

**HEALTH RISKS ASSOCIATED WITH METAL EXPOSURE IN ROASTED
MEAT, DRINKING WATER AND BLACK TEA**

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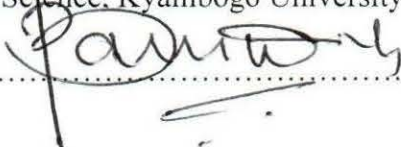
DECLARATION

I declare that the thesis which I hereby submit for the degree of Doctor of Philosophy in Food Technology of Kyambogo University is entirely mine and has not been presented for any ward at another University or higher institution of learning.

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DEDICATION

To my teachers “Jones Higenyi wa-Pabire and Professor dr. ir. Bruno De Meuleaner”
who inspired and made me so proud.

To the cancer patients in Uganda. My sympathies and beliefs are always with them.

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ABSTRACT

Heavy metals are major environmental pollutants, and their toxicity is a problem of increasing significance for ecological, evolutionary, health and environmental reasons. Regular consumption of food and water contaminated with heavy metals exposes the consumer especially children and women of child bearing age to adverse developmental, reproductive, neurological, immunological, teratogenic and carcinogenic effects. Data on the potential risk contribution of heavy metal contaminated water and food towards the disease burden in Uganda is inadequate. This study aimed to assess heavy metal exposure and health risks posed to the population in Kampala, through consumption of street roasted meat (SRM), drinking water and commercial black tea sold in the city.

Twelve samples of each of the street roasted pork, beef, goat, and chicken were randomly purchased on the streets of Kampala City. Forty seven samples of each of groundwater-fed protected spring, tap and bottled water were obtained from the five divisions of the city. Twenty samples of commercial black tea brands were randomly purchased from supermarkets and retail shops in the five divisions of Kampala City. Street roasted meat were analysed for lead (Pb), arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), zinc (Zn) and iron (Fe) using Atomic Absorption Spectrophotometry. Drinking water and black tea samples were analyzed for aluminium (Al), mercury (Hg), manganese (Mn) and nickel (Ni) in addition to the above parameters. Human health risks due to exposure to toxic elements were determined using the deterministic risk analysis approach described by the United States Environment Protection Agency (US EPA). Cancer and non-cancer risks were estimated for both children and adults using incremental lifetime cancer risk (ILCR) and non-cancer hazard quotient (HQ), respectively.