THE SUSTAINABILITY AND IMPACT OF SCHOOL SANITATION, WATER AND HYGIENE EDUCATION IN KENYA

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EXECUTIVE SUMMARY

This study investigated impact and sustainability of school interventions for water, sanitation and hygiene education (WASH). It was carried out in 100 schools spread over 3 districts (Nairobi, Mombasa, Kwale). In each school a range of data collection methods was used: interviews with teachers, observations of school facilities, observations of handwashing practices of 1000 children, classroom voting by 4900 children and small group discussions with children in 16 schools. The schools had an average population of about 1,000 pupils. Schools had varying inputs in terms of construction of water, sanitation or handwashing facilities or training of teachers and children.

A large body of research from around the world demonstrates that using toilets, washing hands with soap and drinking sufficient safe water/liquids provide very significant health advantages. Therefore the study focused on these aspects of effectiveness in a WASH in school programme:

- Each child washes both hands with soap after using the toilet and, highly desired, before eating.
- Each child will use the latrine or urinal consistently.
- Each child will be able to drink safe water supplied by the school.

Focusing on these parameters of effectiveness, the research sought evidence that would be related to two questions: What makes a programme effective? What are results or impacts of an effective WASH in schools programme?

Many of the research findings follow common-sense expectations. Thus, for example, in order for children to use latrines and drink safe water consistently, the facilities must exist. However, while all schools had toilets, 12 out of the 100 schools had no water for drinking, 48 had no handwashing areas or facilities. As is expected (Table A below), in the schools that had facilities, the handwashing practice of girls and of boys was significantly better than in schools without the facilities ($p<0.0001$)[1]. Interestingly, however, in the schools which had all the facilities, there was no evidence that the toilets were used more consistently or were cleaner than in the other schools. The implication is that construction of facilities alone is not sufficient to ensure good WASH in schools.

WATER AND HANDWASHING

The water provided to the schools in the urban areas is not reliable and cannot be managed by the school alone. Some of the schools in Nairobi and Mombasa face major water shortages.

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[1] For interpretation of these p values, see footnote 7 on page 11.

Number of water taps or points: On average there were about 3 working water taps or water points, with a mean of 203 children per tap. However, in 26 schools more than 500 children had to share one water tap. When there were more water points for the children, then more girls ($p<0.0001$) and boys ($p<0.001$) washed their hands after using the toilet. However. no large-scale handwashing was seen. In schools where there are many hundreds of children per water point, it may be difficult to organize handwashing by children before eating. Further thought and trials of different approaches might be useful to deal with the challenges of handwashing with soap after defecation and preferably also before eating.

Location of water points or taps. When water for handwashing was located in the toilets, then the toilets tended to be cleaner ($p<0.004$). More girls ($p<0.0001$) washed their hands when there was water in the toilet (but not boys).

Soap: Only 5 out of 100 schools had soap available for children. Soap is essential for real cleansing of hands. Less than 2% (only 21 out of 951 of the children) were observed to wash their hands with soap.

SANITATION AND TOILETS

Cleanliness. Observations showed that only about 2 out of 5 (43%) schools had clean toilets. This finding was similar to the anonymous voting in which 41% of the 2,336 girls perceived the toilets to be clean, while 34% of the 2,583 boys stated that their toilets were clean.

Toilet use: In schools where children found toilets were clean, a higher proportion of the children reported using them (girls $p<0.006$, boys $p<0.009$). Similarly, for both boys and girls, toilets that afforded more privacy were used more (girls $p<0.002$, boys, $p<0.002$). Teacher planning and school organization for keeping toilets clean deserves high priority. About two out of three girls and also boys in Nairobi school classes indicated that they were afraid of teasing or bullying when they were near or in the toilets. Menstruating girls face problems when attending school, particularly with the disposal of soiled materials.

Technology and design. Less than one in three of the flush toilets are working as flush toilets. The current technology, design and materials are not sufficiently durable for heavy-use situations or situations where the water supply is irregular. This issue needs to be addressed quickly but carefully.

Used anal cleansing papers were often seen thrown around or blocking toilets or in filthy open containers. Provision of water for anal cleansing also does not appear well organized.

Operation + maintenance (O&M): Teachers were asked if maintenance and repairs had been carried out. Not unexpectedly, maintenance and repairs were related to many important aspects of the programme such as having water supply in the toilet ($p<0.05$), having more working water taps or points per child ($p<0.008$) and cleaner toilets ($p<0.05$). Thus, through this, it was also associated with reported use of the toilets by girls ($p<0.006$), though not by boys.

In almost 3 out of 5 schools it was reported that the head teacher or facilities teacher controlled the fund for maintenance and repairs together with the PTA. Where the teachers controlled the use of the fund, there tended to be better water supply in the toilets ($p<0.009$) and more taps for children ($p<0.04$). Both girls ($p<0.002$) and boys ($p<0.001$) were observed to wash hands more frequently. This interesting finding give hints about the optimum management structure of the programme.

NOT SUPPORTED BY DATA

Participation by children: Having WASH clubs was not associated with better water or sanitation in the school. The relevance of the contents of training for children and teachers in clubs was questioned.

Teach children how to use facilities. Data was contradictory. However, children in 11 out of 16 schools said that training children about how to use facilities was a special problem and was one of the top priorities for improvement.

Cleaning facilities. There was no evidence that having a janitor clean the toilets or asking children to clean facilities was related to toilet cleanliness. Only in 6 out of 100 schools did the teachers indicate that they themselves helped clean the facilities. In 5 of these 6 schools, observations showed that the toilets were indeed clean. However the number of schools is too small to generalize.

Training. There was no evidence that the training of teachers or children was related to cleaner facilities or more handwashing. In some cases the training had taken place a long time ago (8 years previously), with no refresher training. In other cases the training was of very short duration (1 day) without supervisory follow-up through school visits. No participants or trainers reported that the training addressed the challenge of how to organize the large population of children in a school for cleanliness and good use of facilities. This implies that more relevant content, including the drafting of management/participation plans for schools, might be needed. The quality of training might be another issue deserving focus, building on positive past experience. Several teachers commented positively and in detail on the participatory PHAST training carried out almost 9 years before this study.

Supervision. The Department of Public health staff sometimes visit the schools to teach children on hygiene and health subjects. They may also inspect the schools during the visits. However, there was no systematic in-school supervision or inspection evident after the construction. This may deserve attention and was mentioned by teachers and district personnel during the data collection in all three districts.

WHAT COULD BE THE RESULTS AND IMPACT OF AN EFFECTIVE PROGRAMMES?

It is very difficult to identify health impacts from most programmes. However, the data indicated that girls were absent less in schools where there was more handwashing ($p<0.043$) and a very high toilet use ($p<0.048$). The association suggests that in one way or another, the successful implementation of the WASH package in a school can significantly reduce girls' absenteeism, a substantial and highly desirable impact from the project. The same was not true for boys which might imply that in schools where toilets are not available, convenient, private and hygienic and where handwashing is not practicable, it is more likely that girls will stay at home during menstruation; it has often been claimed that this occurs, but until now most of the evidence has been anecdotal.

Another impact, the motivation to build and use toilets in the homes of the children depends, as children indicated in the focus group discussions, on having successful, well-maintained toilets within the school.

