

Assessment of iron and nitrates concentration in drinking water, in the district of Bragança, Portugal between 2012 and 2013

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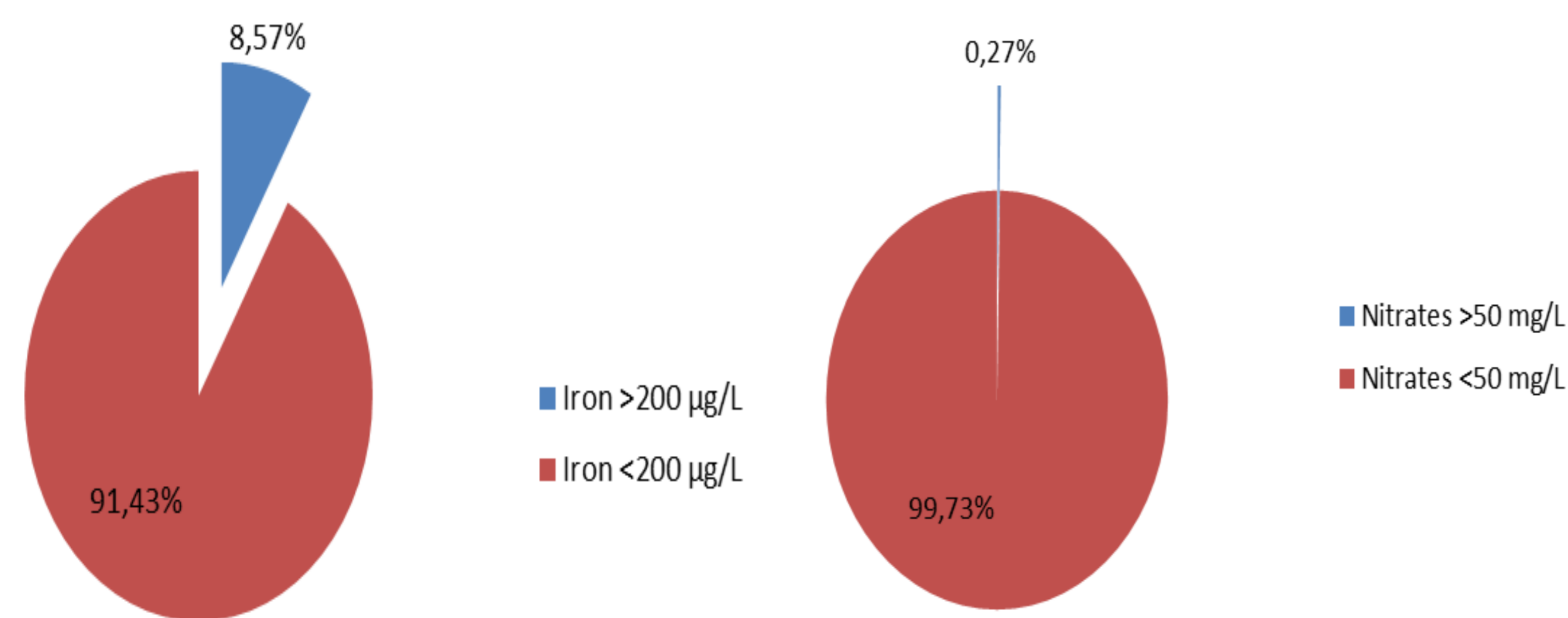
INTRODUCTION

Water is an essential resource for the survival of all living beings. Therefore, it is necessary to promote means to get drinking water for human consumption. Nitrate ion (NO₃⁻) has a high solubility level, and may reach the groundwater. High concentrations of nitrates can be very harmful to human health, since they can be easily converted into nitrites which in high concentrations can cause methaemoglobinaemia especially in newborns. Nitrate concentration can not exceed the limit value of 50 mg/L in drinking water (Law Dec. no. 306/2007).¹ Iron exists in low concentrations in natural waters and, usually, their presence results from the leaching of soils or industrial pollution.² The presence of iron in the water or the use of iron salts as agents of coagulation/flocculation in water treatment, can cause corrosion in pipelines.³ Parametric value of iron is 200ug/L (Law Dec. no. 306/2007) in drinking water.¹ Principal objective of this study was to evaluate the concentration of nitrate and iron in drinking water of the Bragança district, in order to identify the sampling point that maintain the concentrations of these ions above the parametric values.

