Supplementary Materials

Text S1 Water sample collection and processing

In each SWSS, three kinds of water samples (input water, tank water, and tap water) were collected. The faucets for collecting input water samples were located in the park of the residential neighborhood. Tank water samples were collected through the drain pipe of the storage tank. For tap water samples, floors 7–30 which were connected to the SWSSs of the residential building were randomly selected. In addition, to better reflect the water quality that users are exposed to, representative water samples were collected after the water was flushed for 5 min at each faucet or drain pipe at maximum flow (Hu et al., 2021). Water samples were collected in 20 L polyethylene plastic buckets treated overnight with sodium hypochlorite and then transported to the laboratory within 2 h. For chemical analysis of water quality parameters, 500 mL of water was pretreated with a 0.45 μm nitrocellulose membrane (Millipore, USA). For heavy metal analysis, 30 mL of water was stabilized with ultrapure nitric acid (0.5% HNO_3, Merck, Germany). Residual chlorine was quenched by sodium thiosulfate for the cultivation of bacteria.

Text S2 **The detection of parameters**

Following our previous studies (Hu et al., 2021; Hu et al., 2022), water samples were measured in situ for water temperature, dissolved oxygen (DO), pH, and turbidity by using portable instruments (HQ40d and 2100Q, Hach, USA). Residual chlorine was measured by the N, N-diethyl-p-phenylenediamine (DPD) colorimetric kit (DR300, Hach, USA). According to Chinese standards (GB/T 11894-1989 and GB/T 5750-2006), a double beam UV-VIS spectrophotometers (UV-9000, Shanghai Metash, China) was used to measure the concentrations of nitrate (NO_3^--N), nitrite (NO_2^--N), and ammonia (NH_4^+-N). Total organic carbon (TOC) was determined using a TOC analyzer (TOC-V WP, Shimadzu, Japan). Trichloromethane (TCM) was determined by capillary-column gas chromatography (GB/T5750-2006) with the help of the local municipal water utility company. Concentrations of 9 heavy metals (Al, Zn, Cu, Cr, Mn, Fe, Cd, As, and Pb) were detected by inductively coupled plasma mass spectrometry (ICP-MS, Agilent 7500cx, Agilent, USA). For total bacterial count, 1 mL of water sample was distributed onto nutrient agar (NA, Qingdao Hopebio, China) for bacteria, and plates were incubated at 37℃ for 48 h. For total fungal count, 100 mL of water sample were filtered through a 0.22 μm nitrocellulose membrane, and the membrane was then attached to dichloran rose bengal chloramphenicol agar (DRBC, Qingdao Hopebio, China) and incubated at 28℃ for 5 days. All measurements were carried out in triplicate (n = 3) and the mean of these values was calculated. The relative standard deviation

(RSDS) was kept within the permissible range specified by the corresponding parameters test method. The results showed that RSD of the sample material were all less than 10%, data precision and accuracy were in accordance with the requirements of the United States Environmental Protection Agency (RSD < 10%).

Table S1 Categorization of indices and their weight coefficients and methods according to DWQI.

Categorization	Indices	Weighting coefficients	Methods
Sensory and chemical indices	pH, turbidity, residual chlorine, Al, Fe, Mn	0.1	Nemerow index method
Organic pollution indices	TOC	0.15	The worst factor criterion method
Carcinogen indices	Cr, As, Pb, Cd, TCM	0.32	
Generally toxic indices	NO_3^--N, Cr, As, Pb, Cu, Zn	0.2	
Enteric infection indices	Total bacterial count, Total fungal count	0.23	

References: (Yuan et al., 2010; Wang et al., 2015).

Table S1 The classification and explanation of water quality grades according to DWQI.

Class	Color	DWQI	Water quality	Explanation
Ⅰ	Green	< 0.5	Excellent	Safety for drinking
Ⅱ	Blue	0.5–1.0	Good	Suitable for drinking
Ⅲ	Yellow	1.0–1.5	Medium	Drinking in a certain condition
Ⅳ	Orange	1.5–2.0	Poor	Drinking after deep treatment and acceptance test
Ⅴ	Red	> 2.0	Extremely poor	Not suitable for drinking

References: (Yuan et al., 2010; Wang et al., 2015).

Table S2 Risk parameters of hazardous substances in health risk assessment (HRA).

Hazardous substances	RfD_{oral} (mg/(kg·d))	SF_{oral} ((kg·d)/mg)	SP (cm/h)	RfD_{dermal} (mg/(kg·d))	SF_{dermal} ((kg·d)/mg)	References
Al	1	—	1.0×10^{-3}	2.00×10^{-1}	—	(Mthembu et al., 2021; Zhang et al., 2022)
Zn	0.3	—	6.0×10^{-4}	6.00×10^{-2}	—	(Liang et al., 2011; Jiang et al., 2022; Zhang et al., 2022)
Cu	0.04	—	1.0×10^{-3}	1.20×10^{-2}	—	(Karim, 2011; Zhang et al., 2022)
Cr	0.003	0.5	2.0×10^{-3}	6.00×10^{-4}	6.4	(USEPA, 2000; Imran et al., 2020)
Mn	0.14	—	1.0×10^{-3}	8.00×10^{-4}	—	(Karim, 2011; Zhang et al., 2022)
Fe	0.7	—	1.0×10^{-3}	4.50×10^{-2}	—	(Karim, 2011; Zhang et al., 2022)
Cd	0.0005	6.1	1.0×10^{-3}	1.00×10^{-4}	41	(Alver, 2019)
As	0.0003	1.5	1.0×10^{-3}	1.23×10^{-4}	3.66	(Waqas et al., 2017; Imran et al., 2020; Davraz and Batur, 2021)
Pb	0.001	0.0085	4.0×10^{-6}	4.20×10^{-4}	0.043	(Karim, 2011; Imran et al., 2020)
NO_3^--N	1.6	—	6.0×10^{-4}	8.00×10^{-1}	—	(Adimalla, 2020; Davraz and Batur, 2021)
TCM	0.01	0.0061	8.9×10^{-3}	2.00×10^{-3}	0.0035	(Gan et al., 2013; Costa et al., 2022)

Table S3 Exposure parameters of populations in HRA.