Thus, the findings indicate that the overall strategy for WASH in schools includes:

- An agreed targets for clean, universally-used toilets. Universal handwashing with soap after using the toilet. Handwashing before eating.
- Improve the availability of water, specifically, water for flushing/cleansing/handwashing in the toilet and reducing number of children per water point.
- Emphasis on organizing repairs and doing maintenance; the control of the fund by teacher with the PTA for repairs and maintenance
- Address some specific issues: (a) flush toilet technology, disposal of soiled papers, (b) school-based planning for mass handwashing with soap, (c) child/teacher participation in monitoring, (d) teaching children how to use facilities. Two other issues are: effectiveness of training and retraining; need for supervisory school visits. The active involvement of professionals in the Ministers and departments of Health, Water and Education are perhaps key. Their day-to-day supervision, focusing on training and adherence to guidelines for WASH in schools may be central to ensuring the sustainability of the facilities.

The overall strategy is to move beyond construction. Indeed, research in such varied locations as Bangladesh, India, Indonesia, Malawi, Peru, Sri Lanka and Vietnam has also demonstrated that facilities and construction interventions alone are often not sufficient to provide a health advantage.[2]

Table A summary of statistically significant findings from the study

The checkmark "✓" shows the strength of the statistical association between the two variables. ✓✓✓ means very strong statistical link (p<.001). ✓✓ means strong (p<.01). ✓ means there is an association between the two variables (p<.05).

	Girls' observed handwash	Boys observed handwash	Girls reported toilet use	Boys observed toilet use	Clean toilets	Water for handwash in toilet	Number children per tap
School has drinking water, handwashing, toilet facilities	✓✓✓	✓✓✓				✓✓✓	
Water for washing hands is in toilet	✓✓✓				✓✓		
Number of children per water tap	✓✓✓	✓✓					
O&M carried out			✓✓		✓	✓	✓✓
Teacher jointly controls O&M fund	✓✓	✓✓✓				✓✓	✓
Perceived toilet cleanliness			✓✓	✓✓			
Perceived privacy in toilet			✓✓	✓✓			
School absences of girls	✓		✓				

ACRONYMS

HW	Handwashing
INEE	Inter-Agency Network for Education in Emergencies
NGO	Non-governmental organization
O&M	Operation and maintenance
PTA	Parent-Teachers Association
PHAST	Participatory Hygiene and Sanitation Transformation
SHC	School Health Club
SMC	School Management Committee
SSHE	School water, sanitation and hygiene education
UNICEF	United Nations Children's Fund
WASH	Water, sanitation and hygiene
WFP	World Food Program.

[2] Hill, Zelee, Betty Kirkwood and Karen Edmond (2004) Family and community practices that promote child survival, growth and development : a review of the evidence. World Health Organization.
Cairncross, Sandy and Kathleen Shordt (2004) It does last! Some findings from the multi-country study of hygiene sustainability. Waterlines. Vol 22. No. 3. http://www.irc.nl/page/9971
Robinson, A.J. (2005) Lessons Learned from Bangladesh, India, and Pakistan: Scaling-Up Rural Sanitation in South Asia. Water and Sanitation Program-South Asia. http://www.wsp.org/publications/SANITATION%20STUDY_PRESS.pdf
Varley, R.C.G., Tarvid, J. & Chao D.N.W. 1998. A reassessment of the cost-effectiveness of water and sanitation interventions in programmes for controlling childhood diarrhoea. Bulletin of the World Health Organization, 76(6):617-631.

INTRODUCTION

In the school just as at home, children have a right to safe drinking water, clean toilets and handwashing facilities and clean surroundings. The school can reach the younger generation to stimulate health-promoting behaviours[3], helping children try out hygienic practices. Indeed, research has indicated that school interventions can stimulate hygiene and sanitation behaviours which are sustained beyond the period of the intervention[4]. These school programmes for water and sanitation are also supported by governments and international agencies as part of the effort for universal primary education as well as universal sanitation where the school is seen as a point of outreach to the household for improving sanitation.

However, less is known about the particular programme elements that lead to long-term sustainability of school programmes for water, sanitation and hygiene behaviours or about the impact of these programmes. This study has investigated aspects related to sustainability and impact in 100 schools drawn from three districts in Kenya. The research provided an opportunity to examine associations between various components of the school intervention, on the one hand, and the current school conditions and student practices, on the other. This, in turn, provided some insights into optimum programming, specifically, addressing the question: *What makes a good school water, sanitation and hygiene education programme?*

This study was carried out in 2006-2007, with the support of UNICEF, as a collaborative research programme on school water, sanitation and hygiene education with three organizations in Kenya, India and the Netherlands[5]. The Kenyan research group was the Network for Water and Sanitation (NETWAS International), a professional, non-profit network for Africa focusing on water, sanitation and environment sector. With headquarters in Nairobi, it is comprised of resource centres in Eastern Africa implementing capacity building activities for professionals, applied research, networking and information sharing, advocacy, advisory and consultancy services.

STUDY SITES AND PRIOR INTERVENTIONS

The study focused on selected schools in:

- Urban Nairobi,
- Urban and peri-urban Mombasa on the seacoast
- Rural Kwale district which is adjacent to Mombasa district.

The research must be understood in the national context. First, the advent of free primary education in 2003 greatly increased the enrolments and put pressure on the infrastructure, meaning that some school facilities were no longer adequate to serve the larger body of children. A second significant external feature is the water situation. All three areas suffer water deficits and in urban areas, the location of the school on the distribution network has a major impact on water availability in the school. Both of these variables have a major impact on the school water, sanitation and hygiene programme.

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[3] See, for example, Snel, Mariëlle, Sumita Ganguly and Kathleen Shordt (2002). **School Sanitation and Hygiene Education – India: Resource Book.** Delft, the Netherlands, IRC International Water and Sanitation Centre. (Technical Paper Series; no. 39). 268 p. Prepared with the support of UNICEF-India.

[4] **School Sanitation and Hygiene Education Results from the assessment of a 6-country pilot project 2006.** UNICEF and IRC International Water and Sanitation Centre, Netherlands. 44 pages. www.**schools**anitation.org/Resources/Readings/UNICEF6Country.pdf

[5] NETWAS Network for Water and Sanitation, Nairobi, Kenya and the IRC International Water and Sanitation Centre, Delft, Netherlands.

Nairobi schools

In Nairobi, the study was carried out in the dense, informal settlements of Kibera. The school children in these informal settlements were of mixed ethnicity and religion. In Kibera, the Nairobi Municipal Council and departments for health and water carried out a project in 20 schools from 2005 through 2007 in cooperation with UNICEF. This project operated over a fixed time period to provide hardware (construction of water, handwashing and sanitation facilities) and software inputs (training of teachers and children) to each school. Total costs were roughly equivalent to US$12,000 per school at early 2007 prices. The study focused on the 20 intervention and 20 other primary schools also in Kibera and related slums which were not in this project. Enrolments in schools were about 800 to 2500 children.

Not all the new toilet/handwashing facilities were in use at the time of the study, although earlier-constructed facilities were being used. Toilet blocks were constructed by a contractor, following a uniform design. All the new toilet blocks have 2 long sinks for hand washing. All toilet blocks were built with flush toilets, with 8 or 9 cubicles and one cubicle for showering.

Table 1 Nairobi: status of intervention schools

Of the 20 project schools…	# schools
toilets in use at time of survey	6
HW facilities were in use at time of survey	5
School WASH clubs organized and trained	19
Teachers trained in SSHE, WASH or general health	17

Topics in the 2-day teacher training included promotion of hand washing, use of latrines, safe drinking water, formation of WASH clubs in schools. Teachers and children were trained by a consultant. In addition, a teacher's organization (NATWAM-Nairobi Teachers WASH Movement) provided training for children separately, where some materials and learning tools were distributed.

