



Toolkit for mycotoxin risk assessment

Background. Mycotoxins pose a significant threat to food safety especially in low-income settings by contaminating staples like maize and groundnuts. Risk assessment plays an important role in understanding the magnitude of the risks attributed to exposure to these hazards via food consumption. To improve food safety and guide evidence-based mitigation strategies, the UP-RISE project validated [a risk assessment toolkit](#) originally developed under the H2020 FoodSafety4EU project. Validation used mycotoxin data from public sources, including the WHO's food safety collaborative platform database.

Objective. The objective is to validate and adapt the FoodSafety4EU toolkit for use in African countries, where food safety challenges —such as inadequate storage, climate conditions, and limited regulatory enforcement— heighten mycotoxin exposure risks. The toolkit integrates mycotoxin occurrence data and food consumption patterns to assess long-term health risks and guide mitigation strategies.

Results. Creation of practical tools for mycotoxin risk assessment and mitigation;
Successful validation of the FoodSafety4EU toolkit for use in AU countries; and
Input for strengthening improved risk assessment frameworks and policy support for food safety.

Recommendations.

Promote the dissemination and adoption of the validated toolkit across AU member states;
Provide continuous training and support for regional risk assessors and stakeholders;
Encourage integration of the toolkit into national food safety programs; and
Capacity-building through partnerships with European and African institutions.

The successful validation of aflatoxin B1 assessment through maize consumption confirms the toolkit's applicability for other mycotoxins. This toolkit will be applied to evaluate long-term health risks of five mycotoxins (aflatoxin B1, fumonisin B1, ochratoxin A, deoxynivalenol and zearalenone) in Benin, Côte d'Ivoire, Kenya, Nigeria, and South-Africa.



1. HAZARD IDENTIFICATION				
Briefly describe the potential hazards to humans that the presence of a substance in food may pose	The hazard posed by AFB1 is significant due to its genotoxic and carcinogenic properties. Genotoxic carcinogens do not have a safe threshold of exposure, meaning that any level of intake carries potential health risks. For AFB1: • Mode of Action: It binds to DNA, causing mutations that may lead to liver cancer. • Vulnerable Populations: Individuals with high maize consumption, particularly in low-income countries, are at increased risk. Regions with inadequate storage facilities for maize are especially prone to contamination due to favorable conditions for fungal growth.			
2. HAZARD CHARACTERISATION				
* Genotoxic carcinogen? Find genotoxicity evaluation in File Genotoxicity_KJ and specify reference point (RP) from File ReferencePoints_KJ https://zenodo.org/record/3693783 if no RP: use 1 IL of 0.0025 mg/kg bw/day	RP in µg/kg bw/day	Type	References	
	0.4	BMDL ₀₁		
* NOT genotoxic? ACUTE dose (ARfD) from File ReferenceValues_KJ on https://zenodo.org/record/3693783	ARfD in µg/kg bw/day	Type	References	
		ARfD		
CHRONIC Specify health-based guidance value (HBGV) from File ReferenceValues_KJ on https://zenodo.org/record/3693783 if no RV: Specify Cramer Class using Toxtree. Class I: use TTC of 30 µg/kg bw/day; Class II: https://apps.idesconsult.net/data	HGBV in µg/kg bw/day	Type	References	
3. EXPOSURE ASSESSMENT				
CONTAMINATION DATA				
	LB mean in µg/kg	UB mean in µg/kg		
	0	0.26287501		
Infants 0-11 months Toddlers 12-35 months Other children 36 months-9 years Adolescents 10-17 years Adults 18-64 years Elderly 65-74years Very elderly 75 years and older	ACUTE CONSUMPTION DATA		CHRONIC CONSUMPTION DATA	
	Average consumers in kg/kg bw/day	High consumers in kg/kg bw/day (95th percentile)	Average consumers in kg/kg bw/day	High consumers in kg/kg bw/day (95th percentile)
			0.002843628	0.006988851
Infants 0-11 months Toddlers 12-35 months Other children 36 months-9 years Adolescents 10-17 years Adults 18-64 years Elderly 65-74years Very elderly 75 years and older	ACUTE EXPOSURE = CONTAMINATION X ACUTE CONSUMPTION		CHRONIC EXPOSURE = CONTAMINATION X CHRONIC CONSUMPTION	
	LB MEAN CONCENTRATION (µg/kg bw/day)	UB mean CONCENTRATION (µg/kg bw/day)	LB MEAN CONCENTRATION (µg/kg bw/day)	UB mean CONCENTRATION (µg/kg bw/day)
	Average consumers (µg/kg bw/day)	High consumers (µg/kg bw/day) (95th percentile)	Average consumers (µg/kg bw/day)	High consumers (µg/kg bw/day) (95th percentile)
			0.000	0.000
			0.001	0.002
4. RISK CHARACTERIZATION				
Infants 0-11 months Toddlers 12-35 months Other children 36 months-9 years Adolescents 10-17 years Adults 18-64 years Elderly 65-74years Very elderly 75 years and older	Non-genotoxic ACUTE HQ = Exposure/ARfD			
	LB MEAN CONCENTRATION	UB mean CONCENTRATION	Average consumers (µg/kg bw/day)	High consumers (µg/kg bw/day) (95th percentile)
Infants 0-11 months Toddlers 12-35 months Other children 36 months-9 years Adolescents 10-17 years Adults 18-64 years Elderly 65-74years Very elderly 75 years and older	Genotoxic compounds MOE = RP/chronic exposure			
	LB MEAN CONCENTRATION	UB MEAN CONCENTRATION	Average consumers	High consumers
	#DIV/0!	#DIV/0!	535.104	217.723
Infants 0-11 months Toddlers 12-35 months Other children 36 months-9 years Adolescents 10-17 years Adults 18-64 years Elderly 65-74years Very elderly 75 years and older	Non-genotoxic compounds HQ = chronic exposure/HBGV			
	LB MEAN CONCENTRATION	UB MEAN CONCENTRATION	Average consumers	High consumers
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Validating risk assessment toolkit for Aflatoxin B1 (AFB1) in maize consumption