

Study on the usage of urinals in Kenyan Schools



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Executive summary

This exploratory study focused on the usage of urinals in Kenyan schools. The key focus of the study was on the potential impact of constructing urinals in order to improve access to sanitation facilities at school. The study focused on two key objectives, namely: to determine the optimal latrine-to-children ratio where adequate urinals are provided for both girls and boys; and to offer recommendations on the cost structure of urinals and latrine facilities in schools.

Within the schools in the study, one in every three schools actually had a urinal for either boys, girls or both. The province with the fewest number of urinals was North Eastern. The results revealed that pupils use the sanitation facilities to urinate more than to defecate. We found that 95% of boys and 89% of girls used the school sanitation facilities during at least one of the break times. A majority of girls (57%) only used the facility for urination, while 32% defecated at least once during the day. The results were similar for boys. In addition, we found that boys were three times as likely and girls nearly two times more likely to not use the sanitation facilities in schools without urinals.

The demand for urination facilities is much higher than for defecation. Through self-report of latrine and urinal use during the morning break, we determined 72% of boys urinated, while 11% defecated. Facility use was considerably lower among boys in schools without urinals (63%), and a slightly higher percentage of boys went to the bush. Overall, boys in schools without urinals were three times (10.2% vs. 3.2%) more likely to report not using the school sanitation facilities during break times.

Similar patterns were found among girls during the morning break: 84% used facilities in schools with urinals, while 68% used them in schools without urinals. Overall, girls in schools without urinals were nearly twice (11.2% vs. 6.4%) as likely to *not* use the school sanitation facilities as compared to those with no urinal.

The main objective of this study was to quantify a revised pupil:latrine and pupil:urinal ratio for boys and girls based on pupil self-report data. Data from the 15 minute morning break was used because it was found to be the most congested time for pupils to use facilities for both urination and defecation. Based on the proportion of pupils that urinated and defecated and the duration of each use, the following ratios were calculated:

Boys: 98 boys per urinal + 55 boys per latrine

Girls: 81 girls per urinal + 33 girls per latrine

The considerable difference in the required ratios between boys and girls highlights the need to consider the equity aspect of construction of sanitation facilities for girls, especially in the light of recent work showing that WASH in schools approaches can drastically reduce absenteeism for girls. The findings here underscore the need to pay special attention to not *equivalent* allocation, where boys and girls have the same access, but *equitable* allocation of resources where girls have more facilities to accommodate their needs.

It should be noted that using the same calculations, based on the data collected, the appropriate ratio to accommodate all children during the morning break would be 33 girls per latrine and 55 boys per latrine. As such, the urinal and latrine ratios calculated represent a marked improvement in the sanitation infrastructure needs, indicating that including urinal provision in schools will drastically alleviate congestion at sanitation facilities.

Based on existing technologies in Kenya, boys urinals that can accommodate 7 boys at one time are the most cost-effective approaches to reducing congestion. Studies have shown that girls do like urinals because they smell less, but only if they provide privacy and space for personal hygiene (walls, doors with locks, water/soap). Urinals construction should be paired with behaviour change education. Based on formative research, girls urinals are cheaper to construct and maintain, don't require a pit, and are highly acceptable. However, they will not reduce the overall number of doors needed, since the current technologies require private stalls, similar to private latrine doors.

Urinals were found to be a relatively cheap way to mitigate the high cost of constructing new latrines. Boys latrines are relatively inexpensive to construct and maintain, may be longer lasting since they don't require a dug pit, require little in the way of behavior change, and can accommodate a large number of boys at one time. With a fixed amount of money, construction of boys urinals can help offset the costs of constructing more latrines and urinals for girls. Construction of boys latrines in order to provide additional latrines for girls may be the most cost-effective, equitable solution in both the short and long term. Access to urinals will help alleviate congestion at latrines, improve conditions, reduce maintenance costs, and sustain latrines longer.

1. Introduction

Disease burden caused by poor water, sanitation, and hygiene (WASH)

There is strong evidence of the impact of improvement of water supply, water treatment, sanitation, and hygiene on diarrheal disease (Esrey, 1986; Fewtrell, 2004; Rabie, 2006; Clasen, 2007). It is estimated that more than 10.5 million children die every year from diseases associated with a lack of access to water and basic sanitation (UNICEF, 2009). This lack of access is responsible for more than 88% of all deaths caused by diarrhoeal diseases (UNICEF, 2006). More than 30% of all school-going children in Africa suffer from intestinal worms (Savioli, 2002). According to WHO (2005) improved sanitation alone reduces the rates of diarrhoea among children by 32%. Available studies seem to suggest that sanitation can reduce diarrheal disease in children under 5 (Clasen, 2009). It is estimated that children lose more than 270 million school days as a result of diarrhoeal related diseases (Hutton & Heller, 2004).¹

A number of studies in Kenya have demonstrated the impact of improved school WASH conditions on health and absenteeism. Two evaluations of a water treatment and hygiene intervention found reductions in absenteeism in Kenyan primary schools by up to 35% (O'Reilly, 2008; Blanton, 2010). A recent study in Western Kenya suggests that a water treatment and hygiene intervention with or without the addition of sanitation can reduce absenteeism by over 50% for girls (Freeman, unpublished data). Sanitation and hygiene may reduce reinfection with intestinal helminthes, such as *Ascaris*, by as much as 50% (Freeman, unpublished data).

The state of sanitation in schools

Currently, more than 60% of all schools in Africa lack sufficient sanitation facilities (UNICEF, 2009). Even in schools with facilities, unhygienic sanitation hinders the ability of students to concentrate and learn at school (Water and Sanitation Collaborative Council and WHO, 2005). In Africa, the lack of basic sanitation facilities further decreases the enrolment of girls in primary schools. Various studies have particularly linked the attendance of girls to the availability of adequate sanitation facilities in schools (UNICEF, 2006). Girls spend more time in schools when the number of sanitation facilities is

¹ In Madagascar for example, school children lose more that 3.5 million school days annually as a result of health maladies resulting from poor sanitation (WSSC & WHO, 2005).

adequate (UNICEF, 2006). As such, the need for improved access to sanitation goes beyond improved health and addresses issues of children rights and gender equity.²

Since the introduction of the Kenyan free primary education in 2003, the enrolment rate of students has tripled (CSAE, 2008). This increase in the number of pupils has not been matched by a proportional increase in the number of sanitation facilities. According to the Kenyan Ministry of Public Health and Sanitation, schools should adhere to a standard ratio of 1 toilet for 25 girls and 1 toilet for 30 boys (GoK, 2008). These ratios however remain unattained and currently, more than 60% of all schools in Kenya lack sufficient sanitation facilities (UNICEF, 2009). Even in cases where the number of sanitation facilities is adequate, they are often in poor condition discouraging their use among children (UNICEF, 2009).

Poorly maintained or insufficient sanitation facilities are also a threat to the entire community. Badly maintained sanitation facilities pollute the natural environment and pose a health hazard to the entire communities, especially when school children may need to defecate in the open due to lack of access at school (UNICEF & IRC, 1998). Ensuring adequate and proper use of sanitation facilities in schools will mean erecting barriers to the fecal-oral transmission route and a clean living environment.

Although there has been considerable effort by the international community and governments, 2.6 billion people do not have access to improved sanitation facilities. It is unlikely that the world will meet the Millennium Development Goal (MDG) target of reducing by half the population without access to sanitation. Further, though access to sanitation is inexorably linked to health, education, and gender equity, the MDGs do not target improvement of school sanitation facilities. Additional effort is needed to improve access to clean, private, and safe sanitation facilities in school. In 1998, UNICEF and IRC provide detailed sanitation packages geared towards increasing access to school sanitation facilities. There is however need for flexibility in these designs to accommodate the local situations.

Provision of urinals

According to a study by the World Bank (2002), 92% of children use sanitation facilities for urination, while only 8% defecate in school. As is frequently the case in Kenya, school latrines are overused, smelly, and poorly maintained. To address the congestion in the existing pit latrines, the World Bank (2002) has recommended increasing the number of

² Studies carried out in Lesotho and Bangladesh, have indicated that girls have a preference for separate facilities (UNICEF & IRC, 1998). In schools where the toilets are shared between girls and boys or are closely located, a significant number of girls drop out of school after they attain puberty because of harassment and lack of privacy (UNICEF & IRC, 1998).

urinals³ in schools. Increasing the number of urinals, in schools could alleviate congestion at latrines, reduce maintenance costs for latrines, sustain the latrines longer, and encourage more students to school facilities. The provision of urinals could therefore provide an optimal solution in promoting the use of sanitation facilities at school. The construction of urinals is cheaper, urinals require less maintenance than pit latrines.

