

The Standards for Drinking Water Quality of China (2022 Edition) Will Take Effect

Jiayi Han¹; Lan Zhang¹; Bixiong Ye¹; Shenghua Gao¹; Xiaoyuan Yao¹; Xiaoming Shi^{1,*}

Safe drinking water is a valuable public health resource that affects people's livelihood and is essential for human health, making it an international concern for drinking water quality improvement. The *Standards for Drinking Water Quality of China* (China SDWQ) is a legal document approved and issued by the Standardization Administration of the People's Republic of China that serves as a starting point for protecting public health and ensuring the quality of human life. There are three versions of China SDWQ, including the 1985 edition, 2006 edition, and 2022 edition. China SDWQ (2022 edition) sets a wide variety of indices covering biological, chemical, physical, and other risk factors in drinking water. Additionally, it establishes management requirements for the entire water supply process, providing a technical basis and criteria for ensuring drinking water safety and a scientific basis for developing drinking water safety policies and proposing targeted public health protection measures.

BACKGROUND

In 1985, the Ministry of Health of the People's Republic of China issued China's first national drinking water standard, which included 35 water quality indices, such as sensory and general chemical indices, toxicological, microbiological, and radioactive indices (1). This standard, known as China SDWQ (1985 edition), was established as a mandatory national standard and its status and role in the health regulatory system were clarified and consolidated. As China's economic construction developed, some of the technical requirements in China SDWQ (1985 edition) became outdated, so the Ministry of Health revised the standard in 2005 and officially issued it as China SDWQ (2006 edition) in December 2006 (2). This new edition contains 106 water quality indices, more than drinking water standards of developed countries or regions have at the same time. This is the first time that a developing country has established

such higher regulations on water quality, and it is the first time by merging both rural and urban standards into a single unified standard text.

The promulgation and implementation of China's SDWQ (2006 edition) has played an important role in improving the quality of drinking water and protecting public health. However, rapid economic and social development has caused major changes in the water environment, resulting in difficulties in maintaining drinking water quality. Water purification and treatment techniques, contaminant risk assessments, and water quality testing have seen great progress and improvement in China. In March 2018, a new round of revisions to the SDWQ was officially launched in response to the current situation.

METHODS

In March 2018, the National Health Commission, in collaboration with the Ministry of Ecology and Environment, the Ministry of Housing and Urban-Rural Development, the Ministry of Water Resources, and the Ministry of Natural Resources, initiated a revision of China's SDWQ. The National Institute of Environmental Health, China CDC was responsible for organizing the drafting and revision process.

Since 2012, continuous monitoring of drinking water quality has been conducted in urban and rural areas in China to understand changes in drinking water quality. The data from this long-term monitoring have provided support for index screening and risk assessment of standard revision. Significant scientific and technological achievements related to safety and health of drinking water, made under the national major scientific and technological projects for water pollution control and treatment during the 11th, 12th, and 13th Five-Year Plans, as well as research results from domestic departments, scientific research institutions, and universities, have contributed to the definition of the index standard limit. This revision adopts the universally accepted health risk assessment

technology as the technical principle, based on a large number of monitoring data and scientific research results. Relevant standard literature at home and abroad, thematic research, and sufficient demonstration have been conducted to ensure the scientificity, rationality, and standardization of the index revision.

RATIONALE AND EVIDENCE

The key aspect of the standard is the screening of water quality indices and the setting of their standard limits. The basic process mainly includes the following steps. First, a list of potential contaminants is developed based on the latest drinking water standards at home and abroad, the latest research results and survey data in the field of drinking water and health, and tracking evaluation information on the China SDWQ (2006 edition). Second, a water quality index is identified from the list if its exposure level in drinking water causes health risks or affects sensory acceptability. Monitoring, testing, investigation, and other technical methods are used to determine the presence and exposure level of the candidate indicators in drinking water. Third, the benchmark value of the water quality index is established based on the results of the health risk assessment for the contaminant. Finally, based on the baseline value of the water quality index, a comprehensive assessment is conducted to determine the standard limit value of the water quality index in SDWQ, taking into account the contaminants detection technology, the treatment process, risk management measures, and other factors. The technical route of standard limits setting is illustrated in Figure 1.

