Application of Probabilistic Modeling to Quantify the Reduction Levels of Hepatocellular Carcinoma Risk Attributable to Chronic Aflatoxins Exposure

Epidemiological studies show a definite connection between areas of high aflatoxin content and a high occurrence of human hepatocellular carcinoma (HCC). Hepatitis B virus in individuals further increases the risk of HCC. The two risk factors are prevalent in rural Kenya and continuously predispose the rural populations to HCC. A quantitative cancer risk assessment therefore quantified the levels at which potential pre- and postharvest interventions reduce the HCC risk attributable to consumption of contaminated maize and groundnuts. The assessment applied a probabilistic model to derive probability distributions of HCC cases and percentage reductions levels of the risk from secondary data. Contaminated maize and groundnuts contributed to 1,847 +/- 514 and 158 +/- 52 HCC cases per annum, respectively. The total contribution of both foods to the risk was additive as it resulted in 2,000 +/- 518 cases per annum. Consumption and contamination levels contributed significantly to the risk whereby lower age groups were most affected. Nonetheless, pre- and postharvest interventions might reduce the risk by 23.0-83.4% and 4.8-95.1%, respectively. Therefore, chronic exposure to aflatoxins increases the HCC risk in rural Kenya, but a significant reduction of the risk can be achieved by applying specific pre- and postharvest interventions.

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