

## A Study on Water Sanitation Hygiene & Hand Washing Practices among Mothers Of Under 5 Children Attending Tertiary Care Hospital In Kolkata, India

Dr. Maumita De<sup>1</sup>, Dr. Pranita Taraphdar<sup>2</sup>.

<sup>1</sup>Demonstrator, Department Of Community Medicine, NRS Medical College, Kolkata, India

<sup>2</sup>Associate Professor, Department Of Community Medicine, NRS Medical College, Kolkata, India

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**Abstract:** Safe drinking water, basic sanitation & hygiene is one of the prime concerns globally. Hand washing with soap is a cost effective way of reducing diarrhoeal disease, acute respiratory infections. But a substantial numbers of women in India have lack of access to these basic facilities & poor practice of hand washing. An observational cross sectional study was undertaken among 300 mothers of under 5 children attending NRS Medical College during three months period, to assess the water & sanitation facilities available to them & their knowledge & practices regarding hand washing. 51% of mothers had piped drinking water supply, only 35% purified water, principally by boiling. 20% of participants practice open field defaecation in spite of having access to latrines. Hand washing practice of mothers regarding timing & material used was good. More emphasis must be given to improved access of water, sanitation facilities as well as their utilization & also on hand hygiene behaviour & knowledge of mothers.

**Keywords:** hand washing, hygiene, water, sanitation

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### I. Introduction

Communicable diseases continue to be the major contributor to global morbidity and mortality. According to WHO estimates, 3.8 million children aged less than five die each year from diarrhoea and acute respiratory tract infections [1]. Inadequate and unsafe water, poor sanitation, and unsafe hygiene practices are the main causes of diarrhoea, which results in at least 1.9 million under-5 child deaths annually. Diarrhoea morbidity rates are also increasing - children in developing countries suffer from average four to five debilitating bouts of diarrhoea per year, which can cause and exacerbate malnutrition and result in long-term growth stunting. Water, sanitation and hygiene (WASH) are also linked to many other diseases including helminth infections, dracunculiasis, trachoma, cholera, fluorosis and arsenicosis [2].

Estimates from the WHO and UNICEF show that about 1.1 billion people lack access to improved water supplies and 2.6 billion people lack adequate sanitation worldwide [3]. In addition to coverage disparities between countries and regions, there are significant inequities within countries: clear rural-urban disparities as well as coverage and service level disparities between richer and poorer households. Microbiological contamination of water sources is a common problem in many countries and chemical contamination (notably arsenic and fluoride) is increasingly a concern [2].

A safe water supply has been defined as a source which is likely to supply water which is not detrimental to health [4]. Safe water sources include: a household piped water connection; a public stand pipe; a borehole; a protected dug well; a protected spring and a rainwater collection system [5] [6]. In the context of goal 7, target 7C of the MDG's; it seems that sanitation is seen principally as the removal of human excreta or the availability of appropriate facilities for its disposal. For example, in tracking progress of the MDG's the term improved sanitation is used, and it refers to connection of households to a private or sewer septic system (with a soak away), a pour flush latrine, a simple pit latrine, or a ventilated improved pit latrine [4] [5]. Water availability therefore influences the type and functionality of the sanitation facilities which exist and as such it is not unusual for the two to be studied in relation to each other. In terms of hygiene, it may refer to a practice which is either personal or domestic. Personal hygiene refers to the use of water for cleaning parts of the body and domestic hygiene refers to water used to clean items in the home such as food, utensils and floors [7]. As such, WHO and UNICEF have considered hygiene information as an important component of their work on water and sanitation issues [5].

Alongside adequate sanitation, hand washing with soap after stool contact is an important barrier to the faecal-oral spread of diarrhoea because it prevents pathogens from reaching the domestic environment and hence their subsequent ingestion. Hand washing with soap before contact with food and water also reduces the secondary transmission of pathogens from the environment to a new host [8]. Beyond diarrhoeal disease, hand washing is also thought to play a role in reducing the transmission of infections such as pneumonia, influenza, helminths, trachoma, neonatal infections, HIV-associated infections and environmental enteropathies [8] [9].

Previous studies have suggested that promoting hand hygiene may be one of the most cost-effective means of reducing the global burden of disease [6].

