Building an Aflatoxin Safe East African Community

Technical Policy Paper 11

Five-Year Communication Strategy for an Aflatoxin Safe East African Community

Knowledge Platform 2015

Situational Analysis

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On the cover: Mobile phones and radios are vital tools for smallholder farmers, delivering daily weather forecasts and information on market prices to help them better adapt to a changing climate. Photo: *N.Palmer, CIAT*.

Foreword

Clear, accurate, and effective communications are pivotal to the EAC realizing our vision for an "aflatoxin safe East African Community "(EAC) over the next 5 years. To achieve this vision our communications must be context specific, culturally appropriate, reflect gender sensitivity and be delivered through indigenous languages. To be accurate, they must be based on scientific evidence blended thoughtfully with both the perceptions and the realities of daily life. And to be effective, they must motivate listeners to not only absorb information, but to act positively upon it. Achieving these ideals across the diverse fields of health, agriculture, trade, and environment is challenging, but possible. In development of this communication strategy, we have called upon both communications and technical experts across East Africa to help construct this framework upon which we can move forward together. This paper is meant to provide the framework and a brief situational analysis for each of the EAC partner states of Burundi, Kenya, Rwanda, Tanzania, and Uganda to inform and influence policy, build awareness, formulate programs, encourage social change, and promote individual behaviors across a wide spectrum of stakeholders to mitigate aflatoxin risks.

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Executive Summary

This "Five-Year Communications Strategy for an Aflatoxin Safe East African Community" presents a regional strategic communications framework designed to influence public policy development, inform the migration of policies into programs and activities, encourage social change, and promote individual behaviors across the wide spectrum of stakeholders that can facilitate cost-effective, efficient, and sustainable reductions in aflatoxin exposure. It is meant to help build awareness, drive information sharing, support interagency and inter-sector coordination, and advance policy and program implementation across the five EAC partner states to mitigate aflatoxin risks and strengthen food safety systems. The strategy is a regional strategy. It is not meant to drill down to the details of national and local aflatoxin communication planning and implementation. Instead, this strategy is designed to take advantage of the special role and vantage points of the EAC as a critical regional entity focused on political integration and the consolidation of regional economic cooperation.

The communications strategy is grounded in the scientific knowledge base and policy recommendations established through the development of 11 technical papers on aflatoxin. The technical papers and policy recommendations were produced by a team of international and regional experts, collaborating with the relevant EAC expert working groups and the International Institute of Tropical Agriculture (IITA). Each paper summarizes research from the published literature and reflects the findings of situational analyses conducted across the five EAC partner states of Burundi, Kenya, Rwanda, Tanzania, and Uganda. The technical papers describe the currently known impacts of aflatoxin across the core topics of human and animal health, good agricultural practices (GAPs), regional standards for food and feed, alternative uses and disposal systems, and economic impacts on trade. They make specific recommendations for a comprehensive policy framework for the EAC.

The technical papers also underscore the complexity of aflatoxin control and the need for cross-cutting participation from the health, agriculture, environment, and trade sectors—as well as the commitment of regional bodies, government ministries, and policy makers within the EAC partner states. They further emphasize the importance of engaging with donors and other potential partners that are addressing related issues, such as improved livelihoods, natural resource management, climate change, and famine early warning systems, which closely link to successful aflatoxin abatement efforts.

The communications strategy identifies the types of key stakeholders to be involved at the regional, national, and local levels, ranging from leading government entities and international organizations to the private sector, producer and trader associations, local groups, and civil society. It describes how to support their effective participation and feedback, and it brings together the strengths of both top-down and bottom-up approaches to distinguish between initiatives that need to be undertaken at national or regional levels and those that should be

addressed more locally. It further provides a synthesis of critical issues and pathways of information needed among these groups to realize an aflatoxin safe EAC.

One key objective of the communications strategy is to establish linkages between the regional framework and targeted national communications plans that will reflect country-level needs, opportunities, and priorities. It outlines the program and policy objectives to be supported by communication activities across each of the four sectors of agriculture, health, environment, and trade. Distinctions are made between short-, medium-, and long-term objectives and activities. For example, short-term activities can focus on dietary diversity and the integration of aflatoxin alerts into early warning systems, while medium-term objectives could include the integration of diagnosis and care of aflatoxicosis into medical and nursing school curricula. The realization of a fully functional regulatory environment would be an example of a longer term objective.

The framework also identifies key positive behaviors, such as those related to GAPs, hepatitis A and B vaccination, or access to affordable aflatoxin testing, to be promoted across the four sectors in the design of country-level communications plans. Suggested multi-level communication channels are included for each sector ranging from mass media, "edutainment," and special events to the use of SMS, school-based programs, folk media, and linkages with other related public outreach programs.

The importance of feedback mechanisms is highlighted, along with monitoring and evaluation (M&E) to capture stakeholder inputs that can further inform policy and program implementation, support shared learning, and increase the relevance and effectiveness of communications activities. Recommendations are made for regular regional meetings so that national and regional representatives can share lessons learned, best practices, and innovative ideas to enhance regional coordination and capacity for building an aflatoxin safe EAC.

Finally, the strategy presents aflatoxin policy recommendations for each of the sectors of health, agriculture, trade, and environment. The recommendations are derived from the findings of the technical papers and situational analyses, and they provide a regional policy framework for the development and implementation of responsive programs and activities at regional, national, community, and household levels.

Introduction

Background

Aflatoxin: A Public Health Emergency with Economic Consequences

Aflatoxin is a poisonous substance produced by the *Aspergillus flavus* fungus. There are four main types of aflatoxin: aflatoxin B1, aflatoxin B2, aflatoxin G1, and aflatoxin G2. Aflatoxin B1 is the most potent and the most prevalent. Aflatoxin contaminates common food crops, such as maize, groundnuts, and cassava, as well as important cash crops like chili peppers and seed oils. Aflatoxin is transmitted to livestock through exposed feed, which can in turn contaminate milk, poultry, farmed fish, and other animal products.

Aflatoxin is a carcinogen. High concentrations in food or feed cause severe illness and can lead to immediate death. In humans, chronic exposure to lower levels of the toxin leads to immune deficiency, childhood stunting, low birth weight babies, and increased rates of liver disease and cancer (Wu, Harrod et al. 2011). It also compromises health and production among livestock (IITA 2015). However, because aflatoxin is invisible, tasteless, and odorless, it is difficult to detect.

The threat of aflatoxin is both urgent and pervasive. It affects 25 percent of the world's food crops and touches an estimated *4.5 billion* men, women, and children worldwide, regardless of socioeconomic status, education levels, occupation, age, and gender (Williams et al. 2004; Cast 2003). Aflatoxin impacts the entire food chain from "field to fork," affecting production, storage, processing, trade, and consumption of both plant and animal products. Its impacts on human health, livestock, agricultural production, the environment, and trade are extensive and overlapping.

Aflatoxin in East Africa

Aflatoxin is endemic in the EAC, which presents the ideal environmental conditions for the *Aspergillus* fungi, particularly in arid and semi-arid areas. The fungi thrive in drought-prone environments, which weaken plants' resistance, as well as in poor post-harvest conditions, where pests, humidity, and temperatures are not well controlled. Additional environmental stresses, such as high heat, poor soil fertility, or insect damage to crops, also promote aflatoxin contamination.

A weak regulatory environment—characterized by a lack of resources and infrastructure for testing, monitoring, and control—further contributes to high exposure levels. Reluctance on the part of the private sector to incur the additional costs of tighter food safety standards is a challenge, particularly in the absence of either sanctions or price differentiation for aflatoxin safe products. In this context, aflatoxin-contaminated foods and feed move through the food chain largely unchecked. In addition, a vast majority of people in the East Africa region consumes food they grow themselves or that is traded on the informal market (IITA 2015). These high levels of on-farm consumption present a significant challenge for the monitoring of aflatoxin in households diets.

As a result of all these factors, both food and feed in the East Africa region often exceed safe limits, leading to widespread chronic exposure among humans and animals.

Episodes of acute aflatoxin poisoning, known as aflatoxicosis, occur regularly—most notably in eastern Kenya, where they have resulted in hundreds of human deaths (IITA 2015; CDC 2004). Moreover, epidemiologists warn that further cases or clusters of aflatoxin poisoning likely go unrecognized, and that for every identified case of aflatoxicosis, there are probably several other persons who have been exposed to unsafe levels and are at risk of adverse consequences (CDC 2004).

Aflatoxin also carries heavy costs in terms of livestock production. Aflatoxin exposure in animals leads to immunosuppression, higher disease risk, decreases in fertility and productivity, and increased deaths. Pigs, ducks, and rabbits are most vulnerable to aflatoxin, followed by turkeys, sheep, and calves. Chickens and cattle are more resistant, and fish vary according to the species.

Impact on Staple Foods

Some of the foods most susceptible to aflatoxin exposure are also major staples in East Africa, including maize, milk, groundnuts, and cassava. Other affected commodities include dried fish, dried fruits, beans, tree nuts, yams, chili peppers, rice, wheat, millet, sorghum, and cottonseed. The presence of aflatoxin in key staple foods is especially insidious as it threatens the food security and livelihoods of those people—many of them poor—who depend on these foods the most. For example, 90 percent of the rural households in Kenya grow maize, and the average Kenyan consumes 400 g of maize per person each day. In Tanzania, 85 percent of the population depends on maize for their food and livelihood, and average maize consumption is 144 g per person each day. Milk consumption is at the center of nutrition and development initiatives in Rwanda, which are promoting a policy of "one cow per poor family." Average milk consumption in Rwanda is 38 kg per person each year, and it is even higher in Kenya, Uganda, and Tanzania, where the averages are 145 kg, 53 kg, and 42 kg per person per year, respectively. In Uganda, tubers such as cassava make up a significant portion of daily calories, and groundnuts are the third most important staple crop. Likewise, cassava is a key staple for over 85 percent of households in Burundi.

At-Risk Foods for Aflatoxin: The list of foods at high risk of aflatoxin contamination includes key dietary staples for East Africa, such as maize, milk, groundnuts, cassava, and their products. Other susceptible foods and commodities include dried fish, dried fruits, beans, tree nuts, yams, chili peppers, rice, wheat, millet, sorghum, and cottonseed.

In addition, most people in rural areas rely on food that is either home grown or purchased from markets in which food is not checked for aflatoxin contamination. As a result, aflatoxin-contaminated foods and animal feed move through the food chain largely unchecked. Estimates of aflatoxin contamination in staple foods are as high as 60 percent in some areas within the EAC.

