

# School toilets: facilitating hand hygiene? A review of primary school hygiene facilities in a developed country

L.M. Reeves<sup>1</sup>, P.C. Priest<sup>1</sup>, M.R. Poore<sup>2</sup>

<sup>1</sup>Department of Preventive and Social Medicine, University of Otago, PO Box 913, Dunedin 9054, New Zealand

<sup>2</sup>Public Health South, Southern District Health Board, PO Box 5144, Dunedin 9058, New Zealand

Address correspondence to P.C. Priest, E-mail: patricia.priest@otago.ac.nz

## ABSTRACT

**Background** Clean hands play an important role in preventing infectious disease transmission. The physical quality of any toilet and handwashing facilities is an important determinant of whether and how it is used, especially for school children.

**Methods** This study assessed the physical quality of toilet and handwashing facilities used by 9 year olds at 68 primary schools in three cities in the South Island of New Zealand. The facilities were assessed for availability, functionality and provision of hand basins, hygiene products and drying facilities.

**Results** Nineteen schools (28%) followed the New Zealand Ministry of Education Code of Practice for toilet and bathroom facilities in schools, by providing warm water, liquid soap at every basin and functioning hand drying facilities. A further 25 schools (37%) would have met the standards except they provided only cold water (21 schools) or the cloth roller towels were unusable (4 schools). The other 24 schools' toilet facilities were deficient in some way, including one with no soap and six that provided no drying facilities. School socioeconomic position and toilet facility quality were not related.

**Conclusions** These results suggest that a significant number of New Zealand children do not currently have access to high quality hygiene facilities at school.

**Keywords** buildings, children, constructions and points, public health

## Introduction

The link between dirty hands and infectious diseases was identified by Semmelweis in 1847, (reviewed by Noakes *et al.*<sup>1</sup>). Although at the time some colleagues found his conclusions to be controversial,<sup>1</sup> it has been accepted for a considerable time now that clean hands contribute to good health and there are many organizations worldwide that work to promote good hand hygiene.<sup>2–5</sup>

Functional toilet and handwashing facilities for children are important to minimize the incidence of infectious diseases<sup>6</sup> in both developing<sup>7</sup> and developed<sup>8,9</sup> countries; for example, the promotion of good hand hygiene was an important component of the public health response to the 2009 influenza pandemic in many countries. Even where infectious diseases acquired through poor hygiene are relatively minor, they are often accompanied by absence from school,

which may affect a child's engagement with the school and with learning. There may also be economic impacts on families and society in general because of the need to look after sick children who would otherwise be at school.

In developed countries, almost all children spend a significant part of their time at school, where provision of toilets and hand washing facilities is the norm. However, the way in which children use the facilities, and in some cases whether they use them at all, can depend on their physical quality; for example, whether they are fully functional and inviting.<sup>9,10</sup> In New Zealand, the Ministry of Education

L.M. Reeves, Assistant Research Fellow

P.C. Priest, Senior Lecturer in Epidemiology

M.R. Poore, Medical Officer of Health

Code of Practice describes the requirements for toilet and handwashing facilities for school pupils.<sup>11</sup> There is no information available about whether New Zealand schools meet this Code. This study sought to assess the toilet and handwashing facilities available to primary school children at city primary schools in the South Island of New Zealand against the Code.

## Materials and methods

### Subjects

This paper reports the results of an environmental survey carried out in primary schools in March 2009. All schools participating in this survey had also agreed to be part of a separate cluster-randomized controlled trial of hand sanitizer provision in primary school classrooms.<sup>12</sup> The environmental survey was carried out prior to the commencement of the trial, so no schools were using sanitizer at the time of the survey.

Eligible schools had at least 100 children in years 1–6 (aged 5–11 years) enrolled in them in November 2008; were located within the city boundaries of Christchurch, Dunedin or Invercargill, in the South Island of New Zealand and were not ‘special schools’ (e.g. schools for deaf or disabled children). Principals of eligible schools were invited to take part in the sanitizer trial by letter and followed up by telephone if necessary. Those who agreed to take part in the trial were then asked to take part in this environmental survey.

