



**Children's Environment and Health Action Plan for Europe**

## **Development of a UK Children's Environment and Health Strategy**

### **Regional Priority Goal I: Water, Sanitation and Health**

**Report prepared by the Health Protection Agency for the Interdepartmental Steering Group (ISG) on Environment and Health**

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## EXECUTIVE SUMMARY

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### Children's Environment and Health Action Plan for Europe: Regional Priority Goal I

**We aim to prevent and significantly reduce the morbidity and mortality arising from gastrointestinal disorders and other health effects, by ensuring that adequate measures are taken to improve access to safe and affordable water and adequate sanitation for all children.**

We aim to achieve this goal in accordance with the commitments made in the Millennium Development Goals and the World Summit on Sustainable Development Plan on Implementation by:

- (a) ensuring that all child care institutions and schools are provided with adequate safe water and basic sanitation, ensuring safe and affordable water and adequate sanitation infrastructure and service development and better implementation of the Protocol on Water and Health to the 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes;
- (b) implementing national plans to increase the proportion of households with access to safe and affordable water and adequate sanitation, thereby ensuring that all children have access to clean water and sanitation by 2015;
- (c) raising awareness among the population, particularly caregivers, and ensuring the provision of education on basic hygiene.

WHO, 2004a

A review has been undertaken to assess the current status relating to water and sanitation issues affecting children in the UK; consideration has been given as to whether the areas highlighted in the Children's Environment and Health Action Plan for Europe's (CEHAPE) Regional Priority Goal I (RPG I; see box above) have been addressed and, where relevant, gaps and areas for further improvement have been highlighted. This paper considers drinking water, bathing water and access to water and sanitation in the home and schools environment and has highlighted the following:

- The UK enjoys provision of a safe public water supply. Compliance with drinking water standards is greater than 99% and the number of disease outbreaks associated with the public water supply has decreased substantially in recent years [*bullet point (a) in box above*].
- Private water supplies serve a small proportion of the population (<2% in England and Wales, <1% in Northern Ireland, and about 3% of the Scottish population). Available evidence suggests that the quality of private water supplies is lower than that of the public supply and as a result there may be an increased risk to health. Measures are already in place in Scotland to bring about improvements in the quality of private water supplies. Work is underway to revise existing measures in the rest of the UK, particularly England and Wales [*bullet point (a) in box above*].

- Tightening of drinking water standards in 2013 aimed at reducing acceptable levels of lead in tap water from the current compliance level of 25 µg/l to 10 µg/l is likely to render a number of households and public buildings non-compliant. A public awareness campaign and planned programme of remedial work may be required over the next few years to address this. Particular attention should be given to schools and childcare settings *[bullet point (b) in box above]*.
- Substantial improvements in bathing water quality in the UK have occurred over the past 10 years. In 2006, 99.5% of UK bathing waters met European Union standards. A number of initiatives are planned over the next few years which should result in further improvements in bathing water quality *[bullet point (b) in box above]*.
- Several disease outbreaks have been associated with swimming pools. Whilst the overall number is low, there may be a need to develop methods for investigating such outbreaks to identify common factors and, hence, interventions to reduce the number of future outbreaks *[bullet points (a) and (b) in box above]*.
- The UK enjoys excellent sanitation provision. The number of homes without basic amenities is less than 1%. The Decent Homes initiative is addressing poor quality housing, which may bring about further improvement in sanitation and hygiene in housing *[bullet points (a) and (b) in box above]*
- Sanitation and hygiene provision in schools is generally adequate. However, there are deficiencies regarding sanitation provision in some schools. Whilst the impact on child health has not yet been quantified, it would be prudent to improve school sanitation provision in these schools *[bullet points (b) and (c) in box above]*
- A health surveillance system for monitoring trends in waterborne (and other) diseases operates in the UK. Evidence suggest that these systems could be strengthened by, for example, improving existing procedures for notification, surveillance and alerting of cases and continuing to encourage laboratories to use standard methods and testing criteria *[bullet points (a) n box above]*

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## CONTENTS

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<b>1</b>	<b>Introduction</b>	<b>1</b>
	1.1 Background	1
	1.2 Structure of report	2
<b>2</b>	<b>Health surveillance and epidemiology of waterborne disease in the UK</b>	<b>3</b>
	2.1 Health surveillance	3
	2.2 Epidemiology of gastrointestinal and waterborne infections in children in the UK	4
<b>3</b>	<b>Drinking water quality</b>	<b>6</b>
	3.1 Legislation	6
	3.2 Current status	7
	3.2.1 Public drinking water supplies	7
	3.2.2 Private water supplies	7
	3.2.3 Spring and bottled drinking water	9
	3.3 Current and planned Initiatives	9
	3.4 Possible gaps and areas for concern	11
<b>4</b>	<b>Bathing and recreational waters (including swimming pools)</b>	<b>12</b>
	4.1 Legislation	12
	4.2 Current status	12
	4.3 Current and planned Initiatives	14
	4.3.1 Bathing waters	14
	4.3.2 Swimming Pools	15
	4.4 Possible gaps and areas for concern	15
<b>5</b>	<b>Access to water and sanitation in housing</b>	<b>17</b>
	5.1 Legislation	17
	5.2 Current status	17
	5.3 Current and planned Initiatives	18
	5.4 Possible gaps and areas for concern	19
<b>6</b>	<b>Access to water and sanitation in schools and child care settings</b>	<b>20</b>
	6.1 Legislation	20
	6.2 Current status	20
	6.3 Current and planned Initiatives	21
	6.4 Possible gaps and areas for concern	23
<b>7</b>	<b>References</b>	<b>25</b>
	<b>APPENDIX A</b>	<b>28</b>
	<b>APPENDIX B</b>	<b>30</b>

## **BOXES, FIGURES AND TABLES**

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### **Boxes**

Box 2.1	Reducing the risk from Cryptosporidium	5
Box 3.1	Addressing emerging issues – radon and private water supplies	9
Box 4.1	Examples of voluntary bathing water award schemes and campaigns	15
Box 6.1	Improving access to water and hygiene in schools in Wales	23

### **Figure**

Figure 4.1	Bathing water compliance, United Kingdom 1993–2006	13
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### **Tables**

Table 2.1	Number of cases and incident rate of selected intestinal infectious diseases in England and Wales, Northern Ireland and Scotland, 2005	4
Table 3.1	Microbiological tests not meeting regulatory drinking water standards	7

## 1 INTRODUCTION

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At the Fourth Ministerial Conference on Environment and Health in 2004, the countries in the World Health Organization (WHO) European Region, including the UK, committed themselves to building a healthy future for their children by adopting the Children's Environment and Health Action Plan for Europe (CEHAPE). This was drafted to ensure reduction and, where possible, elimination of children's exposure to environmental risk factors. Individual countries were required to develop national children's environmental and health action plans (CEHAP) the purpose of which being to identify:

- specific environmental risks to children;
- initiatives currently in place to reduce these risks; and
- gaps or areas where work may be directed to continue to reduce or eliminate such risks.

The WHO European Region has identified four Regional Priority Goals (RPGs) relevant to CEHAPE under which specific areas of risk are to be considered. The four RPGs are: to (i) ensure safe water and adequate sanitation; (ii) ensure protection from accidents, injuries, obesity and physical activity; (iii) ensure clean indoor and outdoor air quality; and (iv) aim to reduce exposure to chemical, physical and biological hazards. All of these can contribute to a wide range of health effects such as defects present at birth, asthma, obesity and cancer. There is a wide range of environmental hazards included in CEHAPE, and the agreed approach is that individual countries should develop plans focusing on the priorities which are most relevant to them.

### 1.1 Background

A clean and safe water supply and access to good sanitation are essential to good public health. The United Kingdom (UK) has a long history of improving water supply and sanitation. In 1848, the Public Health Act gave Boards of Health powers to improve water supplies, drainage and sanitation with the aim of improving public health. Since then there has been significant improvement in the quality of our waters, including drinking and bathing waters, which has in turn led to a significant gain in the health of the population. For several decades, there have been no reported cases of infantile methaemoglobinemia attributable to nitrate in public drinking-water supplies and since 1975 there have been no recorded outbreaks of typhoid from drinking water (Said *et al.*, 2003). More recently, specific regulations, introduced in 1999 to control against the risk of *Cryptosporidium* in public water supplies, have resulted in measurable decreases in cryptosporidiosis in the UK (Nichols *et al.*, 2006). There have also been steady improvements in the chemical quality of drinking water.

Children may be particularly susceptible to adverse health effects from poor water quality and sanitation given that they (a) have a lower immunity to infection (relative to adults), (b) drink proportionately more water than adults, and (c) have a higher propensity to undertake recreational water activities. There are a number of water quality issues that are of particular relevance to children, and to adults of reproductive

age, for example, waterborne infections, drinking water as a contributory source of lead exposure, and trihalomethanes and the potential effect on the unborn child. Also of importance is sanitation and hygiene in homes, schools and other child care settings. The World Health Organization Guidelines for drinking-water quality specifically highlight the importance of working with children in schools as part of a long-term approach to improving hygiene in the community (WHO, 2004b). The guidelines highlight the need for the school environment specifically to meet the requirements of good hygiene (e.g. by providing toilets, water for hand-washing and generally clean surroundings and hygienic facilities).

