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KANPUR - MIRZAPUR
UNDER GANGA ACTION PLAN

REPORT ON DIARRHOEAL INCIDENCE STUDY

FINDINGS OF THE FIRST, SECOND AND THIRD ROUND OF SURVEYS

APRIL 1989

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1. INTRODUCTION

1.1 Magnitude of Diarrhoeal Disease

In India 1.4 million children die each year from diarrhoeal diseases (cholera not included)(Registrar General and Census Commissioner 1972) According to the survey of infant and child mortality in India for the year 1979 diarrhoeal diseases were cited as a cause of death for 1343 infants, 389 children in the second year and 279 in the third year for every 100,000 rural children of respective ages. Datta-Banik et al (1969) in a longitudinal study reported morbidity rate of diarrhoeal disease to be 406, 293, 247 and 210 per 1000 children per month in the age group of 0-6, 7-12, 13-18 and 19-24 months respectively. Ghai et al (1969) also observed maximum incidence of diarrhoeal diseases in the age group of 7-9 months (3.59 episodes) followed by 10-12 months (3.19 episodes) and 13-18 months (2.77 episodes) per child per year respectively. Reportings from the outdoor patients departments of primary Health Centres in Gujarat,Andhra Pradesh and Vellore,revealed that proportionate morbidity rate of diarrhoeal diseases were 23.4%, 18.7% and 17.4% respectively (personal communication). In a cohort study conducted by ScrimShaw et al in Ludhiana district of Punjab, prevalence rate and case fatility rate of diarrhoeal diseases were reported to be 29.1% and 3.1% respectively in a group of infants.

W.H.O. studies in children of seven countries reported a monthly attack rate of diarrhoea upto 40% (Van Zijl 1966). In another study in Guatemala, Gordon et al (1964) reported that by the age of one year each child has an average of four attacks of diarrhoea.

The grim situation of diarrhoea which is now prevailing in the developing countries was the same as in now developed countries some 70 years ago. Since then sanitation, protected water supply and better medical therapy has drastically reduced the incidence of diarrhoea with nearly hundred fold drop in mortality.

Today a high incidence of enteric diseases associated with poor sanitation is characteristic of many developing countries. The appropriate ways of combating these diseases are the provision of safe drinking water and the sanitary disposal of excreta.

It is now increasingly realized that mere provision of safe drinking water and sanitation facilities are not going to produce a perceptible dent in the problem of diarrhoeal/ water borne diseases unless human and behavioural aspects concerning water and sanitation facilities are also taken into account.These might include water storage practices personal and domestic hygiene and perception about water

related diseases ie diarrhoeas. Against this background, a study is being carried out in a few selected areas in Jajmau (Kanpur)and urban localities in Mirzapur.

The Objectives of the study are

1. To determine the magnitude of diarrhoeas in children below 5 years of age in selected areas of Jajmau (Kanpur) and urban Mirzapur and to record changes in prevalence and incidence of diarrhoea in children during the courses of study.

2. To study a few epidemilogical correlates of diarrhoea in study areas of Kanpur and Mirzapur.

3. To elicit KAP of mothers and children regarding water use, excreta disposal and diarrhoea management in children and record changes in KAP if any during the course of study.

4. To carry out bacteriological surveillance of drinking water at source and at the drinking water storage vessels in the house holds in study areas.

1.2 **Methods of Study**

1. **Study area**

The study is being carried out in selected areas of Jajmau (Kanpur) and urban Mirzapur. In Jajmau (Kanpur) following areas were included

-Ompurva
-GajjuPurva
-Makku Shahid ka Bhatta

In urban Mirzapur, areas selected were

-Sabri
-Amanganj
-Kotwan-Ka-Purva

The reasons for including above mentioned areas in the present study were

a. Low level of water and sanitation facilities and high prevalence of diarrhoeal morbidities in these areas reflected in reports of initial survey and pilot studies (September 1987)conducted by the socio-economic unit of the project in Kanpur and Mirzapur.

b Proposed provision on priority basis of drinking water supply (including India Mark II handpumps) and sanitation facilities in above mentioned areas by the

local self government and the Indo-Dutch project under the Ganga Action Plan.

2. Duration of Study

The first phase of the study will be for a period of one year i.e. June/July 1988 to July 1989.

3. Study Population

200 families having children below 5 years of age were included in the present study (in Kanpur however 203 families were included). Total number of underfive children in selected areas during the first round of survey in Kanpur and Mirzapur were 304 and 350 respectively.

4. Sampling

Sampling frame consisted of all households in study areas having one or more children below 5 years of age.Of these,203 families in Kanpur and 200 families in Mirzapur were selected from above mentioned areas using systematic random sampling technique.

5. Method of data collection

The selected households were visited once in every 2 months to elicit relevant information (including occurrence of diarrhoea in underfive children) from mothers using precoded and pretested questionnaires.Recall period to record diarrhoeal morbidities in children was 14 days.

Definition of Diarrhoea: For the purpose of present study the term diarrhoea was defined as passage of more than 3 loose stools per day or passage of single stool with blood and mucus per day in children.

Information was collected by trained field investigators (post graduates in sociology and medical-interns) and supervised by project officers and senior teachers of Preventive and social medicine departments of Medical colleges at Kanpur and BHU Varanasi.

During the course of subsequent data collection special attempts were made to disseminate the relevant messages on diarrhoea management, water storage & sanitation practices and personal hygiene to mothers.

Questionnaires used to elicit information are included in Annexure 1.

6. Bacteriological Examination of drinking water

It was envisaged to carry out bacteriological surveillance of drinking water in the study areas at least in 3 seasons i.e. Summer (June/May).Rainy (July/Aug) and winter (Dec/Jan) during the course of study. 50 samples of drinking water during each season would be collected from commonly used sources of water supply and water storage vessels of households in the study area according to WHO procedure. Households having a case of diarrhoea at the time of survey got preferably included for bacteriological analysis of drinking water there. Otherwise households were selected on random sampling basis for the purpose. Bacteriological analysis of water included presumptive and confirmatory coliform tests conducted in the laboratories of preventive and social medicines departments of Banaras Hindu University and Kanpur Medical College for Mirzapur and Kanpur study areas respectively.

1.3 Limitations of the Study

1. A large number of attempts have been undertaken to establish a positive correlation between specific sanitary interventions and incidence of diarrhoeal diseases. Upto now those attempts have failed.

   It should be noted that this study does not pretend to give the final evidence researchers have been trying to give before. Diarrhoeal diseases are multifactoral in origin and therefore fluctuations in their magnitude in any area cannot be attributed exclusively to water and sanitation facilities existing in that area.

   Rather than measuring the impact of specific sanitary improvements the study is aimed at an assessment of the effectiveness of the total package of sanitary improvements including promotion activities.

   The findings of the study should provide directions in terms of approaches and focal messages to be adopted for carrying out promotional activities in the area.

2. The findings of the study presented in this report cover the first three rounds of survey only. It is only when the findings of the second round of the general survey are available (one year after the first round) the impact of sanitary improvements can be assessed.

3. As the diarrhoeal morbidities in children were elicited on the basis of "history-taking", from mothers the element of 'recall bias' or memory bias and consequent under reporting of morbidities to some extent cannot be completely ruled out..

2. RESULTS OF INITIAL (FIRST ROUND) SURVEYS

The first round of surveys in Kanpur and Mirzapur were conducted during the months of June 1988 and July/August 1988 respectively.

Findings of the study are presented under the following broad headings

2.1 General Survey

2.2 Morbidity Survey-Comprising

2.2.1 Correlates of Diarrhoeal Morbidities
2.2.2 Clinical Features and Treatment Practices of Diarrhoeal Morbidities

2.3 Bacteriological Surveillance of Drinking Water

2.1 General Survey

Study Population and Family Size (Table 1 to 3)

In Kanpur, 203 families (with 304 children below five years of age) were included from different study area (i.e. Makku Shaheed Ka Bhatta, Ompurwa and Gajjupurwa) as specified earlier. Total population covered under selected families was 1308 giving a mean family size of 6.4 in Kanpur. Out of 203 families, 84.2% were nuclear.Religion wise distribution of families in Kanpur revealed that 57.6% of families were Hindus and 42.4% were Muslims.

In Mirzapur, 200 families (with 350 children below five years of age) were included from different study areas (i.e. Sabri, Amanganj and Katwaru Ka Purwa) as described earlier. Total population covered was 1538 giving a mean family size of 7.6 In Mirzapur, 82.0% of families were Hindus and 17.0% were Muslims in different study areas. Majority i.e. 62.0% of families were nuclear families in Mirzapur.

The total population of underfive children (i.e.304) was almost equally distributed in different study areas in Kanpur (ranging between 31.9% to 35.9%).

In Mirzapur, however fewer underfive children came from Katwaru Ka Purwa (18.3%) whereas in other two study areas i.e Sabri and Amanganj, the distribution was almost equal (i.e 40.0% and 41.7% respectively).

Age wise distribution of underfives in study areas revealed that 23.9% of children were in the age group of 0 to 12 months in Kanpur as well as in Mirzapur. Of the total underfive children, 37.7% belonged to the age group of 13 months & 36 months in Kanpur compared to 44.8% of children

in Mirzapur who belonged to the age group 13 months to 36 months.

Income wise distribution of study population (Table 4)

In Kanpur, mean total family monthly income was Rs 886 and per capita monthly income was Rs 138.3. In Mirzapur, the values for corresponding income levels were Rs 1010.8 and Rs 131.4 respectively.

The government of India has prescribed cut off levels of total monthly income for demarcating poverty line and poorest of poor families in urban areas. These are, Rs 533.3 (poverty line) and Rs 291.6 (poorest of poor) respectively. For ease of calculation these levels are slightly modified for the purpose of present study.Thus the cut off levels for deciding poverty line and poorest of the poor family had been kept at rupees 600 rupees and 300 per month respectively. In Kanpur 44.3% family were below poverty line and 2.9% could be considered to be belonging to poorest of the poor section. In Mirzapur however 35.5% of families could be placed below poverty line and 1.0% of families could be regarded as poorest of the poor adopting the similar cut off income levels.

It is obvious that the situation in Mirzapur was slightly better as adjudged by the proportion of families falling below poverty line or poorest of the poor income levels.

