6. Foods such as beans, broccoli, cauliflower, cabbage, Brussels sprouts, onions and green peppers that produce gases should be avoided.

Diarrhoea is usually caused by one of a number of food or water born pathogens. The supply of adequate and clean drinking water, Improvement of sanitation facilities and personal hygiene thus can play an important role in reducing the incidence of diarrhoea. (Arif and Ibrahim, 1998)

1.5 AREA OF STUDY

INDIA

Child diarrhoea in terms of prevalence, treatment and socio-economic characteristic will be examined in India with special reference to regional variations among Southern Region (Tamil Nadu, Andhra Pradesh, Kerala and Karnataka), Northern Region (Punjab, Haryana, Himachal and Jammu and Kashmir), Western Region (Gujarat, Maharashtra and Goa), Eastern Region (Tripura, Assam, Nagaland, Mizoram, Manipur, West Bengal, Meghalaya, Arunachal Pradesh and Sikkim) and BIMARUO Region (Bihar, Madhya Pradesh, Rajasthan, Uttar Pradesh and Orissa). The study uses data of NFHS-2. Madhya Pradesh and Tamil Nadu have been selected for the comparative study.

Although India occupies only 2.4 percent of the world's land area, it supports over 15 percent of the world's population. The population in India as at 0:00 hours on 1st March 2001 stood at 1,027,015,247 persons. With this, India became only the second country in the world after China to cross the one billion mark. India's population rose by 21.34 percent between 1991-2001. The sex ratio (i.e., number of females per thousand males) of population was 933, rising from 927 as at the 1991 Census. Total literacy rate in India was returned as 65.38 percent. Almost 40 percent of Indians are younger than 15 years of age.

About 70 percent of the people live in more than 5, 50,000 villages, and the remainder in more than 200 towns and cities. India's primary sector, including agriculture, forestry, fishing, mining, and quarrying, accounted for 32.8 percent of GDP. Religion, caste, and language are major determinants of social and political organization in India today. The government has recognized 18 languages as official; Hindi is the most widely spoken. Although 83 percent of the people are Hindu, India also is the home of more than 120 million Muslims—one of the world's largest Muslim populations. The population also includes Christians, Sikhs, Jains, Buddhists and Parsis.

As shown in Table 1.1, prevalence of child diarrhoea is very high among BIMARUO states; Orissa 27.8 percent, Madhya Pradesh 23.5 percent, Uttar Pradesh

22.5 percent, Rajasthan 19.3 percent and Bihar 17.4 percent. The prevalence of diarrhoea in Northern states is 28.6 percent Himachal, 9.9 percent Punjab, and 13.7 percent Haryana 32.3 percent Jammu and Kashmir. However, the prevalence of diarrhoea in eastern states is also high except in West Bengal. In Tripura 10 percent, Arunachal Pradesh 23 percent, West Bengal 7.4 percent, Meghalaya 21.3 percent, Mizoram 21.8 percent and Nagaland 21.3 percent. So West Bengal and Tripura have very low prevalence. In Western States Gujarat have 19.4 percent, Maharashtra 23.9 and Goa 18.5 percent. The above distribution shows that except West Bengal, Tripura and Himachal all states have high percentage of diarrhoea but in case of Southern states the Prevalence of Diarrhoea is low as compare to all other region. Andhra Pradesh 14.5 percent, Tamil Nadu 14.4 percent, Kerala 11.5 percent and Karnataka 13.9 percent have prevalence of diarrhoea. So the distribution including southern states shows that in average southern states have low percentages of child diarrhoea because of developed socio-economic and demographic condition.

The demographic characteristic according to the NFHS-2 (1998-99) results as shown in Table 1.4 that out of 30984 children 34.3 percent are less than one year, while 32.9 percent and 32.8 percent are in age group of one to two years and two to three years respectively. Out of this under three years age of children 29.1 percent children are of first birth order, 25.9 percent of second birth order and 45.0 after second birth order. Out of this under three year's age of children, 52.2 percent are male and the rest 47.8 percent are females. Out of 33026 surveyed mothers, 15-19 years mothers age group have 10.7 percent of population and others age group (20-45 years) have 89.3 percent of population.

The social characteristics of India according to the NFHS-2 (1998-99) results as presented in table 1.2 shows that the mother's education shows 55 percent mothers are illiterate and 45 percent are literate. Thus the very low level of the female education in the country shows that the mothers are not aware of the well being of their children. The ethnic distribution of population shows that 66.9 percent mothers belong to the general caste while the schedule caste and schedule tribe together constitute 33.1 percent of the total population. The majority of the peoples are Hindus (89.5 percent) and others are 10.45 percent. In case of place of residence

74.2 percent population is Rural and only 25.8 percent population is Urban. Thus a large share of rural population and very low literacy of mothers shows that mothers are not aware about illness and treatment of their child.

The economic characteristic in terms of household standard of living shows that 32.7 percent of the surveyed population have low standard of living while medium and high standard of living together constitute 67.3 percent of total population.

Other factor like exposure to mass media is low (56.3 percent). While 43.7 percent are not exposed to mass media.

In India 13.5 percent peoples belongs to Southern India, 14.3 percent people in Northern India, 17.3 percent in Eastern India, 10.3 percent in Western India and 44.6 percent in BIMARUO States.

TAMIL NADU

Tamil Nadu is one of India's economically and industrially developed states. Although it continues to be predominantly an agricultural state. Tamil Nadu's economy has been changing rapidly into an industrial economy. Canals, tanks and wells extensively irrigate agricultural land. Important natural resources include lignite, crude petroleum and natural gas. Tamil Nadu has good public transport system with more than 90 percent of villages covered by metalled roads. Most of the villages in the state have been electrified. The state also has very good health infrastructure in both rural and urban areas. As per the Relative Infrastructure Development Index, Tamil Nadu ranks third among the 17 major states of India (Centre for Monitoring Indian Economy, 1997). According to 2001 census, it is the most urbanised states in the country. Except for Kerala, Tamil Nadu recorded the lowest population growth rate of 11.2 percent in 1991-2001 among all the states and union territories in India. It is also one of the educationally more advanced states in the country having a literacy rate of 73 percent among the population age seven and above (2001 census). According to sample Registration System (1998), fertility in Tamil Nadu has declined to 19.2 per 1000 population and the total fertility rate is 2.0

Table 1.4

Percentage distribution of selected demographic and socio-economic variables in India, Madhya Pradesh and Tamil Nadu on the basis of NFHS-1998-99							
Independent variables		INDIA		MADHYA PRADESH		TAMILNADU	
		Number	Percentage	Number	Percentage	Number	Percentage
DEMOGRAPHIC FACTORS							
Age of mother	15-19	3533	10.7	478	16.5	117	8.7
	Others	29493	89.3	2418	83.5	1228	91.3
Current age of child	< 1 year	10617	34.3	944	35.9	422	32.7
	1-2 year	10209	32.9	851	32.3	437	33.8
	2-3 year	10158	32.8	838	31.8	432	33.5
Birth order of child	First	9618	29.1	716	24.7	580	43.1
	Second	8540	25.9	631	21.8	473	35.2
	> Second	14868	45	1549	53.5	292	21.7
Sex of child	Male	17254	52.2	1473	50.9	706	52.5
	Female	15772	47.8	1423	49.1	639	47.5
SOCIO-ECONOMIC FACTORS							
Education	Illiterate	18168	55	2002	69.1	492	46.5
	illiterates	14858	45	894	30.9	565	53.5
Ethnicity	General	22090	66.9	1745	60.3	1009	75
	S.C/S.T	10936	33.1	151	39.7	336	25
Religion	Hindu	29375	89.5	2662	91.9	1156	85.9
	Others	3433	10.5	234	8.1	189	14.1
Standard of living	low	10670	32.7	1056	36.6	486	36.6
	Medium	21927	67.3	1832	63.4	841	63.4
Residence	Rural	24493	74.2	2246	77.7	748	55.6
	Urban	8533	25.8	650	22.4	597	44.4
OTHER FACTORS							
Mass media exposure	No	14408	43.7	1482	51.2	265	19.7
	Yes	18585	56.3	1412	48.8	1079	80.3
Source of water	Tap water	12276	37.2	732	25.3	923	68.6
	Hand pump	12069	36.5	1029	35.5	234	17.4
	Others	8681	26.3	1135	39.2	188	14
Regions	South	4454	13.5	*	*	*	*
	North	4722	14.3	*	*	*	*
	East	5718	17.3	*	*	*	*
	West	3412	10.3	*	*	*	*
	Bimaru	14720	44.6	*	*	*	*

Source : IIPS (2000)

Note- 1. * not considered in percentage distribution

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children per woman. The infant mortality rate is 53 per 1000 live births and the crude death rate is 8.5 per 1000 population.

Table 1.1 shows that in Tamil Nadu 14.4 percent children (under age three years) had diarrhoea which is lower as compare to average prevalence (19 percent) of India. In Tamil Nadu 69.2 percent children (under age three years) get medical treatment for diarrhoea which is lower than average medical treatment (62.8 percent) of India. Similarly in case of any treatment received for diarrhoea in Tamil Nadu is 88.6 percent which is again lower than average any treatment received for diarrhoea (87.6 percent) of India. This shows that prevalence of diarrhoea is low in Tamil Nadu and Treatment (medical and any treatment) is very high.

The demographic characteristic results that out of 1291 children 32.7 percent are less than one year while 33.8 percent and 33.5 percent are in age group of one to two years and two to three years respectively. Out of this under three years age of children 43.1 percent children are of first birth order, 35.2 percent of second birth order and 21.7 after second birth order. Out of this under three year's age of children, 52.5 percent are male and the rest 47.5 percent are females. Out of 1345 surveyed mother, 15-19 years mothers age group have 8.7 percent of population and others age group (20-45 years) have 91.3 percent of population. The percentage is showing that the share of mothers in 15-19 age groups is low and because Tamil Nadu is socially developed state and below 18 years of age of girl's marriage are very rare.

The social characteristics according to the NFHS-2 (1998-99) results as presented in Table 1.4 show that 46.5 percent mothers are illiterate and 53.5 percent are literate. Mother's literacy rate in Tamil Nadu is and mothers are aware about the illness and treatment of their children. The ethnic distribution of population shows that 75 percent belong to the general caste while the schedule caste and schedule tribe together constitute a low share of population (25 percent) in compare to other selected states. The majority of the peoples are Hindus (85.9 percent) and others are 14.1 percent. In case of place of residence 55.6 percent population is Rural and 44.4

percent population is Urban. As we have already mentioned Tamil Nadu is most urbanized state (according to 2001 census) of India.

The economic characteristic in terms of household standard of living shows that 36.6 percent of the surveyed population have low standard of living while medium and high standard of living together constitute 63.4 percent of total population.

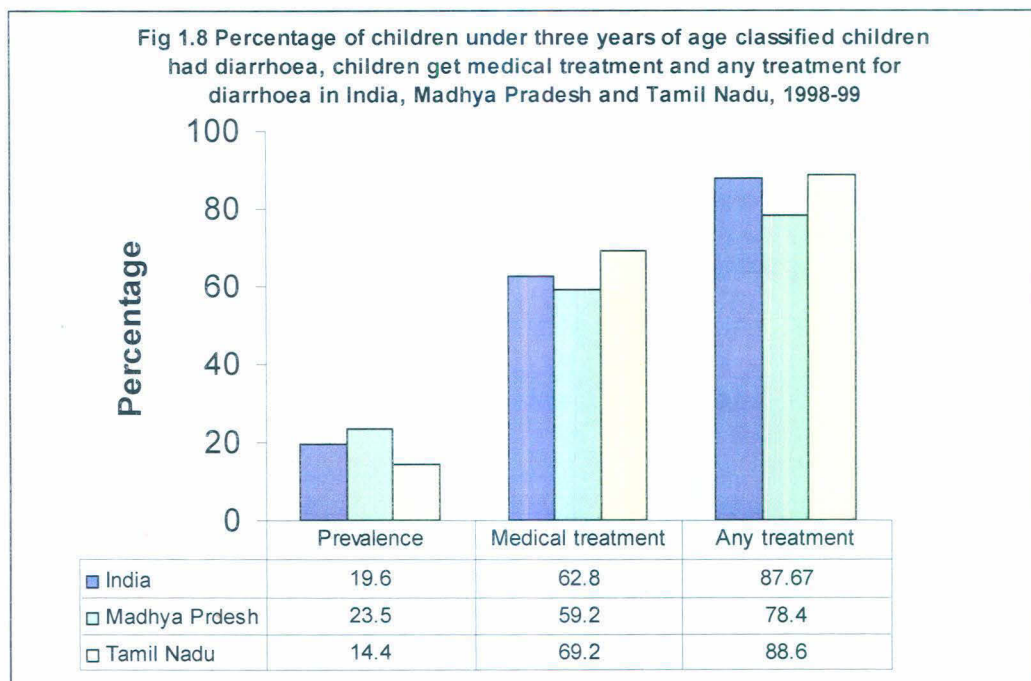
Other factor like exposure to mass media is very high (80.3 percent). While only 19.7 percent are not exposed to mass media. In case of source of drinking water tap water is 68.6 percent, hand pump 17.4 percent and others are 14.0 percent. Tap water is main source of drinking water.

MADHYA PRADESH

Agriculture is the mainstay of the economy of Madhya Pradesh. Industrialisation in the state is confined to selected pockets surrounding the state's metropolitan towns. Despite industrial advances; there is little diffusion of development to rural and remote areas. According to 1991 census, the literacy rate for population age seven and above was 44 percent. In demographic indicators too, Madhya Pradesh performs poorly in comparison to most others states. According to sample registration system (1998), the crude rate was 30.7 per 1000 population and the total fertility was 4.0 children per woman. In the same period, Madhya Pradesh had the highest crude death rate and infant mortality rate in the country.

Table.1.1 shows that in Madhya Pradesh 23.5 percent children (under age three years) had diarrhoea which is much higher prevalence as compare to average prevalence (19 percent) of India. In Madhya Pradesh 59.2 percent children (under age three years) get medical treatment for diarrhoea which is lower than average medical treatment (62.8 percent) of India. Similarly in case of any treatment received for diarrhoea in Madhya Pradesh is 78.4 percent which is again lower than average any treatment received for diarrhoea (87.6 percent) of India. This shows that prevalence of diarrhoea is too high in Madhya Pradesh and Treatment (medical and any treatment) is very low.

The demographic characteristic according to the NFHS-2 (1998-99) results as presented in table 1.4 shows that out of 2630 children 35.9 percent are less than one year while 32.3 percent and 31.8 percent are in age group of one to two years and two to three years respectively. Out of this under three years age of children 24.7 percent children are of first birth order, 21.8 percent of second birth order and 53.5 after second birth order. Out of this under three year's age of children, 50.9 percent are male and the rest 49.1 percent are females. Out of 2896 surveyed mother, 15-19 years mothers age group have 16.5 percent of population and others age group (20-45 years) have 83.5 percent of population. The percentage is showing that the share of low age group (15-19 years) is high and this age group is not mature enough or aware about child care which may causes more prevalence and less treatment in Madhya Pradesh.



Source: IIPS, 2000

The social characteristics results as presented in table 1.4 show that 69.1 percent mothers are illiterate and only 30.9 percent are literate. Mother's literacy rate in Madhya Pradesh is very low and they are less aware about the illness and treatment

of their children. The ethnic distribution of population shows that 60.3 percent belong to the general caste while the schedule caste and schedule tribe together constitute a high share of population (39.7 percent) in compare to other selected states. The majority of the peoples are Hindus (91.9 percent) and others are 8.1 percent. In case of place of residence 77.7 percent population is Rural and only 22.4 percent population is Urban. The share of urban population is very low and less than country's average urban percentage (25.8) of population.

The economic characteristic in terms of household standard of living shows that 36.6 percent of the surveyed population have low standard of living while medium and high standard of living together constitute 63.4 percent of total population.

Other factor like exposure to mass media is very low (48.8 percent). While 51.2 percent are not exposed to mass media.

In case of source of drinking water tap water is 25.3 percent, hand pump 35.5 percent and others are 39.3 percent.

As shown in fig 1.8 Madhya Pradesh show higher prevalence of diarrhoea (23.5 percent) as compared to Tamil Nadu (14.4 percent) and show lower medical (59.2 percent) and any treatment (78.4 percent) as compared to Tamil Nadu (69.2 and 88.6 percent respectively). Among bigger states, Tamil Nadu shows lowest percentage of prevalence of diarrhoea after Kerala (11.5 percent) and Karnatka (13.9 percent) but Kerala and Karnatka have less number of variables and we have taken Tamil Nadu for our study. Among bigger states, Madhya Pradesh shows the highest percentage of prevalence of diarrhoea (23.5 Percent) after Orrissa (27 percent) but the treatment of diarrhoea is verry low in Orrissa and again number of variables becomes less and this will create problem while running logistic regression. Thus with the whole study of India, The states of Tamil Nadu Nadu and Madhya Pradessh have been chosen for the study and Tamil Nadu Nadu and Madhya Pradesh examining the different demographic and socio-economic factors that have resulted in high prevalence and low treatment of child diarrhoea in Madhya Pradesh and low prevalence and high treatment of child diarrhoea Tamil Nadu.

