

# Determination of Carcinogenic Polycyclic Aromatic Hydrocarbons (PAHs), Aflatoxins, and Nitrosamines in Processed Fish from the Winam Gulf Area of Kenya and Estimated Potential Exposure in Human.

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## Abstract

PAHs, aflatoxins and nitrosamines were analyzed in fish samples obtained from various markets and locations within the Winam Gulf area and processed by various methods often used in Kenya. The mean concentrations of total PAHs (TPAHs) in the smoked, charcoal-grilled and fresh tilapia muscle samples ranged from 22.27–44.58, 20.36–28.51, and 11.43–16.53 µg/kg wet weight, respectively. The concentrations of individual PAHs decreased in the order smoked>charcoal-grilled>fresh fish. Of the USEPA 16 PAHs, benzo(a)pyrene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, and benzo(g,h,i)perylene were not detected in all samples analyzed. Fluoranthene, acenaphthene, anthracene, phenanthrene, and acenaphthylene were not detected in fresh tilapia muscles but were generated in significant amounts on the samples during smoking and charcoal-grilling. The risk of exposure to human was estimated to be 0.67 µg/day through consumption of tilapia. The TPAHs levels in fresh fish, smoked and grilled tilapia were higher than the maximum allowable concentrations as per the WHO standards. Aflatoxins were found to be generated in sun-dried Dagaa during handling and storage with total mean concentrations ranging from 0.33–1.58 µg/kg wet weight but none were detected in the fresh samples. The daily intake of aflatoxins through consumption of Dagaa was estimated to be 0.0079 µg/day during the rainy season when the drying process is less efficient. None of the nitrosamines were detected in both fresh and the deep-fried tilapia muscle samples (frying temperatures ranging from 110–170°C) after exposure to nitrites and nitrates in water, in concentrations ranging up to 10 µg/L (NO<sub>2</sub><sup>-</sup>) and up to 160 µg/L (NO<sub>3</sub><sup>-</sup>).

Key Words: Aflatoxins, nitrosamines, polycyclic aromatic hydrocarbons, processed fish, Winam Gulf, Kenya

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