Abstract

A cross-sectional survey was carried out in a rural village in Nueva Ecija province in the Philippines to identify the association between mothers' hygiene behaviour and their socioeconomic status and household environment. A total of 206 mothers with children aged 0-5 years old participated in this study. Household visits with face-to-face interviews using a structured questionnaire and observation of household environments were conducted. Logistic regression analysis revealed that the frequency of water boiling in mothers was significantly associated with children aged under two years old and the availability of domestic electricity. Availability of domestic electricity, mother's educational level, possession of a private lavatory and of a private well were significant predictors of whether hand-washing with soap was practiced after defecation. For hand-washing with soap before feeding children, child's age under one year old and the volume of the water supply were statistically significant. The volume of the water supply was identified as a significant predictor. Although health educational programme participation rates were very high (83.2%), no significant association with hygiene behaviour was observed.

This study indicates that improvements in water availability, household environment and health education may contribute to more frequent hand-washing. ***Asia Pac J Public Health 2002; 14(2): 91-98.***

Keywords: **Hygiene, socioeconomic, household environment, water, health education, behaviour.**

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Domestic Hygiene Behaviour of Mothers with Children Aged 0–5 Years Old in Tayabo Village, Nueva Ecija, the Philippines

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Introduction

Child diarrhoea has been and still is one of the major causes of child mortality especially in developing countries[1-4]. To reduce mortality and morbidity rates caused by child diarrhoea, an adequate supply of safe water and the installation of basic sanitation facilities have been shown to be crucial[1-2]. During the decade of International Water Supply and Sanitation from 1981 to 1990, access to safe water supplies and sanitation facilities were greatly increased[5]. However, several studies have suggested[4-5] that the majority of the cases of child diarrhoea are caused by ingesting certain bacteria, viruses or parasites which may be spread through water, food, hands and so forth[1,3,6-7]. Several studies have also indicated that infant diarrhoea might be reduced by improved domestic hygiene behaviour, such as more frequent hand-washing by child caretakers[4,6,8-15]. The World Health Organisation (WHO), UNICEF has tried to encourage communities and families to promote desirable hygienic behaviour[1,3]. Their primary message to communities and families is that diarrhoea could be prevented by washing hands with soap after contact with excrement[3]. However, in spite of significant efforts and studies, people's hygiene behaviour did not change, especially in developing countries[8].

Pickford *et al.* (1994)[5] have shown that improving the hygiene practices of mothers is especially important as shown by that mothers are considered to be the best teachers of health and have the potential to influence family members, particularly the children. The present study is to clarify the domestic behaviour of targeted mothers and to examine factors associated with good hygiene.

Study area

Nueva Ecija Province is located in the Central Luzon area of the Luzon islands, approximately 100 kilometres north of Metro Manila, the capital of the Philippines. Nueva Ecija province is largely agrarian with many paddy fields, and is categorised as a rural area[16]. Tayabo village is one of the villages in San Jose city, located along the national highway. Socioeconomic status of Tayabo village is approximately average for the study area[17].

According to a household survey conducted in 1997[18], the total population of Tayabo village was 3,392 (male 1,765, female 1,627), with

a total of 617 households.

Subjects and Methods

Study design

The study was designed based on the conceptual framework devised by Oratai *et al.*[19] which identified several independent variables that might influence personal hygiene behaviour. A cross sectional study was carried out using a structured questionnaire, face-to-face interviews and observations of each household's environment. The study was conducted from August to September 1998.

Sampling

Two stage cluster sampling was used in this study. Two villages were approximately average in terms of socioeconomic status according to the village household survey (1997) conducted by the local non-government organisation, PRRM (Philippine Rural Reconstruction Movement). The larger of the two villages was then selected. There were no reliable household addresses, so ten zones within the twelve zones were selected randomly based on the cluster sampling method. All the households within the selected clusters were visited. A total of 206 mothers who had a child aged 0-5 years agreed to participate in this study.