1.6 OBJECTIVES

1. To examine the effects of demographic and socio-economic factors on prevalence of diarrhoea.
2. To examine the effects of demographic and socio-economic factors on medical treatment of diarrhoea.
3. To examine the effects of demographic and socio-economic factors on received any treatment of diarrhoea.

1.7 ORGANISATION OF THE STUDY

The study of the effects of the different demographic and socio-economic factors on the child diarrhoea in India with Regional variations is spread over five chapters. A review of literature is presented in the second chapter. Chapter three develops the conceptual framework for the analysis on the basis of literature review and thereby derives the research questions. Third chapter also describes the selection of dependent and independent variables and the data and methodology adopted. Chapter four examines in detail the analytical results of the effects of the demographic and socio-economic factors on child diarrhoea. The fifth chapter concludes the study by suggesting certain policy implication that the government could pursue for improving child diarrhoea through various programmes.

CHAPTER 2

CHAPTER 2

REVIEW OF LITERATURE

This chapter reviews previous research conducted by the scholars on different factors that influence child diarrhoea. In this chapter, a brief review of the different socio-economic and demographic variables as well as maternal and other factors, which effect child diarrhoea, is discussed. The social factors include mother's education, caste of the child, and religion of the child and place of residence. The economic factors that influence child diarrhoea are: standard of living and mass media exposure. The demographic factors responsible for child diarrhoea are age of mother, current age of child, birth order of child and sex of child.

DEMOGRAPHIC VARIABLES

Current age of child

The article by Arif and Ibrahim (1998), reviewed mortality pattern among children in Pakistan due to diarrhoea. Children belong to 1-11 months are highly associated with diarrhoea. Child's age appeared to be one of the strong determinants for both prevalence and duration of diarrhoea. Its association with these two measures of diarrhoea morbidity was negative. It is well established that breastfeeding provides protection against diarrhoeal infection and personal hygiene of those who prepare food for children.

Diarrhoea affects all age group and both sexes. But child population under five years suffers from an average of 12 attacks of diarrhoea before reaching age five than other age group. Rota viral infection is common in children between six months to two years. Most of the out break is below five years. (Prakashan and Sharad, 2005)

Sazawal and Hiremath (2006) have explained efficacy of probiotics in prevention of acute diarrhoea from 34 masked, randomized, placebo-controlled trials. Only one trial was community based and carried out in a developing country. Most of the remaining 33 studies were carried out in a developed country. Evaluating the

evidence by types of acute diarrhoea suggests that probiotics significantly reduced antibiotic-associated diarrhoea by 52 percent, reduced the risk of travelers' diarrhoea by 8 percent and that of acute diarrhoea of diverse causes by 34 percent. Probiotics reduced the associated risk of acute diarrhoea among children by 57 percent, and by 26 percent among adults. Although there is some suggestion that probiotics may be efficacious in preventing acute diarrhoea there is a lack of data from developing countries evaluating the effect on acute diarrhoea unrelated to antibiotic usage. The effect on acute diarrhoea is dependent on the age of the host and genera of strain used.

Wright, et.al (2006) has explained episodes of diarrhoea in three countries of sub-Saharan Africa. The study was conducted to assess the effect of definition of episode on diarrhoeal morbidity and to develop a means of adjusting estimates of morbidity for the definition of episode used. This paper report on a cohort study of 374 children, aged 9-32 month, which recorded frequency and consistency of stool over a seven month period. Different definitions of episodes were applied to these data to asses their effect on annualized diarrhoeal morbidity. Adjustment factors were then derived that corrected morbidity for non standard definition of episodes. Applying non-standard definition of episode gave estimates of an annualized number of episodes between 38 percent and 137 percent of the internationally-accepted definition. The authors have explained that researchers should be encouraged to use the standard definition of episode of diarrhoea and to use appropriate field protocols.

Heyman, et.al (1990) has explained that oral rehydration therapy in Malawia was introduced in 1977. In 1987 a review of records of pediatric inpatients over the period 1981-86 was carried out to evaluate retrospectively the effect of refresher training on hospital practices for dehydration associated with acute diarrhoeal diseases and of out patients ORT activities on the number severity and cost of pediatric admissions for such diseases. In the first two years, refresher training of pediatric staff in ORT at the Kamuzu central hospital, Lilongwe, Malawi, there was a 50 percent decrease in number of children admitted to the pediatric ward with the diagnosis of diarrhoeal disease, a 56 percent decrease in the use of intravenous fluid

to rehydrate such children, a three fold increase in the use of ORS exclusively to rehydrate children with mild or moderate rehydration

Alam, et. al. (2005) has written about a new hypo-osmolar oral rehydration solution to routine use in the treatment of diarrhoea. In May 2002 WHO and UNICEF recommended the use of a new, low sodium, low glucose, and low osmolarity oral rehydration salt (ORS) solution in place of the previous solution. The author has presented measure the incidence of symptomatic hyponatraemia during treatment of diarrhoea with the newly recommended ORS formulation. The study was conducted at the ICDDR, B hospital in Dhaka and in Mat lab over a complete year. The result of this study demonstrates that the occurrence of altered consciousness associated with hyponatraemia in patient treated with the new ORS formulation is rare and that the incidence rate of symptomatic hyponatraemia associated to use of the new ORS is less than the incidence observed with the old ORS solution. Based on the result of this, we can conclude that the new reduced osmolarity oral rehydration salts solution recommended by WHO and UNICEF is safe and that it can used for the treatment of acute diarrhoea of all etiologies and in all age groups.

Current age of child affects child diarrhoea in developing countries like India. For every 100 children aged 5 years or less. 7 cases of persistent diarrhoea are reported per year in India. The incidence is much higher among the children aged less than 2 years than older children. Nevertheless, its control and prevention has received less attention than acute diarrhoea. Shankar and Ravi, (2004) described the status of persistent diarrhoea and its overall management.

Sex of child

Amin and K.Farhana (2004) have explained gender bias among rural villages of Chennai in India. The finding suggests that parents were willing to pay more to protect their male child compared to the female child suffering from a diarrhoeal episode. The median willingness to pay to avoid an episode for male and female were calculated at Rs.33.7 and Rs.25.2 respectively a difference of around 34

percent. After adjusting for the greater duration and severity of the illness, it was found that the difference between the two median increased to 51 percent.

Praven and Roy (2000) have presented the picture of India in terms of gender disparity on the basis of NFHS 1 and 2. The female disadvantage over male children is higher for treatment in diarrhoea for the country as a whole. In the majority of the states the proportion of girls who did not receive any treatment for fever or diarrhoea was higher than boys. More than a third of the children did not receive any treatment when they had fever and more than a quarter did not receive any treatment when they suffered from diarrhoea. In Sikkim, three-fourths of the boys and three-fifths of the girls did not receive any treatment for diarrhoea. Gender disparity is found to be highest in Tamil Nadu, where against 17 percent of the boys 27 percent of the girls were not treated for diarrhoea. Disparity is lowest in Uttar Pradesh, while in the states of Bihar, Haryana, Rajasthan, Jammu & Kashmir, Sikkim and Delhi a slightly higher proportion of female than male children received treatment for diarrhoea.

Sudharsanam and Rotti (2007) have explained the factors affecting child diarrhoea in Pondichery among fishermen's. Birth order of child does not influence treatment seeking behaviors in Pondichery and gender does not play a role in health seeking preferences as there was no a gender difference in seeking private or government health care.

SOCIO-ECONOMIC VARIABLES

Education of mother

Boorooah (2004) has explained the incidence of diarrhoea among young Indian children. The paper highlights the importance of different factors like water supply, mother's education, housing condition, and the level of development of villages. The results emphasize the importance of mother education in promoting domestic hygiene.

Basu and Stephenson (2005) have explained the impact of "low" level of maternal education on the child mortality. The author has used the NFHS-1992-93 individual data; Twenty-two outcomes are investigated, representing child mortality and

morbidity, illness management, service utilization and health behaviors. Maternal education is a significant correlate of the outcomes, and even low level of education increase child survival prospects and health related behaviors except for neonatal mortality and the effective management of diarrhoea. The authors speculate on some of the possible mechanisms behind such impressive findings and suggest that rather than female autonomy, it may be the 'hidden curriculum' values of discipline and obedience of authority that account for them.

Boonstra, Lindbake, and Ngome (2005) have presented the management of diarrhoea in primary health care in Botswana. They design a cross-sectional field survey. This study comprises 185 cases of acute respiratory infections and 85 cases of diarrhoea. The percentage of ORS provided 74 (87percent) was calculated in case of diarrhoea. In 262 cases 97 percent health care providers were nurses and in 3 percent family welfare educators.

In the given article Bryceson. (1977) has explained the rehydration in diarrhoeal diseases. The author has explained that the success of treatment depends largely upon an understanding and acceptance of replacement therapy by villagers. Several schemes have shown that the oral rehydration in the home for child is a realistic possibility provided that salts are available and propaganda is thorough.

Mangala, et.al (2001) conducted a pre and post comparison study was carried out in the field practice area of M.S. Ramaiah Medical college Bangalore , Karnataka to assess the impact of education intervention on the knowledge of mothers of under five children on home management of diarrhoeal diseases. The study was conducted in 3 stages. Stage 1 initial knowledge, attitude and practice of mothers were assessed. Stage 2 one to one educational intervention was conducted and supported by audiovisual aids and live demonstration. Stage 3 included post intervention knowledge, attitude and practice after 2 months and 2 years. After the educational intervention, there was significant improvement on knowledge of mothers regarding definition of diarrhoea, signs of dehydration and awareness of ORS solution.

Mahapatra (2006) has explained the beliefs of rural mother about diarrhoea in Orissa. A total of 1000 mothers were interviewed two third of whom were illiterate mother thought that diarrhoea to her children was caused by “evil eyes” (65 percent). They believe that children cannot digest the breast milk of mother who eat oily and spicy food. The most distressing fact observed in the study was that 136 mothers even from the more educated group, blamed their own breast for causing diarrhoea. This shows that education of mother does not affect prevalence of diarrhoea.

Varalakshami and Madhavi, (2002) analyse the causative factors and incidence of diarrhoea impact of health education and awareness including promotion of ORT and dietary beliefs and practices of mothers. The factors responsible for the changes in the dietary behavior of the mothers and the conditions of food, personal and environmental hygiene in the study area, besides the socio-economic profile of the responding mothers.

Place of residence

Hasan, et.al. (2006) have explained an etiology of diarrhoea in a birth cohort of children aged 0-2 years in rural Marzipan, Bangladesh. The incidence of a etiology specific diarrhoea and the pathogen city of infectious agents in a birth cohort (n=252) in rural Bangladesh were determined. Stool specimens or rectal swabs were collected from diarrhoeal cases over two years and routinely on a monthly basis. Stool samples from children with diarrhoea were compared with stool samples from children without diarrhoea to calculate rates of isolation and pathogen city of agents. In total, 1,750 stool specimens from diarrhoea patients and 5679 stool specimens from children without diarrhoea were tested. An infectious agent was identified in 58 percent of the stools specimens from diarrhoea patient and 21.6 percent of the stool specimens from the children without diarrhoea. The most commonly-isolated pathogens from all specimens were entotoxigenic Escherichia coil (ETEC), Shigella, Campylobacter jejune and rotavirus. Etiology-specific infections were associated with acute episodes.

ICDDR, B (2005) conducted a cross-sectional cluster survey of households in Bangladesh. A total of 7247 children with diarrhoea within the preceding 2 weeks were enrolled. Among children who sought care outside of the home 92 percent visited private providers, a minority of whom was licensed physicians. Over 70 percent of residents of Dhaka and Chittagong used oral rehydration solution, but fewer than 50 percent of rural residents did.

Kandal and Magadi (2006) have examined the pattern and determinants of diarrhoea in Malawi and highlighted inequalities in child health. The result suggests that children living in some urban agglomerations are associated with a higher morbidity risk. The spatial pattern emphasizes the role of remoteness as well as climatic, environmental, and geographic factors on morbidity. The fixed effect shows that for diarrhoea, the child morbidity appears to be lower among infants who are exclusively breastfed than among those who are mixed-fed. Results show that maternal education highly affects the prevalence and treatments of diarrhoea, highly educated mothers are more aware about the treatment of diarrhoea.

Mandal, Tiwari and Sanyal, (1990) have explained the condition of diarrhoea in an urban slum area of Varanasi with special reference to some factors responsible for its causation. Out of 108 episodes in the entire year 53 (49.1percent) were observed during summer and 33 (30.5 percent) during rainy season. Out of 10,888 (81.5 percent) one or more parasite in the stool samples. *Ascaris Lumbricoides* (42.1 percent) was the most commonly isolated intestinal parasite followed by *E. coli*, *histolytica* (32.2 percent), and hookworm (7.9 percent) and *E.coil* (5.7 percent).

Source of drinking water

Das. (1996) has explained the cryptosporidium, an intestinal protozoan parasite, once known to be a causative agent of acute diarrhoea in animals, has now emerged as one of the main cause of life threatening diarrhoea in immune-comprised patients and particular so, in patients suffering from AIDS. The first case was detected in 1976. Studies on childhood diarrhoea in developing countries reported an average prevalence rate of 8.3 for cryptosporidium. The disease is acquired by ingestion of

oocyst in contaminated water, by contact with infected animals, and by person to person transmission. Even there in no effective drug therapy or prevention vaccine available, the mechanism of immunity to *Cryptosporidium* is not well understood. *Cryptosporidium* has been detected in the pharynx, esophagus, stomach, duodenum, jejunum, ileum, appendix colon, rectum, gall bladder and respiratory tract of humans, the jejunum being the most heavily infected.

Ali. and Haq. (2003) have discussed about the relationship between the WES (Water and Environmental Sanitation) intervention and the incidence of diarrhoea. Access to clean drinking water and sanitation facilities have a direct positive impact on health through prevention of water born diseases, especially diarrhoeal morbidity of children. Lack of WES services and poor hygiene in Pakistan contribute significantly to the prevalence of diarrhoea, a major cause of infant death and children less than 5 years of age. The estimates show that about 30 percent of total deaths among children are attributed to diarrhoeal diseases (UNICEF 2000), and 4.1 years in the life expectancy can be added if water borne disease is eliminated.

Crump et al. (2005) has discussed the household based treatment of drinking water in Kenya. In areas of turbid water, flocculent-disinfectant was associated with a significant reduction in diarrhoea.

Sur et.al., (2002) have explain an outbreak of diarrhoea disease which occurred in the Baishabghata Putli area of Kolkata Municipal Corporation during September to October, 2000, was investigated by a team from the National Institute of Cholera and Enteric Diseases, Kolkata to identify the causative agent and determine the antimicrobial suspecting pattern. A total of 710 cases of diarrhoea occurred with an attack rate of 7.1 percent. The majority were adults Extensive chlorination of all water source resulted in a dramatic decline of the out break.

Saxena and Chetna (2002) have presented there findings regarding water born diseases in desert city Bikaner (Rajasthan). In the city 15.5 percent population was found to suffer from one or more common water diseases including diarrhoea, jaundice and typhoid. The highest incidence was that of diarrhoea (5.4 percent)

population. The highest incidence was noted during summer (58.8 percent). Relationship of disease with population like age, education, economy and family size has been discussed. Education level of mother and source of water does not affect child diarrhoea. Economy of the family has positive effect on child diarrhoea.

Source of drinking water is a major contributory factor for diarrhoeal morbidity. Percent of children suffering from diarrhoea whose source of drinking water was “piped water” followed by Madhya Pradesh (28.3) and Rajasthan (20.6). It has been observed that of percent children with diarrhoea and with blood were more in Orissa, Madhya Pradesh followed by Maharashtra with all sources of water (piped water, hand Pump and well water). This clearly indicates that water is not potable water in these states. In this study conducted by IIPS analyses bring out the information that water supplied through pipe and purified at home reduces diarrhoeal morbidity. (IIPS NFHS-2)

Region

According to the salient findings of RCH (Reproductive and Child Health) -1996 although knowledge of diarrhoea management is high in almost all the states/union territories but knowledge about ORS is low. Knowledge of diarrhoea management is lowest in Assam (32percent) and highest in Gujarat (93 percent). Knowledge of ORS is also not common, and it is lowest in Uttar Pradesh (13 percent). Women in Assam, Uttaranchal, Rajasthan, Jharkhand, Bihar and Madhya Pradesh also have relatively low level of knowledge of ORS. In comparison to awareness about diarrhoea management, the awareness of danger signs of pneumonia is quite low. It is the lowest in Pondicherry (6 percent) and ranges 40-60 percent in the states Punjab, Mizoram, Nagaland, Madhya Pradesh, Haryana, Jharkhand, Uttar Pradesh, Uttaranchal, Rajasthan and Bihar, and is highest in Bihar (80 percent).