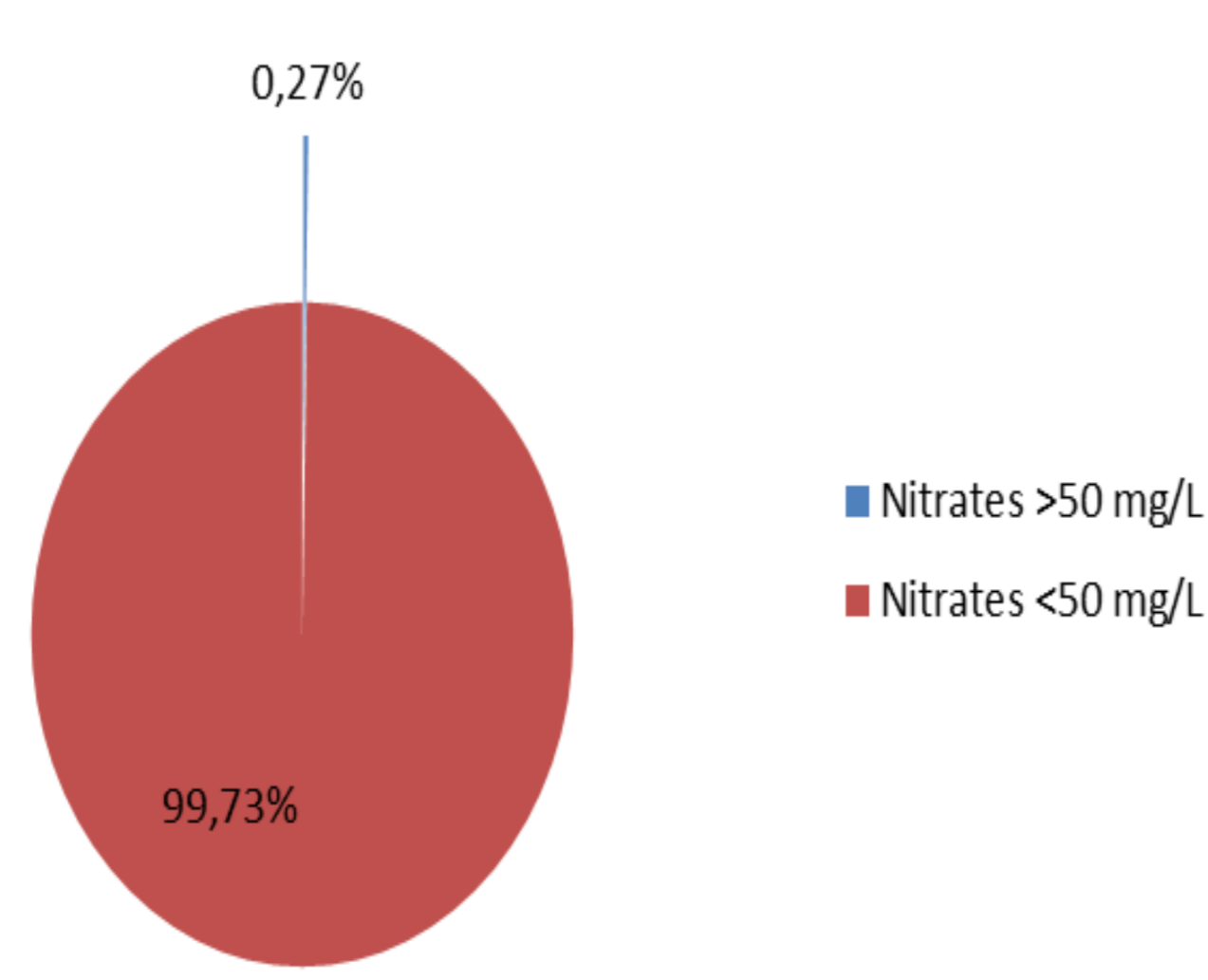
MATERIAL AND METHODS

Type of study: retrospective cross-sectional study that took place between January 2012 and December 2013 in PHLB; **Sample:** all samples of water for human consumption received in PHLB for the determination of iron and nitrates were analyzed; **Processing of samples:** iron content and nitrate were determined by spectrophotometry.