Special Populations

While aflatoxin exposure is potentially harmful to people of every age and walk of life, certain populations are especially at risk. Infants are very susceptible to aflatoxin contamination, particularly during the first 1,000 days of life, from conception to age 2 years. They can be exposed to aflatoxin during pregnancy, through breastfeeding, and with the introduction of maize,

groundnut, or milk-based baby foods that are often highly contaminated. Such early exposure can lead to health problems and developmental delays that carry through childhood into adulthood (Hoffman, Jones, Leroy 2014; Terry and Susser 2001). Likewise, individuals infected with HIV or hepatitis, and those with compromised immune systems, are more vulnerable to the effects of aflatoxin exposure. It may accelerate disease progression and heighten the risk of liver cancer.

Field to Fork

As illustrated in **Figure 1**, below, the pathway to aflatoxin exposure starts at the very beginning of the food value chain when susceptible crops are planted in contaminated soils. Additional environmental conditions, such as drought, pests, and poor soil fertility, produce stress in the plants and make them more susceptible to the Aspergillus flavus fungi. Exposure may be further aggravated by poor agricultural practices affecting crop and land management, or inadequate post-harvest conditions that promote the development of aflatoxin.

Aflatoxin can pass directly to humans through the consumption of food from contaminated crops or reach them indirectly when they eat or drink animal products that have been exposed to contaminated feed. By-products from both maize and groundnuts are commonly used as animal feeds, as are stocks of products deemed unfit for human consumption. Further dissemination of aflatoxin can occur through the processing, sale and trade, and inappropriate reuse or disposal of tainted products. Thus, problems that start in farmers' fields have outcomes that extend across species, sectors, and geographic boundaries.

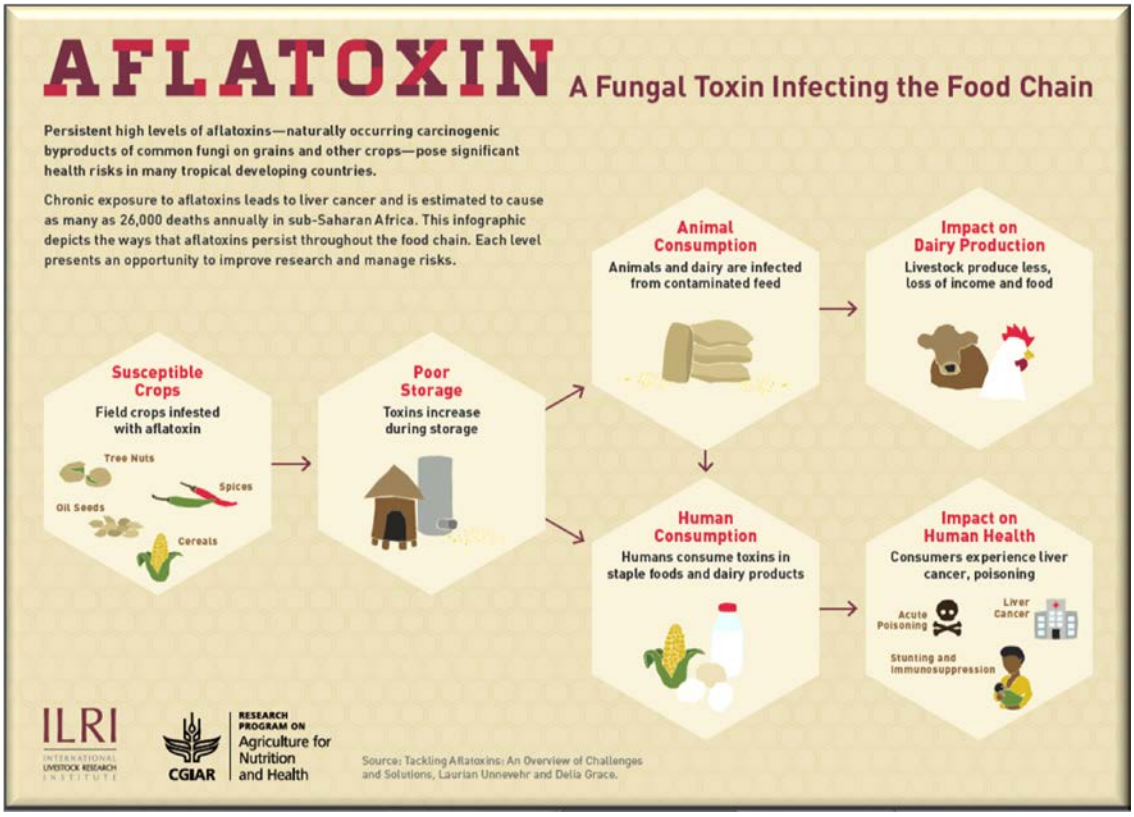

Figure 1: Aflatoxin - A fungal toxin infecting the food chain

Mitigation

Although aflatoxin is endemic in tropical soils, there are numerous measures that can mitigate its spread and contamination across the food chain (**Table 1**). For example, the better tracking of aflatoxin hot spots through the integration of aflatoxin analysis into food security forecasting models can inform planting practices, potentially avoiding the production of the most at-risk crops in the most high-risk areas.

GAPs such as proper soil preparation, integrated pest management, crop rotation, and the development and dissemination of crop varieties that are more resistant to drought, pests, or disease can significantly inhibit the growth and accumulation of the Aspergillus flavus toxin. Good post-harvest practices, including proper storage, transport, and processing, are critical, too, as this is a particularly vulnerable point for contamination of both food and animal feed. Additional post-consumption interventions for humans or livestock exist as well, such as the use of dietary additives to lower aflatoxin absorption or inhibit its metabolism after ingestion.

The use of biological control products in farmers' fields has been proven to be very effective at reducing aflatoxin contamination where it first takes hold. The process involves the application of non-toxic varieties of the Aspergillus flavus fungus to the fields to push out and replace the toxin-producing varieties. The biocontrol product AflaSafe™ has been specially developed for African conditions, with demonstrated reductions in aflatoxin contamination in Kenyan fields of 75 percent or more.

Health interventions, such as vaccination against hepatitis A and B, diet diversification to include foods less susceptible to aflatoxin contamination, and early diagnosis and detoxification also represent mitigation activities that can be promoted through policies, programs, and individual-level behavior changes.

Further mitigation practices include the identification and isolation of contaminated products. Depending on their levels of contamination, some crops may be appropriate for alternative uses, such as animal feed or biofuel. Others will need to be disposed of properly to ensure they do not migrate back into the food chain through resale in informal markets.

Table 1: Examples of mitigation behaviors and strategies

Setting		Intervention
Agricultural	Pre-harvest	Choice of suitable cultivars Breeding for resistance (e.g., drought, pests, flood) Biocontrol Agro-chemical control: pesticides Good agricultural practices: soil and water management, timing of planting and harvest, crop management Antioxidants (e.g., caffeic acid, gallic acid)
	Post-harvest	Cleaning Improved storage / drying / transportation conditions Affordable, effective, easy-to-use testing Chemical control (insecticides, fungicides) Sorting and segregation
	Processing	Processing (e.g., peanut oil from groundnuts)
Dietary		Dietary diversification away from high-risk crops and food products Extended breastfeeding, delay of solid food introduction Green tea polyphenols
Clinical		Hepatitis A and B vaccinations Early diagnosis and treatment of aflatoxin exposure Nutrition education
Forecasting		Integration of aflatoxin surveillance in early warning systems (e.g., FEWSNET, FAO Early Warning)

Adapted from Wu and Khlangwiset 2010.

Clearly, the control and prevention of aflatoxin represent a complex undertaking that requires cross-cutting cooperation, attention, and approaches ranging from the local to the national, regional, and international levels. Participation from each affected sector is critical, as is the multisectoral commitment of regional bodies and government ministries within the EAC partner states. Other important partners include donors and other entities that are addressing issues, such as climate change adaptation or cancer prevention, which overlap with aflatoxin abatement efforts.

Rationale for the EAC Aflatoxin Communication Strategy

Aflatoxin contamination presents a significant obstacle to the boosting of national food security, nutrition, and poverty reduction in East African countries, which depend largely on farming and herding as a major source of food, employment, and trade. Agricultural production constitutes the main economic activity and source of income for rural households, especially women. It is at the forefront of national economic growth plans and generates a large portion of national trade and export revenues: 85 percent in Tanzania, 70 percent in Rwanda and Uganda, 65 percent in Kenya, and 40 percent in Burundi (Tanzania Economy Profile 2014; Burundi Economy Profile 2014; Kenya Institute for Public Policy Research and Analysis 2013; FAO; Rwanda Development Board). However, the East African region has lost most of its trade shares in the global marketplace for

aflatoxin-prone crops, due to the inability to meet rigorous European and North American aflatoxin standards. Affected crops include major export commodities ranging from cereals and nuts to dried fruits, spices, coffee beans, and cottonseed.

Prevalence at Crisis Levels

The threat of aflatoxin represents a crisis of truly staggering scale. Numerous sampling studies suggest that the costs and burdens of aflatoxin are heavily compromising the health, economies, environment, growth perspectives, and future generations of African countries.

Comparative exposure studies have found detectable levels of aflatoxin in over 90 percent of young children in Gambia and Benin, with high exposure in all age groups (Gong, Egal et al. 2003; Gong, Hounsa et al. 2004). In Tanzania, studies of blood samples from children under the age of 2 years and from the milk of breastfeeding mothers found that 67–100 percent contained aflatoxin and other mycotoxins. In Kenya, the U.S. Centers for Disease Control and Prevention (CDC) carried out aflatoxin studies as part of the Kenya AIDS Indicator Survey (KAIS) of 2011, and found that approximately 80 percent of participants had detectable levels (Yard et al. 2013).

Studies of aflatoxin contamination in staple foods consistently show unsafe levels as well. The EAC has harmonized standards for safe minimal levels of aflatoxin in 42 different staple foods. They include the most commonly traded and consumed commodities in the region. The limit for total aflatoxins is set at 10 parts per billion (ppb), with a limit of 5 ppb for aflatoxin B1 (IITA 2015).

Four separate studies in Uganda undertaken during the 1990s found levels in staple foods above the maximum 20 ppb allowed at the time, particularly in groundnuts and groundnut products (Kaaya and Warren 2005; Kitya et al. 2005). Baby foods were of particular concern as the more affordable ones are locally manufactured, commonly use groundnuts, and are not regulated. Similarly, testing studies in Kenya have found high levels (38%) of contamination in peanut samples (Mutegi et al. 2010). An assessment of maize samples in Eastern Kenya found aflatoxin levels exceeding 20 ppb in 41 percent and 51 percent of samples for 2005 and 2006, which were aflatoxin outbreak years. The highest levels were found in homegrown maize samples (Daniel, Lewis et al. 2011; Kimanya et al. 2014). Aflatoxin contamination has been reported in studies on maize in Tanzania, as well as in locally processed fish (Shirima et al. 2013). Locally brewed alcoholic beverages made from aflatoxin-susceptible crops are of concern in Tanzania and other parts of East Africa, as they are commonly consumed and untested.