### Measures

School decile (a measure of the socioeconomic advantage of the school’s catchment, with 1 being least advantaged and 10 the most advantaged) was obtained from Ministry of Education data.

The Ministry of Education Code of Practice<sup>11</sup> stipulates that every hand basin shall be provided with an adequate piped supply of warm water, liquid soap and equipment to facilitate adequate hand drying. This code does not set any standards and does not say how such facilities should be operated (for example how often they should be cleaned).

A checklist of hygiene facilities and their features was developed for use in the environmental survey and piloted at two schools to assess its suitability. After some modifications, four research assistants were trained to consistently perform the observations, measurements and reporting. The information that was collected is shown in **Box 1**. The overall appearance of the hand basins was recorded by comparison with photos of a clean, a moderately dirty and a

### Box 1 Information collected

#### Toilets

Number, whether inside (same block as the classroom) or outside (a stand-alone separate toilet block) and whether there was toilet paper in each toilet.

#### Hand basins

Number, height from the floor, accessibility, temperature of the water source (cold, hot, warm, mixer)\*, presence of splash boards, type of taps, how many basins had working taps and the overall appearance of the hand basins.

#### Hand hygiene products

Products provided\*, height of the products from the floor, accessibility, how many dispensers/bars of soap there were and how much liquid soap was left\*.

#### Hand drying

Facilities provided\*, accessibility, height of the drying facilities from the floor, if paper towels were used whether there were any left\*, if the cloth roller was usable\* and if the air dryer worked\* and if it blew hot or cold air.

#### Other

Whether there were relevant posters or information about hand hygiene in view, were the floors clear of rubbish, method for entering the toilet block, what ventilation is provided, whether the toilet block had a rubbish bin and what heating was provided, what the cleaning contract specified in relation to cleaning the toilets.

\*Information used to determine whether the Code of Practice was met.

very dirty basin (see Supplementary data, Fig. S1). The research assistants recorded the photo which most closely resembled the basins in the toilet block. Where this varied, the photo resembling the most dirty basin in the block was recorded.

Schools were defined as meeting the Ministry of Education’s Code if both girls’ and boys’ toilet facilities had piped warm water (this was considered to be present if working hot and cold taps or premixed warm water was available), liquid soap at every basin and functioning hand-drying facilities.<sup>11</sup>

### Procedure

Each school was visited once, immediately after the school’s lunch break. A research assistant inspected the toilet blocks used by year 4 girls and year 4 boys (aged 8–9 years), and assessed toilets, hand basins, hand hygiene products and drying facilities. We did not have the resources to inspect all toilets in each school, so we identified a particular age group in order to ensure that the different schools’ facilities should be reasonably comparable. We chose toilets used by children in the middle of the age range for these schools.

## Data analysis

Data were entered into a Filemaker Pro Version 9 (Filemaker Inc, Santa Clara, CA) database, and summarized using the statistical package Stata Version 10 (StataCorp, College Station, TX).

## Results

Sixty-eight (49.6%) of the 137 eligible schools agreed to take part in the trial: 37 in Christchurch, 23 in Dunedin and 8 in Invercargill. The principals of all 68 schools agreed to allow us to conduct an environmental survey on their year 4 girls' and year 4 boys' toilet blocks. School participation rates are shown in Table 1. Larger schools (with rolls over 300) were less likely to take part in the study, and there was differential participation by city, but there was no statistically significant effect of socioeconomic advantage on participation.

As one school in the study was an all girls' school, and one was an all boys' school, and in one school girls and boys used the same toilet block, a total of 133 surveys were collected. Boys' and girls' toilet blocks within a school hardly differed in their facilities (data not shown), so data were combined and summarized by school.