Figure 1 Mombasa painting on school wall

Mombasa district and schools

The second intervention district was Mombasa, an urban centre on the coast with an average population density of about 3200 people per sq km. Mombasa is Kenya's chief port on the Indian Ocean and an important commercial and industrial center. Despite the high average density, the Municipality not only manages large urban schools but also smaller schools of peri-urban and rural character. Beginning in 1991, UNICEF in partnership with the Municipal Council of Mombasa initiated the school health programme. The earliest of these interventions were geared towards the construction of toilets and

latrines. After 1997, in view of the water scarcity in Mombasa, the programme expanded to include water facilities, new technical designs and training for teachers as well as public health officers who supervised the school programme. This training, called PHAST (Participatory Hygiene and Sanitation Transformation) is not primarily focused on schools. It seeks to empower communities to manage their water services and control sanitation-related diseases by promoting collective health awareness and understanding, which in turn is meant to lead to environmental and behavioural improvements. In 2007, additional support was given to organize and train children to activate health clubs that also focused on HIV-AIDS.

The inputs to improve water supply included provision of water storage tanks, piped water re – connection in the school, and construction of hand dug wells in some schools. There was monitoring of the construction works.

Kwale District

Kwale is a rural district, adjacent to Mombasa with about half a million people and an average population density of only 58 per square kilometer. Occupations include farming (maize, cassava, bananas, coconuts), livestock and fishing and some mining. Some inputs for school sanitation began in the early 1990s, mainly with the construction of toilets. Later, water supply and training were implemented in selected schools. Schools have received one or two inputs, but not a whole package for toilets, water, handwashing facilities, and software such as teacher training, organizing school WASH clubs for children and making educational wall paintings.

In Kwale, PHAST training of teachers was carried out in week-long programmes in 1999. Most of the physical implementation of water and sanitation facilities was done from 2002 through to 2005.

Table 2 Project inputs in kwale district

Year	1999	2002	2003	2004	2005
water tanks, 5,000 to 10,000 liter capacity		10 schools		18 schools	
repair of water tanks		9 schools			
toilet blocks (4 cubicles each for boys and girls)			9 schools	3 schools with hand wash facilities	12 schools with hand wash facilities
Training	18 schools, 51 teachers				

The following tables describe the interventions in the three districts in greater detail.

Table 3 inputs for intervention schools

	Nairobi	Kwale	Mombasa
Dates	2005-2007	Approx. 1991, 1995, 1997, 1999, 2002-5	Approx. 1991, 1995, 1997, 2001-4, 2006-7
# of intervention primary schools	20	15	15
# control schools	20	15	15
Carried out by	Departments of water development and Health,	Departments of Health, water, many external	Departments of Health, water, many external

	Nairobi City Council, Consultant and training NGO, UNICEF	support agencies and UNICEF	support agencies and UNICEF
Training by UNICEF[6]	Teachers: 2 days Children: Teacher organization and a consultant	18 schools PHAST training: 7 days	Public health extension staff, also teachers who inspect schools, some PTA parents. Children: health clubs set up and trained
Water facilities (by UNICEF)	5,000 liter water tanks, installation done by school or external agency	5,000 liter water takes in 28 schools. Tank repair in 9 schools.	5000 liter tanks, open wells, connections to piped water
Sanitation (by UNICEF)	Toilet blocks: all flush toilets, sinks. Mobilets in 5 schools. Rehabilitation of toilets in some schools.	toilet blocks with handwashing facilities in 15 schools. Toilet blocks in 9 schools	Toilet blocks in 18 schools (VIP) by UNICEF.
Other	Wall paintings	6 child-friendly toilets constructed for pre-primary institutions	
	School clubs including some water and sanitation issues	School clubs including some water and sanitation issues	School clubs, including water, sanitation and hygiene issues.

In these districts, . UNICEF programmes are normally linked with each other. For example programmes for WASH, Nutrition, Education, Heath and HIV AIDs operate in the same districts and sometimes involve the same personnel. Thus a certain synergy may operate, making it very difficult to isolate the effects from one set of interventions for WASH in schools, compared to other interventions. many agencies in addition to UNICEF have supported school programmes. Therefore, it was not possible to separate the inputs for water, sanitation and hygiene supported by one agency from those supported by another (or from the government). In addition to the government health and education departments and UNICEF, the other agencies involved in school water and sanitation have included: the Catholic Archdiocese, Aga Khan Foundation, JOICA, PLAN, Borne Free Foundation, VDT, ActionAid, Verkaart, and so on. Thus the schools in this study have had somewhat different inputs in different years. The inputs have varied in duration, strategy and time since completion. Thus we can refer to schools with some additional inputs from various agencies, but not project schools in the usual sense.

METHODS AND MATERIALS

SAMPLING

Data were collected by three teams of 3 people each, over a four week period in September/October 2007 in 100 schools, half of which had some inputs from UNICEF, and half without these inputs, (although they may have had inputs from other organizations, as noted earlier). The visits to the schools were unannounced, although the schools in the districts knew that there was a research study on-going. From a list of intervention schools in Mombasa and in Kwale, 15 schools were selected at random from each district. Control schools were selected by going to the next school and checking that it was not an intervention school. In Nairobi, all the 20 schools in which UNICEF was finishing its inputs were selected for study. The remaining 20 schools were those in the same peripheral areas of slums, chiefly the Kibera slum.

[6] In some schools, there was additional training, or construction of water or sanitation facilities supported by other organizations; however, the details of this are not known in detail.

Table 4 study samples

District	Number of schools in study	Number of control schools	Number of small group interviews with children	Number of children voting (ages 13 to 15 years)	Observed practices of children (# of children)
Nairobi	20	20	16	2330 (1218 boys, 1112 girls)	385
Kwale	15	15	8	1067 (586 boys, 481 girls)	300
Mombasa	15	15	8	1522 (779 boys, 743 girls)	300
Total	50	50	32 groups with about 120 children in all (16 girl groups, 16 boy groups)	4919 children (2583 boys, 2,336 girls)	985 children (500 girls, 485 boys)

Data collection and analysis

The research protocol was in English, supplemented by local languages when needed (for example, with children). The protocol had been field tested and improvements made accordingly. Data were subsequently analysed by Kathleen Shordt of the IRC International Water and Sanitation Centre and Dr Wolf-Peter Schmidt of the London School of Hygiene and Tropical Medicine.

Measurements

Sustainability was taken to mean the continued functioning, maintenance, cleanliness, acceptability and use of school facilities for water, sanitation, handwashing. Thus, within the school, data was collected about these variables through:

- interviews with the head teacher and teachers;
- inspection of the facilities;
- observations of handwashing practice among children;
- anonymous class voting; and
- small group interviews.

For the class voting, information was collected in one class in each school which had students aged 13 to 16 years through anonymous written items about their satisfaction with facilities, cleanliness of facilities, current hygiene practices, and sensitive issues related to teasing/harrassment. These responses were cross checked and discussed in greater depth (including issues related to menstruation and use of the school facilities) during the small group interviews with girls and boys separately. Female data collectors held the discussions with girls. Thus measurement of hygiene behaviours was done through peer-reporting, observations as well as self-reporting.

It is difficult to measure the health impact of an intervention after its completion particularly where there were other, subsequent interventions[7]. In this study, an attempt to investigate health impacts was

[7] About this, see, for example: Cairncross, Sandy (1999). Measuring the health impact of water and sanitation. WELL FACTSHEET http://www.lboro.ac.uk/well/resources/fact-sheets/fact-sheets-htm/mthiws.htm

Cairncross Sandy (1990). Health impacts in developing countries: new evidence and new prospects. **Journal of the Institution of Water and Environmental Management.** 4 (6): 571–577.31.