Sources of Drinking water in study areas (Tables 5A, 5B)

Surface well handpump and taps provided different sources of water supply in study areas. The sources were either privately owned or publicly owned. In Kanpur only a few families were dependent upon the open well water, either private (2.0%) or public (6.4%). Majority of family in Kanpur were dependent upon public handpumps, which also included India Mark - II handpumps which had been installed by the local self government and Indo-dutch project under the Ganga Action Plan in the project areas, Thus, substantive number of families were dependent upon India Mark II handpumps entirely (32.5%) or occasionally (39.9%).

Only 3.9% of families had private taps in their houses in Kanpur while 19.7% of the families were dependent upon public taps as source of water supply.About one third of the families (31%)in Kanpur study areas were dependent upon water supply made available to them from the tanneries in Jajmau area (deep tubewells).

In Mirzapur, comparatively more number of families were dependent upon well water, either private wells(2%) or public wells(26.5%). Handpumps were sparingly available in study areas as source of drinking water supply. Installation

of India Mark - II handpumps under the Ganga Action Plan as mentioned above did not get started in Mirzapur,during the initial survey period of the present study (months of June and July 1988). It was noticed that 46% of families in Mirzapur had private tap connections in their houses, whereas 36.5% families were dependent upon public taps in the study areas.Supply of water through these taps were irregular and limited to a few hours per day in Mirzapur.

It may be mentioned here that more than one source of water supply was being utilized by many families in study areas in Kanpur as well as in Mirzapur.

Water Storage practices in study areas (Tables 6A, 6B, 6C)

Water storage vessels (Table 6A)

A wide variety of water storage vessels was being used in study areas in Kanpur as well as in Mirzapur. Most commonly employed vessels were earthen 'ghada' (73.9% in Kanpur and 65% in Mirzapur) and metallic buckets (53.2% in Kanpur and 61.5% in Mirzapur). During the course of data collection it was observed that more than one type of vessel was being used by many families in Kanpur and Mirzapur.Other types of storage vessels used were earthen kunda, drum, tin cans, etc.

Covering of water storage vessels (Table 6B)

In Kanpur, majority of the families (82.3%) were keeping their water storage vessels covered. In Mirzapur, however, only 43.5% of families adopted the practice of covering their water storage vessels covered. It was found in Mirzapur that water storage vessels of more than one type (bucket or Ghada) were commonly used, some of which were kept covered while other did not get covered. This situation was noticed in 39.0% of families.

It was observed in Kanpur as well as in Mirzapur that even in families where water storage vessel was being kept covered, the practice needed much improvement. The lid used to cover the water storage vessel was mostly dirty. The members of the concerned families used to place the covering lid on the floor when taking out water for drinking purposes.

Method of taking out water for drinking from storage vessels (Table 6C)

Majority of the families in Kanpur (60.6%) and Mirzapur (68.5%) were using a separate utensil without handle to draw water from storage vessels. Only a limited number of families were using a separate utensil with handle for taking out water from the storage vessel (i.e 13.3% in

Kanpur and 7.5% in Mirzapur). It may be mentioned here that in almost all such families the utensils with handle used for the purpose consisted of metallic jugs, cups or mugs etc which had very small sized handle or arrangement for holding. Thus, while taking out water for use it did not prevent fingers/hands to come in contact with drinking water kept in water storage vessels.Therefore, the chances of drinking water in storage vessels getting polluted were high even when separate utensil with handle was put to use for taking out water from them. Gradually, persons in the study area should be motivated to use a separate utensil with long handle to take out water for drinking from storage vessels. This would prevent fingers/hands to come in contact with water kept in the storage vessel and thus polluting it.

Water was also being taken out for use by 'tilting' the water storage vessel. This practice was fairly common in the study areas (50.7% in Kanpur and 56.0% families in Mirzapur).

Cleaning agents used and frequency of cleaning of water storage vessels (Tables 7 and 8).

In most of the families in study areas, water storage vessels were being cleaned either once daily (by 48.3% families in Kanpur and 51.5% families in Mirzapur) or twice daily (by 41.4% families in Kanpur and 33.0% families in Mirzapur). Majority of the families just used water to clean the storage vessels (73.4% in Kanpur and 57.5% in Mirzapur).

Ash was a popular vessel cleaning agent being utilised by 31.0% of families in Kanpur and 44.0% of families in Mirzapur followed by soap/ washing powder (by 20.7% families in Kanpur and 15.5% in Mirzapur).

Mud was less commonly used by families in study areas in Kanpur (6.4%)compared to that in Mirzapur where more than one third of families (37.5%) still used mud as a water storage vessel cleaning agent.

Latrine facilities available (Table 9)

More than two-third of families in Kanpur (63.5%) and more than one-half in Mirzapur (52.5%) did not have latrine facilities and used open field for defecation.

In about one-third of the families in study areas private latrines were available either dry type of latrines (23.6% in Kanpur and 18.5% in Mirzapur) or flush type of latrines (14.8% in Kanpur and 16.0% in Mirzapur).

Child defecation practices (Table 10)

With regard to child defecation practices, it was observed that most common was door-yard pollution being practiced by children in study areas (51.7% Kanpur, 51.0% Mirzapur).

Open drains either inside or outside the house were adopted for defecation by children from 18.0% families in Kanpur and 40.0% families in Mirzapur. Children from 36.9% families in Kanpur and 13.0% families in Mirzapur went to open fields for defecation away from their houses.

Latrines were used by children from a few families only (private dry type by 10.8% in Kanpur and 3.0% in Mirzapur and private flush type by 9.4% in Kanpur and 11.5% in Mirzapur).

Public latrines were minimally used by children (2.0% families in Kanpur and 1.5% in Mirzapur)

Child excreta disposal practices (Table 11)

Most of the families disposed excreta of their children by indiscriminately throwing it just near to their houses (26.1% in Kanpur and 22.5% in Mirzapur).

Latrines were utilized by a few families for the purpose (15.8% in Kanpur and 12.0% in Mirzapur).

Personal Hygiene (Tables 12, 13, 14)

Hand washing by children after defecation (Table 12)

It was noticed in 136 families of Kanpur and 116 families in Mirzapur that children were old enough to clean themselves after defecation. In remaining families they were too young to care for themselves and entirely depended upon their mothers for the purpose.

In a few families only (13.9% in Kanpur and 12.9% in Mirzapur) children did not wash their hands after defecation due to various reasons like parents did not feel it necessary or there was shortage of water.

It was noticed that in 32.3% families in Kanpur and 18.9% families in Mirzapur, children washed their hands only with water after defecation.

Mud was used as a cleaning agent for the purpose by children from 30.1% families in Kanpur and 45.7% in Mirzapur.

In about 88.2% families in Kanpur children use either ash (22.0%) or soap (66.2%) for cleaning their hands after defecation.

In Mirzapur only 34.5% families had children using 'ash' (4.3%) or soap (30.2%) to clean their hands after defecation.

Hand washing by parents after cleaning the child (Table 13)

Majority of the parents used to wash their hands after cleaning the child who had defecated. They did so using 'mud' (28.7% in Kanpur and 67.0% in Mirzapur), 'ash' (22.8% in Kanpur and 6.3% in Mirzapur) or soap (58.5% in Kanpur and 39.3% in Mirzapur). Only water was used in a few families by parents to wash hands after cleaning the child who had defecated (12.2% in Kanpur and 7.5% in Mirzapur). However, in study areas of Kanpur and Mirzapur parents from only 188 and 173 families respectively were involved in cleaning the children who had defecated. In remaining families children were comparatively older and were expected to wash hands after cleaning themselves after defecation.

Hand washing before feeding the child (Table 14)

This aspect of hygienic practice to be adopted by parents in study areas was more relevant in 172 families in Kanpur and 159 families in Mirzapur. In remaining families children were being mostly breast fed. The situation in this regard was worse in Mirzapur study areas than that in Kanpur. In former, parents from 27.0% families did not wash the hands before feeding the children compared to 7.5% families in Kanpur. Of those families where hand washing practice was adopted, majority of parents did so using only water (82.5% in Kanpur and 68.5% in Mirzapur). Only a few families were using soap for the purpose (15.7% in Kanpur & 6.9% in Mirzapur).

Use of feeding bottles by families (Table 15)

In Kanpur 178 families and in Mirzapur 149 families had children in whom top feeds using feeding bottle could be given.

It was seen that in less than one-fifth of such families feeding bottles were being used (17.4% in Kanpur and 18.8% in Mirzapur). Majority of the families did not use feeding bottles in study areas although there were children requiring top feeds in such families.

2.2 Morbidity Survey

2.2.1 Correlates of Diarrhoeal Morbidities

Numerous factors like drinking water supply and sanitation facilities,personal hygiene and feeding practices of children in community get reflected in determining the magnitude of diarrhoeal diseases in underfive children. A few such parameters were also taken into account in the present study.

Distribution of diarrhoeal morbidities according to different study areas. (Tables 16A and 16B)

As described earlier, 304 children below five years of age were studied from different areas in Kanpur and 350 underfive children were included from different study areas in Mirzapur.

In Kanpur maximum number of diarrhoeal morbidities were reported from Gajjupurva(17.5%) followed by Makku Shahid Ka Bhatta(15.6%) and Ompurva (10.2%). The overall prevalence of diarrhoeal morbidities in underfive children in Kanpur was 14.5% during the month of June 1988.

In Mirzapur the worst affected area in terms of diarrhoeal morbidities was Amanganj(34.2%) followed by Sabri(33.6%) and Kotwaru Ka Purwa(28.1%). The overall prevalence of diarrhoeal morbidities in underfine children in Mirzapur was 32.9% during the months of July/August 1988.

Although, different areas included for study in Kanpur and Mirzapur showed different prevalence rates for diarrhoeal morbidities in underfive children these differences in diarrhoeal morbidities were statistically not significant. (Chisquare = 1.155(Kanpur)and 0.761(Mirzapur),P>0.05).

