

What impact does the provision of separate toilets for girls at school have on their primary and secondary school enrolment, attendance and completion?

A systematic review of the evidence

A collaborative project of:

the London School of Hygiene & Tropical Medicine and
Institute of Education

With guidance by:

Save the Children USA, UNICEF & Care International

Technical Report

Main title	What impact does the provision of separate toilets for girls at schools have on their primary and secondary school enrolment, attendance and completion?	
Sub title	A systematic review of the evidence	
Authors IN ORDER OF CREDIT (Please include first and surnames, institutions. Include titles - Dr, Prof - if you want them to be used.)	<p>Isolde Birdthistle, Center for Maternal, Reproductive & Child Health (MARCH), London School of Hygiene & Tropical Medicine (LSHTM)</p> <p>Kelly Dickson, EPPI-Centre, Social Science Research Unit, Institute of Education, University of London</p> <p>Matthew Freeman, Sanitation & Hygiene Applied Research for Equity (SHARE) Consortium, LSHTM and Emory University Center for Global Safe Water</p> <p>Leila Javidi, St George's University Medical School, Grenada</p>	
This report should be cited as:	Birdthistle I, Dickson K, Freeman M & L Javidi. What is the impact of separate toilets for girls at schools on girls' educational outcomes? A systematic review of the evidence. MARCH Centre at LSHTM and EPPI-Centre, University of London. March 2011.	
Contact details (address, phone number, email)	<p>Isolde Birdthistle, Faculty of Epidemiology & Population Health, LSHTM, Keppel Street 3rd Floor, London, WC1E 7HT</p> <p>Tel: +44 20 7612 7889</p> <p>E-mail: Isolde.Birdthistle@lshtm.ac.uk wash.review@lshtm.ac.uk</p>	
Institutional base	MARCH Centre, LSHTM	
Review Group (with institutions)	The authors were supported by Clare Stansfield and a Staff Associate at the Institute of Education, and by Rachel Groom and Stefanie Dringus at LSHTM.	
Advisory group (with institutions)	<p>Oona Campbell, MARCH Centre, LSHTM</p> <p>Sandy Cairncross, SHARE Consortium, LSHTM</p> <p>Rick Rheingans, SHARE Consortium, LSHTM & Emory University</p> <p>Seung Lee, School Health & Nutrition, Department of Education & Child Development, Save the Children USA</p> <p>Murat Sahin, WASH in Schools, UNICEF, New York</p>	
Peer Reviewers	<p>Dr Helen Pankhurst</p> <p>Senior Technical Advisor, Water Team</p> <p>CARE International</p> <p>hpankhurst@care.org</p>	<p>Dr Chris Bonell</p> <p>Sr Lecturer in Social Science & Epidemiology</p> <p>Dept of Social & Environmental Health Research</p> <p>LSHTM</p> <p>Chris.Bonell@lshtm.ac.uk</p>

Conflicts of interest (if any)	None of the authors have any financial interests in this review topic. Matt Freeman has been involved in the evaluation of related interventions (school-based water, sanitation and hygiene), with related primary research, however, this work has not addressed the specific question of separate toilets in schools.
Acknowledgements	We are grateful for the encouragement and guidance of the project advisors, the support of our respective institutions and research centres, and insight of our peer reviewers. We appreciate the responsiveness and helpfulness of many authors who responded to requests for relevant research, particularly Sue Caville, and those who provided further details about their studies and datasets. We also acknowledge the input and financial support of the UK Department for International Development, specifically Maxime Gasteen and Nicola Crissel and our Policy Leads Guy Howard and Sanjay Wijesekera.

1. BACKGROUND

1.1 Aims and rationale for review

The education of girls is increasingly recognised as an investment with many valuable returns, including the health and economic prosperity of women, their families and nations (Herz 2004). Despite recent progress in increasing girls' enrolment, statistics from 157 countries indicate that only one country out of three had reached gender parity in both primary and secondary education in 2008 (UNESCO 2010). UNESCO estimates that almost half of the 157 countries are unlikely to meet the Millennium Development Goal target "to eliminate gender disparity in primary and secondary education no later than 2015" (MDG-Goal 3, Target 4). Thus there is much interest in identifying the most effective ways of increasing girls' enrolment and completion.

In a recent review of international literature on drop-out and retention, a wide range of factors have been shown to contribute to girls' absenteeism or drop-out, including those described as either 'school supply-side' or 'demand-side' factors (Hunt 2008). More specifically:

(a) Supply-side or 'push' factors, that is, conditions in schools that can *push girls out of school* (Hunt 2008) such as:

- Distance to the school
- Harassment, bullying, discrimination or punishment at school
- Sexual harassment or other dangers at or on the way to school
- Expectations to do chores at school (e.g., water collection)

(b) Demand-side, or 'pull' factors, stem from conditions outside of schools - in household, community and social contexts - that *pull girls out of school* (Hunt 2008; Glynn 2010; Birdthistle 2009) and can include:

- Ill health
- Onset of puberty, marking the beginning of adulthood and adult roles
- Early menarche
- Early sexual debut
- Pregnancy or expulsion for pregnancy
- Marriage or expectations to marry
- Death of a parent
- Domestic duties, chores, childcare
- Expectations/pressures to work for income
- Lack of social and economic opportunities for girls
- Parent death, particularly in contexts of high HIV/AIDS
- Inability to pay school fees
- Inability to pay for uniform, books, etc.
- Family preference to spend school fees / expenses on male children

- Hunger

Poor school sanitation facilities have been cited as a factor that can *push* children, particularly girls, out of school. While we are not aware of studies providing quantitative evidence of this (based on background research for this review), qualitative research indicates that some girls may be discouraged from attending school without adequate toilet facilities (WaterAid 2009), and the claim has been supported by water and sanitation practitioners and organisations. For example, Lidonde writes in *Waterlines*, “Poor sanitation in schools limits school attendance... School drop-out and low literacy rates, especially among the girl children, can be largely attributed to poor sanitation” (Lidonde 2005). Arguing more specifically that the lack of access to separate and decent toilets is impeding girls’ access to their education, UNICEF and the International Water and Sanitation Centre have commented that “Education for girls can be supported and fostered by something as basic as a girls-only toilet,” (UNICEF 2005). Consequently, a growing number of organisations are calling for increased investment in gender-sensitive water, sanitation and health (WASH) interventions in schools, through such initiatives as the Raising Clean Hands for WASH in Schools (Raising Clean Hands, 2010).

To help verify whether WASH conditions contribute to girls’ educational outcomes, a systematic literature review was conducted to determine what impact the provision of separate toilets for girls has on their primary and secondary school enrolment, attendance and completion.

1.2 Definitional and conceptual issues

This section outlines and defines the key issues addressed in this review. We aimed for explicit and precise definitions to make clear the scope and limits of the review. This also allowed us to develop a coherent search strategy, which can be replicated in the future.

1.2.1 School-based water, sanitation and hygiene interventions

There are a wide range of school-based interventions that fall under the umbrella of ‘water, sanitation and hygiene’ (WASH) interventions, including clean water for drinking and washing, hygiene education and safe waste disposal. For this review, we aimed to identify school-based interventions delivered within the context of a toilet (i.e., the physical space for excreta disposal), particularly the provision of separate toilets for girls.

1.2.2 Educational settings

We searched for interventions implemented in educational settings, including primary and secondary schools (both public and private, and either single- or mixed-sex schools), where girls aged 4-18 are in attendance.

1.2.3 Lower and middle income countries

This review focused on lower and middle income countries (LMIC) as defined by the World Bank (<http://data.worldbank.org/about/country-classifications>). The main criteria for classifying countries are based on Gross National Income (GNI) per capita. A full list of countries that meet the World Bank Criteria, according to 2009 GNI per capita, was compiled and used to screen studies for inclusion.

1.2.4 Educational and health outcomes

The review sought to identify studies that reported both educational and health outcomes. The key educational outcomes included:

Enrolment: The number of individuals registered in both primary and secondary schools

Attendance: The number of students present at a school during the time it is in session

Completion: The number of individuals who complete primary or secondary school

A wide range of health outcomes were considered, including infectious/vector-borne diseases (e.g., diarrhea, helminth infections, respiratory infections); sexual health (e.g., sexual exploitation at school); and reproductive health including menstrual management and hygiene. Psycho-social experiences of bullying, harassment, privacy and embarrassment were also considered.

1.3 Review questions and approach

1.3.1 Review synthesis questions

Figure 1 illustrates the framework we used to guide the review, based on our initial understanding of the literature in this and related areas. It informed how we searched for and described studies which could answer the following potential review questions:

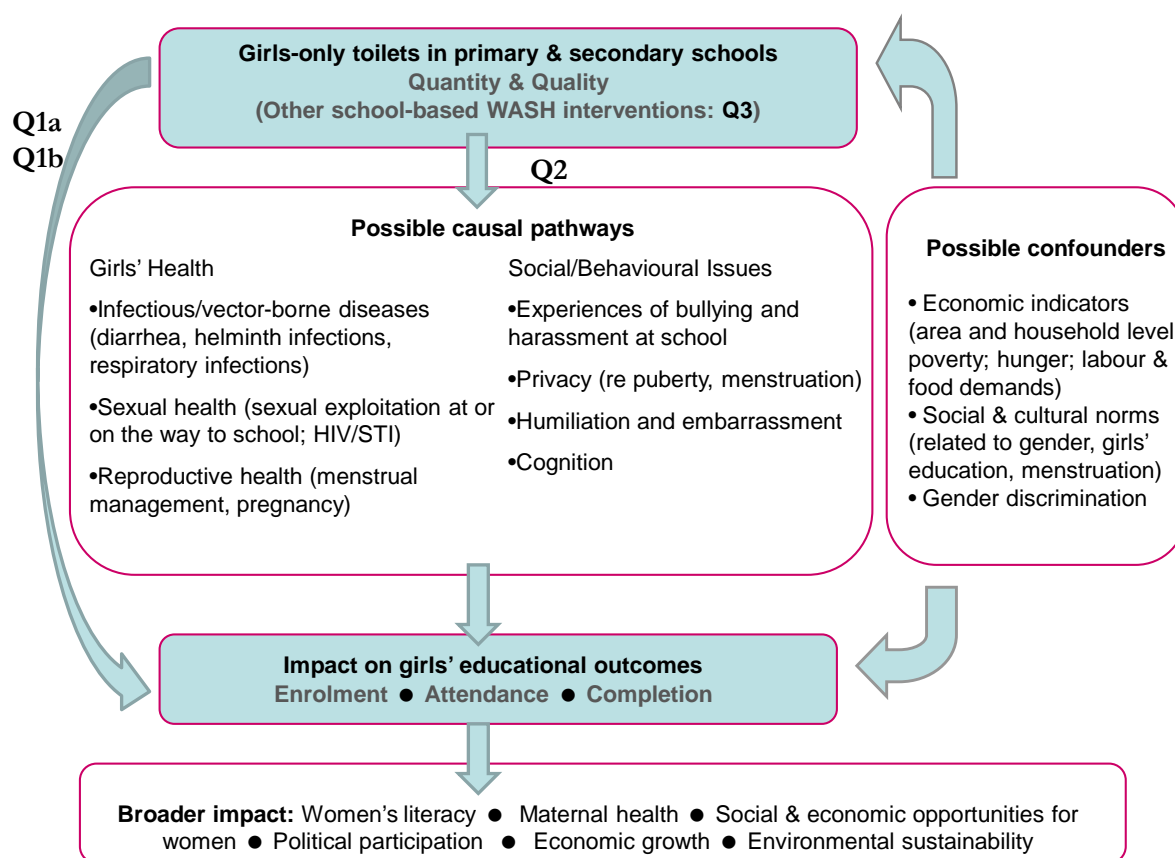
Q1a. Is there any evidence of an *impact* of providing single-sex toilets on the enrolment, attendance and/or completion of girls in primary or secondary schools?

Q1b. Is there evidence of *associations* between separate toilets and girls' educational outcomes?

Answering these questions was the primary aim of the review. We sought for

research in which separate toilets are the intervention of interest, or identified as part of a broader intervention. We first aimed to identify evidence of causality between the provision of separate toilets and girls' educational outcomes, that is, where impact could be attributed to the separate provision of toilets. We also sought to report associations between separate toilets and girls' educational outcomes (e.g., where changes in educational outcomes cannot be attributed to the provision of separate toilets alone, since alternative explanations cannot be ruled out). In as much detail as possible, we aimed assess the quantity and quality of research addressing questions 1a and 1b to determine what evidence exists and what further evidence is needed.

Figure 1.1 Guiding framework for the review



In the absence or scarcity of evidence to answer questions 1a-b, we proposed to map research in two related areas. First, to explore possible causal pathways by which single-sex latrines may impact educational outcomes, we searched for studies that address the following question:

Q2. What is the impact of separate toilets on girls' health?

Research has shown that school WASH conditions are related to health issues such as vector-borne diseases including diarrhoea and soil transmitted helminths (Migele 2007), and incidents of harassment and humiliation in school toilets (Abrahams 2006; Leach 2003). Given that health issues are also known to impact school attendance and completion (Hunt 2008), establishing an impact of separate-sex toilets on girls' health could build indirect evidence of an impact of separate toilets on girls' educational outcomes. To map studies that address question 2, we focused on whether the provision of *separate* toilets (rather than *any* toilets) are related to girls' health issues.

To explore possible confounders of the relationship between separate toilets and educational outcomes, we also proposed to identify studies that could answer:

Of factors known to influence girls' educational outcomes (e.g., poverty and gender norms and expectations) which are important determinants of whether schools provide separate toilets for girls?

As an example, socio-economic conditions may explain educational improvements since school with more resources may be more likely to provide separate-sex toilets (as in Ekpo et al's comparison of government and private schools in Nigeria, 2008) and also more likely to achieve better educational outcomes. Similarly, a good head-teacher may be the reason some schools provide separate toilets and also perform well. Socio-economic factors would thus be the underlying explanation for why girls-only toilets are correlated with girls' educational outcomes (rather than the toilets themselves). Similarly, issues like gender discrimination may explain why some schools do not cater to girls' needs (e.g., by providing separate toilets) or show improvements in enrolling and retaining girls, particularly if girls are burdened with WASH duties like water collection and cleaning of toilets. Following peer-review of the Protocol, it was decided that this question (of confounders) was beyond the scope of this review, and consequently the search was *not* designed to answer this question. It would be noted, however, whether studies designed to answer Questions 1-2 considered potential confounders in their analyses.

