Dataset on assessment of physical and chemical quality of groundwater in rural drinking water, west Azerbaijan Province in Iran

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A B S T R A C T

Analyzing the quality of drinking water and comparing it with standards, provides useful information regarding in the state of water supply and health protection to consumers. In the current research, the quality of drinking water in the cities of West Azerbaijan province has been investigated. In the current study, the results of drinking water analysis in 17 counties of West Azerbaijan province (except Urmia city), including 355 analyzes were conducted in 2016. The results were analyzed by SPSS software and compared with the national standard. Based on the analysis, the hardness of drinking water in the West Azerbaijan province ranged from 22 to 912 mg/L as calcium carbonate, and the average of the experiment was measured to be $136 \pm 327$ mg/L as calcium carbonate. The TDS values in this study were 39–1710 mg/L, and on average $397.7 \pm 265.8$ mg/L. Also, based on the analyzes performed in this study, the Fluoride concentration was from 0 to
3.45 mg/L, and on average 323.376 ± 0.05 mg/L and the Nitrate concentration was 0–218 mg/L and on average 3.58 ± 1.1 mg/L.

**Specifications table**

| Subject area | Chemistry |
|--------------|-----------|
| More specific subject area | Describe narrower subject area |
| Type of data | Tables, figure |
| How data was acquired | The studied subject was drinking water resources in the cities of West Azerbaijan province. In order to carry out this study, the results of chemical analysis of urban and rural water resources of 13 cities of West Azerbaijan province were collected as a sample in 2017. In the following, data on the concentration of cations and anions, hardness, electrical conductivity, turbidity, TDS, and alkalinity were extracted and the values of mean, standard deviation and correlation coefficient were calculated |
| Data format | Raw, analyzed |
| Experimental factors | The mentioned parameters above, in abstract section, were analyzed according to the standards for water and wastewater treatment handbook. |
| Experimental features | The levels of physical and chemical parameters were determined. |
| Data source location | West Azerbaijan province, Iran |
| Data accessibility | The data are available with this article |

**Value of the data**

- Determination of the physical and chemical parameters including $\text{F}^-$, $\text{NO}_3^-$, $\text{Cl}^-$, $\text{SO}_4^{2-}$, $\text{K}^+$, $\text{Na}^+$, $\text{Mg}^{2+}$, $\text{Ca}^{2+}$, pH, ALK, Turbidity, TH, TDS and EC in ground water was investigated the cities of West Azerbaijan province, Iran.
- In a number of cities in the West Azerbaijan province, the results of comparing the quality parameters of drinking water with national and international standards showed that some of these parameters were not within the standard range.
- Fluoridation of drinking water in cities area with less than the WHO optimum value is recommended.
- Based on the data, defluoridation water could be recommended in fluorotic cities area.
- According to the Pearson correlation, there is a positive correlation between the concentration of water fluoride and EC, TH, $\text{Na}^+$, $\text{K}^+$, ALK and $\text{SO}_4^{2-}$.

1. Data

See Tables 1–3.
Table 1
Statistical description of quality parameters of drinking water resources of West Azerbaijan province in 2017.

| Parameter | Mean | SD | Min | Max |
|-----------|------|----|-----|-----|
| F<sup>-</sup> (mg/L) | 0.32 | 0.37 | 0 | 0.57 |
| NO<sub>3</sub> (mg/L) | 3.58 | 17.2 | 85.34 | 88.34 |
| Cl (mg/L) | 2.43 | 41.5 | 72.26 | 73.47 |
| SO<sub>4</sub> (mg/L) | 48.21 | 218 | 301.3 | 293.9 |
| K<sup>+</sup> (mg/L) | 0.267 | 700 | 0.36 | 1.36 |
| Na<sup>+</sup> (mg/L) | 208.6 | 980 | 0.02 | 4.02 |
| Mg<sup>2+</sup> (mg/L) | 64 | 26 | 39 | 440 |

Table 2
Status of public and sanitary parameters of water in the cities of West Azerbaijan province in 2017.