Curtis, Valerie and Bernadette Kanki, Simon Cousens, Ibrahim Diallo, Alphonse Kpozehouen, Morike Sangare´ & Michel Nikiema (2001) Evidence of behaviour change following a hygiene promotion programme in Burkina Faso. Bulletin of the World Health Organization, 79 (6): 518-527. http://www.who.int/docstore/bulletin/pdf/2001/issue6/vol.79.no.6.518-527.pdf

combined with measurement of other impact variables. Thus, the possible impact of the school water, sanitation and hygiene education programmes was investigated in three ways:

- The attendance register was checked with a view to comparing attendance between schools which had water/sanitation intervention and those that did not.
- Continuation of hygienic practices, is a measure of sustainability but also is considered to be a measurement of impact.
- Continuing inputs for maintenance of water/sanitation facilities by the school or the local government were compared for intervention and control schools. This was viewed as an indicator of impact on management--- whether they continued to support maintenance.

Data analysis

The analysis had two components: (a) comparison among the three districts of the indicators of sustainability and impact of the interventions, and (b) investigating associations between variables among the 100 schools. The results are shown in the tables below, where the p-value is provided at the bottom of the table. In the tables, "NS" means not significant[8].

A problematic though probably unavoidable methodological feature of the survey is the delivery of the school sanitation intervention at district level. Schools within one district are likely to be more similar to each other than to schools in other districts. However, the conventional calculation of p-values and confidence intervals assumes that individual schools were randomly allocated to the intervention regardless of location. Thus, the p-values presented in this report relating to differences between districts are therefore only indicative.

FINDINGS

Number of children*:* The schools which had UNICEF-supported inputs were significantly larger than control schools with an average number of students (mean) more than 1,100 (Table 5). The average population of all the schools in Kwale was 631, but in the cities this was much larger: in Mombasa more than 1014 and in Nariobi 1336.

Table 5 Average number of children per school

Input school	N (schools)	Mean no. of children	SD
No	50	906	544
Yes	50	1159	560
P		0.025	

INPUTS

This section compares the inputs from UNICEF for the schools with other schools that did not have these inputs. It was not possible, however, to identify all inputs or those from other agencies.

[8] The p-value is the probability that the results could have arisen by chance. Statisticians consider that an apparent association is 'significant' if the p-value is less than 0.05 (5%, or a chance of one in twenty of it being a coincidence). This does not mean that a p-value of 0.06 means that there is no association or that p=0.04 means that the association is proven. But this convention does help to focus our attention on the results for which the evidence is reasonably strong. Note also that a significant association between two variables does not necessarily mean that one variable 'caused' another.

Drinking water facilities and handwashing (HW) facilities: Most schools had drinking water for children, as shown in Table 6. About half had special areas or facilities for handwashing. Where the intervention had ended earlier (Kwale and Mombasa), less than half the UNICEF-input schools had handwashing facilities, while in urban Nairobi most schools (85%) had handwashing facilities.

Table 6 Drinking water and handwashing facilities

Input school	N (schools)	Proportion with drinking water for children	Proportion with dedicated HW facilities
No	50	84% (42)	48%
Yes	50	92%(46)	56%
P		NS	NS

"NS means "not significant association or difference".

Water for schools in Mombasa and Nairobi is usually supplied from the municipal water systems and stored in tanks on school premises. The storage tanks help compensate for irregular or low pressure in the urban water supply. Some schools in the rural district (Kwale) also experience water shortage and have water tanks with a rain-water catchment. In terms of regularity of water supply, 61 out of the 100 schools reported having water supply almost every day.

Sanitation facilities: In each school, separate toilets had been constructed for girls, although in three schools the girls had no functioning toilets; and in 3 schools the boys had no functioning toilets[9].

Table 7 Mean number of toilets constructed per 1000 children

Input school	Girls	Boys
No	60	76
Yes	70	72
P	NS	NS

Table 8 Proportion of schools with urinals (%)

Input school	number schools	for boys	for girls
No	50	63%	8%
Yes	50	81%	4%
P		0.05	NS

Table 7 shows slightly more toilet cubicles have been constructed for girls than boys; however, boys have urinals (Table 8) to offset this difference. Four-fifths of the input schools have urinals for boys which is more than the non-project schools. In the input schools, the average number of toilets per 1000 children will increase because six of the project-constructed toilet blocks in Nairobi were not yet commissioned at the time of the data collection.

Clubs for children: In some schools, the intervention by UNICEF and other institutions supported clubs for children. These are groups, usually of 20 to 80 older children in the school, who meet or undertake activities related to water, sanitation, hygiene and/or health. The clubs have varying emphases. Some were set up solely for hygiene/sanitation in the school, while others focus more on personal health and HIV/AIDS. Some exist in name only while in others children might be actively involved in some of these activities: speaking on health or sanitation topics in school assemblies, teaching younger children how to use facilities, bringing messages home, monitoring or cleaning the facilities. As Table 9 shows, in all 3 districts the proportion of input schools having these clubs was significantly greater.

[9] One of these was in Mombasa with 1100 children and had no working toilets or drinking water for either boys or girls.

Table 9 Proportion of schools with WASH clubs and trained teachers %(number)

Input school	# of schools	% of schools with WASH clubs	% of schools with teachers trained in WASH, SSHE, or PHAST (number)	Mean number of trained teachers per school
No	50	28%(14)	28% (14)	0.54
Yes	50	80%(40)	92% (46)	1.55
P		<0.001	<0.001	<0.001

Teacher training: In 1999 to 2001, teachers, district staff and municipal workers were trained in selected schools in Kwale and Mombasa districts. Training for teachers took place later, in 2006, in Nairobi district. Three types of training were reportedly provided, depending on the year and location: (a) training specifically for SSHE (sanitation, water and hygiene education) and (b) more general training (also including children) and focus on health/AIDS and (c) PHAST (Participatory Hygiene and Sanitation Transformation). As expected (Table 9), more intervention schools had trained teachers in each district. The input schools also were more likely to have more than one trained teacher per school.

Schools had different inputs: As noted earlier, schools have received varied inputs from UNICEF and other agenices. However, of the 100 schools, 23 had an entire package of: water, toilets, handwashing facilities, trained teachers, children's clubs, as shown below. Each of the 50 project schools had inputs supported by UNICEF.

Number of schools with whole package: water, toilets, handwashing facilities, teacher training, children's clubs				
	Kwale District	Mombasa District	Nairobi	total
school with total package	3	2	18	23
schools without total package	27	28	22	77
total	30	30	40	100

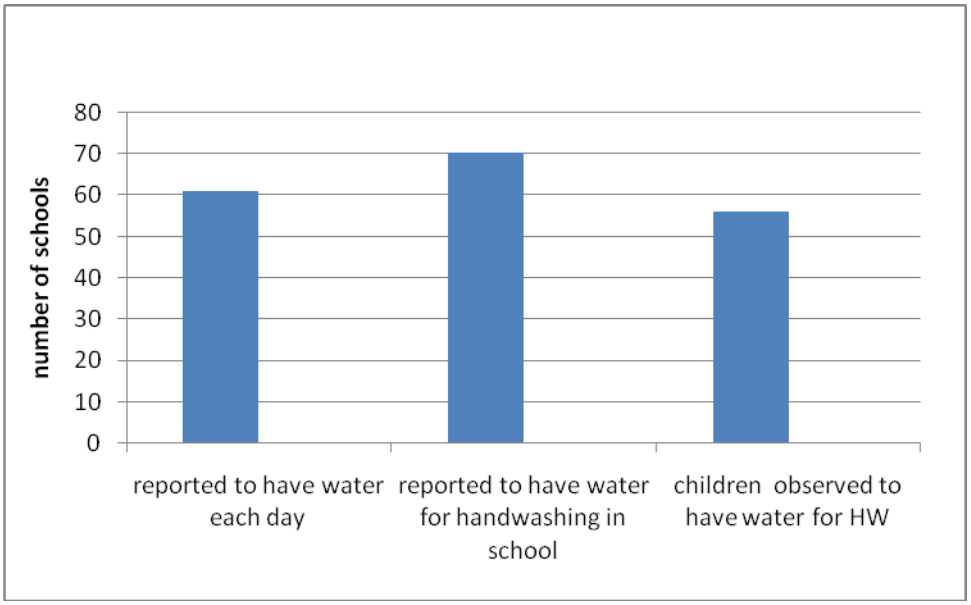
RESULTS

The study attempts to answer the questions: what were the results of these inputs for schools? What is needed for an effective SSHE programme? Our consideration of these questions is organized around five topics: water, handwashing, sanitation, management/participation and impact. In reporting the results, we do not report the Unicef input and non-input schools separately unless there was a significant difference between them.

