STRENGTHENING AFLATOXIN CONTROL IN THE GAMBIA: POLICY RECOMMENDATIONS

BASED ON FINDINGS OF THE COUNTRY-LED SITUATION ANALYSIS AND ACTION PLANNING (C-SAAP) CONDUCTED FROM 2015 TO 2017 BY THE PARTNERSHIP FOR AFLATOXIN CONTROL IN AFRICA (PACA)

PACA
Partnership for Aflatoxin Control in Africa
Partenariat pour lutter contre l'aflatoxine en Afrique
Parceria para o Controle da Aflatoxina em África
الشراكة من أجل مكافحة الافلاتوكسين في أفريقيا

1. WHAT ARE AFLATOXINS?

Aflatoxins are highly toxic metabolites that affect the safety of food and feed in tropical and subtropical regions of the world, including The Gambia. They are mainly produced by *Aspergillus flavus* and *Aspergillus parasiticus* fungi that reside in soil. There are four types of aflatoxins that are important in health and agriculture: aflatoxin B_1, B_2, G_1 and G_2. Aflatoxin B_1 is the most common of the four types.

2. WHAT ARE THE HEALTH EFFECTS OF AFLATOXINS?

The health effects of aflatoxins can be categorized into two general forms: acute and chronic aflatoxicosis. Acute aflatoxicosis results from ingestion of food containing moderate to high levels of aflatoxins and is characterized by a rapid and obvious onset of toxic responses, including hemorrhaging, acute liver damage, edema (swelling), digestive difficulties, and possibly death, usually within a week of exposure. Chronic aflatoxicosis is experienced when individuals ingest low levels of aflatoxins in food over a long period. This is associated with immune suppression, low birth weight, impaired child growth and liver cancer. The biggest and best known health effect of aflatoxin is liver cancer. It is estimated that globally about 782,200 new cases of liver cancer occur yearly, and that 83% (648,200) of them occur in less developed countries, including African countries[1]. According to Liu and Wu[2], as high as 28.2% of the annual global liver cancer cases may be attributable to aflatoxin exposure and 40% of these cases occur in Africa, making liver cancer the top cause of cancer mortality in the continent. Aflatoxin B_1 is recognized by the International Agency for Research on Cancer of the World Health Organization (WHO) as one of the most toxic and carcinogenic substances found in nature.

3. WHAT ARE THE TRADE IMPACTS OF AFLATOXIN CONTAMINATION?

The Food and Agriculture Organization of the United Nations estimates that 25% of the food produced worldwide is contaminated with aflatoxins. Due to the increasing recognition of the impact of aflatoxins on human health, food regulatory authorities have set and enforced limits for aflatoxins in traded food. Stringent limits of 2 ppb for aflatoxin B_1 and 4 ppb for total aflatoxins in foods are enforced in the European Union (EU). In countries that fail to meet aflatoxin standards, foreign income from aflatoxin prone foods falls as exporters cannot access strategically important international markets. Africa is reported to lose more than US$ 670 million per year in export earnings due to the presence of aflatoxins in farm produce. If a country does not have or enforce aflatoxin regulations, contaminated foods which do not meet export standards will be sold in the domestic market or used for household consumption, increasing the health risks associated with aflatoxin exposure in local communities.

4. WHAT TYPES OF FOOD ARE PRONE TO AFLATOXIN CONTAMINATION?

Aspergillus spp. can colonize and contaminate a wide variety of food commodities with aflatoxins, including maize, rice and groundnuts, which are staple foods in The Gambia.

1 Ferlay, J., Soerjomataram, I., Dikshit, R., Eser ,S., Mathers, C., Rebelo, M., Parkin, D., Forman, D. and Bray, F. 2015. Cancer incidence and mortality worldwide: sources, methods and major patterns in GLOBOCAN 2012. *International Journal of Cancer* 136(5): E359-E386. Doi:10.1002/ijc.29210.