The overall prevalence rates of 14.5% recorded for Kanpur and 32.9% for Mirzapur were in consonance with observations made by other authors in this regard in different parts of the country.For example in a study conducted by Rao et al in Vellore(India) prevalence of diarrhoea was found to be 19.3% Scrimshaw et al on the basis of study conducted in Ludhiana district of Punjab (India) covering a birth cohort of 720 infants reported a prevalence rate of 29.1% in those where breast feeding and artificial feeding were given. W.H.O. Studies covering children of seven countries reported a monthly attack rate of diarrhoea upto 40% (Van Zijl 1966).

The high prevalence rate of diarrhoeal morbidity in Mirzapur (32.9%) could not be compared with that in Kanpur (14.5%)as the surveys were carried out during different periods ie. during the peak morbidity season (July/August) in Mirzapur

and in Kanpur during summer season, i.e. in the month of June 1988

Age-wise distribution of diarrhoeal morbidities (Tables 17A and 17B)

Prevalence of diarrhoeal morbidities was less in age group 0 to 6 months (19.5% in Kanpur and 27.7% in Mirzapur) compared to other age groups of children (excluding age group 37-48 months and above as the number of children were quite less in this group in Kanpur)

The obvious reason for low prevalance of diarrhoeal morbidities in children in the age-group 0 - 6 months was predominant dependence of such children on breast feeds which reduced chances of extraneous infections besides offering local protection to the intestines of infant against bacteria responsible for diarrhoeal morbidities.
In Kanpur as well as in Mirzapur, the differences observed in prevalence rates of diarrhoeal morbidities in children of different age groups were statistically not significant. (Chi square(0-12 months vs 13-48 months group=2.91 for Kanpur and 0.81 for Mirzapur; $P>0.05$)

Diarrhoeal morbidities according to religion and type of family (Tables 18 and 19)

Diarrhoeal morbidities were found to be more prevalent in children belonging to Muslim families(18.5% in Kanpur and 33.8% in Mirzapur) compared to Hindus (11.2% in Kanpur and 32.7% in Mirzapur).

In Kanpur, children from joint families suffered more from diarrhoeal morbidities (17.8%) compared to single or nuclear families (13.7%) whereas reverse was true in case of Mirzapur (Nuclear families 34.8%, Single 30.7%).

The differences in prevalence rates of diarrhoeal morbidities in nuclear or joint families observed in study areas of Kanpur or Mirzapur were statistically not significant ($Z=.761$ for Kanpur; $Z=0.8$ for Mirzapur) $P>0.05$)

Diarrhoeal morbidities according to source of drinking water (Tables 20A and 20B)

As described earlier main sources of drinking water supply in Kanpur study areas were public handpumps, taps or piped water supply from tanneries (deep tube well).
Main sources of water supply in Mirzapur study areas were wells and taps.

It was seen that the prevalence of diarrhoeal morbidities were higher in children depending upon tap water supply (17.6%) followed by those on handpumps (13.3%) in Kanpur. However the difference in prevalence rates of diarrhoeal

morbidities in children dependent upon different sources of water supply were not significant (X^2=1.078,P>0.05)

In Mirzapur, diarrhoeal morbidities were more prevalent in children dependant upon well water (34.3%) followed by those deriving water supplies from taps (31.0%). The number of children using handpumps as source of drinking water was minimal (only 3). However, the difference in the prevalence rates of diarrhoeal morbidities in children in Mirzapur according to various sources of drinking water utilized was not significant (X^2=0.36, P>0.05).

The possible explanation for having observed no significant difference in diarrhoeal morbidities in children dependant upon different sources of water supply could be in terms of the following:

a. More than one source of drinking water supply was frequently used by many families.

b. Although bacteriological quality of drinking water was satisfactory (for taps and handpumps) at source, it got polluted after reaching the household. Most of the samples of drinking water taken from water storage vessels from different households were bacteriologically not satisfactory. Pollutants could have gained access to drinking water obtained from different sources either during collection, transport or storage or use of water at the point of consumption in families.

Diarrhoeal morbidities according to water storage practices (Tables 21A, 21B, 22A, 22B, 23A, 23B)

Storage Vessels (Tables 21A, 21B)

As has been pointed out earlier, only a few families (8.4% in Kanpur and 2.5% in Mirzapur) were using plastic jars to store the drinking water.Majority used earthen 'ghada' or metallic buckets for the purpose.

Diarrhoeal morbidities were less in children belonging to families where water was being stored in 'Surahi' (6.9% in Kanpur and 31.6% in Mirzapur) followed by 'Buckets' (11.9% in Kanpur and 32.2% in Mirzapur) and 'Ghada' (15.4% in Kanpur and 33.6% in Mirzapur).

Storage vessels kept covered (Tables 22A, 22B)

In Kanpur prevalence of diarrhoeal morbidities in children from families where water storage vessel was kept covered was higher (14.4%) compared to those where storage vessel was kept uncovered (10.9%). However, the difference in prevalence rates of diarrhoeal morbidity two categories were

found to be statistically not significant (X^2-=0.0013;P>0.05).

In Mirzapur the prevalence of diarrhoeal morbidities were less in families where storage vessel was covered (27.4%) compared to the families where storage vessels were not covered (43.0%) or partially covered (33.8%).In Mirzapur also, difference in the prevalence rates of diarrhoeal morbidities in this regard was found to be statistically not significant(X^2 = 3.2, P>0.05)

A few relevant observations made on this aspect during the course of data collection may be mentioned here. In Kanpur, majority of the families (82.3%) were keeping the water storage vessel covered but this practice left much to be desired from hygienic point of view. The lids which were being used to cover the storage vessel were unclean and dusty. Members of the family used to put this lid on the floor each time they took water from storage vessel for drinking. This further facilitated entry of dirt or pollutants to the drinking water. Such observations must be kept in view while carrying out educational campaigns in the community aimed at improvement of existing water storage practices.

Method of taking out drinking water from storage vessels (Tables 23A, 23B)

In Kanpur and Mirzapur diarrhoeal morbidities were higher (23.8% and 36.7%) in children from families where separate utensil with handle was used to take out drinking water from storage vessels compared to those using separate utensil without handle for the purpose (14.1% and 32.9%)

In Kanpur diarrhoeal morbidities were lowest(11.5%) in families where water was taken out of storage vessels 'by tilting'. This method of taking out water can be applied with convenience if the water storage vessel is narrow mouthed. (eg.'Surahi'). The chances of pollutants entering through separate utensil or by fingers coming in contact with drinking water in such type of storage vessels could be thus, minimized. However this aspect needs further study before any conclusions could be drawn.

There were no significant differences between the prevalence rates of diarrhoeal morbidities observed according to method of taking out drinking water from storage vessels (X^2=1.39, for Kanpur and Mirzapur and P>0.05) in study areas of Kanpur and Mirzapur.

It is logical to advocate use of separate utensil with long handle to take out drinking water from storage vessels in order to prevent dirty hands/fingers coming in contact with water. It was observed in the study area that only a few families were using a separate utensil with handle for taking out water from the storage vessels (i.e. 13.3% in Kanpur and 7.5% in Mirzapur). In almost all such families, the utensils with handle used for the purpose consisted of metallic jugs/ cups or mugs etc. which had very small sized handle or arrangement for holding the utensil. Thus while taking out water for use it did not prevent finger/ hands to come in contact with stored drinking water. Obviously, the need for motivating the study population to use a separate utensil with a long handle to take out water for drinking from storage vessels can't be over emphasized.

Frequency of cleaning of water storage vessels (Tables 24A,24B)

In Kanpur as well as in Mirzapur prevalence of diarrhoeal morbidities were found to be less in children from families where water storage vessels were cleaned two times per day (14.1% in Kanpur and 26.9% in Mirzapur) compared to those where storage vessels were being cleaned on alternate days or once daily (25.0% and 14.7% respectively for Kanpur;37.1% and 37.0% respectively for Mirzapur)

The differences observed in prevalence rates of diarrhoeal morbidities in this regard were found to be statistically not significant in Kanpur as well as in Mirzapur (X^2=2.96 for Kanpur and 3.17 for Mirzapur; P>0.05)

Cleaning agents used for water storage vessels (Table 25A, 25B)

In Kanpur, diarrhoeal morbidities were highest (20%) in children where families were using mud as cleaning agents followed by those using only water (15.7%), ash (8.8%) or soap/washing powder (8.4%).

In Mirzapur diarrhoeal morbidities were lowest in children where families used soap/washing powder as cleaning agents(31.0%). The prevalence of diarrhoeal morbidities were almost the same in children where families were using only water(34.9%) or mud (33.6%) or ash (34.8%).

However,in Kanpur or in Mirzapur the differences in prevalence rates of diarrhoeal morbidities in this regard were not significant (X^2=5.96 for Kanpur; X^2=0.18 for Mirzapur; P>0.05).

Diarrhoeal morbidities according to latrine facilities (Tables 26A,26B)

A few families only ie.1.0% of families in Kanpur and 12.5% in Mirzapur were using public latrines.The prevalence of diarrhoea in children from such families was 33.1% and 42.8%. In this regard no valid comments on diarrhoeal morbidity rates can be offered since in Kanpur study areas number of children were only 3.

The prevalence of diarrhoea was less in children from families where private flush type of latrines existed (ie.12.2% in Kanpur and 29.0% in Mirzapur) than those having private dry type of latrines (20.0% in Kanpur and 32.4% in Mirzapur)

Families without latrine facilities or those going to open field for defecation had 12.2% and 31.8% as prevalence rates for diarrhoeal morbidity in children.It may be surmised that ill maintained latrines (private dry type mainly)may lead to increased diarrhoeal morbidities.

However in Kanpur as well as in Mirzapur the prevalence of diarrhoeal morbidities in children according to availability of latrine facilities in the families did not show any significant difference. (X^2=2.68 for Kanpur; X^2=0.28 for Mirzapur P>0.05)

Diarrhoeal morbidities according to child defecation practices (Table 27A, 27B)

Only a few children in Kanpur as well as in Mirzapur study areas utilized public latrines.

In Kanpur, maximum prevalence of diarrhoeal morbidities was seen in children using private dry type latrine(21.6%) closely followed by those adopting dooryard (17.1%) open drain (16.6%)or private flush latrine (15.6%)for defecation. These differences in prevalence rates were however not significant (X^2=3.36,P>0.05).