Gupta et.al., (1990) have explained an out break of acute diarrhoeal disease between August and October 1985 in 3 districts of Manipur state by investigating among 9,29,077 People at risk during the last decade. At least three major outbreaks of acute diarrhoeal diseases have been reported in this state. The all over attack rate and case fatality rate were 0.2 percent and 0.9 percent respectively. Hospital records

revealed that 58.8 percent cases occurred among older children above 5 years of age. V.Cholera was isolated from 25.3 percent of cases sampled. Increase frequency in weekly admission of cases amongst children during first two year of life increased in the beginning of October when the original peak was caused by rotavirus which could be detected from 50 percent of diarrhoeal children in this age group this possibly reflected beginning of usual rotavirus diarrhoea season in the locality. During this period from 24 August and 20 October a total of 1833 cases and 17 death were reported from these three districts amongst the population of 9, 29,077 at risk. The overall attack rate and case fatality were 2 per 1000 and 0.9 percent respectively.

Other factors

Prevalence of diarrhoea

Lopez AD, Mathers CD, Ezzati M, et.al,(2001) have explained the Global and regional burden of disease and risk factors for 2001, to examine regional trends from 1990 to 2001, and to provide a starting point for the analysis of the Disease Control Priorities Project (DCPP). They have calculated mortality, incidence, prevalence and disability adjusted life years (Daly's) for 136 diseases and injuries, for seven income/ geographic country groups. They estimated mortality and disease burden attributable to 19 risk factors about 56 million people died in 2001. Of these 10.6 million were children, 99 percent of whom lived in low- and middle-income countries. More than half of child deaths in 2001 were attributable to acute respiratory infections, measles, diarrhoea, malaria, and HIV/AIDS. The results are showing that major disease, injury, and risk factor causes of health, together with information on the cost effectiveness of interventions, can assist in accelerating progress towards better health and reducing the persistent differentials in health between poor and rich countries.

Treatment of diarrhoea

Anand et al. (2001), have shown the Diarrhoea accounts for 25 percent infant deaths in India. Death is caused due to severe dehydration in young children, especially

those who are under nourished. The development of oral therapy for rehydration and maintenance of children with dehydrating diarrhoea has become the worldwide mainstay of national diarrhoeal control programs. More recently, proper nutrition for children and diarrhoea is viewed as an important adjunct to therapy, whereas antibiotics and other drugs play only a limited role. Therefore, particular attention should be given to the use of oral therapy for rehydration and maintenance therapy for the dehydrated child and their nutrition.

Deogaonkar (2004) reviews the effects of growing socio-economic inequality in Indian population and its effect on the healthcare system. The author identifies the factors responsible for the difficulties in healthcare delivery in an unequal society and its effect on the health of a society. The socially under-privileged are unable to access the healthcare due to geographical, social, economic or gender related distances. Unregulated private healthcare sector makes the gap between rich and poor more apparent.

Mahalanabis Dilip gave current status of oral rehydration as a strategy for the control of diarrhoeal diseases. For more than two decades, WHO and UNICEF have recommended Oral Rehydration Salt (ORS) solution based on glucose and three salts. During the last 16 year numerous studies were undertaken to develop an improved ORS. Recently rice-based ORS, in a number of studies, was found superior to standard ORS in adults and children with cholera and its use in such patients is recommended but comparatively less effective for severely malnourished children. Recently, several studies evaluated glucose-based ORS made hypoosmolar by reducing the concentration of glucose and sodium.

Sahu (1986) has explained the diarrhoea and malnutrition in Dhaka, Bangladesh, which was basically concerned about the government efforts towards child health and that could be an advances in managing diarrhoea (supplementation of micronutrient, particularly zinc) were to be implemented. Most episodes of diarrhoea are infectious and are caused by a variety of bacteria, viruses, and parasites. Dehydration is the most direct effect of diarrhoea, accounting for the majority of

deaths. The advent and widespread adoption of oral rehydration therapy has greatly reduced the mortality of diarrhoea.

Strina et.al, (2005) have explained the childhood diarrhoea symptoms, management and duration in northeast Brazil. A total of 2403 diarrhoea episodes were recorded. The number of liquid motion per day (3.6) did not vary significantly with duration. During the course of an episode, rehydration, medication, and care-seeking also showed a decline in frequency after the first or second week. As episodes continue, less rehydration and medical care are provided by carers.

Bhattacharya. (1996) has described how to manage diarrhoea. Acute diarrhoeal diseases are an important cause of morbidity and mortality, particularly in children. Acute diarrhoea may be watery, where features of dehydration are more prominent or dysenteric, where the stool contain blood and mucous. Rehydration therapy is the key to management of acute watery diarrhoea, whereas antibiotics play a vital role in the management of acute watery diarrhoea, whereas antibiotics play a vital role in the management of acute invasive diarrhoea, particularly shigellosis. Rehydration may be done either by the oral or intravenous routes depending upon the degree of dehydration.

World Health Organization (Department of Child and Adolescent Health and Development (2005) has presented a manual that describes the principles and practices of treating infectious diarrhoea, especially in young children. It is intended for physician and other senior level health workers. This fourth revision reflects recent clinical experience and research finding in diarrhoea case management. It includes revised guidelines on the management of children with acute diarrhoea using the new reduced osmolarity ORS formulation and using zinc supplements, which have shown to reduce duration and severity of diarrhoeal episodes, and revised guideline for the management of bloody diarrhoeal episodes.

WHO/UNICEF (2001) have recommended a single formulation of glucose-based Oral Rehydration Salts (ORS) to treat or prevent dehydration from diarrhoea. There has also been concern that the solution, which is slightly hyperosmolar when

compared with plasma, may risk hypernatraemia or an osmotically driven increase in stool output. For children with acute non-cholera diarrhoea, reduced osmolarity ORS solutions of glucose are safe.

ORS has been recommended as major treatment of child diarrhoea in given article by Anands, et al. (2001), have shown Oral rehydration therapy (ORT) with glucose electrolyte solutions to be one of the greatest therapeutic advances of this century. ORT is effective in acute diarrhoeal diseases of diverse etiology. The most widely used oral rehydration solution worldwide is that which is exclusively recommended by the World Health Organization (Na (sodium) 90, K (potassium) 20, glucose 111 and citrate 10 mmol/L).It can be applied in the management therapy in all types of diarrhoea, practically without side effects. Further the ORS has eventually been regarded as the principle management module in the treatment of diarrhoea. It has further evolved, a similar recognition in diarrhoea treatment as perhaps what water may have stood for in any first aid therapy in case of a burn.

Cost of treatment for has been explained by diarrhoea (Gokhale 1999) in Pune City. The average cost borne by the hospital for treatment of an episode of diarrhoea was Rs. 164.87 when average duration of stay was 2.01 days and the average cost borne by the patient was Rs.111.36. The total cost was Rs.276.23.

On the basis of literature review next chapter is analyzing the conceptual framework.

CHAPTER 3

CHAPTER 3

CONCEPTUAL FRAMEWORK FOR ANALYSING CHILD DIARRHOEA IN TAMIL NADU AND MADHYA PRADESH

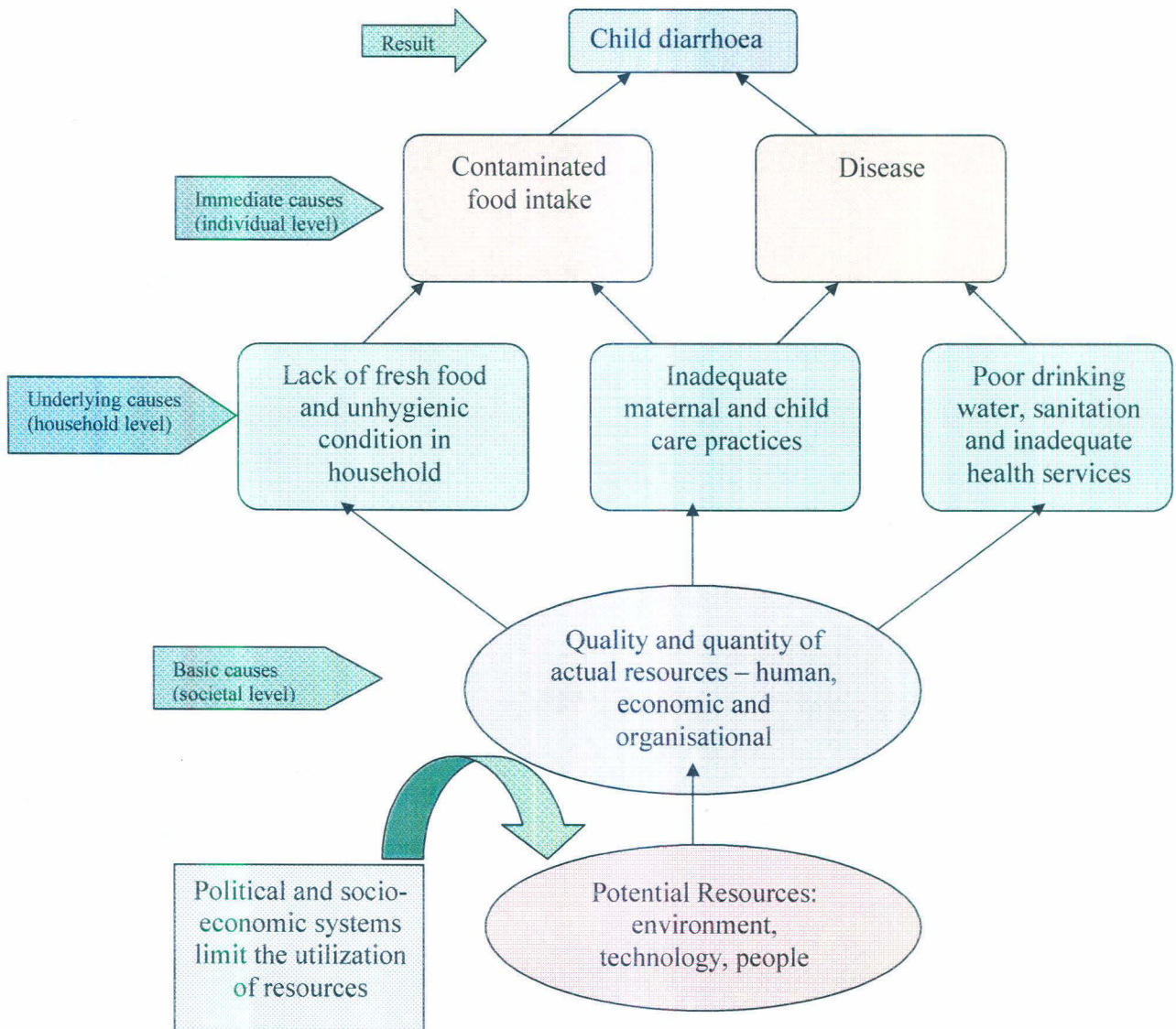
Conceptual framework is a useful tool for understanding the relationship between the key concepts that are to be examined from the empirical data. In this chapter we develop a conceptual framework for the analysis of the effects of the different demographic and socio-economic variables on child diarrhoea on the basis of literature review.

3.1 CONCEPTUAL FRAMEWORK

The conceptual framework, as shown in figure 3.1. a. is related to the causes of child diarrhoea and is based on framework developed by UNICEF (1998). The framework shows that causes of child diarrhoea are contaminated food, health and caring practices, source of water etc. They are also classified as immediate (individual level), underlying (household or family level) and basic (societal level), whereby factors at one level influences other levels. The two most significant immediate causes of child diarrhoea are: 1) contaminated food intake and 2) disease. The interplay of these two causes tends to create child diarrhoea. Food born transmission may occur when food contaminated by faeces is eaten. Three underlying causes that lead to immediate causes are: 1) lack of fresh food, 2) insufficient health services and an unhealthy environment and 3) poor water and sanitation and inadequate health services for children. Lack of fresh food in a household is determined by poor economic conditions. Insufficient health services and an unhealthy environment are determined by the accessibility of health services, safe water and sanitation. In terms of healthy environment there should be ready access to safe water supply and proper sanitation and hygienic way of handling food as well as hygienic condition in and around homes for the prevention of childhood diarrhoea and other infectious diseases. Water born transmission may occur when water contaminated by faeces is drunk. Direct transmission may occur when young

children put their contaminated finger in the mouth or the mothers contaminate food during its preparation.

Fig. 3.1 a. Conceptual framework of the causes of child diarrhoea.



Source: UNICEF, 1998

Fig. 3.1.b Conceptual framework for the Prevention of child diarrhoea.

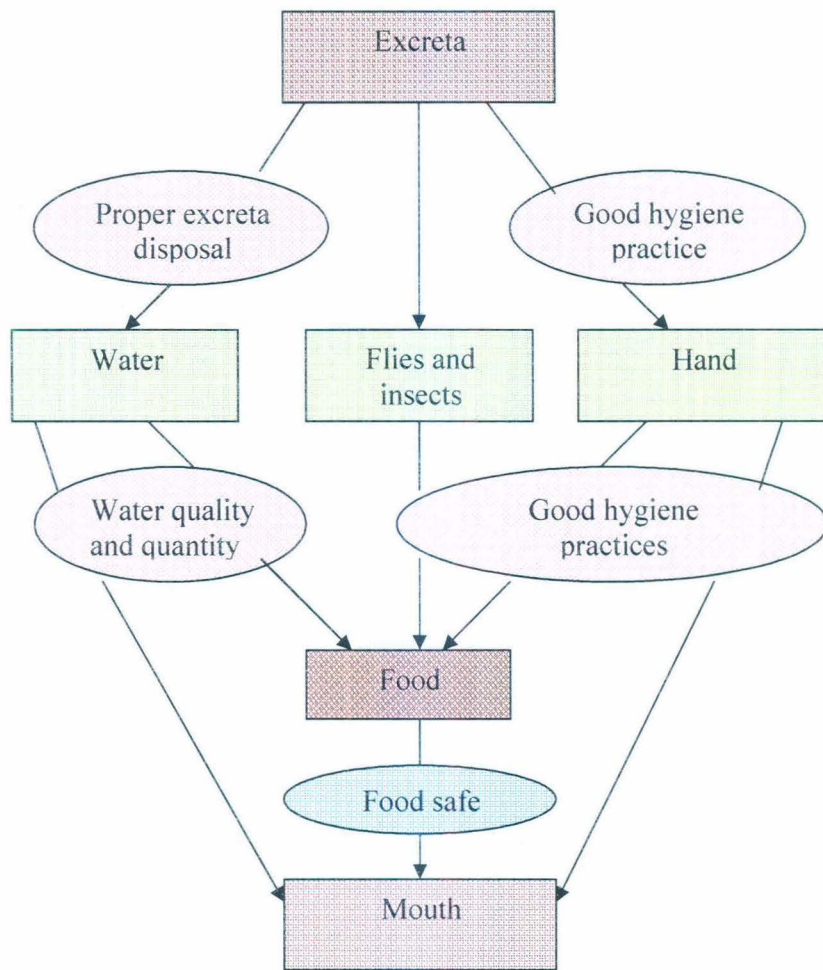
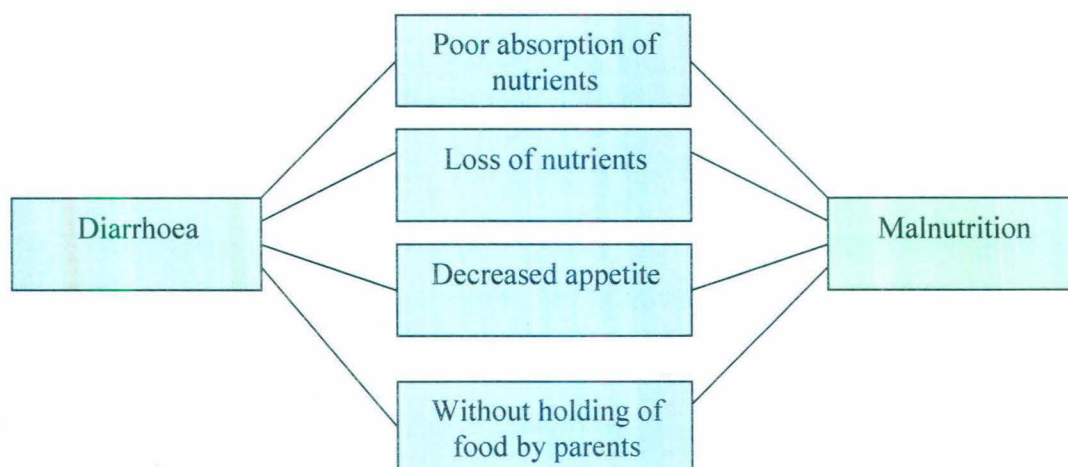


Fig. 3.2 shows that for the prevention of child diarrhoea there is need for proper waste disposal, good hygienic practices and pure supply of drinking water. The figure shows that to maintain the objective of health, food, water supply and food safety is essential. These measures block the transmission of pathogenic organisms in various phases from source to environment to food and drinking water and ultimate to mouth.