| City          | Statistical F<sup>-</sup> (mg/L) | NO<sub>3</sub> (mg/L) | pH | ALK (mg/L as CaCO<sub>3</sub>) | TH (mg/L as CaCO<sub>3</sub>) | EC (µs/cm) |
|---------------|----------------------------------|-----------------------|----|-------------------------------|-------------------------------|------------|
| Sardasht      | Mean 0.15 ± 0.22, SD 0.37        | 2.43 ± 1.32           | 7.4 | 208.6 ± 64                    | 230.1 ± 78.3                  | 442.2 ± 143.2 |
|               | Min 0                             | 1.7                   | 7   | 40                            | 56                            | 82         |
|               | Max 1                            | 7                     | 8   | 340                           | 456                           | 829        |
| Mahabad       | Mean 0.23 ± 0.23, SD 10.41       | 7.25 ± 0.2            | 80  | 301.3 ± 144.6                 | 354 ± 161                     | 827.7 ± 482 |
|               | Min 0                            | 1                     | 7   | 80                            | 76                            | 260        |
|               | Max 0.77                         | 218                   | 8   | 520                           | 604                           | 1880       |
| Takab         | Mean 0.2 ± 0.12, SD 2.61          | 5.7 ± 0.2             | 80  | 249.2 ± 77.5                  | 298.2 ± 132                   | 661.1 ± 363 |
|               | Min 0                            | 0                     | 7   | 68                            | 80                            | 151        |
|               | Max 0.58                         | 110                   | 8   | 368                           | 596                           | 1740       |
| Naqadeh       | Mean 0.22 ± 0.11, SD 2.71         | 7.73 ± 0.26           | 7.3 | 309 ± 76.1                    | 305.2 ± 50                    | 657.5 ± 135.8 |
|               | Min 0.04                         | 1                     | 7   | 172                           | 200                           | 477        |
|               | Max 0.5                          | 10                    | 8   | 460                           | 428                           | 927        |
| Chaypareh     | Mean 0.22 ± 0.11, SD 3.24         | 7.33 ± 0.26           | 8.1 | 313.25 ± 81                   | 291 ± 47                      | 683.6 ± 145.7 |
|               | Min 0.04                         | 1                     | 7   | 172                           | 200                           | 497        |
|               | Max 0.5                          | 10                    | 8   | 460                           | 428                           | 927        |
| Khoy          | Mean 0.2 ± 0.22, SD 2.68          | 7.46 ± 0.2            | 172 | 284.7 ± 147                   | 361.1 ± 156.8                 | 861.03 ± 565.2 |
|               | Min 0                            | 0                     | 7   | 72                            | 148                           | 330        |
|               | Max 0.9                          | 12                    | 8   | 704                           | 820                           | 2510       |
| Miandoab      | Mean 0.35 ± 0.28, SD 1.93         | 7.48 ± 0.22           | 128 | 285.9 ± 80.2                  | 355.7 ± 153                   | 993.6 ± 543.5 |
|               | Min 0                            | 0                     | 7   | 128                           | 164                           | 322        |
|               | Max 1.44                        | 4                     | 8   | 404                           | 828                           | 2920       |
| Oshnavieh     | Mean 0.16 ± 0.14, SD 2.52         | 7.52 ± 0.3            | 136 | 268.25 ± 136                  | 289.6 ± 114                   | 545.87 ± 310 |
|               | Min 0.01                         | 1                     | 7   | 72                            | 72                            | 149        |
|               | Max 0.4                          | 7                    | 8   | 560                           | 460                           | 1210       |
| Salmas        | Mean 0.27 ± 0.23, SD 3.36         | 7.3 ± 0.13            | 73.1| 311 ± 73.1                    | 380.2 ± 102                   | 1001 ± 478 |
|               | Min 0                            | 1                     | 7   | 140                           | 240                           | 675        |
|               | Max 0.83                         | 10                    | 8   | 496                           | 680                           | 2780       |
| Boukan        | Mean 0.31 ± 0.15, SD 3.61         | 7.23 ± 0.18           | 92  | 273.6 ± 92                    | 326.3 ± 125                   | 710.6 ± 259.8 |
|               | Min 0.02                         | 1                     | 7   | 100                           | 24                            | 274        |
|               | Max 0.57                         | 2                     | 8   | 488                           | 620                           | 1423       |
| Shahin Dezh   | Mean 0.28 ± 0.31, SD 3.31         | 7.28 ± 0.11           | 51.6| 221.52 ± 53.6                 | 300.5 ± 73.3                  | 568.7 ± 181 |
|               | Min 0.13                         | 7                     | 8   | 104                           | 148                           | 275        |
|               | Max 0.54                         | 7                     | 7   | 316                           | 468                           | 1087       |
| Maku          | Mean 0.73 ± 0.67, SD 0.89         | 7.4 ± 0.25            | 154.6| 345.5 ± 154.6                 | 367 ± 132                     | 1096.4 ± 671 |
|               | Min 0                            | 0                     | 8   | 88                            | 96                            | 233        |
|               | Max 3.45                        | 4                     | 8   | 628                           | 656                           | 3270       |
| Piranshahr    | Mean 0.094 ± 0.11, SD 4.29        | 7.53 ± 0.17           | 56.8| 177.8 ± 56.8                  | 195 ± 62                      | 407.5 ± 82 |
|               | Min 0                            | 0                     | 7   | 0                             | 22                            | 267        |
|               | Max 0.4                          | 13                    | 8   | 236                           | 288                           | 591        |
| Total         | Mean 0.32 ± 0.37, SD 3.58         | 7.39 ± 0.23           | 117 | 283.97 ± 117                  | 327.2 ± 136                   | 810.8 ± 527 |
|               | Min 0                            | 0                     | 7   | 0                             | 22                            | 82         |
|               | Max 3.45                        | 218                   | 8   | 720                           | 912                           | 3360       |
2. Experimental design, materials and methods