In Mirzapur highest prevalence of diarrhoeal morbidities was seen in children adopting dooryard for defecation (35.9%) followed by those using open drain (34.9%) open field (29.8%) or private dry type of latrine (27.2%) for the purpose. The differences in prevalence rates were however not significant (X^2=2.08, P>0.05).

It can be observed (on the basis of Tables 26 A,26B and 27 A,27B) that private dry type of latrines posed risks and were conducive to occurrence of high levels of diarrhoeal

morbidities in the concerned families. The faecal matter often remains in such latrines as each time it is not flushed away or cleaned after use. This acts as a source of pollution within the household itself.Houseflies often acting as a mechanical carriers of different illnesses including diarrhoeal morbidities spreading through feco oral route. It is heartening to note that in the study areas in Kanpur and Mirzapur these dry type of latrines would be converted to water-seal latrines under onsite/offsite sanitation programme to be carried out under Ganga Action Plan.

Diarrhoeal morbidities according to child excreta disposal practice (Table 28A,28B)

In Kanpur highest prevalence (30.7%) of diarrhoeal morbidities were seen in children in whose families garbage bins(inside house) were used to dispose off children excreta followed by those families using latrines (22.8%) or indiscriminately disposing children excreta near their houses (19.3%). It may be mentioned here that only a few families used garbage bins (3.5%) or had latrine facilities in their houses (15.8%).

In Mirzapur the highest prevalence of diarrhoeal morbidities (43.4%) was observed in children from families who used open drains (inside or outside their houses) as defecation sites for children . The prevalence of diarrhoeal morbidities in children was 40.0% in the families who used to dispose off children excreta indiscriminately near their houses. Families with latrine facilities had prevalence rate of 17.2% for diarrhoeal morbidities in their children.

Diarrhoeal morbidities according to practice of handwashing in study areas (Tables 29A to 31B)

Handwashing by children after defecation (Tables 29A, 29B)

In Kanpur diarrhoeal morbidities were highest in children (24.0%) who did not wash their hands after defecation followed by those who washed their hands with water only (17.1%). Lower prevalence of diarrhoea was seen in children using ash or soap to wash their hands after defecation (12.5% and 13.8% respectively)

- Similar pattern of diarrhoeal morbidity prevalence was observed in Mirzapur ie. highest prevalence rates of diarrhoea being recorded in children not washing their hands after defecation (46.2%) or using water only to wash their hands and the low prevalence rates in those washing hands with ash (8.3%) or soap (29.5%) or mud (25.9%).

Handwashing by parents after cleaning the child who had defecated (Table 30A, 30B).

In Kanpur diarrhoeal prevalence rate in children was less in families where parents used to wash their hands with ash or soap after cleaning the children (8.6% and 13.2% respectively) compared to those where they did so using water only. (17.1%)

In Mirzapur almost similar pattern was observed i.e.high prevalence rates of diarrhoeal morbidities being recorded in underfive children from families where parents washed their hands only with water after cleaning the child who had defecated (63.0%) compared to those who did so using ash or soap (23.8% and 29.3% respectively)

These observations definitely stress upon the need for educating the masses on observing proper personal hygiene ensured by use of soap at family level.

Handwashing by parents before feeding children (Tables 31A,31B)

In Kanpur study areas,it was observed that prevalence of diarrhoeal morbidities tended to be lower in children in whose families parents used to wash their hands with soap or water before feeding the children (14.0% and 11.4% respectively) compared to those where parents did not adopt practice of handwashing before feeding the children (21.0%)

In Mirzapur, prevalence of diarrhoeal morbidities was almost same in children whose parents used to wash hands before feeding them (31.7%) or did not do so (30.7%). Only in a few families parents were using mud or soap (3.8% and 6.9% respectively) to wash hands before feeding the children.

Diarrhoeal morbidities according to bottle feeding practices (Table 32A, 32B)

In Kanpur prevalence of diarrhoea was higher in children from families where bottle feeding was practiced (19.6%) compared to those who did not use bottle (14.0%).

In Mirzapur prevalence of diarrhoea in children from families using bottle feeding was 24.1% compared to those where bottle was not used 35.1%. However the difference in prevalence rates of diarrhoeal morbidities in children from above mentioned families were statistically not significant (X^2=2.15, P>0.05)

2.2.2 Clinical Features and Treatment Practices of Diarrhoeal Morbidities

Kanpur

Prevalence of diarrhoea

Out of 304 children studied, 44 ie. 14.5% had suffered from diarrhoea during the last two weeks of survey. At the time of survey ,27 children were suffering from diarrhoea (ie. point prevalence was 8.8%)

Type of Diarrhoea

Majority of the diarrhoea cases (34 out of 44 ie. 77.2%) presented as liquid/watery stools.There was history of passage of mucus and blood with stools in 16 cases (ie. 36.3%) and 4 cases (ie 9.0%) respectively.

Diarrhoea with other diseases

In 25% of cases (ie 11 out of 44) diarrhoea was also accompanied by other diseases (mainly fever in 10 cases ie.22.7%).

Treatment Practices and place of treatment in Diarrhoea

11.4% of diarrhoea cases (5 out of 44) did not take any treatment. Oral rehydration packets were used minimally ie.only by 4.5% (ie. 2 out of 44 cases). Home made oral rehydration therapy was being practiced in one family only. Majority of cases (ie. 39 out of 44 or 88.6%)used drugs to treat diarrhoea. Private practitioners were most commonly utilized for the purpose (by 28 out of 44 cases ie. 66.3%). Nobody went to district hospital or Medical college hospital. Only a few cases utilized other government agencies like government dispensaries (by 3 or 6.8%) or ESI dispensary(by 4 or 9.1%).

Feeding practice during Diarrhoea

Breast feeding was continued as usual during diarrhoea in 21 out of 44 cases (ie 47.7%) and less frequently in one case. However in 3 cases (6.8%) it was stopped on doctors advice. Breast feeding was not applicable in 19 cases of diarrhoea (ie 43.2%)
In majority of diarrhoea cases, food was continued as usual (in 23 cases ie. 52.3%) or in diminished amount/liquid form (ie. 20.5%)

Mirzapur

Study Area and population

The survey was conducted in 3 urban areas of Mirzapur (in Sabri, Amanganj and Katwaru Ka Purva) during the last week of July 1988 and first week of August 1988.

In all 350 children below 5 years of age were surveyed from the study areas mentioned above.

Prevalence of Diarrhoea

Out of 350 children 113 i.e. 32.3% had suffered from diarrhoea during past 2 weeks of survey. At the time of survey 59 children were found to be suffering from diarrhoea. Thus the point prevalence of diarrhoea was 16.9%.

Type of Diarrhoea

Majority of diarrhoeal children (i.e. 83 out of 113 or 73.4%) presented with symptoms of liquid/watery stools. There was history of passage of mucus and blood with stools in 36 (31.8%) and 21 (6.7%) cases of diarrhoea respectively.

Diarrhoea with other diseases

34.5% children with diarrhoea had symptoms of other diseases as well (39 out of 113).Most common among them were fever (in 28 out of 113 i.e. 24.7%) and cough (in 14 out of 113 or 12.3%).

Treatment Practices and place of treatment in diarrhoea

28 out of 113 diarrhoea cases (24.7%) did not have any treatment.

Oral rehydration solution/oral rehydration therapy was being utilized minimally (by 3 families)in study areas.

Drugs were being used to treat majority of diarrhoea cases (83 out of 113 or 73.4%). Private practitioners were most commonly utilized for the purpose (80 out of 113 cases or 70.7%). Nobody went to distt. hospitals, only 3 cases utilized services from government dispensaries.

Breast feeding and other feeding activities during diarrhoea

Breast feeding was continued as usual in 60 out of 113 cases of diarrhoea (53.0%) and less frequently in 3 cases. Breast feeding was stopped on doctor's advice in 2 cases. Breast feeding was not applicable in 52 cases of diarrhoea (46.0%) because children concerned were older.
In majority of diarrhoea cases (i.e. 53 out of 113 or 46.9%)

food was continued as usual or in diminished amount or in liquid form (22 out of 113 or 19.4%). However in 5 cases of diarrhoea, food was withheld on doctor's advice.

2.3 Bacteriological Surveillance of Drinking Water

Kanpur

Water samples were collected from source (wells,public standposts,Indo-Dutch handpump, public handpump and overhead tanks) as well as from the storage vessels in households.

A total of 53 samples were taken including 21 samples from source and 32 samples from households (where diarrhoea case were present)

Bacteriological analysis included presumptive and confirmatory coliform tests.(done at KMC Kanpur)

Out of 32 samples taken from households 31 were found to be positive (96.8%)

Out of 21 samples taken from source, 13 were found to be polluted (61.9%)

Area-wise detailed report of water sample analysis is included (Annex 2).

Mirzapur

Water samples were collected from source (wells and standposts) and from households .A total of 67 samples were collected (29 from source and 38 from the storage vessels in households).

Bacteriological analysis of water sample including presumptive and confirmatory coliform tests (done at IMS,BHU)

Out of 29 samples from source, 10 were found to be positive (34.4%). Out of 38 samples taken from household 21 were found to be positive (55.1%)

Area-wise detailed report of water sample analysis is included (Annex 2)

3. FINDINGS OF SECOND ROUND OF SURVEY

3.1 Kanpur (August 1988)

Study population

The survey began in the areas of Jajmau (i.e. Gajjupurwa, Ompurwa, Makku Shahid Ka Bhatta) in the month of August 1988 and was completed within 8 days period.

In all 318 children below 5 years of age were surveyed from the selected households.

Prevalence of Diarrhoea

Out of 318 children surveyed 86 had suffered from diarrhoea during past two weeks giving a prevalence rate of 27.0%. During the survey period, however 55 children were found to be suffering from diarrhoea. Thus the point prevalence of diarrhoea was 17.3%.

Type of Diarrhoea

Majority of the diarrhoeal children presented with liquid/ water stools (i.e. 62 out of 86 or 72.1%). There was history of passage of mucus and blood in diarrhoeal stools in 25 cases (29.0%) and 10 cases (11.6%) respectively.