Fig 3.1 c. The vicious cycle of diarrhoea- malnutrition-diarrhoea.



Source: Piyush and Ghai (2006)

Repeated diarrhoeal episodes are major causes of malnutrition. On the other hand undernourished children suffer from long greater risk of dying as compared to a well nourished child with diarrhoeal illness. Diarrhoea leads to decreased absorption and increased loss of nutrients absorption and improper feeding during episode all contributing to malnutrition.



Diarrhoea is more common in person with Malnutrition. Malnutrition leads to infection and infection to diarrhoea. This is well known vicious cycle malnutrition-diarrhoea-malnutrition.

Environmental factor such as drinking water, type of toilet facilities also effects diarrhoea. . “The prevalence of diarrhoea among children who lived with flush system was substantially lower than among those who lived without flush system. In urban areas with prevalence of diarrhoea during the rainy season was more than twice the rate in the non rainy season”. (Arif and Ibrahim, 1998). The basic causes

of child diarrhoea are: no rights of women, the political and economic system that determines who income and assets are distributed and the ideologies and policies that govern the social sector

3.2 RESERCH QUESTIONS

Based on the literature review and the conceptual framework the following research questions have been formulated to understand the effect of socio-economic and demographic variables on prevalence and treatment of child diarrhoea.

1. Sex of child, mothers and age of mother's education does not have any impact on the prevalence of diarrhoea but have positive impact on treatment of diarrhoea.
2. Children in the age group of one to two years have more prevalence and treatment of diarrhoea than children in the age group of less than one year.
3. The higher standard of living of the children has less prevalence of diarrhoea.
4. The caste of child has positive impact on child diarrhoea. The children among scheduled caste and tribe have more prevalence and less treatment of diarrhoea than general caste children.
5. Southern region have less prevalence and high treatment of child diarrhoea as compared to Bimaruo region.

3.3 SOURCE OF DATA

This study uses secondary data from the second round of NFHS-2 for the status of Tamil Nadu and Madhya Pradesh. The second round of NFHS conducted in 1998-99 by the International Institute for population sciences (IIPS), Mumbai under the directive of the Ministry of Health and family welfare and finally supported by United States agency for International Developed (USAID) UNICEF, provides information on fertility, family planning infant and child mortality, reproductive health, child health, nutrition of woman and children and quality of health and family welfare services. The NFHS-2 National sample covers more than 99 percent of India's population living in 26 states that existed at the time of the survey. It does not cover the Union territory. NFHS-2 is a household sample survey with an overall

sample size of 90,303 ever-married women in the age group of 15-49 years living in 92,486 households. Three types of questionnaires were used in NFHS-2 namely: the villages Questionnaire the household Questionnaires and the Woman's Questionnaires, which also included data pertaining to the children, in this study data from the kids file in the Woman's Questionnaires are taken the analysis.

In Tamil Nadu NFHS-2 field staff collected information from 5281 households between 8 March 1999 and 7 June 1999 and interviewed 4676 eligible women in these households. In addition the survey collected information on 1359 children born to eligible women in the 3 years preceding the survey. The Questionnaires in Tamil Nadu were bilingual with questions both in Tamil and English.

In Madhya Pradesh NFHS-2 field staff collected information from 6749 households between 26 November 1998 and 24 April 1999 and interviewed 6041 eligible women in these households. In addition the survey collected information on 2837 children born to eligible women in the 3 years preceding the survey. The Questionnaires in Madhya Pradesh were bilingual with questions both in Hindi and English. Here Madhya Pradesh comprises both the states of Madhya Pradesh and Chattisgarh.

3.4 SELECTION OF VARIABLES

Identification of the casual relationship among the different variable of any study is an essential concern of an investigation a casual relationship between the two variables exists only one of them may logically considered as the cause of the other. Thus for analyzing the data two sets of variables are chosen they are

Dependent variables

1. Prevalence of child diarrhoea
2. Treatment of child diarrhoea

Independent variables

1. Place of residence
2. Education of mother

Table 3.1

Serial number	Name of the old variables	Name of the recorded variables for prevalence of diarrhoea	Categories of the recorded variables
1	Type of place of residence	Place of residence	Rural = 0 Urban = 1
2	Ethnicity (scheduled caste or tribe)	Ethnicity	Others=0 S.C/S.T =1
3	Religion	Religion	Hindu=0 Others=1
4	Education	Education	Illiterate=0 Literate=1
5	Household standard of living	Standard of living	Low=0 High=1
6	Reads newspaper once a week Watches TV every week Listens to radio every week	Mass media exposure	No=0 Yes=1
7	Source of drinking water	Source of drinking water	Tap water=0 Hand pump=1 Others=2
8	Sex of child	Sex of child	Male=0 Female=1
9	Age 5-year groups	Age of mother	15-19=0 20-45=1
10	Current age of child	Current age of child	Less than 1 year=0 1 to 2 year=1 2 to 3 year=2
11	Birth order number	Birth order of child	First=0 Second=1 Third and above=2
12	Regions	Regions	South=0 North=1 East=2 West=3 BIMARUO=4

Source: IIPS, 2000

3. Age of mother
4. Current age of child
5. Birth order of child
6. Sex of child
7. Ethnicity
8. Religions
9. Source of drinking water
10. Standards Of Living
11. Mass Media exposure
12. Regions

The factor which is supposed to be the effect is known as the dependent variable and the factor which is supposed to be the laws is known as the independent variables. Thus the variable may be explained in terms of the variation in the independent variable.

3.5 METHODOLOGY

Once the variables – dependent and independent – are chosen and suitably recorded to meet the need of the analysis, SPSS 10.0 (software package in social Sciences) is used for the analysis of the research problem. The following methodologies are adopted for the analysis:

Cross tabulation

Chi-square

Correlation coefficient

Binary logistics

Cross tabulation of the dependent and independent variables are prepares to find out the percentage of the demographic and socio-economic variables.

Pearson's chi-square is calculated to show the statistical association between the dependent and independent variables.

Correlation Coefficient is calculated to show the relation among independent variables. The value of correlation coefficient (r) varies between -1 and +1. The

value +1 or -1 indicates a perfect positive or negative correlation. As the extent of correlation decreases the value of (r) approaches zero.

Binary logistics regression or simply logistic regression is applied to a dichotomous dependent variable, where the dependent variable is the odds of the event of interest occurring. Logistic regression determines the effect of a set of variables on the probability as well as the effect of the individual variables. In this case, two dependent variables namely: prevalence of child diarrhoea and treatment of child diarrhoea have dichotomous values (No=0, Yes=1) and thus binary logistic is the model of choice.

The general logistic model expresses a qualitative dependent variable as a function of several independent variables, both qualitative and quantitative.

Let, $P = 2$ (if i th children have diarrhoea and not treated)

$P = 1$ (normal)

Thus, prevalence and treatment of child diarrhoea is dichotomous dependent variables reflecting binary choices. Let us assume that prevalence and treatment of child diarrhoea depends on a set of economic, socio-cultural and demographic characteristics to be represented by a vector. The basic form of a logistic function is:

$$P = 1/(1+e^{-z})$$

$$\text{Or, } 1-P = 1/(1+e^z)$$

$$\text{Or, } P/1-P = e^z$$

$$\log (P/1-P) = z$$

Where, P = estimated probability (the probability of the prevalence and treatment of child diarrhoea)

Z = independent variable

e = the base of natural logarithm ($e = 2.7183$)

The independent variable has the largest effect on P when $P = 0.5$ and P becomes smaller in absolute magnitudes as P approaches 0 to 1.00.

In case, if we use multivariate logistic function involving 'k' independent variables, like, $x_1, x_2, x_3, \dots, x_a$, the relationship can be written as:

$$\log\{P/(1-P)\} = b_0 + b_1x_1 + b_2x_2 + b_3x_3 \dots b_kx_k$$

The coefficient b_1 represents the additive effect of one unit change in independent variable x_1 on the logistics odds of the prevalence and treatment of child diarrhoea.

The quantity e^b is called the odds ratio that represent the multiplicative effect on one unit change in the independent variable x_1 on the odds of the prevalence and treatment of child diarrhoea. The odds ratio interpreted as ' e^b ' $\{Exp(B)\}$ is more readily understandable as a measure of effect. This represents proportional increase (if greater than 1.0) or decrease (if less than 1.0) event occurring (i.e. the prevalence and treatment of child diarrhoea) for unit change in corresponding independent variable.

Having discussed the conceptual framework for the analysis, data to be used and the methodology to be followed in this chapter, we will present a detailed analysis of the effects of the demographic and socio-economic factors on the child diarrhoea in India, Tamil Nadu and Madhya Pradesh in the next chapter.

CHAPTER 4

CHAPTER 4

ANALYSES OF CHILD DIARRHOEA IN INDIA WITH SPECIAL REFERENCE TO MADHYA PRADESH AND TAMIL NADU

This chapter analyses the effect of socio-economic and demographic variables on the child diarrhoea in terms of prevalence and treatment seeking behavior for children who are born three years before the NFHS-2 survey in selected states of Madhya Pradesh, Tamil Nadu and India. This chapter has been divided into four sections. The first section shows the association between the dependent and independent variables for Madhya Pradesh, Tamil Nadu and India. Cross-tabulation with Chi-square and its significant values are shown to understand the nature of association between the variables. This analysis also attempts to bring out a comparative study of the associations among the variables in India, Madhya Pradesh and Tamil Nadu. The second section of this chapter shows the correlation coefficient among independent variables in Madhya Pradesh, Tamil Nadu and India. The third section of this chapter analysis the effect of demographic and socio-economic variables on prevalence and treatment of diarrhoea with the help of binary logistic regression models. The fourth section summarizes the whole chapter.

4.1 ASSOCIATION BETWEEN THE DEPENDENT AND THE INDEPENDENT VARIABLES

4.1. a Association between prevalence of diarrhoea and the independent variables

Table 4.1 shows the percentage of prevalence of diarrhoea among children below three years of age among the different categories of the respective demographic and socio-economic variables for India, Madhya Pradesh and Tamil Nadu. In most of the cases the prevalence of diarrhoea is higher for all the independent variables for India, Madhya Pradesh and lower for Tamil Nadu.

The demographic variable age of mother influences child diarrhoea; 22.1 percent in India, 23.0 percent in Madhya Pradesh and 18.8 percent in Tamil Nadu belong to 15-19 year age group of mothers while 19.4 percent in India, 23.6 percent in Madhya Pradesh and 14.0 percent in Tamil Nadu children having diarrhoea belong to 20-45 year age group of mothers. This shows that children belonging to 15-19 year age group of mothers have higher prevalence of diarrhoea as compared with children belonging to higher age group of mothers. However the chi-square shows statistically significant association for India ($\chi^2 = 13.250$, sig. = .000).

Age of the child shows that out of the total children less than one year, 20.9 percent in India, 25.7 percent in Madhya Pradesh and 17.1 percent in Tamil Nadu have diarrhoea as against 22.4 percent in India, 25.9 percent in Madhya Pradesh and 14.9 percent in Tamil Nadu who are in one to two year age group. Among all the children who are two to three years of age 15.6 percent in India, 18.5 percent in Madhya Pradesh and 11.3 percent in Tamil Nadu children have diarrhoea. The chi-square shows statistically significant association for India ($\chi^2 = 163.747$, sig. = .000), and Madhya Pradesh ($\chi^2 = 16.881$, sig. = .000) and shows association at 5.8 percent of level in Tamil Nadu ($\chi^2 = 5.799$, sig. = .056) because of fewer cases.

In terms of birth order of child, 19.1 percent of children in India, 25.0 percent in Madhya Pradesh and 12.6 percent in Tamil Nadu who have diarrhoea belong to first birth order while 18.5 percent in India, 20.9 percent in Madhya Pradesh and 15.9 percent in Tamil Nadu children who have diarrhoea belong to second birth order. The children belonging to third and above birth order who have diarrhoea are 20.7 percent in India, 23.9 percent in Madhya Pradesh and 16.1 percent in Tamil Nadu. The chi-square shows statistically significant association for India ($\chi^2 = 17.350$, sig. = .000).

In case of sex, male children show more prevalence of diarrhoea as compared with the female children. Among male children 20.1 percent in India, 23.9 percent in Madhya Pradesh and 14.9 percent in Tamil Nadu have diarrhoea while among female children 19.2 percent in India, 23.0 percent in Madhya Pradesh and 13.9 percent in Tamil Nadu have diarrhoea.

Table:4.1

**Prevalence of Diarrhoea among children (under age 3 years) by selected variables
in India, Madhya Pradesh and Tamil Nadu in 1998-1999**

	Category	INDIA		MADHYA PRADESH		TAMIL NADU	
		Percentage	Number	Percentage	Number	Percentage	Number
Demographic factors							
AGE OF MOTHER	15-19	22.1	712	23	97	18.8	21
	OTHERS	19.4	5371	23.6	521	14	165
	Pearson chi- square(sig) 13.250(.000)				.071(.790)		1.875(.171)
SEX OF CHILD	Male	20.1	3247	23.9	320	14.9	101
	Female	19.2	2836	23	298	13.9	85
	Pearson chi- square(sig) 3.925(.048)				.276(.599)		.254(.614)
CURRENT AGE OF CHILD	less than 1 year	20.9	2219	25.7	243	17.1	72
	1 year to 2 year	22.4	2281	25.9	220	14.9	65
	2 year and above	15.6	1583	18.5	155	11.3	49
	Pearson chi- square(sig) 163.747(.000)				16.881(.000)		5.779(.056)
BIRTH ORDER OF CHILD	First	19.1	1720	25	159	12.6	71
	Second	18.5	1495	20.9	120	15.7	70
	Third and above	20.7	2868	23.9	339	16.1	45
	Pearson chi- square(sig) 17.350(.000)				2.942(.230)		2.710(.258)
Socio economic factors							
EDUCATION	Illiterate	20.4	3418	22.4	400	16.4	76
	Literate	18.7	2665	25.8	218	13.9	76
	Pearson chi- square(sig) 13.711(.000)				3.787(.052)		1.214(.271)
ETHNICITY	Others	19	3964	23.4	374	14.9	144
	S.C. / S.T.	20.9	2119	23.7	244	12.8	42
	Pearson chi- square(sig) 14.135(.000)				.038(.846)		.868(.325)
RELIGION	Hindu	19.7	5410	22.9	552	14.2	158
	Others	19.2	624	29.9	66	15.6	28
	Pearson chi- square(sig) .495(.482)				5.456(.020)		.224(.636)
STANDARD OF LIVING	low	20.2	1983	21.9	205	17	79
	Medium / High	19.4	4034	24.4	412	13	105
	Pearson chi- square(sig) 2.439(.118)				1.998(.158)		3.712(.054)
PLACE OF RESIDENCE	Rural	19.8	4514	22.6	457	13.8	99
	Urban	19.3	1569	26.4	161	15.2	87
	Pearson chi- square(sig) .964(.326)				3.625(.057)		.503(.478)
Other factors							
SOURCE OF DRINKING WATER	Tap water	20.4	2382	27.6	188	15	133
	Handpump	19	2123	23.5	219	11.9	26
	Others	19.5	1578	20.7	211	14.8	27
	Pearson chi- square(sig) 7.650(.022)				10.561(.005)		1.380(.502)
MASS MEDIA EXPOSURE	No	19.5	2587	20.9	276	14.5	37
	Yes	19.8	3492	26.2	342	14.4	149
	Pearson chi- square(sig) .335(.563)				10.294(.001)		.002(.963)
REGIONS	South	13.9	592	*	*	*	*
	North	22.9	1025	*	*	*	*
	East	15.6	846	*	*	*	*
	West	21.7	706	*	*	*	*
	bimaru	21.5	2914	*	*	*	*
	Pearson chi- square(sig) 214.944(.000)						

SOURCE: IIPS (2000)

Note: Chi-square is not given for marked (*)

The social variable such as the mother's education shows that 20.4 percent of child diarrhoea in India is among illiterate mothers while it is 18.7 percent for literate mothers. In Madhya Pradesh 22.4 percent of child diarrhoea is among illiterate mothers while 25.8 percent is among literate mothers. In Tamil Nadu 16.4 percent of child diarrhoea occurs among illiterate mothers while it is 13.9 percent for literate mothers. The association is statistically supported by chi-square only for India ($\chi^2 = 13.711$, sig. = .000) and Madhya Pradesh ($\chi^2 = 3.787$, sig. = .052) showing that illiterate mothers have higher percent of children who had diarrhoea compared with literate mothers.

