World Health Organization

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Bottled drinking water

"Water, water everywhere, but not a drop to drink" from the Rhyme of the Ancient Mariner is perhaps a fitting description of the attitude of many consumers living in urban areas today who are increasingly looking toward bottled water as a means of meeting some or all of their daily requirements. As fresh water supplies are further stretched to meet the demands of industry, agriculture and an ever-expanding population, the shortage of safe and accessible drinking-water will become a major challenge in many parts of the world. In the wake of several major outbreaks involving food and water, there is a growing concern for the safety and quality of drinking-water. While bottled water is widely available in both industrialised and developing countries, it may represent a significant cost to the consumer. Consumers may have various reasons for purchasing bottled drinking-water, such as taste, convenience or fashion, but for many consumers, safety and potential health benefits are important considerations. Since such considerations are often not founded on facts, these will be specifically addressed here.

The safety of bottled drinking water

While the term *bottled water* is widely used, the term *packaged water* is perhaps more accurate. Water sold in countries for consumption can come in cans, laminated boxes and even plastic bags. However, bottled water is most commonly sold in glass or disposable plastic bottles. Bottled water also comes in various sizes from single servings to large carbouys holding up to 80 litres. Depending on the climate, physical activity and culture, the drinking-water needs for individuals vary, but for high consumers it is estimated to be about two litres per day for a 60 kg person and one litre per day for a 10 kg child.

Drinking-water may be contaminated by a range of chemical, microbial and physical hazards that could pose risks to health if they are present at high levels. Examples of chemical hazards include lead, arsenic and benzene. Microbial hazards, include bacteria, viruses and parasites, such as *Vibrio cholerae*, *hepatitis A virus*, and *Crytosporidium parvum*, respectively. Physical hazards include glass chips and metal fragments. Because of the large number of possible hazards in drinking-water, the development of standards for drinking-water requires significant resources and expertise, which many countries are unable to afford. Fortunately, guidance is available at the international level.

The World Health Organization (WHO) publishes *Guidelines for Drinking-water Quality* which many countries use as the basis to establish their own national standards. The Guidelines represent a scientific assessment of the risks to health from biological and chemical constituents of drinking-water and of the effectiveness of associated control measures. WHO recommends that social, economic and environmental factors be taken into account through a risk-benefit approach when adapting the Guideline values to national standards. As the *WHO Guidelines for Drinking-water Quality* are meant to be the scientific

point of departure for standards development, including bottled water, actual standards will sometimes vary from the *Guidelines*. It should also be noted that water used for making edible ice should be subject to the same drinking-water standard and include specific sanitary requirements for equipment for making and storing ice. For water in carbouys, similar sanitary requirements for dispensing devices need to be observed.

In applying the WHO *Guidelines* to bottled waters, certain factors may be more readily controlled than in piped distribution systems and stricter standards may, therefore, be preferred in order to reduce overall population exposure. This has, for example, been argued for the case of lead. Similarly, when flexibility exists regarding the source of the water, stricter standards for certain naturally-occurring substances of health concern, such as arsenic and fluoride, may be more readily achieved than in piped distribution systems.

Contrary to this, some substances may prove more difficult to manage in bottled than tap water. This is generally because bottled water is stored for longer periods and at higher temperatures than water distributed in piped distribution systems. Control of materials used in containers and closures for bottled waters is, therefore, of special concern. In addition, some micro-organisms, which are normally of little or no public health significance, may grow to higher levels in bottled waters. This growth appears to occur less frequently in gasified water and in water bottled in glass containers compared to still water and water bottled in plastic containers. However, the public health significance of this remains little understood, especially for vulnerable individuals, such as infants and children, pregnant women, immuno-compromised individuals and the elderly. In regard to infants, as bottled water is not sterile, it should be disinfected - for example, by boiling for one minute - prior to its use in the preparation of infant formula.

There have also been reports of fraud in which ordinary tap water has been added to used mineral water bottles and sold as the original article. Consumers may not be able to detect this by taste alone and, if concern is warranted, should examine the closures of bottled waters carefully before purchase and insist on seeing bottles opened in their presence in restaurants and other food and beverage service establishments.