2 Liu, Y. and Wu, F. 2010. Global burden of aflatoxin-induced hepatocellular carcinoma: a risk assessment. *Environmental Health Perspectives* 118(6): 818-824

TABLE 1: VARIATION OF AFLATOXIN B_1 OCCURRENCE IN GROUNDNUTS ACROSS DIFFERENT REGIONS OF THE GAMBIA[3]

Region	Aflatoxin positive samples (%)	Range of AFB1 levels (ppb)	Mean AFB1 (ppb)	Samples exceeding maximum limit of 2ppb for AFB1 (%)
West Coast	65	1.60–1189	170.06	60
Lower River	30	1.55 – 7.53	2.19	20
Central River-South	65	2.92–218.6	33.56	100
Central River-North	70	6.48 –569.7	68.17	70
Upper River-South	50	2.24 –200.64	15.57	100
Upper River-North	75	0.79 –42.86	3.55	40
North Bank	55	16.35 –342.71	73.96	100

5. WHAT ARE THE GLOBAL REGIONS MOST AFFECTED BY THE AFLATOXIN CONTAMINATION PROBLEM?

Fungal growth and the formation of aflatoxins in food is influenced by climatic conditions. Regions and countries, such as The Gambia, located between 40°N and 40°S, have a climate that favors growth of the aflatoxin producing *Aspergillus* spp. and are thus chronically affected by aflatoxin contamination of food and feed.

6. AT WHAT STAGE ALONG THE FOOD CHAIN DOES AFLATOXIN CONTAMINATION OCCUR?

The risk of aflatoxin contamination begins during pre-harvest and can be worsened by inappropriate harvesting, handling, storage, processing, and transport practices. Drought, high temperature, low soil fertility, pest infestation and other stresses that affect plant growth and vigor increase the likelihood of fungal infection as well as the levels of aflatoxins produced by the *Aspergillus* fungi. Aflatoxin contamination can thus be prevented by application of good agricultural practices in crop cultivation and good management practices in post-harvest food handling.

7. TO WHAT EXTENT ARE GAMBIAN FOODS CONTAMINATED WITH AFLATOXINS?

The prevalence of aflatoxins in groundnut varies from 30% of all groundnuts produced in The Gambia's Lower River region to 75% in the Upper River-North region. In the North Bank, Central River-North, and Upper River–South regions, 100% of the positive samples recorded by PACA contained aflatoxin B_1 levels exceeding the EU maximum limit of 2 ppb (Table 1). In addition, nearly 100% of positive samples from the North Bank and Central River-North regions contained total aflatoxin levels exceeding the EU maximum limit of 4 ppb.

Hudson *et al.* (1992)[4] found that in The Gambia aflatoxin levels ranged from 2-35 ppb (with a mean of 9.7 ppb) in maize and 2-19 ppb (with a mean of 10.5 ppb) in cooked rice. However, there is urgent need for more recent information on aflatoxin contamination in maize and rice, as well as other important food sources in The Gambia.

8. TO WHAT EXTENT ARE GROUNDNUT, RICE AND MAIZE IMPORTANT FOR FOOD SECURITY AND TRADE IN THE GAMBIA?

Groundnut is one of The Gambia's staple foods and its principal export crop, constituting approximately 66% of the country's earnings from agricultural exports. The average per capita groundnut consumption in The Gambia is 77 g/day, while it is 302 g/day for rice and 22 g/day for maize.[5]

3 PACA. 2017. *Country-led Aflatoxin and Food Safety Situation Analysis and Action Planning for The Gambia: Final Report*, Partnership for Aflatoxin Control in Africa, African Union Commission

4 Hudson, G.J., Wild, C.P., Zarba, A. and Groopman, J.D. 1992. Aflatoxins isolated by immunoaffinity chromatography from foods consumed in The Gambia, West Africa. *Natural Toxins* 1: 100-105

5 Shephard, G.S. 2008. Risk assessment of aflatoxins in food in Africa. *Food Additives and Contaminants, Part A, Chemistry, Analysis, Control, Exposure and Risk Assessment* 25: 1246-1256

9. WHAT IS THE EXTENT OF AFLATOXIN EXPOSURE AMONG THE PEOPLE OF THE GAMBIA?

Assuming an individual in The Gambia consumes groundnut on a daily basis, aflatoxin exposure can be as high as 155.3 ng/kg body weight (bw) per day. However, it should be noted that dietary exposure to aflatoxins among people in The Gambia may be higher than this estimate because a person is likely to consume maize, rice, millet, sorghum and findo, in addition to groundnuts, all of which are likely to contain aflatoxins.

10. WHAT IS THE RISK OF DEVELOPING AFLATOXIN-INDUCED LIVER CANCER IN THE GAMBIA?

The risk of developing liver cancer (when individuals are exposed to aflatoxins) is 30 times higher in people exposed to the hepatitis B Virus (HBV) compared to those who are not. In The Gambia about 15% of the population is HBV positive[5].

