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## SACMEQ Gender Series Contribution #3 (March 2013)

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### **To flush or not to flush: Monitoring and evaluating the primary school sanitary facilities against Ministries' benchmark standards in Southern and Eastern African countries<sup>1</sup>**

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#### **Introduction**

Sustainable access to basic sanitation in school is well featured in the Education for All (EFA) goals and Millennium Development Goal (MDG). The United Nations General Assembly of 2010 declared access to sanitation as a human right (United Nations, 2010) in association with the MDG #7, with a particular target to “halve the proportion of people without sustainable access to safe drinking water and basic sanitation” by 2015 (United Nations, 2006, p.18). In education context, this target could be translated as the improvement of the availability of the sustainable basic sanitation at school premises to be accessed by students and staff.

Meanwhile, the UNESCO definition of the ‘gender equality’ within the EFA goals refers to the notion of boys and girls having the same advantages and disadvantages to not only going to school but also having the equal opportunities for access to better health and better quality of school life (UNESCO, 2000; 2003). Therefore, following this UNESCO definition, it would be worthwhile to examine and compare whether boys and girls are experiencing the same advantages for the access to basic sanitation facilities at school and compare the differences in the school outcomes of boys and girls who are in these different sanitation conditions.

#### **Literature review**

The importance of the toilet provision in schools has been advocated in great deal by UNICEF since 1960s (UNICEF, 2013). The organization has implemented projects related to sanitation in more than 90 countries as of 2013, and sub-Saharan African countries have been very much one of the targeted areas. UNICEF’s interventions, focusing on water, sanitation, and hygiene (often referred to as WASH), have been part of the form of “child friendly” schools or “girl friendly” schools. As Adams et al (2009) argue, this advocacy is based on the hypothesis which states that healthy students tend to attend school more, and in turn, they tend to be better learners. This notion seems to be particularly important for girls who face menstruation

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regularly. However, comparing the data on the access to improved sanitation facilities in 1990 and 2010, the World Bank (2013) reported that while rapid expansion is seen worldwide, the progress in Sub-Saharan Africa has been stagnating.

The World Health Organization (WHO)/UNICEF Joint Monitoring Programme for Water Supply and Sanitation (JPM) was established by United Nations in 2010 in order to monitor the MDG progress on water and sanitation. Although some progress has been seen in the availability of drinking water worldwide, according to their 2012 report, sub-Saharan Africa has decreased open defecation only by 11 percent points in between the period 1990 and 2010 (UNICEF & WHO, 2012). Taking into consideration the massive population expansion in the region, the 11 percent decrease translates into an increase in actual number of people practicing open defecation in 2010. It further reports that in the sub-Saharan Africa, the proportion of the population that was using the rather 'improved' form of sanitation was about 30 percent in 2010. Here, the 'improved' form of sanitation, according to WHO/UNICEF's definition, includes flush or pours flush toilets, ventilated latrines, pit latrines with slab, and composting toilets.

Several countries in Southern and Eastern African countries implemented policies and interventions in this area. For example, Kenya Education Sector Support Programme (KESSP) initiative, supported by multiple developmental partners, achieved constructions of more than 5000 new school toilets in 2010 through disbursing funds directly to schools (Njoka et al, 2012). Malawi set a plan for 'gender sensitive infrastructure' already in 2004 which drew out the targets for toilet inputs all the way to year 2015 (Government of Malawi, 2004). Namibia was another pioneer country which identified the needs of universal access to sanitation services that include: "(i) flush toilets with connection to sewer line; (ii) flush toilets with no connection to sewer line; and (iii) pit latrines or dry toilets" (Republic of Namibia, 2008, p.208).

There have been several studies that have examined the relationship between the availability of sanitation and school outcomes. For example, Freeman et al (2012) reported that school intervention related to water treatment, hygiene, and sanitation has improved the attendance of primary school children, especially girls, in areas less affected by post-election violence in Nyanza province of Kenya. However, the intervention did not have significant impact on learning achievement.

Toilet provision was one of the resources provided within the scheme of "girl friendly" schools in Burkina Faso, together with textbooks and canteens in the study conducted by Kazianga et al (2012) to examine its effect on school enrolment and learning achievement. While the positive effect of the "girl friendly schools" scheme was found on both boys and girls enrolment and learning achievement, with larger benefit for girls, it was not possible to disentangle the different resources within the scheme, therefore, the unique contribution of the toilet provision was not known from this study. In contrast, a longitudinal study in Malawi (Grant et al 2013) found no effect of the availability or the quality of toilets on menstruation-related absenteeism of adolescent students, suggesting that the improvement of the toilets would not significantly reduce the absenteeism.

Using the Rasch measurement approach, Saito (2005; 2007) has established a scale to measure school resources based on the data from some 3,000 schools of 15 schools systems in Africa.

Some 70 school resource items that were included in the SACMEQ surveys in 1995 and 2000 were used to calibrate the scale in order to measure the school resource provision. These ordered items were further categorized into six hierarchical levels: (1) insufficient; (2) limited; (3) basic; (4) comfortable; (5) affluent; and (6) prosperous (see **Appendix A** for the entire list of school resource levels and resource items). The item on the toilet provision had the criterion of less than 60 pupils per toilet, which was the natural break determined based on the distribution of sampled schools on their pupil per toilet ratios. This item came as one of the items within level 3: basic school resource provision. The items in level 3 include, in addition to all the items in levels 1 and 2, fence, store room staff room, piped water, less than 60 pupils per toilet, wall chart, map, teaching guides, English dictionary, map of a country, atlas, notebook, and eraser. That is, the 'difficulty' for a school to meet the criteria of less than 60 pupils per school was about the same as having the above-mentioned items available in schools.

In the analysis of changes in the gender-related background variables of SACMEQ countries between 2000 and 2007, Saito (2011) indicated that in Botswana, Lesotho, Malawi, Swaziland, Tanzania, Uganda, and Zambia, the statistical significance was absent in the differences between ratios for boys per toilet and girls per toilet in both years. That is, in these countries, the provision of toilets for boys and girls was practically equal, and this equality did not change over time. Mozambique was the only country where girls were in a disadvantageous position (with a larger pupil per toilet ratio) in 2000, but the toilet provision situation became equal in 2007. In other countries, usually girls were in an advantageous position. In other words, it seemed that there was practically no problem in terms of toilet provision for girls.

However, in her article, Saito raised a number of concerns:

- It may not be enough to examine the 'equality' in these ratios since the needs for the availability of toilets might be different between boys and girls;
- In many SACMEQ countries both the boys per toilet ratio and the girls per toilet ratio seemed to be equally far too high compared to the Ministry's benchmark, if any;
- Even if benchmarks are set in some countries, these boy's and girl's benchmarks may require gender differentiation.

In addition, as Adams et al (2009) set out in the WHO's guideline for toilets (see **Appendix B**) and UNICEF (2012) specifies in detailed WASH indicators (see **Appendix C**), the following concerns could be further considered important in order to monitor the progress in this area:

- These pupils per toilet ratios are usually established without taking into consideration the difference between the types of toilets, such as flush toilets, non-flush toilets, seating toilets, and squat holes; and
- These indicators do not contain any qualitative notions such as cleanliness, safety, and provision of special needs for girls.

## **Research questions**

In order to address the above issues, the following research questions are addressed:

- (i) What kind of quantity and quality of toilet data have been collected and reported in Southern and Eastern African countries?
- (ii) What have been the changes in the boys and girls to toilet ratios since 1995 in Southern and Eastern African schools, as compared to Ministries benchmark standards?
- (iii) What have been the changes in the diffusion of different types of toilets for boys and girls since 1995 in Southern and Eastern African schools, taking into consideration the different types of toilets?
- (iv) What was the relationship between the status of toilet provision and absenteeism, Reading achievement, and Mathematics achievement for boys and girls in Southern and Eastern African schools in 2007?

By looking in to these research questions, this chapter aims to:

- Review trends on the provision of different types of toilets in primary schools of Southern and Eastern Africa sub-region;
- Discuss potential impact of gender-friendly school environment on absenteeism as well as learning achievement of boys and girls;
- Provide the setting for comparative analysis of trends in the gender equality in the provision of toilets and learning achievement in countries of Southern and Eastern Africa; and
- Generate solid information and suggestions in order to assist Ministry officials in the elaboration of educational policies, aiming at achieving gender equality and removing disparities and gender inequalities and monitor the progress towards the EFA Goal and MDG.

## **Methodology**

For the review of data collection tools, the current chapter uses (i) the school head questionnaires that were used in the three large-scale assessments by SACMEQ in 1995, 2000, and 2007, (ii) school observation tool that was used during the IIEP project “Stories behind gender differences in student achievement” in Kenya in 2012; and (iii) Education Management Information System (EMIS) covering the WASH indicators in Malawi 2011.

For the analyses of trends in toilet provision, the chapter mainly uses the survey data from the three large-scale assessment results undertaken by SACMEQ in 1995, 2000, and 2007, covering 15 Ministries of Education in Africa.