WATER AVAILABILITY AND ACCESS

Availability of water can have different meanings, as shown in figure 1.

Figure 2 Availability of water in schools



At the time of the survey, 72 out of the 100 schools had water in the sense that a 20 litre bucket could be filled in 2 minutes or less. Sixty-one out of 100 schools reported having water supply almost each day. However, during the observation of handwashing practice it was seen that in only around half of the schools (54 out of the 100) could children get water to wash their hands. In 28 schools there was no water.

On average there were about 3 working water taps or water points per school, with a mean of 203 children per tap. In 26 schools, more than 500 children had to share one water tap.

Table 10 Number of children for one tap

One working water tap must serve	Number of schools (N = 100)
No working water taps	28
1 to 200 children	14
200 to 500 children	32
500 to 750 children	7
More than 750 children	19

These high ratios in general raise the question about the feasibility of children washing their hands in school. Imagine, for example, 500 children using one tap to wash their hands before eating, figuring two children washing their hands together at the same tap even for so short a period as 10 seconds, and then changing places with the next children. This would require most of the lunch recess to complete. Organized school handwashing by all children before eating was never seen during the month-long survey of 100 schools.

Small group interviews were held with children aged 13 to 16 years from 8 schools where the water and sanitation situation seemed better and 8 where it seemed worse. However of the 16 schools, 5 schools had no water, while another 8 (including 5 of the schools considered to be better) complained about periodic or seasonal interruptions in the supply. Other problems included too few working water taps and broken taps (mentioned in 9 schools) and inappropriate location (not near latrines for washing).

These typical responses from the children highlight the importance of management and organization in the school:

The water supply is good because it runs throughout the school term. But children have to beg for water. Water is enough but (taps are) normally closed for children not to misuse.

There is water in the school all the time but water containers in the toilets are mostly empty. The drinking water points are few.

Most of the taps are out of order. There is no water in the school and when the tank has water, only the teachers use it.

Top priority "*Drinking water with an adequate number of taps."*

Figure 3 (left) children try to get drinking water from tank with little water (above) containers that wait for water (below) not enough water outlets

Handwashing

Research shows that handwashing can provide a significant health advantage. In particular, washing hands with soap before eating and after defecation can reduce diarrheal disease morbidity, and also reduce the transmission of respiratory infections and of some influenzas.[10]

[10] See, for example, Curtis V., and S. Cairncross (2003) "Effect of washing hands with soap on diarrhoea risk in the community: a systematic review.' **Lancet Infectious Diseases** 2003;3:275–281.

Cairncross, S.(2003) Editorial: Handwashing with soap – a new way to prevent ARIs? **Tropical Medicine & International Health** 8(8):677. http://www.globalhandwashing.org/Publications/Attachments/ Cairncross-HandwashingARIs.pdf

Fung, Isaac Chun-Hai, and Sandy Cairncross (2006) "Effectiveness of handwashing in preventing SARS: a review." **Tropical Medicine & International Health 11** (11), 1749-1758.

Handwashing behaviours in school were measured in two ways:

- self-reporting by children who voted anonymously[11] and
- observations of 5 boys and 5 girls in each school after they used the toilet.

Out of roughly 4,900 children who voted, more than half (59% of the girls, 53% boys) reported washing their hands in school on the previous day. However, in the observations of almost 1000 children using the toilet, less than one-fourth were observed to actually wash their hands after doing so (Table 11).

Table 11 Handwashing behaviour in school

	Children report washing hands in school on previous day		**Children observed washing both hands after using toilet (%)**	
	Girls	**Boys**	**Girls**	**Boys**
	59%	53%	27%	19%
Total number	2,336	2,583	491	485

Access to soap, another element needed for cleaning hands, was rare. Observations during handwashing showed that only 5 out of 100 schools had soap available for handwashing. Out of 491 girls observed, 14 used soap to wash their hands. Only 7 out of 485 boys were observed to wash their hands with soap after using the toilet.

Handwashing among girls (see Table 13) after using the toilet was associated to the availability of water in the toilet area (p=.0001) and the number of children per working water tap (p=.0001). For boys, handwashing after using the toilet was statistically associated only to the number of children per tap (p=.0001). This implies that the location of the water in the latrine area is particularly important for the girls. As expected, having enough water points is necessary for all children to wash hands.

Table 12 Water availability and % schools where boys wash hands

	number of working taps per 500 children in the school		
boys washed hands after using toilet	more than 1 tap	less than 1 tap	Total number schools
Yes	76%	24%	34
No	29%	71%	63

$p < 0.0001$

Table 13 Location of water and % of schools where girls washed hands

	water for handwashing available in toilet area		
girls washed hands after using toilet	yes	not always	Total number of schools
Yes	68%	32%	47
No	17%	83%	53

$p < 0.0001$

[11] The question was: Did you wash your hands in schools yesterday (or the last school day)?

Interestingly, the observed handwashing for both boys and girls is also associated with the teacher (and PTA) controlling the fund for maintaining and repairing facilities (see Table 22 Teachers control fund for maintaining facilities and repairs).

In 32 small group interviews with children from 16 schools Children said that their top priority needs are: water supply, more water points for handwashing facilities that work, and which are located near toilets (more than 11 schools)

SANITATION:

Sanitation, in the sense used here, refers to the safe disposal of human excreta and urine. Safe sanitation provides a significant health advantage, preventing diarrheal disease, worm and other infections [12]. Four aspects of sanitation were studied: access to toilets, maintenance, cleanliness, and use of facilities by children. Table 14 shows that, on average, there were more than 60 girls and 70 boys for one working toilet cubicle in a school. This ratio will become smaller once the new toilets in Nairobi schools are all commissioned.

Table 14 Number of children for one working toilet cubicle.

	Girls	Boys
Mean number of children	67	77
Median number	50	69

However, this mean is a high ratio by international standards[13]. Furthermore, at the time of the survey, in one in three schools, there were more than 100 children per toilet. To imagine what this might mean, assume, as in many schools, that children are only allowed to use the toilet during school breaks. If a girl takes, on the average, 1 to 2 minutes in the toilet, this means that during one lunch break perhaps 15 to 20 girls, out of more than 100 would be able to use the toilet. This issue was also mentioned in the 32 small group interviews, where 22 of the groups discussed queues and need for more facilities. Some comments were:

Toilets are not enough and sometimes we are waiting to use the same facilities with small boys who cannot cope with the waiting and end up messing themselves with faeces.

