

## Risk Assessment and Haloacetic Acids Exposure in Drinking Water in Tunja, Colombia

**Authors :** Bibiana Matilde Bernal Gómez, Manuel Salvador Rodríguez Susa, Mildred Fernanda Lemus Perez

**Abstract :** In chlorinated drinking water, Haloacetic acids have been identified and are classified as disinfection byproducts originating from reaction between natural organic matter and/or bromide ions in water sources. These byproducts can be generated through a variety of chemical and pharmaceutical processes. The term 'Total Haloacetic Acids' (THAAs) is used to describe the cumulative concentration of dichloroacetic acid, trichloroacetic acid, monochloroacetic acid, monobromoacetic acid, and dibromoacetic acid in water samples, which are usually measured to evaluate water quality. Chronic presence of these acids in drinking water has a risk of cancer in humans. The detection of THAAs for the first time in 15 municipalities of Boyacá was accomplished in 2023. Aim is to describe the correlation between the levels of THAAs and digestive cancer in Tunja, a city in Colombia with higher rates of digestive cancer and to compare the risk across 15 towns, taking into account factors such as water quality. A research project was conducted with the aim of comparing water sources based on the geographical features of the town, describing the disinfection process in 15 municipalities, and exploring physical properties such as water temperature and pH level. The project also involved a study of contact time based on habits documented through a survey, and a comparison of socioeconomic factors and lifestyle, in order to assess the personal risk of exposure. Data on the levels of THAAs were obtained after characterizing the water quality in urban sectors in eight months of 2022. This, based on the protocol described in the Stage 2 DBP of the United States Environmental Protection Agency (USEPA) from 2006, which takes into account the size of the population being supplied. A cancer risk assessment was conducted to evaluate the likelihood of an individual developing cancer due to exposure to pollutants THAAs. The assessment considered exposure methods like oral ingestion, skin absorption, and inhalation. The chronic daily intake (CDI) for these exposure routes was calculated using specific equations. The lifetime cancer risk (LCR) was then determined by adding the cancer risks from the three exposure routes for each HAA. The risk assessment process involved four phases: exposure assessment, toxicity evaluation, data gathering and analysis, and risk definition and management. The results conclude that there is a cumulative higher risk of digestive cancer due to THAAs exposure in drinking water.

**Keywords :** haloacetic acids, drinking water, water quality, cancer risk assessment

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