The methodologies used in SACMEQ and IIEP project have been summarized below.

### SACMEQ Survey Methodology

The data comprises over 120,000 Grade 6 boys and girls in over 6,000 primary schools from 15 Ministries of Education, namely Botswana, Kenya, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Uganda, Zambia, Zanzibar, and Zimbabwe, that were collected in three different times, 1995, 2000, and 2007. For all SACMEQ studies, the target population has been the Grade 6 pupils in registered schools. The sample of Grade 6 pupils in each country was selected using a stratified two-stage cluster sampling

method with a probability sampling proportional to the size of schools based on the parameters that specify: (a) the rate of heterogeneity (Roh) between clusters, (b) the internationally acceptable effective sample size (ESS) which provides the same accuracy level as a simple random sample of 400 pupils; and (c) the planned cluster size. Then at each of the selected schools, a random sample of pupils equivalent to the planned cluster size was taken. The total size of the final sample depended on the value of Roh which differed from country to another. More detailed information about the sampling procedure can be found in Ross & Saito (in preparation).

### Methodology in “Stories behind Gender Differences in Student Achievement”

Some exploratory data were collected in Nairobi, Kenya in 2012. Four pilot schools were selected using a judgment sampling method out of the 2007 SACMEQ sample of schools, in order to have a mixture of different patterns of gender differences in learning achievement. Data were collected collaboratively by the staff of International Institute of Educational Planning (IIEP) and the planners and researchers from Kenya Ministry of Education and its affiliated offices and institutions during 2012. This chapter will make a reference to a measuring tool which was used in order to collect information on the number of different types of toilets. For the complete information regarding: (i) practice of toilet management by the school leaders; and (ii) views by the Standard 6 and 8 boys and girls on the toilet situation and how they use them, see Saito (Ed.) (in preparation).

### **Results**

- (i) What kind of quantity and quality of toilet data have been collected and reported in Southern and Eastern African countries?

The first section is a review of some existing tools in order to measure the quantity and the quality of toilets.

### Data Collection and Reporting on Toilet Information within SACMEQ Studies

Since the first SACMEQ study in 1995, the question of the toilet provision was one of the priority concerns of the Ministries’ decision makers. As shown in **Figure 1**, the data were collected altogether as ‘squat holes or toilets’ without separating potentially different forms of toilets. Then a pupil per toilet ratio was established, using the number of pupils that were in the largest shift, which would give the largest pupil per toilet ratio at any point in a school day. This was because not all the pupils in all the shifts would be physically apposite for the use of toilets at the same time. Although the toilet data were collected separately for boys’ toilets and girls’ toilets, SACMEQ I policy research reports used only the generic pupil per toilet ratio, without taking into consideration the important gender distinction.

**Figure 1: Question on Toilet Provision in the SACMEQ I School Head Questionnaire**

<b>30. How many squat holes or toilets does your school have?</b>	
<i>(Please write the numbers in the boxes below.)</i>	
<b>30.1 Boys squat holes or toilets</b>	<input type="text"/> <input type="text"/>
<b>30.2 Girls squat holes or toilets</b>	<input type="text"/> <input type="text"/>

Source: SACMEQ archive (Ross et al, 2004)

During SACMEQ II, the question on the toilet provision was more elaborated so that it was possible to capture different types of toilets such as: (a) flush toilets; (b) squat holes or pit toilets; and (c) other types of toilet or latrine. The question was also expanded in order to collect the information on the provision of the staff toilets (see **Figure 2**). However, in the SACMEQ II policy research reports, the same indicator (i.e., the pupil per toilet ratio combining all types of toilets and combining both boys' toilets and girls' toilets) was used in order to keep the comparability for the monitoring purpose.

**Figure 2: Question on Toilet Provision in the SACMEQ II School Head Questionnaire**

<b>37. How many toilets or latrines does your school have? State the number of places for individual pupils.</b>	
<i>(Please write the number in the boxes for each type of users for each category. If there are no toilets of any kind, tick the final column. If the answer is zero, please put a zero.)</i>	
	<b>Types of toilet</b>
<b>Toilets / latrine places for</b>	<b>Flush toilet</b>
	<b>Squat holes or pit toilets</b>
	<b>Other types of toilet or latrine</b>
	<b>No toilets or latrines at all</b>
<b>37.1 Boys</b>	a <input type="text"/> <input type="text"/>
	b <input type="text"/> <input type="text"/>
	c <input type="text"/> <input type="text"/>
	d <input type="checkbox"/> (2)
<b>37.2 Girls</b>	a <input type="text"/> <input type="text"/>
	b <input type="text"/> <input type="text"/>
	c <input type="text"/> <input type="text"/>
	d <input type="checkbox"/> (2)
<b>37.3 Staff</b>	a <input type="text"/> <input type="text"/>
	b <input type="text"/> <input type="text"/>
	c <input type="text"/> <input type="text"/>
	d <input type="checkbox"/> (2)

Source: SACMEQ archive (Ross et al, 2004)

**Figure 3: Question on Toilet Provision in the SACMEQ III School Information Booklet**

18. How many toilets (flush toilets, latrine places, squat holes, or pit toilets) does your school have?  
 State the number of places for individuals.  
 (Please write the number in the box below for each type of user for each category.  
 If there are no toilets write '0'.)

		Types of toilet	
		Flush toilets	Latrine places, squat holes, or pit toilets
18.1	Boys	a <input type="text" value=""/>	b <input type="text" value=""/>
18.2	Girls	a <input type="text" value=""/>	b <input type="text" value=""/>
18.3	Staff	a <input type="text" value=""/>	b <input type="text" value=""/>

Source: SACMEQ archive (SACMEQ, 2007)

During SACMEQ III, it was decided to simplify the toilet provision question because practically all of the values given for category (c) during SACMEQ II were zero in most of the countries. As was the case in SACMEQ II, the question in SACMEQ III separated the flush toilets, and it addressed separately the toilets for boys, girls, and staff (see **Figure 3**). The SACMEQ III policy research reports used the same indicator as previously in order to be comparable. In addition, an attempt was made by the SACMEQ National Research Coordinators (NRCs) to examine and report the toilet ratios separately for boys and girls for their National Policy Briefs on the progress in gender equality in education. However, no attempt has been made so far to use the information on the flush toilets.

### EMIS Report of Malawi

Malawi is one of the very rare Ministries of Education in the Southern Africa sub-region which has been collecting data on various types of toilets as well as hand-washing facilities and water sources within their regular EMIS data collection. Its education statistics report 2011 has included the raw data of number of toilets separately for boys and girls taking into consideration different types (flush toilets, pit latrines drop holes, or urinal blocks), whether it is in use or under construction, and whether it is improved form or basic form as shown in **Figure 4**. While the meaning of "basic" in the "pit latrines drop holes" is not clear in **Figure 4**, by deducing from other columns, it could be assumed that the first two columns in the "pit latrines drop holes" are meant to be for the improved form. Although such detailed data were collected, in the EMIS report, these numbers were only summed at the district level. It would have been possible to calculate such indicators as ratios of pupils to toilets and percentage of schools with certain criteria separately for boys' toilets and girls' toilets; however, there has been no reporting on these indicators.

**Figure 4: Extract from Malawi EMIS report**

Flush Toilets		Pit Latrines Drop Holes			Urinal Blocks			Hand washing facilities		
In use	Under construction	In use	Under construction	Basic Pit Latrines	Improved & in use	Improved under construction	Basic in use	Improved & in use	Improved under construction	Basic use

Source: Ministry of Education Science and Technology. (2011)

Observation Tools in IIEP’s “Stories behind Gender Differences in Student Achievement”

Within the IIEP’s study on “Stories behind gender differences in student achievement”, the information about the provision and the use of toilets were collected based on the observations and interviews.

The school observation tool had a special section on the quantity and the quality of toilets. First of all, the data collectors were to draw the school premise map in order to indicate where the boys’ and girls’ toilets are and where the hand washing facilities are. Secondly, the toilets were to be counted based on some criteria separately for boys, girls, male staff, and female staff. Thirdly, different types of toilets need to be taken into account, for example, seating toilet with flush, seating toilet without flush, squat hole with flush, and squat hole without flush. Furthermore, toilets were counted based on some quality, i.e., whether the door closes properly, water availability (in tank or in bucket), usability of seats (for a seating type), whether trash can is equipped, paper availability, and cleanliness (see **Figure 5**). The notion of being clean, however, totally relied on the interpretation of the data collectors. In addition, a focus group interview has captured how Standards 6 and 8 pupils have felt about their school toilets.

