

2021-04-12

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Wageningen Academic Publishers

<https://doi.org/10.3920/WMJ2020.2570>

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Risks of aflatoxin exposure among adolescents in boarding schools in Kilimanjaro region, Tanzania

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Abstract

School feeding in low-income countries is dominated by cereals and legumes, which are susceptible to aflatoxin contamination but are usually not assessed for aflatoxins. A cross sectional study was conducted to assess aflatoxin exposure among adolescents through consumption of school meals in Kilimanjaro region. Food frequency questionnaires and 24 h dietary recalls were used to collect information on food consumption. At least four samples of common food used in school meals were collected. A deterministic approach was used to estimate the dietary aflatoxin exposure. High Performance Liquid chromatography (HPLC) was used to analyse presence of aflatoxin contamination. Results showed that, maize based food and beans were consumed on daily basis. The intake of maize flour and dehulled maize ranged from 17.5 to 738.2 g and 28.2 to 272 g per person per day respectively. Furthermore, consumption of beans and rice were in the range of 121.1 to 595.2 g and 15.7 to 42.2 g per person per day respectively. Total aflatoxins ranged 0.20-438.53 µg/kg (median 2.30 µg/kg). The highest contamination range (0.59-438.53 µg/kg) was in maize while the lowest (0.20-3.41 µg/kg) was found in rice. Similarly, the highest aflatoxin B1 (AFB1) concentration (35.88 µg/kg) was in dehulled maize while the lowest (0.44 µg/kg) was in rice. The highest dietary exposure to total aflatoxins and AFB1 due to consumption of maize ranged from 0.70 to 973.45 ng/kg/bodyweight (bw)/day, and from 0.05-81.06 ng/kg/bw/day, respectively. This pronounced risk of exposure to aflatoxins might have been contributed by a monotonous maize based diet in boarding schools. These findings call for institutions immediate interventions, such as the use of appropriate storage technologies, sorting, cleaning and winnowing in order to remove damaged grains, thereby reducing the risk of dietary exposure to aflatoxins. Likewise, the relevant ministries should consider food diversification and routine risk assessments of the susceptible crops throughout the value chain as a long-term intervention plan at policy level.

Keywords: Aflatoxin exposure, Monotonous meals, Adolescents, Boarding school