Table 2 shows that 19 (28%) of schools surveyed met all the three Ministry of Education Code of Practice requirements (warm water, liquid soap and functioning drying facilities in all surveyed toilet blocks). Thirty (44%) met only 2 of the 3; 21 of these did not meet 3 standards because they

did not supply warm water and 4 because their cloth roller towels were not functional. Among the 17 (25%) schools that met only one requirement, this was the provision of adequate drying facilities in all but three cases. There was no statistically significant pattern by school decile.

Table 3 shows in more detail the facilities available in the toilet blocks.

**Table 2** Number of Ministry of Education standards met by school decile

School decile	Number of schools	Number (%) of schools meeting standards <sup>a</sup>			
		0 standards met	1 standard met	2 standards met	3 standards met
1–3	16	1 (6)	4 (25)	6 (38)	5 (31)
4–7	15	0	4 (27)	8 (53)	3 (20)
8–10	37	1 (3)	9 (24)	16 (43)	11 (30)
Total	68	2 (3)	17 (25)	30 (44)	19 (28)

<sup>a</sup> $\chi^2 = 1.96$ ,  $P = 0.92$ .

**Table 3** Facilities provided in year 4 toilet blocks

	Schools (n = 68), n (%)
<b>Toilets</b>	
All toilets access from inside school	45 (66)
No toilet paper in some toilets	5 (7)
<b>Basins</b>	
All taps at school worked	61 (90)
Cold running water only	34 (50)
Hot and cold running water, separate taps	24 (35)
Premixed warm running water, single tap	5 (7)
Clean	48 (71)
Moderately clean	20 (29)
<b>Soap</b>	
Liquid soap provided in all blocks	48 (71)
Some dispensers empty	2 (3)
Bar soap provided	15 (22)
No soap at all provided	1 (1)
<b>Hand-drying facilities<sup>a</sup></b>	
Cloth rollers provided	34 (50)
Some cloth rollers do not work	5 (7)
Paper towels provided	10 (15)
Air dryer provided	21 (31)
No drying facilities provided	6 (9)

<sup>a</sup>Some schools provided more than one type.

**Table 1** School participation by size and socioeconomic status

	Eligible schools	Participating schools, n (%)	$\chi^2$ (P value)
<b>Roll</b>			
100–199	50	32 (64)	14.92 (0.001)
200–299	37	22 (59)	
>300	50	14 (28)	
<b>Decile</b>			
1–3 (least advantaged)	35	16 (46)	3.50 (0.174)
4–7	38	15 (39)	
8–10 (most advantaged)	64	37 (58)	
<b>City</b>			
Christchurch	90	37 (41)	10.10 (0.006)
Dunedin	31	23 (74)	
Invercargill	16	8 (50)	

## Toilets

Two-thirds of schools provided access to toilets from inside the classroom building. In five schools, at least one toilet had no toilet paper. This was the case in both the girls' and boys' toilet blocks in one school, in boys' toilets only in two schools and in girls' toilets only in two other schools.

## Basins

Three schools had one tap that did not work and one school had two non-working taps. Half of the schools provided only cold water for washing hands. In addition, three schools had only cold running water in one of either the boys' or the girls' toilets. Only a small number of schools (5; 7.5%) provided premixed warm water.

No basins were classified as 'very dirty', and in the majority of schools (71%) all basins were clean.

## Soap

Wall-mounted liquid soap was favoured over other products for washing hands, followed by bar soap. Among the 48 schools that used wall-mounted liquid soap, 2 had at least 1 dispenser that was empty. In one school, no soap at all was provided for washing hands. In addition, one school had no soap in the boys' toilet block and two had none in the girls'.

## Drying facilities

Half of the schools provided a cloth roller towel for the children to dry their hands, but in five schools not all roller towels were working. Next most common was air dryers, and then paper towels. Six schools provided no hand-drying facilities at all for their students, with one of these asking students to bring their own towels from home.