Finally, if we did not find sufficient research on the provision of separate toilets (in Qs1-2), we also proposed to enumerate the literature on a wider range of school-based WASH interventions, to answer:

Q3. Is there evidence that any school-based WASH interventions have an impact on girls' educational outcomes?

We proposed to note the quantity and type of studies assessing the impact of any school WASH programmes on educational outcomes disaggregated by sex, and among sub-populations of girls (e.g., by socio-economic status). This could include whether the provision of *any* toilets (separated or not) impact girls' educational outcomes.

1.3.2 Type of review approach

The review questions moved from narrow (impact) to broad (mapping) and had implications for the type of review methodology we applied. We proposed a two-stage review process:

Stage one: Search for studies which investigate school-based water, sanitation and hygiene interventions and which report girls' education and/or health outcomes.

The aim of the first stage was to identify all studies that meet the review inclusion criteria (see 2.2.1), and can answer *any* of the research questions listed above. Descriptive information about these studies were collected using a pre-determined coding framework to produce a 'map' of the research and populate the guiding framework in Figure 1.

Stage two: Use the map to decide whether we have evidence/data that can

- i) be synthesised to answer Q1a or Q1b; or
- ii) provide a conceptual map of mediating factors by which separate toilets may impact educational outcomes (Q2); or
- iii) build a map of all the school WASH studies identified (Q3).

2. METHODS USED IN THE REVIEW

2.2 User involvement

2.1.1 Approach and rationale

We aimed to engage potential users in all aspects of the review, from the design and process of the review to the dissemination and application of findings. Collaborators represented UNICEF, Save the Children, Care International and WaterAid, and informed the progress of the review at four key points:

- 1) **Protocol:** Users had the opportunity to assess the scope of the review including the conceptual framework, search strategy and draft inclusion and exclusion criteria. A draft Protocol was sent to the Project Advisors and discussed by all members and advisors of the research team via teleconference.
- 2) **Searching:** We announced the review with an electronic 'Request for Relevant Research' sent to staff at UNICEF, Save the Children, DFID, Plan, Care, WaterAid, Emory University's Center for Global Safe Water, LSHTM's MARCH (Maternal, Reproductive and Child Health) and SHARE (Sanitation & Hygiene Applied Research for Equity) Centres, and encouraged all to circulate the Request. (See **Appendix 2.3** for the letter issued)
- 3) **Draft report:** We organised a workshop in February 2011 to:
 - ▶ share preliminary findings of the review, and invite feedback from the Project Advisors
 - ▶ identify changes and additions needed to submit a complete draft of the report, for peer review
 - ▶ discuss implications of the review for research and practice, e.g., how the review findings can serve as a catalyst for better research and evaluation by discussing:
 - a) adequacy of the evidence base to support the prioritising of and/or to inform decisions about investments in separate toilets for girls;
 - b) the limitations of existing research;
 - c) how better research and systematic monitoring can fill existing gaps;
 - d) how to increase interest and investments in high-quality research in this area, including building capacity to undertake rigorous impact studies; and
 - e) opportunities for integration of girl-friendly WASH interventions with other school health initiatives (e.g., life skills-based education, and

health-promoting policies and health services, as outlined by the FRESH¹ framework).

- 4) **Dissemination:** The final report will be disseminated in printed and electronic form via the SHARE and MARCH websites and user networks nurtured throughout the project. We will work with the DFID programme and stakeholders to develop ways of disseminating the results to a range of audiences. We also plan to submit the review for publication as a Campbell Systematic Review.

2.2 Identifying and describing studies

2.2.1 Defining relevant studies: inclusion and exclusion criteria

To be included in the map, research must:

- 1) Scope & Setting: Examine the educational and/or health impact of a school-based WASH intervention delivered in an educational setting, e.g., a public, independent or private school
- 2) Geographical location: Be conducted in a lower or middle income country
- 3) Population: Collect and report outcome data for girls aged between 4-18 years old
- 4) Study design: Be empirical research
- 5) Date: any
- 6) Language: any

Therefore, research was excluded for any of the following reasons (and the first reason for exclusion was recorded for every study screened):

- 1) Did not examine the impact of a toilet-based intervention delivered in an educational setting
- 2) Was not conducted in a lower or middle income country
- 3) Did not collect and report educational and/or health outcome data for girls aged between 4-18 years old
- 4) Was either ('non-empirical' research):
 - a) descriptive
 - b) methodological paper
 - c) editorial, commentary, book review
 - d) policy document

¹ The FRESH Start initiative, launched at the World Education Forum in Senegal, 2000, is an inter-agency partnership to Focus Resources on Effective School Health, through comprehensive school health programmes. <http://www.freshschools.org/>

- e) resource, textbook
- f) bibliography
- g) theoretical paper
- h) position paper

We were inclusive in the types of study designs and conceptualised 'impact' to be broader than the 'effect' of an intervention. For example, the types of evidence synthesised could include girls' perceptions of the impact of separate toilets on their educational outcomes. Different investigative approaches offer different strengths as well as shortcomings, and triangulating various types of evidence can maximise what we learn.

2.2.2 Identification of potential studies: Search strategy

Key search terms were determined by the review question and the inclusion and inclusion criteria, and were tested against papers already identified through hand searching.

The search strategy involved developing strings of terms to denote three key aspects of the review, namely:

- Relevant interventions - e.g., sanitation, hygiene, toilets, girl-friendly
- Population / Setting - e.g. schools, pupils, girl
- Research type - e.g. evaluation, impact, intervention, perception

Appendix 2.1 includes a more complete list of generic terms from which search strings were developed.

The strings included 'free text' terms (i.e. the database searches for an instance of a term in the title and abstract of a record) and descriptor terms (i.e. codes applied by individual databases to characterise studies also referred to as MeSH headings, thesaurus terms or keywords).

- Published research: Searches were undertaken of the following bibliographic databases
 - PubMed
 - ERIC
 - Social Sciences Citation Index (SSCI)
 - Global Health
 - LILACs
 - WHOLIS
 - PAHO
 - REPIDISCA
 - MEDICARIB
 - ADOLEC
 - IBSS

The search strings applied, and the number of hits with each database, have been summarised in **Appendix 2.2**.

- Reviews: identification of reviews as a source of further research studies included searching the following databases
 - Cochrane
 - Campbell
 - 3ie

Hand-searching:

We checked the bibliographies of recent and relevant papers found in the electronic searches, for studies missed through the above database searches. Also, to help identify research reports (not necessarily published in academic journals), grey literature and research that has not yet been published, we issued a '*Request for Relevant Research*' through the respective networks of all project partners. We encouraged recipients to forward the Request to colleagues and networks, to reach the largest audience possible. A copy of the 'Request' has been included in **Appendix 2.3**. A dedicated e-mail account was created to receive responses (wash.review@lshtm.ac.uk).

Finally, the following websites were searched for relevant research:

- OECD
- DFID
- World Bank
- Water Aid
- IRC International Water and Sanitation Centre
- WHO

- CDC
- Health Management Information Consortium (HMIC) database
- WASH Research News (<http://washresearch.wordpress.com>)
- WASH in Schools (<http://www.schools.watsan.net>)
- freshschools.org
- schoolsandhealth.org

2.2.3 Screening studies: applying inclusion and exclusion criteria

Inclusion and exclusion criteria were applied successively to (i) titles and abstracts and (ii) full reports. Full reports were obtained for those studies that appeared to meet the criteria or where we had insufficient information to decide. The inclusion and exclusion criteria were re-applied to the full reports and those that did not meet these initial criteria were excluded. ('EPPI-Reviewer' software was used for screening, coding and analysing, using a single web location to house the documents and monitor progress of the review.)

2.2.4 Full-text coding

The studies remaining after application of the criteria were screened to identify if they could answer the key review questions (as per the conceptual framework). A coding tool was developed to identify key elements of each study, including:

- Description of the intervention, e.g., separate toilets, girl-friendly toilets, handwashing after using toilets, *etc*
- Comparison groups in the study analysis, e.g., separate vs shared toilets; separate vs no toilets; 'girl-friendly' toilets with menstrual supplies vs separate toilets without supplies, *etc*.
- Population characteristics/setting, e.g., age, primary school, secondary school
- Study design, e.g., randomised controlled trial, in-depth interviews, *etc*.
- Outcomes measured, e.g., educational enrolment, attendance, completion
- Geographical location, e.g., which lower middle income county, urban/rural

A copy of the coding tool has been included in **Appendix 2.5**.

For a selection of studies (n=10) which included toilet provision and educational or health outcomes, but either:

- did not specify if the toilets were separate for girls; and/or
- did not report the outcomes separately for girls

we contacted the authors to request sex-specific data. One example of this 'Request for additional data' is provided in **Appendix 2.4**.

2.2.5 Identifying and describing studies: quality assurance process

At all steps of the screening (on title and abstract, full-text, and then coding), a sample of studies (about 10%) were screened by two researchers. This was to ensure consistency in application of the inclusion and exclusion criteria. Where the screening decisions did not match, the Principal Investigator made the final allocation. The remaining studies were screened independently by single reviewers, but uncertainties and reasons for discrepancies were regularly discussed by the review team, to continually improve consistency.

3. RESULTS

3.1 Studies included from searching and screening

Figure 3.1 illustrates the process of filtering from searching to mapping and finally to synthesis.

A total of 5741 citations were identified through systematic searches of 11 electronic databases. The largest yield of the citations identified came from health index databases, e.g., Global Health (n=2385), followed by PubMed (n=850). The number of citations identified in each database is documented in **Appendix 2.2**.

Of the 5741 citations identified, 722 were duplicates and excluded when citations were uploaded onto the EPPI-Reviewer database. A further 63 papers were identified through hand-searching (including author contact) leaving a total of 5082 citations to screen.

Titles and abstracts were screened using the exclusion criteria, described in section 2.2.1. The majority of papers excluded at this stage (n=4245) did not meet the first inclusion criterion, as they did not relate to the intervention of interest (i.e., they did not investigate the impact of toilet provision in education settings). The second most common exclusion criterion was based on geographical location with 289 studies excluded because they were conducted in high-income countries (though did not necessarily investigate the impact of toilet provision in schools; full text was not screened for these studies).

A total of 79 papers were unobtainable for full text screening. There was difficulty sourcing 49 papers because of lack of citation details particularly international government reports written in Spanish. The remaining 30 were sourced and put on request through the interlibrary loan system but have either not been retrieved in time or there been a delay in obtaining the citation. Again this has mainly applied to the non-English language literature.

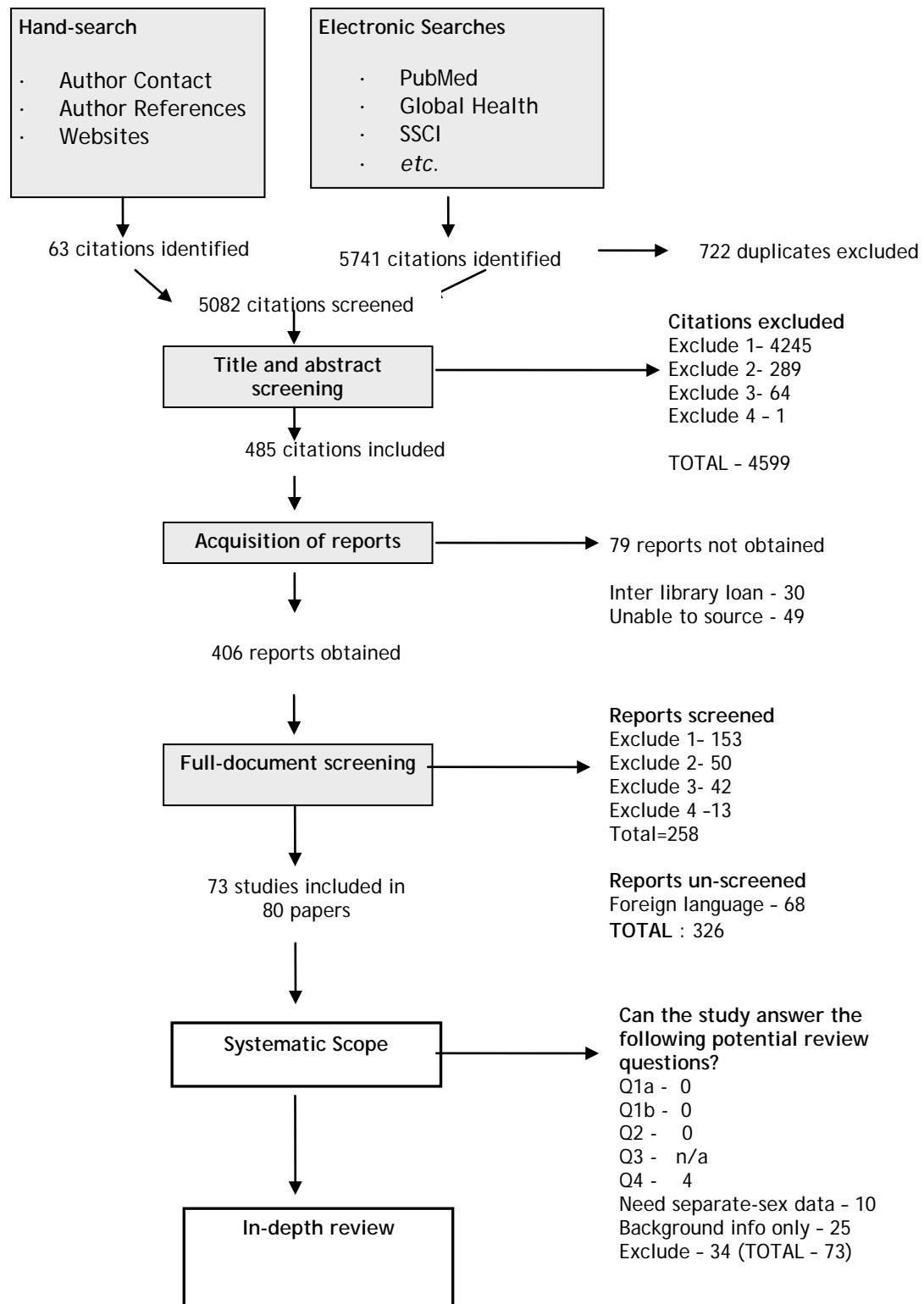
The decision to include non-English citations introduced a set of unique methodological issues such as using Google translate to screen on title and abstract, finding new portals to obtain Spanish references (e.g. <http://www.scielo.br/>) and additional time for the retrieval of international literature that is not as readily available through electronic download. The database closed on 11th January 2011.