The potential health benefits of bottled drinking water

In European and certain other countries, many consumers believe *that natural mineral water*s have medicinal properties or offer other health benefits. Such waters are typically of high mineral content and, in some cases, significantly above the concentrations normally accepted in drinking-water. Such waters have a long tradition of use and are often accepted on the basis that they are considered foods rather than drinking-water *per se*. Although certain mineral waters may be useful in providing essential micro-nutrients, such as calcium, WHO is unaware of any convincing evidence to support the beneficial effects of consuming such mineral waters. As a consequence, WHO *Guidelines for Drinking-water Quality* do not make recommendations regarding minimum concentrations of essential compounds.

On the other hand, in some countries, bottled waters with very low mineral content, such as distilled or demineralised waters, may be offered for sale. While a large number of people have traditionally consumed rainwater which is similarly low in minerals without apparent adverse health effects, WHO has no scientific information on the benefits or hazards of regularly consuming these types of bottled waters.

International standards for bottled drinking water

The intergovernmental body for the development of internationally recognized standards for food is the Codex Alimentarius Commission (CAC). WHO, one of the co-sponsors of the CAC, has advocated the use of the *Guidelines for Drinking-water Quality* as the basis for derivation of standards for all bottled waters.

The CAC has developed a Codex *Standard for Natural Mineral Waters* and an associated code of practice. The Codex *Standard* describes the product and its labelling, compositional and quality factors, including limits for certain chemicals, hygiene, packaging and labelling. The Codex *Code of Practice for Collecting, Processing and Marketing of Natural Mineral Waters* provides guidance to the industry on a range of good manufacturing practices matters. While CAC standards and recommendations are not strictly mandatory, Codex health and safety requirements are recognized by the World Trade Organization as representing the international consensus for consumer protection and any deviation from Codex recommendations may require a scientifically-based justification.

This Commission is currently developing a draft of a Codex *Standard for Bottled/Packaged Waters* to cover drinking-water other than *natural mineral waters*. Under the existing Codex Standard and Code of Practice, *natural mineral waters* must conform to strict requirements concerning, for example, their direct collection and bottling without further treatment from a natural source, such as a spring or well. In comparison, the draft Codex *Standard for Bottled/Packaged Waters* has been proposed to include waters from other sources, in addition to springs and wells, and treatment to improve their safety and quality. The distinctions between these standards are especially relevant in regions where *natural mineral waters* have a long cultural history. Within the CAC, the Codex Committee for Natural Mineral Waters, which is hosted by Switzerland, is responsible for the development of draft Codex Standards and Codes of Practice in consultation with other relevant Codex Committees, notably the Codex Committees on Food Additives and Contaminants and Food Hygiene. Parties interested in participating in this work of Codex should contact the National Codex Contact Point in their country.

It should be noted that neither the CAC nor WHO offer certification of any bottled or mineral water products. In this regard, WHO does not permit its name or emblem to be used in connection with any commercial purposes. While many countries have national standards for bottled waters and some have national certification schemes, no universally accepted international certification scheme now exists. Persons seeking information on bottled water certification should approach the national authorities in the country concerned.

For further information

The WHO *Guidelines for Drinking-water Quality* (second edition) are available as a WHO publication in three volumes: *Volume 1 – Recommendations*; *Volume 2 – Health Criteria and Other Supporting Information*; *and Volume 3 – Surveillance and Control of Community Supplies*. Addenda to Volumes 1 and 2 were published in 1997 and 1998 and provide updated information or new reviews on certain chemicals. A further addendum comprising review documents on selected microbes will be published in 2000. To purchase *the Guidelines for Drinking-water Quality*, please contact Distribution and Sales, World Health Organization, 20 avenue Appia, CH-1211 Geneva 27, Switzerland; fax: 41 22 791 4857; or e-mail: publications@who.ch. Most of the text of the *Guidelines* is also available on the Internet at http://www.who.int/water_sanitation_health/

Further details on the WHO Food Safety Programme can be found at http://www.who.int/fsf and on the WHO Water, Sanitation and Health Programme at http://www.who.int/water_sanitation_health.

For further information on the Codex Alimentarius Commission and its Codex Committee on Natural Mineral Waters, and the *Codex Standard for Natural Mineral Waters* and its companion *Code of Practice*, readers are referred to the Codex Alimentarius website located at http://www.fao.org/WAICENT/FAOINFO/ECONOMIC/ESN/codex/

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