The attendant costs of aflatoxin exposure are significant. Health costs can be measured in terms of premature death, morbidity, pain, suffering, anxiety, and reduction of quality of life. A study in Tanzania assessing the long-term effects of child stunting found cost estimates reaching into the billions of dollars in terms of lost human productivity. Estimated costs associated with reductions in disability-adjusted life years (DALYs) due to aflatoxin-related liver cancer cases, alone, equal $18,000–$72,000 in Burundi; $49,000–$207,000 in Kenya; $33,000–$134,000 in Rwanda; $37,000–$161,000 in Tanzania; and $31,000–$128,000 in Uganda. Trade costs, due to lost revenues from rejected food exports, are estimated to total some $1.2 billion per year for the African continent.

The report from a 2014 COMESA Regional Workshop on Aflatoxin in Eastern and Southern Africa puts it this way (COMESA 2014):

The aflatoxin challenge constitutes a significant threat to food and economic security, and undermines poverty eradication in Africa. It is a major cause of post-harvest loss that further constrains the quantum of food reaching our markets and households across the African continent. In addition, aflatoxin poses a major public health challenge to consumers all over the continent and can result in foregone revenues and profit from domestic and regional commerce and international trade.

From the regional and national perspectives, aflatoxin needs to be treated with the same urgency as any other public health epidemic. In terms of funding allocations, program planning and coordination, partnership building, and public policy development and implementation, aflatoxin must be addressed as a top priority.

Awareness

In spite of the spread and significance of its threat, public awareness of the risks and prevalence of aflatoxin remains negligible. Aflatoxin is difficult to detect and often co-exists with more high-profile priorities, such as HIV/AIDS, food security concerns, business interests, and economic development, which may overshadow its importance. Apart from Kenya, where outbreaks of acute aflatoxin poisoning have garnered media attention, there is very low awareness of aflatoxin occurrence in foods and its negative health effects (Kaaya and Muduuli 1992; Abt Associates and TFDA 2012; Yard et al. 2013). Moreover, low-risk perception regarding aflatoxin is shared across a full spectrum of stakeholders from food producers and consumers to all levels of public and private influencers and decision makers. Even in Kenya, where more people are apt to have heard of aflatoxin due to periodic outbreaks of severe aflatoxin poisoning, awareness does not translate into reduced exposure to aflatoxin-contaminated food or to a clear understanding of the risks and actions needed to address them (Daniel et al. 2011).

Enforcement

The enforcement of standards for aflatoxin control is plagued by numerous challenges. Staff and technical capacity are insufficient, and awareness levels are low among regulatory and inspection agents. There is poor interagency coordination and a lack of clarity on the roles and responsibilities of food regulatory bodies. Weak inspection capacity is aggravated by a shortage of accessible testing technology. When potentially contaminated commodities are scrutinized, control is hindered by the lack of standardized testing protocols for quality control, the sparse availability of appropriate laboratory facilities, and the associated costs. In cases where contaminated commodities are rejected, they are seldom disposed of properly. More often, the rejected products end up making their way back into the informal marketplace to be sold to low-income consumers or used as animal feed. Only large-scale commercial exporters that target global markets are likely to comply with strict safety standards to avoid the risk of significant financial losses.

As a result, markets, trade, and the food processing industry remain largely unregulated. Further complicating the situation are the high proportions of food and feed that are produced and used directly on the farm, without passing through any formal system or set of controls (IITA 2015).

Strategic Communications as an Integral Part of the Aflatoxin Agenda

There is no vaccine against resistance or refusals that are rooted in social-cultural, religious, and political contexts. No supply chain can overcome issues of gender-based decision making in households. Medical approaches alone cannot address certain community concerns. These challenges demand effective communication action (Obregón et al. 2009).

Communications is a critical component of any initiative or agenda aimed at trying to effect changes in individual behaviors, among social groups, or within political systems. It is central to building the active involvement and cooperation of the key stakeholders needed for migrating policy and program objectives into tangible outcomes. Both the Organization for Economic Co-operation and Development (OECD) and United Nations Development Programme (UNDP) regard communications and awareness raising as part of the nine core mechanisms needed to support strategy processes for sustainable development. It is considered a prerequisite and instrument of effective policy making and public participation, from the formulation of a vision through negotiation, decision making, planning, implementation, and monitoring of impacts (GTZ 2006).

In recent years, the science of communication has evolved. It has moved beyond a focus solely on awareness raising to also encompass the stimulation of positive changes in attitudes and practices that can create lasting social change. It has become more strategic, evidence-based, and participatory. The "strategic" aspect is proactive and results-oriented, based on identified objectives. The design of communications strategies thus entails considerable analyses of existing knowledge and needs, key stakeholders and their interconnections, and potential communications channels and partners. It also incorporates the identification of challenges and opportunities that may be unforeseen by planners and decision makers (Ramírez and Quarry 2004).

Strategic communications supports the effective participation of key stakeholders at various levels to inform the process and keep it relevant, while promoting the engagement of key planners, decision makers, and end users. Stakeholder input is critical for doing such things as assessing needs, sharing ideas, ranking solutions, forming partnerships, addressing potential conflicts, and spurring innovation.

Strategic communications thus aims to reflect relevant cultures, contexts, constraints, and opportunities. It favors a multiplicity of communications approaches to foster the sharing and uptake of new knowledge, technologies, and practices. It brings together the strengths of both top-down and bottom-up approaches to distinguish between initiatives that need to be undertaken at national or regional levels and those that should be addressed more locally. Ultimately, strategic communications helps to foster social awareness, contribute to evidence-based policy, and build shared understanding that can lead to social and behavioral changes (UNICEF 2005).

As the acknowledgment of the importance of strategic communications has grown, so too has the understanding that it must be properly integrated into programs and policies, and that it needs to be well funded (UNICEF 2005). Examples of ways strategic communication helps to achieve the objectives of complex agendas include:

- Fostering public participation in the change process, which drives motivation and increases sustainability, and without which no amount of investment or technology and inputs will bring about lasting improvements
- Creating opportunities for shared dialog and debate to take into account the needs, attitudes, and knowledge of key stakeholders
- Building trust through dialog with stakeholders and partners
- Helping people at all levels to recognize important issues and find common ground for action
- Advising stakeholders about new ideas and methods and promoting the transfer of skills and knowledge that will enhance their uptake
- Infusing training and teaching curricula with new knowledge, findings, or technologies
- Helping to secure political will by mobilizing stakeholders, creating space for public participation, and enhancing information exchange to drive demand for change
- Helping to transform public disillusionment into a more positive engagement in public policy development
- Bringing an understanding of the local political, social, and cultural realities to bear in the design of programs and policies
- Producing bottom-up solutions to community-identified problems and informing the policy and program agendas with community-level responses and ideas
- Improving coordination between agencies to harmonize agendas, reduce duplication, improve information exchange, and increase shared commitment
- Changing social attitudes and individual behaviors
- Boosting access to information and services or technologies that can improve livelihoods and increase adaptability
- Establishing government as a reliable source of information and managing expectations, especially when they are unrealistically high
- Enhancing disaster risk reduction and response

The Five-Year Communications Strategy for an Aflatoxin Safe East African Community is a strategic communications framework aimed at addressing the complexity, ubiquity, and overlapping dimensions of aflatoxin's impacts, along with the need for multifaceted responses to mitigate its

affects. It is designed to influence policy development, inform the translation of policies into programs and activities, and encourage social responsibility and individual behaviors that can facilitate reductions in aflatoxin exposure. The strategy is meant to help build awareness, drive information sharing, support interagency and inter-sector coordination, and advance policy and program implementation across the five EAC partner states to mitigate aflatoxin risks and strengthen food safety systems.

Research Base: Technical Reports, Literature Review, Communications Audit, Situational Analyses

A Science-Based Approach

The Five-Year Communications Strategy for an Aflatoxin Safe East African Community is grounded in the scientific knowledge base and policy recommendations established through the development of 11 technical papers on aflatoxin. The papers were produced as part of the Aflatoxin Policy and Program for Eastern Africa (APPEAR) initiative by a team of international and regional experts, collaborating with the relevant EAC expert working groups and the IITA. Each paper summarizes research from the published literature and reflects the findings of situational analyses conducted across the five EAC partner states of Burundi, Kenya, Rwanda, Tanzania, and Uganda.

The technical papers describe the currently known impacts of aflatoxin across the topics of human and animal health, GAPs, regional standards for food and feed, alternative uses and disposal systems, and economic impacts on trade. They make specific recommendations for a comprehensive policy framework for the EAC and for the development of responsive programs and activities. Each is briefly summarized in **Boxes 1a-k** below:

Box 1a: Aflatoxin and Human Health
Aflatoxin exacerbates the effects of diseases like HIV and hepatitis A and B, which are widespread in EAC partner states. Although eradication of aflatoxin in staple foods in East Africa is impractical, there are a number of changes that could have a significant impact on exposure levels. Low-cost, sustainable, community-based interventions, such as increased vaccination against hepatitis A and B, have the potential for economic application in rural settings.

Box 1b: Aflatoxin and the 1,000 Days
Aflatoxin exposure occurs in the first 1,000 days of life through pregnancy, breastfeeding, and the use of contaminated baby foods. Rates as high as 90 percent of children sampled in East Africa have detectable aflatoxin levels, which can impair healthy growth and development, with life-long consequences for individual health and productivity. Priority must be given to interventions targeting infants, small children, and pregnant and lactating women, including through nutrition, antenatal outreach, food safety standards, and dietary diversification efforts.

Box 1c: Aflatoxin – Redefining At-Risk Populations for Hepatitis A and B
Study results suggest that the value of economic losses to residents of all EAC partner states associated with morbidity and mortality from aflatoxin-attributable liver cancer is a measurable share of their countries' respective GDPs. Public funding should be invested to address this problem, including for the expansion of vaccination programs for hepatitis A and B.

Box 1d: Impact of Aflatoxin on Animal Health and Productivity – Situational Analysis, East Africa Region

Livestock production in the East Africa region is still undergoing development, with impressive growth rates and significant contribution to GDP. There is an urgent need for research focused on ways to quantify aflatoxin prevalence in animal and fish feeds from different agro-ecological zones, farming systems, and breeds. Such studies will generate data to inform mitigation measures, standards development, policy formulation, and program strategies. Measures to increase awareness must target the entire value chain, from the first point of production among the smallest producers all the way to the end consumers.