## **1.2 Structure and content of report**

This is one of a series of four papers addressing the individual RPGs. This paper addresses Regional Priority Goal I: Water, Sanitation and Health. It presents a review of the current situation in the UK. The paper also summarises key legislation in place to support measures aimed at reducing risk and protecting the public (including children) and identifies a number of national, regional and local initiatives which support the achievement of this goal. In so far as data are available, the paper highlights the current situation relating to children and attempts to identify areas where levels of risk are not sufficiently known or addressed. Areas of concern and gaps in knowledge or activity are identified and recommendations on how these gaps may be addressed are also provided.

This report assesses the current status relating to water and sanitation issues affecting children in the UK and considers drinking water, bathing waters and access to water and sanitation in the home and school environments and highlights gaps in activity and areas for further improvements. Appendix A summarises UK initiatives that address the specific goals of CEHAPE.

Unless specified information presented in this report is applicable to the whole of the UK and, where relevant, issues specific to Devolved Administrations or to local and regional areas, are also highlighted. Legislation references throughout the document may be predominantly sourced from English and Welsh law; however it should be noted that equivalent separate legislation and policy documentation may exist in Devolved Administrations when referring to particular areas.

Whilst every effort has been made to ensure this document is comprehensive, it should be recognised that there are many other activities undertaken throughout the UK at a local, regional and national level as well as internationally (at WHO Europe Member State level), all of which also contribute to meeting the commitments of CEHAPE. Further information on relevant on-going activities and new CEHAPE initiatives aimed at fulfilling the UK's commitments to CEHAPE will be placed on the HPA's web page in due course.

## 2 HEALTH SURVEILLANCE AND EPIDEMIOLOGY OF WATERBORNE DISEASE IN THE UK

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### 2.1 Health surveillance

Communicable disease surveillance is routinely carried out in the UK and has three main aims:

- detection of changes in disease patterns, including outbreaks, to enable early preventive action to be taken, when appropriate;
- evaluation of disease control measures; and
- provision of data for health service planning (HPA, 2007).

Reports are provided by microbiologists from a network of Food, Water and Environmental laboratories in England and Wales. Included in the list of infections to be reported are those commonly associated with water sources, including: *Campylobacter*, *Cryptosporidium*, *Escherichia coli* O157 and *Giardia lamblia* (HPA, 2007). Case reports include information on demographic data, including the case's age (enabling the identification of children) and postcode.

A National Surveillance Scheme for General Outbreaks of Infectious Intestinal Disease also operates and laboratory reports form one means of identifying an outbreak. Other sources for identifying an outbreak include consultants in communicable disease control, environmental health officers, microbiologists, and Health Protection Agency (HPA) reference laboratories.<sup>1</sup>

A recent review of surveillance for *Cryptosporidium* highlighted the variability in practice between reporting laboratories regarding the use of standard identification methods and testing criteria for faecal samples, resulting in a non-systematic bias in detection and under-ascertainment of cases (Nichols, *et al.*, 2006). Variability in the completeness and timeliness of associated demographic data provided with case reports was also identified, although it was noted that it had improved in recent years. The report recommended that existing procedures for notification, surveillance and alerting of cases of cryptosporidiosis should be reviewed, that laboratories should be encouraged to use standard methods and testing criteria, and that the timeliness and completeness of surveillance data needs to be further improved (Nichols, *et al.*, 2006). The recommendations may also be of relevance to the reporting of other infections.

There are several other surveillance systems within the UK, which monitor trends in gastrointestinal disease. These include the NHS Direct Syndromic Surveillance Project, which collect data from the NHS Direct telephone helpline on a number of symptoms, including vomiting and diarrhoea, and these data are reported weekly, including age-

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<sup>1</sup> HPA (2003) *National Surveillance Scheme for General Outbreaks of Infectious Intestinal Disease*, available [Nov 2006] at: <http://www.hpa.org.uk/>

group specific trends.<sup>1</sup> Other disease surveillance systems which include gastrointestinal disease amongst the conditions reported include the Health Protection Agency (HPA)/Nottingham University National Surveillance Project (Q Research) and the Royal College of General Practitioners Weekly Returns Service.

## 2.2 Epidemiology of gastrointestinal and waterborne infections in children in the UK

The number of General Practitioner (GP) consultations for intestinal infectious disease (IID) amongst <1 year olds, 1–4 year olds and 5–14 year olds was 558, 466, and 95 per 10,000, respectively, in England and Wales in 2005.<sup>2</sup> Over the past 10 years there has been a continual decrease in IID GP consultations in the whole population, although the cause of this is unknown (HPA, 2005). Table 2.1 summaries the number of cases and rate per 100,000 population for common IIDs which can be transmitted via contaminated water sources.

**Table 2.1 Number of cases and incident rate of selected intestinal infectious diseases in England and Wales, Northern Ireland and Scotland, 2005**

	Case number (all ages)			Case number (<14 years)	Incidence rate per 100,000 (all ages)		
	England and Wales	Northern Ireland	Scotland	England and Wales	England and Wales	Northern Ireland	Scotland
Campylobacteriosis	46,298	890	4581	5685	86.7	52.4	90.2
Cryptosporidiosis	4527	165	709	2565	8.5	9.7	12.0
<i>E. coli</i> O157	950	49	172	n/a	1.8	2.9	3.4
Giardiasis	2924	18	197	n/a	5.5	1.1	3.9
Norovirus	2922	209	1552	n/a	*	*	*

n/a, not available

\* not calculated due to significant under-reporting

Data from: Smith-Palmer *et al.*, 2007 & Locking *et al.*, 2007

Cryptosporidiosis has been of particular concern in recent years in the UK, due to several large outbreaks in the 1990s and is of relevance to infants and children, given that they have lower immunity than adults as they are likely to have had less prior exposure to infection. As a result, children under 5 years of age experience higher rates of cryptosporidiosis than the rest of the UK population, although there is a long-term general trend of decreasing number of cases in the under 5 age group (Nichols *et al.*, 2006). Between 1989 and 2005 there were 81,109 recorded cases of cryptosporidiosis, of which children (<19 years) accounted for approximately 65% of cases. In 2004 the prevalence of *Cryptosporidium* infection in 1–4 year olds in different Strategic Health Authority (SHAs) in England and Wales ranged from 6 to 95 per 100,000, highlighting substantial regional differences in prevalence in this age group; a decrease in

<sup>1</sup> HPA (2006) *Primary Care Surveillance – NHS Direct Syndromic Surveillance Project*, available [Nov 2006] at: <http://www.hpa.org.uk/>

<sup>2</sup> RCGP Birmingham Research Unit (2006) *Weekly Returns Service Annual Prevalence Report 2005*, available [Nov 2006] at: <http://www.rcgp.org.uk/>

prevalence has been observed in 6 of the 29 SHAs (1990–2000 cf. 2001–2004), with no significant change in prevalence in the remaining 23 SHAs (Nichols *et al.*, 2006). Cryptosporidiosis in England and Wales has a strong seasonal pattern, with increased number of cases in spring and autumn. Since 2001, the spring increase has declined (Box 2.1), whereas the autumn peak has increased.

**Box 2.1 Reducing the risk from *Cryptosporidium***

Following the occurrence of several large *Cryptosporidium* outbreaks linked to water supplies in Devon in 1995 and in Hertfordshire and North London in 1997, the Government introduced specific *Cryptosporidium* Regulations in 1999. The aim of the regulations was to reduce the frequency of consumer exposure to *Cryptosporidium* and the possibility of *Cryptosporidium* outbreaks occurring due to failure of the public water supply. Health surveillance data have demonstrated that these regulations have had a beneficial impact on the occurrence of illness, preventing approximately 615 reported cases per annum (an estimated 4500 cases in total; Nichols *et al.*, 2006). This is likely to have benefited children as much of the non-child population has been regularly exposed to cryptosporidiosis infection and will show an increased resistance to infection.

## 3 DRINKING WATER QUALITY

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### 3.1 Legislation

The regulatory framework and standards for drinking water in the United Kingdom (UK) largely stem from WHO Guidelines, European legislation and, in particular, Council Directive 98/83/EC on the quality of water intended for human consumption (CEU, 1998), which is implemented through different pieces of legislation in the UK.

Public drinking water supplies are regulated throughout the UK by the Water Supply (Water Quality) Regulations<sup>1</sup> which define wholesomeness of water intended for human consumption. Whilst the regulations do not explicitly consider children, there are a number of provisions within the regulations which are of relevance to children (Appendix A).