Children prefer sanitation and hygiene facilities that are child-friendly and are tailored to their specific needs and desires (Sidibe, 2007). To promote the use of girls urinals, a study in Kenya found critical design characteristics, such as: mirrors, tile floors and hand washing stations (SWASH+, 2010). In fact, boys regularly sneak into the girls' urinals to use the



Photo 1: School children in Kenya

mirrors. Students prefer using urinals for short calls because they do not smell like the pit latrine (SWASH+, 2010). In addition, girls prefer urinals that had designs that hindered the splashing of urine on their feet.

Instilling behavioral change among school going children promotes the health of an entire community. In this regard, school children are agents of change in improving sanitation and hygiene practices in their community (Onyango-Ouma, 2005; Bowen 2007). Researchers have observed that in most cases,

younger students are the ones who use urinals for long calls. This mainly stems from the fact that young children are afraid of large latrine holes (SWASH+, 2010). As is the case with all WASH interventions, behavior change education is critical. Educating young children on the need for proper use of urinals is therefore of critical importance as well as providing adequate hygiene facilities.

2. Study Goals and Objectives

The goal of this study was to assess the utility of urinals in the school context and to make recommendations on a way forward for inclusion of urinals as part of the Government of Kenya policy for sanitation in public schools. To that end, our objectives were to:

- Describe urinal and latrine use patterns and preferences for school children
- Suggest appropriate pupil:urinal and pupil:latrine ratios
- Quantify costs for different types of urinals and latrines

³ A urinal in the case of this report entails a waterless urinal. It has the form of a simple wall with manual drainage. It may include a roof and door. Within this study, all the schools had waterless urinals.

- Offer policy recommendations based on the results of this study

3. Methods

An exploratory study was conducted on the sanitation conditions and use in 45 Kenyan schools between September through October 2010.⁴ This study employed a mixed methods approach – utilizing both quantitative and qualitative techniques – in order to comprehensively assess the role of urinals in context of schools in Kenya. Since no studies of this kind have been previously conducted, data collected in the study were exploratory in order to capture the breath of conditions within the Kenyan context. As such, data derived from this study should be used to guide future studies and policy development. However, as with *all* research studies, caution should be exercised when attempting to apply the findings globally.

School selection, head teacher survey, and school observations

A total of 45 schools in four of the eight administrative provinces in Kenya were selected as part of this study. Schools were chosen using purposive sampling in order to maximize observations at schools with operational urinals.). The provinces and districts were selected for logistical purposes and to include school facilities supported by UNICEF, the Government of Kenya, or non- governmental organizations. This selection included 13 schools from Coast province (Mombasa district), 10 schools in Nyanza province (Rachuonyo & Kisumu East districts), 10 schools Rift Valley (Kajiado & Loitokitok districts), 10 schools North Eastern province (Garissa district) and 2 in Nairobi.⁵

Head teachers from each school were asked open-ended questions about cost and maintenance of sanitation facilities. Researchers conducted observations at the school to determine the presence of urinals and latrines, the capacity of the sanitation facilities and condition of the structures. We determined the optimal capacity of the urinals based on observation of the number of pupils who used the facility at one time during the morning break. The usage of urinals and latrines were observed by two enumerators throughout a single school day. Enumerators were positioned in unobtrusive locations in order to maximally observe facility use without altering pupil behaviour. In order to quantify the time taken either for urination or defecation by pupils, enumerators observed and noted the time taken by at least 10 students in either the urinal or latrine. Where there were urinals, an average of time spent by each pupil was determined as average time for short call. For latrines, time under 90 seconds for boys and 120 seconds for girls was considered

⁴ The field work was initially carried out between May and June 2010. However based on the initial field results, it was decided to re-visit the field to verify the data initially collected. The re-visited fieldwork took place between September and October 2010.

⁵ The selection of the two schools in Nairobi was based on the fact that these contained girls' urinals.

to be urination, while any amount of time over 90 and 120 seconds for boys/girls was considered defecation. Facility usage were observed during and in-between break time to determine the patterns of usage.

Pupil selection and pupil survey

Within each school, we randomly selected 10% of pupils to be interviewed about their use of the school’s sanitation facilities and attitudes about the urinals. Random selection was done through the use of class registries. A total of 4,433 pupils were selected, 2,026 (45.7%) of which were female. Pupils were asked about their use of urinals and latrines at the school that school day. The semi-structured questionnaire included both open and closed response questions. Quantitative data were entered, cleaned, and analyzed using the Statistical Package for Social Science (SPSS v.12) and STATA version10.

Secondary data collection

Information about the construction design and costs for sanitation facilities was collected at schools visited during data collection. Secondary data was gathered from a grey literature on sanitation, urinal and latrine usage, economic benefits of urinals, and trends of enrolment of pupils in Kenyan schools. The purpose of the review was to establish the existing knowledge on sanitation in schools and thereby any existing research gaps.

4. Findings

Distribution of sanitation facilities

The median number of pupils at the 45 sampled schools was 782 (range 162 – 2228). Three schools were all-girls schools. The median percentage of girls to boys at the 39 mixed gender schools was 48% (range 29% - 54%). All single gender schools were located in Mombasa District in Coast Province: three schools were all girls, while three were boys only.

Over two-thirds (67%) of the schools surveyed had at least one urinal for boys, while only 19% of schools had one urinal for girls (Table 1). Overall, One in every three schools did not have a urinal for either boys, girls or both. All three boys-only schools had urinals, while none of the three girls-only schools had urinals. The province with the fewest number of urinals was North Eastern.

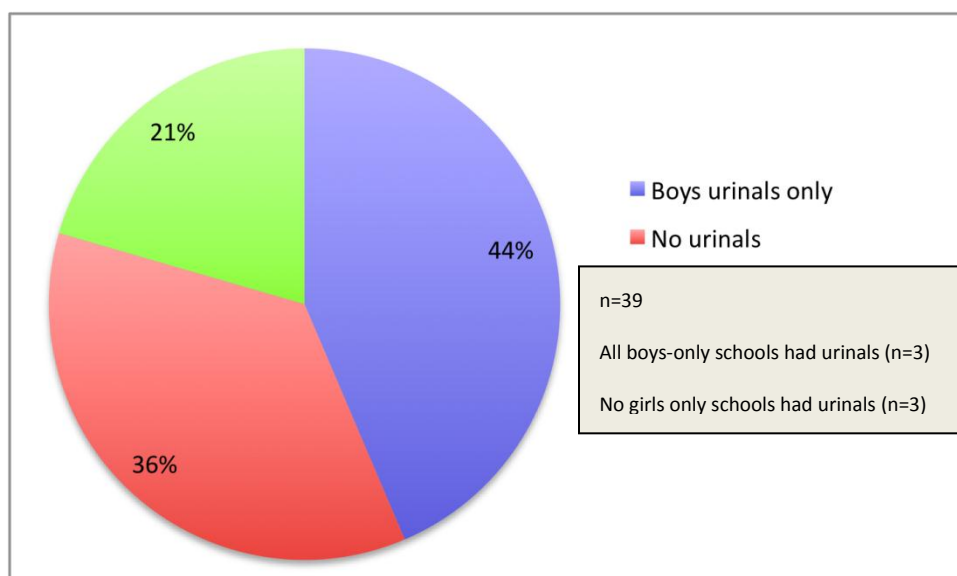
Table 1: Distribution of urinals by location

Province	Urinals for boys n=42	Urinals for girls n=42
Nyanza (n=10)	8 (80%)	4 (40%)
North eastern (n=10)	1 (10%)	0 (0%)

Coast (n=13)*	8 (80%)	1 (10%)
Rift valley (n=10)	9 (90%)	1 (10%)
Nairobi (n=2)	2 (100%)	2 (100%)
Total (n=45)	28 (67%)	8 (19%)
*Coast Province: 7 co-ed schools, 3 all girl schools and 3 all boys schools		

Of the 45 schools in the study that had urinals, 8 (17%) had both boys and girls urinals, while 20 (44%) had boys urinals only. No schools had only girls urinals (Figure 1). The mean number of urinal blocks for boys was 2 (range 1 – 7), while all eight schools with girls urinals had only 1 block. Only 17 (61%) of the schools with boys urinals had at least one block that was in working condition. None of the urinal blocks in Mombasa District were found to be in working condition.

