

## Maternal Knowledge and Practices Towards Sanitation and Their Relationships with Occurrence of Diarrhoea in Children

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### ABSTRACT

Diarrhoea, a major contributor of childhood morbidity and mortality is mostly caused by poor hygiene and sanitation. Literature reveal that hygiene practices at household levels greatly affects the occurrence of diarrhoea among children. A cross sectional study was conducted to determine association between hygiene knowledge and practices of mothers with occurrence of diarrhoea in young children below 3 years in the tribal villages of Gujarat. Structured questionnaire was used to elicit information on personal hygiene (PH), food Hygiene (FH), and environmental Hygiene (EH) practices of 536 mothers with children between 6-36 months of age. Past one month diarrhoeal episodes were recorded using the recall method. The mean percent scores for FH, PH and EH practices were 77%, 88% and 80% respectively. Almost 35% children suffered from diarrhoea in the past one month of which 10 were admitted to the hospital. Diarrhoeal incidences were associated with FH and EH practices ( $p < 0.001$ ) and not with PH practices. Improvement in the environmental and personal hygiene practices of the mothers can contribute largely in reducing the prevalence of diarrhoea among children in Chikhli taluka of Gujarat.

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### 1. INTRODUCTION

An estimated 801,000 children younger than 5 years of age perish from diarrhea each year, mostly in developing countries. This amounts to 11% of the 7.6 million deaths of children under the age of five and means that about 2,200 children are dying every day as a result of diarrheal diseases [1]. Reducing diarrheal deaths by more than 1.4 million per year would be a major contribution towards MDG4 [2].

Diarrhoea targets mostly the poor community due to poor environmental sanitation, inadequate water supply, poverty and poor education [3]. As per WHO 2008 [4] estimates 81% cases of diarrhoea worldwide are attributable to unsafe water, inadequate sanitation or insufficient hygiene. These cases result in 1.5 million deaths each year, most being the deaths of children. In addition the total number of deaths caused directly and indirectly by malnutrition induced by unsafe water, inadequate sanitation and insufficient hygiene is 860 000 deaths per year in children under five years of age. Globally, around 2.4 million deaths (4.2% of all deaths) could be prevented annually if everyone practised appropriate hygiene and had good, reliable sanitation and drinking water [5]. According to estimations, 88% of all diarrhoeal diseases are caused due to contaminated water and inadequate hygiene and sanitation [6]. Other researchers also pointed out that

that among the main childhood diseases that are directly linked to poor hygiene and sanitation is diarrhea [7]-[10].

World Health Organisation [11] has outlined the basic principles for the preparation of safe food for infants and young children but the effect of food-hygiene practices of mothers on diarrhoea among children in community settings has been sparingly reported [12],[13]. Moreover the tribal areas of Indian subcontinent are unexplored in this area.

Hence the study was undertaken with an objective to determine if the hygiene and sanitation knowledge and practices of mothers are associated with occurrence of diarrhoea in children. The study will help highlight the undesirable practices followed by the mothers with respect to domestic hygiene which might contribute to occurrence of diarrhoea in children.

## 2. RESEARCH METHOD

### Locale of study

The study was carried out in the tribal villages of *Chikhli taluka*, Navsari District of Gujarat, India. Gujarat has 33 districts and Navsari district comprises of 6 talukas which includes 389 urban, rural and tribal villages. Chikhli a tribal taluka of Navsari district has 88 villages [14]. As reported Chikhli has a population of 293014, with 148,729 males and 144,285 females [15],[16].

Under the Integrated Child Development Scheme (ICDS) of Government of India, Chikhli taluka has about 400 functional anganwadis (community centre). Taking an average of 10 children between the age group 6- 36 months enrolled in each anganwadi, it was assumed that there are approximately 4000 children between 6-36 months in Chikhli. With a confidence interval of 4 and confidence level of 95% the minimum sample size calculates to be 522. Therefore a sample of 536 was selected for the study.