In total, 406 papers went through to full text screening. At this second, more detailed stage of screening, a further 258 papers were excluded, most often on the grounds that they did not meet the first criterion for inclusion (n=153) or that they were not conducted in a lower- or middle-income country (n=50), or the outcomes

assessed were not relevant to this review (n=42). A further 68 studies are in languages other than English.

The full-text screening resulted in a total of 78 studies (reported in 82 papers) that were coded to see if they answered any of the key review questions. Details of those studies are provided in the following section.

Figure 3.1 Results of the search and mapping



3.2 Details of studies found from the search

3.2.1 Questions 1a - *Is there any evidence of an impact of providing single-sex toilets on the enrolment, attendance and/or completion of girls in primary or secondary schools?*

The primary aim of this systematic review was to identify and synthesize evidence of the impact of separate toilets for girls on their enrolment and attendance in schools. We did not identify any studies that were designed specifically to assess the impact of separate-sex toilets. And to date, no trial has been registered to assess the impact of separate-sex toilets (Cochrane Central Register of Controlled Trials; and the Campbell Library), suggesting that no evaluations are currently underway.

From our systematic search, however, we identified five studies in which separate toilets for girls were included as part of a broader WASH intervention. In each case, the study was supported by UNICEF and designed to evaluate local adaptations of UNICEF's *School Sanitation & Hygiene Education (SSHE)*, an initiative combining 'hardware' (construction of water, handwashing and sanitation facilities) and 'software' (training, supervision, joint planning, parent mobilisation, life skills education, children's clubs, outreach activities) inputs. SSHE promotes a gender-sensitive approach including equal input and responsibilities of boys and girls, and gender-specific facilities including separate toilets for girls and boys.

The five SSHE evaluations, summarised in **Table 3.1**, show that while UNICEF's SSHE initiative includes separate toilets for girls, evaluations of SSHE to date have not been designed, and are not capable of, assessing the specific impact of separate-sex toilets on girls' educational or health outcomes. Reasons for this limitation are discussed below, for each of the five studies.

1. A study was conducted to evaluate the impact and sustainability of SSHE in Kerala, India in 2006, by comparing 150 schools that had completed the intervention four years prior (in 2002), to 150 control schools that had not received the SSHE intervention (Mathew 2009).
2. A pilot study assessed SSHE in 6 countries, by comparing schools before and two years after the intervention, and by comparing intervention schools with control schools in each country (UNICEF/IRC 2006). The number of intervention schools ranged from 10 in Colombia to 64 in Nepal; and the number of control schools ranged from 3 in Colombia to 19 in Zambia.

Both studies collected attendance data, and compared attendance between schools that had received the SSHE intervention and control schools (neither study randomly allocated intervention and control schools). Unfortunately, it is not

possible from these two studies to assess the impact of separate sex toilets on school attendance since neither study specified whether the control schools had separate toilets for girls. In both studies, some of the control schools had received interventions sponsored by other agencies/donors, which may have included separate-sex toilets. And in the Kerala study, separate toilets are described as the 'standard design', suggesting they would be present in the non-intervention schools. In either case, given the many components of the SSHE intervention, it would be difficult to disentangle the effect of separate toilets from other elements. The authors acknowledge they could not single out the impact of specific components.

3. A third study to evaluate UNICEF's SSHE programme was conducted in the Dowa District of Malawi in 2007, by comparing 3 schools that had implemented the programme (2 years prior) with 3 control schools (McPhedran 2010). It was not possible from this evaluation to gauge the impact of separate toilets for girls, since all schools in the study - intervention and control - had separate-sex toilets.

4. A study was conducted in Bangladesh in 1993-1994 to assess the impact of newly-constructed sanitation facilities in 228 rural primary schools in 16 Thanas (UNICEF 1994). The schools were randomly selected from 1089 primary schools that had been part of a Government of Bangladesh and UNICEF effort to construct safe water and sanitation facilities between 1992-1993. The sanitation facilities included separate toilets for girls (the 'software' component of SSHE had not yet been implemented). The sanitary facilities and conditions within each school were assessed retrospectively (1-2 years after construction) and girls' attendance was compared between March 1993 and March 1994. It is not possible from this evaluation to assess the specific impact of separate-sex toilets on girls' attendance, since baseline data on sanitary provision was not provided. Specifically, it is not reported whether or which schools had separate toilets for girls *before* the intervention.

5. A study conducted in three districts of Kenya in 2006-2007 compared 100 randomly selected schools that had received a UNICEF-supported intervention (including water facilities, toilets and handwashing facilities, teacher training and children's clubs) with 50 control schools (a neighbouring school) (Njuguna 2009). In each intervention school, separate toilets had been constructed for girls (although, in three schools, the girls' toilets were not functioning, and in three schools, the boys' toilets were not working). Days missed were counted from attendance records, and assessed according to frequency of handwashing, and cleanliness and use of toilets, but not by whether schools provided separate-sex toilets or not. (As with the above studies, it was not specified whether the control schools had separate-sex toilets.)

3.2.2 Question 1b - Is there evidence of associations between separate toilets and girls' educational outcomes?

We identified one study that assessed whether existing school conditions, including provision and conditions of girls' toilets, were associated with educational outcomes (no intervention was provided). In 1998, Mensch and colleagues conducted an in-depth study of the school environment in a purposively selected sample of 36 primary schools in 3 districts of rural Kenya (Mensch 1998). Data was collected from 1,963 students in standards 7 and 8, and observations made of existing conditions, including the following aspects of girls' toilets: whether the girls' toilets were clean; if there was a barrier between girls' toilets; if toilets were secure from observation; if boys were observed hanging around girls' toilet; and girls' experiences of harassment at toilets. These and other factors were compared among schools categorised as 'high-performing' (n=12) and 'low-performing' (n=21), according to girls' scores on the national primary school leaving exam. It was not specified whether high and low-performing schools had separate-sex toilets or not. It appeared from the data that all schools provided separate toilets for girls, thus precluding comparisons with any other arrangements.

3.2.3 Question 2 - What is the impact of separate toilets on girls' health?

We sought studies that investigated the specific impacts of separate-sex toilets on girls' health outcomes. We identified two promising studies, but, upon review, determined they could not establish a link between health outcomes and separate-sex toilets for the following reasons.

1. In 1978, Kooper and colleagues conducted the first epidemiological study to measure the importance of toilets in causing endemic diarrhea (Kooper 1978). Data were captured from 8329 male and female students in grades 1-5, in 14 municipal schools. Children's experiences of diarrhea and vomiting were assessed according to schools' number of toilets, proportion of functional toilets, and hygienic toilets. However, it was not stated whether schools provided separate toilets for girls. Neither was the sex of the participants reported, precluding a separate analysis for girls.
2. The above-mentioned study conducted in Kerala, India, by Mathew and colleagues (2009) also compared health outcomes (self-reported colds and diarrhoea), between intervention and control schools. However, it was not possible to compare health outcomes by whether schools had separate sex toilets, since it was not specified whether the control schools had separate toilets for girls.

Table 3.1 Studies that assessed WASH interventions (including separate toilets for girls) and impact on educational and/or health outcomes

Author, Year	Purpose of the study	Setting and sample	Methodology	Intervention(s) provided	Comparison group(s)	Key findings re impact of <i>separate toilets</i> on girls' educational and/or health outcomes
<i>Evaluations of interventions that included separate toilets for girls</i>						
Mathew 2009	To investigate the impact and sustainability of school interventions for water, sanitation and hygiene education, and secondarily, examine the associations between inputs at the school conditions and pupil practices.	Kerala State, Allapuzha, Pattanamthitta, and Kottayam Districts, India; 2006-2007. The intervention took place prior to 2003. 300 (75 in each intervention, 150 in control) upper primary govt schools (from class 7) within 50 meters of a water supply facility.	Cross-sectional survey conducted 4 yrs after intervention completed (no baseline data). Two intervention districts with one post-intervention control district, chosen due to similarities of geography, economics, and socially (not specified). School visits (unannounced) were conducted to observe facilities, interview teachers and 569 groups of 7,835 children, 764 household visits.	District-wide intervention in two districts for 1 year prior to 2003. 150 schools in each intervention districts implemented UNICEF-supported <i>School Sanitation & Hygiene Education (SSHE)</i> combining 'hardware' (construction of water, handwashing and sanitation facilities) & 'software' (training, supervision, joint planning, parent mobilisation, etc) inputs, including a 'gender policy' ensuring separate toilet facilities for girls.	150 schools in 1 control district (not randomly allocated) Did not receive the SSHE intervention, but some received subsequent district-wide programmes.	Not reported. Attendance was compared between schools that had SSHE interventions vs those that did not, but not by whether schools had separate sex toilets or not. (Almost all schools had separate sex toilets?) <i>Health outcomes</i> Self-reported student health (colds & diarrhoea) compared between schools with SSHE interventions vs those without, but not by whether schools had separate sex toilets.

UNICEF/IRC 2006	To assess a pilot programme for school water, sanitation and hygiene education in 6 countries.	Burkina Faso, Colombia, Nepal, Nicaragua, Viet Nam, Zambia (data not reported for Nicaragua)	Participatory research to make pre- and post-comparisons in intervention schools (2 years after implementation); and comparisons between intervention & control schools, based on surveys and focus group discussions with children, teachers, head teachers, parents & school council, and school observations.	Combination of 'hardware' (construction) & 'software' (training, supervision, life skills education, children's clubs, outreach activities), with gender-sensitive approach (equal input & responsibilities) and gender-specific facilities including separate toilets for girls and boys. No. of intervent'n schools Burkina Faso: 26 Colombia: 10 Nepal: 64 Viet Nam: 40 Zambia: 31	No. control schools: Burkina Faso: 4 Colombia: 3 Nepal: 7 Viet Nam: 14 Zambia: 19	Not reported. It was not specified whether intervention & control schools had separate-sex toilets or not.
UNICEF, 1994	To assess the impact of sanitation facilities on girls attendance	Bangladesh, 1993-1994 228 randomly selected rural primary schools. Sample size calculated based on assumed latrine quality.	Retrospective survey of WASH conditions, with attendance compared before and after the intervention.	Provision of sanitation and safe water supply, gender separate girls latrines. ('Hardware' only, as per Phase 1 – Construction. Phase 2 of the programme – hygiene education – had not yet been implemented.)	None	Not reported. It was not stated whether schools had separate toilets for girls before the intervention. Baseline data on sanitary provision before the intervention was not provided.

McPhedran 2007	To assess impact of school sanitation on girls' attendance.	Dowa District, Malawi Six schools, not randomly allocated	Cross-sectional comparison of intervention and control schools, 2 years after implementation (no baseline data). Sanitation survey, questionnaires, interviews and FGDs. School registers	Three schools, had received school sanitation intervention by UNICEF 2 years prior	3 comparison schools	Not reported. Enrolment was compared between intervention and control schools, but all 6 schools (3 intervention & 3 controls) had separate sex toilets.
Njuguna 2009	To understand 1) what makes a program effective, and 2) what are the impacts of a WASH-in- schools program	100 schools in Nairobi, Mombasa, Kwale District, Kenya. >5000 children either observed or involved in classroom voting. Year: 2007	Cross-sectional study Observation of handwashing (n=1000 pupils), classroom voting (n=4900 pupils), small group discussion (16 schools)	50 schools provided software (teacher training) and hardware (construction of water, sanitation, and hygiene) at schools from 2005 – 2007. Inputs provided by UNICEF	50 schools that did not receive the UNICEF intervention (the first non-intervention school found next to each intervention school)	Not reported. Girls' daily absences were compared by schools, but it was not specified whether control schools had separate-sex toilets or not.
<i>Non-intervention studies (no intervention provided, existing conditions assessed)</i>						
Mensch 1998	To provide an in-depth look at the school environment and the ways it potentially can help or hinder adolescents	Rural Kenya (3 districts) 36 primary schools (purposely selected to represent a wide range of	A situation analysis combining quantitative & qualitative methods, e.g., observations and inventories of school facilities and interviews with teachers and students	No intervention provided: observational study of existing conditions, including: - Water at school - Girls' toilet clean - Barrier betw/ girls' toilets - Toilets secure from	'High-performing' (n=12) schools were compared to 'low-performing' schools (n=21), according to	Not reported. It was not specified whether high and low-performing schools had separate-sex toilets or not.

		environments), with data collected from 1963 students in standards 7 & 8		observation - Boys observed hanging around girls' toilets - Girls' harassment at toilets	girls' scores on national primary school leaving exam.	
Koopman 1978	The first epidemiologic study to measure the importance of toilets in causing endemic diarrhea	Cali, Colombia 8329 male & female students in grades 1-5, in 14 municipal schools Year: 1977	Cross-sectional symptom prevalence survey with students School observations (unannounced visits)	None: observational study of existing conditions, including: - number of toilets - % toilets functioning - % toilets with feces outside bowl - number of water faucets	None.	Not reported. No educational outcomes were reported. <i>Health outcomes</i> Not reported by sex. Sex of participants was not recorded in the survey. Using a combined hygienic status for males and females, unhygienic toilet conditions were associated with diarrhea and vomiting, but not necessarily causal.

3.2.4 *Why existing studies cannot answer the key review questions (Q1a, 1b, 2)*

For a selection of studies (n=10) that included toilet provision and educational and/or health outcomes, but either:

- did not specify if the toilets were separate for girls; and/or
- did not report the outcomes separately for girls

we contacted the authors to request sex-specific data. We thought it may be possible they had collected but not reported separate-sex data in their publication. One example of this 'Request for additional data' is provided in **Appendix 2.4**.

Examples of the authors' responses are provided in **Table 3.2**. Based on our review of these studies, and follow-up with authors, we conclude that, existing studies cannot answer the key review questions for the following reasons:

1. All schools in the study had separate-sex toilets, thereby precluding a comparison with other arrangements, such as shared toilets or no toilets (e.g., Njuguna 2009, Bowen 2007)
2. All schools in the study had shared toilets (e.g., Koopman 1978)
3. The outcomes were not disaggregated by sex (e.g., Blanton 2010, O'Reilly 2007)
4. Separate-sex toilets are included as part of a comprehensive package of WASH interventions, and the study was not designed to disentangle the effects of single components (e.g., UNICEF/IRC 2006, Mathew 2009). We did not identify evaluations in which the only intervention offered was separate toilets for girls, or where this was phased in before or after other interventions. Rather, separate toilets were one component within a 'bundle' of WASH interventions (including 'hardware' like the provision of safe water, soap and adequate lighting, as well as 'software' such as hygiene education and/or teacher training). Even 'girl-friendly latrines' - a concept growing in popularity among international organisations, governments and women's rights movements - should not only be separate from boys, but provide water, soap, supplies for menstrual management, and privacy from other girls as well as boys. Where this is being implemented, for example with UNICEF's support, the evaluations have not been able to distinguish the relative effects of single components.