Diarrhoea with other diseases

Many diarrhoeal children were suffering from other symptoms as well (49 out of 86 i.e. 56.9%). Fever and cough were most common accompaniments involving 48.8% (42 out of 86) and 24.4% (21 out of 86) children respectively.

Treatment practices and place of treatment in diarrhoea

In 20.9% of diarrhoea cases no treatment was taken (18 out of 86).
Oral Rehydration Solution/Oral Rehydration therapy were minimally used (in case of 3 children i.e. 3.4%).

In majority of cases drugs were used to treat diarrhoea (i.e. 79.0% or 68 out of 86). Private practitioners were most commonly utilized for the purpose i.e. 79.0% (68 out of 86). Only 3 cases utilized government health care agencies (3.4%) like ESI (2 cases) and government dispensary (1 case).

Feeding practices during diarrhoea

Breast feeding was continued as usual in diarrhoea i.e. 32 out of 86 cases (37.2%) and less frequently in 6 cases (6.9%).
It was stopped on the doctors advice in 3 cases (3.4%) whereas in 2 cases mothers discontinued breast feeding to their diarrhoeal children out of their own. However, breast feeding was not applicable in 42 out of 86 children (48.8%) who suffered from diarrhoea.

Food was continued as usual in 42 cases (i.e. 48.8%). However, in 22 cases (25.5%) it was being offered to children in diminished amounts or as liquids and light forms.

Results of drinking water analysis (bacteriological)

In all 63 samples were collected from wells (3 samples), handpumps (9 samples), public standposts (4 samples), overhead tanks (4 samples) and households (43 samples).

Bacteriological tests included presumptive and confirmatory coliform tests. Out of 20 samples analysed from different source of drinking water 12 were polluted (60.0%). None of the samples from overhead tanks was polluted.

Out of 43 samples collected from households 31 were polluted (72.0%)

Areawise detailed report is enclosed as Annex 3

3.2 **Mirzapur (October 1988)**

Study area and population

Study was conducted in 3 urban areas of Mirzapur (i.e. Sabri, Amanganj and Kotwaru Ka Purwa) involving 372 children below 5 years of age. In the first round there were only 349 children in the selected households. However, in the present survey following demographic changes in the study population were taken into account.

a. The number of new birth taking place in the area was 25 (between Aug - Oct.1988)

b. 3 children expired.

c. 2 households were replaced (due to death at 1 household and permanent migration with the second

Both the randomly substituted households had 2 children below 5 years of age.Thus the total under five children included in the second round of survey was 372.

Prevalence of diarrhoea

Out of 372 children surveyed, 35 had suffered from diarrhoea during last 14 days of survey. Thus,the period prevalence of diarrhoea was 9.4%. At the time of survey 19 children were found to be still suffering from diarrhoea giving a point prevalence rate of diarrhoea in under five children as 5.1%.

Type of diarrhoea

Majority of the diarrhoeal children (26 out of 35 ie. 74.2%) presented with symptoms of liquid/ watery stools. There was history of passage of mucus and blood with stools in 7 cases (20.0%) and 6 cases (17.1%) respectively.

Diarrhoea with other diseases

26 out of 35 children with diarrhoea (ie. 74.3%) had symptoms of other diseases. Fever (23 children or 65.7%) and cough (12 children ie. 34.2%) were most common accompaniments of diarrhoea.

Treatment practices and place of treatment

Only 4 children with diarrhoea (11.4%) did not take any treatment for this ailment.

ORS/ home made oral rehydration therapy were being practised by 12 cases i.e. 32.4% (3 cases utilized ORS whereas 9 cases took homemade sugar salt solutions).

However drugs were being used in majority of diarrhoea cases for treatment i.e. in 82.8% Private practitioners were most commonly utilized for the treatment of diarrhoea purpose by 22 cases ie. 62.8%.

Government run health care facilities were minimally utilized (Only in 3 cases or 8.5%)

Breast feeding/other feeding practices during diarrhoea

Breast feeding was applicable in 14 out of 35 children suffering from diarrhoea. Breast feeding was continued for all the eligible children with diarrhoea either as usual or in full amount (in 12 children or 85.7%) or less frequently for 2 children (14.2%).

In majority of diarrhoea cases (i.e. 19 out of 35 or 54.2%) food was continued as usual or in diminished or liquid form (in 6 cases i.e. 17.1%).

Nobody stopped food or withheld breast feeding during diarrhoea on doctor's advice as reported in the second round of survey in Mirzapur.

Results of water sample analysis (bacteriological)

In all 45 water samples were collected from wells (3 samples), stand posts (9 samples) and households (33 samples). Bacteriological analysis included presumptive and confirmatory coliform tests.

Out 12 samples collected from source, 3 were found to be positive (25.0%). All three samples belonged to wells.

Out of 33 samples collected from households 15 were found to be positive (45.4%).

Areawise detailed report of water sample analysis is enclosed in Annex 3.

4. FINDINGS OF THIRD ROUND OF SURVEY

4.1 Kanpur (October 1988)

Study Area and Population

The survey was carried out in the month of October 1988 in three areas of Jajmau (Kanpur) ie. Ompurva, Makku Shahid ka Bhatta and Gajju purva. In all 309 children below 5 years of age were included.

Prevalence of diarrhoea

Out of 309 children surveyed, 26 had suffered from diarrhoea during the last 14 days giving a period prevalence rate of 8.4%. At the time of survey 9 children were still suffering from diarrhoea. The point prevalence of diarrhoea was 2.9%.

Type of diarrhoea

Majority of diarrhoea children (ie. 17 out of 26 or 65.4%) presented with liquid/watery stools. History of passage of blood and mucus with diarrhoeal stool was elicited in 34.6% (9 out of 26) and 46.1% (12 out of 26) of children respectively.

Diarrhoea with other diseases

69.23% of children (18 out 26) with diarrhoea had symptoms of other diseases as well. Fever (17 out of 26 or 65.4%) and cough (10 out of 26 or 38.4%) were most common accompaniments of diarrhoea respectively.

Treatment practices and place of treatment in diarrhoea

15.3% children with diarrhoea (4 out of 26) did not go anywhere for treatment
Very few (only one case) adopted - ORS/oral rehydration therapy in event of diarrhoea.
Drugs were used by majority to treat cases of diarrhoea ie.80.7% (21 out of 26). Private practitioners were mostly consulted for treatment of diarrhoea (by 84.6% of cases).
Nobody went to government run health care agencies like the district hospital, ESI or other government dispensaries.

Breast feeding/other feeding practices

Breast feeding was only applicable in 50% of diarrhoeal children ie. 13 children.

Breast feeding was continued in almost all the eligible children of diarrhoea as usual (in 12 or 92.3%) or less frequently (1 out of 13 or 7.6%).

Majority of the children with diarrhoea continued to take food as usual (50%) or in light form or diminished amount (46.1%).
Doctors in the area did not advise to withhold breast feeds or meals of diarrhoeal children in Jajmau (Kanpur).

Results of drinking water analysis (bacteriological)

In all, 39 samples were collected for analysis ie.13 from source of water supply (4 from overhead tanks, 4 from India Mark-II handpump and 2 from public stand post, and 1 from public handpump, 1 from well, 1 from river Ganges).

From households, 26 samples were collected from water storage vessels. These households had occurrence diarrhoeal cases in them.

Out of 13 samples from source of water supply, 4 were polluted (30.80%). No sample from overhead tanks or from India Mark-II handpump was polluted. Out of 26 samples from households 21 were polluted (80.8%)

Detailed areawise report is enclosed as Annex 4

4.2 Mirzapur (December 1988)

Study population

The survey began in the urban areas of Mirzapur (Sabri, Amanganj and Kotwaru Ka Purwa) during December 1988.

In all, 393 children below 5 years of age were included. In the second round there were 372 underfive children in the selected households. Following demographic changes were taken into account.

a. 22 new births took place.
b. 2 children expired and 1 migrated (temporary)
c. 2 households were replaced

Net increase in the number of underfive children in the third round of survey was 21.

Prevalence of diarrhoea

Out of 393 children surveyed, 34 had suffered from diarrhoea during the last 14 days of survey.Thus the period prevalence rate of diarrhoea was 8.6%. At the time of survey 23 children presented with diarrhoea thereby giving a point prevalence rate of 5.9% .

Type of Diarrhoea

Majority of the diarrhoeal children (30 out of 34 or 88.2%) presented with symptoms of liquid or watery stools.There was history of passage of mucus and blood in stools in 17.6% of diarrhoeal cases. (6 each)

Diarrhoea with other diseases

Of 34 children with diarrhoea 13 (38.2%) had symptoms of other illnesses. It mainly included fever (8 cases or 23.5%) or cough (9 cases or 26.5%).

Treatment practices and place of treatment

Only six children with diarrhoea (17.6%) did not take any treatment for this ailment.

Only a few families used Oral rehydration therapy in form of homemade sugar salt solution (by 3 cases ie. 8.8%) or ORS packets (by 1 case ie. 2.9%).

Majority of diarrhoea cases utilised drugs (19 cases or 55.8%). However, 3 cases (8.8%) used ORS along with other drugs.

Private practitioners continued to treat 44.1% of diarrhoeal cases.Government dispenseries or hospitals were minimally utilised (5.8%) cases and (8.8%) respectively.

Feeding Practices during diarrhoea

Breast feeding was continued in 16 cases (47.0%)either as usual or in diminished amount (1 case). Only in one case of diarrhoea breast feeding was on doctors advice. Food was being continued as usual in 15 cases (44.1%) or in liquid or diminished form in 5 cases (11.8%) of diarrhoea.

5. IMPLICATIONS FOR HEALTH PROMOTION APPROACH

1. In study areas (specially in Mirzapur), quite a few number of families still depended upon wells as source of water supply. Samples of water from the wells showed very high coliform counts on examination. Thus there was need of disinfecting drinking water at source (wells) and at the level of individual households. Well water may be disinfected using bleaching powder.(following standard techniques). Similarly at the level of individual households drinking water can be purified using chlorine tablets for the purpose.

   These families should be followed up to ensure that drinking water is being properly disinfected before consumption till the time proper water supply facilities have been provided.