Revised private water supply regulations are currently being drafted for England and Wales (DWI, 2005)<sup>2</sup> and are regulated by Local authorities in England and Wales and by the Department of Environment in Northern Ireland. The regulations do not specifically consider children. Requirements of Directive 98/83/EC are yet to be implemented with regard to private water supplies in England, Wales and Northern Ireland, therefore the standards for some parameters of particular relevance to children (e.g. lead, 50 µg/l) are not as stringent as those contained within Directive 98/83/EC.

Directive 98/83/EC is implemented in Scotland by means of The Private Water Supplies (Scotland) Regulations 2006 (SSI 2006 No. 209) and associated legislation<sup>3</sup> which require local monitoring authorities to conduct appropriate risk assessments on water supplies.

Bottled spring water and bottled drinking water need to meet with requirements of Directive 98/83/EC.<sup>4</sup> Non-compliance with the regulations can result, on conviction, in a fine. The regulations do not explicitly consider children's health other than in the derivation of standards, and labelling (contraindicating consumption by children under 7 years of age where fluoride levels exceed 1.5 mg/l).

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<sup>1</sup> SI 2000, No. 3184; SI 2001, No. 3911; SR 2007, No. 147 and SSI 2001, No. 207 as amended by SI 2001, No. 2885; SR 2003, No. 369 and SSI 2001, No. 238

<sup>2</sup> Currently, private drinking water supplies are regulated in England and Wales by the Private Water Supplies Regulations 1991 (SI 1991 No. 2790) and in Northern Ireland by the Private Water Supplies Regulations (Northern Ireland) 1994 (SR 1994 No. 237).

<sup>3</sup> The Private Water Supplies (Scotland) (Notices) Regulations 2006 (SSI 2006 No. 297) (made under the Water (Scotland) Act 1980); these came into force on 03 July 2006

<sup>4</sup> Council Directive 98/83/EC is implemented by The Natural Mineral Water, Spring Water and Bottled Drinking Water Regulations 1999 (SI 1999 No. 1540), as amended (SI 2003 No. 3042; SR 2003 No. 182; SSI 2003 No. 139)

## 3.2 Current status

### 3.2.1 Public drinking water supplies

Public drinking water quality in the UK is consistently high. In 2006 in England and Wales, and 2005 in Northern Ireland and Scotland mean zonal compliance with drinking water quality standards were >99% (DWI, 2007a; DWQR, 2007; NIDWI, 2006) and forms part of a trend of steadily improving water quality. Compliance for lead was also  $\geq 98\%$  in England and Wales (2006) Northern Ireland (2005) and Scotland (2006), respectively, and nearly 100%, 75%<sup>1</sup> and 95% for trihalomethanes in England and Wales (2006), Northern Ireland (2005) and Scotland (2006), respectively (DWI, 2007a; DWQR, 2007; NIDWI, 2006).

Microbiological tests taken from consumers' taps are of particular relevance for public health. Compliance with microbiological parameters is consistently high across the UK (Table 3.1).

**Table 3.1 Microbiological tests not meeting regulatory drinking water standards**

Region	Tests not meeting the standard (%)			
	Coliform bacteria a	Cryptosporidium b	E coli c	Enterococci c
England and Wales (2006)	0.07%	0	0.03%	0.06%
Northern Ireland (2005)	0.22%	0	0.04%	0
Scotland (2005)	0.21% (0.77% <sup>c</sup> )	6.3% <sup>d</sup>	0.07%	0.06%

Calculated using data from DWI (2007a), DWQR (2007) and NIDWI (2006)

<sup>a</sup> Samples taken from service reservoirs and water treatment works

<sup>b</sup> Samples taken from water leaving water treatment works

<sup>c</sup> Samples taken from consumer's taps

<sup>d</sup> Results for Scotland report the number of samples containing oocysts, whereas those for England and Wales, and Northern Ireland report the number of samples exceeding the standard of 1 oocysts per 10 litres of water. Hence the results may not be directly comparable.

In England and Wales, from 1992 to 2003 there has been a consistent decline in the number of disease outbreaks associated with the public water supply, with a particularly dramatic decline since 2000 (Smith *et al.*, 2006). In 2004, there were no outbreaks associated with the public water supply. There were two outbreaks in 2005 (140 and 232 cases, respectively) of *Cryptosporidium* (HPA, 2006a & b). Whilst the number of children affected wasn't specified, children are likely to have formed a proportion of cases given that the epidemiology of cryptosporidiosis shows that it particularly affects those under 16 years of age (Nichols *et al.*, 2006).

### 3.2.2 Private water supplies

It is estimated that in England and Wales about 50,000<sup>2</sup> private water supplies serve less than <2% of the population (DWI, 2006a). Microbiological data are available on the quality of private water supplies; in 2003 (the most recent data available), 13% (210/2656) and 29% (373/1289) of supplies tested positive for *E. coli* for the first and second half of the year, respectively (HPA, 2003 & 2004). A review of outbreaks of

<sup>1</sup> Much of the non-compliance with the standards are Authorised Departures and, as such, are subject to improvement plans

<sup>2</sup> DWI (2007) *Private Water Supplies*, available [May 2007] at: <http://www.dwi.gov.uk/>

waterborne IID in England and Wales between 1992 and 2003 found that, whilst the overall number of outbreaks and individuals affected was low, the incident rate in recipients of private water supplies may be as high as 35 times the rate in those receiving public water supplies (Smith *et al.*, 2006). A review of outbreaks of infectious disease associated with private water supplies in England and Wales from 1970–2000 found that campylobacter was implicated in 52% of outbreaks and most outbreaks occurred in commercial (Category Two) supplies, which potentially affect larger populations (Said *et al.*, 2003). The review also highlighted that childhood infections in private water supplies might be expected to be more common (and potentially more serious) and recommended that monitoring of private water supplies be improved with the introduction of risk assessments.

In Scotland there are 21,512 private water supplies serving 141,374 people (2.8% of the population of Scotland). The quality of private water supplies is highly variable and Health Protection Scotland estimates that those using private water supplies are at least 10 times more likely to become ill from consuming contaminated water than those on public water supplies (DWQR, 2006). In 2005, approximately 35% of private water supplies tested in Scotland failed to meet the requirements of the Private Water Supplies (Scotland) Regulations 1992, although many of the category one failures related to single dwellings (DWQR, 2006).

In Northern Ireland it is estimated that there are between 4000–5000 private water supplies of which 1260 (91% of which relate to dairy farms, the remainder to commercial and domestic premises) are subject to the private water supplies regulations; the remaining serve single dwellings (NIDWI, 2006). Of 12,510 tests carried out in 2005, 97% met the regulatory standards; the highest percentage of failures (excluding dairy farms) related to manganese (16%), iron (13%), total coliforms (13.0%), *E.coli* (12%) and trihalomethanes (8%; NIDWI, 2006).

In addition to the above monitoring, occasional ad hoc surveys are carried out as issues of concern arise, an example of which is presented in Box 3.1.

**Box 3.1 Addressing emerging issues – radon and private water supplies**

In 2001, the then Department of the Environment, Transport and the Regions (DETR) commissioned a survey of naturally occurring radioactive elements in private water supplies in the South West of England (an area of high natural radioactivity). The survey examined 128 private water supplies and found high concentrations of radon-222 in over 50% of the samples analysed, which could result in annual effective doses up to around 40 millisieverts (mSv) for an infant and about 20 mSv for an adult. In view of the magnitude of the estimated doses, the DETR requested advice from the Department of Health and the Committee on Medical Aspects of Radiation in the Environment. The Committee considered that the estimated doses would pose a significant additional health risk in the longer term, and recommended that owners and users of the water supplies be informed of the results and that further work be carried out to identify other parts of the UK where private water supplies could be affected. As a consequence, the Drinking Water Inspectorate wrote to every local authority in the UK to highlight the issue and to encourage those affected to take steps to ensure proper control of radon in private water supplies in their area. Similarly, Scottish Ministers also issued advice to all 32 Local authorities in Scotland.

In 2003, the Welsh Assembly Government monitored private water supplies in two radon affected areas (Ceredigion and Denbighshire), and compared the results with an area (Anglesey) not designated as radon affected. Monitoring showed that the maximum radon level was 15% of the draft European Commission's recommended Action Level of 1000 Becquerels/litre. Radon levels varied little over time, although weather conditions had a marginal effect.

Council Directive 98/83/EC is yet to be fully implemented with respect to private water supplies in England, Northern Ireland and Wales and, as such, some of the standards of particular relevance to children (e.g. lead) do not yet conform with the more stringent requirements of Directive 98/83/EC insofar as it applies to private water supplies.

### 3.2.3 Spring and bottled drinking water

Whilst information regarding the quality of spring and bottled drinking water is not routinely published, ad hoc surveys have been conducted by the Food Standards Agency<sup>1,2</sup> and Pesticide Safety Directorate<sup>3</sup>. In all cases, the levels of contaminants investigated were within regulatory limits in force at that time. Specific consideration has been given to the levels of uranium in mineral and other bottled drinking water used to reconstitute infant formula by the Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT).<sup>4</sup> The COT found that, on the basis of the available evidence, the potential exposure of formula fed infants did not raise specific concerns for health.