Table 1. Socio-demographic characteristics (N = 202)

Variables		n	(%)
Mother's age			
	<20	8	(4.0%)
	20-29	93	(46.0%)
	30-39	84	(41.6%)
	40-49	15	(7.4%)
	50-59	2	(1.0%)
	Mean(SD)		29.9(6.8)
Child's age			
	<1	50	(24.8%)
	1	49	(24.2%)
	2	45	(22.3%)
	3	23	(11.4%)
	4	18	(8.9%)
	5	17	(8.4%)
	Mean(SD)		1.8(1.6)
Mother's occupation			
	housewife	179	(88.6%)
	self employment	9	(4.5%)
	public sector worker	6	(3.0%)
	farmer	3	(1.5%)
	have two jobs	2	(1.0%)
	others	3	(1.5%)
Mother's educational level			
	no schooling	0	(0.0%)
	primary school not completed	27	(13.4%)
	primary school completed	47	(23.3%)
	secondary school not completed	44	(21.8%)
	secondary school completed	42	(20.8%)
	college, university not completed	30	(14.8%)
	college, university completed	11	(5.4%)
	N/A	1	(0.5%)
Mother's attendance to health education program before			
	yes	168	(83.2%)
	no	31	(15.3%)
	N/A	3	(1.5%)

N/A=not available

Structured questionnaire

Variables assessed by the questionnaire were: child and mother's age, level of education, experience of health education, occupation, economic status, presence of utilities, household wealth (for examples, possession of radio, television, refrigerator, means of transport), sanitary conditions such as a source of water, water treatment, lavatory use, and mother's hygiene behaviour. In addition, results of the observation of the household by the researchers were also included, such as the existence of soap and the presence of domestic animals.

Training of the interviewers

Six community health workers were trained as interviewers for two days. During this time, the content of the questionnaire was reviewed by the interviewers, all of whom were familiar with the area.

Statistical analysis

The variables that indicated mothers' socioeconomic status, household environment and hand-washing and water treatment behaviour, were analysed using the chi-square test and Fisher's test. We employed multivariate analyses (logistic regression analyses) to determine the variables associated with desirable hygiene behaviour. All the statistical analyses used a p-value of 0.05 for statistical significance. SPSS software version 10.0 for Windows was employed.

Results

Socio-demographic characteristics of respondents

Among the mothers interviewed, we

found four children who were over six years old. Therefore we excluded four data from the results. The effective answers totalled 202 out of 206 mothers (the effective answer rate was 98.1%) (*Table 1*).

Ages of mothers interviewed ranged from 16 to 52 with a mean of 29.9±6.8 (*SD*) years. The mean age of children was 1.8±1.6 (*SD*) years. Nearly a half of mothers (49.0%) had children under two years old. As regards to the occupation of the mothers, 88.6% were housewives, and only 11.4% of mothers had another occupation. All the respondents had some kind of formal education, 36.7% was enrolled in elementary school, 42.6% had entered high school, and 20.2% had attended an institution of higher education such as a college or university. Many of the mothers interviewed (83.2%) have attended some health education and participated in health-related activities in the study area.

Possession of private property

Since we did not ask about monthly income, the possession of private property as a measure of the economic status of the respondents was ascertained. The majority of those interviewed owned land (56.4 %) or a house (72.8 %). However, only 27.7% of the households owned any kind of vehicle, and only 12.9% of respondents owned a refrigerator. Almost half of the respondents had a radio (49.5%), either as their only source of broadcast information or with a television (42.6%) as well (Table 2).