2. Quality of water samples from taps(private or public) and India Mark II handpumps was found to be satisfactory. The samples of drinking water taken from water storage vessels were heavily polluted.Obviously, pollutants get access to drinking water during collection, transport storage or at the point of consumption in the household. Following observations made on above mentioned aspects during the course of study may be borne in mind while carrying out health promotional campaigns in study areas.

a. Drinking water was being carried mainly in buckets or 'earthen ghada' from the source. It was difficult for a person to prevent his/her fingers from coming in contact with water,if 'earthen ghada' was being used as it was mostly filled to the brim.It was more hygienic to carry water in buckets as the fingers/hands do not come in contact with the drinking water inside the bucket.

   Thus use of buckets to carry drinking water should be encouraged. 'Earthen ghada' if used must not be filled upto the brim so that fingers of the person do not come in contact with drinking water while lifting or carrying.

b. It was noticed that the lids used to cover the storage vessel in different families were dirty. Members of the families used to put this lid on the 'Kaccha' floor each time they took out water from storage vessels. These practices need to be modified.

c. It was observed that the separate utensil used to take out water from storage vessels had very small handles or arrangements for holding. Thus it could not prevent fingers or hands to come in contact with drinking water

inside the storage vessels.It is recommended therefore that persons should be motivated to use a separate utensil with long handle to take out water from storage vessels.

d. Water storage vessels should be at least cleaned once daily using ash/detergent powder.

4. Handwashing after defecation by children and by parents after cleaning the child who had defecated was not being practiced by all. Intensive promotional campaigns are needed aimed at changing this practice. Use of soap in all such instances are to be encouraged.

5. Having latrine facilities inside the house is no doubt desirable but they tend to become a source of pollution within the household if not maintained properly. Private dry type of latrine poses special risk. Those owning such type of latrines should be motivated to get them converted into water seal type of latrines.Such facilities for conversion of latrines do exist in study areas and community members are to be properly briefed and enlightened to ensure their fullest co operation and involvement.

6. It was observed that maximum number of diarrhoeal cases were being treated by private practitioners using drugs or antibiotics. Use of oral-rehydration salts or fluids was minimal in the study areas. This points at the need of promotional campaigns directed towards private practitioners as well as mothers in the families to promote oral-rehydration therapy and proper feeding practices in diarrhoea cases.

Table 1: Study Population and Family Size in Kanpur/Mirzapur

Description	Kanpur		Mirzapur	
	No.	%	No.	%
Total Population	1308	-	1538	-
Total families	203	-	200	-
Nuclear families	171	84.2	124	62
Under five children	304		350	
Boys	146	48.0	184	52.6
Girls	158	52.0	166	54.6
Hindus	117	57.6	164	82
Muslims	86	42.4	34	17
Mean family size	6.4		7.6	

Table 2: Area Wise Distribution of Underfives - Kanpur & Mirzapur

Area	No.	%
Kanpur		
Makku Shahid Ka Bhatta	109	35.9
Ompurwa	98	32.2
Gajju Purwa	97	31.9
Total	**304**	**100**
Mirzapur		
Sabri	140	40
Amanganj	147	41.7
Katwaru ka Purwa	64	18.3
Total	**351**	**100**

Table 3: Agewise Distribution of Children - Kanpur & Mirzapur

Age (Months)	Kanpur		Mirzapur	
	No.	%	No.	%
0 - 6	26	8.5	36	10.2
7 - 12	47	15.4	48	13.7
13 - 24	54	17.7	81	23.1
25 - 36	61	20.0	76	21.7
37 - 48	72	23.6	69	19.7
> 48	44	14.4	40	11.4
Total	**304**		**350**	

Table 4: Monthly Income Wise Distribution of Study Population, Kanpur & Mirzapur

Income Level (Rs.)	Kanpur		Mirzapur	
	No.	%	No.	%
< 300	06	2.9	02	1.0
301 - 600	84	41.3	71	35.5
601 -1000	67	33.0	70	35.0
1000-1500	29	14.2	30	15.0
1501-2000	10	4.9	16	8.0
> 2000	7	3.4	11	5.5

	Kanpur	Mirzapur
Total mean monthly income (Rs.)	886	1010.8
Mean Per capita monthly income (Rs.)	138.3	131.4
% family below poverty line (≤Rs.600)	44.3	35.5
% family below absolute poverty line (≤300)(Poorest of poor)	2.9	1.0

Table 5A: Main Sources of Drinking Water Used by Families in Study Areas, Kanpur & Mirzapur

	Kanpur		Mirzapur	
	No.	%	No.	%
Private				
Well	4	2	4	2.0
Handpump	22	10.8	1	0.5
Tap	8	3.9	92	46.0
Public				
Well	13	6.4	53	26.5
Handpump	137	67.5	1	0.5
Tap	40	19.7	73	36.5
Others				
Tanneries	63	31.0	0	0
Any other	-	-	-	-

Note: More than one source of drinking water supply was being used

Table 5B: Dependence on Indo-Dutch Handpump as Source of Water Supply, Kanpur & Mirzapur

	Kanpur		Mirzapur	
	No.	%	No.	%
At times	81	39.9	0	0
Entirely	66	32.5	0	0
Never/N.A.	56	27.6	200	100

Table 6A: Water Storage Practices in Study Areas (Vessels Used), Kanpur & Mirzapur

Vessels Used	Kanpur		Mirzapur	
	No.	%	No.	%
Ghada	150	73.9	130	65
Surahi	21	10.3	10	5
Bucket	100	53.2	123	61.5
Plastic Jars	17	8.4	5	2.5
Others	27	13.3	33	16.5

Note: 1. More than one type of vessel was being used,
2. Others included earthern Kunda, drum, tincans etc.

Table 6B: Water Storage Practices in Study Areas (Vessels Covered), Kanpur & Mirzapur

Storage Vessels Covered	Kanpur		Mirzapur	
	No.	%	No.	%
Covered	167	82.3	87	43.5
Not covered	30	14.8	35	17.5
No answer	6	3.0	-	-
Mixed/partially covered	-	-	78	39.0

Table 6C: Water Storage Practices in Study Areas (Method of Taking out Drinking Water) Kanpur & Mirzapur

Method of Taking Out	Kanpur		Mirzapur	
	No.	%	No.	%
Tilting	103	50.7	112	56.0
Utensil with handle	27	13.3	15	7.5
Utensil without handle	123	60.6	137	68.5
Others	2	1.0	3	1.5

Table 7: Water Storage Vessel Cleaning Frequency in Families of Kanpur & Mirzapur

Frequency	Kanpur		Mirzapur	
	No.	%	No.	%
Alternate days	8	3.9	20	10.0
Once daily	98	48.3	103	51.5
Twice daily	84	41.4	66	33.0
> twice daily	9	4.4	5	2.5
Never	-	-	2	1.0

Table 8: Agents Used to Clean Water Storage Vessels in Kanpur & Mirzapur

Vessel Cleaning Agents	Kanpur		Mirzapur	
	No.	%	No.	%
Only water	149	73.4	115	57.5
Mud	13	6.4	75	37.5
Ash	63	31.0	88	44.0
Soap/Washing powder	42	20.7	31	15:5
Other agents	-	-	1	0.5

Table 9: Latrine Facilities Available to Families in Kanpur & Mirzapur

Latrine Facilities	Kanpur		Mirzapur	
	No.	%	No.	%
O.F.D.*	129	63.5	105	52.5
Private dry type	48	23.6	37	18.5
Private flush type	30	14.8	32	16.0
Public latrine	2	1.0	25	12.5

* Open Field Defecation

Table 10: Child Defecation Practices in Study Areas, Kanpur & Mirzapur

Practices	Kanpur		Mirzapur	
	No.	%	No.	%
Door yard	105	51.7	102	51.0
Open drain*	37	18.0	80	40.0
Open field	75	36.9	26	13.0
Private flush	19	9.4	23	11.5
Private dry	22	10.8	6	3.0
Public latrine	4	2.0	3	1.5

* Open drain situated either inside or outside the house.

Table 11: Children Excreta Disposal Practices in Families of Kanpur & Mirzapur

Practices	Kanpur		Mirzapur	
	No.	%	No.	%
Latrine (Dry/flush)	32	15.8	24	12.0
Garbage bin (Near house)	7	3.5	11	5.5
Drain	22	10.8	33	16.5
Throw near house (Indiscriminately)	53	26.1	45	22.5
Throw awary from house	41	22.2	25	12.5
Not applicable (Not aplicable as Children were elder)	52	25.6	67	33.5

Table 12: Personal Hygiene - Practice of Hand Washing after Defecation in Children, Kanpur & Mirzapur

Handwashing	Kanpur		Mirzapur	
	No.	%	No.	%
No felt need	14	10.3	1	0.9
No (other reason)	5	3.6	14	12.0
Yes with water	44	32.3	22	18.9
Yes with mud	41	30.1	53	45.7
Yes with ash	30	22.0	5	4.3
Yes with soap	90	66.2	35	30.2
Not applicable	67	33.0	84	42.0

Note: Percentages are calculated out of eligible families for the purpose i.e. 136 in Kanpur and 116 in Mirzapur

Table 13: Practice of Hand Washing by Parents in Study Areas of Kanpur & Mirzapur After Cleaning the Child who had Defecated

Handwashing	Kanpur		Mirzapur	
	No.	%	No.	%
Not done	1	0.5	3	1.7
Yes with water	23	12.2	13	7.5
Yes with Mud	54	28.7	116	67.0
Yes with Ash	43	22.8	11	6.3
Yes with Soap	110	58.5	68	39.3
N.A.	15	7.4	27	13.5

Note: Percentages are calculated out of eligible families for the purpose i.e. 188 in Kanpur and 173 in Mirzapur

Table 14: Practice of Hand Washing by Parents before Feeding the Child in Study Areas, Kanpur & Mirzapur

Handwashing	Kanpur		Mirzapur	
	No.	%	No.	%
Not done	13	6.4	43	22.5
Yes with water	142	70.0	109	54.5
Yes with mud	10	4.9	6	3.0
Yes with Soap	27	13.3	11	5.5
Not applicable	31	15.3	41	20.5

Note: Percentages are calculated out of eligible families for the purpose i.e. 172 in Kanpur and 159 in Mirzapur