### Sampling

A map of Chikhli taluka was taken and with Chikhli village as the center point a circle of 15 cm was drawn. The area was divided into 4 zones. Four villages were randomly selected from each zone and including *Chikhli*, a total of 17 villages were identified. About 31 households with children between 6-36 months were selected randomly from each village.

### Collection of data

Data were collected by a trained investigator using a pretested proforma. The institutional ethical committee gave approval to the data schedule. Informed consent was taken from the mothers and they were explained the purpose of the study.

The questionnaire consisted of different sections to elicit information under the following heads i).background information to assess the socio economic status of the family; ii) household information iii) disease profile of the child for the past one month with reference to RTI and diarrhoeal episodes iv) knowledge and practices of mothers on hygiene and sanitation.

Background information was collected which included questions related to income of the family, educational qualification of mother and father, ownership of property, etc. This information was used to assess the socio economic status of the family according to criteria developed by Agrawal et al [17].

The hygiene and sanitation questionnaire included several close ended questions related to environmental, food and personal hygiene which helped assess the present knowledge and practices of the mothers in relation to the three hygiene aspects. The questionnaire was compiled as per the checklists developed and used by many investigators and government surveys [18]-[26]. The questionnaire was pretested with 15 mothers and modified accordingly. Each desirable response was given a score of 2 or 3 (depending on the question) and an undesirable response was given a score of 1. A composite score was calculated for each aspect and the mothers were ranked into four categories i.e excellent (with a score of 91-100%), very good (76-90%), fair (61-75%) and poor ( $\leq 60\%$ ).

The questionnaire was developed in English but was translated to the local language (Gujarati) during administration. The investigator took about 20-30 minutes to administer one questionnaire.

### Statistical analysis

Means and standard deviations for various responses were calculated using Microsoft Excel 2007. Epi Info software (Version 2000) was used to obtain association of diarrhoeal disease in children with various factors like child's age, SES, mothers' education, household facilities etc. p - Values smaller than 0.05 were considered to be statistically significant.

### 3. RESULTS AND ANALYSIS

#### Socio-demographic characteristics of respondents

Out the 536 children enrolled most (255; 47.6%) were in the age group of 13-24 months, 153 were aged between 6-12 months and rest were between 25-36 months. The enrolled subjects had almost equal percentage of males and females. Majority of the families (473; 88.2%) were Hindus and 50% of the children were the first offspring of their parents (Table 1).

Table 1. Background information of the child/ family

	Total	No.	%	Chi Square Value
<b>Age</b>				
6 -12 months	153	59	11.0	<b>3.16<sup>NS</sup></b>
13 -24 months	255	93	17.4	
25 -36 months	128	37	6.9	
<b>Sex</b>				
Male	285	95	17.7	<b>0.991<sup>NS</sup></b>
Female	251	94	17.5	
<b>Religion</b>				
Hindu	473	155	28.9	<b>10.2<sup>**</sup></b>
Muslim	61	33	6.2	
Christian	2	1	0.2	
<b>Birth Order</b>				
First	268	89	16.6	<b>4.96<sup>NS</sup></b>
Second	194	66	12.3	
Third	54	24	4.5	
Fourth	15	7	1.3	
Fifth	2	1	0.2	
Sixth and above	3	2	0.4	
<b>Socio economic status (SES)</b>				
Upper High	11	1	0.2	<b>22.8<sup>***</sup></b>
High	53	15	2.8	
Upper Middle	200	57	10.6	
Lower Middle	234	93	17.4	
Poor	37	23	4.3	
Very Poor	1	1	0.2	
<b>Type of Family</b>				
Nuclear	170	61	11.4	<b>1.01<sup>NS</sup></b>
Joint	193	63	11.8	
Extended	173	65	12.1	
<b>Age of Mother</b>				
18 – 20	17	10	1.9	<b>5.13<sup>NS</sup></b>
21 – 25	283	109	20.3	
26 – 30	145	29	5.4	
31 and above	37	12	2.2	
Don't Know	54	29	5.4	
<b>Age of Father</b>				
18 – 20	3	1	0.2	<b>19.0<sup>**</sup></b>
21 – 25	72	34	6.3	
26 – 30	191	69	12.9	
31 and above	214	56	10.4	
Don't Know (3 fathers who were dead are included in this category)	56	29	5.4	
<b>Educational qualification of mother</b>				
Illiterate	84	35	6.5	<b>4.2<sup>NS</sup></b>
Primary to Higher secondary (Grade 1 to 10)	126	50	9.3	
Higher senior secondary (Grade 11 and above)	326	104	19.4	
<b>Educational qualification of father (OUT OF 533)</b>				
Illiterate	37	17	3.2	<b>1.97<sup>NS</sup></b>
Primary to Higher secondary (Grade 1 to 10)	135	48	9.0	
Higher senior secondary (Grade 11 and above)	361	124	23.1	