The Millennium Declaration and the Goals recognize the importance of safe drinking water and sanitation to meet the global commitments. This is now an integral part of Target 10 under Millennium Development Goal 7 on ensuring environmental sustainability, as well as important input for other goals. WASH is a key input for the achievement of universal primary education and reductions in child mortality (Goals 2 and 4) and is directly linked to the eradication of poverty and hunger, the empowerment of women, improvements in maternal health and the reduction of diseases (Goals 1, 3, 5 and 6) [2].

From the 42 studies reporting hand washing prevalence Freeman et al estimate that approximately 19% of the world population washes hands with soap after contact with excreta. Meta-regression of risk estimates suggests that handwashing reduces the risk of diarrhoeal disease by 40% (risk ratio 0.60, 95% CI 0.53–0.68) [9]. In a study conducted in Assam, India it was observed that, out of 384 cases, 330 women (86%) always washed their hands before cooking food while 16 women (4%) never washed their hands prior to cooking. 93% of these women always washed hands before eating food, of which 31% washed with soap [10].

However, there are limited data that have assessed the water, sanitation & hand hygiene behavior of mothers of under five children in West Bengal, India. Keeping this in view present study was taken up to assess the water & sanitation facilities available to the mothers of under five children attending the immunization clinic & their knowledge & practices regarding hand washing.

## II. Methodology

An observational, descriptive, cross sectional study was undertaken during three months period (from 11th January to 10th April 2016) among mothers of under five children attending the immunisation clinic of NRS Medical College, Kolkata, India and willing to participate in the study. Sample size was estimated by following way:

According to a cross sectional study in Andhra Pradesh, 71.5% mothers stated that hand washing was important in prevention of some or the other communicable diseases [11]. Therefore based on anticipated population proportion  $P = 71.5\%$  and assuming confidence level of 95% and absolute precision of 6%, the minimum required sample size was calculated using the formula [12]:

$$n = Z^2_{1-\alpha/2} \frac{P(1-P)}{d^2}$$
$$Z^2_{1-\alpha/2} = 1.96$$
$$P = 71.5\% = 0.72$$
$$d = 6\%$$
$$= \frac{(1.96)^2 \times 0.72(1-0.72)}{(0.06)^2}$$
$$= 215$$

Assuming 15% of non responder, minimum sample size was 248. A total of 300 mothers of under five children were included in the study after interviewing every third mother attending the immunisation clinic of NRS Medical College during study period, using the predesigned, pretested & semi structured schedule. Prior institutional ethical clearance and informed verbal consent were obtained from the participants who were assured of anonymity and confidentiality of information collected. Independent study variables were age, residence (rural/urban), religion (Hindu/Muslim/Christian), caste (general/SC/ST/OBC), literacy status of mother (illiterate/non-formal/primary/secondary/higher secondary and above), occupation of mother (homemaker/working), type of family (nuclear/Joint), socioeconomic class and dependent variable was water, sanitation hygiene & hand washing practices. Collected data were analyzed by proportions & expressed as percentages.

## III. Results

Majority (79.33%) of the mothers belonged to the age group of 20-29 years. The proportion of mothers from rural and urban areas was almost equal. More than three fourths (77.3%) of the study population was Hindus. Less than half (44.6%) of the study population was from unreserved category. Almost one third belonged to scheduled castes. One fifth (20.6%) of the study population was either illiterate or non formal literates. Almost half (48.6%) of mothers were educated up to secondary level & above. Majority (86.67%) of the mothers were home-makers. Almost 2/3rd of the study population (61.3%) was from nuclear families. 76% of the study population belonged to social class III or below (according to modified B. G. Prasad scale 2014) [13] [Table 1].