Table 3.2 Authors' responses to request for separate-sex data (on toilets and/or educational outcomes)

Author, Year	Study title	Authors' response
Koopman 1978	'Diarrhea and school toilet hygiene in Cali, Colombia'	Sex-specific data were not collected. Sex-separate facilities were not provided in many of these schools. There were individual toilet doors with common washing facilities.
Njuguna 2009	'The sustainability and impact of school sanitation, water and hygiene education in Kenya'	Data were made available for further analysis. The authors also noted that all schools in the sample had separate latrines for girls and boys (having been part of a UNICEF programme).
Mensch 1998	'Gender differences in the schooling experiences of adolescents in low-income countries'	Data were made available for further analysis.
O'Reilly 2007	'The impact of a school-based safe water and hygiene programme on knowledge and practices of students and their parents: Nyanza Province, western Kenya.'	Sex-specific absentee data were not available.
Bowen 2007	'A cluster-randomized controlled trial evaluating the effect of a handwashing-promotion program in Chinese primary schools'	Data about separate toilets were not collected. The authors also noted that that the schools almost always had gender-specific toilets.
Wagbatsoma 2008	'Sanitary Provision and Helminthiasis among School Children in Benin City, Nigeria'	Data on separate toilets for males and females were not collected, and educational outcomes were not compared for males and females.
Blanton 2010	'Evaluation of the role of school children in the promotion of point-of-use water treatment and handwashing in schools and households—Nyanza Province, Western Kenya, 2007'	Did not collect gender specific outcomes.
Mathew 2009	'The Sustainability and Impact of School Sanitation, Water & Hygiene Education in southern India'	No confirmation received.
UNICEF/IRC 2006	'School Sanitation and Hygiene Education Results from the assessment of a 6-country pilot'	No confirmation received.

3.2.5 Question 3 - *Is there evidence that any school-based WASH interventions have an impact on girls' educational outcomes?*

In the absence of evidence to answer Questions 1-2, we had proposed to note the quantity and type of studies assessing the impact of any school WASH programmes on girls' educational outcomes (whether the intervention included separate toilets or not). Although we provide details of the studies such as methodological design, geographical location, and examples of findings reported, in the sections that follow, it should be noted that the studies have not been subjected to formal critical appraisal (the intention was to map rather than review these studies).

Table 3.3 in the Appendix (page 62) summarises 12 evaluations of school-based WASH programmes, including interventions providing:

- handwashing stations
- water treatment solutions
- teacher training to promote water treatment and hygiene to pupils
- hygiene education
- 'hardware' and 'software' inputs together.

The studies assess a range of outcomes, including:

- improved knowledge/awareness of hygiene
- behaviour change (e.g., handwashing before eating; handwashing with soap after defecation)
- diarrhoeal incidence
- increases in household water treatment practices (e.g., from pupils sharing knowledge with family and community members)
- educational outcomes including absenteeism and/or enrolment.

Most of the studies in Table 3.3 cannot demonstrate an impact on girls' educational outcomes. This is either because they did not measure educational data, or they did not disaggregate the data by sex. However, four studies assessed girls' educational outcomes and reported a beneficial effect. In the case of two studies - one showing an increase in girls' enrolment in Dowa District in Malawi (McPhedran 2010) and the other in girls' attendance in Bangladesh (UNICEF 1994) - both assessed their interventions retrospectively (about 2 years after implementation), and without baseline data. Thus, they cannot rule out the influence of other concurrent or subsequent government schemes that were designed to increase enrolment (e.g., financial support to families of girls). That said, the interventions were well-received, with good uptake. A third study showed that girls were less absent where there was more handwashing ($p < 0.043$) and very high toilet use ($> 90\%$; $p < 0.048$). Finally, preliminary evidence from a cluster-randomised trial in Kenya suggests that a comprehensive school WASH programme entitled 'SWASH+' (including improvements in hygiene, sanitation and water treatment) reduces

absenteeism for girls, including absenteeism due to illness, but not necessarily for boys (presentation by Mathew Freeman, February 2011).

Three studies showed substantial reductions in absenteeism for both boys and girls combined (Blanton 2010, Bowen 2007, O'Reilly 2007), but did not disaggregate the outcomes by sex. For example, a cluster randomised trial of an intensive hand-washing campaign in rural China reported 42% fewer absences, 54% fewer absence days, and 71% fewer in class illnesses, in interventions compared to control schools.

3.3 Related issues that emerged from the search

Two issues emerged as prominent in the literature resulting from the systematic search: the issue of menstrual management in schools and its relationship with attendance; and the existing provision and conditions of school toilets. Studies addressing those issues are summarized below. As in the section above, these studies were not subjected to formal critical appraisal, because they were not designed or able to answer the key review questions 1a or 1b.

3.3.1 Menstrual management in schools

A number of studies addressed the issue of menstrual management in schools. We were interested in whether those studies provided evidence that separate toilets have an impact on girls' education *after puberty*, for example, to help manage menstruation. We did not identify any direct evidence that menstruation causes drop-out (Glynn 2010), however, it was cited as a reason for absenteeism in several qualitative studies. For example, in focus group discussions in Malawi, South Africa and Ethiopia, school-girls admitted they stay at home during menstruation, or leave school early, sometimes pretending to be sick, for the following reasons:

- Pain and discomfort. "If I experience menstrual pains, I ask permission to go home. I don't tell the truth. I just say I have a headache or a stomach ache. All our teachers are men." (Amhara girl, aged 18, Ethiopia; Ngales 2007)
- Fears in the context of HIV/AIDS (Abrahams, 2002)
- They cannot afford sanitary napkins
- They lack underpants, or clean clothes for changing. "Sometimes we stay home or we wear black or dark skirts in case the cloth is not sufficient," (Dowa District, Malawi).

On the other hand, in some focus group discussions in Dowa District, Malawi, with females aged 14 (in standards 7 & 8), "girls were not aware of any girls who did *not* go to schools and stated that despite feeling shy and awkward during menstruation they do still come to school." In the same study in Malawi, girls in other focus

groups admitted to missing school or leaving early during their menstruation, but did not cite sanitation conditions as a cause of dropping out of school; “this was thought to be a more rural problem or a problem for orphans and those being forced to marry or becoming pregnant” (McPhedran 2010).

Three studies attempted to quantify absenteeism due to menstruation and reported a low prevalence: Oster and colleagues (2009) reported that schoolgirls in Nepal were 2.4 percentage points less likely to attend school when they had their period; and Mensch and colleagues (1998) reported that 5% of girls in their rural Kenyan study claimed to have stayed away from school the last time they had their period. In a survey of 156 13-18 year olds girls in three towns in Ethiopia (purposively selected based on the existence of CARE projects), menstruation was not identified as one of the main reasons for girls’ absenteeism: it was ranked eighth in importance after early marriage; absent parents; heavy work load at home; and other ‘pull-out’ factors. However, of the girls who had reached menarche, about 43% reported missing school at some point due to menstruation (Fehr 2010).

Where absenteeism is evident, it appeared that menstruation can serve as both a:

- *pull out* factor, if girls do not attend school because of menstrual pain or family/cultural expectations to stay home, or where menarche leads to early sex, pregnancy, and/or marriage; or
- a *push out* factor, whereby girls avoid or miss school because of inadequate facilities to manage their menstruation.

It is in the latter case whereby facilities at school (specifically separate toilets for girls) may reduce absenteeism. We did not identify any studies that showed an impact of separate toilets on menstrual management (and consequently kept girls in school). However, two studies claimed benefits of their WASH intervention. In the evaluation of SSHE in Kerala, India, girls in the control schools were more likely than girls in the intervention schools to report problems using facilities during menstrual periods (52% vs 25%, $p < 0.001$), although the specific nature of those problems was not mentioned. And, in the 6-country pilot study of UNICEF’s SSHE, one country reported that “girls, who used to be absent during their menstrual period, seem to show improved school attendance.” The authors continue, “However, hard data was not available. This deserves better study in the future” (UNICEF/IRC 2006).

3.3.2 *The general state of school toilets for girls*

As a whole, the studies we read painted a dire picture of the state of school toilet facilities. UNICEF’s claim that there is a “lack of gender-appropriate sanitation in schools” is no doubt accurate (UNICEF, 2005). However, many schools seem to lack any adequate facilities at all. And even where separate toilets are provided for girls, their conditions often deem them unusable. In their comparison of high and low-performing schools in Kenya, for example, Mensch and colleagues conclude: “toilet facilities are equally inadequate in both groups. Many are neither clean, functional, nor secure from observation.”

While we did not propose to review studies describing the provision and conditions of school toilets, we provide examples below of how those issues are addressed in the studies we coded on full-text.

In terms of **toilet provision**, we encountered ratios such as those summarised in Table 3.4, where one toilet could be shared by 386 students in Ethiopia, and by 800 students in Senegal. And it was not uncommon for authors to report schools with no toilets at all. Some authors worried that the introduction of Universal Primary Education may exacerbate these conditions, by increasing the number of pupils but not toilet provision.

In Table 3.4, examples of actual ratios observed in studies are followed by a range of national standards, for comparison. For example, in Sweden, students are not expected to share a toilet with more than 14 other students. We were not able to find information on how common it is for schools to provide separate toilets for girls.

Table 3.4 Provision of toilets in schools

Author, Year	Setting	Ratio of toilets to pupils
<i>Examples reported in studies</i>		
Abrahams 2002	Malawi	1 : > 100
Ngales 2007	Rural Ethiopia (Benishangul-Gumuz Regional State)	Range 1 : 46 to 1: 386 and some schools with no latrine
Koopman 1978	Cali, Colombia	1 : 41 [girls] 1 : 60 [boys]
WSP Field Note, 2007	Dakar, Senegal	Median 1 : 85 pupils Max 1 : 800 pupils
<i>National standards</i>		
Vernon, 2003	National standard for schools in England	1: 20 pupils (>5 yrs)
	National standard for schools in Sweden	1: 15 pupils (>5 yrs)

UNICEF/IRC 2006 (Ministry of Education 'norms')	Colombia	1: 25 pupils
	Nepal	1 urinal : 40 pupils 1 toilet : 100 pupils
	Viet Nam	1 latrine for 100-200 (due to double school sessions each day)
	Zambia	1 : 40 [boys] 1 : 25 [girls]
WHO	WHO recommendation	1 : 30 pupils

Even where toilets are provided, studies show they are often left unused due to their conditions. For example, a qualitative study in Dakar concluded that, "Although most schools had some sort of sanitary facilities, they were often not functional, and many could not be used (e.g., no door, some fouled with several days' excreta, could not be flushed, appropriated by teachers, etc)," (WSP Field Note, 2007). Table 3.5 lists examples of the conditions of toilets in various studies from this review. Some of the factors impeding girls' use of toilets included the following:

- Hygiene. School observations often reported problems with toilets not being clean (e.g., major traces of fecal material). Some authors noted that, in this aspect, schools may actually pose a risk of infection to students (e.g., unclean toilets may provide more opportunities for hand contamination than no toilets at all). In many settings, children were often responsible for the cleaning, especially girls (Abrahams 2002), and this is often viewed as punishment, and not done very well. In many other schools, no maintenance is carried out at all. In a number of settings, better maintenance and cleanliness were associated with higher toilet use (Mathew 2009; Njuguna 2009).
- Privacy. The qualitative work in Dakar, Senegal highlighted the importance of privacy, where boys and girls must share toilets: "The lack of separate toilets causes great shame amongst girls and boys... The lack of privacy means that pupils would be aware of defecation activities, which is very shameful amongst children. This forces many pupils to wait until they return home before relieving themselves. Gender interactions among pupils, even at a young age, are very important and need to be taken more seriously," (WSP Field Note, 2007)
- Privacy from other girls. Even where separate toilets were provided for girls, and/or where toilets were well-used and maintained, girls noted their discomfort where there was no privacy from other girls, e.g., for urination or menstrual management (UNICEF/IRC 2006; McPhedran 2010).
- Security. In a number of studies, both boys and girls mentioned incidents of harassment, pushing and physical abuse in toilets, and cited fear as a

reason for not using the toilets (Vernon 2003; WSP Field Note 2007).

- Comfort. In a survey of adolescent girls in three town of Ethiopia, most (94%) said their school had a girls' latrine, however, only 55% were comfortable using the latrine. The main reasons for feeling uncomfortable about using the school latrine were: the girls were not used to using a latrine; it smelled bad, and it was not private. Girls also avoided using the toilet because it was crowded, dirty, or scary (e.g., too dark), and the presence of flies.

