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Designing User-Friendly Grids for the Gender-Specification of Rural, Semi-Urban, and Urban School Toilets in West Africa: Lessons from the Republic of Benin

T. A. Kouévi
University of Abomey-Calavi (UAC), Republic of Benin
F. Okry
National University of Agriculture (UNA), Republic of Benin
H. Kpangon
Water and Sanitation for Africa (WSA), Benin-chapter, Republic of Benin
A. C. Kouévi
H. Amoukpo
L. Hounkpatin
University of Abomey-Calavi (UAC), Republic of Benin
E. Attakin
Water and Sanitation for Africa (WSA), Benin-chapter, Republic of Benin
C. R. Tossou
E. Achigan-Dako
University of Abomey-Calavi (UAC), Republic of Benin
M-P. Kestemont
Catholic University of Louvain (UCL), Belgium

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Abstract

Gender equity, quality education, and sanitation in rural and urban areas are widely considered as development imperatives. However, while many countries of the world are already far with the gendering of their schools' toilets, most others still tend to systematically construct the same number of toilet cabins for female and male students, often ignoring specific

needs associated with biophysical differences and disabilities among the students. This poor gendering of school toilets prevailed in the Republic of Benin until 2013, when, within the framework of the Pluriannual Water and Sanitation Programme (PPEA phase 2) funded by the Netherlands' Ministry of Cooperation through its Embassy in the Republic of Benin, the Directorate of Hygiene and Sanitation of the Ministry of Public Health in collaboration with Water and Sanitation for Africa Agency, decided to launch a study for gender and disability specific toilets in primary and secondary schools. This original paper discusses the process towards the design of norms and grids for the calculation of toilet cabins and urinals needs of primary and secondary school students of rural, semi-urban, urban, Sahelian, Sudanian, lake, and coastal areas of the Republic of Benin. The study took place in four steps. The first step consisted of identifying key factors that affect the use of school toilets by students, especially female and disabled students. The second step consisted of observing and recording the use of school toilets by students, and building on those observations and records to estimate the number of toilet cabins and urinals required per agroecological and sociocultural area. The third step built on the results from the first and second steps to design simplified grids that allow sanitation and schools' decision-makers to easily and quickly calculate the number of toilet cabins and urinals required for the target schools, per gender and disability. The fourth step consisted of building the capacities of potential users of the grids, for their relevant use. The findings indicate a variation of needs among primary and secondary schools, and the study zones, due to sociocultural and development differences. The grids have been in use in Benin since 2016 and it has easily helped to calculate gender-specific toilet needs in the study areas. After five years of use, their performance requires to be assessed for further adaptations. A further paper will report on the performance of these grids.

Keywords: Agroecology; Culture; Gender equity; Sanitation; School toilet number calculation grid; Republic of Benin

Introduction

This paper addresses the gendering of public schools' toilets in the Republic of Benin, West-Africa. Toilet related needs are among the basic needs that females and males, with and without disabilities cannot sustainably and safely prevent themselves of satisfying (Drewko, 2007; Health and Safety Executive, 2011; Human_Rights_Council, 2011; Plante and Soulie, 2006; Serment and Guys, 2005). Therefore, many public health and sanitation decision-makers from the world have constantly kept taking relevant decisions for the effective and sustainable satisfaction of toilet

related needs of their citizens, however, with various levels of consideration of gender equity (Bichard and Knight, 2011; Department for Education and Skills, 2007; Eau-Hygiène-Assainissement de l'UNICEF-Mali, 2012 ; Greed, 2004; Kyansem, 2010; Ministère des Enseignements Primaire, Secondaire et de l'Alphabétisation, 2009; Restroom Association, 2013; Sheikh, 2008; State of Florida Seal, 2012; US Department of Justice, 2009; Vinel, 2008; Water Aid Bangladesh, 2006; Water Supply and Sanitation Collaborative Council, 2013). With regard to this subject matter, the Republic of Benin has also gone through its own gender equity consideration in the construction of public and institutional toilets as this is reported in the following sections (Clegbaza, 2010; COWI-Afric Performances, 2008; Direction de l'Hygiène et de l'Assainissement de base, 2006 and 2010; Sossou and Agossou, 2005; Tonouhewa and Fourn, 2009). This original paper discusses the design of region and gender specific grids for the calculation of toilet needs of female, male and people with disabilities (PWD) in primary and secondary schools, in the Republic of Benin. The collaborative action research that led to this paper took place from 2013 to 2015, within the framework of the phase 2 of the *Programme Pluriannuel d'appui au secteur de l'Eau et de l'Assainissement (PPEA 2)* funded by the Dutch Royal Embassy in Benin. This programme aimed, among other things, at reducing inequity, discriminations and limitations of previous public infrastructure construction approaches, through the provision of more and better toilet facilities to female, male, and PWD students in schools, and other public and institutional spaces (Ambassade des Pays-Bas, 2012). The following sections respectively address the research questions, the research methodology, the results and discussion, and the conclusion.