Only 11 out of 536 families belonged to the upper high SES group with majority of families (234; 43.7%) belonging to lower middle group. Upper middle income group had 200 families and 37 families were categorized in poor income group.

Almost an equal distribution was observed in the family composition with 170 (31.7%) nuclear families, 193 (36.0%) joint and 173 (32.3%) extended families. Almost 75% (400) families were non vegetarians.

The average age of the mothers was 25 yrs and that of fathers was 30 yrs. About 10% mothers didn't know their age or their husband's age. Majority of the parents were literate with only 15.7% (84) mothers and 6.9% (37) illiterate fathers. Most of the mothers, (505; 94.25%) were houses wives.

### Household information of the families

More than half the families, 60.6% (325) resided in semi *pakka* houses and open drainage system was found in 64.4% (345) households (Table 2). Hand pump or borehole was the main source of drinking water for majority (257; 47.9%) of the families. Only 11 households used open well water for drinking purposes (Table 2).

**Table 2. Household information of the family**

	Total	No.	%	Chi Square Value
<b>Drainage facility</b>				
Open	345	132	24.6	<b>3.82*</b>
Close	191	57	10.6	
<b>Type of House</b>				
<i>Kaccha</i> €	62	27	5.0	<b>10.5**</b>
<i>Semi Pakka</i> £	325	125	23.3	
<i>Pakka</i> ¥	149	37	6.9	
<b>Source of drinking water</b>				
pipd water/ municipal supply	83	37	6.9	<b>6.61<sup>NS</sup></b>
Open well	6	3	0.6	
Hand pump/ Borehole	257	93	17.4	
Bottled water	190	56	10.4	
<b>Source of cooking water</b>				
pipd water/ municipal supply	118	54	10.1	<b>8.92*</b>
Open well	11	3	0.6	
Handpump/ Borehole	348	117	21.8	
Bottled water	59	15	2.8	
<b>Source of water for other household activities</b>				
Piped water/ municipal supply	164	69	12.9	<b>4.80*</b>
Handpump/ Borehole	372	120	22.4	

€: house with temporary roof and walls, made of materials like wood, tin sheets, hay, asbestos etc.

£: House with concrete walls but temporary roof.

¥: house with concrete roof and walls.

### Morbidity profile of the children

As reported by mothers, 69% (370) children suffered from cough and cold, and 35.3% (189) from diarrhoea in the past one month. Majority of the diarrhoeal cases (171; 90.5%) were watery diarrhoea, 9.5% (18) bloody diarrhoea and 10 children were admitted to hospital during the diarrhoeal episodes.

### Knowledge and practices of mothers on hygiene and sanitation.

Table 3 summarizes the ranking of mothers according to scores obtained for different hygiene aspects.