Prevalence of child diarrhoea is low for the general caste as compared to the children of scheduled caste and tribe. For general caste 19.0 percent, 23.4 percent and 14.9 percent of children had diarrhoea in India, Madhya Pradesh and Tamil Nadu respectively. The percentage in scheduled caste and tribe children is 20.9 percent and 23.7 percent in India and Madhya Pradesh respectively. In Tamil Nadu within schedule caste and tribe the prevalence of child diarrhoea (12.8 percent) is low compared to general caste. The chi-square shows statistically significant association in India ($\chi^2 = 14.135$, sig. = .000).

The prevalence of child diarrhoea is higher among the Hindus in India (19.7 percent) than among the children belonging to the other religious background (19.2 percent). While child diarrhoea among the Hindus in Madhya Pradesh and Tamil Nadu is lower (22.9 percent and 14.2 percent), for others it is 29.9 percent and 15.6 percent respectively.

The prevalence of child diarrhoea is high in rural areas as compared to the urban areas in India. Madhya Pradesh and Tamil Nadu show higher percentage of child diarrhoea among urban population. In India, Madhya Pradesh and Tamil Nadu 19.8 percent, 22.6 percent and 13.8 percent of children having diarrhoea reside in rural areas respectively as against 19.3 percent, 26.4 percent and 15.2 percent of children having diarrhoea reside in urban areas of India, Madhya Pradesh and Tamil Nadu respectively. The chi-square shows association at 5.7 percent level of significance in Madhya Pradesh.

The economic factors like standard of living show that prevalence of child diarrhoea tends to be lower with the increase in the standard of living. Among the children belonging to households having low standard of living, 20.2 percent, 21.9 percent and 17.0 percent children have diarrhoea in India, Madhya Pradesh and Tamil Nadu respectively as against 19.4 percent, 24.4 percent and 13.0 percent children have diarrhoea belonging to high standard of living in India, Madhya Pradesh and Tamil Nadu respectively. The chi-square shows association at 5.8 percent level of significance in Tamil Nadu.

Among other factors, exposure to mass media does not have strong influence on child diarrhoea in India and Tamil Nadu. India, Madhya Pradesh and Tamil Nadu have 19.5 percent, 20.9 percent and 14.5 percent children with diarrhoea belong to mothers who are not exposed to mass media respectively while 19.8 percent, 26.2 percent and 14.4 percent children with diarrhoea belong to mothers who are exposed to mass media respectively. The chi-square shows statistically significant association for Madhya Pradesh ($\chi^2 = 10.294$, sig. = .001).

The cross tabulation between source of drinking water and prevalence of diarrhoea shows that prevalence of diarrhoea is more among the children who use tap water as against the children who use hand pump water. In India, Madhya Pradesh and Tamil Nadu 20.4 percent, 27.6 percent and 15.0 percent children have diarrhoea that are using tap water as against 19.0 percent, 23.2 percent and 11.9 percent of children who are using hand pump water respectively. In case of other sources of drinking water 19.5 percent, 20.7 percent and 14.8 percent of children have diarrhoea in India, Madhya Pradesh and Tamil Nadu respectively. The chi-square shows statistically significant association for India ($\chi^2 = 7.650$, sig. = .022) and Madhya Pradesh ($\chi^2 = 10.561$, sig. = .005).

Regions shows that the prevalence of child diarrhoea is 13.9 percent in Southern region, 22.9 percent in Northern region, 15.6 percent in Eastern region, 21.7 percent in Western region and 21.5 in BIMARUO region. Southern region has the lowest percentage of prevalence of child diarrhoea. Western region and BIMARUO region

shows a slight difference of prevalence of diarrhoea. Chi square shows statistically significant association for regions in India ($\chi^2 = 294.944$, sig. = .000).

In sum, the southern region has the lowest percentage of diarrhoea and because of this reason there are a fewer cases in Tamil Nadu and the chi-square test have to be carefully interpreted. Education and caste of child does not affect diarrhoea.

4.1. b Association between Medical Treatment of diarrhoea and the independent variables

Table 4.2 shows the percentage of medical treatment of diarrhoea below three years of age among the different categories of the respective demographic and socio-economic variables for India, Tamil Nadu and Madhya Pradesh. Medical treatment of diarrhoea in case of almost all the independent variables for Tamil Nadu is higher when compared with India and Madhya Pradesh.

The demographic variable age of mother influences 62.2 percent in India, 58.8 percent in Madhya Pradesh and 65.0 percent in Tamil Nadu belong to among 15-19 year age group of mothers while 62.7 percent in India, 59.1 percent in Madhya Pradesh and 69.7 percent in Tamil Nadu children having treatment of diarrhoea belong to 20-45 year age group of mothers. The result is not significant for any selected state shows that age of mother doesn't effect medical treatment of diarrhoea.

Age of the child shows that out of the total children less than one year, 60.5 percent in India, 53.5 percent in Madhya Pradesh and 70.8 percent in Tamil Nadu children get treatment of diarrhoea as against 65.4 percent in India, 64.1 percent in Madhya Pradesh and 73.4 percent in Tamil Nadu who are in one to two year age group. Among all the children who are two to three years of age 61.8 percent in India, 60.6 percent in Madhya Pradesh and 61.2 percent in Tamil Nadu children have medical treatment of diarrhoea. The result shows that children belonging to age group one to

Table : 4.2

**Medical treatment of Diarrhoea among children (under age 3 years) by selected variables
in India, Madhya Pradesh and Tamil Nadu in 1998-1999**

	Category	INDIA		MADHYA PRADESH		TAMILNADU	
		Percentage	Number	Percentage	Number	Percentage	Number
Demographic factors							
AGE OF MOTHER	15-19	62.2	443	58.8	57	65	13
	others	62.7	3370	59.1	308	69.7	115
		Pearson chi- square(sig) .074(.785)		.004(.948)		.185(.667)	
SEX OF CHILD	Male	64.3	2087	63.4	203	72	72
	Female	60.9	1726	54.4	162	65.9	56
		Pearson chi- square(sig) 7.544(.006)		5.26(.022)		.807(.369)	
AGE OF CHILD	<1 year	60.5	1343	53.5	130	70.8	51
	1 year-2 year	65.4	1491	64.1	141	73.4	47
	> 2 years	61.8	979	60.6	94	61.2	30
		Pearson chi- square(sig) 11.923(.003)		5.573(.062)		2.091(.351)	
BIRTH ORDER OF CHILD	first	68.2	1173	66	105	74.6	53
	Second	63.9	956	60.8	73	71	49
	> third year	58.7	1684	57.1	187	57.8	26
		Pearson chi- square(sig) 49.675(.000)		5.488(.064)		3.849(.146)	
Socio-economic factors							
EDUCATION	Illiterate	57.9	1978	53	212	64.5	49
	literate	68.9	1835	70.2	153	66.7	50
		Pearson chi- square(sig) 77.255(.000)		17.231(.000)		.080(.777)	
ETHNICITY	Others	66	2619	63.9	239	68.8	99
	S.C / S.T	56.3	1194	51.6	126	70.7	29
		Pearson chi- square(sig) 55.799(.000)		9.186(.002)		.059(.808)	
RELIGION	Hindu	64.3	3478	50	320	66.2	104
	Others	48.9	305	68.2	45	85.7	24
		Pearson chi- square(sig) 56.805(.000)		2.542(.111)		4.226(.040)	
STANDARD OF LIVING	low	53.2	1055	46.3	95	65.4	51
	Medium / High	67.1	2708	65.3	269	71.4	75
		Pearson chi- square(sig) 110.072(.000)		20.320(.000)		.762(.383)	
PLACE OF RESIDENCE	Rural	59.1	267	53.6	245	65.3	64
	Urban	72.8	1143	74.5	120	73.6	64
Other factors							
MASS MEDIA EXPOSURE	No	54.7	1415	50.4	139	70.3	26
	Yes	68.6	2395	66.1	226	68.9	102
		Pearson chi- square(sig) 122.583(.000)		15.616(.000)		.205(.873)	
REGIONS	South	69.9	413	*	*	*	*
	North	85.6	877	*	*	*	*
	East	41.9	354	*	*	*	*
	West	72.8	514	*	*	*	*
	BIMARUO	57	1655	*	*	*	*
		Pearson chi- square(sig) 471.85(.000)					

SOURCE: IIPS (2000)

Note: Chi-square is not given for marked (*)

two years have higher percentage of treatment of diarrhoea as compared to the other age group. The chi-square shows statistically significant association for India ($\chi^2 = 11.923$, sig. = .003).

In terms of birth order of child, 68.2 percent of children in India, 66.0 percent in Madhya Pradesh and 74.6 percent in Tamil Nadu who received treatment of diarrhoea belong to first birth order while 63.9 percent in India, 60.8 percent in Madhya Pradesh and 71 percent in Tamil Nadu children who received treatment of diarrhoea belong to second birth order. The children belonging to third and above birth order who received treatment of diarrhoea are 58.7 percent in India, 55.2 percent in Madhya Pradesh and 57.8 percent in Tamil Nadu. The result shows that with decreasing birth order of children treatment of diarrhoea also decreases. The chi-square shows statistically significant association for India ($\chi^2 = 49.675$, sig. = .000).

In case of sex of child, male children show more medical treatment of diarrhoea as compared with the female children. Among male children 64.3 percent in India, 63.4 percent in Madhya Pradesh and 72 percent in Tamil Nadu received treatment of diarrhoea while among female children 60.9 percent in India, 54.4 percent in Madhya Pradesh and 65.9 percent in Tamil Nadu received treatment of diarrhoea. The chi-square shows statistically significant association for India ($\chi^2 = 7.544$, sig. = .006).

The social variables such as mother's education show that 57.9 percent of child diarrhoea in India is among illiterate mothers while 68.9 percent case is among literate mothers. In Madhya Pradesh 53.0 percent of child diarrhoea is among illiterate mothers while 70.2 percent is among literate mothers. In Tamil Nadu 64.5 percent cases of child diarrhoea occurs among illiterate mothers while it is 66.7 percent for literate mothers. Chi-square shows statistically significant association for India ($\chi^2 = 77.255$, sig. = .000) and Madhya Pradesh ($\chi^2 = 17.231$, sig. = .000).

The treatment of child diarrhoea is high for the general caste as compared to the children of schedule caste and tribe. For general caste 66.1 percent, 63.9 percent and

68.8 percent of children had diarrhoea in India, Madhya Pradesh and Tamil Nadu respectively. The percentage in scheduled caste and tribe children is 56.3 percent, 51.6 percent and 70.7 percent in India, Madhya Pradesh and Tamil Nadu respectively. The chi-square shows significant association for India ($\chi^2 = 55.799$, sig. = .000) and Madhya Pradesh ($\chi^2 = 9.186$, sig. = .002).

The treatment of child diarrhoea is high among the Hindu in India (64.3 percent), low among Hindu in Madhya Pradesh (50.0 percent) and Tamil Nadu (66.2 percent) as compared with children belonging to the other religious background. The treatment of child diarrhoea is low among other religious background in India (48.9 percent). The medical treatment of child diarrhoea is high among other religious background in Madhya Pradesh (68.2 percent) and Tamil Nadu (85.7 percent). The chi-square shows significant association only for India ($\chi^2 = 56.805$, sig. = .000).

The treatment of child diarrhoea is low in rural areas as compared to the urban areas in all selected states. India, Madhya Pradesh and Tamil Nadu show 59.1 percent, 53.6 percent and 65.3 percent of children having diarrhoea belong to rural areas as against 72.8 percent, 74.5 percent and 73.6 percent of children in urban areas respectively. The association is statistically supported by chi-square showing that rural areas have less percentage of treatment of child diarrhoea as compared to the urban areas.

The economic factors like standard of living show that medical treatment of child diarrhoea tends to be higher with the increase in the standard of living. Among the children belonging low standard of living, 53.2 percent, 46.3 percent and 64.7 percent children have diarrhoea in India, Madhya Pradesh and Tamil Nadu respectively as against 67.1 percent, 65.3 percent and 71.4 percent children belonging to high standard of living in India, Madhya Pradesh and Tamil Nadu respectively. The chi-square shows statistically significant association in India ($\chi^2 = 110.072$, sig. = .000) and Madhya Pradesh ($\chi^2 = 20.320$, sig. = .000). In Tamil Nadu the difference is not much between low and high standard of living.

The exposure to mass media has strong influence on treatment of child diarrhoea. India, Madhya Pradesh and Tamil Nadu have 54.7 percent, 50.4 percent and 70.3 percent children who have received treatment for diarrhoea belong to mothers who are not exposed to mass media respectively while 68.6 percent, 66.1 percent and 68.9 percent children who have received treatment for diarrhoea belong to mothers who are exposed to mass media respectively. The chi-square shows statistically significant association for India ($\chi^2 = 122.583$, sig. = .000) and Madhya Pradesh ($\chi^2 = 15.616$, sig. = .000).

Region shows that the medical treatment of child diarrhoea is 69.9 percent in Southern region, 85.6 percent in Northern region, 41.9 percent in Eastern region, 72.8 percent in Western region and 57.0 in BIMARUO region. The Northern region has highest percentage of medical treatment for child diarrhoea.

In sum, the Northern region (Punjab, Himachal, Jammu and Kashmir and Haryana) has high percentage of child diarrhoea. Education is significantly associated with treatment of child diarrhoea. Educated mothers have higher medical treatment for child diarrhoea. A caste of child also strongly influences medical treatment of child diarrhoea; scheduled caste and tribe people have represented as lower percentage for treatment in India and Madhya Pradesh.

4.1. c Association between received any treatment of diarrhoea and the independent variables

Table 4.3 shows the percentage of any treatment of diarrhoea below three years of age among the different categories of the respective demographic and socio-economic variables for India, Madhya Pradesh and Tamil Nadu. As in the case of section 4.1 a. and 4.1 b. in most of the cases any treatment of child diarrhoea is higher for all the independent variables for Tamil Nadu.

The demographic variable age of mother influences child diarrhoea; 81.3 percent in India, 77.3 percent in Madhya Pradesh and 85.0 percent in Tamil Nadu belong to among 15-19 year age group of mothers while 85.8 percent in India, 78.8 percent in Madhya Pradesh and 89.1 percent in Tamil Nadu children having any treatment of

Table: 4.3

**Any treatment of Diarrhoea among children (under age 3 years) by selected variables
in India, Madhya Pradesh and Tamil Nadu in 1998-1999**

	Category	INDIA		MADHYA PRADESH		TAMILNADU	
		Percentage	Number	Percentage	Number	Percentage	Number
Demographic factors							
AGE OF MOTHER	15-19	81.3	578	77.3	75	85	17
	others	85.8	4593	78.7	409	89.1	147
		Pearson chi- square(sig) 9.921(.002)		.086(.769)		.297(.586)	
SEX OF CHILD	Male	85.3	2762	81.6	261	92	92
	Female	85.1	2409	75.1	223	84.7	72
		Pearson chi- square(sig) .049(.825)		3.823(.051)		2.429(.119)	
AGE OF CHILD	<1 year	79.9	1770	71.2	173	88.9	64
	1 year-2 year	87.9	1997	84.1	185	89.1	57
	> 2 years	88.9	1404	81.8	126	87.8	43
		Pearson chi- square(sig) 80.393(.000)		12.74(.002)		.054(.973)	
BIRTH ORDER OF CHILD	first	86.7	1491	79.9	127	87.3	62
	Second	87.9	1313	80	96	92.8	64
	> third year	82.9	2367	77.2	261	84.4	38
		Pearson chi- square(sig) 24.072(.000)		.664(.717)		2.070(.355)	
Socio-economic factors							
EDUCATION	Illiterate	81.2	2764	73.7	294	80.3	61
	literate	90.5	2407	87.2	190	93.3	70
		Pearson chi- square(sig) 102.731(.000)		15.131(.000)		5.612(.018)	
ETHNICITY	Others	87	3403	80.7	302	90.3	130
	S.C / S.T	82.4	1737	74.9	182	82.9	34
		Pearson chi- square(sig) 22.867(.000)		2.983(.084)		1.714(.191)	
RELIGION	Hindu	84.6	3734	77.3	426	87.3	137
	Others	87	1394	87.9	58	96.4	27
		Pearson chi- square(sig) 5.19(.023)		3.891(.049)		1.985(.159)	
STANDARD OF LIVING	low	79.9	1578	69.1	141	87.2	68
	Medium / High	87.7	3530	83	342	89.5	94
		Pearson chi- square(sig) 64.373(.000)		15.554(.000)		2.42(.623)	
PLACE OF RESIDENCE	Rural	83.2	3744	74.8	341	85.7	84
	Urban	91.1	1427	88.8	143	92	80
		Pearson chi- square(sig) 58.223(.000)		13.870(.000)		1.783(.182)	
Other factors							
MASS MEDIA EXPOSURE	No	79.5	2048	71.4	197	87.3	137
	Yes	89.4	3111	84.2	287	96.4	27
		Pearson chi- square(sig) 116.308(.000)		14.751(.000)		1.985(.159)	
REGIONS	South	90.7	536	*	*	*	*
	North	95.6	982	*	*	*	*
	East	81.7	690	*	*	*	*
	West	88.1	622	*	*	*	*
	BIMARUO	80.8	2343	*	*	*	*
		Pearson chi- square(sig) 160.301(.000)					

SOURCE: IIPS (2000)

Note: Chi-square is not given for marked (*)

diarrhoea belonging to 20-45 year age group of mothers. The chi square shows statistically significant association for India ($\chi^2 = 9.921$, sig. = .002).