In accordance with the above principles, the 2022 edition of the China SDWQ reduced the number of mandatory indices from 106 to 97 (3). Four indices were added, including perchlorate, acetochlor, geosmin, and 2-methylisoborneol. A total of 13 indices were removed, including heat-resistant coliforms, trichloroacetaldehyde, hydrogen sulfide, cyanogen chloride (measured as CN^-), hexachlorocyclohexane (total), parathion, methyl parathion, lindane, dichlorodiphenyltrichloroethane, formaldehyde, 1,1,1-trichloroethane, 1,2-dichlorobenzene, and ethylbenzene. The standard limits for 8 indices were adjusted, including nitrate (N), turbidity, permanganate index (measured as O_2), free chlorine, boron, vinyl chloride, trichloroethylene, and dimethoate. The number of non-mandatory indices

increased from 28 to 55, including pollutants such as nitrosodimethylamine, perfluoro caprylic acid, perfluorooctane sulfonate, and iodide. The 2022 edition of the China SDWQ has unified the assessment requirements of urban and rural water supply quality, strengthened the scientific and safety of disinfection, and improved the management requirements of sensory properties of drinking water, which is more in line with the current requirements of drinking water quality in China.

PRESENTATION

After four years of research and demonstration, the China SDWQ (2022 edition) was issued on March 15, 2022 and will take effect on April 1, 2023 (3). The standard specifies the quality requirements for drinking water and drinking water sources, sanitation requirements for centralized water supply units, secondary water supplies, products involving drinking water sanitation safety products, and water quality standard examination methods. This standard can be applied to all types of drinking water.

China is a rapidly developing country with a variety of geographical and geomorphological conditions and varying economic levels, as well as differences in drinking water quality. The Standard and its Appendix, combined with China's current water quality problems and management, specify water quality standard limits for 152 indices. These indices are classified as regular, expanded, and reference indices. The regular indices refer to water quality indices that reflect the basic characteristics of water quality, including 43 indices. The expanded indices refer to water quality indices that reflect the characteristics of regional drinking water quality in a specific period or under specific conditions, consisting of 54 indices. It is important to note that both the expanded and regular indices are mandatory requirements with the same legal status, and they are not permitted to exceed the standard limit. The reference indices refer to water quality indices that have reference significance for China's current testing, monitoring, management, and evaluation of drinking water quality, but the technical basis for their inclusion in the standard body is not sufficient. There are 55 reference indices in this edition.