**Figure 5: Extract from the School Observation Tool**

For	Total	Door closes properly	With water	Usable seat	Trash can	With paper	Clean
Boys	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Girls	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Male Staff	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Female Staff	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Source: Saito (2012)

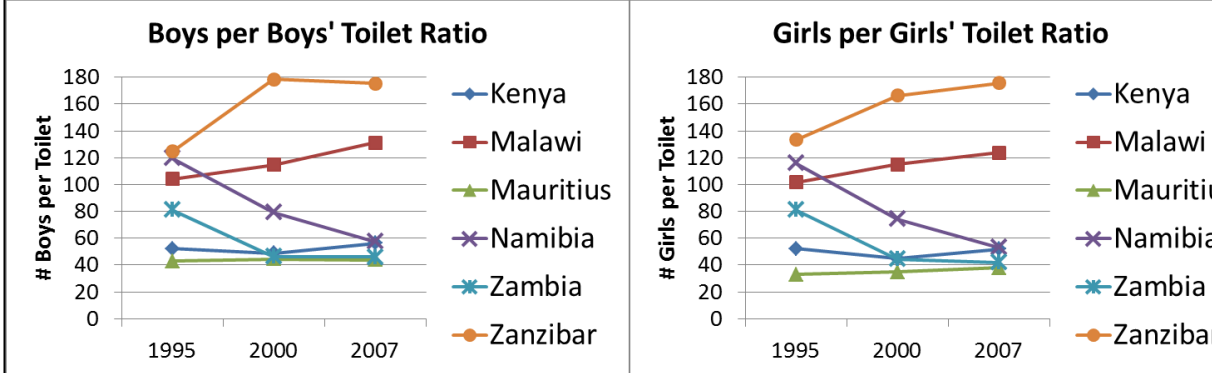
- (ii) What have been the changes in the boys and girls to toilet ratios since 1995 in Southern and Eastern African schools, as compared to Ministries benchmark standards?

**Appendix D** illuminates the situation of toilet provision, by the measure of mean number of boys and girls per toilet that have been calculated separately for boys’ toilets and girls’ toilets. Those pupils that were in schools without any form of toilet have been excluded from these



calculations. **Figure 6** is a visualization of the results for the five countries that have participated in all SACMEQ studies so far, which shows the similarity between the ratios for boys' toilets and girls' toilets.

**Figure 6: Boys per Boys' Toilet Ratio and Girls per Girls' Toilet Ratio for Five SACMEQ Countries (1995, 2000, and 2007)**



Source: Constructed by the author based on Ross et al (2004) and SACMEQ (2007)

The 'systematic' progress in Namibia has been noteworthy. That is, Namibia not only provided some form of toilets to almost all the primary schools (see next section), but also improved the ratio of number of pupils to the number of toilets. These ratios went from alarming 120 boys per boys' toilets and 116 girls per girls' toilets in 1995 to 79 and 75 respectively in 2000, all the way to more reasonable 58 and 53 respectively in 2007. In contrast, in Zambia, while it also improved on the mean boys and girls per toilet throughout years, these only concerned 58 percent of boys and girls that were in those schools that had some form of toilets. Malawi, Namibia, and Zanzibar started at a similar level of this ratio with over 100 boys and girls per toilet. However, both Malawi and Zanzibar further increased this ratio, i.e., there has been deterioration in the provision of toilets. In addition to Malawi and Zanzibar, as of 2007, Uganda and Mozambique also had the ratio with over 100. The most tormenting result came from Mozambique where the already large ratios in 2000 were augmented to 243 boys per boys' toilet and 238 girls per girls' toilet in 2007.

One could argue that the international comparison of the pupil per toilet ratios would not be faire if we take into consideration the different country contexts. One way to monitor the progress therefore would be to compare against its own standards, rather than to compare internationally. The next analysis is concerned with the comparison against Ministries' national benchmark for pupil per toilet ratio as the reference point, incorporating different benchmarks for boys' toilets and girls' toilets, if any (see **Table 1**).

**Table 1: Ministry's Benchmark Standards on Pupil per Toilet Ratio (as of 2013)**

School System	Ministry Benchmark		NOTE
	Boys	Girls	
Botswana	15	15	
Kenya	30	25	
Lesotho	3 per school	4 per school	These benchmarks are applied to any size of the school.
Malawi	12	10	
Mauritius	50	25	
Mozambique	Not reported		To use WHO's benchmark for Table 2.
Namibia	35	35	
Seychelles	Not reported		To use WHO's benchmark for Table 2.
South Africa	30	30	WHO's benchmark of 30 is adopted for boys and girls.
Swaziland	40	40	
Tanzania	25	20	
Uganda	Not reported		To use WHO's benchmark for Table 2.
Zambia	Not reported		To use WHO's benchmark for Table 2.
Zanzibar	Not reported		To use the Tanzania Mainland's benchmarks for Table 2.
Zimbabwe	25	20	

Sources: Constructed by the author based on the benchmarks reported in Amadhila et al (2011); Chitiga & Chinoona (2011); Jopo et al (2011); Mhonyiwa et al (2011); Milner et al (2011); Moloji & Chetty (2011); Monyaku (2012); Ngware et al (2008); Saito et al (2011); Sauba & Lutcmiah (2011); Shabalala & Nxumalo (2011); and Wasanga et al (2011).

As shown in **Table 1**, not all Ministries of Education in SACMEQ have the benchmark for the provision of school toilet, as seen in Mozambique, Seychelles, South Africa, Uganda, Zambia, and Zanzibar (Passos et al, 2011; Leste & Benstrong, 2011; Saito et al, 2011; Kaba & Musonda, 2011; Mohammed & Salim, 2011). According to Moloji & Chetty (2011), South Africa's Department of Education officially uses WHO's benchmark of 30 for both boys' and girls' toilets. In addition, Botswana, Namibia, Swaziland, and WHO have the same benchmarks for boys' and girls' toilets, regardless of the generally recognized gender differences in the needs of toilet usage. The Ministries that have established different benchmarks for boys' toilets and girls' toilets are Kenya, Lesotho, Malawi, Mauritius, Tanzania, and Zimbabwe. The benchmarks for Lesotho indicate that each school should have 3 boys' toilets and 4 girls' toilets no matter how big the school is. This could be a problem for larger schools. For example, if the size of the school reaches 90 boys and 120 girls and beyond, then both the ratios of boys to boys' toilets and girls to girls' toilets would go over the WHO's benchmark of 30.

Assuming no change was made in the benchmarks, they were used in order to calculate the percentage of Grade 6 pupils who were going to schools that meet the Ministries' benchmarks on toilet provision. **Table 2** shows the evolution throughout different years. For SACMEQ countries that did not have the Ministries' benchmarks, the WHO's benchmark of 30 has been applied for the current analyses, except for Zanzibar, where the benchmarks of the Tanzania Mainland have been applied.

**Table 2: Percentages and Standard Errors of Grade 6 Boys and Girls in Schools That Meet the Ministries' Benchmark Standards in 2007**

School System	Percentage Meeting Benchmark											
	Boys' Toilets Provision						Girls' Toilet Provision					
	1995		2000		2007		1995		2000		2007	
	%	SE	%	SE	%	SE	%	SE	%	SE	%	S
Botswana	NA	NA	3.5	1.46	7.5	2.15	NA	NA	5.2	1.56	10.8	2
Kenya	25.6	3.97	34.4	3.90	24.2	3.41	18.5	3.33	28.3	3.73	20.2	3
Lesotho	NA	NA	65.0	4.01	58.3	4.13	NA	NA	62.2	4.06	55.2	4
Malawi	0.7	0.65	0.9	0.88	0.0	0.00	0.7	0.65	1.7	1.19	0.7	0
Mauritius	68.3	4.03	67.8	4.02	69.0	3.97	34.9	3.89	29.4	3.67	33.0	3
Mozambique	NA	NA	10.9	2.30	0.0	0.00	NA	NA	6.2	1.80	0.6	0
Namibia	24.1	2.56	24.4	2.48	28.0	2.76	29.4	2.37	30.4	2.60	38.6	2
Seychelles	NA	NA	73.4	0.02	32.4	0.18	NA	NA	80.1	0.01	78.0	0
South Africa	NA	NA	31.4	4.28	29.4	2.59	NA	NA	41.1	4.38	37.2	2
Swaziland	NA	NA	15.3	2.97	25.6	3.43	NA	NA	21.0	3.35	31.1	3
Tanzania	NA	NA	18.3	3.30	3.3	1.22	NA	NA	11.6	2.73	2.4	1
Uganda	NA	NA	5.5	1.56	5.1	1.33	NA	NA	7.1	1.92	5.1	1
Zambia	22.0	3.49	39.2	4.88	22.5	3.45	20.6	3.35	40.5	4.84	23.6	3
Zanzibar	0.7	0.00	3.0	0.02	0.8	0.55	0.7	0.00	1.3	0.01	0.7	0
Zimbabwe	31.3	3.73	NA	NA	33.2	4.18	17.7	3.21	NA	NA	21.8	3

NA=Not Administered

Source: Constructed by the author based on Table 1, Ross et al (2004), and SACMEQ (2007)

Since the SACMEQ data archive used the pupil as the unit of analysis, the percentages reported for all the data analyses should be linked to the target population, Grade 6 pupils. Therefore, an example interpretation would be: In Botswana, 3.5 percent of Grade 6 pupils are in schools where the boys' toilet provision meets the Ministry's benchmark standard on the ratio for boys to toilets.

