

Original Article

Influence of mothers' handwashing practices and availability of water and sanitary latrine on under-five morbidity

Shib Sekhar Datta, Abhijit Vinodrao Boratne, Zile Singh, V Senthilvel, Murugan Natesan, Vatsal Gajera

Abstract

Background: Clean water and handwashing are viewed as highly cost-effective for ensuring global health.

Objectives: To study association of availability of water and sanitary latrine in the household and handwashing practices of mothers, and how maternal handwashing practices and availability of water as well as sanitary latrine in the household affect morbidity among under-five children.

Methods: A community based cross-sectional study was undertaken during February 2010 covering 28 villages in coastal South India. The EPI 30-cluster sampling method was used and 1898 mothers of under-five children were interviewed regarding availability of water and sanitary latrine in the household, their handwashing practices and child morbidity in last one month.

Results: 58.9% and 39.9% households had a functioning water source and sanitary latrine respectively. Presence of water source and latrine inside the house and use of latrine improved handwashing practices of mothers ($p < 0.001$). Handwashing by mothers with soap after defaecation, after routine work, before feeding the child and after cleaning the child who had defaecated reduced diarrhoea among children ($p < 0.05$). Dwelling water supply source reduced frequency of ARI and fever among children ($p < 0.05$). Use of sanitary latrine reduced occurrence of diarrhoea ($p = 0.004$) and fever ($p = 0.01$) among under-five children.

Conclusion: Household water availability and use of sanitary latrine reduce sanitation related morbidity among children by improving handwashing practices of mothers.

Key words: Family characteristics; sanitation; handwashing.

Introduction

Clean water and handwashing are viewed as the most cost-effective interventions for ensuring global health [1]. Various studies have highlighted that simple act of handwashing could prevent diarrhoea, acute respiratory infections (ARI) and skin infections [2,3]. Young children cannot wash their own hands and therefore cannot interrupt the transfer of pathogens between their hands and their mouth [4]; whereas, most mothers in both developed and developing countries fail to wash their hands adequately after faecal contact [5]. A secure and dependable water supply contributes greatly to a healthy population, particularly when supported by promotion of hygienic behaviours [6]. Till date, very few studies from developing countries

have highlighted on various factors which influence mothers' handwashing practices and their impact on childhood morbidity. Therefore, it was planned to assess availability of water, sanitary latrine in the household and handwashing practices among mothers of under-five children, and their influence on morbidity among under-five children.

Methods

The present community based cross-sectional study was undertaken during February 2010 covering 22 villages of Villupuram district, 3 villages each of Pondicherry and Kanchipuram district, coastal South India with a total population of 32,564 under the field practice area of Department of Community Medicine, Pondicherry Institute of Medical Sciences,

Dept. of Community Medicine, Pondicherry Institute of Medical Sciences, Pondicherry - 605014 India

Corresponding Author: Dr. Shib Sekhar Datta, Department of Community Medicine, Madha Medical College and Hospital, Kovur, Chennai - 600022 India Email : drshibsekhar.datta@rediffmail.com

Received : 22-08-2010 | **Accepted :** 18-04-2011 | **Published Online :** 29-04-2011

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (creativecommons.org/licenses/by/3.0)

Conflict of interest: None declared **Source of funding:** Nil

Pondicherry, India. Trained medical undergraduates collected data under supervision, using a pre-designed and pre-tested proforma by house-to-house survey. Mothers of under-five children were informed about the reasons of the survey and a verbal consent was obtained. Mothers not willing to participate in the study and those with speech and hearing impairment were excluded from the study (n=22). The EPI 30 cluster sampling method was used to carry out the survey; 30 such clusters with 60 mothers of under-five children in each cluster were considered and a total of 1898 mothers were covered with two additional clusters from bigger villages considered during study design for non-response. For study purpose, a mother and child was taken as one unit. Information regarding availability and source of water in the house, availability and use of sanitary latrine in the house and child's morbidity in last one month was collected. Practice of handwashing was defined as washing hands with plain or antimicrobial soap and water [7]. Handwashing by mothers after defaecation and at other critical moments viz. before preparing food, before feeding the child, after cleaning child who had just defaecated, and after routine work was

enquired.