## Discussion

### Main findings of this study

In this study, only 28% of schools met all the standards as required in the Ministry of Education Health and Safety Code of Practice for State and State Integrated Schools.<sup>11</sup>

This low percentage was in part due to only cold water being supplied rather than warm water as the code states. A further 31% of schools met the code apart from providing only cold water. Only one school provided no soap, but 9% had no facilities for hand drying and 7% had unusable cloth roller towels. It does not appear that socioeconomic status is the main determinant of not meeting the standards, as school decile was not related to the number of standards met.

In 5% of schools some toilets had no toilet paper available at the time of the survey. Toilets were inspected immediately after the lunch break, when they are likely to have been heavily used. However, it is a reasonable expectation that those who use them at the end of the lunch break should nonetheless have access to toilet paper and hand-washing and drying facilities.

### What is already known on this topic

The few other reported assessments of the quality of school toilets in developed countries have also tended to find the facilities wanting. A survey of sanitary facilities in 37 schools in Bloomsbury, London in 1990 found that 15 had insufficient numbers of toilets and handbasins, that in 10 schools, toilet paper was not always available and in 18 schools toilets were not clean.<sup>13</sup> In 2002, a survey of 87 school children from Wales found that while 98% always had access to handwashing facilities, only 63% of the children reported that toilet paper was always available in their school toilets and only 37% reported that the toilet facilities were always clean.<sup>10</sup> This study also found that 40% of the children would never use the school toilet to defaecate and a further 32% would do so only when desperate. While we did not find any reports of studies directly linking school sanitation facilities with illness rates, improved hand hygiene has been shown to reduce illness in the community.<sup>14,15</sup> If the facilities provided are inadequate or uninviting, proper hand-washing is less likely to take place.<sup>16</sup>

### What this study adds

If the schools that participated in this study are representative of New Zealand primary schools in general, then a large number of children are using sub-optimal hygiene facilities at an important time in their development. In particular, while the use of cold water does not preclude hand cleaning, in winter in the regions where this study was carried out cold water is likely to be a disincentive to thorough hand washing.

### Limitations

This study was limited to schools that had agreed to be part of a subsequent trial of hand sanitizer. All of the trial schools agreed to take part. The 68 participating schools were on average more advantaged than all schools in New Zealand (about half were in the three most advantaged national deciles). It is possible that in these schools the principals were particularly aware of the importance of hand hygiene, and therefore that their toilet and handwashing facilities were better than non-participating schools. On the

other hand, they may have been concerned about their sub-standard facilities and thought that participation would help their advocacy for better facilities. We have no way of assessing whether either of these opposing biases was operating, but study staff who interacted with the schools did not get the impression that either was the case.

Schools outside city boundaries and with fewer than 100 students were not eligible to take part in the study, and so the results of this study may not be generalizable to such schools.

Because of practical considerations, we were limited to surveying only the toilets available to one age group in each school, but this age group was consistent across schools so the information from different schools should be comparable.

## Implications

Sanitation facilities and personal hygiene practice are fundamental prerequisites for good health. Children initially learn about personal hygiene at home and in pre-school education settings. Their experiences with school facilities can affect their attitudes and hand hygiene behaviours and their health,<sup>9</sup> and could presumably influence adult hygiene behaviour, which is known to be suboptimal.<sup>17</sup> Child-friendly facilities that are clean, well resourced and where consideration is given to ensuring the child can easily use the facility, may be a precondition for effective hygiene education.<sup>18</sup>

Almost 70% of New Zealand schools are between 30 and 100 years old,<sup>19</sup> including many of the surveyed schools. Although they would have met the building standards of the time, the 1992 Code has no requirement for upgrading or retrofitting toilet facilities. In addition, declining school rolls in some areas has resulted in overall reduced funding and further pressure on the ability to upgrade infrastructure facilities.