When the comparison was made against the Ministries' benchmark standards, there seem to have significant gender differences in some countries. For example, in Mauritius, when the benchmarks are set differently by gender, the percentages meeting the criteria were significantly higher for boys' toilets throughout years. Therefore, in order to achieve the 'equality' at this output level, Ministries of Education would require implementing an 'equity' measure, i.e., furnishing toilets more for girls than for boys.

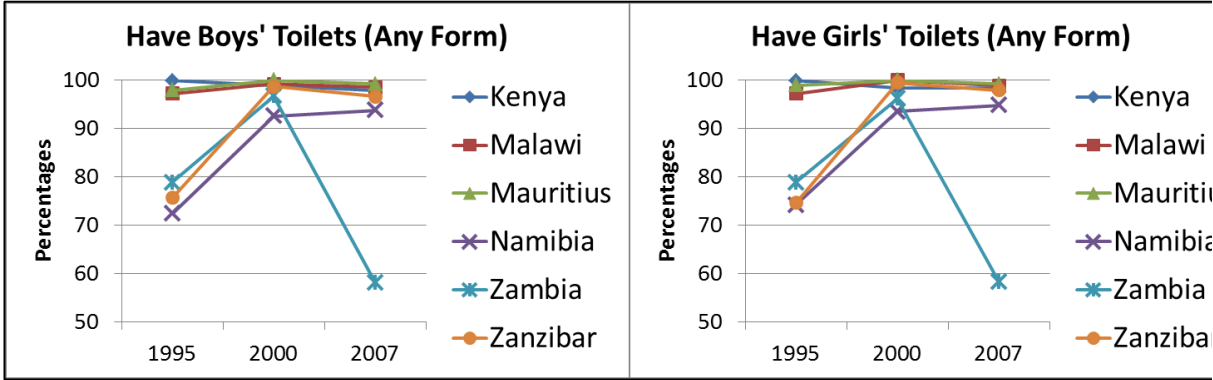
Another pertinent finding is that none of the countries without benchmarks have improved the situation over time. While having the benchmarks may not be the automatic solution, establishing reasonable seems to be an important foundation for monitoring the progress.

- (iii) What have been the changes in the diffusion of different types of toilets for boys and girls since 1995 in Southern and Eastern African schools, taking into consideration the different types of toilets?

**Appendix E** illustrates the percentages and standard errors (SEs) of Grade 6 pupils who were going to schools where there was any form of boys' toilets (on the left side of the table) and

girls' toilets (on the right side of the table) throughout the three studies of SACMEQ, i.e., in 1995, 2000, and 2007. **Figure 7** is a visualization of the results for the five countries that have participated in all SACMEQ studies so far. In general, somewhat higher percentages were reported for the girls' toilets than for the boys' toilets. But the patterns were the same for boys' and girls' toilets.

**Figure 7: Percentages of Grade 6 Pupils at Schools with Any Form of Boys' and Girls' Toilets in Five SACMEQ Countries (1995, 2000, and 2007)**



Source: Constructed by the author based on Ross et al (2004) and SACMEQ (2007)

As can be seen in **Appendix E**, while no school systems achieved the 100 percent coverage for either boys' or girls' toilets during 1995, the highest percentage was recorded in Kenya (99.9 percent). The lowest percentage in 1995 was about 72 to 74 percent in Namibia and Zanzibar. However, the results for 2000 show the 100 percent coverage for some form of toilets in several school systems, such as Botswana, Mauritius, and Seychelles for both boys' and girls' toilets, and Malawi for girls' toilets. The lowest percentage in 2000 was recorded at 83 percent in Lesotho. In 2007, percentages varied from the lowest at 58 percent in Zambia to the highest at 100 percent in Mozambique and Seychelles for boys' and girls' toilets and Swaziland for only girls' toilets.

Several school systems improved in the trend over time, for example, in Namibia, as seen in the previous section, the percentage in 1995 was the lowest at 72 percent for boys' toilets and 74 percent for girls' toilets, but it improved to around 93 percent, and maintained the level with even a slight improvement to around 94 percent for both boys' and girls' toilets in 2007.

A similar trend of improvement was also seen in Zanzibar. On the other hand, Zambia, which started at 79 percent in 1995, had improved quite remarkably to 96-97 percent in 2000, but the percentage in 2007 was a worrying 58 percent. Zimbabwe was another country that showed moderate decrease in 2007. In Kenya, Malawi, and Mauritius, the percentages did not fluctuate much throughout three studies at a very high level ranging 97 to 100 percent for boy boys' and girls' toilets. When comparing the toilet provision situation only in 2000 and in 2007 in **Appendix E**, Seychelles was the only country which kept the 100 percent coverage between these years. However, some improvement was seen in five school systems (Mozambique, Namibia, South Africa, Swaziland, and Tanzania). The rest of the SACMEQ school systems deteriorated on the toilet provision situation between 2000 and 2007, even in Botswana and Mauritius, although slightly.

**Appendix F** further illustrates percentages and SEs for Grade 6 pupils who were in schools with flush toilets during three SACMEQ studies. Results include only SACMEQ II and SACMEQ III since the questions during the first SACMEQ study did not ask separately for flush toilets vs. non-flush toilets.

The situation was much different compared to the results on any form of toilets, except for Seychelles, where all the available boys' and girls' toilets were the flush toilets in both years. Mauritius was another country where the percentage was maintained at a very high level of over 99 percent for both boys' and girls' toilets throughout years, indicating that almost all of the Grade 6 pupils have access to flush toilets in school. On the other hand, in 2007 still four countries (Lesotho, Malawi, Tanzania, and Uganda) remained less than 5 percent of Grade 6 boys and girls with access to flush toilets.

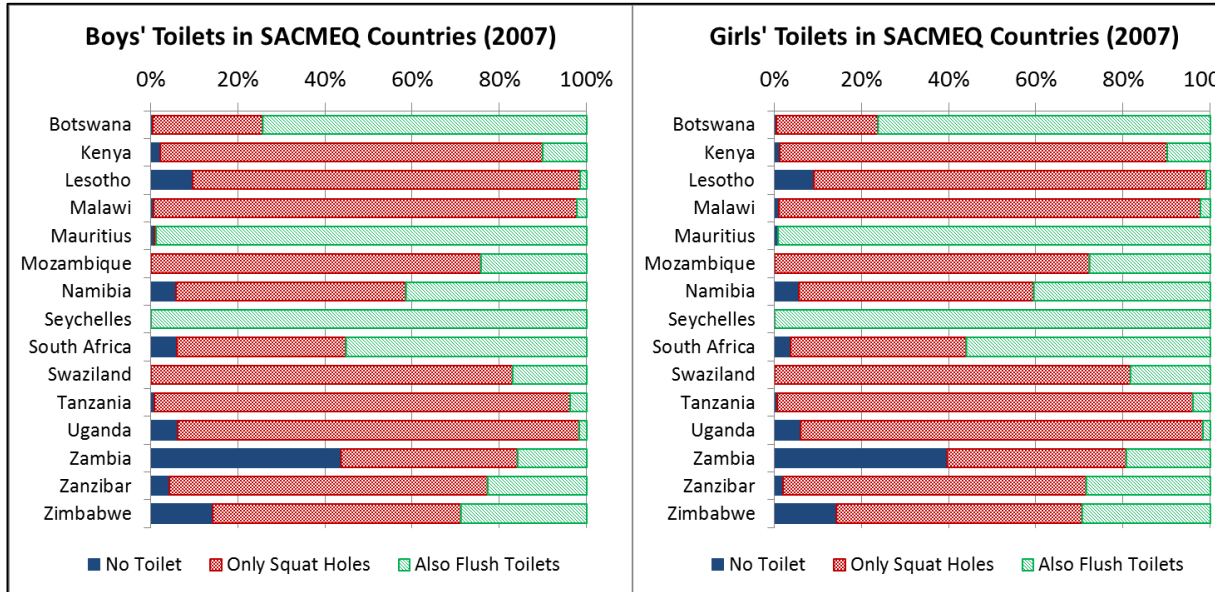
The evolution pattern was very mixed among the SACMEQ countries. For example when comparing Botswana and South Africa, where the provision of flush toilets were around 50 and 60 percent in 2000, while Botswana improved to 74 percent in 2007, South Africa maintained at a similar level of 55 percent in 2007 for both boys' and girls' toilets. Furthermore, Malawi and Zanzibar, both of which had around 11 percent in 2000, also had different paths: Malawi reduced to 2 percent while Zanzibar increased to around 26 percent in 2007 for both boys' and girls' toilets. Mozambique and Namibia that started at middle 30s in 2000 also went to different directions: Mozambique reduced to 26 percent while Namibia increased to 42 percent for both boys' and girls' toilets.