In view of the estimated aflatoxin exposure of 155.3 ng/kg bw/day as a result of groundnut consumption in The Gambia and based on the HBV prevalence of 15% for the population, the risk of liver cancer is 8.3 cases per 100,000 people. Given the population of The Gambia, which was 1.928,000 in 2013[6], it was estimated that there could be 160 new liver cancer cases in the country each year.

11. WHAT IS THE ECONOMIC IMPACT OF AFLATOXIN-INDUCED LIVER CANCER IN THE GAMBIA?

The annual economic impact of the 160 liver cancer cases was estimated to be as high as US$ 22.5 million. This value was estimated using the transferred value per statistical life (VSL) method and assuming that all of the annual aflatoxin-induced liver cancer cases result in death within three months.

6 Gambia Bureau of Statistics. 2013. *Population and Housing Census of Gambia, 2013*. Banjul , Republic of The Gambia. http://www.gbos.gov.gm

12. WHAT IS THE IMPACT OF AFLATOXINS ON THE GAMBIA'S PARTICIPATION IN THE INTERNATIONAL TRADE OF GROUNDNUTS?

Based on notifications from the EU Rapid Alert System for Food and Feed (RASFF), there were cases when The Gambia's groundnut exports were rejected by the EU between 2012 and 2015, due to aflatoxin contamination levels above the EU limit of 4 ppb (for confectionery) and 10 ppb (for bird feed). The few cases of rejection were a blow to the exporters in question, but more importantly undermine business confidence and lead to further decline of groundnut export from The Gambia.

13. WHAT ARE THE PACA SUPPORTED INITIATIVES TO CONTROL AFLATOXINS IN THE GAMBIA?

PACA supported the country-led situation analysis and action planning (C-SAAP) for control of aflatoxins along the groundnut, rice and maize value chains in The Gambia. The policy recommendations in this document are based on the outcomes of the C-SAAP. Additionally, in partnership with key institutions in The Gambia, PACA is generating and sharing data under the framework of the Africa Aflatoxin Information Management System (AfricaAIMS) initiative. AfricaAIMS generates data on aflatoxin contamination in groundnut, rice and maize, as well as on other aflatoxin related issues in the health and trade sectors. The initiative's key objective is to provide locally relevant, home grown and reliable evidence to facilitate informed decisions on policies, food safety regulations and standards, mitigation interventions (e.g. educational and technological), resource allocation, and advocacy and awareness raising activities by the Gambian government and other stakeholders. Local capacity building, through the provision of equipment and training of personnel, is central to AfricaAIMS.

PACA also provided catalytic support to develop a resource mobilization strategy and convene business meetings to enhance ownership and financing of the national aflatoxin control plan. PACA's catalytic support extends to convening aflatoxin working groups to spearhead planning and implementation of aflatoxin mitigation actions at the country level. In order to ensure that these efforts are well coordinated, PACA has hired a country officer who is hosted by the Food Safety and Quality Authority (FSQA) of The Gambia. PACA shall provide ongoing support to track progress in the implementation of the national aflatoxin control plan.

14. WHAT ARE THE ROLES OF KEY INSTITUTIONS INVOLVED IN DELIVERY OF FOOD SAFETY CONTROL SERVICES IN THE GAMBIA?

a. **The Food Safety and Quality Authority**
The FSQA, an agency under the Vice President's Office, is responsible for coordination of food safety regulatory services in the country. The Authority performs its functions under the Food Safety and Quality Act, 2011. FSQA is also responsible for the surveillance and monitoring of food and feed safety hazards, including aflatoxins. FSQA utilizes standards set by The Gambia Standards Bureau.

b. **The Gambia Standards Bureau**
Setting food standards is the mandate of The Gambia Standards Bureau, which delivers its functions in accordance with The Gambia Standards Act, 2010. The bureau has already prescribed national standards for groundnuts and maize that include maximum limits (MLs) for aflatoxins as set by the Codex Alimentarius Commission (GAMX Codex Standard 200-1915). The Codex ML for aflatoxin contamination in groundnuts for further processing is 15 ppb, but the Commission has not yet set an aflatoxin limit for maize.

c. **National Agricultural Research Institute (NARI)**
Food analysis services in The Gambia are provided by NARI, which has a laboratory with the capacity for analysis of aflatoxins, although the method has not been accredited. A recent assessment of the laboratory by both an EU-funded program (EDES - Strengthening Food Safety Systems through SPS measures) and FSQA concluded that the laboratory has deficiencies in terms of staff competencies, design, structure and facilities. Since 2015, PACA has provided equipment and trained personnel in order to strengthen NARI's capacity for aflatoxin analysis.