In 1989 the New Zealand Ministry of Education implemented the 'Tomorrow's Schools' policy.<sup>20</sup> This gave schools autonomy within local communities and required local Boards of Trustees to provide the necessary governance, including responsibility for all aspects of infrastructure such as buildings and toilet facilities. Prior to this, Ministry of Education inspectors regularly reviewed all aspects of activity in schools from teaching and learning through to adequacy of stock and plant. The Education Review Office now conducts spot audits to verify compliance with specified infrastructure requirements, which might include toilet facilities, but there is no longer any routine inspection of facilities as Boards of Trustees are fully responsible for the adequacy of all school facilities. The policy change in 1989

without clear prioritization of how funding should be spent may have contributed to the poor quality of toilet facilities.

Moreover, in New Zealand, as in other countries,<sup>10,21</sup> there is a discrepancy between requirements for sanitary conveniences in the workplace and in schools. For workplaces, Department of Labour guidelines stipulate not only that toilets, handwashing and drying facilities be provided, but also that toilet paper should be provided, conveniences should be private and the sanitary facilities should be readily accessible, well-lit and ventilated and kept clean.<sup>22</sup> The 1992 Code of Practice for schools<sup>11</sup> has no explicit instruction to provide toilet paper, and privacy is addressed only by stating that each toilet should be supplied with a door. There is no obvious reason why children deserve to have less attractive, clean, user-friendly toilet facilities than workers or, say, department store shoppers.

Schools receive two main funding streams from the Ministry of Education—one for day-to-day operations and the other a five yearly grant for property management. Until recently, schools have had the flexibility to choose how to spend their property fund, e.g. upgrading the administration block or modernizing the toilet block. While ensuring adequate sanitation facilities is just one area competing for funds, this study suggests that the way in which facilities are operated and managed requires more attention.

In 2011 a newly developed property strategy<sup>19</sup> was introduced which now requires schools to prioritize the way in which property funding is allocated. Health and safety and essential infrastructure are two priorities, with a requirement to upgrade toilet facilities every 25 years. Over time this, new approach has the potential to minimize the prevalence of poor quality hygiene facilities available to children.

The implications of a major policy shift over 20 years ago are now being understood. We recommend that standards for school toilets should be amended to be at least as rigorous as those set for adults, along with consideration of how the facility is operated and managed. If this anomaly was addressed then children would have higher quality facilities and may well benefit from improved hygiene.

## Human subjects approval statement

The New Zealand Multi-Region Health and Disability Ethics Committee provided approval for the trial on 13 March 2009 (MEC/09/01/005).

## Supplementary data

Supplementary data are available at the *Journal of Public Health* online.

## Acknowledgements

We thank the principals and staff of all the schools involved in the study for their participation, Jennie Connor for helpful comments on drafts of this paper and Rebecca Psutka for helpful comments and assistance with collation of data.

## Funding

The study was funded by the Health Research Council of New Zealand through a project grant (08/368).