**Table 3. Ranking of the mothers for different hygiene aspects**

	KEH		PEH		KFH		PFH		KPH		PPH	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
91- 100% (Excellent)	382	71.3	75	14.0	45	8.4	49	9.1	410	76.5	159	29.7
76 - 90 % (Very Good)	36	6.7	99	18.5	198	36.9	423	78.9	88	16.4	264	49.3
61 - 75% (Fair)	47	8.8	95	17.7	256	47.8	63	11.8	24	4.5	100	18.7
≤ 60 % (Poor)	71	13.2	267	49.8	37	6.9	1	0.2	14	2.6	13	2.4
Chi square value	1.92 <sup>NS</sup>		14.0 <sup>**</sup>		5.77 <sup>NS</sup>		0.595 <sup>NS</sup>		5.89 <sup>NS</sup>		5.89 <sup>*</sup>	

KEH: Knowledge on environmental hygiene

PEH: Practices on environmental hygiene

KFH: Knowledge on food hygiene

PFH: Practices on food hygiene

KPH: Knowledge on personal hygiene

PPH: Practices on personal hygiene

<sup>NS</sup>: Non significant ; p< 0.05      <sup>\*\*</sup>: p<0.001      <sup>\*\*\*</sup>: p<0.0001

### *Environmental hygiene (EH)*

Majority of mothers (382; 71.3%) had excellent scores for knowledge on EH. Mothers knew that accumulated water, flies, fecal matter outside the house and mopping, sweeping; animals and flies inside the house can affect their child's health. Disposing household solid waste in open was considered desirable by almost 43% (229) mothers.

The environmental hygiene practices of the mothers were comparatively poor, with almost 50% mothers scoring  $\leq 60\%$ . The most undesirable practices included open defecation by 239 (44.6%) families and open collection and disposal of solid waste by 79.3% (425) and 61.4% (329) families respectively and not using any disinfectant for mopping by 61.8% (331) families.

### *Food Hygiene (FH)*

Majority of the mothers (256; 47.8%) scored fairly on food hygiene. Most of the mothers (317; 59%) were unaware about the safe temperatures for heating leftover moist food for consumption and almost half the mothers didn't know about the safe duration of storage of cooked moist food stored at room temperature before consumption. A large percentage of mothers (476; 88.8%) regarded "bulk washing only once" as the ideal way of washing fruits and vegetables. Many (359; 67%) mothers believed that "warming" the stored moist weaning foods is sufficient before feeding the baby. Boiling water and adding chlorine was reported as a method to make water safe for drinking by 289 mothers.

High percentage of mothers (423; 78.9%) were ranked as "very good" for practices on food hygiene (PFH). Desirable food hygiene practices followed by mothers included using soap for washing utensils, washing fruits and vegetables before use and air drying of utensils after washing. The most undesirable food hygiene practices included dipping a container in stored water vessel (where hand comes in contact with water) for drawing water and consuming moist leftover food without sufficient heating.

### *Personal Hygiene (PH)*

Excellent scores were obtained by most of the mothers (410; 76.5%). Almost all mothers (524; 97.8%) knew that washing their hands and child's hands (506; 94.4%) before feeding the child is necessary. Many knew that washing hands with soap is much better than water alone as it facilitates efficient removal of dirt and germs and helps prevent diseases. Personal hygiene practices of the mothers were assessed primarily with respect to their hand washing practices with soap. Mothers were questioned regarding use of soap for washing hands before and after a number of activities.

All the mothers used soap after visiting toilet and also after attending the child who has defecated. Every mother bathed daily and wore clean clothes. Only half used soap for washing hands before feeding the child and an almost similar number before eating food. Insufficient use of soap was found before cooking, before breastfeeding the child and after touching raw foods. The overall scores showed that only 29.7% (159) mother had excellent scores for personal hygiene practices.