Figure 1: Urinals at selected co-ed schools



The Government of Kenya policy is that all schools have a sanitation facility. All

schools in this study did have some form of latrine, yet the condition and access to these facility varied widely. Among schools with boys (n=43), two (5%) did not have any latrines in working condition. Within the remaining schools, there were a median of 6.5 working latrine doors (range of number of doors in good working condition: 1 – 29) with a median pupil:latrine ratio of 55:1 (not including urinals). Three (7%) of schools with girls did not have working latrines for girls. The median number of working latrines was higher (8, range 2 – 21) and the pupil latrine ratio was 52.7 (18 – 263). Fourteen (33%) schools exceeded the Government of Kenya latrine ratios for boys by three times (90:1) and 14 (33%) school exceeded the ratio for girls by three times (75:1). Eleven (24%) exceeded the ratio by three times for both boys and girls. These schools were primarily found in Nyanza (3) and North Eastern (4) Provinces.

Utilization of sanitation facilities

Based on data collected from pupil self-report, the majority of pupils use the school's sanitation facility (urinals or latrines) for urination during the school day. Of the 2,407 boys, 2,281 (95%) used the facility during the school day (Figure 2). A majority of boys (57%) only used the facility for urination, while 38% of boys defecated at least once during the day (that includes defecation during one break and urinating during the other). The results for girls were similar: 57% only urinated, while 32% defecated at least once, though a greater proportion (11%) did not use the facility at all (Figure 3).

Figure 2: Boys use of sanitation facilities during break times

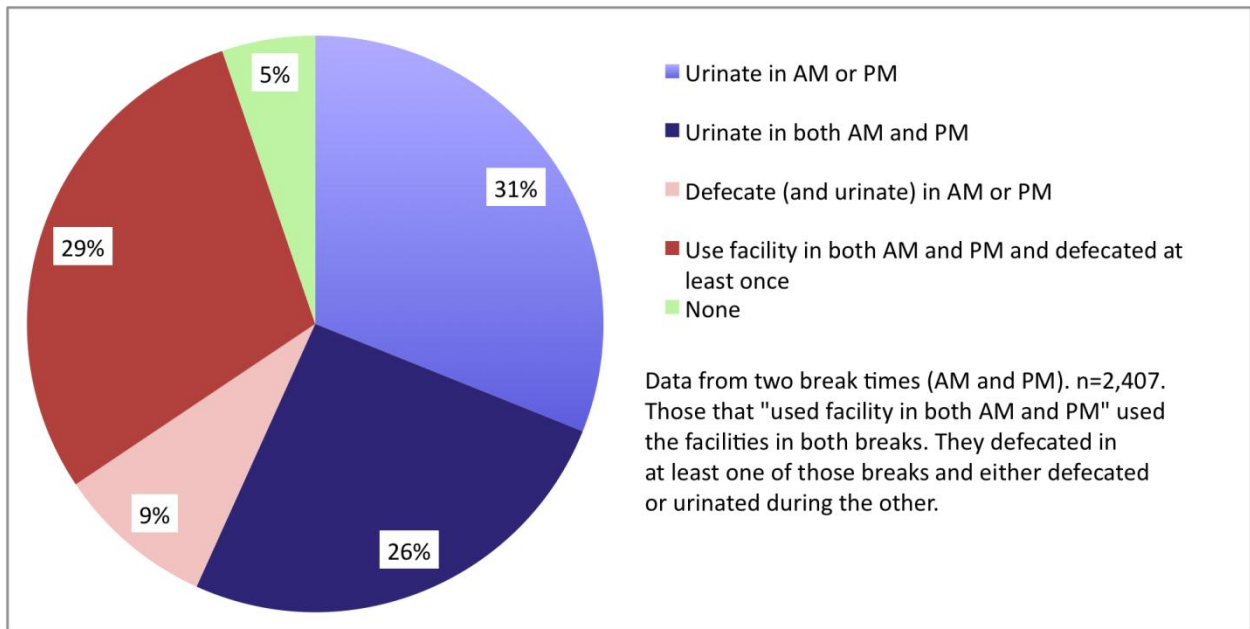
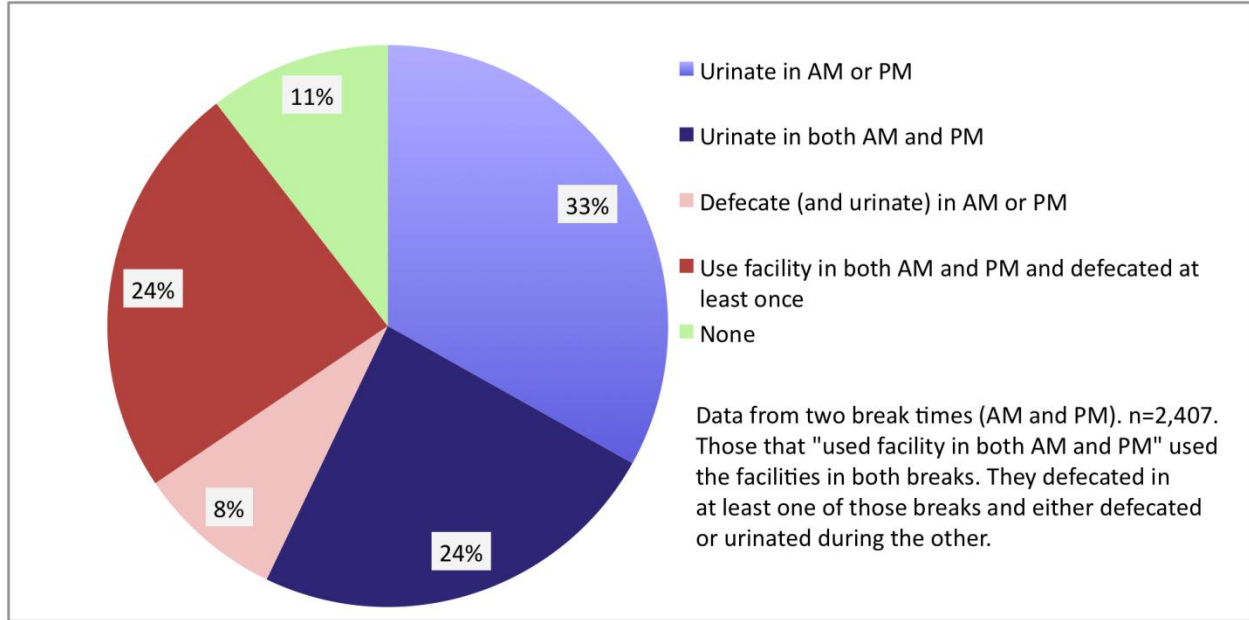


Figure 3: Girls use of sanitation facilities during break times

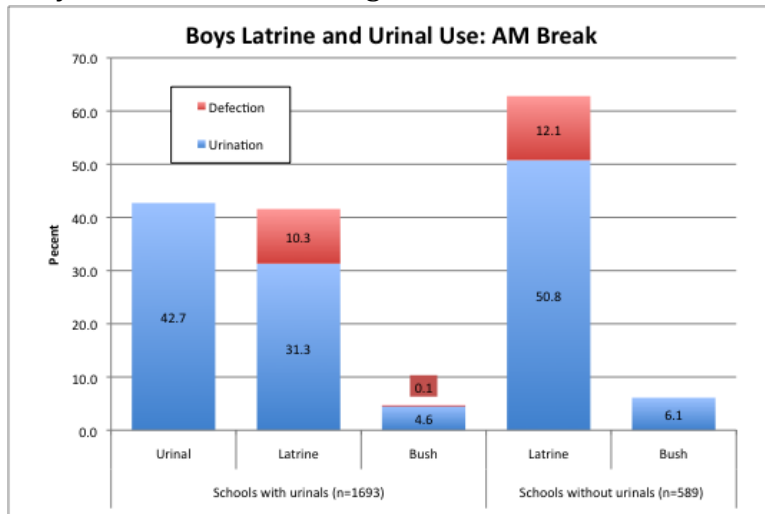


Urinal and latrine usage during morning breaks

Boys

Figure 4: Boys latrine and urinal use: AM break

Through self-report of latrine and urinal use during the morning break, we determined 72% of boys urinated, while 11% at least defecated. Among schools with urinals, 84% of boys used facilities during break, and the use was evenly split between urinals and latrines