**Table 1:** Sociodemographic profile of the study population  
(n = 300)

Variables	Characters	No (%)
Age Group (years)	< 19	22 (7.33)
	20 – 29	238 (79.33)
	30 – 39	38 (12.67)
	≥ 40	2 (0.67)
Residence	Rural	156 (52.00)
	Urban	144 (48.00)
Religion	Hindu	232 (77.33)
	Muslim	66 (22.00)
	Christian	2 (0.67)
Caste	General (unreserved)	134 (44.67)
	OBC	52 (17.33)
	SC	96 (32.00)
	ST	18 (6.00)
Education	Illiterate	30 (10.00)
	Non formal literate	32 (10.67)
	Primary	52 (17.33)
	Middle	40 (13.33)
	Secondary	96 (32.00)
	Higher secondary & above	50 (16.67)
Occupation	Homemaker	260 (86.67)
	Working	40 (13.33)
Type of family	Nuclear	184 (61.33)
	Joint	116 (38.67)
Social class	I (≥ 5357)	6 (2.0)
	II (2652-5356)	66 (22.00)
	III (1570-2651)	64 (21.33)
	IV (812-1569)	106 (35.33)
	V (< 811)	58 (19.34)

About half (51.3%) of the study population received piped drinking water supply. Among those subjects who received piped water supply, majority (70%) of the study population received intermittent water supply. About 1/4th (26.6%) of the study population had to queue for drinking water. Almost half (51%) of the subjects who had to queue for drinking water have to wait for 10-20 min to receive drinking water and almost one third (30%) had to wait for 20 minutes or more. Majority (69.3%) of the study population used plastic products (bottles & buckets) for the storage of drinking water. Another significant storage container is metal pots. More than half (55.3%) of the study population cleaned the storage containers daily. Most of the study population (65%) used to drink water without any purification at household level. Among half (47%) of the study subjects who purified the drinking water, boiling is the common practice for purification [Table 2].

**Table 2: Distribution of the study population on water supply, storage & purification**

Variables	Characters	No (%)
Main source of drinking water (n=300)	Piped Water supply	154 (51.33)
	Tube well	132 (44.00)
	Well	12 (4.00)
	Pond	2 (0.67)
Type of water supply (n=154)	Continuous	46 (29.87)
	intermittent	108 (70.13)
Queuing for drinking water (n=300)	Yes	80 (26.67)
	No	220 (73.33)
Queuing time (n=80)	<10 min	15 (18.75)
	10-20 min	41 (51.25)
	20-30 min	14 (17.5)
	>30 min	10 (12.5)
Storage container (n=300) *	Plastic bucket	122 (40.67)
	Plastic bottles	86 (28.67)
	Earthen pot	26 (8.67)
	Metal pot	80 (26.67)
	Others (glass container etc)	16 (5.33)
Frequency of cleaning container (n=300)	Daily	166 (55.33)
	>1 time weekly	56 (18.66)
	Once weekly	54 (18.00)
	Monthly	4 (1.34)
	When container is dirty	20 (6.67)
Purification of drinking water (n=300)	Yes	106 (35.33)
	No	194 (64.67)
Method of purification of drinking water at household level (n=106)	UV radiation	34 (32.08)
	Boiling	50 (47.17)
	Filtration	22 (20.75)