When the comparison was made based on the Ministries' benchmark standards in the previous section, the gender differences were emerging in some countries. However, when the comparison was made based on the pupil per toilet ratios and the percentage of availability of toilets, the difference between boys' toilets provision and girls' toilets provision did not seem to be evident. Rather the pattern was almost identical between boys' and girls' toilets provisions. This demonstrates the importance of benchmark standards as the reference point.

- (iv) What was the relationship between the status of toilet provision and absenteeism, Reading achievement, and Mathematics achievement for boys and girls in Southern and Eastern African schools in 2007?

Before going into the analyses regarding the toilet situation and absenteeism and learning outcome variables for 2007, it is worthwhile to take note of the actual proportions of sub-samples constituting the different hierarchical levels of toilet situation (i) schools have no toilet; (ii) schools only have squat holes; and (iii) schools have flush toilets in addition to the squat holes (see **Figure 8**).

**Figure 8: Hierarchies of Toilet Situation in SACMEQ Countries (2007)**



Source: Constructed by the author based on SACMEQ (2007)

In Mauritius and Seychelles, it can be observed that the flush toilets were the main form of toilets for both boys and girls in 2007. The diffusion of flush toilets was also very much developing in Botswana and South Africa, over and above the majority. In most of the countries, however, the squat holes were the main form of toilets.

The means of absenteeism and learning outcome variables are to be compared regardless of the varied proportions of the toilet provision level. It should be also noted that the intention is not to draw a cause-and-effect conclusion between the status of the toilets and these other outcome variables. In addition, the outcome results reported for the categories with extremely small percentages (for example, the 'no toilet' category for Botswana or 'flush toilet' category for Lesotho) need to be interpreted with caution.

As mentioned previously, the impact of sanitation and school attendance has been much studied under a generally agreed assumption that if the basic sanitation facility is not in place, children tend to be absent, especially girls during the menstruation (Freeman et al, 2012; Grant et al, 2013). The next analysis will concern the comparison of boys' and girls' absences by the hierarchically categorized level of toilet provision (see **Table 3**).



**Table 3: Grade 6 Boys' and Girls' Mean Absent Days per Month and Standard Errors Based on Toilet Provision in 2007**

School System	No Toilet				Only Squat Holes				Have Flush Toilets			
	Boys		Girls		Boys		Girls		Boys		Girls	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Botswana	0.8	0.00	0.6	0.00**	0.5	0.08	0.3	0.05**	0.4	0.05	0.3	0.04
Kenya	1.1	0.33	1.2	0.00	1.4	0.15	1.2	0.12	0.8	0.17	0.8	0.15
Lesotho	2.0	0.24	1.6	0.21	1.7	0.12	1.3	0.08**	2.1	0.19	0.7	0.04
Malawi	2.7	0.00	0.0	0.00**	1.8	0.11	1.5	0.10	1.4	0.58	1.6	1.09
Mauritius	2.8	0.00	2.6	0.00**	6.1	1.32	NC	NC	1.9	0.08	1.7	0.08
Mozambique	NC	NC	NC	NC	1.3	0.10	0.9	0.07**	1.1	0.16	1.0	0.15
Namibia	1.1	0.23	1.1	0.15	1.4	0.11	1.1	0.11**	0.7	0.05	0.6	0.05
Seychelles	NC	NC	NC	NC	NC	NC	NC	NC	1.7	0.08	1.8	0.09
South Africa	1.4	0.30	0.8	0.21	1.3	0.29	1.0	0.24	0.9	0.05	0.8	0.05
Swaziland	NC	NC	NC	NC	0.5	0.04	0.3	0.04**	0.4	0.06	0.3	0.06
Tanzania	2.7	1.05	5.8	0.00**	2.2	0.14	2.1	0.13	1.2	0.42	1.2	0.37
Uganda	2.9	0.83	2.2	0.38	2.5	0.12	2.2	0.10	2.5	0.78	2.5	0.63
Zambia	2.3	0.17	2.5	0.22	3.0	0.25	2.6	0.19	2.2	0.22	2.2	0.18
Zanzibar	2.0	0.59	1.5	0.48	2.2	0.16	1.5	0.10**	2.2	0.33	1.3	0.13
Zimbabwe	2.4	0.26	2.1	0.34	1.9	0.18	1.6	0.15	1.4	0.24	1.7	0.22

\*\* Gender difference is statistically significant at 95% confidence level.

Source: Constructed by the author based on SACMEQ (2007)

In **Table 3**, boys' and girls' mean absent days in the previous month of the data collection and SEs have been presented for the different toilet provision levels for each SACMEQ country in 2007. It should be noted, however, that the main reason for absence was simply chosen from a list by each pupil, and these reported days were not counted separately for different reasons. In addition, no data were collected on absent days due to menstruation.

In general, the level of absenteeism was higher for boys than for girls at all toilet provision levels. The most prominent exception was the monthly average of almost 6 days by girls in the 'no toilet' group compared with less than 3 days for boys. As mentioned earlier, these values must be interpreted with caution. The number of countries with statistically significant gender differences in favor of girls was four (Botswana, Malawi, Mauritius, and Tanzania) in the 'no toilet' group, six (Botswana, Lesotho, Mozambique, Namibia, Swaziland, and Zanzibar) in the 'only squat holes' group, and three (Lesotho, Mauritius, and Zanzibar) in the 'have flush toilets' group.

In terms of the difference between the toilet provision levels, statistically significant attendance results were associated with boys having access to flush toilets in Kenya, Lesotho, Mauritius, Namibia, Tanzania, and Zambia. For girls, the same results were seen in Kenya, Lesotho, Namibia, and Tanzania. In other words, the effect of having 'improved' form of toilets was less present for girls.

In **Table 4**, the mean reading scores and SEs of Reading test scores in 2007 have been shown for boys and girls separately with different toilet provision levels. Reading tests were equated using a Rasch measurement technique based on the common items in 1995, 2000, and 2007,

and the scores were standardized using the 500 as the pupil mean and 100 as the Standard Deviation for all countries in SACMEQ in 2000.

**Table 4: Grade 6 Boys' and Girls' Mean Reading Scores and Standard Errors Based on Toilet Provision in 2007**

School System	No Toilet				Only Squat Holes				Have Flush Toilets			
	Boys		Girls		Boys		Girls		Boys		Girls	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Botswana	594.0	0.00	640.8	0.00**	487.6	5.78	520.0	7.11**	530.1	6.48	557.9	5.79
Kenya	581.4	46.83	634.1	0.00	534.6	4.93	533.1	5.69	616.8	17.38	609.9	21.96
Lesotho	450.2	7.34	454.4	6.79	465.0	3.83	473.2	3.23	460.5	14.70	467.2	9.94
Malawi	419.8	0.00	389.3	0.00**	437.4	2.98	428.0	2.75**	481.9	9.83	461.8	1.04
Mauritius	559.6	0.00	579.5	0.00**	431.3	20.56	NC	NC	559.2	5.92	588.9	5.18
Mozambique	NC	NC	NC	NC	471.8	3.45	463.9	4.40	499.1	7.26	497.3	9.72
Namibia	451.8	5.36	464.6	8.45	457.5	2.64	472.2	3.05**	535.5	6.07	550.6	5.91
Seychelles	NC	NC	NC	NC	NC	NC	NC	NC	544.4	4.50	607.2	3.97
South Africa	417.0	7.29	450.6	18.66	427.0	4.00	438.8	4.53	530.3	6.98	558.1	6.53
Swaziland	NC	NC	NC	NC	535.4	3.04	543.7	2.92	591.9	5.75	597.4	5.60
Tanzania	573.8	4.52	557.9	0.00**	583.6	3.69	566.8	3.75**	647.8	21.61	638.0	17.45
Uganda	492.7	18.77	469.7	14.24	479.7	3.86	475.9	3.86	532.6	19.25	496.4	39.55
Zambia	442.1	5.80	437.2	8.32	426.4	4.31	412.8	3.07**	451.0	9.30	459.3	7.97
Zanzibar	489.9	19.55	453.5	22.96	519.7	3.79	531.9	3.69**	553.3	8.30	564.0	6.12
Zimbabwe	465.6	18.80	484.0	13.52	466.1	5.55	475.6	5.21	588.4	9.44	596.4	9.96

\*\* Gender difference is statistically significant at 95% confidence level.

Source: Constructed by the author based on SACMEQ (2007)

Since the availability of flush toilets tends to be associated with the higher endowment in general school infrastructure, it is expected for both boys and girls in the schools with flush toilets to perform better than those without flush toilets. This was the case in Namibia, South Africa, and Zimbabwe. For Mozambique and Tanzania, the gender difference (in favor of boys) was smaller in schools with flush toilets than those schools with only squat holes. In Zambia, the direction of gender difference changes between the 'only squat holes' group (boys better) and the 'have flush toilets' group (girls better). That is, girls seem to be profiting more from the flush toilets these countries. However this was not evident in Lesotho, where the achievement was practically the same whatever the level of toilet provision for both boys and girls.