The data were analysed using Epi Info software package version 6.04 and Statistical Package for the Social Sciences for Windows (SPSS) version 16.0. To compare data sets chi-square test was used and $p < 0.05$ was considered statistically significant.

Results

Household water and sanitary latrine availability and handwashing by mothers is shown in table 1. In the study area, households get water through tap (48.89%), bore well (18.81%) and hand pump (22.81%), while 180 (9.49%) respondents used other sources of water supply such as ponds, shallow wells etc. 1118 (58.9%) mothers stated presence of a functioning source of water supply in their houses. Only 759 (39.99%) houses had a sanitary latrine and 597 (78.66%) latrines had a running water supply. Four-fifths of the mothers in households with water source inside were washing hands after defaecation, as compared to three-fifths of the mothers who did not have such water source available. Only three-fourths of the households having latrines were actually using them. 85.9%

Table 1- Availability of water and sanitary latrine in the household and handwashing practices among mothers of under five year children (N=1898)

Characteristics	Number practicing handwashing n(%)
Source of water	
Tap	722/928 (77.80)
Bore well	266/357 (74.51)
Hand pump	267 /433(61.66)
Other	134/180 (74.44)
Functioning tap, hand pump or bore well in the house	
Yes	906/1118 (81.04)
No	483/780 (61.92)
Presence of sanitary latrine in the house	
Yes	652/759 (85.90)
No	737/1139 (64.71)
Use of sanitary latrine (N=759)	
Yes	500/565 (88.50)
No	112/194 (57.73)
Presence of running water in latrine (N=759)	
Yes	507/597 (84.93)
No	102/162 (62.96)

Chi-square value $p < 0.001$ in all instances

mothers washed their hands after defaecation where sanitary latrine was available as compared to 65% mothers where such facility was absent. 88.5% mothers who used sanitary latrines were washing their hands after defaecation, as compared to 57.73% mothers who were not using the latrines. 85% mothers washed their hands after defaecation in households having running water in the latrine, as against 63% mothers, where it was absent.

The respective proportion of mothers washing their hands with soap and water after defaecation, before preparing food, before feeding the child, after cleaning the child who had defaecated and after routine work is 73.18%, 20.92%, 29.98%, 63.91% and 17.18% respectively. It was noticed that the incidence of diarrhoea, ARI and skin infections are more in children of those mothers who did not practice handwashing at these critical moments (table 2).

The association between household water and latrine availability and childhood morbidity is depicted in table 3. Under-five children belonging to households having bore well water supply suffered less from diarrhoea, skin infections and any morbidity. A functioning source of water supply in the houses significantly reduced occurrence of ARI, fever and skin infections among children. Presence of a sanitary latrine in the household did not bring down any morbidity among under-five children except for reduction in fever episodes. However, use of sanitary latrine and presence of running water in the latrine did reduce incidence of diarrhoea as well (table 3).

Discussion

It has been observed that, availability of water and soap at household and their presence near latrine dramatically improves handwashing practices after

Table 2- Handwashing practices of mothers and morbidity among under five year children (N=1898)

Childhood morbidity indicators	Mothers washing hands with soap and water		p value
	Yes n (%)	No n (%)	
After defaecation	1389	509	
Diarrhoea	200 (14.40)	96 (18.86)	0.037*
ARI	796 (57.31)	280 (55.01)	
Skin infections	90 (6.48)	25 (4.91)	
Before preparing food	397	1501	
Diarrhoea	51 (12.85)	245 (16.32)	0.090
ARI	237 (59.70)	839 (55.90)	
Skin infections	30 (7.56)	85 (5.66)	
Before feeding child	569	1329	
Diarrhoea	63 (11.07)	233 (17.53)	0.004*
ARI	333 (58.52)	743 (55.91)	
Skin infections	37 (6.50)	78 (5.87)	
After cleaning child who has defecated	1213	685	
Diarrhoea	157 (12.94)	139 (20.29)	0.002*
ARI	687 (56.64)	389 (56.79)	
Skin infections	76 (6.27)	39 (5.69)	
After routine work	326	1572	
Diarrhoea	48 (14.72)	248 (15.78)	0.020*
ARI	181 (55.52)	895 (56.93)	
Skin infections	31 (9.51)	84 (5.34)	