Table 15: Use of Feeding Bottles by Families in Study Areas, Kanpur & Mirzapur

Feeding Bottles	Kanpur		Mirzapur	
	No.	%	No.	%
Bottle used	31	17.4	28	18.8
Not used	147	82.6	121	81.2
Not applicable	25	12.3	51	25.5

Table 16A: Study Area Wise Distribution of Diarrhoeal Morbidity in Under Five Children in Kanpur

Area	Suffered		Not Suffered		Total	
	No.	%	No.	%	No.	%
Makku Shahid ka Bhatta	17	15.6	92	84.4	109	35.9
Om Purwa	10	10.2	88	89.8	98	32.2
Gajju Purwa	17	17.5	80	82.6	97	31.9
Total	**44**	**14.5**	**260**	**85.5**	**304**	**3.4**

Chi square (Ompurwa Vs Gajju Purwa) = 1.155; P>0.05

Table 16B: Study Area Wise Distribution of Diarrhoeal Moridity in Under Five Children in Mirzapur

Area	Suffered		Not Suffered		Total	
	No.	%	No.	%	No.	%
Sabri	47	33.6	93	66.4	140	40.0
Amanganj	50	34.2	96	65.7	146	41.7
Katwaru ka Purwa	18	28.1	46	71.9	64	18.3
Total	**115**	**67.1**	**235**		**350**	

Chi square (Amanganj) Vs Kotwaru Ka Purwa) = 0.761, P>0.05

Table 17A: Age Wise Distribution of Diarrhoeal Morbidity in Under Five Children in Kanpur

Age in Month	Suffered		Not Suffered		Total
	No.	%	No.	%	No.
Kanpur					
0 - 6	5	19.2	21	80.8	26
7 - 12	10	21.3	37	78.7	47
13 - 24	13	24.0	41	76.0	54
25 - 36	12	19.6	49	80.4	61
37 - 48	3	4.2	69	95.8	72
> 48	1	2.3	43	97.7	44
Total	**44**	**14.5**	**260**	**85.5**	**304**

Chi square (0-12 months Vs 13-48 months) = 2.91, P>0.05

Table 17B: Age Wise Distribution of Diarrhoel Morbidity in Under Five Children in Mirzapur

Age in Month	Suffered		Not Suffered		Total
	No.	%	No.	%	No.
0 - 6	10	27.7	26	72.2	36
7 - 12	21	43.7	27	56.3	48
13 - 24	35	43.2	46	56.8	81
25 - 36	25	32.9	51	67.1	76
37 - 48	19	27.5	50	72.5	69
> 48	5	12.5	35	87.5	40
Total	**115**		**235**		**350**

Chi square (0-12 months Vs 13-48 months) = 0.81, P>0.05

Table 18: Diarrhoeal Morbidity in Under Five Children, According to Religion in Kanpur and Mirzapur

	Suffered		Not Suffered		Total
	No.	%	No.	%	No.
Kanpur					
Hindu	19	11.2	150	88.8	169
Muslim	25	18.5	110	81.5	135
Mirzapur					
Hindu	91	32.7	187	67.3	278
Muslim	23	33.8	45	66.2	68
Others	1	25.0	3	75.0	4

Table 19: Diarrhoeal Morbidity in Under Five Children, According to Type of Family

	Suffered		Not Suffered		Total
	No.	%	No.	%	No.
Kanpur					
Nuclear	34	13.7	214	86.3	248
Joint	10	17.8	48	82.2	56
Mirzapur					
Nuclear	65	34.8	122	65.2	187
Joint	50	30.7	113	69.3	163

Z = 0.761; P>0.05 (Kanpur)
Z = 0.8 ; P>0.05 (Mirzapur)

Table 20: Diarrhoeal Morbidity in Under Five Children, According to Source of Drinking Water in Study Area

Source	Suffered		Not Suffered		Total
	No.	%	No.	%	No.
Kanpur					
Well	3	12.5	21	87.5	24
Handpump	32	13.3	209	86.7	241
Taps	12	17.6	56	82.4	68
Tannery & Others	14	12.5	98	87.5	112
Mirzapur					
Well	34	34.3	65	65.5	99
Handpump	2	66.6	1	33.3	3
Taps	90	31.0	200	69.0	290
Tannery & Others	1	11.1	8	88.9	9

Note: a. Chi square (handpump Vs Taps Vs Tanneries & Others) = 1.078 (Kanpur P>0.05)

Chi Square (Wells Vs Taps) = 0.36 (Mirzapur) P>0.05

b. More than one source of drinking water was being utilized by many in Kanpur as well as in Mirzapur study areas.

Table 21A: Diarrhoeal Morbidities according to Type of Water Storage Vessel used in Study Areas for Under Five Children in Kanpur

Storage Vessel	Suffered		Not Suffered		Total
	No.	%	No.	%	No.
Ghada	34	15.4	187	84.6	221
Surahi	2	6.9	27	93.1	29
Bucket	20	11.9	148	88.8	168
Plastic Jar	6	23.0	20	77.0	26
Others	4	18.2	18	81.8	22

Note: a. 'others' included earthen Kunda, metallic drums, tin cans etc.
b. More than one type of vessel was being used by many.

Table 21B: Diarrhoeal Morbidities according to Type of Water Storage Vessel used in Study Areas for Under Five Children in Mirzapur

Storage Vessel	Suffered		Not Suffered		Total
	No.	%	No.	%	No.
Ghada	76	33.6	150	66.4	226
Surahi	6	31.6	13	68.4	19
Bucket	66	32.2	139	67.8	205
Plastic Jar	2	18.2	9	81.8	11
Others	23	34.3	44	65.7	67

Note: a. 'others' included earthen Kunda, metallic drums, tin cans etc.
b. More than one type of vessel was being used by many.

Table 22A: Diarrhoeal Morbidities according to Water Storage Vessels kept Covered in Study Areas for Under Five Children in Kanpur

Storage Vessel	Suffered		Not Suffered		Total
	No.	%	No.	%	No.
Covered	36	14.4	213	85.6	249
Not covered	5	10.9	41	89.1	46
No answer	3	33.3	6	66.7	9

Chi square (covered vs other group) = 0.001 P > 0.05

Table 22B: Diarrhoeal Morbidities according to Water Storage Vessels kept Covered in Study Areas for Under Five Children in Mirzapur

Storage Vessel	Suffered		Not Suffered		Total
	No.	%	No.	%	No.
Covered	40	27.4	106	72.6	146
Not covered	28	43.0	37	57.0	65
Mixed/Partially	47	33.8	92	66.2	139

Chi square (Covered vs not covered and partially covered) = 3.26, P > 0.05

Table 23A: Diarrhoeal Morbidities according to the Method of Taking Out Drinking Water for use in Study Areas for Under Five Children in Kanpur

Method	Suffered		Not Suffered		Total
	No.	%	No.	%	No.
Tilting	18	11.5	139	88.5	157
Utensil with handle	10	23.8	32	76.2	42
Utensil without handle	25	14.1	152	85.5	177
Others	0	-	3	-	3

Chi square (Tilting vs utensil with and without handle) = 1.39 P > 0.05

Table 23B: Diarrhoea Morbidities according to the Method of Taking out Drinking Water for use in Study Areas for Under Five Children in Mirzapur

Method	Suffered		Not Suffered		Total
	No.	%	No.	%	No.
Tilting	66	33.7	130	66.3	196
Utensils with handle	11	36.7	19	63.3	30
Utensil without handle	73	32.9	149	67.1	222
Others	1	16.7	5	83.3	6

Chi square (Tilting Vs Utensil with and without handle) = 0.027, P > 0.05

Table 24A: Diarrhoeal Morbidities according to Frequency of Water Storage Vessel Cleaning Practice in Study Areas for Under Five Children in Kanpur

Cleaning Frequency	Suffered		Not Suffered		Total
	No.	%	No.	%	No.
Alternate days	3	25.0	9	62	12
Once daily	20	14.7	116	85.3	136
Twice daily	19	14.1	116	85.9	135
> Twice daily	0	-	15		15

Chi square (Alternate days Vs once daily) = 2 times) = 2.965 P>0.05

Table 24B: Diarrhoeal Morbidities according to Frequency of Water Storage Vessel Cleaning Practice in Study Areas for Under Five Children in Mirzapur

Cleaning Frequency	Suffered		Not Suffered		Total
	No.	%	No.	%	No.
Alternate days	13	37.1	22	62.9	35
Once daily	67	37.0	114	63.0	187
Twice daily	31	26.9	84	73.1	115
> Twice daily	3	37.5	5	62.5	8

Chi square (once daily Vs twice daily group) = 3.17, P>0.05

Table 25A: Diarrhoeal Morbidities according to Cleaning Agents used for Water Storage Vessel in Study areas for Under Five Children in Kanpur

Cleaning Agents	Suffered		Not Suffered		Total
	No.	%	No.	%	No.
Only water	34	15.7	183	84.3	217
Mud	4	20.0	16	80.0	20
Ash	9	8.8	93	91.2	102
Soap/Washing Powder	6	8.4	65	92.6	71

Chi square (Only water Vs Mud Vs Ash Vs soap groups) = 5.96, df 3; P > 0.05

Table 25B: Diarrhoeal Morbidities according to Cleaning Agents used for Water Storage Vessel in Study areas for Under Five Children in Mirzapur

Cleaning Agents	Suffered		Not Suffered		Total
	No.	%	No.	%	No.
Only water	72	34.9	134	65.1	206
Mud	43	33.6	85	66.4	128
Ash	53	34.8	99	65.2	152
Soap/Washing Powder	18	31.0	38	69.0	58
Other agents	0	-	2	-	2

Chi square (Only water Vs Mud Vs Ash Vs soap groups) = 0.18 P > 0.05

Table 26: Diarrhoeal Morbidities according to Latrine Facilities available in Study Areas for Under Five Children in Kanpur

Facilities	Suffered		Not Suffered		Total
	No.	%	No.	%	No.
O.F.D	22	12.2	158	87.8	180
Private dry type	16	20.0	64	80.0	80
Private flush type	6	12.2	43	87.8	49
Public Latrine	1	33.3	2	66.7	3

OFD = Open field defecation
Chi square (OFD vs Private dry type) = 2.68, P > 0.05