Age of child shows that out of the total children less than one year, 79.9 percent in India, 71.2 percent in Madhya Pradesh and 88.9 percent in Tamil Nadu children get any treatment of diarrhoea as against 87.9 percent in India, 84.1 percent in Madhya Pradesh and 89.1 percent in Tamil Nadu who are in one to two year age group. Among all the children who are in two to three years 88.9 percent in India, 81.8 percent in Madhya Pradesh and 87.8 percent in Tamil Nadu children get any treatment of diarrhoea. The result shows that children belonging to age group one to two years have higher percentage of treatment of diarrhoea as compared to the other age group. The chi-square shows statistically significant association for India ($\chi^2 = 80.393$, sig. = .000) and Madhya Pradesh ($\chi^2 = 12.74$, sig. = .002). In Tamil Nadu current age of child does not effect any treatment for diarrhoea.

In terms of birth order of child, 86.7 percent of children in India, 79.9 percent of children in Madhya Pradesh and 87.3 percent in Tamil Nadu get any treatment of diarrhoea belong to first birth order while 87.9 percent in India, 80 percent in Madhya Pradesh and 92.8 percent in Tamil Nadu who received any treatment of diarrhoea belong to second birth order. The children belonging to third and above birth order who received any treatment of diarrhoea are 82.9 percent in India, 77.2 percent in Madhya Pradesh and 84.4 percent in Tamil Nadu. The result shows that with decreasing birth order of children treatment of diarrhoea also decreases. The percentages show that there is not much difference in first and second birth order for any treatment for diarrhoea but after second birth order treatment for diarrhoea decreases. The chi-square shows statistically significant association for India ($\chi^2 = 24.072$ sig. = .000).

In case of sex of child, male children show more treatment of diarrhoea as compared with the female children. Among male children 85.3 percent in India, 81.6 percent in Madhya Pradesh and 92.0 percent in Tamil Nadu received treatment of diarrhoea, while among female children 85.1 percent in India, 75.1 percent in Madhya Pradesh

and 84.7 percent in Tamil Nadu received treatment of diarrhoea. Females get less treatment for diarrhoea.

The social variable such as mother's education shows that 81 percent of any treatment of child diarrhoea in India is among illiterate mothers while 90.5 percent belong to literate mothers. In Madhya Pradesh 73.7 percent of child diarrhoea is among illiterate mothers, while 87.2 percent is among literate mothers. In Tamil Nadu 80.3 percent of child diarrhoea occurs among illiterate mothers, while 93.3 percent cases are for literate mothers. The chi-square shows statistically significant association for India ($\chi^2 = 102.731$ sig. = .000) and Madhya Pradesh ($\chi^2 = 15.131$ sig. = .000). The result show that education of mother is not an effective factor for prevalence of diarrhoea but it is an important factor for treatment of diarrhoea. Educated mothers have more treatment for child diarrhoea as compared to illiterate mothers.

Any treatment of child diarrhoea is high for the general caste as compared to the children of schedule caste and tribe. For general caste 66.1 percent, 63.9 percent and 90.3 percent of children get any treatment for diarrhoea in India, Madhya Pradesh and Tamil Nadu respectively. The percentage of any treatment in scheduled caste and tribe children is 56.3 percent, 51.6 percent and 82.9 percent in India, Madhya Pradesh and Tamil Nadu respectively. The chi-square shows statistically significant association for India ($\chi^2 = 22.867$ sig. = .000).

Any treatment of child diarrhoea is low among the Hindus in India (84.6 percent), Madhya Pradesh (77.3 percent) and Tamil Nadu (87.3 percent) as compared with children belonging to the other religious background. The treatment of child diarrhoea is high in India (87 percent), Madhya Pradesh (87.9 percent) and Tamil Nadu (96.4 percent). The chi-square shows statistically significant association only for India ($\chi^2 = 5.19$ sig. = .023).

Any treatment of child diarrhoea is low in rural areas as compared to the urban areas in all selected states. In India, Madhya Pradesh and Tamil Nadu 83.2 percent, 74.8 percent and 85.7 percent of children having diarrhoea reside in rural areas

respectively as against 91.1 percent, 88.8 percent and 92.0 percent of children having diarrhoea reside in urban areas of India, Madhya Pradesh and Tamil Nadu respectively. The association is statistically supported by chi-square showing that rural areas have less percentage of treatment of child diarrhoea as compared with urban areas.

The economic factors like standard of living show that the treatment tends to be higher with the increase in the standard of living. Among the children belonging low standard of living, 79.9 percent, 69.1 percent and 87.2 percent children have diarrhoea in India, Madhya Pradesh and Tamil Nadu respectively as against 87.7 percent, 83 percent and 89.5 percent children have diarrhoea belonging to high standard of living in India, Madhya Pradesh and Tamil Nadu respectively. The chi-square shows statistically significant association in India ($\chi^2 = 64.373$ sig. = .000) and Madhya Pradesh ($\chi^2 = 15.554$ sig. = .000).

Among other factors, exposure to mass media has strong influence on treatment of child diarrhoea. India, Madhya Pradesh and Tamil Nadu have 79.5 percent, 71.4 percent and 81.1 percent children received treatment for diarrhoea belong to mothers who are not exposed to mass media respectively while 89.4 percent, 84.2 percent and 90.5 percent children received treatment for diarrhoea belong to mothers who are exposed to mass media respectively. The chi-square shows statistically significant association for India ($\chi^2 = 116.308$ sig. = .000) and Madhya Pradesh ($\chi^2 = 14.751$ sig. = .000).

Child diarrhoea is 90.7 percent in Southern region, 95.6 percent in Northern region, 81.7 percent in Eastern region, 88.1 percent in Western region and 80.8 in BIMARUO region. Northern region has the highest percentage of medical treatment for child diarrhoea.

4.2 CORRELATION COEFFICIENTS AMONG ALL INDEPENDENT VARIABLES

We have also computed correlation coefficient for all the independent variables for India.

Table 4.4 shows the computed correlation coefficient for all the independent variables in India.

The table 4.4 shows that age of mother has high correlation with birth order of child (.659). As age of mother increases age of child and birth order of child also increases. The current age of child shows some relation with age of mother (.128). Birth order of child shows positive relation with mass media exposure (.254) and age of mother (.659) and negative relation with education (.254) and mass media (.254). Ethnicity shows negative relation with standard of living (-.203). Source of drinking water shows negative relation with residence (-.229). Standard of living shows positive relation with education (.350), mass media (.405) and residence (.230) and shows negative relation with ethnicity (-.203).

Mass media exposure has high positive correlation with education (.500), residence (.327) and standard of living (.404). As education of mother increases standard of living also increases and this leads to increase in mass media exposure. Mass media exposure has negative correlation with birth order number (-.254). Place of residence shows positive correlation with education of mother (.267), standard of living (.230) and mass media exposure (.327). Place of residence shows negative relation with source of drinking water (-.229)

The sex of child and religion and does not shows high positive relation with other variables.

As shown in table 4.5 and 4.6 correlation coefficient among independent variables for Madhya Pradesh and Tamil Nadu shows the same trend as in India and we have analyses the result only for India.

Only in some cases correlation coefficient is high for example among birth order and age of child. However in case of most of the variables correlation coefficient are not significant.

Table: 4.4

Correlation coefficient among independent variables in India, 1998-99

		Mothers age	Age of child	Birth order of child	Sex of child	Religion	Education of mother	Ethnicity	Standard of living	Residence	Source of drinking water	Mass media exposure
Mothers age	Correlation	1.000	0.128	0.659	-0.003	0.088	-0.068	0.003	-0.017	0.030	0.022	-0.065
	Sig.		0.000	0.000	0.602	0.000	0.000	0.557	0.002	0.000	0.000	0.000
Age of child	Correlation	0.128	1.000	0.009	0.000	0.014	-0.001	-0.003	0.004	0.014	-0.009	-0.002
	Sig.	0.000		0.124	0.954	0.012	0.866	0.645	0.534	0.015	0.119	0.790
Birth order	Correlation	0.659	0.009	1.000	0.003	0.080	-0.305	0.093	-0.175	-0.128	0.057	-0.254
	Sig.	0.000	0.124		0.546	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sex	Correlation	-0.003	0.000	0.003	1.000	0.001	-0.020	0.003	-0.012	-0.004	0.003	-0.015
	Sig.	0.602	0.954	0.546		0.814	0.000	0.591	0.029	0.512	0.635	0.006
Religion	Correlation	0.088	0.014	0.080	0.001	1.000	0.068	-0.029	0.046	0.082	0.007	0.060
	Sig.	0.000	0.012	0.000	0.814		0.000	0.000	0.000	0.000	0.186	0.000
Education	Correlation	-0.068	-0.001	-0.305	-0.020	0.068	1.000	-0.134	0.350	0.267	-0.081	0.500
	Sig.	0.000	0.866	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000
Ethnicity	Correlation	0.003	-0.003	0.093	0.003	-0.029	-0.134	1.000	-0.203	-0.111	0.091	-0.131
	Sig.	0.557	0.645	0.000	0.591	0.000	0.000		0.000	0.000	0.000	0.000
Standard of living	Correlation	-0.017	0.004	-0.175	-0.012	0.046	0.350	-0.203	1.000	0.230	-0.116	0.405
	Sig.	0.002	0.534	0.000	0.029	0.000	0.000	0.000		0.000	0.000	0.000
Residence	Correlation	0.030	0.014	-0.128	-0.004	0.082	0.267	-0.111	0.230	1.000	-0.229	0.327
	Sig.	0.000	0.015	0.000	0.512	0.000	0.000	0.000	0.000		0.000	0.000
Source of water	Correlation	0.022	-0.009	0.057	0.003	0.007	-0.081	0.091	-0.116	-0.229	1.000	-0.127
	Sig.	0.000	0.119	0.000	0.635	0.186	0.000	0.000	0.000	0.000		0.000
Mass media	Correlation	-0.065	-0.002	-0.254	-0.015	0.060	0.500	-0.131	0.405	0.327	-0.127	1.000
	Sig.	0.000	0.790	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	

Note: Bold number are significant below 5 percent level .

Source : IIPS, 2000

Table : 4.5

Correlation coefficient among independent variables in Madhya Pradesh, 1998-99

		Mothers age	Age of child	Birth order of child	Sex of child	Religion	Education of mother	Ethnicity	Standard of living	Residence	Source of drinking water	Mass media exposure
Mothers age	Correlation	1	0.123	0.715	-0.002	0.059	-0.067	0.003	-0.041	0.05	-0.035	-0.087
	Sig.		0	0	0.902	0.002	0	0.874	0.026	0.008	0.059	0
Age of child	Correlation	0.123	1	0.003	0.017	0.006	0.025	-0.035	0.033	0.015	-0.023	0.009
	Sig.	0		0.883	0.392	0.739	0.204	0.076	0.089	0.445	0.237	0.629
Birth order	Correlation	0.715	0.003	1	0.007	0.023	-0.267	0.141	-0.183	-0.103	0.096	-0.233
	Sig.	0.000	0.883		0.712	0.216	0.000	0.000	0.000	0.000	0.000	0.000
Sex of child	Correlation	-0.002	0.017	0.007	1.000	0.000	-0.014	0.002	0.007	0.001	0.005	-0.003
	Sig.	0.902	0.392	0.712		0.998	0.455	0.913	0.723	0.957	0.779	0.865
Religion	Correlation	0.059	0.006	0.023	0.000	1.000	0.104	-0.199	0.070	0.293	-0.267	0.135
	Sig.	0.002	0.739	0.216	0.998		0.000	0.000	0.000	0.000	0.000	0.000
Education	Correlation	-0.067	0.025	-0.267	-0.014	0.104	1.000	-0.265	0.265	0.303	-0.279	0.458
	Sig.	0.000	0.204	0.000	0.455	0.000		0.000	0.000	0.000	0.000	0.000
Ethnicity	Correlation	0.003	-0.035	0.141	0.002	-0.199	-0.265	1.000	-0.232	-0.170	0.166	-0.214
	Sig.	0.874	0.076	0.000	0.913	0.000	0.000		0.000	0.000	0.000	0.000
Standard of - living	Correlation	-0.041	0.033	-0.183	0.007	0.070	0.265	-0.232	1.000	0.180	-0.143	0.296
	Sig.	0.026	0.089	0.000	0.723	0.000	0.000	0.000		0.000	0.000	0.000
Residence	Correlation	0.050	0.015	-0.103	0.001	0.293	0.303	-0.170	0.180	1.000	-0.515	0.329
	Sig.	0.008	0.445	0.000	0.957	0.000	0.000	0.000	0.000		0.000	0.000
Source of - water	Correlation	-0.035	0.023	0.096	0.005	-0.267	-0.279	0.166	-0.143	-0.515	1.000	-0.322
	Sig.	0.059	0.237	0.000	0.779	0.000	0.000	0.000	0.000	0.000		0.000
Mass media - exposure	Correlation	-0.087	0.009	-0.233	-0.003	0.135	0.458	-0.214	0.296	0.329	-0.322	1.000
	Sig.	0.000	0.629	0.000	0.865	0.000	0.000	0.000	0.000	0.000	0.000	

Note: Bold number are significant below 5 percent level .

Source : IIPS, 2000

Table : 4.6

Correlation coefficient among independent variables in Tamil Nadu, 1998-99

		Mothers age	Age of child	Birth order of child	Sex of child	Religion	Education of mother	Ethnicity	Standard of living	Residence	Source of water	Mass media exposure
Mothers age	Correlation	1	0.177	0.467	0.003	0.103	-0.087	-0.071	0.05	0.12	-0.012	-0.08
	Sig.		0	0	0.909	0	0.005	0.009	0.066	0	0.654	0.003
Age of child	Correlation	0.177	1	0.039	0.016	0.037	-0.04	0.014	-0.009	0.045	-0.004	-0.034
	Sig.	0		0.157	0.572	0.179	0.204	0.611	0.756	0.105	0.889	0.229
Birth order	Correlation	0.467	0.039	1	-0.008	0.038	-0.188	0.109	-0.15	-0.11	0.014	-0.147
	Sig.	0.000	0.157		0.777	0.161	0.000	0.000	0.000	0.000	0.609	0.000
Sex of child	Correlation	0.003	0.016	-0.008	1.000	0.022	0.003	0.018	-0.030	-0.047	0.003	-0.031
	Sig.	0.909	0.572	0.777		0.414	0.935	0.499	0.277	0.086	0.914	0.260
Religion	Correlation	0.103	0.037	0.038	0.022	1.000	0.065	-0.120	0.129	0.207	-0.040	0.007
	Sig.	0.000	0.179	0.161	0.414		0.035	0.000	0.000	0.000	0.147	0.803
Education	Correlation	-0.087	-0.040	-0.188	0.003	0.065	1.000	-0.102	0.219	0.131	-0.072	0.241
	Sig.	0.005	0.204	0.000	0.935	0.035		0.001	0.000	0.000	0.020	0.000
Ethnicity	Correlation	-0.071	0.014	0.109	0.018	-0.120	-0.102	1.000	-0.263	-0.097	-0.069	-0.072
	Sig.	0.009	0.611	0.000	0.499	0.000	0.001		0.000	0.000	0.011	0.008
Standard of - living	Correlation	0.050	-0.009	-0.150	-0.030	0.129	0.219	-0.263	1.000	0.243	-0.045	0.375
	Sig.	0.066	0.756	0.000	0.277	0.000	0.000	0.000		0.000	0.105	0.000
Residence	Correlation	0.120	0.045	-0.110	-0.047	0.207	0.131	-0.097	0.243	1.000	-0.118	0.153
	Sig.	0.000	0.105	0.000	0.086	0.000	0.000	0.000	0.000		0.000	0.000
Source of- water	Correlation	-0.012	-0.004	0.014	0.003	-0.040	-0.072	-0.069	-0.045	-0.118	1.000	0.022
	Sig.	0.654	0.889	0.609	0.914	0.147	0.020	0.011	0.105	0.000		0.422
Mass media- exposure	Correlation	-0.080	-0.034	-0.147	-0.031	0.007	0.241	-0.072	0.375	0.153	0.022	1.000
	Sig.	0.003	0.229	0.000	0.260	0.803	0.000	0.008	0.000	0.000	0.422	

Note: Bold number are significant below 5 percent level .