Table 3.5 Examples of conditions of toilets in schools, as reported in a range of studies

Author, Year	Setting	Purpose & Methods	Participants	Key findings	Examples / descriptions
Abrahams 2002	Malawi	Field observations during a review of the Malawi school sanitation and hygiene promotion project (SSHP)	Researcher observations	In many cases, the facilities were poorly constructed, unsafe, vandalised and in poor sanitary condition.	“Naturally children, particularly young and disabled children, do not use these facilities and therefore revert to open defecation. Girls travel to neighbouring households to use the sanitation facilities, as well as up to a kilometre, two or three times a day, to fetch water.”
Ngales 2007	Rural Ethiopia (Benishangul-Gumuz Regional State)	Two-month study to assess all dimensions of hygiene and sanitation in sampled schools, to inform recommendations for improvement	304 participants (age, gender, etc, not specified) in 32 sample schools	Gender is not considered during latrine construction and maintenance. Although most schools nominally separate male, female and teachers’ facilities, male students often ignore the signs. Concerns about privacy overwhelmingly affect girls and women, yet [they] play no part in the planning or design of school latrines.	“In many of the schools studied, the latrines are situated badly, such as close to a public road or to the classrooms, and in the majority of cases, the door is missing or broken.” (Authors) “The flush toilets were new to me. Nobody taught us how to use them. As you can see most of them are broken even if they are newly constructed... We were told to use only tissue paper, which I cannot afford to buy.” (Gumuz girl, aged 18)
Mathew 2009	Kerala, India	To investigate the impact and sustainability of school interventions for water, sanitation and hygiene education.	569 small group interviews with children	Many students, particularly boys, practiced open-air defecation / urination. Better maintenance and cleanliness was associated with higher toilet use.	‘Children repeatedly said that they need doors and latches for the toilets, and inside they need a bucket, mug and soap... Urinals need a roof, a sloping floor for drainage and running water.’ (Authors)

McPhedran 2010	Dowa District, Malawi	To assess the impact of school sanitation on adolescent girls in primary schools within Dowa District, Malawi	Females aged 14 (in standards 7 & 8), in focus group discussions	Older girls do not use the new girls' urinals, especially during menstruation, because the facilities are shared with younger girls and there is no privacy.	"In order to manage menstruation, we need privacy from both boys and younger girls. We need water, buckets and sanitary pads. We change our menstrual clothes at home as there are no facilities at school." (Standard 7 female)
Mensch	Rural Kenya	To provide an in-depth look at the school environment and the ways it potentially can help or hinder adolescents	1963 students in standards 7 and 8, in 36 primary schools	Toilet facilities generally inadequate across a range of schools: many neither clean, functional, nor secure from observation.	"The toilets of this school are in a state of disrepair. The boys stand at the door and urinate while the girls are forced to go in. The wooden planks (the floor) look like they could give way any time." (High performing school) "They have now completed a new toilet for boys because they're mischievous to girls in or near the toilet... Boys are 'cheeky' with the girls close to the toilet." (Low performing school)
Vernon, 2003	Newcastle, England & Sweden	Survey to ascertain why children & parents frequently describe problems with school toilets.	Pupils aged 9-11 years in England (n=394) & Sweden (n=157)	All school toilets cleaned once daily, but became dirtier as the day progressed (e.g., unflushed toilets). 62% of boys and 35% of girls in the UK avoided using the school toilet; 28% of boys and girls in Swedish site avoided using school toilet to defecate.	Most children found school toilets unpleasant, dirty, and smelly, with no significant differences between sexes in either country. Pupils described bullying including 'pushing, shoving, physical abuse and trying to kick the toilet door open while on the toilet' and 'they shove your head in the toilet bowl' (also described as being 'baptised')

Visscher, 1996	40 Highland communities in Ecuador	Participatory evaluation of the water supply and sanitation conditions in communities	School-children aged between 10-12 years	<p>'With inadequate treatment and poor chlorination, the water [in schools] presents a considerable health risk.'</p> <p>'If repairs are needed, the onus is on the parents who are also supposed to cover the costs.'</p>	<p>"I just go behind school, I don't use the latrine – it's horrible! It smells and its dirty. And you have to go a long way to fetch the water to flush it." (girl participant)</p> <p>"I just use the bush, because sometimes you can't wait, so you just sit down." (child participant)</p>
WSP Field Note, 2007	Dakar, Senegal	Formative research (through structured & checklist observations & diaries) was conducted to understand hygiene behaviour once facilities were in place in schools.	Primary school students	The research revealed a wide range of reasons why pupils avoid school toilets. They are associated with immorality and danger, including the presence of snakes, filth, sexual experiences, rapes and drug exchange. A major concern was to avoid the disgust and embarrassment of stepping on feces.	<p>"Children used many negative words to describe their experience of using school toilets, such as 'going to war'. They also compared it to their fear of exams." (authors)</p> <p>"During the drawing sessions the pupils revealed that it was shameful to ask for toilet paper in front of the whole class before going to the toilet. Hence the children resorted to using their underpants in place of toilet paper." (Authors)</p>

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 Key Findings

The primary aim of this systematic review was to identify and synthesize evidence of the impact of separate toilets for girls on their enrolment and attendance in schools. We did not identify any studies that were designed to assess the impact of separate-sex toilets. And while we identified some evaluations of school-based WASH programmes that included separate toilets for girls, the impact of separate toilets on girls' educational outcomes could not be assessed for the following reasons:

- All schools in the study had separate-sex toilets, thus precluding a comparison with other arrangements, such as shared toilets or no toilets.
- All schools in the study had shared toilets.
- The educational outcomes were not disaggregated by sex.
- As part of a broader, complex WASH intervention, the relative effects of single components, such as the separate-sex toilets, could not be distinguished.

Thus, with an absence of studies in this area, there is evidence neither for nor against the impact of separate toilets for girls on their educational outcomes (equipose). To understand why this question has not been studied, we posed the following scenarios to the project advisors:

- Is this area of research missing a gender lens? (e.g., would that explain the lack of sex-separated data)
- Is there inadequate research capacity in this field?
- Is the question not considered important, or relevant to practice?
- Or: 'we already know, and don't need research studies to tell us' that separate toilets benefit girls' education?

The project advisors suggested that all of these possibilities may apply, to an extent. For example, the lack of sex-disaggregated data (with regard to school toilets as well as health and educational outcomes) may stem from a lack of gender awareness in the field of hygiene and sanitation. Also, it was acknowledged that there is a lack of research capacity, particularly to design and implement rigorous evaluations that can measure the effects of different components of comprehensive interventions. Collaboration between governments, NGOs, and researchers with evaluation expertise would help generate empirical evidence and build research capacity, but such collaborations are rare (in this and other fields).

4.2 Priorities for future research

While the review question was considered to be important, 'practitioner wisdom', or field experience, has already convinced many of those in the sector that providing separate toilets for girls is not only the right thing to do, from a human rights perspective, but, because it facilitates girls' educational experience. How much priority is placed on this may depend on whether there is an opportunity cost of investing in separate toilets. For example, if separate toilets are no more expensive than shared toilets, then one could easily argue for the former. However, if it is more expensive to provide separate toilets and will thus result in less funding for other measures, and it is worth investing in further evaluation of the impact on education.

However, the Advisory Team agreed it would be helpful first to step back from the specific question of separate toilets, to understand the following:

- Are there *enough* toilets in schools (what is the provision)?
- And are the conditions of toilets *good enough* (what is the quality)?

The former would ensure adequate access for both boys and girls. Findings from studies identified in this review suggest that access is largely inadequate in most schools - a situation being exacerbated by expansion of the primary system in many settings. However, the sanitation conditions of most schools in most countries is not well documented or understood. The latter (quality) would help ensure that, where provided, girls and boys use the toilets. So, 'enough' and 'good enough' toilets may be more important than separate toilets. On the other hand, gender separation can potentially influence girls' access and usage of toilets, and may be necessary for both.

This may depend on what is meant by a 'separate' toilet, and going forward, research may need to qualify what constitutes a separate toilet. Is it about the privacy of a toilet, whether gender-segregated or not? Is physical separation essential? If so, are separate stalls adequate, or must boys and girls toilets be provided in separate blocks? Can toilets to be separated by time rather than space, for example, with different 'shifts' for boys and girls? And who defines whether and how toilets are separate? While schools may label toilets as separate, this does not ensure they will be used that way. Examples were cited in Section 3.3 of teachers appropriating student toilets, boys using girls' toilets, and the removal or breakage of physical features - like curtains and doors - designed to separate boys and girls' toilets.

It was also apparent from existing research (in Section 3.3) that, even where provided, the conditions of girls-only toilets meant that girls either could not or chose not to use them. Examples in a range of contexts showed girls were less likely to use toilets that were not secure or clean or functional or private (from

other girls as well as boys); or where girls were unfamiliar with a new type of latrine; or where amenities like water, soap, toilet paper and supplies for menstrual management were not provided. Thus, while gender separation may be a necessary component of acceptability to girls, it is not sufficient. Older girls in particular may also require privacy from other girls, especially younger girls, as well as sanitary supplies, clean water, and menstrual hygiene education (Sommer 2009a).

Future research can more clearly define the determinants of girls' acceptability and use, including the nature and role of separation from boys, at different ages and stages of development, and in different contexts. This can help inform the implementation and uptake of programmes, since toilets can only benefit girls' educational outcomes if girls are actually using them.

4.3 Specific recommendations for future research

The authors, in conjunction with the project advisors, developed a number of specific recommendations to strengthen the evidence base in this area. These include opportunities to learn from existing resources and efforts, as well as new research.

4.3.1 Learning from existing resources

- ▶ Conduct a 'review of reviews' to better understand the causes of poor educational attainment, absenteeism and drop out for girls, at different ages and stages of development. In particular: what is the contribution of school WASH conditions and is poor school sanitation an important 'push-out' factor for girls and/or boys?
- ▶ The database resulting from this review (5082 citations) may provide an opportunity to map studies in related areas, and ask related questions such as:
 - What kinds of programmes have improved menstrual management and hygiene through schools?
 - Is there evidence of an impact of gender-separate toilets in schools in high-income countries (including historical research)?
 - What is known about access to toilets for disabled pupils?

4.3.2 Learning from existing conditions and efforts

- ▶ Given how little is known about the provision and conditions of school toilets in general, a lot could be learned from 'surveillance' or 'auditing' of existing school facilities. Yet no such efforts appear to be underway. (Can we learn from EFA Monitoring efforts? Or the World Bank initiative around benchmarking of school health and nutrition?)

- ▶ It would be useful to map government policies or regulations related to ratios of latrines to pupils, and whether and how toilets should be separated for girls and boys. And to assess how well practice reflects policy (e.g., by comparing school WASH audits with policy mapping).
- ▶ Document models of best practice in this area, by governmental or non-governmental efforts to improve WASH conditions in schools.
- ▶ Build strong monitoring and evaluation plans into existing programmes to improve WASH conditions in schools (ideally from the design stage).
- ▶ In some cases, large-scale programmes are providing girls-only toilets and supplies for menstrual management in school WASH interventions, for example, in over 3000 secondary schools in Bangladesh, but not collecting data on attendance, to assess impact on girls' educational outcomes (personal communication with Kathleen Shordt, Jan 2011). Such programmes could be encouraged to collect absenteeism and drop-out data.

4.3.3 *New qualitative research, to help explore:*

- ▶ the meaning and importance of 'separate' toilets. Given that toilets may be separated in different ways, in different settings, what are we trying to measure? And who defines it?
- ▶ the value placed on toilets by girls, relative to other aspects of their school. Is there a difference in what girls of different ages consider important and acceptable?

4.3.4 *Generating evidence of impact*

Since the provision of separate-sex toilets is most likely necessary but not sufficient to impact girls' educational outcomes, the review team felt that the most useful question to answer was Question 3 of this review: *Is there evidence that any school-based WASH interventions have an impact on girls' educational outcomes?* The 'SWASH+'² study currently underway in Kenya may help answer this question. However, at least two additional well-designed, cluster-randomised trials are needed to generate sound evidence from different contexts, where cultural and environmental factors differ (e.g., religion and access to water, respectively). For example, multi-site studies in Africa and Asia were suggested. Randomised and controlled trials were considered the most useful design for this question, given the preponderance of potential confounders.

² <http://www.swashplus.org/>

Such studies would investigate whether and how a comprehensive school sanitation and hygiene intervention impacts both educational outcomes (such as attendance or reduced absence) and health outcomes, including soil-transmitted helminth infection, reduced fecal exposure (viral or bacterial infection), and experiences of harassment and humiliation. More distal outcomes like educational attainment and achievement could require prohibitively large study sizes to detect important effects.

Such an intervention could be delivered as part of a broader school health programme, for example, based on the four pillars of the FRESH framework (described in Section 2.1.1). In such a programme, safe water and sanitation - considered to be essential steps toward a healthy learning environment - would be implemented alongside:

- skills-based health education;
- school-based health and nutrition services; and
- health-related school policies.

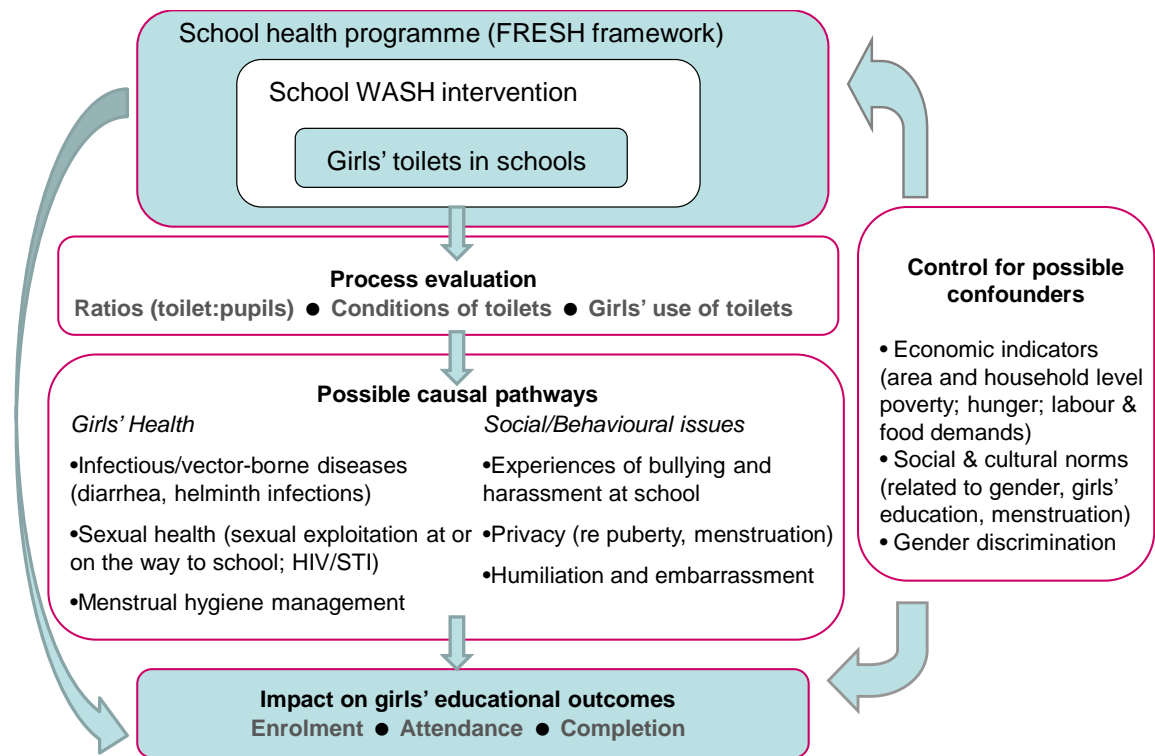
The specific impact of girls' toilets could be measured by phasing in the sanitation 'hardware' before other components (e.g., education and training, and 'low cost recurring' components like soap, brooms, toilet paper, menstrual supplies), or through a factorial study design.