Table 26B: Diarrhoeal Morbidities according to Latrine Facilities Available in Study Areas for Under Five Children in Mirzapur

Facilities	Suffered		Not Suffered		Total
	No.	%	No.	%	No.
O.F.D	57	31.8	122	68.2	179
Private dry type	23	32.4	48	67.6	71
Private flush type	16	29.0	39	71.0	55
Public Latrine	18	42.8	24	57.2	42

OFD = Open field defecation
Chi square (OFD vs private dry type vs private flush type) = 0.228, P > 0.05

Table 27A: Diarrhoeal Morbidities according to Child Defecation Practices in Study Areas for Under Five Children in Kanpur

Practices	Suffered		Not Suffered		Total
	No.	%	No.	%	No.
Door yard	30	17.1	145	82.9	175
Open drain	10	16.6	50	83.4	60
Open field	9	8.4	98	91.6	107
Latrines					
Private flush	5	15.6	27	84.4	32
Private dry	8	21.6	29	78.4	37
Public	2	33.3	4	66.7	6

Chi square (Door yard vs Open drain vs Open field vs Latrine group) = 3.3.6 df 3, P > 0.05

Table 27B: Diarrhoeal Morbidities according to Child Defecation Practices in Study Areas for Under Five Children in Mirzapur

Practices	Suffered		Not Suffered		Total
	No.	%	No.	%	No.
Door yard	68	35.9	121	64.1	189
Open drain	52	34.9	97	65.1	149
Open field	17	29.8	40	70.2	57
Latrines					
Private flush	8	20.0	32	80.0	40
Private dry	3	27.2	8	72.8	11
Public	2	33.3	4	66.7	6

Chi square (Door yard vs Open drain vs Open field vs Latrine group) = 2.08; df=3, P > 0.05

Table 28A: Diarrhoeal Morbidities according to Child Excreta Disposal Practices in Study Areas for Under Five Children in Kanpur

Practices	Suffered		Not Suffered		Total
	No.	%	No.	%	No.
Latrines (dry/flush)	13	22.8	44	77.2	57
Garbage bin	4	30.7	9	69.3	13
Drains	6	15.8	32	84.2	38
Throw near House (indiscriminately)	17	19.3	71	80.7	88
Throw away from House	8	12.7	55	87.3	63
Not Applicable	3	4.9	58	95.1	61

Table 28B: Diarrhoeal Morbidities according to Child Excreta Disposal Practices in Study Areas for Under Five Children in Mirzapur

Practices	Suffered		Not Suffered		Total
	No.	%	No.	%	No.
Latrine (dry flush)	10	17.2	48	82.8	58
Garbage bins	6	28.5	15	71.5	21
Drains	23	43.4	30	56.6	53
Throw near house (indiscriminately)	34	40.0	51	60.0	85
Throw away from house	13	30.9	29	69.1	42
Not applicable	31	31.3	68	68.7	99

Table 28A: Diarrhoel Morbidities according to Practice of Handwashing after Defecation in Study Areas for Under Five Children in Kanpur

Handwashing	Suffered		Not Suffered		Total
	No.	%	No.	%	No.
Not washed	6	24	20	76	26
Yes, with water	12	17.1	58	82.9	70
Yes, with mud	9	14.2	54	85.8	63
Yes, with ash	6	12.5	42	87.5	48
Yes, with soap	19	13.8	118	86.2	137
Not applicable	16	14.5	94	85.5	110

Table 29B: Diarrhoeal Morbidities according to Practice of Handwashing After Defeaction in Study Areas for Under Five Children in Mirzapur

Handwashing	Suffered		Not Suffered		Total
	No.	%	No.	%	No.
Not washed	12	46.2	14	53.8	26
Yes, with water	19	43.2	25	56.8	44
Yes, with mud	27	25.9	77	74.1	104
Yes, with ash	1	8.3	11	91.7	12
Yes, with soap	23	29.5	55	70.5	78
Not applicable	47	40.2	70	59.8	117

Table 30A: Diarrhoeal Morbidities according to Practice of and washing by Parents in Study Areas after Cleaning the Child who had Defecated for Under Five Children in Kanpur

Handwashing	Suffered		Not Suffered		Total
	No.	%	No.	%	No.
Not washed	0	-	1	-	1
Yes, with water	7	17.1	34	82.9	41
Yes, with mud	15	17.4	71	92.6	86
Yes, with ash	6	8.6	64	91.4	70
Yes, with soap	22	13.2	145	86.8	167
Not applicable	0	-	17	100.0	17

Table 30B: Diarrhoeal Morbidities according to Practice of and washing by Parents in Study Areas after Cleaning the Child who had Defecated for Under Five Children in Mirzapur

Handwashing	Suffered		Not Suffered		Total
	No.	%	No.	%	No.
Not washed	1	33.3	2	66.7	3
Yes, with water	17	63.0	10	37.0	27
Yes, with mud	72	34.1	139	65.9	211
Yes, with ash	5	23.8	16	76.2	21
Yes, with soap	41	29.3	99	70.7	140
Not applicable	7	22.6	24	77.4	31

Table 31A: Diarrhoeal Morbidities according to Practice of Handwashing by Parents before Feeding Children in Study Areas for Under Five in Kanpur

Handwashing	Suffered		Not Suffered		Total
	No.	%	No.	%	No.
Not washed	4	21.0	15	79.0	19
Yes, with water	31	14.0	190	86.0	221
Yes, with mud	2	12.5	14	87.5	16
Yes, with soap	5	11.4	39	88.6	44
Not applicable	5	13.5	32	86.5	37

Table 31B: Diarrhoeal Morbidities according to Practice of Handwashing by Parents before Feeding Children in Study Areas for Under Five in Mirzapur

Handwashing	Suffered		Not Suffered		Total
	No.	%	No.	%	No.
Not washed	24	30.0	56	70.0	80
Yes, with water	67	31.7	144	68.3	211
Yes, with mud	6	66.7	3	33.3	9
Yes, with soap	8	36.4	14	63.6	22
Not applicable	18	39.1	28	60.9	46

Table 32A: Diarrhoeal Morbidities according to Bottle Feeding Practices Adopted by Mothers in Study Areas for Under Five Children in Kanpur

Bottle Feeding	Suffered		Not Suffered		Total
	No.	%	No.	%	No.
Practiced	10	19.6	41	80.4	51
Not practiced	32	14.0	94	86.0	227
Not applicable	2	7.7	24	92.3	26

Table 32B: Diarrhoeal Morbidities according to Bottle Feeding Practices Adopted by Mothers in Study Areas for Under Five Children in Mirzapur

Bottle Feeding	Suffered		Not Suffered		Total
	No.	%	No.	%	No.
Practiced	16	24.1	50	75.8	66
Not practiced	79	35.1	146	64.9	225
Not applicable	20	33.9	39	66.1	59

Chi square (bottle feeding Vs not bottle feeding) = 2.15
$P > 0.05$

Results of water sample analysis of first round survey

Kanpur

Area	Type of sample	No. collected	Polluted Ecoli No	%
Ompurwa	Household	9	6	66.6
	Wells	2	2	100
	Handpump(I/D)	2	0	000
	Handpump	1	0	000
	Public tap	1	1	000
Total		**15**	**9**	
Gajju Purwa	Household	13	13	100
	Handpump(I/D)	03	01	33.3
	Handpump(public)	01	00	00
Total		**17**	**14**	
Makku Shaheed Ka Batta	Household	10	8	80
	Handpump(I/D)	03	0	00
	Handpump(public)	01	0	00
	Well	02	0	00
	Ganga water	01	1	100
Total		**17**	**9**	
	Overhead Tank	04	0	00
Grand Total				
	source	21	05	23.80
	Household	32	27	84.37

Mirzapur

Area	Type of sample	No. collected	Polluted Ecoli No	%
Katwaroo Ka Pura	Household	15	13	86.66
	W	06	06	100.00
	S	01	00	000.00
		22	19	
Sabri	Household	14	06	42.85
	W	02	02	100.00
	S	12	02	16.66
		28	10	
Amanganj	Household	09	02	22.22
	S	08	00	00.00
		17	02	11.76
Grand total				
	Household	38	21	55.26
	Source	29	10	34.48

Results of water sample analysis of second round survey

Kanpur

Area	Type of sample	No. collected	Polluted Ecoli No	%
Ompurwa	Household	16	10	62.5
	Wells	02	02	100
	Handpump(I/D)	06	04	66.6
Total		**24**	**16**	
Gajju Purva	Household	14	11	78.57
	Handpump(I/D)	01	00	000
	Well	01	01	100.0
	Tap Tannery	02	02	100.0
Total		**18**	**14**	
Makku Shaheed Ka Batta	Household	13	10	76.92
	Handpump(I/D)	02	01	50.00
	Tannery tap	02	02	100.00
Total		**17**	**13**	
	Overhead Tank	04	0	00
Grand Total				
	source	20	12	60.01
	Household	43	31	72.0

Mirzapur

Area	Type of sample	No. collected	Polluted Ecoli No	%
Katwaroo Ka Pura	Household	05	04	80.0
	W	02	02	100.0
		07	06	85.71
Sabri	Household	15	6	40
	W	01	1	100
	S	04	-	000
Amanganj	Household	13	05	38.5
	S	45	00	00.0
		18	05	27.77
Grand total				
	Household	33	15	45.4
	Source	12	3	25.0

Results of water sample analysis of third round survey

Kanpur

Area	Type of sample	No. collected	Polluted Ecoli No	%
Ompurwa	Household	9	7	
	Handpump(I/D)	0	0	
Total		**09**	**7**	
Gajju	Household	07	07	100
Purva	Handpump(I/D)	02	00	00.0
	Tannery tap	01	01	100
Total		**10**	**09**	
Makku				
Shaheed	Household	10	07	70
Ka Bhatta	Handpump(I/D)	02	00	00
	Handpump(public)	01	01	100
	Well	01	01	100
	Ganga water	01	01	100
	Public tap	01	00	00
Total		**16**	**10**	
	Overhead Tank	04	0	00
Grand Total				
	source	13	04	30.8
	Household	26	21	80.80

The results from Mirzapur are not available yet.