Research questions (RQ)

The questions addressed by the research were three-folds: RQ1 (What are key factors to consider in the design of gender specific school toilets?); RQ2 (Which user-friendly grids can be used to calculate gender specific toilet needs of schools?); and, RQ3 (How should the grids be used by sanitation and public infrastructure construction decision makers in schools?)

Detailed methodology

To answer the above research questions, the research team led by socio-anthropologists and economists from the University of Abomey-Calavi, and the University of Agriculture of *Ketou* (actual National University of Agriculture), respectively conducted:

A literature review on factors that may affect the quantity and the quality of toilet to be constructed in schools, with regards to agroecology and

culture of regions, gender, and disabilities (Keihas, 2013; Makanguile, 2010). This literature review took place along the whole study process, and addressed biological, technical, sociocultural, ethical/legal/rights, economic and financial factors. This review helped designing and implementing two-phase field surveys during the 2012-2013, 2013-2014, and 2014 – 2015 academic years.

The first field survey consisted mainly of identifying factors that may affect the quantity and the quality of toilet to be constructed in schools. It was run from June through August 2013 in four agroecological and sociocultural and economic areas selected together with the study coordination team. These areas were considered as representative of the whole Benin country from agroecological, sociocultural (religion and cultural practices), and economic perspectives. These criteria have been considered in order to take account of some specificities of each ethnic and cultural group, and religions. Thus, people from the Northern Sahelian area represented by the municipalities of Natitingou and Bembereke ; the Central Sudanian area represented by the municipalities of Dassa-Zoumè and Bohicon ; the Coastal zone represented by the municipalities of Grand-Popo, Cotonou and Sèmè-Kpodji ; and the lake areas represented by the municipalities of Grand-Popo and Sô-Ava, were surveyed. Through all these study areas, sixteen primary and sixteen secondary schools somehow equipped with toilets (two primary and two secondary schools per Commune or municipality) were randomly selected for the survey. The aim of this first field survey was to identify real-life gender and disability related factors that affect or may affect the construction and the use of school toilets in the Republic of Benin. Since people with disabilities (PWDs) and pubescent females are mostly concerned with the design of toilets, this first survey focused essentially on their views and experiences. Thus, in total six (6) PWDs and one hundred and thirty-two (132) pubescent female students from primary and secondary schools, selected using snowball sampling method, and twenty six (26) resource persons (8 cultural leaders, 11 school directors, 2 heads of school zones, 2 managers of public toilets, and 3 healthcare agents), were interviewed. Participant observations, and evidence data collection with camera also took place.

The second survey took place from November through December 2014 and consisted mainly of real-time toilet use and time of use data collection per gender and per disability through the same target schools. The collection of these data consisted of discrete observations and recording of the uses (time of the day, duration, and needs satisfied) made of the existing toilets, including those who did satisfy their needs in the nature (bushes and other open spaces) for various reasons. These observations and recordings were made by two research assistants from the University of Abomey-Calavi

through the selected schools, from Monday through Friday and from 7 am through 5pm or 7pm depending on the start and the end of class times of the schools. The same assistants went through all the study schools for the sake of reducing errors that may be due to the variation of observers. These observations and recording aimed at generating real-time and real-use data for the design of grids for the calculation of toilet quantities needed per gender. The real use made of the toilets were discretely inquired near some of the toilet users by the assistants, such as to not affect the real-time use of the toilets. In total, five thousand, one hundred and thirty-seven (5137) uses' time were recorded (3,085 in secondary schools and 2,052 in primary schools), and used for the design of the toilet cabins calculation grids.

For data treatment and analysis, the literature review consisted of syntheses of the key factors to consider while designing public and institutional toilets in terms of quality and quantity. Data from the first survey were transcribed into excel sheets and major trends were estimated, and graphs and tables were generated on the factors that may influence the design of the school toilets. Data from the second and last survey were also coded and transcribed into Excel sheets that helped designing the target grids.

Two plenary multi-stakeholders – settings' presentations of the research results to financial and technical partners, sanitation policymakers, and other key stakeholders, were completed for the validation and the refinement of the study conclusions, to assure information sharing, quality control and buy-in. The first validation section focused on factors to consider in the design of school toilets, while the second one addressed the calculation grids and their use.

At the end of this two-year process, two reports (one on factors affecting the use of toilets, and the second one on real-time use of the school toilets), and the calculation grids were validated, refined and delivered to the research process sponsors and coordinators, who were at the same time parts of the end users of the research results.