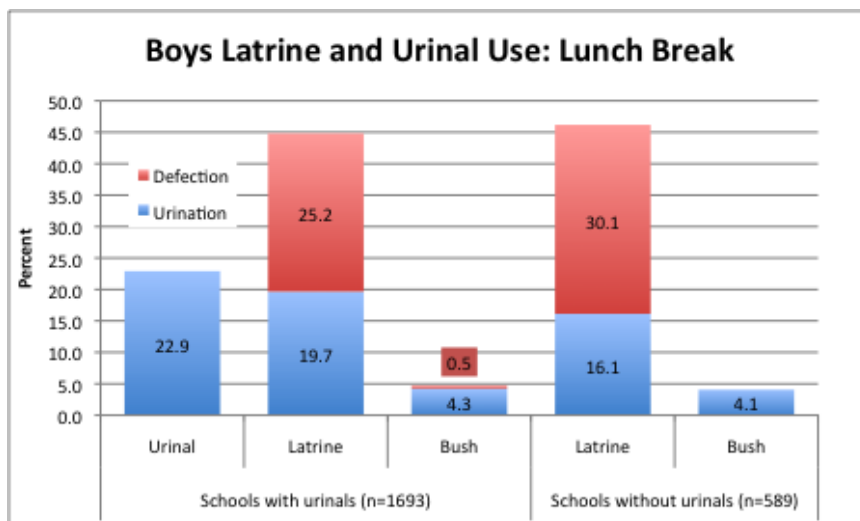


(Figure 4). Facility use was considerably lower among boys in schools without urinals (63%), and a slightly higher percentage of boys went to the bush. Overall, boys in schools

without urinals were three times (10.2% vs. 3.2%) more likely to report not using the school sanitation facilities during break times.

During the lunch break, fewer boys used the facilities (67%), though nearly 30% used latrines for defecation. Similar to the morning, a similar proportion of boys used the latrines for defecation (25% in schools with urinals, 30% in schools without urinals) (Figure 5). A similar proportion used the bush; however, overall use of facilities was considerably higher in schools with urinals (69%), compared to schools without urinals (46%).

Figure 5: Boys latrine and urinal use during lunch break



Girls

The patterns of latrine use for girls during the AM and lunch breaks was similar to those of boys. During the morning break, 1,249 (62%) urinated, while 269 (13%) defecated. A higher proportion of girls in schools with urinals used facilities during the morning break (84%) than in schools without urinals (68%) (Figure 6). There was a similar pattern for girls after the lunch break: 64% used the facilities in schools with urinals as opposed to 59% in schools without (Figure 7).

A higher proportion of girls defecated after lunch in schools without urinals (23%) as compared to ones with urinals (10%). Overall, girls in schools without urinals were nearly twice (11.2% vs. 6.4%) as likely to *not* use the school sanitation facilities as compared to those with urinals (data not shown).

Figure 6: Girls urinal and latrine use: AM break

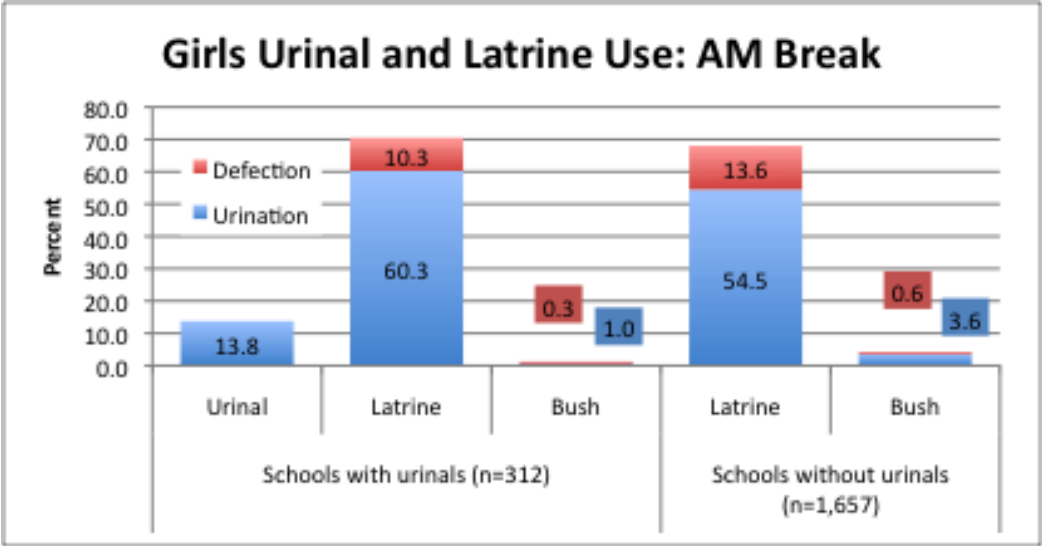
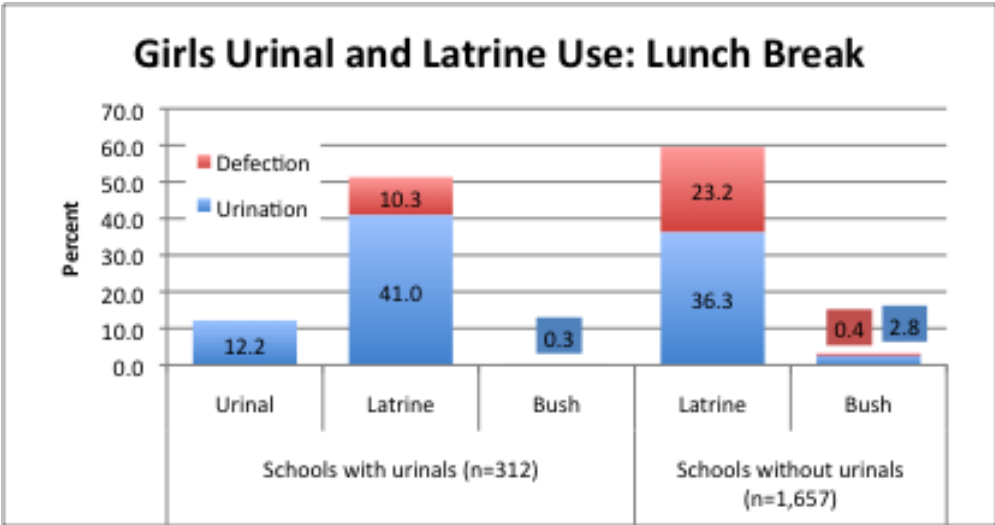


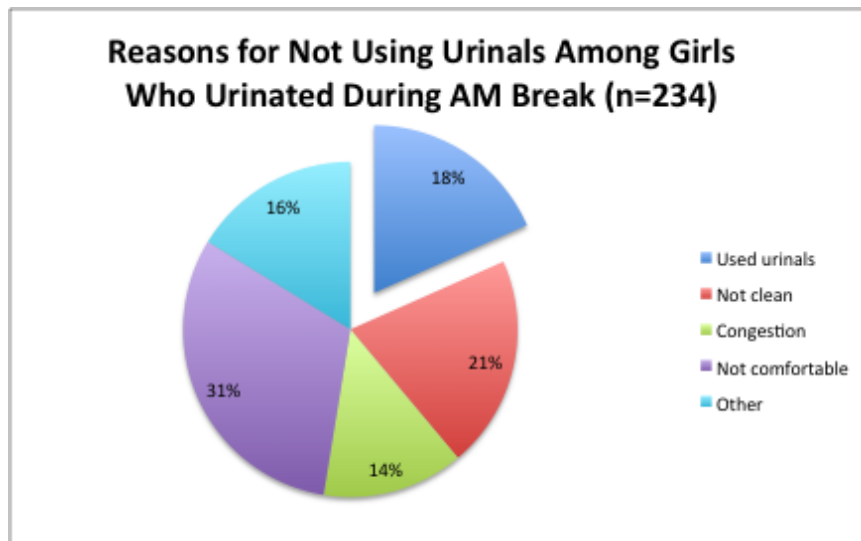
Figure 7:



Girls urinal and latrine use: lunch break

Based on responses to open ended questions, many of the girls noted that they were not comfortable using the urinals for a variety of reasons such as, lack of privacy, queuing and uncleanliness of the urinals. Of the 234 girls at schools with urinals who reported urinating during the morning break time, 191 (82%) chose not to use the urinal and opted instead for the latrine or the bush (Figure 8). Of all respondent girls who reported urinating during the morning break from schools with urinals those that didn't use a urinal gave the following reasons: 73 (31%) were not comfortable, 48 (21%) said the urinals weren't clean, and 32 (14%) said there was congestion.