## 3.3 Current and planned Initiatives

There are a number of current and planned initiatives, which will result in further improvements in drinking water quality in the future and are of relevance to children.

**Lead** – The drinking water quality standard for lead of 10 µg/l is due to come into force in 2013 (an interim standard of 25 µg/l currently applies). The percentage of tests not meeting the 10 µg/l standard in England and Wales is in decline and in 2005 was 2.1%<sup>5</sup>. A number of actions are being undertaken across the UK to reduce the level of lead in drinking water. These include:

- replacing of lead pipes by water companies and by local authorities (in social housing and schools as and when these are modernised);
- use of phosphate dosing of drinking water to make it less likely to dissolve lead from pipes and solder; and
- at the request of consumers, testing of lead in water supplies by water companies (DWI, 2006b & 2007a; DWQR, 2006; NIDWI, 2006).

Additionally, the Water Supply (Water Quality) Regulations require that water companies notify the consumer and local authority of exceedances of the current standard of 25 µg/l. The Drinking Water Inspectorate is encouraging local authorities (England and Wales) to actively review these exceedances to identify 'hot spots' in their area and consider whether additional measures may be required to reduce exposure (e.g.

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<sup>1</sup> FSA (2002) Antimony, arsenic, bromate and nickel contents of bottled water. *Food Survey Information Sheet 28/02*, available [Oct 2006] at: <http://www.food.gov.uk/>

<sup>2</sup> FSA (2004) Analysis of the natural radioactivity content of bottled waters. *Food Survey Information Sheet 67/04*, available [Oct 2006] at: <http://www.food.gov.uk/>

<sup>3</sup> Pesticides Residues Committee (2000) *Pesticide Residues Monitoring Report. Fourth Quarter Results. October–December 2000*, available [Oct 2006] at: <http://www.pesticides.gov.uk/>

<sup>4</sup> COT (2006) *COT Statement on Uranium Levels in Water Used to Reconstitute Infant Formula*, available [Oct 2006] at: <http://www.food.gov.uk/>

<sup>5</sup> Calculated from data presented in DWI, 2007b

promoting the fact that water companies will replace their part of the service pipe when the building owner indicates that they are replacing the domestic lead plumbing; DWI, 2006c). Locations of particular interest might include schools, other similar public buildings and social housing (DWI, 2006a). With regard to school buildings specifically, the Department for Children, Families and Schools (DCFS) Guidelines for Environmental Design in Schools recommends that the extent of lead pipework in schools built before the early 1950s should be assessed and a programme drawn up for its removal, where applicable (DfES, 2003b).

**Planned improvements to drinking water quality** – A number of improvement programmes are planned by water companies in England and Wales for the period 2006–2011, aimed at reducing the risk of exceedances and improving compliance with specific drinking water standards. Of the 317 improvement schemes (4 of which have already been completed), 22% of these relate to nitrate, 11% to coliform bacteria, 10% to *Cryptosporidium*, 7.9% to pesticides and the remaining 49% relate to 14 other drinking water standards (including lead (five schemes) and trihalomethanes (six schemes; DWI, 2007a). Similarly, in Northern Ireland and Scotland programmes of work are underway to improve drinking water quality, particularly where authorised departures have been granted for parameters such as trihalomethanes (DWQR, 2006; NIDWI, 2006). In Northern Ireland, a major investment programme aimed at upgrading water and wastewater treatment works and restoring or replacing the existing water mains pipework has been on-going for several years.

**Drinking Water Inspectorate/Health Protection Agency Forum** – The Drinking Water Inspectorate and Health Protection Agency meet on a regular basis to consider areas of mutual interest regarding water and health.

**Drinking Water Quality and Health Research Programme** – The Drinking Water Inspectorate manages, on behalf of the Department of the Environment, Food and Rural Affairs, the National Drinking Water Quality and Health Research Programme. This research programme supports Government policy on the quality and regulation of water supplies and, where relevant, has included child specific issues. For example, research is on-going looking at the possible relationships between chlorination by-products and adverse pregnancy outcomes (DWI, 2007a).

**Private water supplies** – The introduction of revised private water supply regulations in Scotland has been accompanied by a system of grants, administered by local authorities, to enable owners of private water supplies and those who are served by them to improve them to comply with the new regulations (SSI 2006, No. 210). The grants scheme will operate until March 2008 and a total of £24 million has been allocated for the scheme (DWQR, 2006).

In England and Wales, revised regulations for private water supplies are currently being drafted, which will implement Directive 98/83/EC, insofar as it applies to private water supplies (this will include private water supplies supplying public buildings, such as schools; DWI, 2005).

### 3.4 Possible gaps and areas for concern

**Public water supplies** – There are few areas of concern given the consistently high compliance with drinking water quality standards and the fact that there are a number of improvement plans and initiatives likely to result in further improvements in water quality. However, consideration should be given to investigating lead in drinking water supplies in schools, especially where there is a likelihood of exceedance of the forthcoming lead standard of 10 µg/l. This is primarily a local authority responsibility and many initiatives are already being considered to address this area. It is important to continue to record exceedances to monitor the effectiveness of these initiatives. There may also be a need to put a communication strategy in place to improve peoples understanding of the implications of being exposed to levels above the revised water quality standards for lead.

**Private water supplies** – As mentioned earlier, the incidence of disease outbreaks from private water supplies is higher than public water supplies. Scotland have already developed and investigated measures to improve the quality of private water supplies.

As the new Directive 98/83/EC is going to be implemented throughout the UK; it would be useful to have a timetable for introducing this legislation and to make information available regarding the number of private drinking water supplies, their quality and the population served in England and Wales as this information is already routinely reported in Northern Ireland and Scotland.

## 4 BATHING AND RECREATIONAL WATERS (INCLUDING SWIMMING POOLS)

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### 4.1 Legislation

Bathing water regulations for the United Kingdom (UK), which stem from Council Directive 76/160/EEC<sup>1</sup>, aim to protect public health and the environment from faecal pollution at bathing waters. There is a requirement to identify popular bathing areas and monitor the waters for indicators of microbial pollution throughout the bathing season and comply with minimum standards and work towards meeting stricter guideline standards. The Department for the Environment, Food and Rural Affairs is responsible for administering the regulations in England and the regulations in the rest of the UK are administered by the relevant Devolved Administrations<sup>2</sup>. The regulations do not explicitly consider children other than as part of the general requirement to protect public health. The European Directive has been revised to monitor compliance on the management of bathing water quality which entered into force on 24 March 2006 and needs to be incorporated into national law within two years.

Swimming pool water quality is not directly regulated in the UK. However, under the Health and Safety at Work Act 1974 and the Management of Health and Safety at Work Regulations 1999 pool operators are required to carry out a suitable and sufficient assessment of risks, taking the precautions necessary to protect the public (including children) as far as is reasonably practicable, including ensuring adequate hygiene.<sup>3</sup> Specific guidance on pool water treatment is published by the Pool Water Treatment Advisory Group (PWTAG), which includes representation from Government departments and agencies.<sup>4</sup>

### 4.2 Current status

In 2006 there were 572 identified bathing waters in the UK, of which 11 were inland freshwater sites. Compliance with the mandatory microbiological standards has continually improved and in 2006, 99.5% of UK bathing waters complied with the minimum standard (Defra, 2007); in Scotland, compliance was 100%.<sup>5</sup> Compliance with the stricter guideline standard has also improved over the past 10 years (Figure 4.1), with 75% of UK bathing waters complying with these stricter standards in 2006. The

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<sup>1</sup> As contained within The Bathing Waters (Classification) Regulations 1991 (SI 1991, No. 1597) and similar legislation in Northern Ireland and Scotland (SR 1993, No. 205; SI 1991, No. 1609(S.144))

<sup>2</sup> The regulations are implemented in England and Wales by the Environment Agency, by the Scottish Environment Protection Agency in Scotland and the Environment and Heritage Service in Northern Ireland