It would also be important to incorporate:

- process evaluation, to assess changes in toilet provision (ratios) and conditions (whether they are adequate and acceptable), and behaviour change (including the use of toilets by girls and boys); and
- qualitative research to help explain the mechanism and context of the findings.

The conceptual framework used to guide this review, has been revised (in Figure 4.1) to reflect these recommendations, and help guide the planning of future research in this area.

Figure 4.1 Guiding framework for future research



REFERENCES

- Abrahams B (2002) Malawi's school sanitation and hygiene promotion project. *Waterlines*. 21(2): 19-21.
- Abrahams N, Mathews S, Ramela P. (2006) Intersections of 'sanitation, sexual coercion and girls' safety in schools. *Tropical Medicine and International Health*. 11(5):751-756.
- Birdthistle IJ, Floyd S, Machingura A, Mudziwapasi N, Gregson S, JR Glynn (2009) Is education the link between orphanhood and HIV? *Social Science & Medicine*, 68(10):1810-8.
- Blanton E, Ombeki S, Oluoch GO, Mwaki A, Wannemuehler K, Quick R (2010) Evaluation of the role of school children in the promotion of point-of-use water treatment and handwashing in schools and households-Nyanza Province, Western Kenya, 2007. *American Journal of Tropical Medicine and Hygiene*. 82(4): 664-71.
- Bolt E, Shordt K, Krukkert I. School sanitation and hygiene education results from the assessment of a 6-country pilot project. UNICEF and IRC, International Water and Sanitation Centre, the Netherlands, 2006.
- Bowen A, Ma H L; Ou J M; Billhimer W, Long T, Mintz E, Hoekstra R M; Luby S (2007) A cluster-randomized controlled trial evaluating the effect of a handwashing-promotion program in Chinese primary schools. *American Journal of Tropical Medicine and Hygiene*. 76(6): 1166-1173.
- Cairncross S, Shordt K (2004) It does last! Some findings from a multi-country study of hygiene sustainability. *Waterlines*. 22(3): 4-7.
- Chapman D, Miske, Shirley J. Promoting Girls' Education in Africa: Evidence from the Field between 1996 and 2003. M. A. Maslak, Ed., *The Structure and Agency of Women's Education*. SUNY Press, 2007.
- Clasen TF, Bostoen K, Schmidt WP, Boisson S, Fung IC, Jenkins MW, Scott B, Sugden S, Cairncross S. Interventions to improve disposal of human excreta for preventing diarrhoea. *Cochrane Database Syst Rev*. 2010 Jun 16;6:CD007180.
- Deo DS (2007) Menstrual problems in adolescent school girls: A comparative study in urban and rural areas. *Indian Journal of Preventive and Social Medicine*. 38: 64-68.
- Dlamini P, Mabuza K (2005) A primary school baseline study of SSHE in Swaziland.. *Waterlines*. 23(3): 20-21.
- Doyle B A. Increasing Education & Other Opportunities for Girls and Women with Water, Sanitation & Hygiene *Waterfront 'Women, Water & Environmental Sanitation' Special Issue*, 1995.
- Ekpo UF, Odoemene SN, Mafiana CF, Sam-Wobo WO (2008) Helminthiasis and Hygiene Conditions of Schools in Ikenne, Ogun State, Nigeria. *PLoS Neglected Tropical Diseases* 2(1):e146.
- Farooq Khan, Syed R T, Mohammed Riaz, Casella D, Kinyanjui V (2008) School-led sanitation promotion: helping achieve total sanitation outcomes in Azad Jammu and Kashmir.. *Waterlines*. 27(3): 224-235.

Fehr AE (2010) Stress, menstruation and school attendance: Effects of water access among adolescent girls in South Gondar, Ethiopia. Summary report for CARE Ethiopia, 29 Oct 2010.

Fentiman A, Hall A, Bundy D. Health and cultural factors associated with enrolment in basic education: a study in rural Ghana. *Social Science & Medicine*, 2001. 52(3):429-39.

Foutoh AA, Mageid FYA, Sabaa AM (2000) Sanitary facilities in school and its relation to selected morbidity indices. *Bulletin of the National Research Centre* (Cairo). 25(4): 437-447.

Freeman M, Porter S, Kurnit M, Saboori S (2009) A review of the impacts of school-based water, sanitation and hygiene (Draft). Center for Global Safe Water at Emory University, December 2009.

Gilany Abdel-Hady El, Badawi Karima, Fedawy Sanaa El (2005) Menstrual hygiene among adolescent schoolgirls in Mansoura, Egypt. *Reproductive health matters*. 13(26): 147-154.

Glynn JR, Kayuni N, Floyd S, Banda E, Francis-Chizororo M, Tanton C, Molesworth, Hemmings J, Crampin AC, French N (2010) Age at menarche, schooling, and sexual debut in Northern Malawi. *PLoS ONE* 5(12): e15334. doi:10.1371/journal.pone.0015334

Herz B, Sperling GB. 2004. *What works in girls' education: evidence and policies from the developing world*. New York: Council on Foreign Relations.

Human Rights Watch (2001) Scared at school. Sexual violence against girls in South African schools. Human Rights Watch, New York.

Hunt F (2008) Dropping out from School: A Cross-Country Review of Literature. CREATE Pathways to Access, Research Monograph No 16, May 2008.

IRC Water and Sanitation Centre (2004) Symposium Proceedings and Framework for Action. School sanitation and hygiene education symposium. The Way Forward: Construction is not enough, Delft, The Netherlands 8-10th June 2004.

IRC Water and Sanitation Centre (2006). Girl friendly toilets for Schoolgirls

Kaya M, Aslan D (2009) An intervention study on "handwashing" among secondary school students in Ankara. *Ankara'da bir ilkogretim okulunda el ykama konusunda bir mudahale calsmas*. 31(2): 135-143.

Kirk J, Sommer M. Menstruation and body awareness: linking girls' health with girls' education.

Koopman JS (1978) DIARRHEA AND SCHOOL TOILET HYGIENE IN CALI, COLOMBIA. *American Journal of Epidemiology*. 107(5): 412-420.

LaFraniere S. "Another school barrier for African girls: no toilet." *New York Times*, 23 Dec 2005.

Leach F, Fiscan V, Kadzamira E, Lemani E and Machakanja P (2003) An investigative study of the abuse of girls in African schools. *Education Research Report* No. 54, London: DFID.

Lidonde R. (2004) Scaling up school sanitation and hygiene promotion and gender concerns. School Sanitation and Hygiene Education Symposium The Way Forward: Construction is not enough! Delft, The Netherlands, WEDC, GWA.

Long T, Bowen A, Ma H L, Ou J M (2006) Effect of a soap hand washing promotion program in Chinese primary schools. 64th Annual Meeting of the American-Academy-of-Dermatology MAR 03-07, 2006 San Francisco, CA, San Francisco, CA.

Lloyd CB. (2009) New Lessons: The Power of Educating Adolescent Girls. A Girls Count Report on Adolescent Girls. Population Council.

Magnussen P, Ndawi B, Sheshe AK, Byskov J, Mbwana K, Christensen NO (2001) The impact of a school health programme on the prevalence and morbidity of urinary schistosomiasis in Mwera Division, Pangani District, Tanzania. *Transactions of the Royal Society of Tropical Medicine and Hygiene*. 95(1): 58-64.

Mathew K, Suma Z, Shordt K, Snel M, Cairncross S, Biran A, Schmidt WP (2009) The sustainability and impact of school sanitation, water and hygiene education in southern India. *Waterlines*. 28(4): 275-292.

McPhedran K, Pearson J, Cairncross S. (2010) The impact of school sanitation on girls' school attendance in the Dowa District of Malawi. 2nd All Africa Environmental Health Congress 2010.

Mensch BS, Lloyd CB. Gender differences in the schooling experiences of adolescents in low-income countries: the case of Kenya. *Studies in Family Planning*, 1998. 29(2):167-184.

Migele J, et al. Diarrhea prevention in a Kenyan school through the use of a simple safe water and hygiene intervention. *American Journal of Tropical Medicine & Hygiene*, 2007. 76(2):351-353.

Montresor A, et al. School enrolment in Zanzibar linked to children's age and helminth infections. *Tropical Medicine and International Health*, 2001. 6(3):227-231.

Ngales M (2007) Sanitation provision in Ethiopia's regional schools - girls' and women's experiences. *Waterlines*. 25(3): 11-13.

Njuguna V, Karanja B, Thurania M, Shordt K, Snel M, Cairncross S, Biran A, Schmidt WP (2009) The sustainability and impact of school sanitation, water and hygiene education in Kenya. London School of Hygiene and Tropical Medicine and UNICEF: London, 2009.

O'Reilly C, Freeman M, Ravani M, Migele J, Mwaki A (2007) The impact of a school-based safe water and hygiene programme on knowledge and practices of students and their parents: Nyanza Province, western Kenya. *Epidemiol. Infect.* 136: 80-91.

Oster E, Thornton R (2009). Menstruation and Education in Nepal. National Bureau of Economic Research Working Paper No. 14853, issues in April 2009.

Plan International (2007) "Girl-friendly latrines reduce school absenteeism" (Warwick, RI: Plan International) <http://www.plan-international.org/wherewework/westafrica/ghana/ghanalatrines/>

Pearson J, McPhedran K (2008) A literature review of the non-health impacts of sanitation. *Waterlines*. 27(1):48-61.

Raising Clean Hands (2010). Advanced Learning, Health and Participation through WASH in Schools: Joint Call to Action 2010. CARE, Dubai Cares, Emory University Center for Global

Safe Water, IRC International Water and Sanitation Centre, Save the Children, UNICEF, Water Advocates, WaterAid, Water for People, WHO.

Reddy PJ, Rani D Usha, Reddy G B, Reddy KK (2005) Reproductive health constraints of adolescent school girls. *Indian Journal of Social Work*. 66(4): 431-442.

Rheingans R, *et al* (2009) Can a school-based water, sanitation and hygiene intervention catalyse changes in household behaviours and environment? Evidence from a randomised trial in western Kenya. *International Research Colloquium of the Network to Promote Household Water Treatment and Safe Storage*, 2009. Royal College of Surgeons Ireland.

Snel M (2004) Worth of School Sanitation and Hygiene Education (SSHE): Case studies (draft). Delft: IRC.

Snel M (2003) School sanitation and hygiene education. In: Snel Marielle, Maier Cecilia, Wijk Christine van; Postma Leonie . Delft: IRC, pages .

Snel M, Bolt E, Postma L (2000) Challenges facing school sanitation and hygiene education from the perspective of the school teacher. *Waterlines*. 19(1): 25-28.

Snel M, Shordt K (2005) The evidence to support hygiene, sanitation and water in schools. *Waterlines*. 23(3).

Sommer M (2009a) Ideologies of sexuality, menstruation and risk: girls' experiences of puberty and schooling in northern Tanzania. *Culture, Health & Sexuality*. 11(4):383-98.

Sommer M (2009b) Where the education system and women's bodies collide: The social and health impact of girls' experiences of menstruation and schooling in Tanzania. *Journal of Adolescence*, doi:10.1016/j.adolescence.2009.03.008

Sommer M (2010) Utilizing participatory and quantitative methods for effective menstrual-hygiene management related policy and planning. Paper for the UNICEF-GPIA Conference.

Tadesse S, Hagos GM (2009) Impact assessment in schools: impact of WASH provision in teaching-learning process, Benishangul Gumuz, Assosa Zone, Menge Woreda. Water, sanitation and hygiene: sustainable development and multisectoral approaches. Proceedings of the 34th WEDC International Conference, United Nations Conference Centre, Addis Ababa, Ethiopia, 18-22 May 2009: 698-702.

UNESCO (2009) *EFA Global Monitoring Report: Overcoming inequality: why governance matters*.

UNICEF (1994) Evaluation of the Use and Maintenance of Water Supply and Sanitation System in Primary Schools. Consulting Services & Associates, Dhaka, October 1994. UNICEF Press Release, Oxford, 24 Jan 2005. "Lack of safe water and sanitation in schools jeopardizes quality education" Roundtable on Water, Sanitation & Hygiene Education for Schools 24-26 January in Oxford, England

UNICEF, IRC (2006) School Sanitation and Hygiene Education Results from the assessment of a 6-country pilot project.

Visscher JT, Garcia M, Madera C, Benavides A, Quiroga E (1996) Out of the mouths of babes: an honest evaluation of water and sanitation in Ecuador. *Waterlines*. 14(3): 19-22.

Wagbatsoma VA, Aimiwu U (2008) Sanitary provision and helminthiasis among school children in Benin City, Nigeria. *The Nigerian Postgraduate Medical Journal*. 15(2): 105-11.

WaterAid (2009) Seen but not heard: A review of the effectiveness of gender approaches in water and sanitation service provision. WaterAid.

WaterAid (2009) Is menstrual hygiene and management an issue for adolescent school girls? A comparative study of four schools in different settings of Nepal. WaterAid.

WaterAid Ethiopia/UNICEF/VSO (2005). Sanitation Provision in Benishangul-Gumuz Region State (BGRS) Schools: Girls and Women's' Experiences.

World Bank (2005) Toolkit on Hygiene, Sanitation and Water in schools.

WHO (1994) Hygiene education and environmental sanitation in schools in Viet Nam: the report of a Project Identification and Formulation Workshop, Hanoi, 8-10 June 1993. World Health Organisation, Geneva: http://whqlibdoc.who.int/hq/1994/WHO_EOS_94.8.pdf

WHO (1995) Hygiene education and environmental sanitation in schools in francophone West Africa: the report of an inter-country workshop to identify problems and options for improvement. World Health Organisation, Geneva.