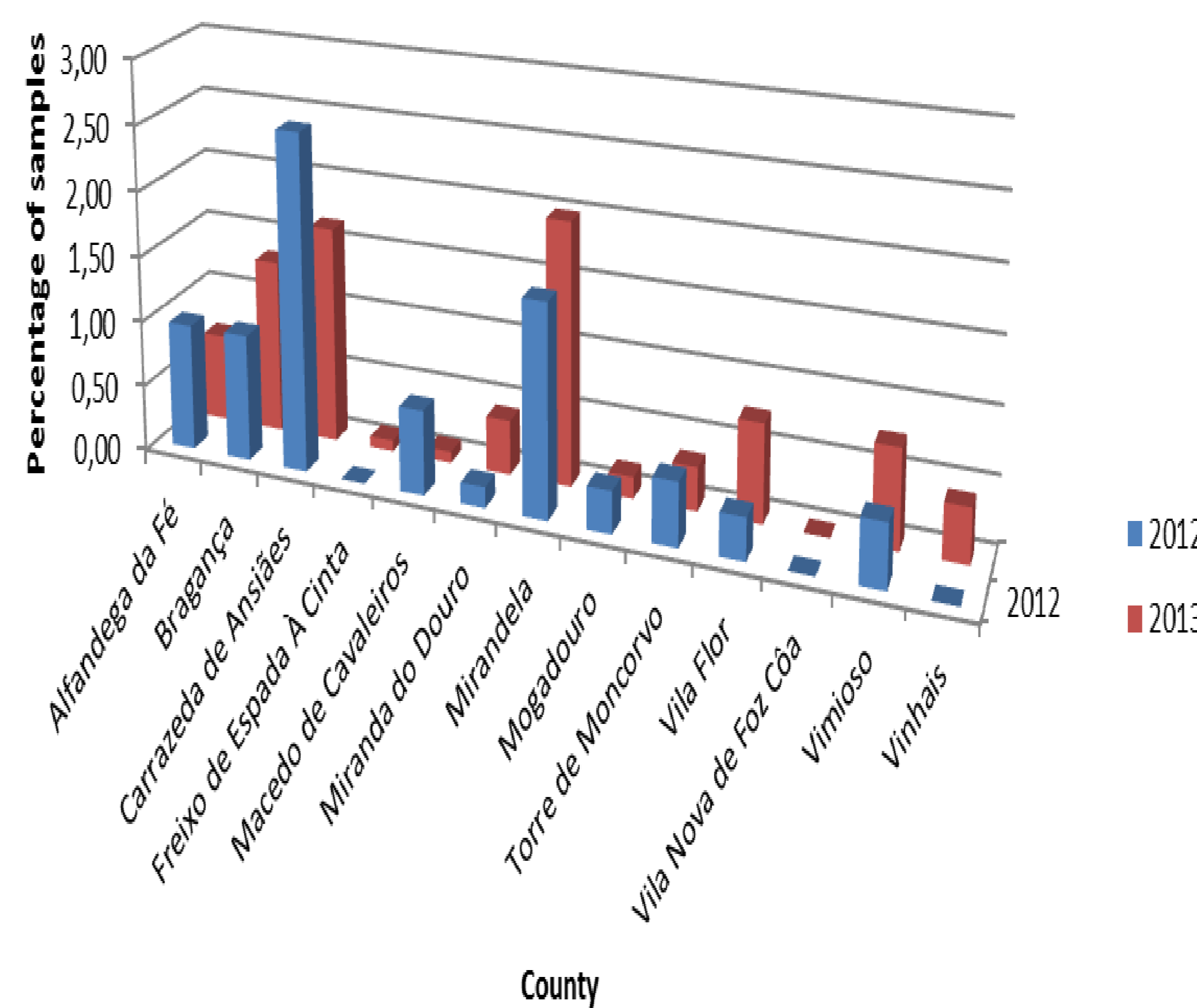
RESULTS



Graph 1. Iron levels in samples of drinking water



Graph 2. Nitrate levels in samples of water for human consumption



Graph 3. Percentage of samples of water for human consumption with value of Iron > 200 µ/L by county

Table 1. Comparison of samples outside the parametric values between the year 2012 and 2013

	2012	2013
Iron	8,5%	8,6%
Nitrates	0,2%	0,3%

DISCUSSION

Data analysis of the drinking water samples in the district of Bragança, showed that some of them are not in accordance with the legislation and constitutes a risk to public health. Iron content was determined in 1831 samples, 157 of which reveal a concentration above the parametric value (PV>200ug/L), which corresponds to 8.57% of the samples (Graph 1). In the year 2012, were analyzed 624 samples of drinking water, and Carraceda de Ansiães county presented greatest number of samples above the iron PV. In comparison with the year 2013, were analyzed 1207 samples of drinking water, and Mirandela county showed the highest number of samples with a value of iron above the PV (Graph 3). Regarding the content of nitrates that was determined in 1832 samples, of which only 5 samples was above the parametric value (PV>50 mg/L), representing only 0.27% of the samples (Graph 2). In 2012 there was only a sample above the PV corresponding to the municipality of Miranda do Douro. In the year 2013 the county of Macedo de Cavaleiros presented the greatest number of samples above the nitrates PV (Graph 3). In the year 2013 there was one sample with values of nitrate and iron above the parametric values in the municipality of Bragança. To emphasize that no significant changes were noticed in that responds to the number of samples in compliance for both parameters between the years of 2012 and 2013 (Table 1).

CONCLUSION

We concluded with this study that the evaluation of water quality is important to be able to detect possible contaminants and later to intervene in such a way as to restore the quality of drinking water. Having said that you should use the periodic analysis of water in order to prevent these adverse effects to human health.

REFERENCES

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2. Eaton, AD, Clesceri LS, Greenberg AE. Standard Methods for Examination of Water and Wastewater. 21th Edition 2005.
3. NP 22/02 (1996) Determination of iron (spectrophotometric method with 1,10-phenanthroline).