Box 1e: Impact of Aflatoxin on Animal Health and Productivity – Knowledge Platform

All animals are affected by aflatoxins. Rabbits, ducks, and pigs are highly susceptible; dogs, calves, turkeys, and sheep are moderately susceptible; chickens and cattle are relatively resistant. Fish vary from highly susceptible to resistant, and honey bees are relatively resistant. Livestock feed is commonly made from highly susceptible crops like maize, peanuts, and cottonseed. Aflatoxins are contributing factors to livestock disease and low productivity in Africa, and they are likely to become more important as livestock production intensifies. Aflatoxin is spread to humans through livestock products, especially milk, which is widely consumed and often given to infants and young children who are most at risk.

Box 1f: Aflatoxin Standards for Food

Standardized maximum levels of aflatoxin contamination were adopted in 2006 by the EAC for 28 selected foods, cereals, and pulses. They are 5 ppb for aflatoxin B1 and 10 ppb for total aflatoxins. Enforcement is a challenge due to poor interagency coordination, lack of accessible testing technology, weak inspection capacities, and lack of clarity on roles and responsibilities of food regulatory bodies. The vast majorities of people in the region consume on-farm production, and both informal and formal markets remain largely unregulated, as is the food processing industry. Standards are needed based on dietary consumption patterns, as are appropriate technologies for aflatoxin abatement along the value chain.

Box 1g: Aflatoxin Standards for Feed – Situational Analysis and Knowledge Platform

Compliance with regulations regarding aflatoxin contamination levels in animal feeds is not keeping pace with the growing demand for dairy and other livestock products. To ensure a safe food supply, investments must target the dearth of human and technical capacity to ensure proper testing and surveillance to meet existing standards.

Box 1h: Biocontrol for Aflatoxin

Biocontrol products are applied to farmers' fields to push out and replace toxin-producing varieties of *Aspergillus flavus* with non-toxic ones. They are a highly cost-effective way to curb aflatoxin contamination where it starts. The production and dissemination of AflaSafe™, a biocontrol developed specifically for African conditions that reduces field contamination by 75 percent or more, should be prioritized.

Box 1i: Aflatoxin and Post-Harvest Losses
Aflatoxin contamination may occur across multiple points along the post-harvest chain: during harvesting, field drying, platform drying, threshing or shelling, winnowing, transport to packing shed, storage at farm level, grading and sorting, handling and transport, storage and handling at the trader level, processing, or during downstream storage or distribution. It results in multiple types of post-harvest losses, including food loss, financial losses to sellers, and economic losses to society. Cost-effective prevention and control measures exist, including traditional methods and improved equipment, such as new generation metal storage silos and hermetic storage solution, which can be adopted at the farm level.

Box 1j: Assessing Aflatoxin Impacts on Trade
Aflatoxin control is a necessary condition to gain a larger share of the international market in commodities where EAC partner states have a comparative advantage. Impacts of greater enforcement of aflatoxin control regulations affect agriculture, trade, and health, with benefits that vary according to the context and sector. Positive health benefits fall on the importing country, while trade and agricultural benefits go to the exporting one. Domestic markets currently have no market differentiation regarding aflatoxin due to low awareness and poor regulation of domestically traded products.

Box 1k: Alternative Uses and Disposal Systems for Aflatoxin-Contaminated Commodities
Commodities contaminated with aflatoxin often end up back in the food chain, either resold on informal markets or used as animal feed. To ensure food safety, they should instead be segregated for either alternative use (e.g., processing, animal feed, or biofuel) or proper disposal. Control of contaminated products carries economic and ecological implications and requires a legal and regulatory framework across EAC partner states.

The findings of the technical papers underscore the complexity of aflatoxin control. They highlight the need for cross-cutting participation from the health, agriculture, environment, and trade sectors, as well as the commitment of regional bodies, government ministries, and policy makers within the EAC partner states. They further emphasize the importance of engaging with donors and other potential partners that are addressing related issues, such as improved livelihoods, natural resource management, climate change, and famine early warning systems, which closely link to successful aflatoxin abatement efforts.

Literature Review on Impacts of Communications Strategies

Knowledge and information are seen as essential for people to respond successfully to the opportunities and challenges of social, economic, and technological changes – including those that help to improve agricultural productivity, food security, and rural livelihoods (Food and Agriculture 2010).

There is a strong research base on the impacts of communications strategies, particularly in the context of international development goals and agendas. Below are examples of ways strategic communications initiatives have affected social, economic, technical, and behavioral changes across multiple sectors. Measurable impacts are presented, as is the importance of feedback and interactive communications for building the trust, engagement, and credibility that are a necessary framework for change.

Health

Communication strategies regarding health issues often target individual health behavior changes that can further health promotion, disease prevention, or improved treatment and outcomes. However, they may also target broader social attitudes or government policies. A multisectoral campaign in Nepal mobilized district offices, nongovernmental organizations, and local leaders to raise awareness of vitamin A deficiency (VAD) and change both opinions and behaviors regarding the value of vitamin A supplements. The result was greater awareness and use of vitamin A supplementation such that VAD is no longer a public health threat in the country (UNICEF 2005). With the aim of reforming national policies affecting access to antiretroviral drugs for people with HIV/AIDS, the Treatment Action Campaign in South Africa used communication tools for advocacy, mass movement, and political pressure. The result was successful in expanding access to lifesaving treatment (Panos 2006).

Numerous initiatives have used educational entertainment programs, known as "edutainment," and interactive approaches to advance knowledge sharing and behavioral transformation for health promotion activities. Examples of edutainment activities include the use of television and radio soap operas, call-in shows, and folk media, such as songs, plays, and puppet shows. South Africa's Soul City Initiative demonstrated the effectiveness of edutainment methods using television and radio dramas, along with information booklets, to promote safer sexual practices. Individuals exposed to the shows and materials were found to have a four-fold increase in condom use compared to those with no exposure (Goldstein and Sheepers 2006). Similarly, educational campaigns, including interactive media, in Cambodia successfully increased condom use by more than 36 percent among men and by 77 percent among women. Communications channels used in the initiative included a television soap opera, radio phone-in shows, discussion programs, and public service announcements on radio and television (BBC World Service Trust 2011). The Suami SIAGA Campaign in Indonesia also used multimedia edutainment—in this case to successfully increase the involvement of husbands in safe motherhood and birth preparedness aimed at improving birth outcomes (Shefner-Rogers and Sood 2004).

In Yemen, an initiative that involved the use of radio, film, and community workshops targeted at countering early marriage resulted in both increased awareness of the benefits of delayed marriage and in the postponement and prevention of a number of child marriages, along with greater buy-in from political and religious leaders (Freij 2010). A project in Nepal used multiple communications interventions to help empower women in spousal relationships around family planning. They included two edutainment radio serials, along with radio spots, national-level orientation workshops, district-level training workshops, and printed materials. Short-term results indicated that women gained a greater voice in contraceptive decision making, and longer term results (5 years) suggested broader shifts in gender relations (Inagaki 2007).

The Polio Eradication Initiative in India and Pakistan demonstrated the value of intensive one-on-one communications approaches, as well as broader initiatives to stimulate social mobilization

around the promotion of polio vaccination among the most hard-to-reach populations in each country. Activities included repeated house-to-house visits by trained healthcare workers and communicators, as well as sustained communication with community and religious leaders at the national, sub-district, and village levels. Muslim training institutions also were engaged in building public confidence and the credibility of the polio eradication campaign. Results of data from 2000–2007 showed that the communication strategies contributed to increased levels of polio immunity, particularly among the most underserved and hard-to-reach groups. A national agenda for polio eradication was established. Demand for vaccination increased, as did booth attendance during National Immunization Days and demand for universal vaccine coverage. The communication elements contributed by mobilizing social networks and leaders, creating political will, increasing knowledge, creating individual- and community-level demand, overcoming gender barriers and resistance to vaccination, and reaching out to the poorest and most marginalized populations (Obregón et al. 2009).

A program of youth dialogs in Ethiopia demonstrated the effectiveness of engaging young people, who represent the largest demographic group in Sub-Saharan Africa, as well as its future workers, leaders, and innovators. Ethiopia has a broad-based, self-organized youth movement, which was tapped to create dialog sites with more than 20,000 youths in five regions. Meeting twice a week at youth clubs, the dialogs spurred individual and group actions, including increased demand for and use of condoms, increased demand for youth-friendly services, and greater uptake of voluntary HIV/AIDS counseling and testing. With a variety of partners, hundreds of clubs are now engaged in a nationwide effort to have an impact on the norms governing HIV/AIDS behavior (Gray-Felder et al. 2006).

Agriculture

Information and communication technology systems are providing new ways for farmers, agricultural extension officers, and other agricultural practitioners to share vital knowledge on agriculture, which can help improve yields in farms. In addition, they are increasing farmers' access to information on market prices, which has been shown repeatedly to increase their bargaining power and incomes. For example, in Tanzania, the Linking Local Learners approach of the First Mile Project shared market price information with farmers using mobile phones and other communication techniques. As a result, farmers raised the amount of money they obtained for a ton of rice from US$100 to US$600. A US$200,000 investment for the program resulted in US$1.8 million of gross income for farmers. The approach also has increased farmers' capacity for knowledge sharing through the use of peer-to-peer learning and exchanges and their introduction to the use of modern information communications technologies. Farmers are willing to pay for the mobile phone calls because they can see their benefits. These factors have helped to ensure the sustainability of the advances beyond the lifespan of the program (World Bank, UN Food and Agriculture Organization 2007).

Likewise, the Ethiopia-based Apposit system uses radio and mobile phone-based messages and an interactive voice response application to provide farmers with agricultural tips and practices, information on market prices, and general information. Besides strengthening the agricultural management and marketing skills of the farmers, the system also provides real-time data that improve logistics and warehouse management decisions due to access to more time-relevant information (Science and Development Network 2013). Similarly, in the Indian state of Uttar Pradesh, a dial-in-service called LifeLines, which provided geographically relevant responses to farmers' phoned-in questions, led to an increase in crop yields of an average of 23 percent (Batch 2015).

Presenters at the ICT4ag International Conference held in Kigali, Rwanda (4–8 November 2013) emphasized the extent to which women and youths are taking up information and communication technologies at a rapid rate to get the best market prices, keeping records, and finding crops in high demand. The technologies are being used to obtain information on pest and disease control, access new farming practices and agricultural technologies, communicate with other farmers, and raise awareness. The communication tools include Internet and social media, especially Facebook. Other popular media include SMS, videos, radio, TV, and online media newspapers, magazines, and brochures. The popularity of Facebook is evident among the more than 45,000 followers of Mkulima Young (Young Farmer)'s Facebook page, which provides a social forum for youths to market their products, ask questions, and create their own networks (Leny 2013).