Appendices

Appendix 2.1 Generic search terms used to create search strings

WASH Interventions	Setting / Population	Research methods
Sanitation / Facilities	School* (variations of)	Intervention*
Sanitary	Primary	Evaluation*
Hygiene	Secondary	Trial*
Water quality	Elementary	Controlled
Toilets*	Pupil*	Impact
water closet	Education*	Perception*
Latrine*	Student*	
Privy / Privies	Girl*	
Lavatory / Lavatories		
Facilities		
Hand washing		
Soap		
Girl-friendly		

Appendix 2.2 Databases searched

Database / Platform	Date	String	Hits
Pubmed	15 th July 2010	<p>((pupils[TIAB] OR pupil[TIAB] OR student[TIAB] OR students[TIAB] OR schoolchildren[tiab] OR schoolchild[tiab] OR schoolgirls[tiab] OR schoolgirl[tiab]) OR (children[TIAB] OR child[TIAB] OR girl[TIAB] OR girls[TIAB]) AND (education[TIAB])) OR ((schools[MeSH Terms:noexp] OR (students[MeSH Terms:noexp] OR (colleges[TIAB] OR (college[TIAB] OR (schools[TIAB] OR (school[TIAB] OR (educational institution[TIAB] OR (educational institutions[TIAB] OR (educational establishment[TIAB] OR (educational establishments[TIAB] OR (educational facilities[TIAB] OR (educational facility[TIAB]))))))) OR (toilet facilities[MeSH Terms] OR (toileting[tiab] OR (bathroom facilities[tiab] OR (hand-washing[tiab] OR (toilet*[tiab] OR (toilet[tiab] OR toilets[tiab]) OR (latrine[tiab] OR latrines[tiab]) OR (privy[tiab] OR privies[tiab]) OR (water closet[tiab] OR (lavatory[tiab] OR lavatories[tiab] OR (water closets[tiab] OR (handwashing[tiab] OR (handwash[tiab] OR ((sanitary[tiab] OR sanitation[tiab] OR hygienic[tiab] OR hygiene[tiab]) AND (facilities[tiab] OR facility[tiab])) OR girl-friendly[tiab]))))</p>	850
ERIC via CSA	15 th July 2010	<p>((KW=toilet*) or(KW=(privy or privies)) or(KW=(lavatory or lavatories)) or(KW=latrine*) or(KW=(girl friendly)) or(KW=(hand washing)) or(KW=soap) or(KW=(water closet)) or(KW=sanitation) or(KW=(sanitary facilities)) or(KW=hygiene)) and((DE=("community schools" or "day schools" or "elementary schools" or "nursery schools" or "public schools" or "rural schools" or "secondary schools" or "slum schools" or "small schools" or "state schools" or "suburban schools" or "traditional schools" or "urban schools")) or(DE=("elementary secondary education" or "access to education")) or(DE=("elementary school students" or "secondary school students"))))</p>	503

SSCI	15 th July 2010	(Topic=(sanitary OR sanitation OR hygienic OR hygiene) AND Topic=(facilities OR facility)) OR (Topic=(toileting OR bathroom facilities OR handwashing OR toilet OR toilets OR latrine OR latrines OR privy OR privies OR water closet OR lavatory OR lavatories OR water closets OR handwashing OR handwash OR girl-friendly) AND Topic=(pupils OR pupil OR student OR students OR schoolchildren OR schoolchild OR colleges OR college OR schools OR school OR educational institution OR educational institutions OR educational establishment OR educational establishments OR educational facilities OR educational facility) OR Topic=(children OR child OR girl OR girls) AND Topic=(education) OR Topic=(schoolgirls) OR Topic=(schoolgirl)	623
IBSS	5 th August	TX toilet* or latrine* or privy* or bathroom* or sanitation* or hygien* or 'girl-friendly*' or *aemoglo* or hand washing or water closet* or water quality or aemoglob* or ((DE "Sanitation") or (DE "Water quality")) or (DE "Hygiene") AND TX pupils OR pupil OR student OR students OR schoolchildren OR schoolchild OR colleges OR college OR schools OR school OR educational institution OR educational institutions OR educational establishment OR educational establishments OR educational facilities OR educational facility OR girl OR girls AND education OR schoolgirls OR schoolgirl	443
LILACS	24 th August 2010	TOILETS" or "HANDWASHING" or "HANDWASHING/" or "TOILET facilities" or "flush TOILETs" or "TOILET facilities" or "SANITATION" or "basic SANITATION" or "school SANITATION" or "personal HYGIENE" [Subject descriptor] or toileting OR bathroom facilities OR handwashing OR toilet OR toilets OR latrine OR latrines OR privy OR privies OR water closet OR lavatory OR lavatories OR water closets OR handwashing OR handwash OR girl-friendly OR latrina OR letrina OR toailete OR banho OR banheiro OR lavabo OR lavatoria [Words] and pupils OR pupil OR student OR students OR schoolchildren OR schoolchild OR colleges OR college OR schools OR school OR educational institution OR educational institutions OR educational establishment OR educational establishments OR educational facilities OR educational facility OR children OR child OR girl OR girls OR schoolgirl OR schoolgirls [Words]	272

Adolec	24 th August 2010	"TOILET FACILITIES/" or "HANDWASHING/" or "SANITATION/" or "TOILETING" or "TOILET" or "LATRINE" or "LATRINES/" [Subject descriptor] or toileting OR bathroom facilities OR hand-washing OR toilet OR toilets OR latrine OR latrines OR privy OR privies OR water closet OR lavatory OR lavatories OR water closets OR handwashing OR handwash OR girl-friendly OR latrina OR letrina OR toaleta OR banho OR banheiro OR lavabo OR lavatoria	138
Medcarib	24 th August 2010	"TOILET FACILITIES/" or "HANDWASHING/" or "SANITATION/" or "TOILETING" or "TOILET" or "LATRINE" or "LATRINES/" [Subject descriptor] or toileting OR bathroom facilities OR hand-washing OR toilet OR toilets OR latrine OR latrines OR privy OR privies OR water closet OR lavatory OR lavatories OR water closets OR handwashing OR handwash OR girl-friendly OR latrina OR letrina OR toaleta OR banho OR banheiro OR lavabo OR lavatoria [Words]	116
REPIDISCA	24 th August 2010	handwashing OR "school sanitation" or "LATRINES" or "LATRINES (ENVIRONMENTAL HEALTH)" or "LATRINES (ENVIRONMENTAL HEALTH)/" or "LATRINES/" or "TOILET" or "TOILET FACILITIES" or "TOILET FACILITIES/" [Subject descriptor] or toileting OR bathroom facilities OR hand-washing OR toilet OR toilets OR latrine OR latrines OR privy OR privies OR water closet OR lavatory OR lavatories OR water closets OR handwashing OR handwash OR girl-friendly OR latrina OR letrina OR toaleta OR banho OR banheiro OR lavabo OR lavatoria [Words] and pupils OR pupil OR student OR students OR schoolchildren OR schoolchild OR colleges OR college OR schools OR school OR educational institution OR educational institutions OR educational establishment OR educational establishments OR educational facilities OR educational facility OR children OR child OR girl OR girls OR schoolgirl OR schoolgirls [Words]	288

PAHO	24 th August 2010	("TOILETS" or "HANDWASHING" or "HANDWASHING/" or "TOILET facilities" or "flush TOILETs" or "TOILET facilities" or "SANITATION" or "basic SANITATION") or "HYGIENE" [Subject descriptor] or toileting OR bathroom facilities OR handwashing OR toilet OR toilets OR latrine OR latrines OR privy OR privies OR water closet OR lavatory OR lavatories OR water closets OR handwashing OR handwash OR girl-friendly OR latrina OR letrina OR toalete OR banho OR banheiro OR lavabo OR lavatoria [Words] and pupils OR pupil OR student OR students OR schoolchildren OR schoolchild OR colleges OR college OR schools OR school OR educational institution OR educational institutions OR educational establishment OR educational establishments OR educational facilities OR educational facility OR children OR child OR girl OR girls OR schoolgirl OR schoolgirls [Words]	77
WHOLIS		("TOILETS" or "HANDWASHING" or "HANDWASHING/" or "TOILET facilities" or "flush TOILETs" or "TOILET facilities" or "SANITATION" or "basic SANITATION") or "HYGIENE" [Subject descriptor] or toileting OR bathroom facilities OR handwashing OR toilet OR toilets OR latrine OR latrines OR privy OR privies OR water closet OR lavatory OR lavatories OR water closets OR handwashing OR handwash OR girl-friendly OR latrina OR letrina OR toalete OR banho OR banheiro OR lavabo OR lavatoria [Words] and pupils OR pupil OR student OR students OR schoolchildren OR schoolchild OR colleges OR college OR schools OR school OR educational institution OR educational institutions OR educational establishment OR educational establishments OR educational facilities OR educational facility OR children OR child OR girl OR girls OR schoolgirl OR schoolgirls [Words]	40
Global Health	7 th October 2011	toilet facilities OR toileting OR bathroom facilities OR toilet OR toilet* OR latrine OR latrines OR privy OR privies OR water closet OR lavatory OR lavatories OR water closets OR handwash* OR sanitary OR sanitation OR girl-friendly OR facility OR facilities AND pupil* OR student* OR schoolchild* OR schoolgirl* OR child* OR girl* AND School* OR educational institution* OR educational establishment* OR educational facilit*	2385

Appendix 2.3 The 'Request for Relevant Research' issued via email

Dear colleague,

We would like to share with you a new research project, and a way in which we would like you to be involved.

With funding and guidance from DFID, we are working together to conduct a systematic review to answer the following question:

"What impact does the provision of separate toilets for girls at schools have on their enrolment, attendance and completion of primary and secondary schooling?"

We would like to ask your help identifying relevant research to include in the review. In particular, if you know of studies (published or unpublished) that have assessed the impact of either:

- 1) separate sex toilets; or
- 2) other school-based WASH interventions

on girls' health or educational outcomes, please forward any documents or details to wash.review@lshtm.ac.uk

We would also be interested to receive any photographs showing what separate toilets look like in schools around the world.

We are grateful for your help to ensure we capture all evidence that is available. Please also let us know if you would like to receive a copy of the final report when it is available.

Yours sincerely,

Isolde Birdthistle, Oona Campbell & Sandy Cairncross (London School of Hygiene & Tropical Medicine, UK)

Kelly Dickson (Institute of Education, UK)

Matt Freeman and Rick Rheingans (Emory University Center for Global Safe Water)

Seung Lee (Save the Children)

Murat Sahin (UNICEF)

Appendix 2.4 Sample request for additional data about separate toilets for girls

Dear Marielle Snel,

We have read with interest your study published in *Waterlines*, 2009 ('The sustainability and impact of school sanitation, water and hygiene education in southern India). We believe it may be helpful for a systematic review we are conducting with funding from the UK Department for International Development.

The systematic review aims to answer the following question:

"What impact does the provision of **separate toilets for girls** at schools have on their enrolment, attendance and completion of primary and secondary schooling?"

We see you have collected information about boys and girls toilets (e.g., the pupil:latrine ratio) and would be interested to see whether it is possible to assess the impact of having separate toilets for girls. For example, is it possible to know whether the educational and/or behavioural outcomes you measured differed in schools with separate sex toilets compared to those with either shared or no toilets? If so, would you be willing to share these data? As an example, we have prepared dummy tables that would be helpful in answering the study question (see attached). To be included in the review, we would need to receive data by 18 January 2011.

We are grateful for your consideration of this request, and look forward to hearing from you soon.

Yours sincerely,

Isolde Birdthistle, Leila Javidi, Oona Campbell (MARCH Ctr, London School of Hygiene & Tropical Medicine, UK)
- working in partnership with the SHARE Consortium (LSHTM), the Institute of Education UK, Save the Children, and UNICEF

Data request for DFID systematic review, for evidence of an impact of **separate sex toilets** on:

- any **educational** outcomes for girls (e.g., absenteeism, enrolment, completion, performance); and/or
- any **health** or **social** outcome for girls (e.g., illness, infection, humiliation, menstrual hygiene, harassment, violence)

		EXAMPLE OUTCOMES: At school or individual level		Measure of association (w/ Confidence Interval) Or test for significance
		GIRLS' EDUCATION=WORSE (Absenteeism = less Enrolment = less Completion = less)	GIRLS' EDUCATION=BETTER (Absenteeism = more Enrolment = more Completion = more)	
INTERVENTION or existing conditions at school	School toilets = Separate sex	(n)	(n)	
	vs School toilets = Shared boys & girls	(n)	(n)	
	or vs No school toilets	(n)	(n)	

		EXAMPLE OUTCOMES: At school or individual level		Measure of association (w/ Confidence Interval) Or test for significance
		Any girls' health /social outcome=WORSE	Any girls' health / social outcome=BETTER	
INTERVENTION or existing conditions at school	School toilets = Separate sex	(n)	(n)	
	vs School toilets = Shared boys & girls	(n)	(n)	
	or vs No school toilets	(n)	(n)	

Appendix 2.5 Coding tool

Section one: Administrative details	
<p>1.1 What is the status of the paper?</p> <p><i>Please use one code only</i></p>	<p>1.1 Peer reviewed journal article</p> <p>1.2 Book / Book chapter</p> <p>1.3 Published report or conference papers <i>(e.g. reports for WHO, IRC, or papers presented at conferences, e.g. newsletter summaries and other webpages)</i></p> <p>1.5 Unpublished <i>e.g. thesis or author manuscripts</i></p>
Section two: Study aims and method	
<p>2.1 What is the purpose of the study?</p> <p><i>Please indicate what the purpose of the study is. For example; code as</i></p> <p><i>2.1 - to evaluate the outcome of an intervention / program - if the study measures effectiveness - i.e. the impact of a specific intervention or programme on a defined sample of recipients or subjects of the programme or intervention</i></p> <p><i>2.2 to evaluate the delivery of an intervention / program – if the study</i></p>	<p>1.1 to evaluate the outcome of an intervention / program (effectiveness)</p> <p>1.2 to evaluate the delivery of an intervention / program (process)</p> <p>1.3 to explore the relationships/associations between variables (observational)</p>

<p>2.2 to explore the relationships between variables - Please use this code for a study type which examines relationships and/or statistical associations between variables in order to build theories and develop hypotheses. These studies may describe a process or processes (what goes on) in order to explore how a particular state of affairs might be produced, maintained and changed. These relationships / associations may be discovered using qualitative techniques, and/or statistical analyses.</p>	
<p>2.2 What is the method used in the study?</p> <p>3.1 =Please use this code if the outcome evaluation employed the design of a randomised controlled trial. E.g. i) compare two or more groups which receive different interventions or different intensities/levels of an intervention with each other; and/or with a group which does not receive any intervention at all</p> <p>AND ii) allocate participants (individuals, groups, classes, schools) or sequences to the different groups based on a fully random schedule (e.g. a random numbers table is used). If the report states that random allocation was used and no further information is given then please keyword as RCT. If the allocation is NOT fully randomised (e.g. allocation by alternate numbers by date of birth) then please keyword as a non-randomised controlled trial</p> <p>3.2 =Please use this code if the evaluation compared two or more groups which receive different interventions, or different intensities/levels of an intervention to each other and/or with a group which does not receive any intervention at all BUT DOES NOT allocate or sequences in a fully random manner. This keyword should be used for studies which describe groups being allocated using a quasi-random method (e.g allocation by alternate numbers or by date of birth) or other non- random method</p> <p>3.3 =Please use this code where a group of subjects e.g. a class of school children is tested on outcome of interest before being given an intervention which is being evaluated. After receiving the</p>	<p>2.1 Experiment with random allocation to groups (Randomised Controlled Trial, Cluster randomised trial)</p> <p>2.2 Experiment with non-random allocation to groups (quasi random / Controlled Trial)</p> <p>2.3 One group pre and post test (e.g. before and after the intervention)</p> <p>2.4 One group post-test only (e.g. no baseline data)</p> <p>2.5 Cohort study (observation, no intervention / program)</p> <p>2.6 Case-control study</p> <p>2.7 Cross sectional study (e.g. survey for quantitative data)</p>

intervention the same test is administered again to the same subjects. The outcome is the difference between the pre and post test scores of the subjects.