**Table 5** shows the results of Mathematics scores depending on the level of toilet provision in 2007. Mathematics tests were also equated and standardized throughout different studies using the same measurement techniques as in Reading tests. As was the case for Reading, the association between the better quality of general school infrastructure and the higher achievement seemed to be present for the Mathematics achievement as well. That is, both boys and girls seem to have higher Mathematics achievement in schools with improved form of toilets, in this case, 'flush toilets'. This pattern was more noticeable in Namibia, South Africa, Tanzania, and Zimbabwe. It was not prominent in countries with some potential outliers in the 'no toilet' category close to zero percentage. The most curious gender difference was in Tanzania where the gender differences in Mathematics achievement (in favor of boys) became smaller as they were exposed to more improved form of toilets.



**Table 5: Grade 6 Boys' and Girls' Mean Mathematics Scores and Standard Errors Based on Toilet Provision in 2007**

School System	No Toilet				Only Squat Holes				Have Flush Toilets			
	Boys		Girls		Boys		Girls		Boys		Girls	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Botswana	552.8	0.00	564.0	0.00 **	494.3	4.38	505.7	5.14	525.0	5.10	528.8	4.54
Kenya	585.9	24.79	583.0	0.00	561.4	4.36	539.6	4.38 **	616.5	17.32	597.8	19.13
Lesotho	472.6	9.66	474.6	9.58	477.3	3.34	476.9	3.03	487.8	1.26	487.1	2.53
Malawi	493.1	0.00	431.0	0.00 **	451.2	3.25	440.8	3.17 **	506.9	2.55	460.3	0.24
Mauritius	637.2	0.00	640.6	0.00 **	475.4	39.89	NC	NC	616.4	7.00	630.6	6.11
Mozambique	NC	NC	NC	NC	485.5	3.05	475.9	4.13	496.6	4.75	485.6	6.80
Namibia	446.1	4.10	443.7	6.52	449.8	2.87	449.2	2.59	503.8	5.26	501.3	4.81
Seychelles	NC	NC	NC	NC	NC	NC	NC	NC	535.2	3.55	566.7	3.34
South Africa	453.0	14.31	481.3	12.05	447.1	4.35	453.8	4.33	526.3	5.93	531.6	5.34
Swaziland	NC	NC	NC	NC	540.5	2.75	531.5	2.82 **	569.5	5.25	556.7	4.79
Tanzania	566.3	11.17	529.7	0.00 **	565.1	3.69	533.7	3.41 **	647.6	38.50	626.5	27.24
Uganda	491.7	16.52	476.2	9.66	485.5	3.44	476.8	3.39	530.9	16.38	499.8	27.49
Zambia	445.9	5.21	435.5	5.02	430.9	3.46	417.2	3.50 **	451.7	6.87	441.8	5.85
Zanzibar	482.7	12.85	469.4	11.69	483.9	2.93	478.2	2.40	507.8	5.51	498.6	3.99
Zimbabwe	504.8	17.53	497.8	16.44	489.4	5.22	490.4	4.00	590.1	10.44	583.8	9.18

\*\* Gender difference is statistically significant at 95% confidence level.

Source: Constructed by the author based on SACMEQ (2007)

## Discussions

The IIEP's project on "Stories behind gender differences in student achievements" has been a small scale exploratory data collection. However, some advantages can be observed, which goes in line with what is suggested in Adams et al (2009) and UNICEF (2012) (see **Appendices B and C** again). For example, it revealed that in one of the schools, while all of the toilets were flush toilets, the water only runs for one hour during the afternoon, while in another school, the water never runs or the flush never functioned. It would be a challenge to keep toilets clean in these situations. In some cases, these flush toilets could be permanently locked and therefore not available for pupils. Maintenance is also a problem in some toilets with the doors not properly closing or missing. This means that any reported ratios of pupils per toilets could be misleading. Moreover, in one school, the toilets and the hand-washing points are completely opposite sides of the school premise, while in another school the hand-washing point is juxtaposed to the toilets but water did not run, meaning that hand-washing practice would be rarely pursued. In these cases, the pupils' well-being could be difficult to be maintained.

Incorporating such a way of observing the situation of toilets availability and utilization in periodic school inspections and/or in the school census data collection would facilitate the process of monitoring the MDG progress. In this case, more elaborated indicators on toilets could be constructed from the data and reported, for example:

- Ratio of boys to boys' functioning flush toilets;
- Ratio of girls to girls' functioning flush toilets;
- Percentage of functioning flush toilets out of all toilets;

- Percentage of toilets cleaned on daily basis;
- Percentage of toilets equipped with (i) doors, (ii) running water, (iii) paper, (iv) trash bin, etc.
- Percentage of toilets with a hand-washing point next to the toilets;
- Etc.

## Conclusions

In this chapter, first, various tools to measure the toilet provision were reviewed. It seems that SACMEQ has evolved much throughout years in terms of the way to count different types of toilets separately for boys, girls, male staff, and female staff. However, the reporting of indicators has been still limited. Likewise, Malawi EMIS also revealed that interesting and rich data were not being used in the reporting. Being inspired by the school observation tool used during the IIEP's study on "Stories behind gender differences in student achievement", the fourth SACMEQ study in 2013 has been even more improved taking into account different quality of these toilets. It would make more relevant if those data will be used by the SACMEQ network in their policy reports.

Secondly, the results regarding benchmarks showed that: (a) five SACMEQ countries still do not have Ministries' benchmark standards which could be used for monitoring the toilet provision; (b) out of those using Ministries' benchmark standards, four countries use the same benchmarks for boys and girls; (c) out of those without Ministries' benchmark standards, one country adopts the WHO's benchmark, which is the same for boys' and girls' toilets; (d) only four countries have made slight improvement compared to their own benchmarks; and (e) those countries that improved on toilet provision were those that have established Ministries' benchmark standards.

Finally, in terms of the hierarchy of toilet provision level, four countries still had extremely small percentages of 'improved' form of toilets. The improved form of toilets seem to be associated with improvements in girls' attendance in four countries, girls' Reading achievement in 11 countries, and girls' Mathematics achievement in eight countries. However, the results for boys were very similar to those for girls. Therefore, the observed patterns were probably due to the better relationship manifested between the general higher quality on infrastructure and learning achievement. Only when the effect of the 'improved' toilet is separate, then would it be possible to conclude on this issue. Furthermore, in order to connect the toilets needs for menstruation, the current data collection, without separating the menstruation as the reason for absence, would not suffice.

Therefore following research and policy suggestions could be considered by the Ministries of Education in Southern and Eastern Africa:

- Those Ministries of Education in Southern and Eastern African countries without the benchmark standards may wish to establish feasible ratios of girls to girls' toilets and boys to boys' toilets so as to guide the construction and rehabilitation plan for the provision of school toilets.
- The planning department in the Ministries of Education in Southern and Eastern African countries might consider integration of more elaborated WASH indicators

within their EMIS and/or school inspections that would help monitor the provision of school toilets.

- The research department in the Ministries of Education in Southern and Eastern African countries might consider to collaborate with developmental partners in order to undertake rigorous evaluation to study the effect of toilet provision and educational outcomes of children, not only limited to academic achievement but also 'well-being'.