Environment

Participatory communications practices can be very effective at addressing environmental issues, especially when they actively tap into local knowledge and participation. A dengue fever control project in Cuba employed a variety of community-based group communication methods to successfully reduce mosquito breeding grounds through the use of community gatherings and debates, interactive puppet shows, drawing competitions, educational events for children, and drama sessions at senior citizen clubs. Results indicated that the numbers of houses and containers infested with mosquito larvae declined dramatically in the intervention area, while those in the control area remained unchanged (Sanchez et al. 2007).

The Livelihood Adaptation to Climate Change project in Bangladesh demonstrated how communications can combine global scientific knowledge with local knowledge systems to help farmers put into place adaptation practices for coping with climate change (FAO 2010). Lessons from Food and Agricultural Organization (FAO) programs in rural Bolivia, Bangladesh, Jamaica, and the Democratic Republic of Congo suggest that communications-based approaches using participatory research and horizontal knowledge sharing improve technical innovation, enhance adaptation, bridge gaps between global research and local knowledge, and strengthen policy dialog between institutions and small farmers (FAO 2010).

Participatory communication activities, such as community surveys, participatory variety selection, and the creation of formal forums for farmers' inputs were used effectively by the Platform for

Agrobiodiversity Research in Bolivia and Malaysia to build trust between farmers and gene banks and to identify and preserve traditional varieties of potatoes and rice that may play an important role in adapting to climate changes. Farmers shared innovative ideas for contributing to the preservation of valuable crop-genetic material within a cultural context that would be acceptable to local communities. Their feedback also informed the research agenda, changing scientists' perceptions of seed exchange from mere gene flow to a type of intellectual property that needs to be protected (Bordoni and Gwinner 2013).

A study of a World Bank program designed to reform the water sector in Delhi, India, showed that communications strategies were vital for building political commitment and addressing opposition and lack of understanding from local organizations and the general public (Singh 2008). Another study in Orissa, India, found that the use of intensive information, education, and communication (IEC) activities aimed at promoting social mobilization for sanitation had a substantial and statistically significant effect on the use and adoption of latrines (Bulletin of the World Organization 2009).

Communication strategies also have been shown to be central for emergency preparedness and response. Following a devastating earthquake in 2008 in Sichuan province, China, a mobile-phone-based communication system replaced the decimated public communication system, which allowed for quick detection and response to prevent outbreaks of infectious diseases (Bulletin of the World Organization 2009).

Trade

An evaluation of the communication activities of the Directorate General for Trade of the European Commission assessed their effectiveness at meeting the stated aims of raising awareness of the impacts of the European Union (EU) in global trade, supporting the achievement of trade goals, and publicizing the EU's positions on trade issues. Findings suggested that the communications strategy needed to be revised to become more engaging and interactive to enhance the credibility and reach of communication efforts. An important aspect of the recommendations was to increase the Directorate's communication footprint by further building on relationships with natural partners, offering training for non-specialist journalists, and by creating interactive forums, where alternative views could be discussed openly (The Evaluation Partnership, Ltd. 2009).

Communications Audit

Dearth of Material

A review of communication efforts and materials on aflatoxin in EAC partner states reveals the paucity and narrow scope of aflatoxin awareness initiatives. A communications audit of aflatoxin materials and efforts in Tanzania undertaken in 2014 found that efforts from the past decade have represented isolated initiatives, rather than broad or coordinated campaigns on aflatoxin (Nathaniels 2014). Moreover, the study highlighted that information on these activities is difficult to come by, located primarily in "grey" literature, such as project reports, or write-ups of meetings and training

events. The same is true of searches for aflatoxin communication efforts in other EAC partner states, which are equally isolated and difficult to trace. Those efforts that can be identified come from government, academic, and international research organization initiatives. They are listed in **Box 2**.

Examples of Initiatives

Box 2: Examples of Aflatoxin Communications Initiatives in EAC Partner States

a) Tanzania Food and Drug Authority: Press conferences on mycotoxins (2010), hosting of the Tanzania National Forum for Mycotoxins Control, efforts to raise awareness among district health and agricultural officers, targeted awareness programs on exposure risk and mitigation in the districts of Manyara, Mbeya, and Morogoro.
b) Nelson Mandela Africa Institute of Science and Technology: New course on food mycotoxicology for MSc and PhD students of Life Sciences, and awareness raising for officials at Ministry of Health and Social Welfare in Dar es Salaam.
c) Tanzania Food and Nutrition Centre: Developed content for food safety training in Mara and Mwanza districts and aflatoxin leaflet.
d) Agricultural Research Institute: Created flyer, poster, radio program, and video in Swahili on aflatoxin health effects and control of groundnuts. Conducted meeting for market traders (2011), multi-stakeholder awareness meetings (2011, 2012) and training for extension staff in Mtwara Region on pre- and post-harvest control of aflatoxin in groundnuts (2014), and awareness raising at national and international meetings (2011–2014).
e) IITA Eastern Africa Hub: Meetings to introduce aflatoxin/mycotoxins research and development component to district officials, extension, and communities in pilot villages in Babati district under the Africa Rising program. Mycotoxins Fact Sheet English and Swahili language, and a poster in English. Swahili summary of aflatoxin testing in maize in Babati, Tanzania.
f) International Crops Research Institute for the Semi-Arid Tropics (ICRISAT): Introduction of Innovation Platform planned to engage with stakeholders in Babati and in Kiteto-Kongwa districts, Tanzania.
g) Training events for extension officers and farmers/farmer associations on aflatoxin and its control in groundnuts 2012–2014 in Tanzania.
h) Lindi and Mtwara Agribusiness Support (LIMAS) project under NIRAS: Distributed ARI Naliendele aflatoxin leaflets to groundnut farmers, extension, and some schools in Newala, Nanyumbu, and Liwale districts of Tanzania.
i) International Livestock Research Institute-Biosciences eastern and central Africa (ILRI-BecA) Hub Nairobi, Kenya: Briefed science journalists in Nairobi on multi-institutional efforts to combat aflatoxins in the food chains of Kenya, 2014. Developing print and video media to inform on aflatoxin in maize and its control in Tanzania.
j) Shamba Shape Up/The Mediae Company, (Kenya, Rwanda, Uganda). Edutainment television series. Series 4, episode 2, aired on TV April 2014, with 10-minute section linking groundnut GAP to aflatoxin management. In English and Swahili and available online.
k) ACDI/VOCA: Developed training manuals on post-harvest handling, storage management, and mycotoxins. Trained extension workers, farmers, and traders in eastern Kenya on GAPs, post-harvest handling, and mycotoxins.
l) The Aflacontrol Project—with ICRISAT, ACDI/VOCA, KARI, International Maize and Whate Improvement Center (CIMMYT), and others—does policy briefs and workshops for Ministry of Agriculture and public health officials.
m) National Agriculture Research Organization (Uganda): Production of manual for farmers, processors, traders, and consumers in Uganda, called Management of Aflatoxins in Groundnuts, 2010.

n) PACA: Supporting effort to mainstream aflatoxin in Uganda's Comprehensive Africa Agriculture Development Programme (CAADP) National Agriculture and Food Security Investment Plan (NAFSIP).
o) CGIAR Research Program on Agriculture for Nutrition and Health: Joint meetings to share current and plan future aflatoxin research activities.
p) IITA, USAID, COMESA, PACA, African Union Commission, workshops on aflatoxin to sensitize member states, high-level decision makers, and industry leaders, 2014.
q) International Livestock Research Institute: Videos and materials describe their work on aflatoxin in animal feed and products.
r) EAC workshops on aflatoxin: Launch of EAC Aflatoxin Control and Improved Nutrition Programme (2012, Arusha, Tanzania); EAC Staff Orientation on Aflatoxin Control (2012, Nairobi, Kenya); EAC Sectoral Council on Agriculture and Food Security (2013, Arusha, Tanzania); Regional Stakeholders Workshop on Communications for Aflatoxin (2014, Zanzibar); EAC Inception Workshop on Aflatoxin Control (2014, Bujumbura, Burundi); featured topic at EAC 5th annual Health and Scientific Conference and Trade Fair (2015, Kampala, Uganda).
s) The following website keeps an updated list of aflatoxin activities in Africa: http://www.scoop.it/t/aflatoxins

Stories about aflatoxin have appeared in the popular press, particularly in Kenya, to report on periodic episodes of aflatoxin poisoning or large-scale discoveries of contaminated commodities.

Lessons Learned

There are no data on the impacts of the selected aflatoxin communications efforts noted above in terms of awareness, changes in behaviors or practices, or policy changes and advances. However, they do offer several lessons learned:

- Educational materials need to be pretested and refined before going into the field, and even then need to be supplemented with one-on-one opportunities for questions and further explanations.
- Describing aflatoxin is difficult. Some languages do not have a word for aflatoxin. The concept is confusing to many, particularly its relationship with mold.
- Visual representations through video, plays, and real-life-type scenarios are well received by viewers. Radio also is an excellent medium due to wide audience accessibility. SMS is highly effective, but underused. In all cases, it is important to engage media/communications specialists to ensure that messages are well crafted, properly tested, and that the technical aspects are used most effectively to enhance knowledge transfer and participation.
- Stakeholder meetings are most effective when they are well facilitated, with opportunity provided for stakeholder input and open discussion.
- Myths and misinformation about aflatoxins abound, such as the notion that it was brought to Africa from the United States, that it only appears when mold is visible, or that livestock are contaminated through tainted medicines.

- Government departments are important partners. They should be included in regular briefings. It is important to acknowledge that representatives from different sectors will not see problems from the same angles. Close linkages also should be established with national research institutions, donors, and development partners (e.g., USAID, USDA, CDC) to avoid duplication of efforts. "If you go it alone, there is dissent."
- Opinion leaders and officials are important champions, particularly during social gatherings, field days, and agricultural/health/trade shows.
- Educating and building relationships with journalists is highly valuable. Some already have reported stories on aflatoxin but would benefit from further training. For them, the opportunity to see aflatoxin testing methods, do site and field visits, and build understanding beyond that conveyed in an interview or press release are very valuable.
- Women are critical audiences. They do much of the agricultural work and feeding of the family, but are often neglected in decision making and input gathering. Likewise, youths present an important and energetic audience, but need to be reached through their preferred channels.
- Using a combination of communication media and methods builds understanding, especially when a variety of actors with widely different interests need to collaborate to mitigate contamination.
- Communications efforts should be planned, including the identification and understanding of the pathways that will lead toward the accomplishment of objectives. Those pathways may include such things as skills and capacity building, links with partners, the adoption of new behaviors, or the implementation of new policies and practices.
- Communications efforts need to be sustained.
- The most effective messages are those that share simple and practical solutions—and convey hope.

Situational Analyses

Purpose and Context

A situational analysis is conducted to contextualize program and policy planning. It helps to identify the state of relevant social, economic, and political environments as they affect planning decisions and priorities. The situational analysis highlights relationships and connections between entities and issues. It also helps to reveal challenges and opportunities.