2.1. Description of study area

West Azerbaijan province is one of the 31 provinces of Iran (Fig. 1). It is in the northwest of the country in coordination 37.5528°N 45.0759°E [1–4].

2.2. Sample collection and analytical procedures

This research is a descriptive-applied study. The studied subject was drinking water resources in the cities of West Azerbaijan province. In order to carry out this study, the results of chemical analysis

Table 3
Correlation (Pearson correlation) between fluoride and different water quality parameters in West Azerbaijan province.

|     | F    | EC   | pH   | TH   | Ca   | Mg   | Na   | K    | ALK  | NO₃  | SO₄  |
|-----|------|------|------|------|------|------|------|------|------|------|------|
| F   | 1    | 0.415** | 0.02 | 0.304** | 0.112 | 0.287** | 0.557** | 0.467** | 0.462** | 0.007 | 0.409** |
| EC  | 0.415** | 1    | -0.084 | 0.843  | 0.52  | 0.6   | 0.912  | 0.528** | 0.61  | -0.02 | 0.803 |
| pH  | 0.02 | -0.084 | 1    | -0.176 | -0.247 | -0.036 | -0.059 | -0.043 | -0.211| 0.028 | 0.046 |
| TH  | 0.304 | 0.843 | -0.176 | 1    | 0.662 | 0.68  | 0.704  | 0.382  | 0.667 | -0.07 | 0.667 |
| Ca  | 0.112 | 0.52  | -0.247 | 0.662 | 1    | 0.221 | 0.344  | 0.13   | 0.41  | -0.076 | 0.365 |
| Mg  | 0.287** | 0.6   | -0.036 | 0.68  | 0.221 | 1    | 0.552  | 0.293  | 0.492 | -0.041 | 0.486 |
| Na  | 0.557** | 0.912 | -0.059 | 0.704 | 0.344 | 0.552 | 1    | 0.607  | 0.602 | 0.007 | 0.715 |
| K   | 0.467** | 0.528 | -0.043 | 0.382 | 0.13 | 0.293 | 0.607  | 1    | 0.457 | -0.014 | 0.37  |
| ALK | 0.462** | 0.61  | -0.211 | 0.667 | 0.41  | 0.492 | 0.602  | 0.457  | 1    | -0.092 | 0.283 |
| NO₃ | 0.007 | -0.02 | 0.028  | -0.07 | -0.076 | -0.041 | 0.007  | -0.014 | -0.092 | 1    | 0.004 |
| SO₄ | 0.409** | 0.803 | 0.046  | 0.667 | 0.365 | 0.486 | 0.715  | 0.37   | 0.283 | 0.004 | 1     |

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Fig. 1. Study area.
of urban and rural water resources of 13 cities of West Azerbaijan province were collected as a sample in 2017. In the following, data on the concentration of cations and anions, hardness, electrical conductivity, turbidity, TDS, and alkalinity were extracted and the values of mean, standard deviation and correlation coefficient were calculated. It should be noted that all of mentioned parameters were measured according to the standard Methods for the Examination of Water and Wastewater [5–15].

This province is limited from the north to Azerbaijan and Turkey, from the west to Turkey and Iraq, from the east to the provinces of East Azerbaijan and Zanjan, and south to the Kurdistan province. The province’s area is 37,059 km², that is the 13th largest province in the country in terms of area. According to the 2006 census, the population of the province is 2,873,459 people and has 17 cities [1,16–23].

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Transparency document. Supporting information

Transparency data associated with this article can be found in the online version at https://doi.org/10.1016/j.dib.2018.09.078.

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