Source : IIPS, 2000

Thus result shows that as because there is no high and significant correlation coefficient and there will be no problem of multi co linearity in logistic regression analysis.

4.3 EFFECT OF THE DEMOGRAPHIC AND SOCIO-ECONOMIC VARIABLES ON PREVALENCE AND TREATMENT OF CHILD DIARRHOEA

The associations between the dependent and independent variables as shown with the help of chi-square shows the gross effect and does not control for the influence of other variables in the analysis and hence the effects are ignored. This section incorporates Logistic regression for demographic and socio-economic background variables to analyses its net effect of child diarrhoea, namely prevalence, medical treatment and any treatment of diarrhoea. It is to be mentioned that only those variables with significant result are to be discussed here.

4.3. a Effect of demographic and socio-economic factors on prevalence of child diarrhoea.

Table 4.7 shows the effect of demographic and socio-economic factors on prevalence of child diarrhoea.

The demographic variables show that age of mother is a significant factor for India and Tamil Nadu. Children belonging to 20-45 year age group of mother are 16.5 percent in India and 39.1 percent in Tamil Nadu less likely to have diarrhoea as compared with children belonging to 15-19 year age group of mother.

Current age of child is an effective variable for prevalence of child diarrhoea for India and Madhya Pradesh in case of two to three years of age group. Children belonging to one to two years of age group show significant on effect child diarrhoea In India. Children belonging to one to two years of age group are 1.1 times in India more likely to get diarrhoea as compared to the children belonging to less than one year of age group. The children belonging to two to three years of age

group are 30.2 percent in India and 35.9 percent in Madhya Pradesh less likely to get diarrhoea as compared to the children belonging to less than one year of age group.

Birth order of children shows significant association on prevalence of child diarrhoea for India in case of third and above birth order. The children who belong to third and above birth order are 1.1 times in India more likely to have diarrhoea as compared to the children belongs to first birth order.

The sex of child shows statistical significance for India, where female children, 5.8 percent less likely to have diarrhoea as compared with male children.

The socio-economic variable such as mother's education is not a significant factor in determining child diarrhoea in India, Madhya Pradesh and Tamil Nadu.

Ethnicity is a significant factor affecting prevalence of diarrhoea for India. The scheduled caste and tribe children in India 1.2 times more likely to have diarrhoea as compared to children belonging to general caste. This shows that in India caste is a major factor in determining the prevalence of child diarrhoea and scheduled caste and tribe are not so aware in India compared to the general caste.

Religion shows positive effect for India. In India children belonging to other religious background are 1.2 times more likely to have diarrhoea as compared with children belonging to Hindu religion.

The place of residence shows positive effect in India and Tamil Nadu. In India children belonging to urban areas are 8.9 percent less likely to get diarrhoea as against children belonging to rural area respectively. In Tamil Nadu children belonging to urban areas are 1.4 times more likely to have diarrhoea as against children belonging to rural area respectively.

The standard of living is a significant factor affecting child diarrhoea in India. The children belonging to high standard of living in India are 11.2 percent less likely to get diarrhoea as against low standard of living children respectively. The children

Table 4.7

Logistic regression results of prevalence among children suffering from diarrhoea on selected socio-economic and demographic variables in selected states of India, Madhya Pradesh and Tamil Nadu
NFHS-2, 1998-99

Independent variable	Category	INDIA		MADHYA PRADESH		TAMIL NADU	
		Odds-ratio	Sig	Odds-ratio	Sig	Odds-ratio	Sig
Demographic factors							
Age of mother	15-19(r)						
	Others	0.835	.000	1.095	.554	0.609	.094
Sex of child	Male (r)						
	Female	0.942	.041	0.947	.561	1.075	.687
Current age of child	<1 year(r)						
	1 year-2 years	1.106	.004	1.002	.985	0.943	.785
	2 - 3 years	0.698	.000	0.641	.000	0.66	.067
Birth order of child	First(r)						
	Second	0.991	.831	0.782	.092	1.443	.096
	Third and above	1.099	.019	1.005	.970	1.539	.079
Socio economic factors							
Mother' education	Illiterate(r)						
	Literate	0.967	.351	1.052	.665	0.788	.212
Ethnicity	General(r)						
	S.C/S.T	1.150	.000	1.147	.184	0.705	.108
Religion	Hindu(r)						
	Others	1.232	.000	1.284	.137	0.938	.822
Standard of living	Low(r)						
	High	0.888	.001	1.085	.445	0.75	.150
Place of residence	Rural(r)						
	Urban	0.911	.016	0.918	.535	1.443	.059
Other factors							
Mass Media exposure	No(r)						
	Yes	1.202	.000	1.259	.038	1.174	.486
Source of water	Tap (r)						
	Hand pump	0.793	.000	0.846	.222	0.713	.186
	Others	0.893	.007	0.746	.043	0.787	.384
Regions	South(r)						
	North	1.894	.000	-	-	-	-
	East	1.052	.419	-	-	-	-
	West	1.744	.000	-	-	-	-
	BIMARUO	1.914	.000	-	-	-	-

SOURCE: IIPS (2000)

Note:

1. (r) is the reference category in the logistic regression.
2. Bold numbers are significant below five percent level of significance.
3. - Not considered in logistic regression.

belonging to high standard of living are less likely to have diarrhoea as compared with low standard of living.

Other variables such as source of drinking water shows that children who use hand pump water are less likely to get diarrhoea in India and Madhya Pradesh. In India children are 20.7 percent and 15.4 percent in Madhya Pradesh less likely to have diarrhoea as compared with children who use tap water.

Exposure to mass media is a significant factor affecting the children who have diarrhoea in India and Madhya Pradesh. Children belonging to mothers who are exposed to mass media are 1.2 times in India and 1.3 times in Madhya Pradesh are more likely to have diarrhoea.

Children in Northern region are 1.8 times, Eastern region 1.1 times, Western region 1.7 times and BIMARUO states 1.9 times more likely to have diarrhoea as compared with Southern region in India.

4.3. b Effect of demographic and socio-economic factors on medical treatment of child diarrhoea.

Table 4.8 shows the effect of demographic and socio-economic factors on medical treatment of child diarrhoea.

The demographic variable, age of mother does not influence medical treatment for child diarrhoea.

Current age of child shows positive effect on medical treatment of child diarrhoea. The children belonging to one to two year of age group are more likely to get diarrhoea as compared to other age group. Children belonging to one to two years of age group are 1.3 times in India and 1.6 times in Madhya Pradesh more likely to get

medical treatment of diarrhoea as compared with children belonging to less than one year of age group. Children belonging to two to three years are 1.1 times in India more likely to get medical treatment of diarrhoea as compared to the children belonging to less than one year of age group.

Birth order of children shows that the children belonging to second birth order are 5.7 percent less likely to get medical treatment of diarrhoea for India as compared with children belonging to first birth order. The children who are in third and above birth order are 18.8 percent less likely to get treatment of diarrhoea in India as compared with children belonging to first birth order. Birth order is a significant factor for India.

The sex of child shows positive effect on medical treatment for India and Madhya Pradesh. Female children are less likely to have medical treatment of diarrhoea. Female children in India are 12.5 percent and Madhya Pradesh 30.7 percent less likely to get medical treatment of diarrhoea as compared with male children. This shows gender inequality in India.

In terms of socio-economic variables mothers education shows significant effect for India. Literate mothers are more likely to provide for medical treatment of child diarrhoea as compared with illiterate mothers in India. In India literate mothers are 1.2times more likely to get medical treatment of diarrhoea of their children as compared with children belonging to illiterate mothers in above states respectively. This shows that literate mothers are more aware about the treatment of their children in India.

Ethnicity shows has positive effect on the medical treatment of child diarrhoea in India. The scheduled caste and tribe children in India are 10.1 percent less likely to get medical treatment of diarrhoea than children belonging to general caste. This shows that in India caste factor is a major determinant of treatment of child diarrhoea.

Table 4.8

Logistic regression results of Medical treatment among children suffering from diarrhoea on selected socio-economic and demographic variables in selected states of India, Madhya Pradesh and Tamil Nadu NFHS-2, 1998-99

Independent variable	Category	INDIA		Madhya Pradesh		Tamil Nadu	
		Odds ratio	Sig	Odds ratio	Sig	Odds ratio	Sig
Demographic factors							
Age of mother	15-19(r)						
	Others	1.018	.856	1.098	.741	1.236	.713
Sex of child	Male (r)						
	Female	0.875	.019	0.693	.034	0.743	.430
Current age of child	<1 year(r)						
	1 year-2 years	1.352	.000	1.571	.024	1.556	.320
	2 - 3 years	1.117	.025	1.430	.106	0.767	.561
Birth order of child	First(r)						
	Second	0.843	.039	0.835	.576	0.886	.790
	Third and above	0.812	.008	0.846	.518	0.581	.271
Socio economic factors							
Mother's education	Illiterate(r)						
	Literate	1.199	.009	1.31	.200	1.031	.936
Ethnicity	General(r)						
	S.C/S.T	0.899	.086	0.776	.172	1.351	.503
Religion	Hindu(r)						
	Others	1.044	.545	0.873	.665	3.037	.116
Standard of living	Low(r)						
	High	1.258	.002	1.718	.005	1.198	.663
Place of residence	Rural(r)						
	Urban	1.044	.545	1.968	.003	1.117	.784
Other factors							
Mass Media exposure	No(r)						
	Yes	1.232	.002	1.215	.327	0.549	.213
Regions	South(r)						
	North	2.505	.000	-	-	-	-
	East	0.329	.000	-	-	-	-
	West	1.134	.320	-	-	-	-
	BIMARUO	0.700	.000	-	-	-	-

SOURCE: IIPS (2000)

Note:

1. (r) is the reference category in the logistic regression.
2. Bold numbers are significant below five percent level of significance.
3. - Not considered in logistic regression.

Religion does not influence medical treatment of child diarrhoea in all selected states.

The place of residence shows positive effect for Madhya Pradesh. In Madhya Pradesh children belonging to urban areas are 1.9 times more likely to get treatment of diarrhoea as against children belonging to rural area respectively because urban people are more aware and have more facilities for treatment.

Standard of living shows positive effect for India and Madhya Pradesh. The children belonging to high standard of living in India and Madhya Pradesh are 1.2 times, 1.7 times more likely to get medical treatment of diarrhoea as against low standard of living children respectively.

Among other factors Exposure to mass media influences medical treatment of diarrhoea for India. The children belonging to mothers in India who are exposed to mass media are 1.2 times more likely to get medical treatment of diarrhoea as compared to the children belonging to mothers who are not exposed to mass media. Children in Northern region are 2.5 times and Western region 1.1 times more likely to have medical treatment of diarrhoea as compared with Southern region in India. However, child diarrhoea in Eastern region is 67.1 percent and BIMARUO region 99.3 percent less likely to have medical treatment of diarrhoea as compared with Southern region in India.

4.3. c Effect of demographic and socio-economic factors on any treatment received for child diarrhoea.

Table 4.9 shows the effect of demographic and socio-economic factors on received any treatment of child diarrhoea.

The demographic variable current age of child, shows positive effect on medical treatment of child diarrhoea in India and Madhya Pradesh. The children belonging to age group more than one year of age are more likely to get medical treatment for diarrhoea as compared to other age group. The children belonging to one to two year

Table 4.9

Logistic regression results of any treatment among children suffering from diarrhoea on selected socio-economic and demographic variables in selected states of India, Madhya Pradesh and Tamil Nadu
NFHS-2, 1998-99

Independent variable	Category	INDIA		Madhya Pradesh		Tamil Nadu	
		Odds ratio	Sig	Odds ratio	Sig	Odds ratio	Sig
Demographic factors							
Age of mother	15-19(r)						
	Others	1.208	.131	0.833	.712	0.845	.832
Sex of child	Male (r)						
	Female	1.041	.599	0.681	.063	0.504	.219
Age of child	<1 year(r)						
	1 year-2 years	1.958	.000	2.148	.002	1.199	.773
	2 - 3 years	2.353	.000	1.956	.011	1.082	.907
Birth order of child	First(r)						
	Second	1.098	.424	1.175	.628	2.688	.148
	Third and above	0.939	.560	1.396	.282	1.660	.453
Socio economic factors							
Mother's education	Illiterate(r)						
	Literate	1.517	.000	1.734	.041	3.445	.038
Ethnicity	General(r)						
	S.C/S.T	0.897	.181	1.017	.940	0.426	.152
Religion	Hindu(r)						
	Others	1.104	.318	1.271	.574	1.236	.852
Standard of living	Low(r)						
	High	1.106	.239	1.725	.014	0.393	.136
Place of residence	Rural(r)						
	Urban	1.340	.007	1.931	.029	2.320	.173
Other factors							
Mass Media exposure	No(r)						
	Yes	1.391	.000	1.343	.211	1.140	.835
Regions	South(r)						
	North	2.094	.001	-	-	-	-
	East	0.461	.000	-	-	-	-
	West	0.746	.120	-	-	-	-
	BIMARUO	0.570	.000	-	-	-	-

SOURCE: IIPS (2000)

Note:

1. (r) is the reference category in the logistic regression.
2. Bold numbers are significant below five percent level of significance.
3. - Not considered in logistic regression.

of age group are 1.9 times in India and 2.1 times in Madhya Pradesh more likely to get any treatment of diarrhoea as compared with children belonging to less than one year of age group. The children belonging to two to three year of age group are 2.4 times in India and 1.9 times in Madhya Pradesh more likely to get any treatment of diarrhoea as compared with children belonging to less than one year of age group.

The demographic variable, age of mother, is and sex of child and birth order does not show statistically significant influence on any treatment of child diarrhoea.

In terms of socio-economic variables mothers education shows positive effect in all selected states. Literate mothers are more likely to medical treatment of child diarrhoea. In India literate mothers are 1.5 times, Madhya Pradesh 1.7 times and Tamil Nadu 3.4 times more likely to receive any treatment of diarrhoea of their children as compared to the children belonging to illiterate mothers in above states respectively. This shows that mother's education plays an important role for child health.

The place of residence shows positive affect for India and Madhya Pradesh. In India and Madhya Pradesh children belonging to urban areas are 1.3 times and 1.9 times more likely to receive any treatment of diarrhoea as against children belonging to rural area respectively because urban people are more aware and have more facilities for treatment.

Standard of living shows positive affect for Madhya Pradesh. The children belonging to high standard of living in Madhya Pradesh are 1.7 times more likely to get medical treatment of diarrhoea as against low standard of living children respectively.

Among socio-economic variables ethnicity and religion does not affect any treatment of diarrhoea.

Among other factors exposure to mass media shows positive effect on any treatment of diarrhoea in India. The children belonging to the mothers who are exposed to

mass media are 1.4 times in India more likely to receive any treatment of diarrhoea as compared with children belonging to the mothers who are not exposed to mass media. Mass media exposure is an important factor influencing any treatment of diarrhoea.

Children living in Northern region are 2.1 times more likely to receive any treatment of diarrhoea as compared with Southern region in India. However Children in Eastern region are 43.5 percent, western region 25.4 percent and BIMARUO region 43 percent are less likely to be treated for diarrhoea as compared with Southern region in India

We can say that in terms of socio-economic variables the trend of prevalence and treatment for diarrhoea is almost same in Madhya Pradesh and different in Tamil Nadu.

4.4 SUMMARY OF THE FINDINGS

To summarise, in all selected states, place of residence shows high relation to prevalence and treatment of child diarrhoea. It is observed from the analysis that urban areas have lower prevalence of child diarrhoea and higher treatment of child diarrhoea. The caste of child also shows high impact on prevalence and treatment of child diarrhoea in India and Madhya Pradesh. It is observed from the analysis that scheduled caste and tribe peoples are more likely to get diarrhoea and less likely to obtain treatment. This could be due to fact that they are unaware about the illness of their children. Mother's education is a highly significant factor for any treatment of diarrhoea in all selected states. As education increases any treatment for diarrhoea also increases. Mass media exposure shows positive effect on prevalence and treatment in India and Madhya Pradesh. Mass media exposure is not a significant variable for Tamil Nadu.

Standard of living high effect on Prevalence of child diarrhoea in India. Standard of living shows positive impact on medical treatment in India and Madhya Pradesh. In Tamil Nadu standard of living does not effect medical treatment of child diarrhoea.