In preparation for this communications strategy, situational analyses were conducted in Burundi, Kenya, Rwanda, Tanzania, and Uganda during 2014 and 2015. They included stakeholder interviews with a broad range of representatives from different parts of the health, agricultural, environmental, and trade sectors in each country. The information obtained sought to document

existing general knowledge and awareness of aflatoxin among key stakeholders, current practices across important behaviors within the context of aflatoxin control, the existing policy and legislative framework, and any government initiatives to control aflatoxin.

The responses were used to inform the regional strategy, identifying potential champions, partners, and hubs of knowledge that could be leveraged and supported to promote aflatoxin communication objectives, inform policy and planning, and help direct program activities. The information is not meant to represent the full detail of issues regarding aflatoxin risks and controls in each country. Rather, it is useful for elucidating common denominators that can help identify priority issues and areas. In addition, the stakeholder responses reveal potential communications partners, channels, and lessons learned from one country context that may help to inform planners from other countries or across the region.

Stakeholder Interviews

Hundreds of individuals from the public and private sectors, as well as community-level organizations and groups, were interviewed for the situational analyses. Examples of the types of stakeholders interviewed include:

- Members of farmers groups/cooperatives/National Farmers Federation
- Public-sector agricultural extension agents
- Commercial food producers, traders, and transporters
- Representatives of key food and feed safety regulatory agency
- Healthcare professionals (e.g., physicians, nutritionists, nurses) and patients
- Veterinarians
- Officials from Ministries of Health (e.g., nutrition officers, nurses, physicians, pharmacists)
- Officials from Ministries of Agriculture (e.g., food safety, food standards, biotechnology, plant safety, aquaculture)
- Officials from Ministries of the Environment
- Officials from the Bureau of Standards
- University professors and researchers
- Media representatives (public and private media)
- Representative from Food and Agriculture Organization of the United Nations
- Officials from the Office of the Prime Ministry (e.g., policy analysts, disaster preparedness/relief, information officer)
- National Drug Authority representatives

A full list of situational analysis respondents is included in the appendices. The information below reflects data and feedback gathered from the interviews. It is not meant to be comprehensive; but rather, to provide information regarding aflatoxin awareness, risks, and control gathered from a wide spectrum of sectors and stakeholders.

Findings

The situational analyses revealed many commonalities across the partner states of the EAC regarding aflatoxin awareness, risks, and controls. It highlighted key shared issues across the sectors of agriculture, health, environment, and trade. Diversity and differences were also noted,

as were issues raised in one context that likely hold true across multiple countries and situations. Key findings are synthesized below by topic.

Awareness

There is a lack of awareness, concern, or curiosity here, even among high-level officials.

Stakeholder, Burundi

General awareness levels for aflatoxin are low across the region. Selected efforts have targeted policy makers and country officials, but they are only at the preliminary stages of understanding the public health impacts of aflatoxin. In Tanzania, senior government officials and staff whose departments have a regulatory role in food and feed safety have received training on mycotoxins. But there is scanty, if any, knowledge at the regional and village levels, even among outreach and extension service workers. In Rwanda, baseline surveys by IITA reveal that targeted farmers have some knowledge of aflatoxin from extension services, but are not aware of mitigation methods or linkages to liver disease or potential milk contamination. Higher levels of awareness are found in large private companies, which have been trained on aflatoxin control by the Bureau of Standards. However, a stakeholder from the Bureau of Standards noted that market inspectors have limited knowledge of aflatoxin contamination.

Kenya is a bit of an outlier, since there has been widespread media coverage of aflatoxicosis outbreaks or the discovery of large stores of products contaminated with aflatoxin, such as maize designated for food support programs and school meals. In spite of this and major efforts from the Kenyan Ministry of Agriculture to train extension agents, farmers, and policy personnel on aflatoxin mitigation, surveys find rates of awareness hovering around 50 percent in peri-urban areas and those that have been affected by aflatoxin (Stakeholder Interview 2014). Moreover, farmers who do say that they have heard of aflatoxin do not report an understanding of the food safety issues and agricultural practice changes needed to prevent aflatoxin growth. In addition, situational analysis respondents note that most stakeholders are unaware of laws, regulations, and standards regarding aflatoxin.

Stakeholders in Burundi, Tanzania, and Uganda echo a common concern regarding the difficulties encountered in trying to find the proper ways and words to describe aflatoxin, particularly in local languages. This is similar to one of the lessons learned from the communications audit, noted above.

Across the region, health care providers—ranging from doctors and nurses to nutritionists and outreach workers—have limited or no knowledge of aflatoxin. Even in Kenya, which has experienced fatal cases of aflatoxin poisoning, stakeholders report that most health facilities do not test for aflatoxin because of a lack of laboratories, low-risk perception, and because it is not widely associated with liver disease by clinicians. In contrast, veterinarians are far more informed and experienced with aflatoxin exposure in animals. All of these groups present important potential champions for the greater integration of aflatoxin awareness and mitigation in their training and service activities.

Aflatoxin researchers may present a further group of potential champions for translating the newest findings and technologies into practice. However, stakeholders note that research is driven by the need to publish and not by the needs of farmers or the broader community. They suggest that researchers would need greater incentives and support to help migrate their work into practical applications, particularly from their national governments and from the donor community.

Key Staples

Dietary diversification away from reliance on the most aflatoxin-susceptible crops is an important mitigation strategy. Comparisons of key staples and dietary habits reveal considerable differences among EAC partner states. Kenya has a very high reliance on maize and milk as primary staple foods. Ninety percent of rural Kenyans grow maize, and the average Kenyan consumes 400 g of maize per day (EAC Report 2013). Milk consumption is 145 kg per person, per year, and more than 80 percent of milk is marketed informally by small-scale producers. Tanzania is similar to Kenyan, with 85 percent of the population dependent on maize for food and livelihood. Average daily maize consumption is 410 g per person (EAC Report 2013). Other common staples in Tanzania that are at risk for aflatoxin contamination include groundnuts, cassava, cured fish, and locally brewed alcoholic beverages. The island of Zanzibar has different dietary practices, depending more on locally grown groundnuts, rice, pigeon peas, and yams, with maize flour imported from the mainland to be used mostly for children's food.

Diets are more diverse in Uganda, Burundi, and Rwanda. In Uganda, roots, tubers, and plantains make up a bigger portion of the daily caloric intake (25–40%), followed by cereals (13–20%) and groundnuts (8–14%). In Rwanda, the six most consumed foods include dry beans, sweet potato, potato, cooking banana, cassava, and fresh beans. In Burundi, 86 percent of households consume tubers (especially cassava), 70 percent consume pulses, 48 percent consume oil, and 35 percent consume vegetables at least 5 days per week.

Agriculture

Millers form a critical bottleneck in the control of aflatoxin contamination. They don't test maize for aflatoxin and knowingly mill and package grains that are visibly damaged.

Stakeholder, Kenya

Agriculture employs 90 percent of the workforce in Burundi, 80 percent in Tanzania and Rwanda, 75 percent in Kenya, and 73 percent in Uganda (U.S. Central Intelligence Agency 2015). However, this does not guarantee that farmers have access to the skills and resources they need to maximize production yields and benefits.

Stakeholders in each country report a need for greater training in GAP and post-harvest handling. But there were wide variations in concerns and practices depending on the diversity of staple crop production and consumption. In Uganda, the main crop of concern is groundnut, which shows high rates of contamination. The nuts are visually sorted, with "clean" (those not showing visible signs of mold or shrivel) ones roasted for direct consumption and poor-quality ones ground for powder

(used to make sauce) or animal feeds. Maize contamination in Kenya and Tanzania is exacerbated by poor harvest and post-harvest practices, such as inappropriate time of harvesting, throwing cobs on the ground or along the roadside to dry, storage in plastic bags or poorly ventilated rooms, and the use of poorly calibrated shelling machines that result in broken grains that are more susceptible to contamination. In Rwanda, as in the other partner states, moldy-looking maize is fed to animals.

Training services vary by country. In Uganda, stakeholders note that agro-dealers provide training and guidance to farmers regarding the use of agricultural inputs. While some receive formal training, more commonly they are trained by larger input suppliers. In Kenya, stakeholders explain that extension services are demand driven, so farmers need to know about a problem before they can request help for it. Complementary extension services are also offered by the University of Nairobi. In Tanzania, there is a wide network of extension workers. However, farmers cite economic challenges in the adoption of GAPs, while extension workers blame it on the slow pace of behavior changes and socio-cultural factors among farmers. In Burundi, where veterinarians report seeing high rates of diagnostic symptoms of aflatoxin in animals, stakeholders report that there are good opportunities for training at the provincial and local levels associated with annual animal vaccination days sponsored by the Director of Ministry of Animal Health. In Rwanda, farmers are encouraged to join cooperatives, which provide a good forum for participatory training and knowledge sharing. Across the board, stakeholders mention the need for greater extension service capacity, both in terms of numbers of extension workers and regarding their level of aflatoxin awareness and mitigation.

Kenyan stakeholders call attention to an additional and important challenge for agricultural extension services. They explain that agricultural extension workers, who are trained agronomists, focus their farmer support activities on production, rather than quality. Their primary aim is to help farmers increase yields and ensure food security. Little attention is given to food safety.

Across the region, stakeholders point to millers and processors as a key bottleneck to ensuring food and feed safety. They do not test for aflatoxin, and grain found to be unacceptably high in moisture is either resold through dubious channels or mixed with "good" grain to be milled for human consumption. One exception is noted among animal feed processors, who do test for aflatoxin. Anecdotal comments from stakeholders support the argument that commercial animal feed is more aflatoxin safe than processed foods meant for human consumption.

Among the positive opportunities to emerge from the interviews are the integration of aflatoxin in food science training models and food safety and agriculture classes at the higher secondary school level in Rwanda. In Kenya, development and production of the highly effective biocontrol product, AflaSafe™ is well underway through partnerships among the Kenyan Agricultural Research Institute (KARI), IITA, and the US Department of Agriculture (USDA). Developed specifically for East African environments, it has the potential to abate aflatoxin at its source in farmers' fields.

Health

We have much more pressing issues here – malaria, AIDS, unwanted pregnancies…

High-level ministry official, Burundi

Outside of episodes of acute aflatoxin poisoning, the health effects of aflatoxin exposure tend to be chronic, spanning a long period. As a result, they often are overshadowed by more pressing concerns. In addition, the national impacts of issues such as liver cancer deaths, childhood stunting, and immunity suppression are not readily understood, even though targeted studies suggest that the economic, social, and livelihood costs are enormous.