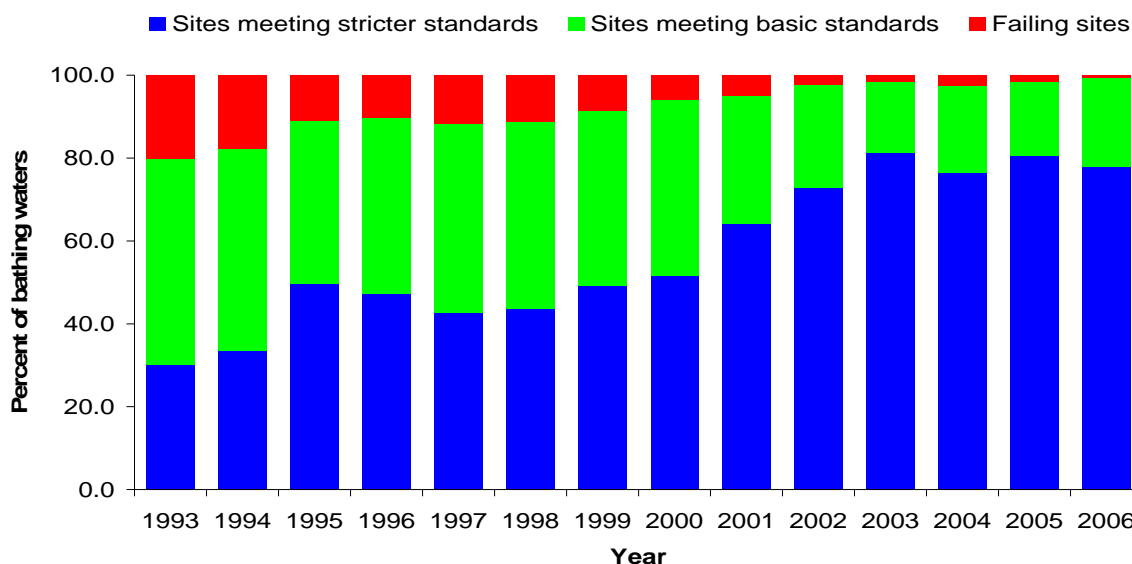
<sup>3</sup> HSE (2006) *Managing health and safety in swimming pools (HSG179)*, available [Oct 2006] at: <http://www.hse.gov.uk/>

<sup>4</sup> PWTAG (2006) *The Pool Water Treatment Advisory Group*, available [Oct 2006] at: <http://www.pwtag.org/home.html>

<sup>5</sup> SEPA (2006) *Full pass marks for Scotland's bathing waters*, available [Oct 2006] at: <http://www.sepa.org.uk/>

improvements are largely attributed to investment by water companies on sewage treatment works (Defra, 2007).

**Figure 4.1 Bathing water compliance, United Kingdom 1993–2006**



Data from: Environment Agency, Environment and Heritage Service (NI) and Scottish Environment Protection Agency

The excess risk of gastrointestinal disease symptoms associated with UK bathing waters has been estimated to be approximately 65 per 1000 exposures (for 1999–2001), and has continued to improve, which would result in a lower excess risk. The risk to children was not considered specifically, although it was noted that children are likely to have a higher propensity to bathe and tend to have a lower immunity and thus face higher risks (Georgiou & Longford, 2002). One recent outbreak of *E. coli* 0157 (12 cases, number of children not reported) was associated with a stream running across a public beach (HPA, 2006b); the beach was subsequently closed to public access.

There is no specific legislation covering recreational inland water quality used for water sports activities such as sailing or canoeing. It is estimated that about 3% of the adult population regularly participates in water-based sport and recreation activities, although it is recognised that the proportion of children participating may be higher (Defra, 2002). Between 1992 and 2003 there were three recorded outbreaks of IID associated with recreational river use (Smith *et al.*, 2006).

Monitoring of water quality in swimming pools has been conducted regularly. Data for 2003 indicate that 2% (49/2381) of pools tested positive for *E. coli* and 10% tested positive for total coliforms (HPA, 2003 & 2004). A number of IID outbreaks have been associated with swimming pools in England and Wales. Between 1992 and 2003, there were 35 outbreaks (762 individual cases; number of children not specified) associated with swimming pools; *Cryptosporidium* was implicated in 33 of these outbreaks and *Giardia* in the remaining two (Smith *et al.*, 2006). More recently, in 2004 and 2005 there were 11 outbreaks associated with swimming pools and a paddling pool in England and Wales (312 individual cases; one *Cryptosporidium* outbreak consisted of 129 cases), 31 cases in three of the outbreaks were specified as children (HPA, 2006a & b).

*Cryptosporidium* was implicated in nine of the outbreaks, and *Giardia* and *E. coli* 0157 in one each from 2004–2005. There is evidence that swimming pools in the UK are contributing to an increase in cryptosporidiosis within local communities in the autumn; this may be due to the increased number of people using swimming pools and a greater number of overseas travellers returning to the UK at this time of year (Nichols *et al.* 2006). Generally, children are more susceptible to infections from swimming pools given their more frequent use of such facilities and their lower immunity to infection.

### **4.3 Current and planned Initiatives**

#### **4.3.1 Bathing waters**

The European Directive has been revised to monitor compliance on the management of bathing water quality which entered into force on 24 March 2006 and needs to be incorporated into national law within two years. The Department for Environment, Food and Rural Affairs and the Environment Agency have assessed the compliance rate that might be expected, assuming no further action is taken to improve bathing waters by using data from 2002-2005. Compliance is expected to be 92% of bathing waters meeting or exceeding the minimum standard ('Sufficient'); 26% of bathing waters would be classed as 'Good' and 51% as 'Excellent'.<sup>1</sup>

In order to improve compliance (prior to 2010) a number of improvements are planned at sewage treatment works at 99 sites in England and Wales up until 2010, which are expected to benefit bathing waters. The Department for Environment, Food and Rural Affairs is also addressing the issue of diffuse pollution (e.g. from agriculture or urban runoff), which should also result in improvements in bathing water quality.<sup>2</sup> Similarly, the Welsh Assembly Government has funded a project by the Environment Agency Wales to identify and to tackle sources of diffuse pollution affecting bathing water quality.

In Northern Ireland, 75% (12/16) of current bathing waters would be expected to be classed as 'Excellent' or 'Good' with respect to the new bathing water standards. A review of the identification of bathing waters was completed in 2006 and resulted in an increase in the number of identified bathing water sites from 16 to 23. This is expected to contribute to improving and protecting bathing water quality in Northern Ireland.

The Scottish Executive recently published its strategy for meeting the revised Bathing Water Directive in Scotland (SEEG, 2006). Applying the revised standards to bathing water quality data for Scotland from the past few years suggests that up to one third of bathing waters in Scotland might be classified as poor. A number of measures are underway and planned to improve bathing waters in Scotland. These include tackling point source pollution and diffuse pollution from agriculture, investing in water and sewerage services, and using innovative methods, such as electronic signage (which has already been piloted), to better inform the public about water quality (SEEG, 2006).

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<sup>1</sup> Defra (2006) *Water Quality – EC Bathing Water Directive*, available [Oct 2006] at: <http://www.defra.gov.uk/>

<sup>2</sup> Defra (2006) *Water Quality – EC Bathing Water Directive*, available [Oct 2006] at: <http://www.defra.gov.uk/>

**Improving Coastal and Recreational Waters European initiative<sup>1</sup>** – This is a European project aimed at bringing about improvements to coastal and inland bathing waters in Europe. The project is led and managed by the Environment Agency and involves partners from France, Ireland, Portugal and Spain. As part of this project a number of actions to improve water quality are being piloted in the North West of England which will result in bathing water quality improvements in that area.

There are also a number of voluntary bathing water awards schemes and campaigns operating in the UK aimed at improving bathing water quality. Whilst not specifically concerned with children, they are considered as part of the general public (Box 4.1).

**Box 4.1 Examples of voluntary bathing water award schemes and campaigns**

**Blue Flag and Seaside awards<sup>2</sup>** – aim at promoting care of the coastal environment and require that water quality meets the mandatory Bathing Water Directive standards (Seaside awards) and guideline values (Blue Flag awards). Those participating in the scheme are also required to display information on current water quality and provide warnings of any pollution incidents.

**Green Coast Award<sup>3</sup>** – introduced by the Green Seas Initiative, an informal partnership of over 40 bodies in Wales committed to protecting and enhancing the coastal environment in Wales. Amongst its criteria, it requires compliance with European Directive guideline values for water quality.

**Marine Conservation Society<sup>4</sup>** – produces a Good Beach Guide highlighting beaches that are considered clean enough for swimming, measured against the most stringent UK standards. The guide aims to reduce the dumping of sewage at sea by highlighting clean beaches and those subject to unsatisfactory discharges.

**Surfers Against Sewage<sup>5</sup>** – a campaign group campaigning for clean, safe recreational waters, free from sewage effluents, toxic chemicals and nuclear waste. Amongst other activities, they maintain a database of reported health effects experienced by surfers and others using inland and coastal waters for recreational activities.

#### 4.3.2 Swimming Pools

The Pool Water Treatment Advisory Group periodically revise their guidance on pool water treatment, and conduct research on water and health related issues. In 2004 PWTAG was involved in trials looking at the effectiveness of filtration regimes for *Cryptosporidium* and particle monitors to attempt to warn of *Cryptosporidium* contamination.<sup>6</sup>

#### 4.4 Possible gaps and areas for concern

A number of epidemiological investigations have been conducted looking at the impact of bathing and the resultant health effects (upon which regulatory standards are based), however findings remain uncertain. Further studies have been commissioned by the

<sup>1</sup> ICREW (2006) *Welcome to ICREW Improving Coastal and Recreational Water*, available [Nov 2006] at: <http://www.icrew.info/>

<sup>2</sup> *Welcome to Blue Flag*, available [Nov 2006] at: <http://www.seasideawards.org.uk/>

<sup>3</sup> *Green Coast Awards*, available [Oct 2006] at: <http://www.keepwalestidy.org/>

<sup>4</sup> Marine Conservation Society (2007) *Good beach guide*, available [May 2007] at: <http://www.mcs.org>

<sup>5</sup> *Surfers Against Sewage*, available [Oct 2006] at: <http://www.sas.org.uk/>

<sup>6</sup> PWTAG (2006) *Pool Water Research*, available [Oct 2006] at: <http://www.pwttag.org/>

European Commission to consider health effects of freshwaters. There is currently a dearth of data regarding health effects in children. Consideration could be given to addressing this data gap. Similarly, further research on the recreational use by children of waters other than beaches (i.e. not covered by the Bathing Water Directive), would help identify areas for future action.