Current age of child shows high positive relation to Prevalence of child diarrhoea as age increases diarrhoea increases but diarrhoea is higher among children belonging to 1-2 year of age as compared to less than year of age group and 2-3 year of age group. The birth order of child shows that after first birth medical treatment decreases but after first birth treatment increases for second birth order and after second it again shows the trend of declining treatment.

In India, Madhya Pradesh and Tamil Nadu prevalence of diarrhoea does not show any relation with source of drinking water. Interestingly, the disease and source of water relationship revealed that each source of water contributed almost equally to different diseases. According to the Saxena and Chetna (2002) it is not a source dependant phenomenon but the pathogens find way in water somewhere between the source and the consumer, i.e., in the supply system. Region shows positive effect on prevalence and treatment of child diarrhoea. Southern region has lowest prevalence of child diarrhoea and BIMARUO states have highest prevalence of child diarrhoea. It is important to mention in this context that mass media exposure shows negative effect on prevalence of child diarrhoea. The sex of child is statistically insignificant with prevalence of diarrhoea.

CHAPTER 5

CHAPTER 5

CONCLUSION

Diarrhoea, a condition that has a major impact on global health, is highly correlated with nutritional status. It is an important area of focus due not only to its high worldwide prevalence and health costs, but also because it can be significantly reduced by appropriate interventions and treatment. There is a need for people to be aware of methods available to prevent diarrhoea. The scenario for source and mode of treatment in India has been discussed below.

Our study shows that age of child, place of residence, standard of living and regions shows positive relation with prevalence of diarrhoea. The age of child shows that as age increases, prevalence of diarrhoea also increases. The result shows that urban people have less prevalence of diarrhoea as compared to rural areas. Increase in living standards decreases prevalence of diarrhoea. The Southern region has low percent of diarrhoea than other selected states. Age of child, sex of child, birth order, place of residence, standard of living, mass media exposure, education of mother, ethnicity and regions show strong positive relation with medical treatment and any treatment of diarrhoea. Children among one to two years get more treatment as compared to children less than one year. Female children get less treatment than compared to male children. Educated mother give more treatment to children as compared to illiterate mother, Scheduled caste and scheduled tribe children are given less treatment as compared to general caste children.

Table 5.1 shows percentage sought treatment for diarrhoea in India, Madhya Pradesh and Tamil Nadu. The graph shows that in India and Tamil Nadu 14.1 percent children with diarrhoea get treatment from government hospital but in Madhya Pradesh 11.7 percent children with diarrhoea get treatment from Government Hospital. Similarly in Madhya Pradesh treatment from Primary health centre is lowest (2.1 percent) among selected states. In Tamil Nadu mothers don't go to community health worker, dispensary, public sector and other private sector for diarrhoea treatment of their children.

Table 5.1

Percentage sought treatment for child diarrhoea in India Madhya Pradesh and Tamil Nadu on the basis of NFHS-2, 1998-99

	INDIA	MADHYA PRADESH	TAMILNADU
GOV.HOSPITAL	14.1	11.7	14.1
PHC\CHC	10.5	2.1	5.4
COMMUNITY-HEALTH WORKER	1.4	0.2	
GOV.DISPENSARY	3.4	0.6	
SUB-CENTRE	2.6	1.5	1.6
PUBLIC SECTOR	0.7	1	
PRIVATE HOSPITAL	25.6	15.9	38.4
PRIVATE DOCTOR	43.01	28.2	8.1
VAIDH \HAKEEM\HOMEOPATHIC	0.2	0.8	1.1
OTHER PRIVATE SECTOR	0.4		
SHOP	1	1.8	2.2

SOURCE: IIPS 2000

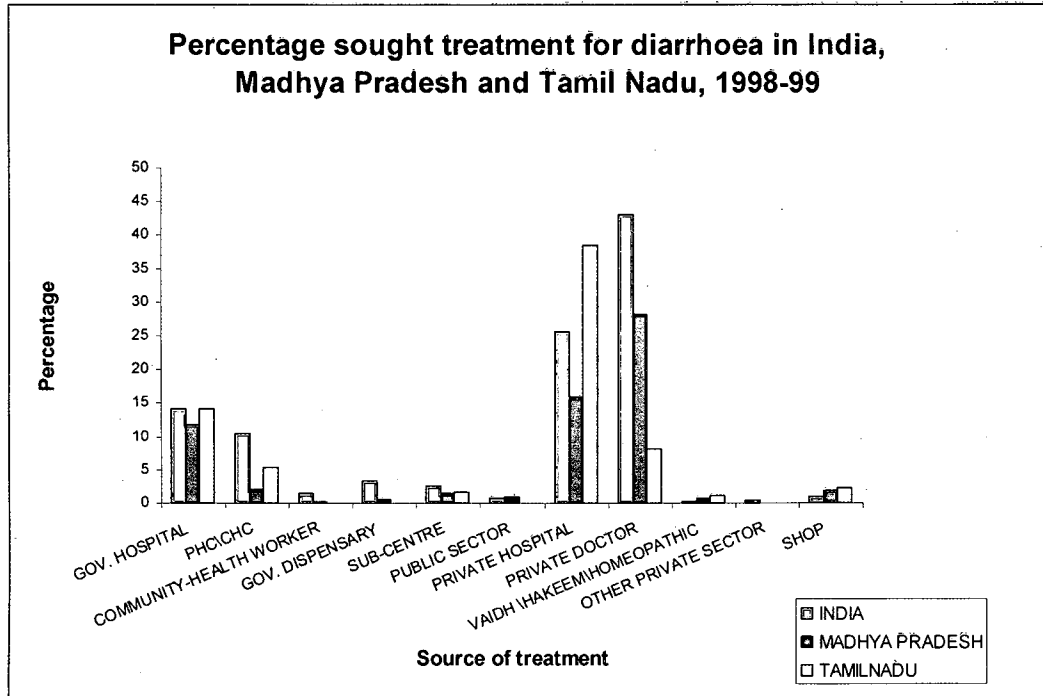
Table 5.2

Percentage distribution of mode of treatment for child diarrhoea in India Madhya Pradesh and Tamil Nadu on the basis of NFHS-2,1998-99

	INDIA	MADHYA PRADESH	TAMILNADU
ORS	30.2	29.3	31.4
HOME SOLUTION	3.9	1.3	1.1
PILLS	52.2	55.8	41.1
INJECTION	13	16.3	27
INTRAVENOUS	4.1	2.9	2.2
HERBAL TREATMENT	0.4	2.1	10.3
GRUEL	17.4	14.4	19.5

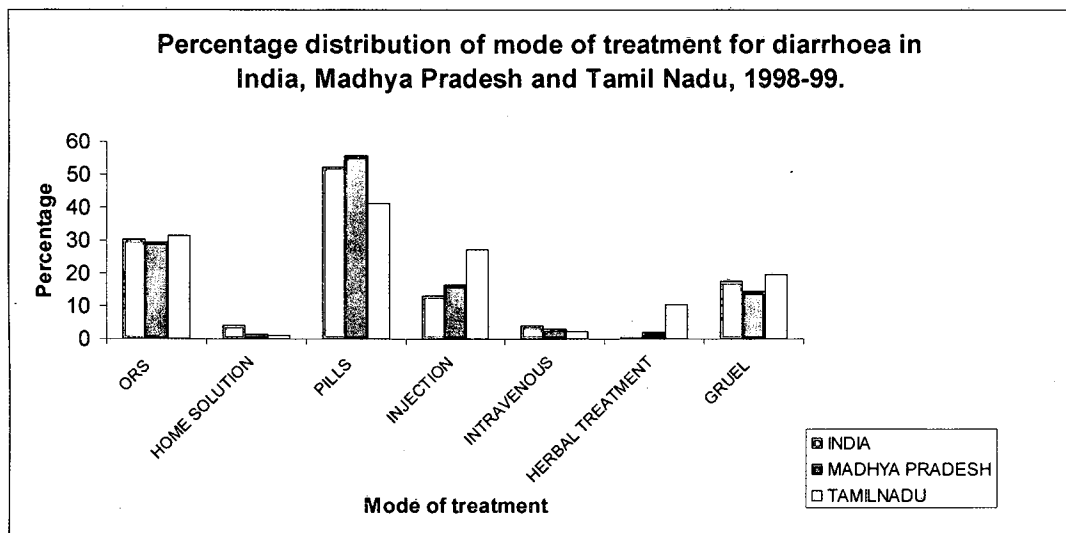
SOURCE: IIPS 2000

Fig. 5.1



Source : IIPS, 2000

Fig. 5.2



Source : IIPS, 2000

Treatment for diarrhoea from private hospital is very high in Tamil Nadu (38.9 percent) and low in Madhya Pradesh (15.9 percent) as compared with India (25.6 percent). Child diarrhoea treatment from private doctor is high in Madhya Pradesh (28.2 percent) as compared to Tamil Nadu (8.1 percent). This shows that the main source of treatment for child diarrhoea in India is private Doctor (43.01 percent), private hospital (25.6 percent) and Government hospital, in Madhya Pradesh is private doctor (28.2 percent) and in Tamil Nadu is private hospital (38.9 percent).

Table 5.2 shows mode of treatment among selected states Use of ORS is almost same in India (30.2 percent), Madhya Pradesh (29.3 percent) and Tamil Nadu (31.4 percent). In Madhya Pradesh use of pills is high (55.8 percent) as compared to Tamil Nadu (41.1 percent). The use of injection is high in Tamil Nadu (27 percent) as compared to Madhya Pradesh (16.3 percent).

The total diarrhoea morbidity for a given child may be as high as one third of its first two years of life. Overall children are ill with diarrhoea for 10-20 percent of their first three years of life and there is an immediate need to be aware about treatment of diarrhoea.

The National Rural Health Mission (NRHM) has targeted the goal for child health as follows: 1) Reduction in IMR to 30 per 1,000 live births by 2012 2) Reduction of maternal mortality rate to 100/100,000 by 2012. 3) Universal access to public health services, including women's health, child health, water, sanitation and hygiene, immunization, and nutrition. 3) Reduction in mortality due to malaria, dengue and Kalazar; Filaria elimination 2015. 4) Access to integrated comprehensive primary health care. 5).Promotion of healthy life styles. 6) Upgrading CHCs to IPHS.

National Cholera Control Programme has undergone changes; it is now termed as Diarrhoeal Diseases Control Programme. The components of this programme are:

- 1) Short term
 - A) Appropriate clinical management using ORS.
- 2) Long term

B) Better maternal and child health care- a) Maternal nutrition will improve the quality of breast milk, b) child nutrition- promotion of breast feeding, appropriate weaning practices and supplementary feeding to improve the nutritional status

C) Preventive strategies- a) Sanitation- Improved water supply, improved excreta disposal and improved domestic and food hygiene. b) Health education- A important part of health workers to prevent diarrhoea by convincing community members to adopt and maintain certain preventive practices such as, breast feeding, improved weaning, clean drinking water, use of plenty of water for hygiene, use of toilets and proper disposal of stools of young children etc. c) Immunisation against measles is a potential intervention for diarrhoea control. d) Fly control- Flies breeding in association with human or animal faeces should be controlled.

D) Preventing diarrhoeal epidemics- a) Primary Health Care involving activities in the field of water supply, waste disposal and health education for diarrhoea control.

Oral Rehydration Therapy Programme was started in 1986-87 in a phased manner. The main objective of the programme is to prevent diarrhoea associated deaths in children due to dehydration.

In addition to government, International Organisation and NGOs campaign support for the use of ORS.

National Water Supply and Sanitation programme was introduced in 1954 with the object of providing safe water supply and adequate drainage facilities for the entire urban and rural population of the country.

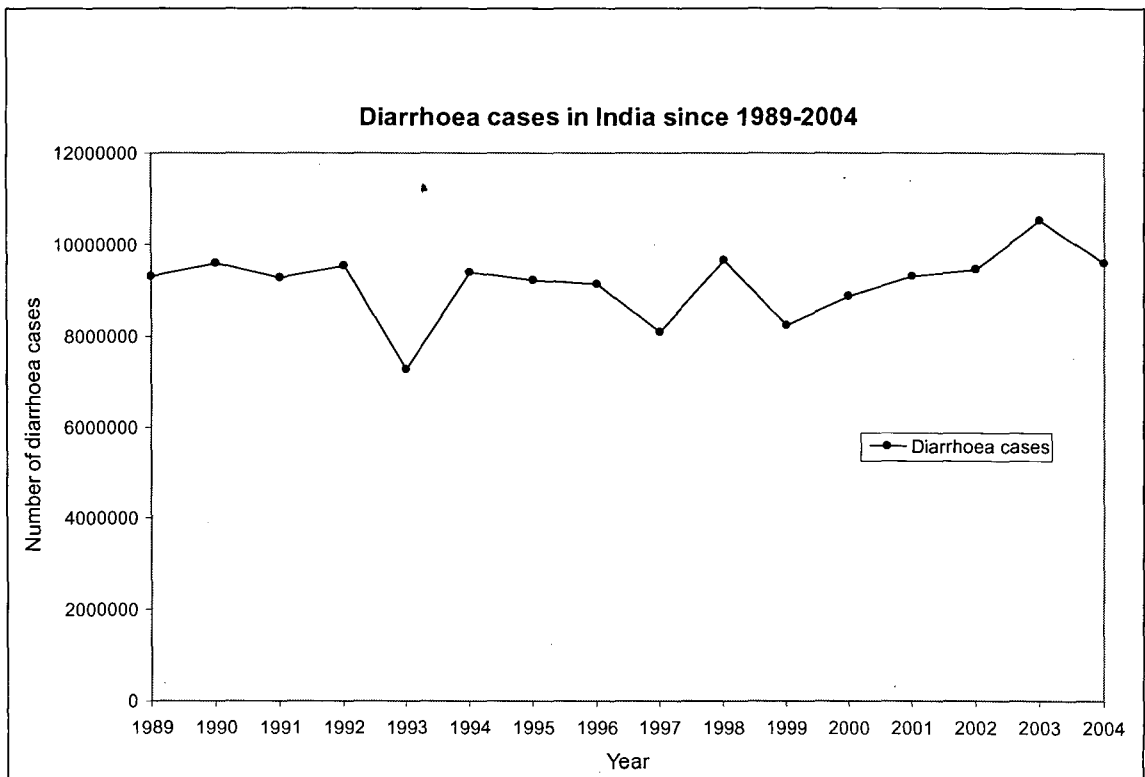
Between 1990 and 2000, diarrhoea-related deaths declined by half, thereby achieving the World Summit goal. While the cause-specific mortality is difficult to measure, it is estimated that more than one million child deaths per year may have been prevented. Success in reducing diarrhoeal disease in all regions can be attributed largely to the promotion and use of oral rehydration therapy for home management of

Table 5.3

Incidence of acute diarrhoea diseases in India (1989-2004)	
Year	Number of diarrhoeal cases
1989	9288242
1990	9579738
1991	9280945
1992	9528037
1993	7262753
1994	9380215
1995	9215353
1996	9130608
1997	8065688
1998	9634787
1999	8215296
2000	8870507
2001	9289558
2002	9441456
2003	10510476
2004	9575112

Source : GOI, 1989-2004

Fig. 5.3



Source : GOI, 1989-2004

children with diarrhoea. Deaths from diarrhoea have been decreased but as Table 5.3 and fig 5.3 shows that there is no significant change in the number of reported cases. This shows that treatment for diarrhoea is increasing but there is no significant change in prevalence for diarrhoea.

Unfortunately in India, government and people both are not in operation of diarrhoea treatment. In India Oral Rehydration Therapy Programme has been from more than a decade but still women's knowledge and use of oral rehydration therapy to treat childhood diarrhoea remain quite limited. "According to the NFHS, only 18 percent of women who gave birth during the four years before the survey know about ORS packets, and only 26 percent have ever used them" (NFHS 1998-1999). The results according to NFHS 1998-99 conclude that the government's Oral Rehydration Therapy Programme mothers are not sufficiently aware of treatment of childhood diarrhoea. Indian Government should take more initiative aware people to save from diarrhoea and to remove the discrimination against girls in the use of ORS packets to treat diarrhoea.

There is a need to educate mothers and to aware them about the importance of increasing fluid intake (including ORS) and continuing breast feeding in the treatment of childhood diarrhoea specially among Bihar states. "Finally, the Oral Rehydration Therapy programme needs to address the problem of gender discrimination and treatment of childhood diarrhoea. The mass media exposure can help in these efforts" (NFHS 1998-99).

The safe disposal of human excreta, availability of uncontaminated water and personal hygiene may lead to a major reduction in transmission of many, if not all, agents of diarrhoeal disease. (Arif and Ibrahim, 1998)

At a fundamental level the nutrition and health status of women and child needs to be improved, especially in rural areas because malnutrition leads to infection and infection leads to diarrhoea. It is time the special health care needs of mother and child health were given urgent and diarrhoeal diseases make a heavy demand on health facilities and national health budget in developing countries including India.

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