## References

- Noakes TD, Borresen J, Hew-Butler T *et al.* Semmelweis and the aetiology of puerperal sepsis 160 years on: an historical review. *Epidemiol Infect* 2008;**136**(1):1–9.
- Centers for Disease Control. Handwashing: clean hands save lives. <http://www.cdc.gov/handwashing/> (13 January 2011, date last accessed).
- Clean Hands Coalition. Clean hands coalition—clean hands save lives. <http://www.cleanhandscoalition.org/> (13 January 2011, date last accessed).
- Public-Private Partnership for Handwashing with Soap (PPPHW). Global handwashing day—clean hands save lives. <http://www.globalhandwashingday.org/Index.asp> (13 January 2011, date last accessed).
- World Health Organization. Clean hands protect against infection. [http://www.who.int/gpsc/clean\\_hands\\_protection/en/index.html](http://www.who.int/gpsc/clean_hands_protection/en/index.html) (13 January 2011, date last accessed).
- Bartlett S. Water, sanitation and urban children: the need to go beyond ‘improved’ provision. *Environ Urban* 2003;**15**(2):57–70.
- Adams J, Bartram J, Chartier Y *et al.* (eds). *Water, Sanitation and Hygiene Standards for Schools in Low-cost Settings*. Geneva: World Health Organization, 2009.
- Sandora TJ, Shih M-C, Goldmann DA. Reducing absenteeism from gastrointestinal and respiratory illness in elementary school students: a randomized, controlled trial of an infection-control intervention. *Pediatrics* 2008;**121**(6):e1555–62.
- Lundblad B, Hellstrom AL. Perceptions of school toilets as a cause for irregular toilet habits among schoolchildren aged 6 to 16 years. *J Sch Health* 2005;**75**(4):125–8.
- Barnes PM, Maddocks A. Standards in school toilets—a questionnaire survey. *J Public Health Med* 2002;**24**(2):85–7.
- Ministry of Education. Ministry of Education Health and Safety Code of Practice for State and State Integrated Schools. Wellington, 2007. <http://www.minedu.govt.nz/NZEducation/EducationPolicies/Schools/SchoolOperations/PropertyManagement/StateSchools/SupportingDocs/Section7OperationalPolicies/HealthAndSafety.aspx>.
- McKenzie J, Priest P, Audas R *et al.* Hand sanitisers for reducing illness absences in primary school children in New Zealand: a cluster randomised controlled trial study protocol. *Trials* 2010;**11**(1):7.
- Jewkes RK, O’Connor BH. Crisis in our schools: survey of sanitation facilities in schools in Bloomsbury health district. *Br Med J* 1990;**301**(6760):1085–7.
- Aiello AE, Coulborn RM, Perez V *et al.* Effect of hand hygiene on infectious disease risk in the community setting: a meta-analysis. *Am J Public Health* 2008;**98**(8):1372–81.
- Curtis V, Cairncross S. Effect of washing hands with soap on diarrhoea risk in the community: a systematic review. *Lancet Infect Dis* 2003;**3**(5):275–81.
- Lopez-Quintero C, Freeman P, Neumark Y. Hand washing among school children in Bogota, Colombia. *Am J Public Health* 2009;**99**(1):94–101.
- Garbutt C, Simmons G, Patrick D *et al.* The public hand hygiene practices of New Zealanders: a national survey. *N Z Med J* 2007;**120**(1265):U2810.
- Zomerplaaq J, Mooijman A. Child-friendly hygiene and sanitation facilities in schools: indispensable to effective hygiene education. Report No. 47. New York: IRC International Water and Sanitations Centre, Delft and United Nations Children’s Fund, 2005.
- Ministry of Education. The New Zealand School Property Strategy 2011–2021. Wellington: Ministry of Education, 2011. [http://www.minedu.govt.nz/NZEducation/EducationPolicies/Schools/SchoolOperations/~/\\_media/MinEdu/Files/EducationSectors/PrimarySecondary/PropertyToolbox/StateSchools/SchoolPropertyStrategy201121.pdf](http://www.minedu.govt.nz/NZEducation/EducationPolicies/Schools/SchoolOperations/~/_media/MinEdu/Files/EducationSectors/PrimarySecondary/PropertyToolbox/StateSchools/SchoolPropertyStrategy201121.pdf) (6 February 2012, date last accessed).
- Novlan JF. New Zealand’s past and tomorrow’s schools: reasons, reforms and results. *Sch Leadersb Manag* 1998;**18**(1):7–18.
- Education and Resources for Improving Childhood Continence (ERIC). Bog standard—better toilets for pupils, UK. <http://www.bog-standard.org/index.aspx> (14 January 2011, date last accessed).
- Department of Labour. Guidelines for the provision of facilities and general safety and health in commercial and industrial premises, to meet the requirements of the Health and Safety in Employment Act 1992 and Regulations 1995. Department of Labour, 1995. <http://www.osh.dol.govt.nz/order/catalogue/33.shtml> (14 January 2011, date last accessed).