A recent report regarding Cryptosporidiosis recommended that a protocol for the examination of swimming pool outbreaks needs to be produced so that risk factors can be better identified (Nichols *et al.*, 2006). This would assist in identifying measures necessary to reduce the risk of such outbreaks in swimming pools.

## 5 ACCESS TO WATER AND SANITATION IN HOUSING

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### 5.1 Legislation

The Water Industry Act 1999 helps to ensure that all children have access to clean water as it is illegal to disconnect of the water supply to homes for reasons of non-payment. This protection extends to schools, children's homes, and children's day care premises.

The Housing Health and Safety Rating System (England) Regulations 2005 (SI. 2005, No. 3208) cover owner-occupied properties, privately rented properties and housing of multiple occupancy and require the assessment of the risk of infection in a property with respect to personal hygiene, sanitation and drainage, and water supply to protect against health effects such as gastrointestinal illness. Children under 5 years are identified as the most vulnerable age group (ODPM, 2006a) and local authorities have a number of enforcement options where identified hazards pose a risk to health.

The Building Regulations 2000 (as amended) require that all 'building work' in England and Wales complies with specific requirements to ensure the health and safety of people in and around the buildings (ODPM, 2005). The regulations cover all types of buildings (domestic, public (including schools) commercial and industrial) and include new buildings and when relevant alterations are made to existing buildings. The regulations specify requirements for drainage and waste disposal, and hygiene (ODPM, 2006b & c); to include the provision of:

- adequate sanitary conveniences in rooms provided for that purpose or in bathrooms;
- adequate washbasins with hot and cold running water;
- sanitary conveniences and washbasins to allow effective cleaning; and
- an adequate system of drainage to carry foul water to an appropriate outflow (e.g. a public sewer).

Similarly the Building (Scotland) Regulations 2004 (SSI 2004, No. 406) (as amended) apply to Scotland. Equivalent regulations for Northern Ireland include the Building (Northern Ireland) Regulations 2000 (SR 2000, No 389), as amended.

### 5.2 Current status

It is generally considered that almost 100% of the UK population will have continuous access to an improved water supply and improved sanitation. There may be some small sections of the population who might have limited access to an improved water supply and sanitation. These include:

- homeless people sleeping rough – at the last official count (June 2006) 502 people were estimated to be sleeping rough in England,<sup>1</sup> representing approximately

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<sup>1</sup> Department for Communities and Local Government (2006) *National Rough Sleeping Estimate 2006*, available [Sept 2006] at: <http://www.communities.gov.uk/>

0.001% of the population.<sup>1</sup> In 2004/05, 3112 individual contacts with rough or former sleepers in London were made by organisations working with former and current rough sleepers; of these 1% (5) were under 18 years of age.<sup>2</sup> Pregnant women, those with dependant children and those under 21 who are homeless are considered to have priority needs for accommodation by local authorities (DCLG, 2006b).

- Gypsies and Irish travellers occupying unauthorised sites – at the last official count (Jan 2006) there were estimated to be 3272 caravans occupying unauthorised sites in England,<sup>3</sup> the number of children on such sites was not reported.

In 2000 less than 1% of housing lacked basic amenities such as a kitchen sink, bath or shower, washbasin, indoor toilet and hot and cold water (DETR, 2000); no more recent statistics have been identified. The English Housing Condition Survey 2004 identified that 25% of young people aged 0–15 years of age currently live in housing that is considered non-decent<sup>4</sup> and that 10% live in homes in serious disrepair (DCLG, 2006a). Whether such classifications relate to water supply and sanitation issues was not reported, although only 41% of homes not meeting the Decent Homes Standard in 2004 were due to fitness, repair or modernisation standards, some of which could possibly include water and sanitation issues (the remaining 59% failed due to poor thermal comfort).

### 5.3 Current and planned Initiatives

In 2001 the Government introduced the Decent Homes initiative that aims to bring all social (council and housing association) housing into decent condition by 2010, with most of the improvement taking place in deprived areas. This initiative also aims to increase the proportion of privately owned housing in decent condition occupied by vulnerable groups (particularly those with children).<sup>5</sup> This includes ensuring that the housing meets statutory minimum standards for housing and has reasonably modern facilities and services (which would include ensuring adequate water supply and sanitation provision). Between 2001 and 2004, the number of homes failing to meet the Decent Homes Standard fell from 7.1 million to 6.3 million (from 33% to 29% of the housing stock), with those failing because of fitness, repair or modernisation standards falling from 2.7 million to 2.6 million (DCLG, 2006a). The greatest improvements were seen amongst social housing.

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<sup>1</sup> Based on 2005 mid-year population estimates for England.

<sup>2</sup> Combined Homelessness and Information Network (2005) *Rough Sleeping Report for London 2004/05*, available [Sept 2006] at: <http://www.broadwaylondon.org/>

<sup>3</sup> Department for Communities and Local Government (2006) *Count of Gypsy and Traveller caravans on 19<sup>th</sup> January 2006 – Last five counts*, available [Sept 2006] at: <http://www.communities.gov.uk/>

<sup>4</sup> For a dwelling to be considered 'decent' it must: meet the statutory minimum standard for housing, be in a reasonable state of repair, have reasonably modern facilities and services, and provide a reasonable degree of thermal comfort.

<sup>5</sup> DCLG (2006) *What is a decent home?*, available [Nov 2006] at: <http://www.communities.gov.uk/>

#### **5.4 Possible gaps and areas for concern**

Given the high standards of access to water and sanitation in housing, the existing regulatory framework, and the Government's Decent Homes initiative, there appears to be no major areas of concern.

## 6 ACCESS TO WATER AND SANITATION IN SCHOOLS AND CHILD CARE SETTINGS

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### 6.1 Legislation

The Education (School Premises) Regulations 1999 (England and Wales) set minimum standards for the provision of facilities in all education establishments in England and Wales, including Local Education Authority (LEA) maintained nurseries (SI 1999, No. 2). These include setting standards for the minimum number of toilets and washbasins (which must have an adequate supply of hot and cold water), specifying that schools must have a wholesome water supply<sup>1</sup>, and that schools must be provided with an adequate drainage system for hygienic purposes and for the general disposal of waste and surface water. The regulations also require that school premises provide reasonable assurance of occupants' health, safety and welfare, including good hygiene. Additionally, health and safety guidance advises that drinking water taps should not be installed in sanitary accommodation.<sup>2</sup> The equivalent regulations in Scotland are The School Premises (General Requirements and Standards) (Scotland) Regulations 1967 (SI 1967, No. 1199), as amended, and the Building (Scotland) Regulations 2004, as amended (SSI 2004, No. 406).

Minimum standards for childcare facilities (e.g. crèches, out-of-school clubs and playgroups) have been promulgated in England, Scotland and Wales (DfES, 2003a; Scottish Executive, 2005; Welsh Assembly Government, 2002). These include standards regarding cleanliness, infection control and personal hygiene (by both staff and children).

### 6.2 Current status

A number of surveys of water and sanitation provision in UK schools have been carried out highlighting that many school toilets are potentially unhygienic. One survey of 928 schools from 70 LEAs (carried out by the Community Practitioners and Health Visitors Association (CPHVA)), found that 30% of school toilets did not have any or sufficient soap (in secondary schools specifically, 27% lacked sufficient soap, whilst 31% had no soap), and 15% had no or insufficient toilet paper (in secondary schools, this was 37%; CPHVA, 2003). A similar survey of 708 pupils, carried out by the Children's Commissioner for Wales, found that 15% of pupils reported that toilets had no toilet paper and 16% that toilets hardly ever had toilet paper, and only 20% of pupils reported that their school toilets were clean (Children's Commissioner for Wales, 2004). Similar findings of potentially unhygienic standards in school toilets and poor access to toilet paper and hand-washing facilities (including soap and towels) have been highlighted in a number of other recent surveys (Barnes & Maddocks, 2002; Corghan, 2002; Veron et

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<sup>1</sup> To meet the requirements of the Water Supply (Water Quality) Regulations

<sup>2</sup> DfES (2006) *Standards for School Premises*, available [Nov 2006] at: <http://www.teachernet.gov.uk/>

al. 2003)<sup>1</sup>, although it is difficult to determine how representative such surveys are of the situation nationally. Several of the studies also noted that children's only access to drinking water was a tap or fountain situated in the toilet area (Children's Commissioner for Wales, 2004; CPHVA, 2003). None of the surveys looked at interventions and the subsequent health impacts (e.g. on gastrointestinal illnesses or absenteeism) and, as a result, it is not possible to quantify the health impacts of the reported sub-optimal conditions in school toilets in the UK (although studies in non-UK countries have demonstrated reduced absenteeism following hygiene interventions). However, ensuring adequate cleaning regimes and access to toilet paper, hot water and soap in sanitary facilities in schools was a recommendation following a review of a recent food-borne *E. coli* 0157 outbreak in South Wales (Office of the Chief Medical Officer, 2005) and the need for the school environment itself to meet the requirements of good hygiene is highlighted in the WHO guidelines for drinking-water quality (WHO, 2004b).