## References

- Adams, J., Bartram, J., Chartier, Y., & Sims, J. (Eds.). (2009). *Water, Sanitation and Hygiene Standards for Schools in Low-cost Settings*. Geneva: World Health Organization.
- Amadhila, L., Dengeinge, R., Miranda, H., & Shikongo, S. (2011). Progress in gender equality in education: Namibia. *SACMEQ policy brief #6*. Windhoek: Ministry of Education.
- Chitiga, Z. M., & Chinoona, A. (2011). Progress in gender equality in education: Zimbabwe. *SACMEQ policy brief #6*. Harare: Ministry of Education, Sports, Arts and Culture.
- Freeman, M. C., Greene, L. E., Dreibelbis, R., Saboori, S., Kuga, R., Brumback, B., & Rheingans, R. (2012). Assessing the impact of a school-based water treatment, hygiene and sanitation programme on pupil absence in Nyanza Province, Kenya: a cluster-randomized trial. *Tropical Medicine and International Health*, 17(3), pp. 380-391.
- Government of Malawi. (2004). *Education for all national action plan*. Lilongwe: Government of Malawi.
- Grant, M., Lloyd, C., & Mensch, B. (2013). Menstruation and school absenteeism: Evidence from rural Malawi. *Comparative education review*, 57(2), pp. 260-284.
- Jopo, H. E., Maema, M., & Ramokoena, M. (2011). Progress in gender equality in education: Lesotho. *SACMEQ policy brief #6*. Maseru: Ministry of Education and Training.
- Kaba, A., & Musonda, B. (2011). Progress in gender equality in education: Zambia. *SACMEQ policy brief #6*. Lusaka: Ministry of Education.
- Kazianga, H., Levy, D., Linden, L., & Sloan, M. (2012). *The effects of 'girl-friendly schools': evidence from the BRIGHTschool construction program in Burkina Faso*. Working paper No. 346. Durham: National Bureau of Economic Research.
- Leste, A., & Benstrong, E. (2011). Progress in gender equality in education: Seychelles. *SACMEQ policy brief #6*. Port Victoria: Ministry of Education and Youth.
- Mhonyiwa, J., Ponera, G., & Mrutu, A. (2011). Progress in gender equality in education: Tanzania. *SACMEQ policy brief #6*. Dar es Salaam: Ministry of Education and Vocational Training.
- Milner, G., Mulera, D., Banda, T. C., Matale, E., & Chimombo, J. (2011). Progress in gender equality in education: Malawi. *SACMEQ policy brief #6*. Lilongwe: Ministry of Education.
- Ministry of Education Science and Technology. (2011). *Education statistics 2011*. Lilongwe: EMIS Section of Department of Education Planning.
- Mohammed, K. A., & Salim, M. M. (2011). Progress in gender equality in education: Zanzibar. *SACMEQ policy brief #6*. Zanzibar: Ministry of Education.
- Moloi, M. Q., & Chetty, M. (2011). Progress in gender equality in education: South Africa. *SACMEQ policy brief #6*. Pretoria: Department of Basic Education.
- Monyaku, B. (2012). *Availability and distribution of resources in Botswana primary schools and their relationship with pupils' learning achievements*. Paris: UNESCO-IIEP.
- Monyaku, B., & Mmereki, O. A. (2011). Progress in gender equality in education: Botswana. *SACMEQ policy brief #6*. Gaborone: Ministry of Education and Skills Development.
- Ngware, M., Oketch, M., & Ezeh, A. C. (2008). *What quality of primary education are children in urban schools receiving: Evidence from Nairobi*. APHRC Working Paper No. 39.
- Njoka, E., Riechi, A., Obiero, C., & Kemunto, E. (2012). *Towards inclusive and equitable basic education system: Kenya's experience*. Tunis: ADEA.
- Passos, A., Nahara, T., & Magaia, F. (2012). Progress in gender equality in education: Mozambique. *SACMEQ policy brief #6*. Maputo: Instituto Nacional do Desenvolvimento da Educação.

- Republic of Namibia. (2008). *Third national development plan (NDP3) 2007/2008-2011/12*, volume I. Windhoek: Republic of Namibia.
- Ross, K., & Saito, M. (in preparation). *SACMEQ III Project International Report: The Condition of Schooling and the Quality of Education in Southern and Eastern Africa (2000-2007)*. Volume 1: Technical Report, Chapter 2: "Sampling". Paris: SACMEQ Coordinating Centre.
- Saito, M. (2005). *The Construction of a "SACMEQ School Resources Index" Using Rasch Scaling*. Paper presented at SACMEQ Research Conference. (Paris, 28-30 September 2005).
- Saito, M. (2007). Construction and application of SACMEQ school resources: Portray of school systems based on the Rasch scaling technique. *Journal of International Cooperation in Education*, 10(1), pp. 165-182.
- Saito, M. (2011). *Trends in gender equality in learning achievement Southern and Eastern Africa: Exploration of characteristics of educational environment and curriculum areas*. Paper presented at the IIEP Policy Forum on Gender Equality in Education (Paris, 3-4 October 2011).
- Saito, M. (2012). *School observation tool for "Stories behind gender differences in student achievements"*. Paris: UNESCO-IIEP.
- Saito, M. (Ed.). (in preparation). *Stories behind gender differences in student achievement*. Paris: UNESCO-IIEP.
- Saito, M., Ssenbulya, F., & Lubega, I. (2011). Progress in gender equality in education: Uganda. *SACMEQ policy brief #6*. Kampala: Ministry of Education and Sports.
- Saubu, D., & Lutchimiah, B. (2011). Progress in gender equality in education: Mauritius. *SACMEQ Policy Brief #6*. Port Louis: Ministry of Education & Human Resources.
- Shabalala, J. T., & Nxumalo, P. (2011). Progress in gender equality in education: Swaziland. *SACMEQ policy brief #6*. Mbabane: Ministry of Education and Training.
- UNESCO. (2000). *The Dakar framework for action: Education all – Meeting our collective commitments*. World Education Forum, Dakar, Senegal, 26-28 April. Paris: UNESCO.
- UNESCO. (2003). *EFA Global Monitoring Report 2003/2004: Gender and education for all: the leap to equality*. Paris: UNESCO.
- UNICEF. (2012). *WASH in schools: Improving the learning environment*. Nairobi: UNICEF.
- UNICEF. (2013). Water, sanitation and hygiene. [http://www.unicef.org/wash/index\\_action.html](http://www.unicef.org/wash/index_action.html) (accessed on 31 July 2013).
- UNICEF & WHO. (2012). *Progress on drinking water and sanitation. 2012 update*. New York and Geneva: UNICEF & World Health Organization.
- United Nations. (2006). *The Millennium Development Goals Report 2006*. New York: United Nations.
- United Nations. (2010). General assembly GA/10967. New York: United Nations. <http://www.un.org/News/Press/docs/2010/ga10967.doc.htm> (accessed on 22 August 2013).
- Unterhalter, E. (2009). What is equity in education? Reflections from the capability approach. *Studies in the Philosophy of Education*, 28, 5, 415-424.
- Wasanga, P. M., Ogle, M. A., & Wambua, R. M. (2011). Progress in gender equality in education: Kenya. *SACMEQ policy brief #6*. Nairobi: Kenya National Examinations Council.
- World Bank. (2013). *World development indicators 2013*. Washington DC: World Bank.

## Appendix A: Level of School Resources

### (i) Level 1: Insufficient School Resources

A school at this level has a playground. Buildings require repairs. Classes take place in an open-air class. There is a writing board and chalk. Pupils have or share sitting/writing places. However they share textbooks. Pupils have at least an exercise book, a ballpoint pen, and a pencil.

### (ii) Level 2: Limited School Resources

In addition to the above resources, a school has a clinic and a market within 5 km from the school. It has a sports ground and non-piped water. Classroom has a temporary and/or permanent structure. The school head has his/her office. In the classroom, there is a chair and a table for the teacher. Teachers have an access to an English dictionary in school. Pupils have rulers.

### (iii) Level 3: Basic School Resources

In addition to the above resources, a school has a fence, a store room, and a staff room. Water is piped, and a toilet is used by less than 60 pupils. In the classroom, there is a wall chart. Teachers have access to a map and teaching guides. They have at hand English dictionary, map of a country, and an atlas. Pupils have at least a notebook and an eraser.

### (iv) Level 4: Comfortable School Resources

In addition to the above resources, a school has electricity and a school library, a classroom library, and a first aid kit. It has a radio, telephone, and a typewriter. In the classroom, there is a cupboard. Teachers have world map, map of Africa at hand in the classroom, and they also have an access to geometric instruments. Pupils have their own textbooks, and sharpeners. The school purchases library books every year, and books can be borrowed.

### (v) Level 5: Affluent School Resources

In addition to the above resources, a school is located within 5 km from a public library and a bookshop. A water tap can be found in a classroom. A school has a duplicator and a tape recorder. In the classroom, there are bookshelves. At least one book per pupil is available for both class and school libraries. Pupils have file folders.

### (vi) Level 6: Prosperous School Resources

In addition to the above resources, a school has a secretary's office; a school hall and a cafeteria. School buildings are in good condition. The teaching space is at least 2m<sup>2</sup> per pupil. The school has a TV, a VCR, a photocopier, a computer, an overhead projector, a fax machine, and a film projector.