Description of the process of interaction with social actors

The research was initiated and funded by the managers of the phase 2 of the pluriannual programme for water and sanitation (PPEA2) financially supported by the Ministry of Cooperation of the Netherlands' Government through the Royal Dutch Embassy in the Republic of Benin. As planned, managers launched a call for consultancy won by a consortium composed of European consulting groups COWI and IGIP. This consortium COWI-IGIP subcontracted with Benin country-office of the panafrican water and sanitation agency (WSA-Benin or EAA-Benin). WSA-Benin linked up with a team of socio-anthropology and economics backgrounds for the design and

the implementation of the consultancy. The Directorate of Basic Hygiene and Sanitation (DHAB) from the National Directorate of Public Health (DNSP), all from the Ministry of Public Health (MSP) were the high-level beneficiaries of the study, and they were also involved in the design and implementation process from the beginning till the end for quality control and buying-in assurance. The Benin's public and institutional toilets' design and construction policy has over time been handled by partners from the DHAB, DNSP and MSP, who were aware of the ground realities and limitations of the policies implemented until then. Therefore, they were able to contribute to the identification of the study zones, and also to the validation of the study results. The students and the resource persons surveyed and observed consciously and unconsciously contributed as citizen scientists to this collaborative action research process, by providing required data to the study team. Representatives of – the National Association of the Communes of Benin (ANCB), teachers, school management boards, journalists, the ministry of public health, the national water partnership (PNE), PPEA2 programme, and of water and sanitation for Africa (WSA)-Benin, also contributed to quality and buying-in assurance through their active and rich participation to the validation of the study results.

In all, financial partners; programme managers; policy-makers; local community leaders; lower level beneficiaries (students, teachers, and school leaders); and researchers linked up in a collaborative action-research way to deliver the desired equitable school toilets design grids.

Results

This section discusses the key factors identified as influential for the design of school toilets, and the school toilets' design grids.

Characteristics of the toilets of the schools studied

The toilets of the schools studied were made of four (04) to ten (10) cabins. Most of them were of Ventilated Improved Pit (VIP) type, and few were of Ecosan[1] type. At some places, one half of the number of cabins were attributed to female students, and the second half to male students. In other places, there were no distribution of the numbers of cabins among female and male students. In all the schools' managers used to keep at least one cabin for themselves and for teachers, and no specific attention was paid to people with disabilities.

Apart from the toilet cabins of managers and teachers which were relatively kept clean (often cleaned by some students as punishment), those of the students were hardly cleaned and attractive. Therefore, due to dirtiness

[1] Ecological Sanitation

and unattractive smells, 37% of the surveyed female students declared that they prefer satisfying their toilet needs in open spaces where they can be able to slightly hide their nakedness, or in the toilets of neighbouring houses. The remaining 63% of the interviewed students mentioned that they sometimes use the school toilets, especially to satisfy at least two pressing needs, that are faeces, urine, and rarely for changes of menstrual diapers.

Key factors considered in the design of school toilets in the Republic of Benin

Combination of data from literature review, and from the surveys led to the identification and the consideration of nine (09) factors as key for the design of school toilets. These are : (1) Regions (mainly due to sociocultural reasons, and to population size) ; (2) Gender ; (3) Disability ; (4) Maximum Numbers of males and females reached in a peak time; (5) Minimum time availed for breaks in a school day ; (6) Record of maximum time used to urinate per gender and per region; (7) Record of maximum time used to defecate per gender and per region ; (8) Record of percentage of students who urinate at peak times per gender and per region; (9) Record of percentage of students who defecate at peak times per gender and per region. Apart from the fourth factor that needs to be estimated per target school by school managers, the remaining factors were assessed by this study and put in grids per region, so that the only gaps to fill in to determine the required numbers of toilet cabins per gender and disability remains the maximum numbers of males and females reached in the schools at a peak time.

School toilet cabin and urinal numbers' calculation grids for the Republic of Benin

In total sixteen grids were designed, of which, eight for the primary and eight for the secondary schools, considering the above factors. Since the surveys took place in rural, peri-urban, and urban areas, and in primary and secondary schools of the four study areas, and some differences were observed among areas and schools, the grids integrated the differences. Table 1 below gives an idea about what the grids look like, and their contents. As mentioned in the previous section, the only gaps to fill in to get the number of toilet cabins required per gender, are the maximum numbers of males and females reached at a peak time.

