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# 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 life. It is a crucial factor for all living beings' survival thus, it is necessary to promote means to obtain drinking water for human consumption.<sup>1</sup> The water intended for human consumption, according to the World Health Organization (WHO), is quality water as soon as it does not cause a significant threat to human health during its consumption.<sup>2</sup> The diseases related to the contamination of water for human consumption constitute a very high responsibility and importance to the Public Health. The nitrates have a high solubility and may reach the groundwater in the deep layers of the soil by processes as leaching, particularly in areas with intensive farming and livestock. High concentrations of nitrates can be very harmful to human health since they can be easily converted into nitrites which concentrations cannot exceed the parametric value of 50 mg/L in water for human consumption (Dec. Law n.º 306/2007). The greater effect of nitrite in human health is your involvement in the oxidation of hemoglobin (Hb) to methemoglobin (MetHb). High concentrations of nitrates cause severe methaemoglobinemia in infants and adults. The methemoglobinemia is a rare condition caused by excessive conversion of hemoglobin (Hb) in methemoglobin (MetHb), being unable to bind and transport oxygen.<sup>3</sup> The iron exists in low concentrations in natural waters and usually its presence results of processes such as leaching of soils or industrial pollution. The presence of iron in the water can consequently cause the corrosion of metal pipes or the use of iron salts as agents of coagulation/flocculation in water treatment and the parametric value of iron is 200µg/L (Dec. Law n.º 306/2007) in water for human consumption.

## OBJECTIVES:

The objective of this study was to evaluate the concentration of nitrate and iron in drinking water in the district of Bragança in order to identify the sampling point that keeps concentrations of these ions above the parametric values.

## MATERIALS AND METHODS:

The collection of drinking water samples in the district of Bragança occurred between the years of 2012 and 2013, with subsequent spectrophotometric determination of nitrate and iron concentration, in the Public Health Laboratory of Bragança (PHLB). Samples with concentrations above the parametric values were identified: above 200 µg/L to iron and above 50 mg/L to nitrates (Dec, Law n.º 306/2007). The collected data was statistically treated in program Microsoft Office - Excel and the analysis of the data was carried out using the normal distribution with levels of confidence of 95 %.

## RESULTS AND DISCUSSION:

In the year 2012 were collected 624 samples and 8.8% of these were outside the parametric values with 8.7% corresponding to samples with values of increased iron and 0.1% corresponding to increased nitrate's

values. In the year 2013 it was collected 1208 samples in which 8.9% were above the parametric values stipulated, from which 8.6% corresponded to samples with increased concentrations of iron and 0.3% corresponded to samples with nitrate levels above the parametric values.

#### **CONCLUSION:**

Two regions exhibited a greater number of samples with concentrations above the established limits for the parameters studied in this work. One of the regions had 15.9% of the samples above the established limits and the other had 12.6%. Individuals that consumed this water with high levels of iron and nitrates may be associated with several potential health threats.

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