The 9 cubicles are not enough for all girls, forcing the younger ones to relieve themselves outside the toilet

[12] Improvements in excreta disposal are also powerful measures to control the transmission of diarrhoea and helminth infections that can impede growth and cognitive development of children. See, for example:
Cairncross, Sandy (1999b). Measuring the health impact of water and sanitation. WELL FACTSHEET
http://www.lboro.ac.uk/well/resources/fact-sheets/fact-sheets-htm/mthiws.htm
Lenton, Roberto and Albert Wright, Kristin Lewis (2005)Health, dignity and development. What will it take? UN Millennium Development Task Force on Water and Sanitation. New York. http://www.unmillenniumproject.org/documents/WaterPart1-lowres.pdf
Nokes, C., Grantham-McGregor, S.M., Sawyer, A.W., Cooper, E.S., Robinson, B.A. and Bundy, D.A.P. (1992) Moderate to heavy infections of Trichuris trichiura affect cognitive function in Jamaican school children. Parasitology, 104: 539-547.

[13] See, for example, International Institute for Educational Planning (2006) **Guidebook for planning education in emergencies and reconstruction.** Paris. Chapter 10, p. 12. "Latrines should be built separately for boys and girls and for teachers and students. Consider the use of the following WFP standards (INEE, 2002):
• One toilet cubicle for every 25 girls.
• One toilet cubicle for every 100 boys and one urinal for every 40-60 boys." INEE (Inter-Agency Network for Education in Emergencies). 2002. "School Environment and Supplies". In: *INEE good practice guide.* http://www.ineesite.org/school/

or in corridors.

When we wait to use the toilet for a long time, we find that the pupils who have gone ahead of us have soiled them and there are faeces all the way to the entrance. In that case we wait until we go home to relieve ourselves.

Toilets are not enough so sometimes pupils have to rush each other when you get your chance to go in the toilet; doors are not lockable from the inside and so there is constant interruption when you are inside. No hand washing facilities are provided.

TOILET TECHNOLOGY

Various types of toilets have been constructed in the schools:

- pit latrines, (the simplest toilet, that requires no water) in 56 schools, including all the schools in the rural district of Kwale.
- pour flush toilets (where the toilet is usually flushed manually by pouring water into the bowl after use) in 42 schools.
- flush toilets (usually operated by pulling a cord, or the equivalent, attached to a water cistern) built in 44 schools in Nairobi and Mombasa.

Some schools have more than one toilet technology.

The average number of each toilet type is shown below, calculated for 1000 girls and 1000 boys, regardless of the size of the school. The first column in Table 155 and Table 166 shows the mean or average number of toilet cubicles of all types that have been constructed for 1000 children whether the facility is working or not. The three columns on the right show the mean number of different types of **functioning and working** toilets of each type (flush, pour-flush and pits) per 1000 children.

Table 15 Mean number of toilet cubicles per 1000 girls

Project input	Mean number of cubicles	Mean number of flush toilets	Mean number of working flush toilets	Mean number of working pour-flush	Mean number of working pit latrines
No	24.5	13.2	3.1	10.4	9.1
Yes	26.8	11.0	3.5	8.1	14.2
P	0.75	0.32	0.23	0.19	0.06

Table 16 Mean number of toilet cubicles per 1000 boys

Project input	Mean number of cubicles	Mean number of flush toilets	Mean number of working flush toilets	Mean number of working pour-flush	Mean number of working pit latrines
No	18.3	9.1	1.7	8.0	7.6
Yes	17.0	5.8	2.2	3.7	10.0
P	0.82	0.04	0.08	0.01	0.06

As Table 15 and 16 show, the average number of toilet cubicles is higher for girls than boys. The total average number of toilets for boys is significantly higher in the input schools than in the other schools. Table 15 also shows that an average of 11 flush toilets were built in project schools for every 1000 girls but only about three are working as flush toilets. Many flush toilets are being used as pour- flush toilets or not being used at all. As Table 17 shows, fewer than 1 out of 3 flush toilets were working in the schools at the time of the survey.

Table 17 Functionality of flush toilets in all schools

Proportion of flush toilets working (girls)	Proportion of flush toilets working (boys)
29%	23%

Possible reasons were given for the very high proportion of failed flush toilets in schools:

- not very strong construction, flush mechanism breaks as do the small pull wires,
- lack of understanding about how to use the flush toilets,
- lack of water in the schools for flush toilets,
- use of heavy anal cleansing papers (e.g. pieces of paper taken from school notebooks) that are not appropriate for the toilet design/technology and tend to block the toilet pipes.

Some technicians and children stated that the current technology and design is not durable. One technician drew attention to an alternative technology in the small number of schools that have "trough" toilets, with systems allowing for automatic flushing. It was stated that this technology is better for large schools, is easier to manage and will dispose of papers more efficiently than flush or pour-flush systems.

Comments from children

Most of the toilets do not flush and therefore the solid waste remains at the top. When the waste is on the top, pupils are unable to use it until it is repaired

The flushing system in the school should be repaired. The toilets should be cleaned more frequently.

Flush cisterns to be replaced with the stronger type as they get damaged very quickly.

Presence of maggots in the toilets scares the girls and therefore they avoid using them.

Technology and design should be planned with a view to the heavy use in schools, and also to the customs of personal hygiene. In Kenya, unlike some other countries, two different customs are practised, often within the same school. The Muslim children tend to use water for anal cleansing which means that water and containers should be available. The non-Muslim children tend to use either nothing for anal cleansing, or pieces of paper taken from school notebooks. This is a rather heavy material and is not suitable for the current flush toilets. In some schools the used papers are disposed of in open receptacles or boxes within the toilet cubicle, which also should be avoided for reasons of hygiene. In other schools, the papers were observed to be thrown about, or stuffed into the broken toilet cistern. This is an issue deserving further discussion and pilot trials.

Figure 4 Filthy toilets

TOILET CLEANLINESS

A toilet was defined as being clean if there was no visible faecal matter or dirty toilet papers on the floors or walls of the cubicles. Using this definition, observations showed that only about 2 out of 5 (43%) schools had clean toilets. This was similar to the results of anonymous voting in which 41% of the 2,336 girls and 34% of the 2,583 boys stated that their toilets were clean (Table 18).

Table 18 Cleanliness of toilets

Results of observation: Faeces and dirty papers on floor and walls (number of schools)			Toilets clean as perceived by girls	Toilets clean as perceived by boys	Total
dirty	A few dirty cubicles	clean	Mean % girls per class	Mean % boys per class	Number of schools
25	32	43	41%	34%	100

Having a janitor clean the toilets or asking children to clean facilities was not related to toilet cleanliness. Toilets were significantly cleaner when there was water available for children in the toilet area.

Table 19 Clean toilets have water

	Water for handwashing in the toilet		
Observed toilet cleanliness	yes	No	Total number of schools
Clean	25	18	43
Not clean	16	41	57
	$p < 0.004$		

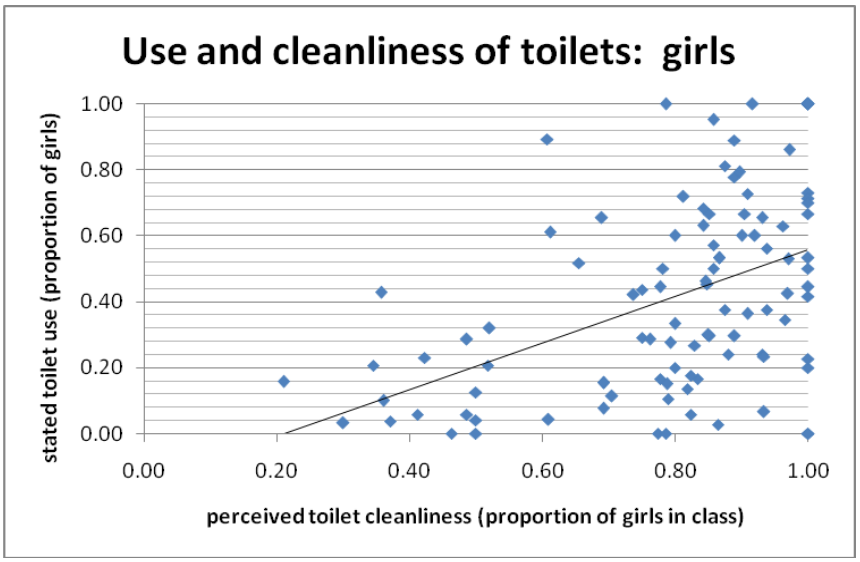
The status of the doors in the toilets was one other aspect of maintenance that was investigated. In half of the schools all the cubicles had doors that could be kept shut. Input schools were significantly better than the others (p=0.03).