Table 1. Grid for the calculation of numbers of urinal and WC needed in secondary schools of Benin's rural Sahelian areas

	Parameters	Females	Males	Observations
A	Maximum Number reached on a peak day	(to be filled)	(to be filled)	Include teachers, administration staff, and other users in the school
B	Minimum time availed for breaks on a school day	10	10	
C	Maximum time used to urinate (recorded after observations)	1	2	
D	Maximum time used to defecate (recorded after observations)	4	5	
E	Percentage of students who urinate at peak times (estimated after observations)	0,69%	0,37%	
F	Percentage of student who defecate at peak times (estimated after observations)	2,76%	1,12%	
G	Number of urinals needed (NU)= A*E/(B/C)	0	1	
H	Number of WC cabins needed (NWC)= A*F/(B/D) – I	1	1	
I	Number of cabins needed for PWD	1	1	Arbitrarily fixed for inclusion of PWDs. They may however be used by others in peak times when there are no or very few PWDs
	TOTAL NUMBERS OF WC FOR PWDs	**1**	**1**	**Summary of numbers of cabins to construct**
	TOTAL NUMBERS OF WC FOR NON-PWDs	**?**	**?**	
	TOTAL NUMBERS OF URINALS	**?**	**?**	

Remark: Relevant conditions may be created in the cabins to allow females and PWDs to manage all their toilet needs. Especially accessibility, cleanliness, water and soap, relevant and discrete dust bins, are key for PWDs and female students.

Tables 2 and 3 below give overviews of norms calculated per study area for primary and secondary schools.

Table 2. Norms calculated for primary schools

Nº	Zones	Number of female students per WC cabin	Number of WC cabin for female PWDs	Number of male students per WC cabin	Number of male students per urinal	Number of WC cabin for male PWDs
1	Rural lake areas	9	1	33	78	1
2	Rural Sudanian areas	24	1	79	79	1
3	Rural Sahelian areas	31	1	80	86	1
4	Peri-urban lake areas	33	1	24	335	1
5	Urban Sudanian areas	64	1	65	54	1
6	Urban Sahelian areas	42	1	23	92	1
7	Urban coastal lake areas	104	1	82	163	1
8	Urban non-lake coastal areas	49	1	117	58	1

Source: Field data, 2012-2015

A quick analysis of table 2 indicates that norms in primary schools vary from area to area, and per gender.

Table 3. Norms calculated for secondary schools

Nº	Zones	Number of female students per WC cabin	Number of WC cabin for female PWDs	Number of male students per WC cabin	Number of male students per urinal	Number of WC cabin for male PWDs
1	Rural lake areas	107	1	720	432	1
2	Rural Sudanian area	73	1	331	232	1
3	Rural Sahelian area	85	1	178	1335	1
4	Peri-urban lake areas	64	1	41	1598	1
5	Urban Sudanian areas	247	1	1276	186	1
6	Urban Sahelian areas	537	1	401	1405	1
7	Urban coastal-lake areas	63	1	146	585	1
8	Urban coastal areas	139	1	2558	278	1

Source: Field data, 2012-2015

Analysis of table 3 also indicates that norms vary per area and gender, in secondary schools.

A comparative analysis of table 2 and 3 indicates that norms were higher for secondary schools than for primary schools. This difference is due to the fact that toilet needs of primary school students are less than those of secondary school students. Age and biophysiological differences might explain those differences. Besides, looking at both tables, one may also notice that there are differences between regions and between urban, peri-urban and rural areas, due to demographic, sociocultural differences, and availability of open spaces. Norms are higher in areas where more open spaces are available and used by the students for most of their toilet needs.

Conclusion

This paper discusses a process towards the design of norms and grids for the calculation of toilet cabins and urinals needs of primary and secondary school students of rural, semi-urban, urban, Sahelian, Sudanian, lake and coastal areas of the republic of Benin. The study took place from 2012 to 2015, and in four steps, across the study areas. The first step consisted of identifying key factors that affect the use of school toilets by students, especially the female and the disabled students. The second step consisted of observing and recording the use of school toilets by students, and building on those observations and records to estimate the numbers of toilet cabins and urinals required per the agroecological and sociocultural areas targeted by the study. The third step built on the results from the first and the second steps of the study to design simplified grids that may allow sanitation and schools decision-makers to easily and quickly calculate the needs of toilet cabins and urinals required for the target schools, per gender and per disability. The fourth and last step consisted of building the capacities of potential users of the grids (municipalities' infrastructure technicians, planning and programming managers of municipalities and of the ministry of health, authorities in charge of hygiene and sanitation in NGOs and school infrastructure construction enterprises), for a relevant use of the grids. A guide for the use of the grids was designed and used during the training of the target users. The grids have been into use in the Republic of Benin since 2016 and has easily helped to calculate for example the gender-specific toilet needs to contribute to the achievement of sustainable development goals (SDG) number 6, 3, 4, 5, 10, 11, and 16. After five years of use, their performance require to be assessed for further adaptations. A further paper will report on the performance of these grids.

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Data Availability: All of the data are included in the content of the paper.

Conflict of Interest: The authors reported no conflict of interest.

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