Source: Saito (2007, p.174 and p.175)

## Appendix B: Guideline on Toilets by WHO

### Guideline 5 Toilets

*Sufficient, accessible, private, secure, clean and culturally appropriate toilets are provided for schoolchildren and staff.*

	Design and construction	Operation and maintenance
1	<ul style="list-style-type: none"> <li>• Are there sufficient toilets at the school for girls, boys and teachers?</li> <li>• Are there separated blocks?</li> </ul>	<ul style="list-style-type: none"> <li>• Are there sufficient toilets actually in use?</li> </ul>
2	<ul style="list-style-type: none"> <li>• Are the toilets situated in the right place?</li> </ul>	<ul style="list-style-type: none"> <li>• Are access paths kept in good condition?</li> </ul>
3	<ul style="list-style-type: none"> <li>• Do the toilets provide privacy and security?</li> <li>• Are they safe to use?</li> </ul>	<ul style="list-style-type: none"> <li>• Are there working locks on the toilet doors and lighting?</li> </ul>
4	<ul style="list-style-type: none"> <li>• Are the toilets appropriate to local culture and social conditions, gender and age of the children?</li> <li>• Are they appropriate and accessible for children with a disability?</li> <li>• Is there one accessible toilet cubicle for disabled females and one for disabled males?</li> </ul>	<ul style="list-style-type: none"> <li>• Are the toilets being used properly?</li> <li>• Are there sufficient toilets for use by males, females and children with disabilities?</li> </ul>
5	<ul style="list-style-type: none"> <li>• Are the toilets hygienic to use and easy to clean?</li> </ul>	<ul style="list-style-type: none"> <li>• Is anal cleansing material available at all times?</li> <li>• Are the toilets clean and without too much smell?</li> <li>• Are flies and other insects controlled?</li> </ul>
6	<ul style="list-style-type: none"> <li>• Are there handwashing facilities close by?</li> </ul>	<ul style="list-style-type: none"> <li>• Is there water and soap available?</li> </ul>
7	<ul style="list-style-type: none"> <li>• Is there a cleaning and maintenance plan?</li> </ul>	<ul style="list-style-type: none"> <li>• Is there an effective cleaning and maintenance routine in operation?</li> </ul>

Source: Adams et al (2009, p.43)

## Appendix C: UNICEF Example Indicators

Category	Determinant	Generic Example Indicators
Enabling Environment	Social Norms	All children are expected to practice hand washing with soap at critical times and use safe drinking water (PoU) by the head teacher and the community, and the community and head teacher provide an enabling environment for children to practice the above
	Legal Framework	National legislation on WASH in Schools standards (including regional targets, gradual improvements, inclusiveness, privacy and dignity for children) and monitoring systems are in place
	Policy Framework	Government/Education sector policy reflects WASH in Schools, allocation of budget for increasing access, operation and maintenance of facilities and hygiene education.
	Budget/ Expenditure	Availability of a multi-sectoral budget for WASH in Schools (capital and recurrent costs) at the district level as a percentage of the national allocation made for the district.
Supply	Availability of essential commodities /inputs	% of schools having access to functional WASH facilities i.e. hand washing stands, toilets and drinking water (PoU - point of use water treatment) as per national standards.
	Availability of human resources	% of schools with trained teachers on hygiene promotion in schools and dedicated staff for operation and maintenance of WASH facilities
	Adequacy of services	% of schools in communities where hygiene education is taking place on a daily basis (i.e. daily hand washing with soap or ash, operation and maintenance of facilities)
Demand	Financial barriers	% of schools that can keep WASH facilities operational (including making soap available at hand washing stands and PoU water treatment systems operational) as per national standards
	Social cultural barriers	% of school children in schools where WASH facilities are operational practicing hand washing with soap after use of toilet and before eating food
	Utilization	
Quality	Quality indicator	

Source: UNICEF (2012, p. 21)



**Appendix D: Mean and Standard Errors of Pupil per Toilet Ratios in SACMEQ School Systems in 1995, 2000, and 2007 (Any type of toilet)**

School System	Boys per Boys' Toilets Ratio						Girls per Girls' Toilets Ratio					
	1995		2000		2007		1995		2000		2007	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Botswana	NA	NA	45.3	2.20	41.0	2.51	NA	NA	44.9	2.34	38.0	2.65
Kenya	52.1	2.23	48.9	2.93	56.3	3.20	52.2	2.49	44.8	2.78	51.9	3.26
Lesotho	NA	NA	79.6	8.22	97.3	9.33	NA	NA	75.4	8.05	92.1	9.30
Malawi	104.2	7.95	114.9	8.11	131.3	11.11	101.8	8.00	114.9	8.53	123.6	11.11
Mauritius	42.9	1.83	44.5	2.16	44.0	2.47	33.0	1.52	34.9	1.42	37.9	2.81
Mozambique	NA	NA	131.6	8.63	243.1	13.17	NA	NA	160.6	9.92	237.5	13.27
Namibia	119.7	11.53	79.4	4.60	57.5	2.53	115.9	11.35	74.5	4.39	53.3	2.92
Seychelles	NA	NA	24.4	0.01	35.3	0.06	NA	NA	23.4	0.00	25.1	0.04
South Africa	NA	NA	53.9	4.35	58.3	2.81	NA	NA	48.9	3.96	50.9	2.67
Swaziland	NA	NA	100.3	10.26	77.1	5.56	NA	NA	93.5	10.28	72.7	5.56
Tanzania	NA	NA	78.6	8.00	82.1	4.33	NA	NA	81.7	9.78	81.5	4.86
Uganda	NA	NA	134.9	12.23	122.1	8.16	NA	NA	132.6	12.82	119.2	8.09
Zambia	81.2	10.18	46.3	3.08	46.0	3.65	81.3	8.55	44.6	3.04	42.1	3.06
Zanzibar	124.6	1.12	178.3	0.80	175.2	7.68	133.4	1.27	166.3	0.83	175.6	7.90
Zimbabwe	34.2	1.43	NA	NA	37.0	3.77	31.5	1.31	NA	NA	35.5	3.95

NA=Not Administered

Source: Constructed by the author based on Ross et al (2004) and SACMEQ (2007)

**Appendix E: Percentages and Standard Errors of Grade 6 Boys and Girls in Schools with Any Form of Toilets in 1995, 2000, and 2007**

School System	Have Toilet (any form) for Boys						Have Toilet (any form) for Girls					
	1995		2000		2007		1995		2000		2007	
	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE
Botswana	NA	NA	100.0	0.00	99.5	0.45	NA	NA	100.0	0.00	99.5	0.45
Kenya	99.9	0.07	98.9	0.85	97.9	1.30	99.9	0.07	98.4	1.09	98.4	1.22
Lesotho	NA	NA	82.6	3.11	89.7	2.28	NA	NA	83.4	3.05	91.9	2.03
Malawi	97.2	1.40	99.2	0.82	98.5	1.05	97.2	1.40	100.0	0.00	98.8	0.84
Mauritius	98.0	1.43	100.0	0.00	99.3	0.73	99.0	0.99	100.0	0.00	99.3	0.73
Mozambique	NA	NA	92.3	1.71	100.0	0.00	NA	NA	91.7	1.75	100.0	0.00
Namibia	72.4	3.74	92.6	1.68	93.8	1.65	74.2	3.69	93.5	1.59	94.8	1.47
Seychelles	NA	NA	100.0	0.00	100.0	0.00	NA	NA	100.0	0.00	100.0	0.00
South Africa	NA	NA	92.9	2.17	94.6	1.29	NA	NA	93.1	2.20	95.7	1.15
Swaziland	NA	NA	96.6	1.56	100.0	0.00	NA	NA	96.9	1.52	99.4	0.61
Tanzania	NA	NA	98.6	0.83	99.1	0.62	NA	NA	98.6	0.83	99.5	0.51
Uganda	NA	NA	98.0	1.45	94.2	1.54	NA	NA	95.7	2.10	93.0	1.67
Zambia	78.8	3.30	96.7	1.44	58.1	3.88	78.8	3.30	96.2	1.53	58.3	3.87
Zanzibar	75.6	0.19	98.7	0.01	96.7	1.49	74.7	0.17	99.5	0.00	97.9	1.21
Zimbabwe	98.4	0.91	NA	NA	85.6	2.94	99.1	0.66	NA	NA	86.2	2.90

NA=Not Administered

Source: Constructed by the author based on Ross et al (2004) and SACMEQ (2007)

**Appendix F: Percentages and Standard Errors of Grade 6 Boys and Girls in Schools With Flush Toilets in 2000 and 2007**

School System	With Flush Toilet for Boys				With Flush Toilet for Girls			
	2000		2007		2000		2007	
	%	SE	%	SE	%	SE	%	SE
Botswana	51.9	3.91	74.4	3.47	50.8	3.90	76.4	3.37
Kenya	6.9	1.74	10.5	2.14	7.5	1.91	9.9	2.09
Lesotho	1.6	0.73	1.9	1.15	1.7	0.77	1.1	0.86
Malawi	11.5	2.92	2.4	1.35	11.9	2.97	2.4	1.35
Mauritius	99.3	0.68	99.0	0.73	99.3	0.68	99.3	0.73
Mozambique	36.9	3.61	26.0	3.40	37.5	3.61	26.0	3.40
Namibia	34.0	2.54	41.5	2.75	34.2	2.54	40.7	2.73
Seychelles	100.0	0.00	100.0	0.00	100.0	0.00	100.0	0.00
South Africa	57.8	4.10	55.1	2.63	55.4	4.12	55.9	2.62
Swaziland	23.5	3.67	17.9	2.94	24.6	3.71	17.2	2.91
Tanzania	9.5	2.47	4.1	1.60	9.5	2.47	4.0	1.55
Uganda	3.3	1.22	2.0	0.92	4.4	1.51	1.7	0.82
Zambia	44.4	4.70	17.3	3.20	44.9	4.69	17.9	3.22
Zanzibar	11.2	0.09	25.7	2.12	12.7	0.22	26.7	2.23
Zimbabwe	NA	NA	29.0	3.93	NA	NA	29.6	3.96

NA=Not Administered

Source: Constructed by the author based on Ross et al (2004) and SACMEQ (2007)