Figure 8: Reasons for not using urinals among girls during AM break



5. Pupil to urinal / latrine ratios

Boys

Out of 28 surveyed schools that had urinals for boys, the median number of urinal blocks in each of school was two. Based on observation in all of the 28 schools, the median capacity was seven (mean: 7, range 3 – 38) slots/ spaces for boys to comfortably urinate at one time, though the most common was 6.

Girls

In all eight schools with girls urinals, each only had one urinal block. Based on observations, the median number of girls that could comfortably use the urinal at one time was five, but most schools had slots for 2 (mean: 7, range 2 – 25).

The median capacity for urinal slots per block and doors per latrine block are found in Table 2 below.

Table 2: Urinal and Latrine slots in study schools

Sex	Urinal blocks per school (median)	Median urinal slots per block (most common)	Latrine doors in working condition per school (median)
Boys	2	7 (6)	6.5
Girls	1	5 (2)	8

Calculating urinal and latrine ratios

The capacity of a sanitation facility at school was calculated with the following equation:

$$\text{Capacity Needed} = \# \text{ Blocks} \times \text{Block capacity} =$$

$$\frac{\% \text{ Pupils urinating or defecating} \times \text{School size} \times \text{Avg. Time}}{\text{Break Time} \times \% \text{ Pupils using facility for urination/defecation}}$$

Data obtained from direct observation of pupils' use of facilities as well as from pupils' self-reporting was used to calculate the urinal and latrine ratios for boys and girls. Based on observations of children entering the urinals and latrines, we determined the minimum time for urination and defecation for boys and girls (Table 2). The proportion of girls and boys using the urinals vs. latrines for urination was used to calculate the current needed number of urinal blocks and latrines. Percentage that used the urinal for urination was determined by the percentage of students that used urinals for urination was based on data from the schools with urinals. In order to calculate the urinal and latrine capacity needed for schools, we used the proportion of pupils who reported defecation and urination at break times where the congestion at the facilities would be greatest. To calculate the capacity of urinals needed for girls and boys, we used the values for the morning break, which is 15 minutes long. A similar calculation could have been made for the afternoon break.

Table 3: Amount of time to use the sanitation facilities for urination and defecation (based on averages during peak breaks in a day)

Activity	Boys		Girls	
	Urination	Defecation	Urination	Defecation
Time spent urinating/defecating	1.5 min	2.5 min	2min	3.5 min
AM Break urination / defecation	78%	10%	62%	13%
PM Break urination / defecation	38%	28%	42%	21%
Percentage of students using latrine for urination / defecation (not including bush)	43%	100%	81%	100%

Calculation of urinal and latrine needs for girls

The projected number of latrines and urinals for girls was calculated using data from our sample, including the median number of pupils, median proportion of girls/boys, percentage of girls/boys that reported urinating during the morning break session, the average time spent urinating for girls/boys, and the percent of girls that elected to use the urinal for urinating at schools where one was available. We assumed that the 15 minute morning break was the most critical time for use of sanitation facilities.

Median Urinal Capacity Needed for Girls (# Blocks) =

$$\frac{62\% \times 375 \text{ girls} \times 2\text{min}}{15 \text{ min} \times 19\%} = 5.9 \text{ Urinal doors} = 2.9 \text{ Urinal blocks (2 doors each)}$$

For the projected number of latrine doors needed, we calculated the number of girls electing to use the latrine for urination in schools with urinals and added the number needed for defecation:

Median latrine doors needed for girls = Capacity for urination in latrines + defecation

$$\frac{62\% \times 375 \text{ girls} \times 2\text{min}}{15 \text{ min} \times 81\%} + \frac{13\% \times 375 \text{ girls} \times 3.5\text{min}}{15 \text{ min} \times 100\%}$$

= 25.1 for urination + 11.4 for defecation = 36.5 doors

We found that, given the data collected at study schools, the median school with 375 girls would require 5.9 urinal doors and 36.5 latrine doors (42.3 doors total), resulting in a ratio of urinal:latrine doors of 1:6. This should not be seen as the “ideal” ratio, since there are a number of ways that this value could be altered in order to save money. If more girls could elect to use the urinal, thus lessening the number of latrine doors needed. We estimate that if 90% of girls used the urinals instead of the 19% we found, that we would require 27.9 urinals and 14.5 latrines. It should be noted that this number would be doubled by 50% if the break time estimated was 30 minutes instead of 15 minutes.

Calculation of urinal and latrine needs for boys

We developed similar calculations for boys for urination:

Median Urinal Capacity Needed for Boys =

$$\frac{78\% \times 406 \text{ boys} \times 1.5\text{min}}{15 \text{ min} \times 57\%} = 18 \text{ Urinal doors} = 3.0 \text{ Urinal blocks (6 doors each)}$$

and defecation:

Median latrine doors needed for boys = Capacity for urination in latrines + defecation

$$\frac{78\% \times 406 \text{ boys} \times 1.5\text{min}}{15 \text{ min} \times 43\%} + \frac{10\% \times 406 \text{ boys} \times 2.5\text{min}}{15 \text{ min} \times 100\%}$$

= 13.6 for urination + 6.7 for defecation = 20.3 doors

This calculation results in a urinal: latrine ratio of 18 urinals to 20.4 latrines (38.4 doors total). If 90% of boys used the urinals for urination instead of latrines, the resulting ratio would be 28.4 to 10 (38.4 total doors).

Calculating a new pupil:latrine and pupi:urinal ratio

Here we use the equations and concepts above to calculate pupil:latrine and pupil:urinal ratios, if we assume that sufficient behavior change approaches will be applied where all or nearly all students that urinate will use urinals.

Below, the optimal ratios for latrines were calculated based on the available data. The calculations were done using data from for the 15 morning break, since it is more congested time for use of the sanitation facilities for both urination and defecation (though more students defecate in the afternoon break, since it is longer, the strain on facilities is not as severe). The calculations are presented here using a hypothetical school of 1000 boys and 1000 girls.

Figure 9: Boys to urinal/latrine ratio

1000 boys (morning break)	72% urinate 11% defecate 1.5 min urinate 2.5 min to defecate Median urinal capacity is 7 students
<p>Urinals</p> <p>$\frac{\text{Time for use of urinal during break time slots}}{\text{Mean duration of urination}} = \frac{15 \text{ min}}{1.5 \text{ min}} = 10$ available time slots in a break per urinal “slot”</p> <p>The average boys urinal has 7 “slots”.</p> <p>Therefore, within a 15 min break time 70 boys can use one urinal (10 time slots x 7 slots)</p> <p>With 1000 boys and 72% of students urinating, we need to accommodate 720 pupils in 15 minutes</p> <p>Urinals needed = $\frac{720 \text{ boys}}{70 \text{ slots per 15 min. break}} = 10.2$ urinals for 1000 boys</p> <p style="text-align: center;">= 98 boys per urinal</p>	
<p>Latrines</p> <p>$\frac{\text{Time for use of urinal during break time slots}}{\text{Mean duration of defecation}} = \frac{15 \text{ min}}{2.5 \text{ min}} = 6$ available time slots in a break per latrine door</p> <p>With 1000 boys and 11% defecating, we need to accommodate 110 boys in 15 minutes</p> <p>Latrine doors needed = $\frac{110 \text{ boys}}{6 \text{ slots per 15 min. break}} = 18.3$ doors for 1000 boys</p> <p style="text-align: center;">= 55 boys per latrine</p>	
<p>Ratios based on field data: 98 boys per urinal + 55 boys per latrine</p>	
<p>Scenario with latrines only With 6 available slots for defecation and 10 available slots for urination per 15 minute break, and</p>	

the need to accommodate 720 urinations and 110 defecations:

72 doors for urination and 18.3 doors for defecation for 1000 boys.

Therefore, these data suggest a pupil to latrine ratio of **11 boys per door**

The dynamism of girls' usage of sanitation facilities yield skewed results on usage of urinals in schools. This can be partly explained by a number of factors, namely: girls need for privacy, usability of the facility and the girl's age. Distribution of pupils by age in school shows that the majority of students were between age 11-15 years. This is critical stage in girls life as this is the stage at which menstruation periods begins. Therefore considering the age factor for girls is vital factor in determining the usage of the urinals. Older girls were observed to have high usage of latrines as opposed to urinals, with the most cited reason being need for privacy. The study results noted that 47% of girls in schools with urinals for girls were between age 11 above. The study also observed that only 20% of these girls used urinals for urination during breaks. This could be strongly attributed to the need for privacy as result of menstruation. So going by the observed data it can be concluded that 73% of girls population required the utilization of urinals.