Childhood stunting is associated with aflatoxin exposure early in life. It is widespread across the EAC, with rates of 58 percent in Burundi, 35 percent in Kenya, 44 percent in Rwanda, 42 percent in Tanzania, and 33 percent in Uganda. Hepatitis B is prevalent, as is co-infection with hepatitis B and HIV. In Uganda, 10 percent of people live with chronic hepatitis B, and the highest infection rates are in the northern part of the country, where a staggering 20–25 percent are infected. In Kenya, there is a high prevalence of hepatitis B (11–15%) and co-infection with HIV. Rates are lower in Rwanda: 3.6 percent for hepatitis B and 3 percent for HIV. In Burundi, stakeholders report that vaccination for hepatitis A and B is provided as part of the basic package for infants and children. One week each year, there is a large vaccination campaign carried out through schools and other service centers.

Environmental Concerns and Alternative Uses or Disposal of Contaminated Commodities

Pour out contaminated milk when there are so many people who cannot afford it? Unheard of! Especially when the effects of contamination are not immediately felt.

Stakeholder, Uganda

Aflatoxin "hot spots" have been identified in the EAC region, based on agronomic data, climate conditions, and surveillance studies of areas with high contamination rates. A *Country Assessment for Aflatoxin Contamination and Control in Tanzania,* undertaken in 2012, provides information on the prevalence and differing geographic ranges of aflatoxins in maize, groundnuts, and cassava, which are the key at-risk crops for the country. Following a major outbreak of aflatoxicosis in 2004, the Kenyan government stepped up efforts to conduct surveys and map out aflatoxin hot spots, in collaboration with development partners. Kenya also has in place a Plant Health Early Warning Response Team, which brings together key partners from government agencies and research institutions. However, confusion remains regarding the designation of responsibilities between the ministries of health and agriculture. More broadly across the EAC, stakeholders raise the need for more coordinated aflatoxin surveillance and monitoring programs to better predict and warn of high-risk periods and places.

Stakeholders from multiple public and private-sector entities underscore the need for simple, affordable testing methods that could be used across the food value chain to identify and sort clean from contaminated crops. Current methods rely primarily on visual examination alone, which is ineffective at detecting contamination. Visibly damaged crops are typically reused for alternative

purposes, despite laws in countries such as Kenya and Uganda, which call for the proper disposal of contaminated crops by licensed waste management facilities. The most common method is via incineration, typically in cement factory kilns. The cost of disposal is borne by the owner of the contaminated consignment, adding to the challenge of enforcing compliance with regulations. Along with the financial challenges to compliance are strong cultural values, which consider the disposal of food crops as anathema, particularly in areas where food is scarce.

The most common alternative use for contaminated crops across the region is as animal feed. This practice is acceptable in some countries if the contaminated feed is blended with clean feed according to designated ratios. However, standard practice is to give damaged crops to livestock directly. The blending of poor and high-quality crops is not acceptable for human consumption, but stakeholders report that it is not uncommon for unscrupulous millers and processors to do so. A further alternative use noted in Tanzania and Kenya is the brewing of traditional beer, which is made from poor-quality maize with the mistaken belief that the brewing process removes any harmful effects.

A recommendation from Uganda points to the value of converting contaminated crops into biofuel (a technology that exists currently in Rwanda) as an incentive for producers and traders to comply with disposal standards.

Attempts have been made to harmonize disposal standards for contaminated crops across the EAC with leadership from a regional network called East African Network on Compliance and Enforcement.

Trade and Regulations

We sample foodstuffs by eyesight and experience. We chew or smell samples to test for quality. Our experience helps determine if the commodity is fit for consumption or not.

Market traders, Zanzibar, Tanzania

We have standards, but limited capacity to enforce them.

Stakeholder, Rwanda

Testing for aflatoxin is expensive, and most feed or food processors are driven by profit.

Stakeholder, Kenya

The EAC has adopted common maximum accepted tolerable limits of aflatoxin for selected crops, but regulations and enforcement vary across partner states. Numerous efforts are being undertaken to strengthen regulatory authorities and national testing capacity. Burundi, which has even lower aflatoxin standards for maize and sorghum than the EAC, is launching a new food and drug authority, the Autoritée Burundaise de Régulation des Médicaments et des Aliments. It also is developing a new lab for the Bureau of Standards with a 2-week training program for technicians, which includes aflatoxins. The National Drug Authority of Uganda is developing a National Drug and Food Act.

However, stakeholders across each of the EAC partner states identify multiple difficulties with the enforcement of border controls, imports, and formal markets due to inadequate human and

technical resources. In Rwanda, market inspection teams assess storage conditions and the physical conditions of grains and flours, also collecting samples for testing. However, they can only cover two markets per week due to staff and transportation constraints. In Uganda, local market inspectors are not trained to test for food safety other than inspecting the cleanliness of the surroundings. The question of controlling aflatoxin contamination in home-grown and informally traded products poses an even greater challenge.

Communications Channels and Opportunities by Country

Specific communication channels and opportunities suggested by stakeholders range from media outlets to events, champions, partnering opportunities, and training or teaching curricula. Although there are some requests for printed materials, most stakeholders highlight the potential of more verbal, dynamic, and interactive mechanisms to engage audiences and promote greater information exchange and uptake. Specific suggestions include the following:

Burundi:

- Radio Television Nationale: very open to story material and collaborations; monthly documentaries on health, and agriculture and livestock; and popular soap opera
- Natural champions among veterinarians, nurses, and nutritionists
- Partnering opportunities with national nutrition education program, UNICEF, FAO
- Ministry of Animal Health annual event for livestock vaccination

Kenya:

- Seed road shows, agricultural shows, farmer demonstration days, community forums, integrated field days with both farmers and government stakeholders
- Farmer-to-farmer mentorship
- Evening radio and television programs, especially community radio
- Schools, including school health programs
- National health education strategy, soon to be revised to include aflatoxin (content and delivery)
- Food fortification training and other trainings targeted to hotel food handlers
- Plant Health Early Warning Response Team
- Milk Regulatory Committee, soon to become Food Quality Regulatory Committee
- Existing government system of information flow for communication of new policies and regulations, most of which developed by senior staff as part of technical teams

Rwanda:

- Ministry of Agriculture radio drama and radio/TV time purchased from interactive show (call in and SMS)
- Ministry of Agriculture SMS messages for farmers
- National annual agriculture show
- Inclusion of aflatoxin in food science training, high secondary school food safety, and extension curricula and training

- Elected farmer "promoters" at village level
- Officials from Ministry of Health and Ministry of Agriculture at every government level
- Quarterly government town meetings
- Community Innovation Centers, business development centers
- Agricultural extension department with website, audio studio, and documentation center
- Phone-in plant pathology service

Tanzania:

- National Mycotoxin Steering Committee
- Partnering with IITA Africa Rising program (focus on post-harvest practices)
- Seminars on mycotoxins for senior government and department members
- Significant penetration of local and national radio, and mobile phone use
- Commercial interest in prevention and control
- Government rallies and gatherings are good communications platforms

Uganda

- Media requirement to provide free time for weekly public programming
- Free SMS can be negotiated with public goodwill partners
- Collaborations with local councils
- Public rallies, mobile road shows
- Working with religious and political leaders, celebrity spokespersons; targeting schools and children as sources of information for their parents
- Agro-dealers to provide training and guidance
- Partnering with USAID effort on liver cancer

Communications Challenges

Numerous challenges confront aflatoxin control efforts. Awareness of these can be used to inform aflatoxin communication strategies and broader objectives to combat its threats.

Challenges include:

- The lack of awareness and low-risk perception regarding aflatoxin
- The dependence on aflatoxin-susceptible crops as staple foods and feed
- The low involvement on the part of decision makers – regional governments must commit resources and energy for the long run to bring the aflatoxin problem under control
- The lack of a silver bullet or single solution; there are no easy answers
- The large number and categories of stakeholders and sectors affected; integration and coordinated actions are needed
- The high rates of on-farm consumption and dependence on informal markets and trading that leave a majority of food unchecked
- The lack of access to necessary resources and technologies for aflatoxin control, particularly among small-scale producers, but also across the value chain and regulatory authorities
- The need to involve millers, processors, and traders, without whose engagement the battle cannot be won
- The need to balance what can be done in the short term with solutions that will require longer term investments and commitments
- The need to make aflatoxin culturally relevant and not overwhelmingly negative
- The silo-ed nature of sectors and services and their lack of experience with cross-cutting communications
- The missed opportunities for shared learning and feedback, when communications
- The dynamic tension between accelerating demand before there is a supply of aflatoxin safe foods
- The question of who bears the additional costs of stricter food safety controls
- The need to allocate funding for communications activities, materials, staff, time, meetings, M&E, etc.

Target Audiences and Stakeholders

A Two-Pronged Approach

The nature of the aflatoxin problem in EAC partner states demands a two-pronged approach to balance the challenges and priorities regarding improved awareness and control. The first prong targets high-level decision makers to address the great urgency presented by the critical scale and impacts of aflatoxin. It is dedicated to the promotion of regional and national-level policy and program developments that respond to the urgency and complexity involved in combating aflatoxin. It includes activities to coordinate efforts across EAC entities and partner state ministries, along with key donors and partners engaged in the aflatoxin control agenda (e.g., USAID, IITA, PACA).

It addresses cross-national issues, such as trade, food security, agricultural development, and the standardization of policies and regulations. It builds on existing linkages and communications opportunities, such as EAC summits, media events, and collaborations.

The second prong addresses interventions targeting the broader public and targeted stakeholders. It is deliberately meant to avoid panic by not overwhelming stakeholders with negative messages about aflatoxin. Instead, this prong is aimed at promoting the positive behaviors and technologies that can be undertaken at the local and individual levels to promote aflatoxin mitigation and control. Because these practices coincide with other GAPs and interventions that improve health, environmental, trade, and economic outcomes, the focus is also on finding creative ways to coordinate with other programs and partners addressing issues that can be interconnected with aflatoxin reduction goals and activities.

Overarching Principles

The following key principles apply to the targeting and segmentation of diverse audiences and stakeholders:

- The need to consider cultural representation – remembering that there are many types of cultures (e.g., regional and ethnic culture, culture of youth, organizational or bureaucratic cultures)

- The need to ensure that women and youths are not excluded, adapting communications strategies to their roles and favored communications mechanisms to ensure feedback and engagement
- The need to reach across multiple sectors to identify the diversity of viewpoints and involvement that may exist around particular areas of focus
- The need to build on new or existing partnerships, networks, and structures – avoiding duplication of efforts, and increasing reach and efficiencies
- The advantage of leveraging talents and roles across different sectors (e.g., partnering with media or local leaders), particularly around issues that share common objectives and help prevent the spread of aflatoxin
- The need to convey hope and share simple and practical solutions
- The need to invest and sustain resources in communications efforts

Targeted Audiences

In keeping with the guidelines of the EAC's Communication Policy and Strategy, the target audiences for the Communication Strategy for an Aflatoxin Safe East African Community have been organized across three broad segments: internal audiences, external audiences, and media. This strategy recognizes that there may be overlap across these three segments.