Table 2. Possession of private properties (N = 202)

Variables		n	(%)
Land	yes	114	(56.4%)
	no	87	(43.1%)
	N/A	1	(0.5%)
House	yes	147	(72.8%)
	no	54	(26.7%)
	N/A	1	(0.5%)
Car/bicycle/motor cycle[a]	yes	56	(27.7%)
	no	145	(71.8%)
	N/A	1	(0.5%)
Refrigerator	yes	26	(12.9%)
	no	167	(82.7%)
	N/A	9	(4.4%)
Information sources	radio only	100	(49.5%)
	radio and televisio	86	(42.6%)
	none	11	(5.4%)
	N/A	5	(2.5%)

[a]Car, bicycle, motor cycle: at least one vehicle such as car, bicycle or motor cycle.
N/A = not available

Household environment

In the study area, ground water was a common source for domestic use. Of the respondents interviewed, 36.6% used a private well with a hand pump as the source of their drinking water and the remaining 62.4% used a communal well with a hand pump. Rainwater was seldom used as drinking water. Half of the respondents (50.0%) used a source of water within three minutes walk, and the other half (50.0%) had to walk for more than three minutes to reach the water source. More than half of the households had electricity (65.3%). With regard to latrines, 40.6% of the households used open pits, 45.5% used water-sealed toilets, and 13.9% had no fixed latrine and used bushes whichever was convenient. Approximately one third of the households (31.6%) shared a latrine with other households (Table 3).

In 49.7% of the households, researchers observed domestic animals including dogs, cats, ducks and hens. Dogs and cats were the most common kinds of animals inside the houses, and were often seen roaming around the cooking area.

Mother's water-related and hand-washing hygiene behaviour

The data on water treatment showed that 46.6% of the mothers boiled drinking water before consumption. Filtering water or other water-treatment measures were not widely used. Soap was commonly observed near the domestic water source (72.3%). With regard to the hand-washing behaviour of mothers, 81.2% of the mothers answered that they washed their hands after defecating, 76.7% washed their hands before feeding their children and 65.3% washed their hands before cooking (Table 4).

Possession of a private well and water volume, distance from water source, presence of soap

Table 5 outlines the variables associated with the possession of private well and the distance from water source, water volume and presence of soap near the water source. Possession of private well and water volume (p=0.000), distance from water source (p=0.000), presence of soap (p=0.012) were positively associated.

Variables associated with mothers' hygiene behaviour

Table 6 demonstrates the variables associated with mother's hygiene behaviour. Water boiling was positively associated with the youngest child under two years old

Table 3. Household environment

	n	(%)
Sources of drinking water (N=202)		
private well	74	(36.6%)
communal well	126	(62.4%)
rain water collection	2	(1.0%)
Distance to water source (N=196)[a]		
within 3 minutes' walk	98	(50.0%)
more than 3 minutes' walk	98	(50.0%)
Provided domestic water volume (N=200)[b]		
less than demand	59	(29.5%)
more than or enough for demand	141	(70.5%)
Availability of electricity (N=202)		
available	132	(65.3%)
not available	70	(34.7%)
Latrine Type (N=202)		
open pit	82	(40.6%)
water sealed	92	(45.5%)
no latrine	28	(13.9%)
Possession of Latrine (N=174)		
use communal/shared latrine	59	(31.6%)
possess private (family use only) latrine	128	(68.4%)
Presence of domestic animals (Observation) (N=197)[c]		
present	98	(49.7%)
absent	99	(50.3%)

[a]Not available (N/A)=6, [b]N/A=1, [c]N/A=5

Table 4. Mother's hygiene behaviour on water and hand washing (N = 202)

Variable	n	(%)
Water treatment for drinking		
no treatment	104	(51.5%)
boiling water	94	(46.6%)
filtering, put tablets	4	(1.9%)
Presence of soap near the water source (Observation)		
Present	146	(72.3%)
Absent	56	(27.7%)
Hand washing with soap		
After defecation		
yes	164	(81.2%)
Before feeding child		
yes	155	(76.7%)
Before cooking		
yes	132	(65.3%)

($p \leq 0.05$), attendance of health education programmes ($p \leq 0.05$), and household electricity availability ($p \leq 0.05$). Hand washing with soap after defecation was significantly associated with higher education ($p \leq 0.05$), possession of private well ($p \leq 0.05$), accessibility to water source within three minutes' walk ($p \leq 0.05$), and household electricity availability ($p \leq 0.01$). Hand washing with soap before feeding the child was positively associated with the possession of a private well ($p \leq 0.05$), accessibility to water source within three minutes' walk ($p \leq 0.05$), and household electricity availability ($p \leq 0.05$).