* p value statistically significant

toilet viz. faecal contact and other critical moments [8]. In present study, only 58.9% households had a source of water in their house, and only 39.9% had a sanitary latrine. However, handwashing practices of mothers did improve significantly due to availability of water source and sanitary latrine in their houses.

Maternal handwashing practices, most importantly after faecal contact and other critical occasions like before preparing food, before feeding the child and after routine work are also important in curtailing childhood morbidity [9]. However, prevalence of handwashing with soap and water after contact with faeces is still low (less than 30%) where diarrhoea and other communicable diseases are important causes of child morbidity [10,11]. Study from Kolkata, reported practice of handwashing after defaecation and after cleaning babies' faeces as 59% and 21.7% respectively [12]. In current study, 73.18% and 63.91% mothers washed their hands after defaecation and after cleaning the child who had defaecated. Higher handwashing practices among mothers in the current study may be attributed to better water availability in the study area.

Presence of regular water supply inside the house [13, 14] and use of latrine [15] has been associated with improved handwashing practices and decreased childhood morbidity including diarrhoea, ARI, and skin infections. In the present study,

handwashing by mothers varied depending on the criticality of the event as perceived by the mothers. It was lowest after routine work (17.18%), and highest after defaecation (73.18%). The frequency of diarrhoea among children significantly reduced with maternal handwashing, although it did not influence incidence of ARI and skin infections. This suggests relative ineffectiveness of handwashing practices on respiratory and surface infections among children.

In present study, use of sanitary latrine by households proved protective against diarrhoea among children. Similarly, presence of water supply and sanitary latrine in the house and use of sanitary latrine by households protected children from fever. Water availability inside the house improved handwashing practices of mothers after critical moments. This fact, together with use of sanitary latrine can effectively reduce the occurrence of sanitation related communicable childhood illnesses.

It is noteworthy that, India has experienced inadequate water supply and handwashing practices over the years, yet much importance has not been given to these tools for prevention of communicable diseases. However, in recent years major investments in water and sanitation infrastructure

Table 3- Availability of water, sanitary latrine and its use and association with child mortality

Characteristics	Diarrhoea	ARI	Fever	Skin infection	Any morbidity
Source of water					
Tap	148 (15.9)*	533 (57.4)	367 (39.6)	55 (5.9)*	733 (79)*
Bore well	40 (11.2)*	180 (50.4)	131 (36.7)	13 (3.6)*	261 (73.1)*
Hand pump	77 (17.8)*	240 (55.4)	193 (44.6)	35 (8.1)*	354 (81.8)*
Functioning tap, hand pump or bore well in the house					
Yes	163 (14.6)	611 (54.6)*	427 (38.2)*	83 (7.4)*	866 (77.4)
No	133 (17.1)	465 (59.6)*	336 (43.1)*	32 (4.1)*	630 (80.8)
Presence of sanitary latrine in the house					
Yes	106 (13.9)	418 (55.1)	282 (37.2)*	47 (6.2)	583 (76.8)
No	190 (16.7)	658 (57.8)	481 (42.2)*	68 (6)	913 (80.2)
Use of sanitary latrine					
Yes	67 (11.9)**	322 (57)	195 (34.5)*	33 (5.8)	435 (77)
No	39 (20.1)**	96 (49.4)	87 (44.9)*	14 (7.2)	148 (76.3)
Presence of running water in latrine					
Yes	92 (15.4)*	331 (55.4)	200 (33.5)**	36 (6)	454 (76.1)
No	14 (8.6)*	87 (53.7)	82 (50.6)**	11 (6.8)	129 (79.6)

* p < 0.05, ** p < 0.001 ; Figures in parenthesis are percentages

have taken place. Thus, a concerted effort needs to be made both at policy as well as implementation level to provide access to adequate clean water at household level and promote construction and use of sanitary latrine to improve handwashing practices and thereby reduce childhood sanitation related morbidity.