3.4 =Please use this code where one group of subjects is tested on outcome of interest after receiving the intervention which is being evaluated

3.5 =Please use this code where researchers prospectively study a sample (e.g. learners), collect data on the different aspects of policies or practices experienced by members of the sample (e.g. teaching methods, class sizes), look forward in time to measure their later outcomes (e.g. achievement) and relate the experiences to the outcomes achieved. The purpose is to assess the effect of the different experiences on outcomes.

3.6 =Please use this code where researchers compare two or more groups of individuals on the basis of their current situation (e.g. 16 year old pupils with high current educational performance compared to those with average educational performance), and look back in time to examine the statistical association with different policies or practices which they have experienced (e.g. class size; attendance at single sex or mixed sex schools; non school activities etc).

3.7 please use this code where researchers have used a survey to collect quantitative data about items in a sample or population

3.8 = Please use this code where the researchers try to understand phenomenon from the point of the 'worldview' of a particular, group, culture or society. In these studies there is attention to subjective meaning, perspectives and experience'.

2.8 Views study (please specify)

3.7.1 Questionnaires

3.7.2 Interviews (semi/open ended)

3.7.3 Focus groups

3.7.4 Group work (e.g. activities used to identify people's views/experiences/opinions)

2.9 Case study (provide detail)

2.10 Secondary data analysis (provide detail)

<p>3.9 – please use this code when researchers refer specifically to their design/ approach as a 'case study'. Where possible further information about the methods used in the case study should be coded</p> <p>3.10 = Please use this code where researchers have used data from a pre-existing dataset to answer their 'new' research question.</p>	
<p>Section three: Population focus</p>	
<p>3.1 Which country are the population sampled from?</p> <p>Tick all that apply – if country not on the list please add 😊</p>	<p>1.1 Low middle income countries - See list on EPPI-Reviewer</p> <p>1.2 Lower middle income countries - see checklist on EPPI-Reviewer</p> <p>1.3 Upper middle income countries see checklist on EPPI-Reviewer</p>
<p>3.2 What ages are covered by the actual sample?</p> <p>Please give the numbers of the sample that fall within each of the given categories. If necessary refer to a page number in the report (e.g. for a useful table). If more than one group is being compared, please describe for each group. If follow-up study, age of entry to the study</p>	<p>2.1 Details</p>
<p>3.3 What is the sex of the participants?</p> <p>Please provide details of the sex of participants included in the study</p> <p>Not mutually exclusive – tick all the apply</p>	<p>3.1 Mixed sample (CYP)</p> <p>3.2 Girls only</p> <p>3.3 Boys only</p>

	3.4 Adults (male or female)
<p>Section four: Description of toilet intervention, provision, experience,</p> <p><i>The aim of this section is to identify what the studies are focusing on in terms of the provision of toilets.</i></p>	
<p>4.1 What type of toilet intervention, provision, and/or experience is described in the study?</p> <p><i>Please indicate what type of intervention or program is being investigated. Tick all that apply</i></p>	<p>1.1 Separate toilets 1.2 Shared toilets 1.3 Toilets not specified if separate or shared 1.4 Other toilet provisions (e.g. handwashing, menstrual management, quality of toilet) 1.5 Hygiene education related to toilets</p>
<p>4.2? What are the comparisons?</p>	<p>2.1 separate vs shared toilets 2.2 separate vs no toilets 2.3 toilets vs no toilets (not specified if separate) 2.4 'girl-friendly' toilets with menstrual supplies vs separate toilets without supplies, etc. 2.5 received hygiene education vs did not receive 2.6 same group before and after WASH intervention/WASH education</p>
<p>Section five: Outcomes reported</p>	

<p>5.1 Which <u>educational</u> outcomes did the study report?</p> <p><i>Always code each outcome reported in the study whether mixed or single sex. Tick child code when reported for girls only.</i></p>	<p>1.1 Enrolment 1.1.1 Enrolment: reported separately for girls? (tick if yes)</p> <p>1.2 Absenteeism 1.2.1 Absenteeism: reported separately for girls? (tick if yes)</p> <p>1.3 Attendance 1.3.1 Attendance: reported separately for girls? (tick if yes)</p> <p>1.4 Completion 1.4.1 Completion: reported separately for girls? (tick if yes)</p> <p>1.5 Performance in school 1.5.1 Performance: reported separately for girls? (tick if yes)</p> <p>1.6 Other</p>
<p>5.2 Which <u>health</u> outcomes did the study report?</p>	<p>2.1 Add detail (please add category) 2.1.1 Category: reported separately for girls? (tick if yes)</p> <p>X3</p>
<p>5.3 Which <u>social/emotional</u> outcomes did the study report?</p>	<p>3.1 Dignity</p> <p>3.2 Humiliation/ Embarrassment</p> <p>3.3 Harassment</p> <p>3.4 Stigma</p>

	3.5 Other (please add category)
5.4 What <u>process</u> outcomes did the study report? (e.g., change in the use, conditions, number of toilets)	4.1 Change in the usage of toilets 4.2 Conditions of toilet - Lighting - Security - Amenities e.g. toilet paper - Privacy 4.3 number of toilets 4.4 Other
5.4 What other outcomes did the study report?	4.1 Details (open text box) e.g. cost effectiveness
Section six: Potential review questions	
6.1 Can the study answer the following potential review questions? Tick all that apply	1.1 Q1a: Is there any evidence of an impact of providing single-sex toilets on the enrolment, attendance and/or completion of girls in primary or secondary schools? (Q1a) 1.2 Q1b: Is there evidence of associations between separate toilets and girls' educational outcomes? 1.3 Q2a. What is the impact of separate toilets on girls' health?

	<p>1.4 For those health factors shown to be influenced by separate toilets, is there any evidence of their impact on girls' educational outcomes? (Q2b.)</p> <p>1.5 Of factors known to influence girls' educational outcomes (e.g., poverty and gender norms and expectations) which are important determinants of whether schools provide separate toilets for girls? (Q3)</p> <p>1.6 Is there evidence that any school-based WASH interventions have an impact on girls' educational outcomes? (Q4)</p>
--	--

Appendix 3.3 Studies assessed to answer review Question 4 (impact of any WASH intervention on girls' educational outcomes)

Author, Year	Purpose of the study	Setting and sample	Methodology	Intervention(s) provided	Comparison group(s)	Key findings re impact on girls' educational outcomes?
Alibhai 2001	To facilitate the adoption of healthy behaviors (hygiene) by involving children in the educational process	Pakistan, location unclear. Sample size unclear.	KAP survey (before and after), interviews (type not mentioned) with mothers and children, evaluations by teachers, direct observation of behaviours. More specific methods not identified.	CtC training and hygiene education in >100 schools	None	None listed
Blanton 2010	To assess uptake and sustained use of water treatment at home	Nyanza Province, Kenya 2007 -2008 666 pupils from grades 4-8 attending public primary school and their parents	Before and after survey of 17 schools Absenteeism collected from registry from 2005 - 2008	Drinking water and handwashing stations, provision of flocculant-disinfectant for point-of-use water treatment, hygiene education for teachers.	None	26% reduction in absence. No data for girls only.
Bowen 2007	To determine whether less intensive, scalable interventions involving hygiene education and soap provision can improve health.	Fujian Province, China; 2003-2004 3962 first-grade students in 90 schools over 10 weeks of follow-up (52,342 pupil-weeks of observation)	Cluster randomized trial. Random selection and assignment into three study arms. Teacher absence records and teacher interviews with parents to assess illness. Teachers were trained by a pediatrician on 10 symptoms to identify for illness.	Arm1: hygiene education at school through teachers training. 30 schools. Arm 2: hygiene education at school through teacher training + provision of soap + students enlisted as handwashing champions. 30 schools.	Only government-sanctioned hygiene education. 30 schools.	Schools in the expanded intervention (Arm2) reported 42% fewer absences, 54% fewer absence days, 71% fewer in class illnesses (against controls) Schools in basic hygiene (Arm 1) reported reductions in the above, though not statistically significant. No differentiation by

						gender.
Kahn 2008	To assess the ability of children to change their own behaviours and serve as change agents as a result of a school sanitation and hygiene education project	Muzzafarad and Nelum Districts, Pakistan.	Case study; descriptive. Overall methods unclear	School led total sanitation	None	Reported girls increase in enrolment, though data not shown.
Mathew 2009	To understand the impact and sustainability of WASH in schools interventions and, secondarily, examine the associations between inputs at the school conditions and pupil practices.	Kerala State, Allapuzha, Pattanamthitta, and Kottayam Districts, India; 2006-2007. The intervention took place prior to 2003. 300 (75 in each intervention, 150 in control) primary schools within 50 meters of a water supply facility.	Cross-sectional study. Two intervention districts with one post-intervention control district, chosen due to similarities of geography, economics, and socially (not specified). 569 small group interviews with 7,835 children; 764 household visits. Direct observation of school conditions. Semi-structured interviews. Class voting exercise.	District-wide intervention in two districts for 1 year prior to 2003. Software (training) & hardware (construction of water, sanitation, and handwashing facilities)	Pupils from 150 schools selected as comparisons for the purposes of the study (no a priori random allocation)	Intervention schools had better WASH facilities 4 years following an intervention. Identified policy of gender-differentiated toilets and evidence of better girl:latrine ratio than boy:latrine ratio. Girls found latrines more convenient to use than boys. 25% of girls in intervention schools had special problems using latrines during menstruation, compared to 50% in control (p<0.01). Relationship between these outcomes and educational impact are not reported.
McPhedra n 2010	To assess impact of school sanitation on	Dowa District, Malawi	Retrospective study of six schools	Three schools received school sanitation	Post-intervention	Girls' enrolment data

	girls' attendance	Six schools	Sanitation survey, questionnaires, interviews and FGDs. School registers	intervention by UNICEF (n=3)	comparison (n=3)	shown, but differences could not be attributed to the sanitation intervention Reported that sanitation access impacts absence (from pupil FGDs), though the data are severely limited and data do not conclusively support this finding. FGDs: some girls reported leaving early or missing during menstruation.
Ngales 2007	To develop recommendations to improve hygiene and sanitation status of schools by using feedback of all stakeholders	304 participants (assumed to be female, though not specifically mentioned) in 32 schools; Benishangul-Gumuz Regional State, Ethiopia	Qualitative research (no mention of methods)	None	None	None mentioned
Njuguna 2009	To understand 1) what makes a program effective, and 2) what are the impacts of a WASH-in- schools program	100 schools in Nairobi, Mombasa, Kwale District, Kenya. >5000 children either observed or involved in classroom voting. Year: 2007	Cross-sectional study Observation of handwashing (n=1000 pupils), classroom voting (n=4900 pupils), small group discussion (16 schools)	50 schools provided software (teacher training) and hardware (construction of water, sanitation, and hygiene) at schools from 2005 – 2007. Inputs provided by UNICEF	50 schools not provided infrastructure and software from UNICEF.	When there was water in the toilets, more girls tended to WASH their hands (not for boys). Girls were less absent where there was more handwashing (p<0.043) and very high toilet (>90%) use

						(<0.048). No association for cleanliness of toilets. Girls in 2 of 16 small groups mentioned that girls sometimes ask to go home during menstruation.
O'Reilly 2007	To assess differences in pupil absence; impact of a school intervention on household uptake of water treatment and hygiene behaviors.	Nyanza Province, Kenya (2005 – 2006). 753 primary school age pupils grades 4-8 (390 at baseline, 363 at follow-up) and their parents.	Before and after survey for intervention; absenteeism analyzed retrospectively from school records for attendance. Schools not randomly allocated.	Water treatment technology, handwashing containers, hygiene education for teachers. Nine schools randomly selected from 45 who re...	9 schools prospectively chosen	Reduction of school absence by 35%. No domain analysis for gender.
Oster 2010	To assess the role of menstruation of girls absence; estimate the impact of provision of menstrual cup in mitigating absence during menstruation.	Chitwan District, Nepal, 2006 – 2008, for 1 school year. 198 girls in 6 th and 7 th grade	Absence due to menstruation: menstrual calendars of girls in control. Reduction due to menstrual cup provision: individual randomization and longitudinal followup	99 girls provided menstrual cups	101 girls randomly allocated	Girls are 2.4 percentage points less likely to attend school when she has her period. Menstruation has a small role in girls absence (0.4 days per 180 school days); provision of cups does not reduce that gap ($p<0.01$)
Tadesse 2009	To quantify and qualify impacts of a WASH in schools project.	Benishangul Gumuz Woreda, Ethiopia Three schools. Pupil sample size unclear	Descriptive study. Pupil and teacher surveys (type unspecified); unspecified qualitative data	WaterAid constructed water supply schemes and sanitation facilities in proximity to the school.	None	Only descriptive statistics reporting differences in reported absence; no statistical comparisons

		Year 2008	collection.			conducted.
UNICEF, 1994	To assess the impact of sanitation facilities on girls attendance	Bangladesh, 1993-1994 228 randomly selected schools. Sample size calculated based on assumed latrine quality.	Retrospective survey of WASH conditions and attendance records.	Sanitation and water supply, gender separate girls latrines.	None	Overall impact on girls' education 11% increase in girls' attendance. Reasons for reduction are sanitation facilities (reported by teachers), even without hygiene education or improved hygiene practices. However, cannot rule out influence of other, simultaneous government "schemes" to increase enrolment (including financial support to families of girls).