Predictors of desirable hygiene behaviour

Table 7 shows the results of the logistic regression analyses of the variables associated with mothers' hygiene behaviour. In the logistic regression, variables were added that showed a significant difference using the chi-square test between good hygiene behaviour and the independent variables. The chi-square tests revealed that there were no significant associations between the possession of land, the possession of a house, attendance of health education programs and hygienic behaviour.

In assessing the frequency of boiling of water before drinking, children aged under two years old (OR=1.786, 95%CI=1.021-3.124, p=0.042) and domestic electricity supply (OR=1.828, 95%CI=1.012-3.301, p=0.046), were found statistically significant predictors. Neither volume of domestic water supply nor mother's education was found significant. With regard to hand-washing with soap after defecation; domestic electricity supply (OR=4.090, 95%CI=1.906-8.777, p=0.000), mother's educational level (OR=3.612, 95%CI=1.688-7.729, p=0.001), possession of a private latrine (OR=2.659, 95%CI=1.241-5.697, p=0.012) and private well (OR=3.173, 95%CI=1.248-8.067, p=0.015) were found significantly to be the predictors. For assessing the likelihood that hand-washing with soap was practiced before feeding the children, logistic regression analysis revealed that the child's age under one year old (OR=2.769,

Table 5. Distance from water resources, water volume and presence of soap between those in possession of private well and non-possession of private well

Variables	Possession of private well		Non-possession of private well		p -value[a]
	n	%	n	%	
Water volume enough or more than demand	71	(97.3%)	71	(55.5%)	0.000***
Water volume less than demand	2	(2.7%)	57	(44.5%)	
Living within three minutes' walk of the source of drinking water	69	(95.8%)	95	(76.6%)	0.000***
Living more than three minutes' walk of the source of drinking water	3	(4.2%)	29	(23.4%)	
Presence of soap near the water Source: Yes	60	(84.5%)	86	(68.3%)	0.012*
No	11	(15.5%)	40	(31.7%)	

[a]chi-square test, $*p \le 0.05$, $**p \le 0.01$, $***p \le 0.001$

Table 6. Mother's hygiene behaviour and studied variables

	Water treatment				Hand washing +soap after defecation				Hand washing + soap before feeding child			
	Boiling		No treatment		Yes		No		Yes		No	
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
Age of the youngest child												
<2 yrs.	53	(54.6)*	44	(45.4)	80	(82.5)	17	(17.5)	73	(75.3)	24	(24.7)
2-5 yrs.	41	(40.6)	60	(59.4)	84	(82.4)	18	(17.6)	82	(80.4)	20	(19.6)
Educational background												
High	41	(51.3)	39	(48.8)	75	(92.6)*	6	(7.4)	68	(84.0)	13	(16.0)
Low	53	(45.3)	64	(54.7)	88	(75.2)	29	(24.8)	86	(73.5)	31	(26.5)
Health education attendance												
Yes	82	(49.7)*	83	(50.3)	134	(81.2)	31	(18.8)	128	(77.6)	37	(22.4)
No	11	(36.7)	19	(63.3)	28	(18.8)	3	(9.7)	24	(77.4)	7	(22.6)
Possesion of private well												
Yes	31	(43.7)	40	(56.3)	65	(91.5)*	6	(8.5)	63	(88.7)*	8	(11.3)
No	63	(49.6)	64	(50.4)	99	(77.3)	29	(22.7)	92	(71.9)	36	(28.1)
Access to water sources												
< 3 min	42	(44.7)	52	(55.3)	85	(89.5)*	10	(10.5)	82	(86.3)*	13	(13.7)
3 min +	50	(51.0)	48	(49.0)	73	(74.5)	25	(25.5)	68	(69.4)	30	(30.6)
Electricity												
Available	68	(52.7)*	61	(47.3)	116	(89.9)**	13	(10.1)	109	(84.5)*	20	(15.5)
Not available	26	(37.7)	43	(62.3)	48	(68.6)	22	(31.4)	46	(65.7)	24	(34.3)

