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Mémoire de Master
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Evaluation des risques sanitaires liés aux métaux lourds (plomb, cadmium) à travers la consommation du riz au Bénin

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ABSTRACT

Rice is the second most consumed cereal in Benin, with an average annual consumption of 82.31 kg per capita. It is an essential staple food for food security. However, its contamination by heavy metals such as lead and cadmium raises public health concerns. This study aimed to quantitatively assess the health risks associated with the consumption of local and imported rice in Benin, focusing on lead and cadmium contamination levels and their potential health impacts. A consumption survey was conducted with 401 persons in the communes of Cotonou and Abomey-Calavi to determine the rice consumption levels in the study area. Subsequently, 60 rice samples, comprising 30 imported and 30 locally produced, were collected to determine lead and cadmium concentrations using the atomic absorption spectrometry (AAS) method. Finally, exposure to heavy metals and the related health risks were estimated using a probabilistic method with the @Risk software. The consumption survey revealed that most consumers preferred imported rice (78.3% of respondents) over local rice (12.5%). Reasons for preference included taste, smell, and market accessibility. Demographically, 59.35% of participants were adults (19–60 years) and 29.68% were adolescents (10–18 years), forming the main consumer groups. Most participants preferred purchasing rice in small quantities without storing it (66%). The analytical results showed that the average lead concentrations in local rice (0.6852 ± 0.2779 mg/kg) were significantly higher than those in imported rice (0.4919 ± 0.1544 mg/kg), both exceeding the maximum limits set by the Codex Alimentarius (0.25 mg/kg). All cadmium concentrations in local rice were below detection limits (0.001–0.01 mg/L), while 26.67% of imported rice samples exhibited cadmium concentrations ranging from 0.021 to 0.0609 mg/kg. The probabilistic analysis revealed that for local rice, the groups most exposed to lead concentrations exceeding toxicological limits were adolescents (2.9%) and children (0.8%), while adolescents (0.6%) and adults (0.5%) had the highest exposure rates among imported rice consumers

Keywords: Rice, heavy metals, food contamination, risk assessment, food safety.