d. **Department of Agriculture**
The Plant Protection Services offers plant health services, under the Ministry of Agriculture. It is responsible for preventing the introduction and spread of plant pests and diseases, as well as the promotion of appropriate phytosanitary measures with the aim of facilitating trade in plants and plant products.

e. **Department of Livestock Services**
The Department of Livestock Services provides animal health and extension services to livestock farmers under the Ministry of Agriculture. It also collects livestock production and health data in accordance with the Diseases of Animals Act (1944). It is possible to intervene in the aflatoxin safety of animal feeds through this Department as a way to improve animal productivity and the safety of livestock food products.

f. **The National Nutrition Agency (NaNA)**
NaNA, under The Gambia's Office of the Vice President, is responsible for the coordination of nutrition research, policy planning and program implementation. The Agency is the primary implementer of the National Nutrition Policy (2010-2020). However, aflatoxin issues are not articulated in the objectives, strategies and programs of this policy.

g. **Ministry of Trade, Industry, Regional Integration & Employment**
The Ministry of Trade, Industry, Regional Integration & Employment in The Gambia is responsible for the facilitation of internal and external trade. The Ministry delivers its services in accordance with the Trade Policy (2011). However, there are no statements promoting food and feed safety in the Policy. Such policy statements are necessary for The Gambia to be competitive and increase its access to major markets while complying with its obligation under the World Trade Organization – Sanitary and Phytosanitary (WTO SPS) agreement to trade in food.

15. WHAT IS THE LEVEL OF AWARENESS AND KNOWLEDGE OF AFLATOXINS AMONG GAMBIANS?

In The Gambia, the level of aflatoxin awareness is higher among groundnut sector actors compared to maize or rice sector actors. In the groundnut sector, 50% of producers, household processors and exporters are aware of the problem. The awareness level among maize and rice value chain actors, consulted in the course of the C-SAAP work, was found to be 25%. Members of consumer associations have very low awareness about the health implications associated with the consumption of aflatoxin contaminated foods.

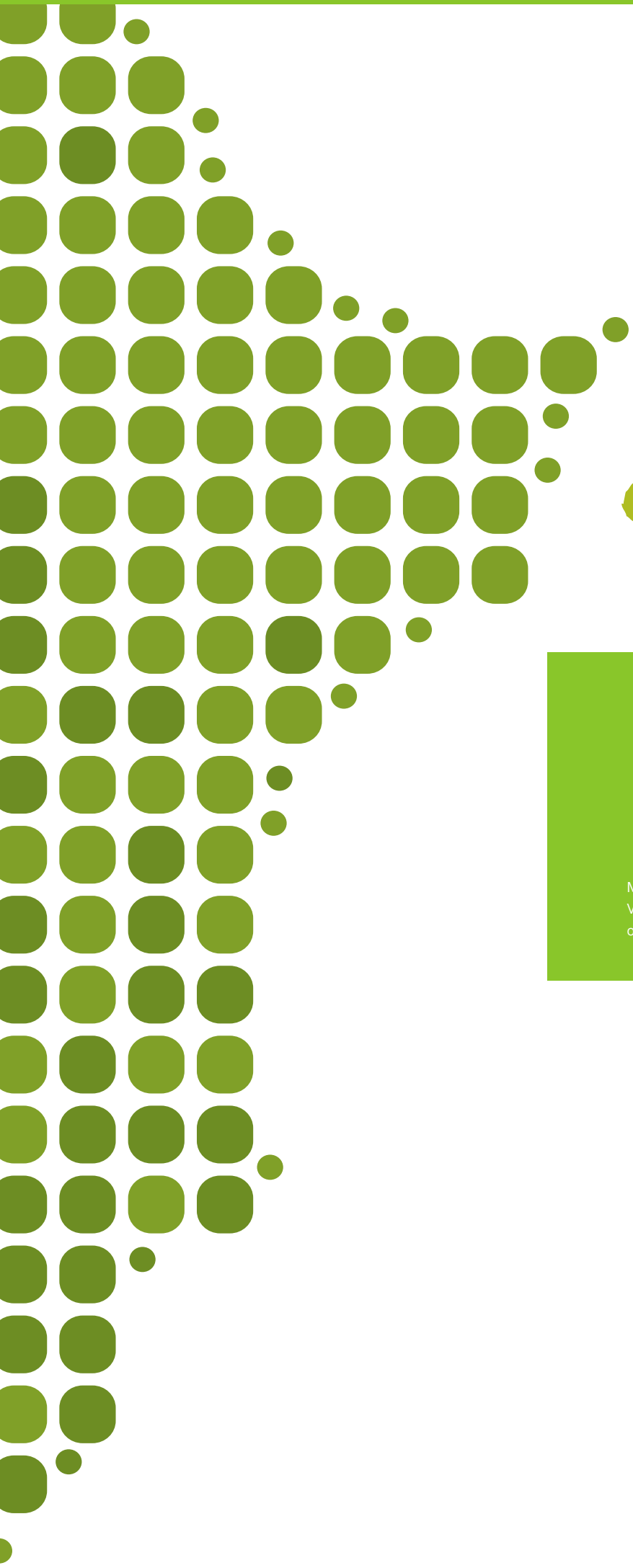
16. EVIDENCE-BASED POLICY RECOMMENDATIONS FOR THE MITIGATION OF THE AFLATOXIN PROBLEM IN THE GAMBIA