$*p \le 0.05$, $**p \le 0.01$

95%*CI*=1.350-5.679, p=0.005) and the volume of water supply (*OR*=2.166, 95%*CI*=1.079-4.348, p=0.030) were significant variables. The volume of water supply (*OR*=2.088, 95%*CI*=1.112-3.922, p=0.022) was identified as the only significant predictor of hand-washing with soap before cooking. The mother's educational level (*OR*=1.762, 95%*CI*=0.964-3.221, p=0.066) was not found to be a significant predictor.

Discussion

This study showed that mothers whose youngest child was under two years old were more likely to boil drinking water than mothers whose youngest child was aged two to five. This could be interpreted as follows: when a child is very young, mothers pay more attention to the child's health and tend to protect the infant from contaminated water.

Domestic electricity supply was found to be a significant predictor of whether the mother regularly boiled drinking water and washed their hands with soap after defecation. Domestic electricity availability is a difficult variable to interpret in terms of its direct relationship with hygienic behaviour. However, one study reported that for mothers with at least primary school education, household electricity supply could be an important socioeconomic factor in

Table 7. Logistic regression analysis of factors associated with mother's hygiene behaviour

Variable	Boiling water before drinking			
	OR	95%*CI*	*p* value	
Child age<2 years old[a]	1.786	1.021-3.124	0.042	*
Domestic electricity supply[b]	1.828	1.012-3.301	0.046	*
Volume of domestic water supply[c]	1.571	0.852-2.898	N.S	
Mother's education[d]	1.100	0.619-1.954	N.S	
	Hand washing with soap after defecation			
Domestic electricity supply[b]	4.090	1.906-8.777	0.000	***
Mother's education[d]	3.612	1.688-7.729	0.001	**
Possession of private (not shared) latrine[e]	2.659	1.241-5.697	0.012	*
Possession of private well[f]	3.173	1.248-8.067	0.015	*
	Hand washing with soap before feeding child			
Child age <1year old[g]	2.769	1.350-5.679	0.005	**
Volume of domestic water supply[c]	2.166	1.079-4.348	0.030	*
	Hand washing with soap before cooking			
Volume of domestic water supply[c]	2.088	1.112-3.922	0.022	*
Mother's education[d]	1.762	0.964-3.221	N.S	

[a]Child age<2yrs: 1= child age<2yrs, 0=child age≥2yrs; [b]Domestic electricity supply: 1=have domestic electricity supply, 0=do not have domestic electricity supply; [c]Volume of domestic water supply: 1=have enough volume of water supply, 0=volume of water supply less than demand; [d]Mother's education: 1=secondary or higher, 0=none or primary school; [e]Posession of private (not shared) latrine: 1=possess private latrine,0=not possess latrine or latrine shared with neighbours; [f]Possession of private well: 1=possess private well in the household. 0=not possess private well or public /community well user, [g]Child age <1yr: 1=Child age<1yr, 0=Child age≥1yr; *OR*=odds ratio, *CI*=confidence intervals, *$p\leq0.05$, *$p\leq0.01$, ***$p\leq0.001$
NS= not significant

determining child survival in developing countries[10]. This might have complicated the relationship between domestic electricity supply and better hygiene behaviour. However, it is well known that electricity supply reduces women's domestic work, and more time might be allocated to schooling or learning activities. Our study also suggests that the mother's higher education and domestic electricity supply may have a positive influence on desirable hygiene behaviour.

