

Key Issue:

Regulating for Health Aspects of Plumbing

Plumbing is the piping, fixtures and appliances within a property, and also all of the work associated with the design, installation, removal, alteration or repair of piping, fixtures and appliances in connection with drinking water supply, non-drinking water supply and drainage systems, which flow in and out of buildings and between given connection points to points of use and/or disposal. While some define plumbing as beginning at the property line, others define it more broadly.

adapted from WHO Health and Environment Lexicon

Why is this issue important?

Water has a profound impact on health. Almost one tenth of the global disease burden could be prevented by improving water supply, sanitation, hygiene, and management of water resources. Infectious and parasitic diseases are the major causes of morbidity in developing countries and cause important outbreaks world-wide. Every year, 2.2 million deaths are attributed to diarrhoea alone, with 1.8 million deaths in children under 5 years old.

Good plumbing is one of the key building blocks in protecting and promoting public health. Plumbing that is designed, installed, operated, and maintained properly can prevent waterborne disease outbreaks. Ignoring the health aspects of plumbing puts public health and safety at risk.

The main aim of a plumbing system is to collect, transport, and distribute water to individuals in a community and to remove liquid waste. Public health and safety can be compromised when harmful bacteria, viruses, parasites, and other contaminants enter the drinking water supply system either at the source, through seepage, as a result of a cross connection, or from within the pipe materials that are in contact with drinking water. A key objective of any plumbing system is to manage risk.

In order to minimize risks to public health, a competent plumber must be responsible for:

- Designing, installing, and maintaining safe drinking-water supply and waste removal systems.
- Managing the health and financial risks associated with plumbing.
- Helping to conserve limited supplies of safe drinking water.

An outbreak of Severe Acute Respiratory Syndrome (SARS) at the Amoy Gardens Estate, Hong Kong in March 2003 illustrates the importance of plumbing regulations to public health. An investigation concluded that the sewerage was responsible for the spread of infection. Inadequate regulations and plumbing design, coupled with faulty plumbing materials, resulted in contaminated air from the sanitary drainage system escaping into the building, contributing to several hundred cases of SARS recorded at Amoy Gardens.

Cross connection: any connection – physical or otherwise – between a drinking-water system and non-drinking water, where contamination can enter the drinking-water supply lines.

Regulation and enforcement of plumbing standards are effective and required tools for regulators to mitigate health risks.

The services of plumbers are generally purchased by consumers who, for the most part, are not aware of the potential risks to themselves and others of sub-standard plumbing. The majority of consumers also lack the technical expertise and knowledge to effectively judge the attributes and quality of plumbing services provided.

Additionally, the nature of plumbing works means that it may take many years for some problems to manifest.

Frequently those responsible for plumbing design, installation, and maintenance may be concerned with the potential direct operations and costs (either to install or in terms of potential or actual property damage). In the absence of specific regulations, broader public health and safety considerations may be overlooked.

How do I address the issue?

Plumbing regulations should cover the design, installation, operations, and maintenance of plumbing and must be designed to minimize health risks arising from:

- Contamination of water sources.
- Accidental contamination from cross-connections between drinking-water supply and waste removal systems.
- Chemical contamination from corrosion of pipes and other fittings.

What frameworks do I need to have in place?

At minimum, plumbing regulations should protect public health and safety; specify minimum installation and material standards for water, wastewater, and drainage systems; establish minimum training and education standards for plumbing professionals; and provide authority for oversight and enforcement.

1. Protect public health and safety

- The drinking-water supply must be protected from cross-connections with unsafe sources or with wastewater plumbing systems. It must be able to cope with the hazards of backpressure or back-siphonage, and the water should not be in contact with plumbing materials that might impart contamination.
- Liquid wastes should be disposed of promptly and hygienically.
- Roles, responsibilities, and communication and reporting requirements between plumbing professionals and other public officials or authorities should be defined.

Plumbing professionals are front-line public health workers.

2. Specify minimum installation and material standards for water, wastewater, and drainage systems

- Standards should be established to provide, at least, minimum quality, safety, or performance specifications for products and performance. Standards may be developed by industry, non-profit organizations or trade associations, as well as national or international bodies.
- All plumbing materials should be assessed and conform to accepted quality and performance specifications.
- Plumbing installations should be tested and disinfected before being put into service.

Standards are sets of rules that outline specification of dimensions, design of operation, materials and performance; or describe quality of materials, products or systems.

3. Establish minimum training and education standards for plumbing professionals

- Training programmes should fully cover both theoretical (knowledge-based) and practical (field training) aspects of plumbing systems.
- An accreditation system should be developed to ensure individuals have achieved and demonstrated appropriate levels of competency.
- Professionals should be trained to identify and use only appropriate materials that conform to required quality and performance specifications.

- Training and professional standards should be flexible enough to accommodate new technologies, standards, and complexities in water and sanitation systems.
- Workmanship should meet accepted quality standards.

4. Provide authority for oversight and enforcement

The regulatory authority must have the ability to:

- Protect public health and safety as it relates to plumbing.
- Gain entry to a property for inspection of work.
- Ensure plumbing materials conform to accepted quality and performance specifications.
- Require rectification action when the installation and/or material(s) do not meet the minimum standards and/or pose a danger to public health.
- Take action when plumbing professionals do not meet required training and education standards.

How can I tell if the issue is being successfully managed?

A surveillance strategy should be incorporated into any regulatory framework. The performance of the plumbing sector must be measured against the defined elements and objectives of the plumbing regulations. Ideally, this would be an annual or periodic process, which would allow for measurement and evaluation over time. Reviews would ensure all regulatory elements remain relevant and effective and identify any areas for improvement.

In order to protect public health, the surveillance role should be performed by the regulatory authority or agency, independent of plumbing providers. The following questions are a starting point for evaluating the performance of the plumbing sector:

- What level of public health and safety has been achieved?
- Are minimum installation and material standards for water, waste water and drainage systems being met?
- Have minimum training and education standards been met?
- Is the provision for regulatory oversight (i.e. inspect and audit standards of work) and enforcement (i.e. power of entry, enforce disciplinary action if required and rectification of faulty work) being implemented and met?
- Is the oversight process based on standards and procedures that are known and available to industry?

Further reading

WHO and World Plumbing Council. *Health Aspects of Plumbing*. WHO and World Plumbing Council, 2006.

Adams J et al, eds. *Essential Environment Health Standards in Health Care*. WHO, 2008.

Marsh G J W. Plumbing: The public health service. Presented at the Worshipful Company of Plumbers' 22nd Annual Lecture, Royal College of Physicians. London, 7 February 2006.