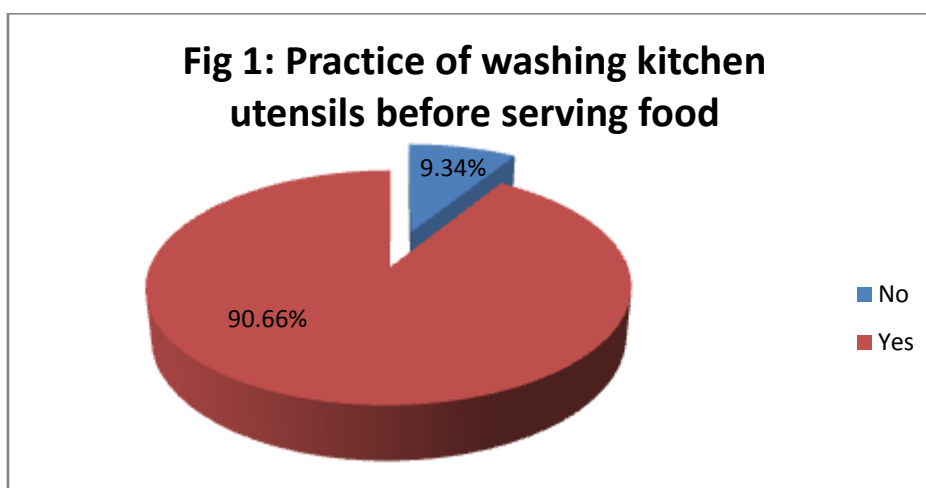
\* Multiple responses

Majority (86%) of the study population had access to sanitary latrines & 72% of them had their own latrines. Almost half (44.4%) of the common latrine users were sharing latrines with 5 or more families. About 17% of the study population still practiced open field defecation, of which one fifth (10 out of 50) had access to sanitary latrine. Majority (80%) of the study population, who practiced open field defecation, cited the reason for this to be absence of sanitary toilets. 46% of the study population used garbage pit or open area to dispose the stool of under five children. About 1/5<sup>th</sup> (19.3%) of the study population used open area for disposing off the solid waste [Table 3].

**Table 3: Available sanitation facilities & solid waste disposal practices of the study population**

Variables	Characters	No (%)
Sanitary latrine (n=300)	Present	260 (86.67)
	Absent	40 (13.33)
Ownership of Sanitary latrine (n=260)	Owned	188 (72.31)
	Common	72 (27.69)
No. of families using common latrine (n=72)	≤ 4	40 (55.56)
	5-9	24 (33.33)
	≥ 10	8 (11.11)
Defecation practice (n=300)	Open defecation	50 (16.67)
	Sanitary latrine	250 (83.33)
Reason for not using sanitary latrine (n=50)	Not present	40 (80.0)
	Dirty toilet	4 (8.0)
	Long queue	6 (12.0)
Method of disposal of stool of under-5 children (n=300)	Sanitary latrine	124 (41.33)
	Garbage pit	74 (24.67)
	Open field	64 (21.33)
	Buried	32 (10.67)
	Others (in river etc)	6 (2.00)
Disposal of solid waste (n=300)	Garbage pit	162 (54.00)
	Buried	52 (17.33)
	Burnt	12 (4.00)
	Open	58 (19.33)
	Municipality service	16 (5.34)

Majority (90.7%) of the study population washed the kitchen utensils before serving food [Fig 1].



Majority of the study population were aware of the timing of hand washing practices. Majority (74.6%) of the study population used soap & water for washing hands. 73% of the study population believed that hand washing is important for removal of dirt, while 45% believed it to be for prevention of diseases [Table 4].

**Table 4: Hand washing knowledge & practices of the study population**

Variables	Characters	No (%)
Time of washing hands (n=300) *	After defecation	300 (100.00)
	After cleaning child's faeces	296 (98.67)
	Before cooking	242 (80.67)
	Before eating	286 (95.33)
	Before breast feeding	224 (74.67)
Material used for washing hands (n=300)	Soap & water	224 (74.67)

	Only water	62 (20.67)
	Ash & water	14 (4.66)
Knowledge of importance of washing hands (n=300) *	Removes dirt	220 (73.33)
	Prevents disease	136 (45.33)

\* Multiple responses

#### IV. Discussion

Clean water and optimum sanitation facilities can prevent the occurrence of various infectious diseases and help in curbing the associated morbidity and mortality. The current study was conducted among mothers of under five children attending the immunisation clinic of NRS Medical College to understand the existing water and sanitation facilities available to the study population & their knowledge & practices regarding hand washing. The study revealed majority of the participants were in the age group of 20-29 years, Hindus, reserved category, from nuclear families & social class III or below, homemakers and educated upto primary level & above. Similar study conducted in urban slum area of Andhra Pradesh reported most of the mothers were between 20-30 years age group (69.8%), educated primary & above (61.9%), housewives ( 71.9%) & from nuclear family (69.01%) [11].