### **Association of diarrhoea with various parameters:**

Diarrhoeal diseases were highly significant with the SES, and type of house in which the families resided (Table 1-3). Other factors associated with diarrhoeal diseases included religion of the family, age of father, drainage facility, type of house, source of cooking water and water used for other household activities, practices on environmental and personal hygiene practices of the mothers. Age and sex of the child, birth order of the child and type of family were not statistically associated with the occurrence of diarrhoeal diseases along with the mother's age, parents educational qualification, mother's working status, source of drinking water, mother's knowledge on EH, FH and PH and practices on FH.

## **4. DISCUSSION**

The present study is one of its kinds as no data is available from the tribal regions of Indian sub continent eliciting household hygiene practices as a causative factor of diarrhoea among young children.

Household information of the families shows that 64.4% households had open drainage system indicating poor environmental conditions. Children residing in *semi pakka* houses were found to have maximum number of diarrhoeal episodes in the present study.

Though majority of mothers (71.3%) got excellent scores for KEH, almost 50% scored poorly for PEH. High percentage (44.6 and 61.4) of families practiced open defecation and open disposal of solid waste, which were the most common undesirable environmental hygiene practices followed. Similar observations were made by surveyors in a study conducted at Democratic Republic of the Congo [27]. The present study revealed that the mothers who had poor PEH scores had the maximum number of children suffering from diarrhoea.

Environmental hygiene as a determinate of diarrhoeal diseases has been pointed out in many studies [28]-[32]. Maung [33] and Freji [34] in their studies pointed out that better family incomes is likely to translate into improvements in housing with more hygienic toilets, fewer flies in the house and ingestion of better weaning foods. According to WHO [35] majority of diarrhoeal cases are attributed to unsafe water, inadequate sanitation and hygiene. In the present study also environmental hygiene practices of the mothers were found to be associated with the occurrence of diarrhoea in the children.

In the present study handwashing practices of the mothers was found to be considerably good. All mothers were washing hands with soap after self and child defecation which is a desirable practice. Insufficient handwashing was observed before cooking and feeding the child which can be a source of contamination. In a similar study in India, Ray et al [36] pointed out that mothers were washing hands with soap after defecation but not after activities like changing babies nappies, before preparing food, immediately after handling raw vegetables and after handling pets and domestic animals. Wilson et al [37] reported a reduction in diarrhoea incidence of 89% through the promotion of hand washing in four different circumstances, including after defaecation, in an Indonesian village. Studies in Nicaragua and Salvador have shown that diarrhoeal episodes increased with poor hand washing practices [38],[39]. The study also showed statistical association of personal hygiene practices (attributed to handwashing practices) of the mothers with occurrence of diarrhoeal diseases in children. Hence an increase in the use of soap for hanwashing can help bring down the diarrhoeal episodes in children.

Diarrhoeal diseases were not associated with age and sex of the child, mothers and fathers education qualification, weight for age of the child, knowledge on EH, FH, PH and practices on FH. These are similar to the finding of previous studies which showed maternal characteristics such as education, occupation and age had no effect on diarrhoeal incidence [40],[41].

This study has certain limitations. Firstly the hygiene practices were graded on the basis of self reported behaviours of the mothers and hence are subject to inaccuracy. Therefore further investigation is required which should use household observations. Other researchers have pointed out that variety of methods are currently utilized to capture sanitation and hygiene behaviours. Interview and questionnaire approaches, while easily modified to represent the community under study, may not be as easily standardized as other available methods and typically result in over-reporting of 'good' behaviours, thus, reducing their validity [42]-[45]. Secondly majority of the subjects in the study resided in areas where there was neither a provision of public toilets nor proper disposal of solid waste. Hence open defecation and solid waste disposal was highly practiced which contributed to low environmental hygiene practice scores.

## 5. CONCLUSION

To conclude the results of the study suggest that improvement in the environmental and personal hygiene practices of the mothers can contribute largely in reducing the prevalence of diarrhoea among children. Apart from that improvement in the civic facilities like provision for toilets and disposal of household waste will automatically contribute to improvement in environmental hygiene practices. Hence attention of the concerned needs to be drawn in this particular area.

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