Model parameters [a]	Unit	Children$_{0-5}$ [b]	Children$_{6-17}$ [b]	Adults [c]
Water ingestion rate (IR)	L/d	1.116	1.322	2.439
Skin surface area (SA)	cm^2	6227	12062	16000
Body weight (BW)	kg	14.0	36.1	60.6
Exposure time (ET)				
Exposure time of taking bath ($ET_{bathing}$)	min/d	11.3	14.3	12
Exposure time of swimming ($ET_{swimming}$) [d]	min/month	74	236	149
Exposure frequency (EF)				
Exposure frequency of drinking ($EF_{drinking}$)	d/a	365	365	365
Exposure frequency of bathing (EF_{bath})	d/a	365	365	365
Exposure frequency of swimming ($EF_{swimming}$)	month/a	12	12	12
Exposure duration (ED) [e]	a	81	81	81
Averaging time (AT)	d	29565	29565	29565

Notes: a) The values of model parameters were modified by referring to the Exposure Factors Handbook of Chinese Population (MEP, 2013) and the seventh census report in this study region.

b) Parameters of children are the average values of each age's parameters in the local province and the weighted average of the population of the corresponding age in the study region.

c) Parameters of adults are the average urban and rural parameter values of the local province.

d) Exposure time of swimming refers to the exposure time of people with swimming behavior.

e) Exposure duration is the expected life of the population in the study region.

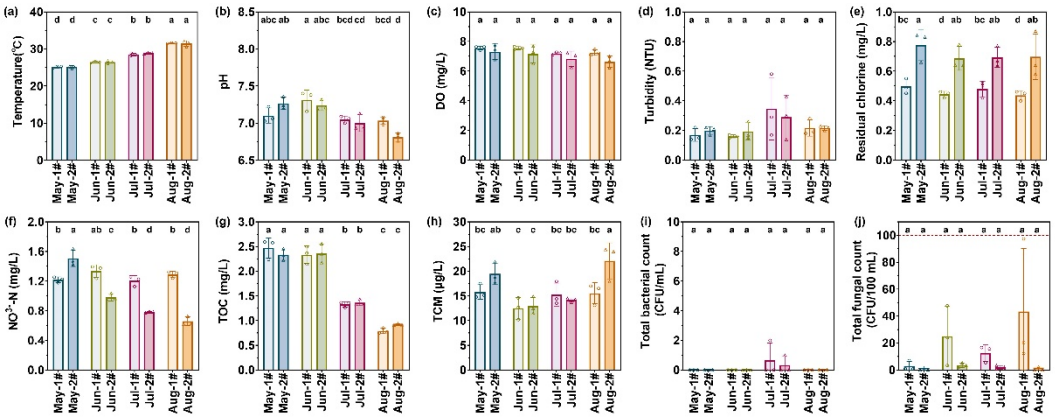

Fig. S1 Bar graph of the concentrations of parameters in monthly summer samples. (a) temperature, (b) pH, (c) DO, (d) turbidity, (e) residual chlorine, (f) NO_3^--N, (g) TOC, (h) TCM, (i) total bacterial count, (j) total fungal count. Groups without common letters (a–d) were significantly different ($p < 0.05$, N = 24).

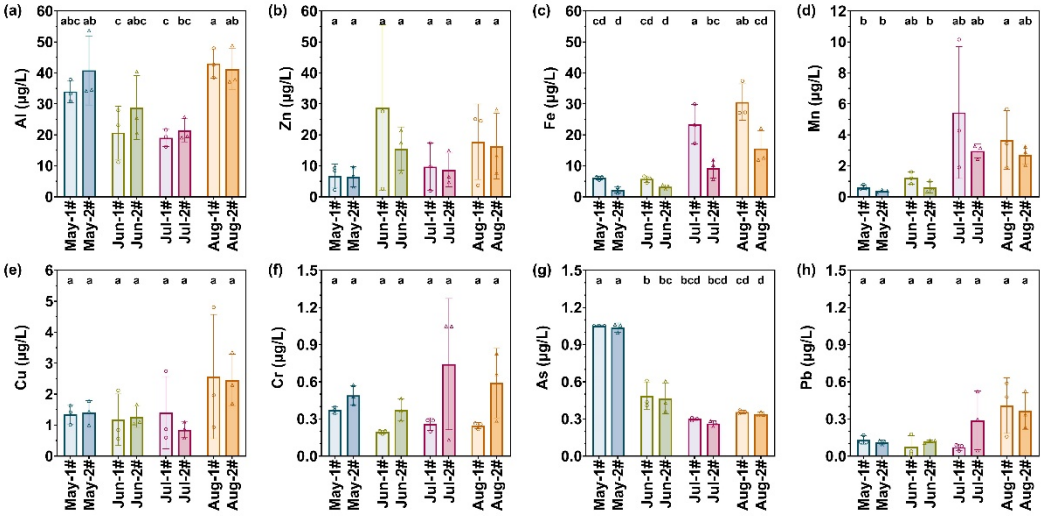

Fig. S2 Bar graph of the concentrations of heavy metals in monthly summer samples. (a) Al, (b) Zn, (c) Fe, (d) Mn, (e) Cu, (f) Cr, (g) As, (h) Pb. Groups without common letters (a–d) were significantly different ($p < 0.05$, N = 24).

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