Figure 10: Girls to urinal/latrine ratios

1000 girls (morning break)	62% urinate 13% defecate 2 min urinate 3.5 min to defecate Urinal capacity average 7 students 73% potential for usage of urinals
<p>Urinals</p> <p>$\frac{\text{Time for use of urinal during break time slots}}{\text{Mean duration of urination}} = \frac{15 \text{ min}}{2 \text{ min}} = 7.5$ available time slots in a break per urinal "slot"</p> <p>Girls urinals don't have slots similar to boys, so here the calculation is for "slots"</p> <p>With 730 girls and 62% urinating, we need to accommodate 453 pupils in 15 minutes</p> <p>Urinals needed = $\frac{453 \text{ girls}}{7.5 \text{ slots per 15 min. break}} = 60$ girls urinals for 730 girls</p> <p>considering n average capacity of 7 girls the required urinals will be 9 urinals blocks therefore;</p> <p style="text-align: center;">1 Urinal to 81 girls</p>	
<p>Latrines</p> <p>$\frac{\text{Time for use of urinal during break time slots}}{\text{Mean duration of defecation}} = \frac{15 \text{ min}}{3.5 \text{ min}} = 4.3$ available time slots in a break per latrine door</p> <p>With 1000 girls and 13% defecating, we need to accommodate 130 girls in 15 minutes</p> <p>Latrine doors needed = $\frac{130 \text{ girls}}{4.3 \text{ girls per 15 min. break}} = 30$ doors for 1000 girls</p> <p style="text-align: center;">= 33 girls per latrine</p>	
<p>Scenario with latrines only</p> <p>With 7.5 available slots for defecation and 4.3 available slots for urination per 15 minute break, and the need to accommodate 453 urinations and 130 defecations:</p> <p>60 doors for urination and 30 doors for defecation for 1000 girls.</p>	

Therefore, these data suggest a pupil to latrine ratio of **11 girls per door**, the same overall number calculated if urinals are also used.

Figure 11: Calculated latrine and urinal ratios

Ratios based on field data in a 15 minute break :
Boys: 98 boys per urinal + 55 boys per latrine
Girls: 81 girls per urinal + 33 girls per latrine

There are a few key points to consider. First, it is clear that the data gathered in this study suggests that the current pupil to latrine ratios suggested by the government are too low. However, another possibility is that a 15 minute break is truly unreasonable, which would reduce the requirements based on our calculations. Second, even with the high use of sanitation facilities reported, the addition of boys urinals as a relatively inexpensive alternative to latrines would drastically ease overcrowding of facilities at school. Third, while girls urinals add considerable value in that they reduce smell and maintenance, the current construction designs do not greatly reduce the need for doors. This is due to the fact that girls urinals still require individual stalls, unlike boys urinal facilities where 1 wall can accommodate 7 boys. Below we discuss the added value in terms of facility design issues and cost differences.

6. Facilities design issues



Photo 2: Angra boys latrine and urinal

There are various factors that determine usage of sanitation facilities for both girls and boys, such as design, maintenance, and availability of facilities for handwashing and personal hygiene. Appropriate latrine and urinal designs are child-friendly and culturally appropriate. They should have roofs, solid walls, doors with a bolt for closing from the inside. Boys and girls facilities should be in different areas of the school, and be far enough away from the classrooms to ensure privacy. Latrine holes should not be too big and latrine spaces should not be overly dark. Latrine slabs must be solidly built and easy to clean.

Handwashing stations should be positioned no more than 10 meters from each latrine block with water and soap. For handwashing stations, the key recommendation – in

addition to provision of soap and water – is that they have taps that are durable and locally available so that they can be replaced. In addition, the ages of students must be considered when making wash facilities, this was because younger students were seen to strain to get access to the wash facilities. Also girls should have some physical space where they can wash and dry their used menstrual pads. Sanitation facilities should adhere to the following set of design recommendations:

Ten points towards child-friendly hygiene and sanitation facilities in schools

Child-friendly hygiene and sanitation facilities in schools...

1. Are 'interactive' spaces that stimulate children's learning and development.
2. Are designed with involvement of children, teachers, parents and communities.
3. Provide lowest-cost solutions with no compromise on quality.
4. Have operation and maintenance plans.
5. Have appropriate dimensions and features for children.
6. Address the special gender-related needs and roles.
7. Do not harm the environment.
8. Encourage hygienic behaviour.
9. Offer enough capacity and minimal waiting time.
10. Have well-considered locations.

Tec

Obs **By Zomerplaag and Mooijman (2005) IRC**

Design was an important consideration for use of latrines. At Morrison primary school the poor design of the latrine negatively impacted the use of that facility. However there were some examples of well designed and maintained facilities that engender use among pupils,

Atono primary school – example from the field

Atono school is a public mixed primary school, in Nyanza province. At present the child population stands at 441 up from 387 in 2007. The school is considered to have one of the best girls' urinal design in the country. The facilities were erected by the SWASH+ program in 2008 by the Kenya Water and Health Organization (KWAHO). The key design issues for the girls urinals are the inclusion of walls and doors for privacy, plus floor and wall tiles to enable easy cleaning. Girls like that the facilities have mirrors that allow them to check their appearance. There are specially designed piped for drainage that minimize clogging. There are a number of health messages painted on the walls of the latrines, urinals and water tanks to enhance use of water and soap for handwashing. See the SWASH+b website (www.swashplus.org) or the photo story with more information available at: <http://www.irc.nl/page/54200> . For further field work footage and discussions refer to the

such as the relatively new urinals at Atono Primary school in Nyanza Province.

Another key element observed was the roofing of the urinals especially for girls. Based on the observations in the field, most of the girls' urinals were roofed. This provided for normal usage of the urinal during in the rainy season and in addition also provided for the needed privacy for girls. Many of the boys urinals were not roofed and half walled. As such, it is unlikely that boys will use these facilities during the rainy season.

Financial- Maintenance cost

In the surveyed schools there was a lack of clear budgetary allocation for repair, operations, and maintenance of WASH facilities, including (re-)purchasing of water treatment products, soap for handwashing, latrine cleaning products, replacement of water taps, replacement of gutters, or for exhausting filled latrines. Moreover, there were no



Photo 3: Girls cleaning urinals

definite plans for sourcing for these funds, although some schools suggested using repairs and maintenance allocation in the Free Primary Education (FPE) funds, donations or to some extent ask contributions by parents. All the interviewed head teachers reported that the FPE funds were generally inadequate, and could not sufficiently cover additional expenses. It was observed that in some cases parents were asked to contribute so as to maintain the facilities. Such an option takes time in terms of raising the needed

money for maintenance which inevitably means that facilities remain in a poor state for a long period of time.

7. Cost structure for urinals in schools

Promotion of urinals

Waterless urinals have been used for a long time in Kenya, motivated by the need to conserve water in arid and semi-arid areas and the fact that many schools don't have an onsite water source. Waterless urinals are also economically effective as they reduce the costs of water supply, which would be a huge financial burden for inadequately funded schools in Kenya. Waterless urinals can be designed to collect urine, which can then be easily diluted and re-used for agricultural purposes.

There have been no significant acceptance problems reported with waterless urinals for boys. However, use of urinals for girls, as well as the use of urine in agriculture, is a relatively new phenomena. Previous pilot studies have revealed that inclusion of attractive features such floor and wall tiles and other features such as mirrors for girls can encourage increased usage. Although such features may initially add on some costs, their intrinsic benefits cannot be ignored. Regardless, girls liked the urinals because they smelled better than latrines. The benefit of urinals are that they are cheaper, easier to maintain, and don't require a pit if urine is collected in a container or the urinal is developed with a soak pit.

Costing of urinals

Urinal construction costs varied between schools and were dependent on various factors, including:

- Facility size/ capacity and design;

- Types of materials used;
- Quality of materials used;
- Cost of contractors;
- Type of geography (e.g. topography of the soil, high water tables); and
- Seasonal variations in labor and materials availability

Various options were explored and the most preferred design was the waterless urinal. The following figures were derived from contractors quotations for urinal facilities at schools visited during this study. Costs are for standard construction of waterless urinals blocks for boys and girls (in US dollars) (**6 meters in length *3 meters in height**) with **25** urinal capacity.

Design

Boys Urinals

Improved designs for waterless designs were proposed. These waterless urinals will include half walled tiles and smooth cemented surfaces. A critical aspect of the design was that it would accommodate sufficient numbers of students at one time in order to ease congestion. Boys urinals included roofs (some of which were transparent for ensuring more light), but did not include doors. Space was optimized to ensure maximum capacity.