In the present study, the majority of mothers (more than 65%) answered that they washed their hands with soap after defecation, before feeding their children and cooking. The rate was surprisingly high compared to previous studies conducted in Africa and other Asian countries[11-12]. This high rate may be attributed to the influence of economic development in this area.

Hand-washing after defecation is recognised as the most effective means of preventing the transmission of bacteria causing diarrhoea[20-21]. This study also revealed that mother's educational level, possession of a private latrine, and a private well were important predictors of hand-washing behaviour after defecation. These results indicate that an improved household environment with an adequate provision of water, a basic sanitary infrastructure and educational input for mothers could promote better hygiene behaviour. The results of the analysis of hand-washing befor feeding the children suggest that if th volume of domestic water supply wer increased, more mothers would was their hands with soap.

These associations suggest th better access to water sources enable the mothers to use water for washin their hands[22]. As shown in Table living within three minutes walk of th water source and the volume of wat meets the demand. Moreove abundance of water is required fc hand-washing with soap, and, in th study area, those mothers who ha better access to water were able t obtain plentiful amounts (Table 5).

The present study found th 72.3% of the households had soap ne their source of water, showing th they had access to soap. Th affordability of soap may influence th hygiene behaviour of mothers in th study area. It has been shown that th cost of soap can be an obstacle promoting effective hand-washing[13- This study also supports th observation made by previou accounts, that hand-washing befo feeding the children is not considere as important as hand-washing aft defecation[15].

In the present study, mothers wh have a child under one year old we more likely to be careful with th child's health. However, one stud showed[23] that quite a few mothe discussed the importance of han washing before preparing foo Washing hands before preparing foc was a common practice for som while for others it was more commc after a meal[24]. When a meal is take outside the home, even a caretak may easily forget about hand-washin because of the lack of water[23].

Hand-washing with soap befo preparing food and eating recognised as sophisticated behaviou since Curtis *et al.* (2000) suggeste that hand-washing before eatin was considered a secondary barri to transmission of pathoger transmission[3]. They emphasised th safe stool disposal should be a primar barrier to prevent pathogens. In th respect, it might be considered th fewer mothers wash their hands befo cooking. The necessity of ensurin hygienic food preparation, not just fc infants but also for children and adult

needs to become more widely recognised. In the present analysis, only the volume of the water supply was identified as a possible determinant of hand-washing with soap before preparing food.

The present study is limited in that although observational methods were used to ascertain the household's environment, direct observation of the hygiene behaviour of the mothers was not employed. Several studies have revealed the differences between answers to interviews and actual practice[24-25]. Further studies that combine direct observational methods and questionnaires to more accurately measure the hygiene behaviour of mothers are therefore needed. Furthermore, this study concentrated on the environment of the households and on the hygiene behaviour of the respondents, and did not focus on episodes of childhood diarrhoea. Clarification of the frequency, duration, severity and outcome of the periods of diarrhoea of children in the study area would have provided more specific findings.

Nonetheless, this study offers a new perspective in investigating factors that appear to determine the hygiene behaviour of mothers. Although previous studies suggested that health education attendance has a significant association with hygiene behaviour[21,26], the present study revealed that attendance of health education programme was not found predictors of better hygiene behaviours of the mothers.

In the study site, health educational activities including family planning and prenatal check-ups are held regularly. It is suggested that in the future, programmes to promote hygiene behaviour should be included in health education programmes.

Based on the findings of the study, three measures are recommended: improvement in household environment, especially better access to water supplies; continual raising of mothers' awareness of health behaviour even after their children are no longer infants; and discussing the contents of health education programmes from different points of view before they are implemented.

Acknowledgements

The authors wish to thank the Philippine Rural Reconstruction Movement (PRRM), Mitsubishi International Foundation for the financial support, and the ex-Secretariat General of Japan Overseas Cooperation Volunteers, Mr. Morihisa Aoki. The authors are especially grateful for the invaluable comments on this paper by Dr Osamu Kunii, former Assistant Professor, the University of Tokyo.

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