A number of outbreaks of *Cryptosporidium* have been associated with child-care settings, particularly nurseries. Since 1983, there were 10 outbreaks of *Cryptosporidium* where the transmission route was person-to-person, of these, 9 occurred in nurseries (Nichols *et al.*, 2006).

### 6.3 Current and planned Initiatives

A number of initiatives are underway aimed at improving sanitation and hygiene in schools and childcare settings some of which are summarised below and in Box 6.1.

**The National Curriculum**<sup>2</sup> – guidance for the Personal, Social and Health Education (PSHE) element of the National Curriculum suggests that Key Stage 1 (5–7 year olds) are taught to maintain personal hygiene. It also suggests that Key Stage 2 (7–11 year olds) are taught that bacteria and viruses can affect health and that following simple, safe routines can reduce their spread.

**Water is cool in school**<sup>3</sup> – a campaign organised by Education and Research to Improve Childhood Continence (ERIC) to increase the quality of provision and access to drinking water in schools in the UK. The campaign was launched in 2001 and an evaluation was conducted in 2003, which identified some improvements in water provision in schools. The campaign was appointed by the Department of Health (DH) to research and develop the Food in Schools Water Provision guidance.

**Bog-standard**<sup>4</sup> – Bog-standard is a UK campaign organised by ERIC, which aims to: increase awareness of the health benefits of better toilets for pupils, to encourage schools to improve the condition of pupils' toilets, to allow pupils to use them when they need to, and to get laws that will make pupils' toilets nicer to use. The campaign is run in partnership with the CPHVA, Schools Council UK, and the British Toilet Association.

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<sup>1</sup> Kurtz Z & Thornes R (2000) *Health Needs of School Age Children. The views of children, parents and teachers, linked to national information*, available [Sept 2006] at: <http://www.wiredforhealth.gov.uk/>

<sup>2</sup> DfES (2006) *PSHE Curriculum*, available [Sept 2006] at: <http://www.teachernet.gov.uk/>

<sup>3</sup> Water is Cool in School, available [Nov 2006] at: <http://www.wateriscoolinschool.org.uk/>

<sup>4</sup> Bog standard, available [May 2007] at: <http://www.bog-standard.org/>

**National Healthy Schools Programme<sup>1</sup>** – this is a joint Department for Children, Schools and Families (DCSF) and DH initiative through which schools in England involve staff, pupils, governors, parents and the wider community in a whole school approach that aims to improve educational achievement, health and emotional well-being, and make schools a safe, secure and healthy environment in which young people can learn and develop by focussing on four compulsory areas; PSHE, healthy eating, physical activity and emotional health and well-being.

**Building Schools for the Future<sup>2</sup>** – this is a Government initiative aimed at re-building or renewing every secondary school in England over the next 10–15 years so that pupils learn in 21<sup>st</sup> Century facilities. A series of Standard Specification Layouts and Dimensions guidance has been produced in support of Building Schools for the Future (BSF), detailing standards that should be adopted in new school building projects. A standard specification and layout has been produced for toilets in schools specifying design standards and facilities that should be adopted in the majority of situations (DfES, 2007). As a result, this is likely to lead to improvements in school toilet provision as the BSF programme progresses.

**Welsh Network of Healthy Schools Schemes<sup>3</sup>** – this is a Welsh Assembly Government initiative which aims to involve all maintained schools by March 2010. As part of the scheme, schools are expected to liaise with caterers to provide free, chilled fresh water separate from toilet areas.

**Germs. Wash Your Hands of Them<sup>4</sup>** - In Scotland, Health Protection Scotland are coordinating a National Hand Hygiene Campaign, which was launched in January 2007. The campaign includes TV adverts, posters and leaflets aimed at healthcare staff, the general public and children. A children's pack is being developed and will be distributed to all nurseries and primary schools in September 2007, targeting children aged 3–4 and up to the age of 6, respectively. The emphasis of the pack is on making hand-washing a fun activity and, as such includes a range of materials so that teachers can develop fun hand-washing activities.

**Primary School Hygiene and Hand-washing initiative** – The Health Protection Agency (HPA) is piloting a hygiene and hand-washing initiative in primary schools in England and Wales. A small pilot was undertaken in September 2005 and this is now being expanded to 300 schools. The pilot will be evaluated by looking at changes in hand-washing behaviour, effectiveness of the resource pack, raised awareness of the importance of hand washing and changes in absenteeism. It is intended to implement this initiative nationally.

A number of Local Authority Environmental Health Departments and school nurses throughout the UK also conduct hand-washing education in schools.

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<sup>1</sup> *National Healthy Schools Programme*, available [Nov 2006] at: <http://www.foodinschools.org/>

<sup>2</sup> DfES (2004) *Building Schools for the Future*, available [Sept 2006] at: <http://www.bsf.gov.uk/>

<sup>3</sup> Welsh Assembly Government (2006) *Developing a Whole School Food and Fitness Policy*, available [May 2007] at: <http://new.wales.gov.uk/>

<sup>4</sup> Health Protection Scotland (2007) *Germs. Wash Your Hands of Them*, available [May 2007] at: <http://www.washyourhandsofthem.com/>

**Box 6.1 Improving access to water and hygiene in schools in Wales**

In 2004–2005, drinking water dispensers were provided by PHS Waterlogic and copies of the publication 'Think Water', for 275 Local Authority primary schools across Wales, as part of a joint venture between the Public Health and Education Departments, and Dwr Cymru Welsh Water, to support the Welsh Assembly Government's (WAG's) Healthy Schools programme. The aim was to increase children's consumption of water as drinking adequate amounts of water is important in maintaining good health. A grant from WAG covered the purchase of the water dispensers and the first year's maintenance. However, because of the positive benefits experienced, 80% of schools chose to commit to an additional two year's maintenance. The intervention was evaluated by WAG's Public Health Improvement Division and found that teachers reported that children's concentration was improved, the children were less tired, children enjoyed having drinking water available, and that it led to an increase in the amount of water consumed during the school day.

Following an outbreak of *E. coli* in schools in South Wales in 2005, WAG took a number of steps to bring about improvements in hygiene and infection control in schools. In particular, WAG produced two booklets:

- *Mind the germs!*<sup>1</sup> – distributed to all nurseries, playgroups and other childcare settings in Wales; and
- *Teach germs a lesson!*<sup>2</sup> – distributed to all primary and secondary schools in Wales.

Both booklets provide information on good hygiene and cleanliness in schools and specifically include information on hand and toilet hygiene and sanitation. A private hygiene and cleaning company, Johnson Diversey, also produced *Bug Blasters*<sup>3</sup>, which are colourful and informative resources for schools in Wales encouraging children and carers to wash their hands properly and pay attention to hygiene (these are aimed at and based on research with 4–11 year olds). These initiatives were introduced in 2006 and as such their impact is yet to be evaluated.

## 6.4 Possible gaps and areas for concern

There appear to be some deficiencies regarding sanitary provision in some schools. Whilst the impact on child health has not been quantified (e.g. in terms of absenteeism, etc.), given that poor sanitation is linked to ill health it would be prudent to improve school sanitation provision. Actions to facilitate this might include:

- research into the impact of poor sanitation provision and school hygiene on absenteeism, morale and educational attainment, and identifying and evaluating effective and long-lasting interventions;
- evaluating whether reinforcing hygiene and hand-washing education at later stages in the National Curriculum would have a beneficial effect;
- the further development of existing guidelines regarding water and sanitation provision in schools. If the interventions introduced in Wales (e.g. Bug Blasters, Teach Germs a Lesson!) prove effective, consideration could be given to implementing similar measures across the UK; and

<sup>1</sup> *Mind the germs! Infection Control Guidance for Nurseries, Playgroups and other Childcare Settings*. Cardiff, Wales, Welsh Assembly Government. Available [Sept 2006] at: <http://new.wales.gov.uk/>

<sup>2</sup> *Teach germs a lesson! Infection Control Guidance for Primary and Secondary Schools*. Cardiff, Wales, Welsh Assembly Government. Available [Nov 2006] at: <http://new.wales.gov.uk/>

<sup>3</sup> *Teach Germs a Lesson and Blast Those Bugs*, available [Nov 2006] at: <http://www.new.wales.gov.uk/>

- development of auditing tools for cleanliness and infection control in childcare settings (particularly schools). This could possibly be explored jointly between the HPA and DCFS.