Based on the identified gaps in aflatoxin control in The Gambia, a set of recommendations were developed by the C-SAAP and validated by stakeholders. The recommendations are categorized into six groups (Table 2).

7 Based on the findings of the C-SAAP: PACA. 2017. *Country-led Aflatoxin and Food Safety Situation Analysis and Action Planning for The Gambia: Final Report*, Partnership for Aflatoxin Control in Africa, African Union Commission

TABLE 2: STRATEGIC RECOMMENDATIONS FOR MITIGATION OF THE AFLATOXIN CHALLENGE IN THE GAMBIA[7]

Advocacy and awareness raising
1. Develop and implement a national aflatoxin communication strategy
2. Develop key messages in local languages to suit the needs of all communities
3. Identify a platform for exchanging and disseminating aflatoxin messages
Farm level operations
4. Enhance and expand the Groundnut Farmers Field Schools initiative to maize and rice value chains
5. Include aflatoxin mitigation in the work plans of public extension services
6. Facilitate access to credit, inputs and certified seeds
7. Make an inventory of indigenous knowledge and technologies used to prevent mold infection, validate their effectiveness and promote their use to mitigate aflatoxins
8. Explore the opportunities for the sustainable production and utilization of Aflasafe as a bio-control technology to mitigate aflatoxins
Transportation and processor interventions
9. FSQA to strengthen regulation of the safety and quality of domestic, import and export food
10. FSQA to delegate the regulation of aflatoxins along the key agricultural value chains to competent bodies, where necessary
11. FSQA to approve laboratories to be used for official controls, including those for aflatoxins
Policy improvement
12. Integrate cancer and HBV in the Integrated Disease Surveillance and Response program of the National Health Policy
13. Improve the National Cancer Registry to allow disaggregation by age, gender and occupation
14. Ensure that trade policy acknowledges The Gambia's obligation under the WTO SPS agreement relating to trade in food
15. Finalize the National Food Safety and Quality Policy
16. Develop regulations to facilitate the implementation of the Food Safety and Quality Act
Institutional capacity building
17. Recruit sufficient numbers of qualified staff for the FSQA and provide continuous training as needed
18. Develop regulations for food safety and quality, including MLs for aflatoxins
19. Mobilize resources for food safety through fees and charges from licenses and certificates for food businesses
20. Establish a national food safety information network, which incorporates AfricaAIMS
21. Strengthen the capacity of the Stakeholders Consultative Forum to carry out its mandate and responsibilities, and address the gaps in aflatoxin control identified
22. NaNA to broaden its interventions to include awareness raising and promote the consumption of foods less prone to aflatoxin contamination
23. Mainstream aflatoxin in the national curriculum of the education system
Private sector engagement
24. Build capacities to implement standards and codes of practice for aflatoxin control in the private sector
25. Facilitate private sector access to mitigation technologies targeting different segments of agricultural value chains
26. Support relevant civil society organizations to build their capacities to engage in aflatoxin control programs
27. Build the capacities of consumer organizations to enhance their knowledge on the implications of aflatoxins for consumer health
28. Build the capacities of consumer organizations in advocacy skills so that they can develop messages and campaign to raise awareness about the risks of aflatoxins



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Visit www.aflatoxinpartnership.org
or contact paca@africa-union.org