USE OF TOILETS

Of the more than 2300 girls and 2400 boys who voted anonymously, slightly less than half (42% of girls and 45% of boys) in each school indicated that they disliked the toilets. In the intervention schools children liked the toilets more than in the other schools (p=0.004).

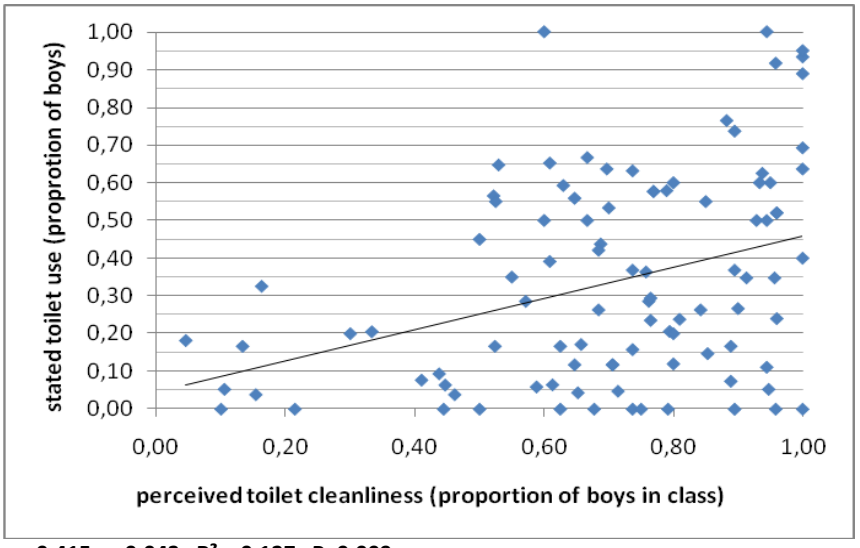
When asked if they used a school toilet the last time they were in need, more than 2/3 of the boys and 3/4 of the girls indicated that they had used the latrine. As the following figures show, there was an association between the reported use of the toilets and the proportion of girls and boys who found the toilets clean ($p<0.006$ and $p<0.009$). Children are more likely to use cleaner toilets.

Figure 5 Girls: Use and cleanliness of toilets



y =0.702x - 0.146. R^2 = 0.215 P<0.006

Figure 6 Boys: Use and cleanliness of toilets



y = 0.415x + 0.043 R^2 = 0.127 P<0.009

Similarly there was a strong association between perceived privacy and use of toilets. In the classes where more girls and boys found the toilets private (good doors and toilets located separately for boys and girls), then the use of the toilets was significantly greater p<0.002 and p<0.006).

TEASING + BULLYING

The more than 4,900 children were asked if they were sometimes afraid of teasing or bullying when they were near or in the toilets. Table 20 shows the results of this voting exercise where by far the greater proportion of Nairobi children expressed fear. Two thirds of the girls and boys in the Nairobi schools said they were sometimes afraid of teasing or bullying. The corresponding proportion was around one-fourth of the children for Mombasa and below one-fifth in Kwale (Table 20).

It may be expected that fear of teasing and bullying would bother more girls than boys, but in fact, both of them expressed fear. Data collectors said the following: boys can be rough with each other, shouting or shoving younger boys and this is the origin of the fear. However, they stated that for girls, there is not only the shouting at little girls to get out of toilets quickly, but also the fear of teasing by boys or sexual harrassment.

Table 20 Are you sometimes afraid of teasing or bullying when you are in or near the toilet?

Average % of girls or boys per class saying YES.		
District	Girls	Boys
Kwale	16%	19%
Mombasa	22%	27%
Nairobi	66%	70%

Most of the groups mentioned the need for more, working toilets. In the 32 small group interviews, 17 groups in 11 out of the 16 schools commented on dirty, smelly toilets that needed to be cleaned and repaired. Lack of water, specifically in the toilet, was mentioned by 9 groups. About half the groups, both boys and girls, identified privacy/doors as a priority for improvement. In 5 schools, children said that being allowed to go to the toilet only during the break period meant that children raced to the toilet.

MENSTRUATION

In small group interviews in 16 schools, women interviewers asked girls about menstruation. At least two groups said: *The girls ask for permission to go home when menstruating .*

About what they use, one group said: *Some use tissue or notepaper paper or cloth when the parents have no money to buy the sanitary towels.* Another said: *The girls use old sheets for protection during their menses but these are not reliable.*

Therefore, girls appreciate that some schools can provide pads in emergencies (7 out of 16 mentioned this).

Another problem is the disposal of dirty paper and pads, particularly where there are flush or pour-flush toilets. Girls in several schools asked to have bins to dispose of pads and paper in the toilet. Some menstruating girls said they used pit latrines which, however, are dirty and few in number.

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SOFTWARE: MANAGEMENT, CAPACITY, PARTICIPATION

There are a cluster of activities in WASH school programmes that do not relate directly to construction or maintenance of hardware, but to things people and children do to create and sustain an effective programme. We examined some of these so-called software factors[14] that might influence the water and sanitation situation in the school:

- training and education

[14] UNICEF and IRC (2006) School Sanitation and Hygiene Education Results from the assessment of a 6-country pilot project. IRC International Water and Sanitation Centre, Netherlands.

- participation: children's clubs, parent-teacher's association and school management committee activities
- organizing O&M (operation and maintenance) of facilities in the school

Well managed programme-- examples given by the children

The toilets are adequate and have been allocated to each class for girls and for boys

The toilets are good and well constructed. The small girls (classes 1 -3) have their own and so do the girls in upper classes. Pupils help to keep the toilets clean. The school has employed a cleaner.

Figure 7 school assembly for health education

TRAINING AND EDUCATION

There was no evidence that schools with more trained teachers or more WASH education for children had cleaner facilities. The teachers who reported that they taught children how to use facilities or had outreach activities in the community, did not have schools with cleaner toilets, more water or better handwashing practice. These reported education activities were not associated with the WASH situation in the school. There could be several explanations for this. For example:

(a) Education activities are not important for WASH in schools. We reject this possibility.

(b) The training and education was defective, not relevant to school facilities and their use. Evidence for this might be that schools which had just finished training in Nairobi did not have cleaner facilities.

(c) Teacher training took place too long ago and was of too short duration to have continuing effect. Evidence for this might be that the training took place 5 years ago in Mombasa and Kwale.

(d) The tools used to gather information were defective. Evidence for this is implied by the discrepancy between the teacher's and children's reports. Teachers, in 80 of the 100 schools, said that children had been trained in how to use facilities. This was belied by the statement by children in 11 out of 16 schools during the focus group interviews, that training children about how to use facilities was a special problem and should be one of the top priorities for improvement.

What children say ...

Need to tell little kids to wash hands (7 schools)

Teach littler kids how to use toilets (5 schools)

Small kids versus the older ones (6 schools): *Children don't know how to use the toilet if they are living in an informal settlement.*

We tell small boys to use the school toilets the way they use home toilets.