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**APPENDIX A Activities and initiatives addressing the Children's Environment and Health  
Action Plan for Europe Regional Priority Goal I**

Regional Priority Goal I	Current actions	Notes
<p>We aim to prevent and significantly reduce the morbidity and mortality arising from gastrointestinal disorders and other health effects, by ensuring that adequate measures are taken to improve access to safe and affordable water and adequate sanitation for all children.</p>		
<p>We aim to achieve this goal in accordance with the commitments made in the Millennium Development Goals and the WSSD Plan on Implementation by:</p>		
<p>a) ensuring that all child care institutions and schools are provided with adequate safe water and basic sanitation, ensuring safe and affordable water and adequate sanitation infrastructure and service development and better implementation of the Protocol on Water and Health to the 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes;</p>	<p>Building Schools for the Future  The Building Regulations 2000 (as amended)  The Building (Scotland) Regulations 2004 (as amended)  The Building (Northern Ireland) Regulations 2000 (as amended)  The Education (School Premises) Regulations 1999  The Private Water Supplies Regulations 1991  The Private Water Supplies (Northern Ireland) Regulations 1994  The Private Water Supply (Scotland) Regulations 2006  The Water Supply (Water Quality) Regulations 2000 (as amended)  The Water Supply (Water Quality) Regulations (Northern Ireland) 2007  The Water Supply (Water Quality) (Scotland) Regulations 2001 (as amended)</p>	<p>Drafting of revised Private Water Supply Regulations for England, Northern Ireland and Wales</p>
<p>b) implementing national plans to increase the proportion of households with access to safe and affordable water and adequate sanitation, thereby ensuring that all children have access to clean water and sanitation by 2015;</p>	<p>Water is Cool in Schools campaign  Decent Homes Initiative  Housing Health and Safety Rating System Regulations 2005  Private Water Supplies (Grants) (Scotland) Regulations 2006</p>	
<p>c) raising awareness among the population, particularly caregivers, and ensuring the provision of education on basic hygiene.</p>	<p>Bog-Standard Campaign  <i>Bug Blasters</i> hand-washing initiative (Wales)  <i>Lifting the lid</i> report (Wales)  <i>Mind the Germs!</i> booklet (Wales)  Primary School Hygiene and Hand-washing Initiative (HPA)  Personal, Social and Health Education element of the National Curriculum  <i>Teach germs a lesson!</i> Booklet (Wales)</p>	<p>Addressing sanitation and hygiene in some school settings</p>

## APPENDIX B

Public drinking water supplies are regulated in England, Northern Ireland, Scotland and Wales by the Water Supply (Water Quality) Regulations.<sup>1</sup> The regulations define wholesomeness of water intended for human consumption and set standards for 40 parameters and 11 indicator parameters to protect human health from the adverse effects of any contamination by ensuring it is wholesome and clean. Whilst the regulations do not explicitly consider children, there are a number of provisions within the regulations which are of relevance to children. In particular:

- the standards<sup>2</sup> are based on the WHO Guidelines for Drinking-water Quality (WHO, 2004b), which give consideration to reproductive outcomes and the effects on infants and children. A number of these standards are set specifically on the basis that infants and/or children represent the most vulnerable sub-group of the population (e.g. lead and nitrate/nitrite) or to protect against potential adverse reproductive outcomes (e.g. trihalomethanes);
- where the standard for lead is exceeded the water company is required to modify or replace its pipes and/or fittings that have a potential to contribute to lead in the water (whether or not the presence of lead in those pipes contributed to the failure);
- where there is a risk that after leaving a water company's pipes the water would contain concentrations of copper and lead in excess of a specified standard, the water company is required to treat the water in such a way so as to eliminate or reduce to a minimum the prescribed risk;
- where water at a consumer's tap contains levels of lead above 10 µg/l but below 25 µg/l and the consumer notifies the water company of their intention to replace lead pipes belonging to them, the water company is required to modify or replace its part of the lead pipe;<sup>3</sup>
- there is a specific requirement to carry out *Cryptosporidium* risk assessments and a specific standard for *Cryptosporidium*.<sup>4</sup> Whilst not specifically aimed at infants or children, such requirements are likely to be of greater benefit to children as much of the UK adult population has been regularly exposed to cryptosporidiosis infection and will show an increased resistance to infection; and
- water quality standards need to be met in public buildings (including schools) regardless of the building water system maintenance.<sup>5</sup>

Insofar as Council Directive 98/83/EC concerns private water supplies (i.e. a private supply providing more than 10 m<sup>3</sup> a day or serving more than 50 people, or which

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<sup>1</sup> SI 2000, No. 3184; SI 2001, No. 3911; SR 2007, No. 147 and SSI 2001, No. 207 as amended by SI 2001, No. 2885; SR 2003, No. 369 and SSI 2001, No. 238

<sup>2</sup> As set out in Council Directive 98/83/EC (which the Water Supply (Water Quality) Regulations implement)

<sup>3</sup> This requirement is extant from 25 December 2003 to 25 December 2013

<sup>4</sup> This is not included in Directive 98/83/EC; in Scotland, this requirement is contained within The *Cryptosporidium* (Scottish Water) Directions 2003 available [Nov 2006] at: <http://www.scotland.gov.uk/>

<sup>5</sup> Directive 98/83/EC only recognises the responsibility of owners for building water system maintenance in domestic properties

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provides water to a public or commercial activity – a Type A supply), the Directive is implemented in Scotland by means of The Private Water Supplies (Scotland) Regulations 2006 (SSI 2006 No. 209) and associated legislation<sup>1</sup>. The regulations require that local monitoring authorities conduct risk assessments for all Type A supplies that are new or considered unwholesome and provide advice and assistance for the risk assessment of Type B supplies<sup>2</sup>. The regulations are enforced by Local authorities who, when they have identified a problem due to a supply providing or at risk of providing unwholesome water, have a duty to serve an improvement notice specifying remedial steps necessary to remediate the supply (Scottish Executive, 2006). Non-compliance with the notice, without reasonable excuse, is punishable on conviction by a fine. The Private Water Supplies Regulations do not explicitly consider children's health other than in the derivation of the standards (as described above) and in that the requirements of the Directive apply to private water supplies (regardless of size) serving public or commercial activities, which would include schools and other child care settings. In contrast to the public water supply regulations, the private water supplies regulations do not contain a standard for *Cryptosporidium*.

Revised private water supply regulations are currently being drafted for England and Wales (DWI, 2005).<sup>3</sup> These are regulated by Local authorities in England and Wales and by the Department of Environment in Northern Ireland, who have a duty to monitor the quality of private water supplies at a frequency in accordance with the regulations. Where a local authority identifies a water supply that does not comply with the regulations, they have a duty to serve an improvement notice specifying the steps necessary to remediate the supply. If this is not complied with, the local authority can take steps to remediate the supply themselves and recover the cost from the owner. As with the regulations for public water supplies, these regulations set standards for a number of parameters to protect human health and ensure that the water is wholesome and clean. The regulations do not specifically consider children other than in the derivation of standards (as described above). Because the requirements of Directive 98/83/EC are yet to be implemented with regard to private water supplies in England, Northern Ireland and Wales, the standards for some parameters of particular relevance to children (e.g. lead, 50 µg/l) are not as stringent as those contained within Directive 98/83/EC.

Bottled spring water and bottled drinking water need to meet with requirements of Directive 98/83/EC.<sup>4</sup> These regulations are enforced by food authorities (local authority Environmental Health and Trading Standards Officers) who are required to sample bottled spring water and bottled drinking water at a frequency dependent on the volume

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<sup>1</sup> The Private Water Supplies (Scotland) (Notices) Regulations 2006 (SSI 2006 No. 297) (made under the Water (Scotland) Act 1980); these came into force on 03 July 2006

<sup>2</sup> A Type B supply is a private water supply not falling within the definition of a Type A supply as defined in Directive 98/83/EC

<sup>3</sup> Currently, private drinking water supplies are regulated in England and Wales by the Private Water Supplies Regulations 1991 (SI 1991 No. 2790) and in Northern Ireland by the Private Water Supplies Regulations (Northern Ireland) 1994 (SR 1994 No. 237).

<sup>4</sup> Council Directive 98/83/EC is implemented by The Natural Mineral Water, Spring Water and Bottled Drinking Water Regulations 1999 (SI 1999 No. 1540), as amended (SI 2003 No. 3042; SR 2003 No. 182; SSI 2003 No. 139)

marketed to ensure the quality is in accordance with the regulations. Non-compliance with the regulations can result, on conviction, in a fine. The regulations do not explicitly consider children's health other than in the derivation of standards (as described above), and labelling (contraindicating consumption by children under 7 years of age where fluoride levels exceed 1.5 mg/l).