Girls Urinals

Girls urinals also considered half walled tiles and smooth cemented walls. The urinals were priced to include ventilations and a few transparent roofs. As opposed to designs for boys urinals, girls urinals were priced with full partitions and half doors, since older girls reported being uncomfortable using open urinals.

Latrines

Design for both boys and girls latrines considered a 1.5 meters supported pit 20 feet deep. The pit is not lined but it is shared among the six latrines. The design considers one ventilation pipe for the block .

Table 4: Waterless urinals for boys (without doors)

Items	Quantify	Costs (USD) ⁶
Blocks	3,000	185
Cement	20 bags	250
Iron sheets	8 (1*2 metres)	100
Transparent sheet	4 (1*2 metres)	75
Sand	2 lorries	175

⁶ The conversion rate is 1 USD to 80 Kenya shillings.

Ceramic tiles	85 dozen (small white tiles)	2,037
Ballast	2 lorries (7 tonnes)	180
Pipes		50
Paints		75
Timber	600 ft * 30	225
Wire mesh		75
Labour	20%	685
Total cost in dollars		4,112

Table 5: Girls waterless urinals (6 doors)

Items	Quantify	Costs (USD)
Blocks	4,000	500
Cement	22 bags	275
Iron sheets	8 (1*2 metres)	100
Transparent sheet	4 ((1*2 metres)	75
Sand	2.5 lorries	219
Ceramic tiles	100 dozen (small white tiles)	2,400
Ballast	2.5 lorries(7tonnes)	225
Pipes		150
Paints		75
Timber (roofing and ventilation)	600 ft * 30	225
Wire mesh		75
Doors and hidges	6 pieces	80
Labour	20%	880
Total cost in dollars		5,279

Table 6: Improved boys waterless urinals without tiles

Items	Quantify	Cost (USD)
Blocks	3,000	185
Cement	25 bags	313
Iron sheets	8 (1*2 metres)	100

Transparent sheet	4 (1*2 metres)	75
Sand	2 lorries	175
Ballast	2lorries(7tonnes)	180
Pipes		50
Paints		75
Timber	600 ft * 30	225
Wire mesh		75
Labour	20%	685
Total cost in dollars		1,744

Table 7: Girls waterless urinals without tiles

Items	Quantify	Costs (USD)
Blocks	4,000	500
Cement	26 bags	325
Iron sheets	8 (1*2 metres)	100
Transparent sheet	4 ((1*2 metres)	75
Sand	2.5 lorries	219
Ballast	2.5 lorries(7tonnes)	225
Pipes		150
Paints		75
Timber (roofing and ventilation)	600 ft * 30	225
Wire mesh		75
Doors and hinges	6 pieces	80
Labour	20%	410
Total cost in dollars		2,459

Table 8: Urinal comparison with and without tiles (in USD)

	Without tiles	With tiles	Difference	% Difference
Urinals for boys	1,744	4,112	2,368	+136%
Urinals for girls	2,459	5,279	2,208	+90%

Table 9: Latrines for boys/girls (with 6 doors)

Items	Quantify	Cost (USD)
Blocks	6,000	750

Cement	25 bags	313
Iron sheet	6(2.3 * 1)	90
Sand	3 lorries	263
Pit Sinking	(6*2.5) 20ft deep	250
Ballasts	3 lorries	270
Paints		75
Timber (roofing and ventilation)	400ft (2*3)	150
Wire mesh and pipes		100
Doors and hinges	6 pieces	80
Labour and extra costs	20%	468
Total costs		2,809

****The costs are standard and are subject to change based on geographical location, cost of material and change in inflation***

A six-door latrines facility (USD 2,809) is more expensive than either a block of girls urinals (USD 2,459) or boys urinal (USD 1,744). The addition of tiles in the urinals raise the cost approximately 2,000 USD, though it creates an added benefit of improving maintenance and sustainability of the facility. The construction of urinals may translate into an added expense during construction, but these costs will be offset by improved maintenance of the latrine, reduced pit filling, and the additional health benefits of easy to clean sanitary facilities.

Per capita cost effectiveness (construction and maintenance)

Per capita break down of costs, of both boys and girls urinals and latrine shows that the initial investment in cost of construction of a single latrine slot is almost thrice the cost of construction of a urinal slot. Urinals construction provides greater economy of scale than latrines. Construction of urinals is also financial viable in terms of space provision and time savings for students. In addition the operation and maintenance of urinals is minimal in comparison to latrines.

In terms of the girls' urinals, as noted in the cost analysis above, the initial construction of girls' urinals is a bit heavier initial investment as opposed to those of boys. However the boys' urinals represent the greatest cost savings which in turn means more finances are available for girls' urinals. Therefore, the long term benefits on per capita maintenance cost of urinal slots to that of latrines slot is relatively low for both boys and girls urinals. Consequently, urinal slots have the potential to serve larger population of both boys and girls as compared latrines.

Socio-cultural factors

Unlike boys, the use of urinals for girls may require extensive behavior change education. Based on observation and self-reporting it was clear that younger girls were using urinals more than older girls, due to the fact that older girls did not find the urinals without doors and roofing private enough. However, previous studies have shown that older girls may be more adept at adopting the new technology if it is designed and maintained correctly (SWASH+, 2010). There are a number of factors that need to be addressed in urinal design in order to ensure that girls of all ages feel comfortable: they need to be private, have doors and roofs, and have water available for personal hygiene. In many ways, the requirements for girls urinals are similar to those for girls latrines. The only major difference is that urinals don't require extensive subsurface construction. In addition, young children need to be educated on proper use so that they don't accidentally defecate or throw trash in the piping.

8. Key findings

Urinal and latrine use

Our findings suggest that the predominant use of sanitation facilities at school are for urination, especially during the morning break as confirmed by 78% and 62% of boys and girls respectively. We expect that construction of urinals will minimize the demand for and alleviate the strain on latrines, and thus serve three key purposes: 1) Reduce the need for construction of new latrine facilities, 2) improve latrine conditions, thus increasing use and access, and 3) reduce maintenance costs and increase longevity of more costly latrines. One of the most interesting findings from this study was that more pupils in schools with urinals used the sanitation facilities, indicating that these facilities were likely better maintained and less congested than those in schools without urinals.

Pupil to latrine / urinal ratios

The main objective of this study was to quantify a revised pupil:latrine and pupil:urinal ratio for boys and girls based on pupil self-report data. Data from the 15 minute morning break was used because it was found to be the most congested time for pupils to use facilities for both urination and defecation. Based on the proportion of pupils that urinated and defecated and the duration of each use, the following ratios were calculated:

Boys: 98 boys per urinal + 55 boys per latrine

Girls: 81 girls per urinal + 33 girls per latrine

The considerable difference in the required ratios between boys and girls highlights the need to consider the equity aspect of construction of sanitation facilities for girls, especially in the light of recent work showing that WASH in schools approaches can drastically reduce

absenteeism for girls. The findings here underscore the need to pay special attention to not *equivalent* allocation, where boys and girls have the same access, but *equitable* allocation of resources where girls have more facilities to accommodate their needs.

It should be noted that using the same calculations, based on the data collected, the appropriate ratio to accommodate all children during the morning break would be 33 girls per latrine and 55 boys per latrine. As such, the urinal and latrine ratios calculated represent a marked improvement in the sanitation infrastructure needs, indicating that including urinal provision in schools will drastically alleviate congestion at sanitation facilities.

Based on existing technologies in Kenya, boys urinals that can accommodate 7 boys at one time are the most cost-effective approaches to reducing congestion. Studies have shown that girls do like urinals because they smell less, but only if they provide privacy and space for personal hygiene (walls, doors with locks, water/soap). Urinals construction should be paired with behaviour change education. Based on formative research, girls urinals are cheaper to construct and maintain, don't require a pit, and are highly acceptable. However, they will not reduce the overall number of doors needed, since the current technologies require private stalls, similar to private latrine doors.

Urinals were found to be a relatively cheap way to mitigate the high cost of constructing new latrines. Boys latrines are relatively inexpensive to construct and maintain, may be longer lasting since they don't require a dug pit, require little in the way of behavior change, and can accommodate a large number of boys at one time. With a fixed amount of money, construction of boys urinals can help offset the costs of constructing more latrines and urinals for girls. Construction of boys latrines in order to provide additional latrines for girls may be the most cost-effective, equitable solution in both the short and long term. Access to urinals will help alleviate congestion at latrines, improve conditions, reduce maintenance costs, and sustain latrines longer.