DISCUSSION

China's mandatory national standard, Standards for

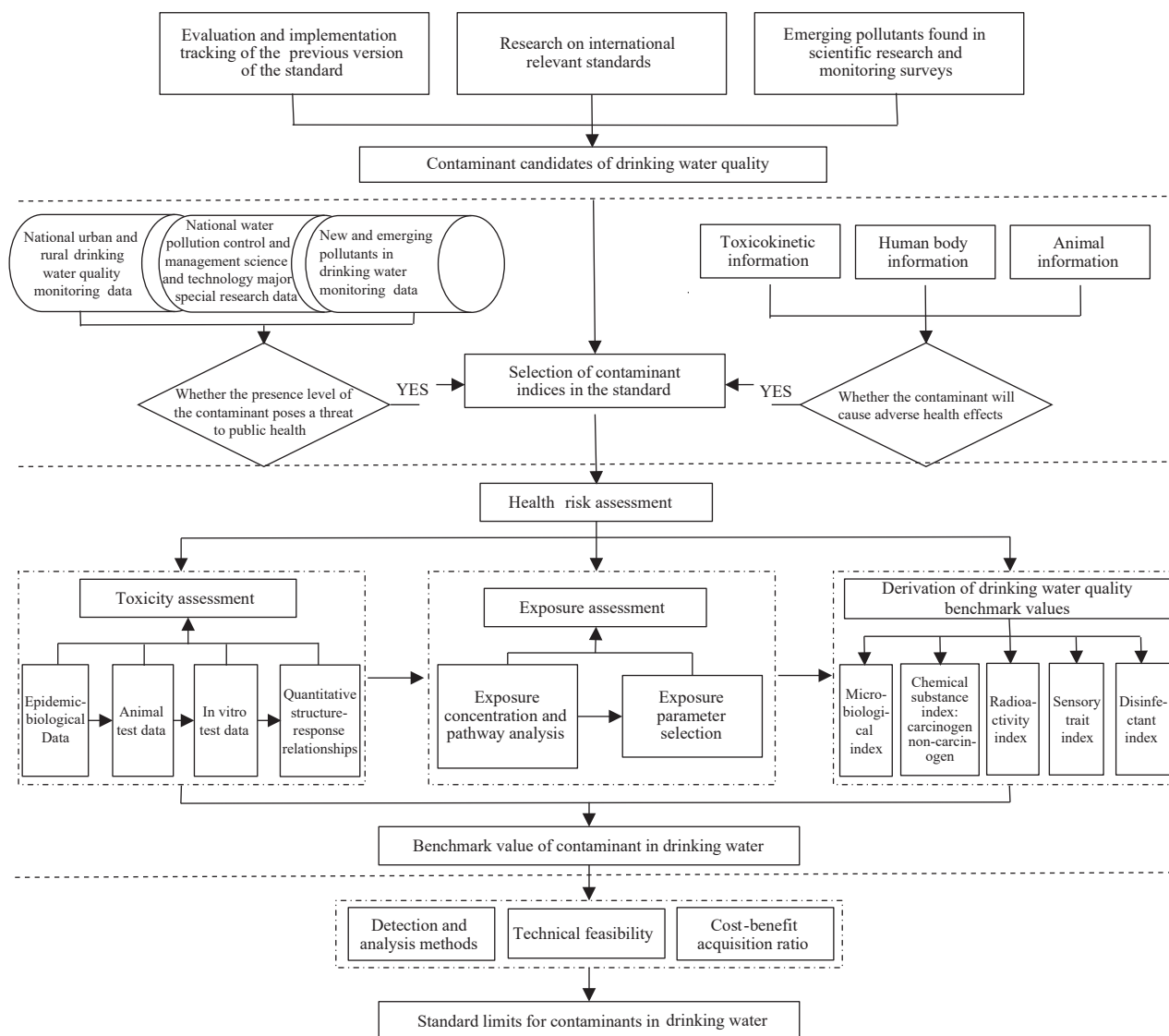


FIGURE 1. Technical process of establishing standard limits.

Drinking Water Quality, is the basic requirement for drinking water quality, and its updating and revision is of great importance in ensuring drinking water safety. Over the past fifteen years, an extensive amount of drinking water monitoring, scientific research, and survey data have been collected in China to serve as the basis for the revision of the standard. The water quality problems and possible risks in China were taken into consideration as the primary factor in selecting indices, and the health risk assessment method was applied using the latest research results in the course of setting the standard limits. Additionally, the level of Chinese water treatment technology and testing technology was taken into account to ensure that the standard is scientifically rigorous and implementable.

The China SDWQ (2022 edition) is more

comprehensive and stringent than ever before. Additionally, the standard has achieved international convergence in terms of the methodology for formulating baseline and standard values (4–5). In essence, China SDWQ (2022 edition) has fully presented the progress China has made in recent years in water pollution prevention, environment management, water treatment technology upgrading, and rural drinking water safety systems construction. With the implementation of the updated standard, drinking water quality and safety in China will be further improved and ensured.

Conflicts of interest: No conflicts of interest.

Funding: Health Standard Preparation and Revision Project, funded by the National Health Commission of China (20180901).

doi: 10.46234/ccdcw2023.054

Corresponding author: Xiaoming Shi, shixm@chinacdc.cn.

¹ National Institute of Environmental Health, Chinese Center for Disease Control and Prevention, Beijing, China.

Submitted: March 07, 2023; Accepted: March 23, 2023

REFERENCES

1. General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China. GB 5749-1985 Sanitary standard for drinking water. Beijing: Standards Press of China, 2005. <https://std.samr.gov.cn/gb/search/gbDetailed?id=71F772D7B895D3A7E05397BE0A0AB82A>. (In Chinese).
2. Ministry of Health of the People's Republic of China, Standardization Administration of the People's Republic of China. GB 5749-2006 Standards for drinking water quality. Beijing: Standards Press of China, 2007. <https://std.samr.gov.cn/gb/search/gbDetailed?id=71F772D7FC82D3A7E05397BE0A0AB82A>. (In Chinese).
3. State Administration for Market Regulation, Standardization Administration of the People's Republic of China. GB 5749-2022 Standards for drinking water quality. Beijing: Standards Press of China, 2022. <https://std.samr.gov.cn/gb/search/gbDetailed?id=DAB6B92C0764FC96E05397BE0A0A5F84>. (In Chinese).
4. World Health Organization. Guidelines for drinking-water quality: Fourth edition incorporating the first and second addenda. Geneva: World Health Organization; 2022. <https://www.who.int/publications/item/9789240045064>
5. United States Environmental Protection Agency. Methodology for deriving ambient water quality criteria for the protection of human health. US Environmental Protection Agency, Office of Water; 2000. Report No.: EPA-822-B-00-004. <https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=20003D2R.txt>.