The first thing should be to educate children on how to use the facilities, then improve drinking water and provide hand washing facilities in the toilets.

Some follow-up school discussions and observations would be useful to understand the positioning of teacher training and children's education and supervision.

PARTICIPATION: CHILDREN'S CLUBS, PARENT-TEACHER'S ASSOCIATION AND SCHOOL MANAGEMENT COMMITTEE ACTIVITIES

There were more children's clubs for WASH/health in the input schools than in the other schools ($p<0.0001$) and they met more frequently, according to both the teachers and the children ($p<.0001$). However, there was no evidence that schools with active WASH clubs had better handwashing practice or cleaner facilities or more soap available for children.

Discussions with a small number of teachers and children raised the question of to what extent the training of children and the WASH/health clubs were relevant to the maintenance or use of school facilities. It was pointed out that in all 3 districts, the WASH club training and teacher training were done by different organizations from those which organized the school facilities (both from UNICEF and other donor agencies), often at times not coordinated with the construction. Perhaps the interface of the software and hardware deserves further investigation in the design of interventions.

For the Parent-Teacher Associations, or school management committees, there was no evidence that schools with more active PTAs had cleaner facilities, more frequent use of toilets, or better water supply. When the PTA collaborated with the teacher, as noted below, it seems to have had an impact, however.

Figure 8 Tap does not work

ORGANIZING O+M (OPERATION AND MAINTENANCE) OF FACILITIES**:** With the implementation of Kenya's free primary education policy in January 2003, large numbers of children entered schools, creating additional pressure on school infrastructure. Under this policy, the government provided a fund, based on the number of students, to replace the previous parent payments for operation and maintenance. These funds are controlled by the (SMC) school management committees or (PTA) Parent Teachers' Association. In more than half the schools, the head teachers, or facilities teachers work with them to control the O&M fund (Table 21).

Table 21 Who controls the fund for maintaining facilities and repairs?

	head teacher or facilities teacher with the PTA/SMC	**PTA/SMC only**	**Other or not known**
Number of schools	59	32	9
%	59%	32%	

As Table 222 shows, the schools where teachers (together with PTA or school committee) control the fund for maintenance and repairs had significantly more water for handwashing in the toilet (p<0.009), and more frequent handwashing by boys and girls was observed after they had used the toilet (p<0.002 and 0.0007).

Table 22 Teachers control fund for maintaining facilities and repairs

	has water for HW in toilet	Observed handwashing by		total schools
teachers control fund for maintaining facilities and repairs	yes	Girls	Boys	Number
yes	51%	54%	47%	59
no	23%	29%	14%	35
p <	0.009	0.002	0.0007	

Cleaning the facilities: As Table 23 shows, around two out of three schools had janitors to clean the facilities. The teachers in the input schools more often said that children also helped keep the sanitation and water facilities clean than in the other schools (p=0.007). However, there was no evidence that the stated involvement of children (p=0.55) in cleaning was associated with cleaner toilets or better handwashing.

Only in 6 out of 100 schools did the teachers indicate that they themselves helped clean facilities. In 5 of these 6 schools, observations showed that the toilets were clean. However the number of schools is too small to generalize.

Table 23 Who cleans school facilities?

N(schools)	janitor cleans WASH facilities	children clean WASH facilities	teachers clean WASH facilities
100	69%	49%	6%

Note: the total is more than 100% as some schools have more than one group involved in cleaning.

IMPACT

The potential impact of the WASH in school was mainly examined from two points of view: absences in school and messages transmitted to the home.

Outreach to the home from the school, with messages from the school, was examined qualitatively in the 32 small group interviews with children. Children in 7 discussion groups voluntarily identified as a priority the promotion of constructing or having a toilet in the home.

However, we asked children what in fact they say at home, some mentioned that they complain to their parents about the bad conditions of the school latrines. They inform the parents that they feel ashamed to be in this school. It seems logical that one pre-condition for outreach with positive sanitation messages from the school to the home is that the school toilets should be operational, clean and appealing. Toilets at school should convey a desirable message about sanitation.

School absences of 4,919 children in 1 class in each of 100 schools were examined by counting days missed from attendance records for the preceding week, in the class from which data had been collected through anonymous voting.

The mean daily absences in a school class were 3% for girls and 4.6% for boys, with a range from no absences to 11%. There was a modest, but statistically significant association ($p<0.043$) between the frequency of handwashing observed after girls had used the toilet and less frequent absences among girls in the class during the preceding week (Table 24). Similarly, classes where more than 90% of the girls said they had used toilets when last in need, tended to have fewer daily absences among girls ($p<0.048$). In other words, classes where more girls washed hands and nearly all used the toilet tended to have better attendance. Toilet use and handwashing are related to fewer absences for girls. The same associations were not observed for boys. When the school had the whole WASH package, girls tended to be absent less frequently ($p<.001$). The whole WASH package was those inputs that UNICEF provided to schools: trained teachers, WASH in schools club, water supply, dedicated handwashing facilities, toilets.

This conclusion is supported by the use of independent tools to collect the information: observation by the data collector of handwashing, self-reporting of earlier toilet use, and the school attendance records.

Table 24 Girls: school absences and hygiene behaviour

		Hands washed after using toilet	toilet use by school class	School has whole WASH package	total schools
		Yes	>90% of girls	Yes	number
Girl daily absences	less than 2%	59%	43%	39%	44
	more than 2%	38%	23%	10%	53
	p	<0.043	<0.048	<0.001	

Several possible causal mechanisms may underlie this association between WASH inputs and outcomes on the one hand, and reduced girls' absenteeism on the other. First, improved hygiene may lead to better health and thus reduce absences due to illness. Second, in schools where toilets are not available, convenient, private and hygienic and where handwashing is not practicable, it is more likely that girls will stay at home during menstruation; it has often been claimed that this occurs, but until now most of the evidence has been anecdotal. Third, it is plausible that in schools where WASH is better-organised, other things will also be organised better and so discourage absenteeism. The fact that a significant association was found for girls but not for boys suggests that the second of these is operating. Whichever applies, the association suggests that in one way or another, the successful implementation of the WASH package in a school can significantly reduce girls' absenteeism, a substantial and highly desirable impact from the project.

Table 25 provides an overview of the significant statistical associations among the variable in this study. It demonstrates that certain elements of an effective programme will lead to better handwashing, toilet cleanliness and use and fewer absences among girls. These elements of an effective programme are: having water for children to drink, wash hands, use in toilets, enough water outlets, good management involving PTA and teachers in organizing operation and maintenance, clean andprivate toilets and repairs.

Table 25 Summary of significant correlations in the study

Each box shows the coefficient of correlation (in brackets) and p value from chi-squared or Fisher's Exact Test. Empty boxes did not have statistically significant associations.

	Girl observed handwashing	Boys observed handwashing	Girls reported toilet use	Boys observed toilet use	Cleanliness of toilets	Water for HW in toilet	Number children per tap
School has drinking water, handwashing, toilet facilities	(0.45) 0.0001	(0.44) 0.0001				(.51) 0.0001	
Water for washing hands is in toilet	(0.61) 0.0001				(O.28) 0.004		
Number of children per tap	(0.32) .0001	(0.27) 0.001					
O&M carried out			(0.25) 0.006		(0.24) .05	(0.25) 0.05	(0.25) 0.008
Teacher jointly controls O&M fund	(0.35) .002	(0.32) .0007				(0.23) .009	(0.24) .04
Perceived toilet cleanliness			(0.46) 0.006	(0.24) .009			
Perceived privacy in toilet			(0.29) .002	(0.33) 0.002			
School absences of girls	(-0.26) .043		(-0.37) .048				

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