The ratios of pupils to urinal and latrine were calculated using the facility use patterns observed at the study schools. Given the many schools did not meet the Government of Kenya recommended pupil:latrine ratio and that maintenance was likely sub-optimal, it is likely that children are avoiding the use of latrines. Thus, it is likely that demand for sanitation facilities is *even higher* than that observed in this study, underscoring the need for additional sanitation facilities. This conclusion is enhanced by data that reveal that a substantial proportion of pupils preferred to use the bush than the latrines or urinals. With a greater number of well-designed facilities, we expect the more children will feel comfortable using the facilities. As such, the calculations of pupil to urinal ratios are intended as a guide to emphasize the need for more urinals.

Latrine costing

We used data collected to determine the optimal number of urinals and latrines. Cost is one of the main considerations for developing an ideal urinal to latrine ratio at a school.

There are additional factors that need to be considered when assessing the full and long-term cost of the sanitation facilities, namely:

- Number of existing facilities available in the school and type;
- Working condition of the existing latrines (and ability to rehabilitate);
- Potential for and availability of pit exhausting services;
- Frequency of urinations in relation to defecation within school environment (and presence of school feeding programs);
- Cultural attitudes on usage and design (special significance to girls urinals and facilities for disabled children);
- Total population of a school (and age distribution);
- Availability of materials; and
- Climate, subsurface geology, and groundwater potential

Limitations

There are a number of key limitations to this study. First, observations and calculations for urination and defecation may be subject to reporting bias. There are a number of reasons that children may not honestly report their sanitation practices to a school observer. Children may be ashamed to report that they used the bush, thus latrine use may be overstated. Second, observations on sanitation practices were conducted at schools with sub-optimal facilities. Thus, these calculations may understate the true demand for sanitation facilities at school if those facilities were clean, private, and well-maintained. We would expect that addition of urinal would lead to more pupils using the facilities at school. Additionally, it should be considered that even though children are urinating, it will require behavior change education and a change in culture for a substantial proportion of children to utilize these facilities.

9. Discussion and Recommendations

Urinals in schools have an important role in the overall WASH in Schools sector. Although this exploratory study has shown that students are more likely to urinate than defecate in school, most of schools continue to principally construct latrines. Latrine rehabilitation and construction or rehabilitation of urinals could alleviate the stress on existing conditions and lessen the need to construct new latrine facilities. The subsequent discussion includes suggested recommendations, divided into the following categories: health and behavior change, technical feasibility, financial costs and community support and student engagement.

Latrine and urinal ratios

- Based on the proportion of pupils that urinated and defecated and the duration of each use, the following ratios were calculated:

Boys: 98 boys per urinal + 55 boys per latrine

Girls: 81 girls per urinal + 33 girls per latrine

Health, education, and behaviour change

- Increasing the use of sanitation facilities has been shown to reduce absence among girls by over 50% and reduce reinfection with soil-transmitted helminths in Western Kenya (Freeman, unpublished data). Sanitation is a cost-effective means of reducing pathogen exposure, pupil retention, and a key way to improve educational attainment and test scores.
- Construction of sanitation facilities – even urinals – need to be accompanied by proper handwashing facilities to prevent disease transmission. Handwashing facilities require water and soap to be positioned ideally within 10 meters from every latrine / urinal block. Separate facilities should be provided for boys and girls. The use of powdered soap mixed with water has been shown to be an acceptable and cost-effective solution for providing soap throughout the school year (SWASH+, 2010).
- Construction of urinals or latrines need to be accompanied with a comprehensive behaviour change program to educate pupils on the need for proper hygiene and sanitation. Education on the proper use of sanitation facilities will improve use among children who are unaccustomed to using sanitation facilities and will improve maintenance.

Technical feasibility

- Government pupil:latrine standards should be refined to include the construction of urinals.. Calculations in this study were based on observed latrine use. However, they should be interpreted with caution, given that the sanitation facilities at many of these schools are sub-optimal.



Photo 4: School urinal in Kisumu



- The ratio of urinals to latrines implies that there will

of that be

need for fewer latrines in school. However an emphasis on girls latrines in relation to urinals needs to take into consideration that girls who are menstruating will require more privacy than would be provide in a urinal and therefore will required more facilities than boys. Since boys latrines are relatively inexpensive and require little in the way of behavior change, construction of boys latrines in order to provide additional latrines for girls may be the most cost-effective, equitable solution. In order to accommodate menstruating girls, these latrines need to be private, clean, especially large to allow girls to change pads and wash, and have a nearby source for water.

- Urinal capacity should be considered carefully in the development of the designs so as to create a correct ratio of boys/girls availability of urinals in a specific school. It should be noted that the larger the school population, the larger the urinal capacity required to reduce queuing time. On the other hand, standardization of urinal capacities in schools is recommended. Based on this exploratory study, the optimal urinal capacity recommendation is between 10 to 25 students for one urinal.
- Waterless urinals can and should be designed to collect urine through drainage pipes and tanks. This option removes the need to dig a pit or construct a soak pit, and the use of urine for agriculture can be ecologically beneficial and economical. Of course, behavior change education in the design of use of urine in agriculture is critical and the design of these urinals should be considered carefully so that the urine is collected and used safely.
- Urinals in schools can have a niche in, for example, difficult geographical circumstances (e.g. hard rock ground). These niche markets could be further developed and can provide the key to making urinals usage more successful in efforts towards potentially scaling up.
- Although within the context of this study the issue of urinals and latrines for disabled students have not be observed, it does not underestimate the importance of reflecting on the technical designs to accommodate these students. In terms of urinal usage this may entails adapted designs for one of the urinals/latrines.

Financial Capability

- Although the costs of floor and wall tiles are a considerable up front expense, the long-term benefits may outweigh the costs. The ease of maintenance and minimization of smells may reduce long-term costs and improve acceptability. Based on the findings in this study it is recommended that urinals should be prioritised in every schools. However, behaviour change on girls' urinals should be considered in the introduction of such facilities in schools.
- Based on this study it is clear that the school budgetary allocation are not sufficient although it is stated that there is a government Free Primary Education (FPE) fund available. This FPE funds were generally inadequate, and can not sufficiently cover additional expenses around maintenance and construction of facilities. As a result of competing interests for free FPE funds it is recommended that more financial

resources should be sourced from partners so as to facilitate construction of more urinals.

Institutional support

- There is a need for support and co-ordination from government stakeholders at the national, district and local level for the further development of urinals. At the national level, there is the need to accommodate the urinals and hence alter the policy on pupil to latrine ratios. District education officers must include construction of urinals as part of their district development plans. Construction funding as part of the Kenya Education Sector Support Programme – a National capital cost programme funded by the UK Department for International Development – must include provision for urinal construction.
- The WASH in Schools Working Group can play a key role in providing for better *inter-sectoral co-operation* between governmental departments dealing with WASH in schools included the development of urinals in schools. Therefore there is a need to stimulate this task force whom could potential encourage the development of a policy that supports the development of school urinals.

Community support and student engagement

- There is a need for advocacy by a range of actors from school personnel to parents to local government and community stakeholders in order to create an awareness on the importance of sanitary facilities especially girls' urinals, which is a relatively new phenomena in Kenya.
- In term of schools management, either through the school health clubs or Parent-Teacher Association, it is critical to reflect on the maintenance of the sanitary facilities. Proper maintenance requires clear roles and responsibilities, monitoring, accountability for stakeholders. Additionally, funds to cover recurrent costs such as soap and brushes for cleaning and a clear system to source spare parts are required.

10. Future potential areas to explore

There are various avenues for potential further research exploration and the following are two key areas recommended in order to strengthen the potential usage of urinals in schools.

- The usage of urinals, outside the fact that it provides capacity, minimal waiting time and is financial viable, needs to also be viewed in light of socio-cultural aspects especially the usage of urinals by girls. Since few girl urinals currently exist, more evidence should be developed on the socio-cultural aspects that may need to be considered depending on the area/district. Although this study has not reflected on this issue, clearly it deserves some attention with a potential other study, to reflect not only on the socio-cultural barrier but on the possible alternative solutions.

- The types of urinal designs that could be developed could be further research including those for disable students. There are a number of interesting studies which could provide some basis for the Kenyan context.

Clearly the increase of urinals in schools throughout Kenya will be a significant step towards better functioning schools. This study revealed the importance of using more urinals for both boys and girls in schools. Safe sanitation is essential to ensure that students get the best start in life; that they are able to enter school healthy and ready to learn.

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