Key Points

- Household water availability improves handwashing practices of mothers and reduces morbidity among young children.
- Use of sanitary latrine by households reduces sanitation related morbidity among young children.
- Availability of water at household level and use of sanitary latrine by households should be promoted to improve handwashing practices of mothers and decrease morbidity among their children.

References

1. Jamison DT, Breman JG, Measham AR et al. (eds). *Disease Control Priorities in Developing Countries*, 2nd edn. Oxford: Oxford University Press, 2006.
2. Luby SP, Agboatwalla M, Feikin DR, Painter J, Billhimer W, Altaf A, Hoekstra RM. Effect of handwashing on child health: A randomized controlled trial. *The Lancet* 2005 July; 366 (9481): 225-233.
3. Shahid NS, Greenough WB, Samadi AR, Hug IM and Rahaman N. Handwashing with soap reduces Diarrhoea and spread of bacterial pathogen in a Bangladesh village. *J Diarrhoeal Dis Res* 1996 Jun; 14(2):85-89.
4. WLuby SP, Agboatwalla M, Painter J, Altaf A, Billhimer W, Hoekstra RM. Effect of intensive handwashing promotion on childhood diarrhoea in high-risk communities in Pakistan: A randomized controlled trial. *JAMA* 2004; 291(21):2547-2554.
5. LiKosek M, Bern C and Guerrant RL. The global burden of diarrhoeal disease, as estimated from studies published between 1992 and 2000. *Bulletin of the World Health Organization* 2003;(81):197-204.
6. Boonyakarnku T and Kingston PA. Water Supply, sanitation, and the children of Thailand. *Regional Health Forum* 2003; 7(1):48-55.
7. World Health Organisation. *WHO guidelines on Hand Hygiene in Health Care*. Geneva, Switzerland: World Health Organisation 2009; Part I: 2.
8. Luby SP, Halder AK, Tronchet C, Akhter S, Bhuiya A and Johnston R. Household Characteristics Associated with Handwashing with Soap in Rural Bangladesh. *Am J Trop Med Hyg* 2009; 81 (5): 882-887.
9. Lanata CF, Huttly SR, Yeager BA. Diarrhoea: whose feces matter? Reflections from studies in a Peruvian shanty town. *Pediatric Infectious Disease Journal* 1998;17(1):7-9.
10. Biran A, Rabie T, Schmidt W, Juvekar S, Hirve S, Curtis V. Comparing the performance of indicators of hand-washing practices in rural Indian households. *Trop Med Int Health* 2008; 13(2): 278-285.
11. Curtis V, Kanki B, Cousens S, Diallo I, Kpozehouen A, Sangare M, Nikiema M. Evidence of behaviour change following a hygiene promotion programme in Burkina Faso. *Bull World Health Organ* 2001; 79(6): 518-527.
12. Ray SK, Dobe M, Lahiri A and Basu SS. Handwashing practices in urban and rural communities in and around Kolkata, West Bengal. *Indian Journal of Public Health* 2009; 53(3):192-195.
13. Luby SP, Halder AK. Associations among handwashing indicators, wealth and symptoms of childhood respiratory illness in urban Bangladesh. *Tropical Medicine and International Health* 2008; 13 (6); 835-844.
14. Clasen T, Roberts I, Rabie T, Schmidt W and Cairncross S. Interventions to improve water quality for preventing diarrhoea. *Cochrane Database of Systematic Reviews* 2006; (3). Art. No.: Cd004794.
15. Biran A, Tabyshaliev A and Salmorbekova Z. Formative research for hygiene promotion in Kyrgyzstan. *Health Policy Plan* 2005; 20(4): 213-221.