The present study found that about half of the study population received piped drinking water supply. Among those subjects who received piped water supply, majority of the study population received intermittent water supply. Almost half (51%) of the subjects who have to queue for drinking water have to wait for 10-20 min to receive drinking water. Kuberan A et al reported major sources of water procurement in Chennai, India were public tap/stand pipe (42%), half of the participants (53%) having intermittent supply of water & majority of them (81%) required <5 min for fetching water from the water outlet [14]. In current study majority of the study population used plastic bottles & buckets for the storage of drinking water followed by metal pot. More than half of the study population cleaned the storage containers daily. Similarly in Chennai study, 75% of study participants stored drinking water in wide mouth closed container and most of them cleaned water container daily (70%) [14]. According to National Family Health Survey (NFHS-3) report, in India approximately 72.7 per cent of the rural population does not use any method of water disinfection [15]. Here also most of the study population (65%) drank water without any purification at household level & 47% of the participants who purified water, boiling was the common practice. On the contrary the commonest form of disinfection in Vellore study found was single-point chlorination, using bleaching powder [3]. In a rural area of Chennai 45% of the participants were not following any methods of water treatment [14]. A Knowledge, Attitudes and Practices (KAP) study addressing water, sanitation and hygiene in a village of Caribbean island of West Indies found that 70.6% of households engaged in some form of water treatment, principally by boiling [16].

National Family Health Survey (NFHS-3) reported, approximately 74 % of Indians have no sanitary toilet [15]. Interestingly this study indicated that majority (86%) of the study population has access to sanitary latrines & 70% of them have their own latrines. Almost half (44.4%) of the common latrine users were sharing latrines with 5 or more families. About 17% of the study population still practices open field defecation, of which 1/5th had access to sanitary latrine. Similarly studies conducted at Chennai & Udipi district of Manipal, India showed that, majority of the subjects (75%) & (97.7%) respectively had latrines in their house [14] [17]. Conversely defaecating in the open fields was a common practice in CMC Vellore study [3]. In present study about 1/5th of the study population used open area for disposal of solid waste. But according to Kuberan A et al, 47% of the participants in Chennai discharged their waste in open drainage [14].

One aspect of food hygiene that many people do not address is cleaning serving dishes before taking the food which prevents stray bacteria from transferring from the dish to the food. But surprisingly in this study 90.7% of the study population washed the kitchen utensils before serving food.

Good hand-washing practices are another neglected area of maintenance of personal hygiene, especially in low-income countries like India. Although people around the world wash their hands with water, very few wash their hands with soap. Multimodal programmes for increasing hand hygiene compliance are now recommended as the most reliable, evidence-based method for ensuring sustainable improvement in hand washing practice [18]. The current study concluded that the mothers of under-5 children practiced hand washing after defecation (100%), after cleaning child's faeces (99%), before eating (95%), before cooking (81%), before breast feeding (75%). Praveen N et al in their study explored that, hand washing before preparing food & before serving food is being practiced by 76.8% & 57.4% of mothers [11]. This differs from the study by Ray SK in two communities of eastern India where hand washing was not practiced before "preparing food" and after handling raw vegetables [19]. In a study conducted at coastal Karnataka India, majority of the mothers wash their hands with soap and water after defecation (90%) and after cleaning child's bottom (87.8%) but fewer women wash their hands before cooking (31.1%), before eating (33.3%) and before feeding the child (38.9%) [19]. It was observed in the present study that majority (4/5th) of the study population used soap & water for washing hands. In Chennai study 17% of the participants used plain water or water with ash to clean their hands [13]. In current study 73% of the study population believed that importance of hand washing is

removal of dirt while 45% believed it to be prevention of diseases. On the contrary in Karnataka study almost all the respondents (96.7%) stated that hand washing was important for the prevention of diseases & 45.6% stated its importance to maintain cleanliness [20].

## V. Conclusion

The present study explored that half of the study population received piped drinking water supply, but majority did not carry out any household level of purification. Most of them had access to sanitary latrines but unfortunately 20% of them still practice open field defecation. About one fifth of participants used open area for solid waste disposal. Hence awareness must be generated among population regarding water borne illnesses & fecal transmission of diseases by various means like vectors etc. However, the translation of knowledge into sustainable behavior needs to be reinforced. Although in this study practice of mothers of under five children regarding timing & material used for hand washing was good & majority used soap & water, but their understanding on importance of hand washing was poor. In resource constraint country like India, in addition to application of other tested interventions worldwide towards improvement in hand washing practices; health workers such as anganwadi workers, ASHA under the aegis of NHM should also be motivated and supported who have better penetration among the communities towards promotion of Information Education & Communication (IEC) activities to promote proper and regular hand washing practices.

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