Internal Audiences

Coordinating communications across and within ministries is a challenge. We don't have a culture of information sharing.

Government official interviewed for situational analysis

Bureaucratic hurdles, technical specialization, sectoral boundaries, and segmented official communication channels represent just some of the barriers to efficient internal communications within the EAC organizations and institutions, across both regional and national levels. Yet prompt access to information on EAC policies, programs, and activities is a recognized priority. As a result, building internal communication capacity is essential for addressing the complexity and cross-sectoral nature of aflatoxin awareness, control, and mitigation.

The groups and Ministries of the EAC play a critical role in coordinating the implementation of EAC policies and programs, including the aflatoxin communications strategy. Equally important are the key funding and program partners that have been deeply involved in the EAC's aflatoxin planning and activities. To be effective, these partners will need to improve communication channels and opportunities that enhance communication, understanding, and engagement at the EAC policy and leadership levels.

Internal audience members for the EAC include:

- EAC Secretariat

- Regional Working Group on Aflatoxins (REWGA)
- EAC Communications Staff and Communications Staff of EAC partner states
- Ministerial Officials of Partner States from Health, Trade, Agriculture/Livestock, Environment
- Designated IITA scientists and communications specialists
- Designated USAID representatives
- Ministries of EAC Affairs in Partner States

The internal stakeholders may be both communications audiences and influencers. **Table 2**, on the following page, shows their potential roles as initiators and as recipients of communications efforts.

Table 2: Internal audiences

Internal audiences/ Stakeholders	As initiators of communications	As recipients of communications
EAC Secretariat **REWGA** **Ministerial officials/staff from Partner States** **Ministries of EAC Affairs in Partner States**	• Contribute to sector-specific policy and program formulation and implementation • Communicate policies, programs, and evolving procedures • Develop or enhance policies/ programs on aflatoxin that increase capacity, access to tools and resources, surveillance, monitoring, regulation, testing, etc. • Collaborate with other national- and regional-level partners/programs to leverage communications resources and objectives	• Increased internal communications and coordination across agencies • Further support of EAC integration within the region • Greater awareness of aflatoxin issues and urgency • Greater understanding of EAC aflatoxin activities that overlap with and can further their ministerial goals • Increased institutional capacity and ability to respond to/warn of outbreaks, risks • Greater alignment of regulations and policies regarding aflatoxin
EAC Communications Staff in Partner States **Communications Staff of EAC Partner States**	• Communicate appropriate non-technical information that provides evidence to promote and support policies and activities that address aflatoxin issues • Support greater internal communications across Ministries and partners (newsletters, web postings) • Partner with media (trainings, site visits, press releases)	• Greater awareness of aflatoxin and messages that can be conveyed that are newsworthy but not apt to create panic • Improved communications partnerships with other organizations and entities working on aflatoxin-related issues • Furthered role in the support of EAC integration across the region
IITA	• Sharing research findings and policy or program recommendations that can be undertaken at the EAC or national levels to promote the translation of science into practical application • Linking communications efforts to leverage resources and impacts	• Greater awareness of aflatoxin activities among other EAC partners • Stronger partnerships with EAC entities and state ministerial representatives • Better informed research and program agendas • Greater linkages to implementation partners in the public and private sectors
USAID **Other relevant donors/investors**	• Support for initiatives and activities • High-level visibility through their own communications vehicles and connections	• Greater awareness of aflatoxin prevention/mitigation technologies and their potential benefits across other key development issues • Fostering of stronger partnerships with EAC based on mutual understanding and interests regarding aflatoxin control and its relationship to development goals • Good stories to bring back to their stakeholders • Good exposure and linkages with EAC/government policies, programs, priorities

External Audiences

Researchers at IITA have been researching on ways to control aflatoxins for the past decade—with considerable success—and we are very excited to be part of this project to broadly share the knowledge and technologies we have developed and to support the East Africa Community to find sustainable ways to deal with aflatoxins.

Stakeholder, IITA

External audiences include public and private-sector organizations, as well as international and national programs that are focused on activities that overlap with aflatoxin control and mitigation objectives. Communications may need to target leaders, partners, decision makers, or key influencers within those programs or organizations. External audiences also include organizations and groupings that represent important end users, such as youths, small-scale farmers, processors, and pregnant or lactating women. However, individual end users are not primary audiences themselves.

External audiences include:

- Government Ministries, Institutions, Bureaus of Standards
- Other regional associations, such as African Union, PACA, COMESA, SADC
- International/national research institutions and programs
- International programs and agencies targeting related issues (e.g., World Food Programme, Save the Children, World Bank, WorldVision, World Trade Organization)
- Large-scale campaigns (e.g., One Health Initiative, Scaling Up Nutrition (SUN), US President's Emergency Plan for AIDS Relief, Millennium Development Goals policy and program leaders)
- Early warning systems (e.g., FEWSNET, FAO Early Warning System)
- Universities and other academic institutions
- Private-sector enterprises and associations, which may be involved in such things as certification, development/dissemination of new technologies, and public/private partnerships to promote awareness, training, new technologies, etc.)
- Commodity Boards, food safety inspection authorities and regulators
- Stakeholder cooperatives, associations, committees
- Trusted influencers at the community levels (e.g., religious leaders, community leaders)
- Entities representing or serving specially targeted groups, such as millers and processors, pregnant women and infants
- Extension and outreach services
- Schools, youth organizations and programs

External stakeholders may be both communications audiences and influencers. **Table 3** shows their potential roles as initiators and as recipients of communications efforts.

Table 3: External audiences

External audiences/ stakeholders	As initiators of communications	As recipients of communications
Government Ministries (e.g., Health, Agriculture, Trade, Environment, Land, Economy) & Institutions, Bureaus of Standards **Other regional associations, such as African Union, PACA, COMESA, Southern African Development Community (SADC)**	• Further communicate policies, programs, and evolving procedures • Provide input on recommendations regarding existing policies and recommended policies/policy changes • Help link information sharing across ministries and regional associations	• Improved internal communications across agencies • Greater awareness of aflatoxin issues, control, and urgency • Greater leveraging of common communications aims and program objectives around issues that help mitigate aflatoxin risks
International/national research institutions and programs **International programs and agencies targeting related issues (e.g., World Food Programme, Save the Children, World Bank, WorldVision, World Trade Organization)** **Large-scale campaigns (e.g., One Health Initiative, Scaling Up Nutrition, US President's Emergency Plan for AIDS Relief, Millennium Development Goals policy and program leaders)** **Early warning systems (e.g., FEWSNET, FAO Early Warning System)**	• Sharing knowledge and communications activities that help motivate and mobilize their addressed audiences to take action and commit themselves to newly promoted practices • Linking communications efforts to leverage resources and impacts	• Greater awareness of aflatoxin prevention/mitigation technologies and their potentially overlapping benefits that help promote other health, agricultural, environmental, and trade agendas • Stronger partnerships with EAC • Better informed research and program agendas • Greater early warning system linkages
Private-sector enterprises **Business and professional organizations** **Large-scale food producers and distributors** **Commodity boards** **Food safety inspection authorities and regulators**	• Integration of policies, expansion of technologies, collaboration around regulations, and the promotion of positive practices that help prevent or mitigate aflatoxin exposure • Dissemination of information regarding aflatoxin safe foods/products, including potential labels	• Greater awareness of aflatoxin prevention/mitigation technologies and their potential economic benefits • Greater understanding of EAC policies and standardization of trade regulations regarding aflatoxin levels • Greater linkages with public and other initiatives • Market advantage of ability to offer foods and products designated as aflatoxin safe • Strengthened understanding of and ability to implement aflatoxin food/feed safety standards
Stakeholder cooperatives, associations, committees **Entities representing or serving specially targeted groups, such as millers and processors, pregnant women and infants**	• Sharing messages, undertaking efforts to build public confidence and address myths, concerns, and resistance • Providing input back to program and policy planners, researchers, and communications specialists	• Greater awareness and ability to respond to aflatoxin risks with promotion of positive behaviors • Greater recognition from regional and national levels and higher profile at national and community level • Stronger linkages with services provided by government or partner organizations

External audiences/ stakeholders	As initiators of communications	As recipients of communications
Community-level trusted influencers (e.g., community/religious leaders)		
Civil society	• Advocating for issues, changes, policies, and support • Linking aflatoxin prevention/mitigation with advocacy issues (e.g., cancer prevention, climate-smart development, safe food, livestock development)	• Stronger linkages with other organizations/cross-cutting initiatives • Greater awareness of aflatoxin prevention/mitigation technologies and their potentially overlapping benefits that help promote their agendas
Community-level trusted influencers (e.g., community/religious leaders)	• Sharing messages, undertaking efforts to build public confidence and address myths, concerns, and resistance • Providing input back to program and policy planners, researchers, and communications specialists	• Greater awareness and ability to respond to aflatoxin risks with promotion of positive behaviors • Greater recognition from regional and national levels and higher profile at national and community level • Stronger linkages with services provided by government or partner organizations
Extension/outreach services	• Translating knowledge into practices; teaching and encouraging changes in beliefs, behaviors, and practices based on new information, technologies, services, resources, etc. • Giving feedback on policies and activities, sharing ideas and innovations	• Access to new information and technologies • Access to programs and efforts that support their objectives
Schools, youth organizations and programs	• Imparting awareness and knowledge of positive behaviors and practices through favored media • Raising awareness and behavioral changes, among students and their peer groups, as well as to their parents and families • Bringing the youth voice and perspective to aflatoxin mitigation programs, strategies, and policies	• Creating a new generation of people more aware of aflatoxin control and the related practices that promote more sustainable development and advances • Countering potential hype or misinformation to which youths may be exposed through various media • Leveraging the energy and eagerness of youth as powerful spokespersons and agents of change
Special populations (e.g., pregnant/lactating women, children, people with HIV/AIDS or hepatitis B, individuals living in high-risk areas)	• Giving feedback • Sharing traditional knowledge and methods • Becoming sharers of knowledge (train the trainer)	• Targeted and focused information and interventions that meet their special needs and promote positive health behaviors
Consumers	• Giving feedback • Providing demand for changes, particularly regarding marketed products	• Information on nutrition, health, best practices, climate-smart approaches, etc.
Farmers and producers	• Giving feedback • Sharing traditional knowledge and methods • Sharing concerns, ideas, and innovations	• Information, training, and resources to promote GAP and good post-harvest practices • Greater access to market information, alerts about climate conditions, updates on crop/livestock management, etc.

International and National Media

Media have the potential to be hugely influential partners, especially among stakeholders with diverse reading and language skills. As noted previously, the impact of "edutainment" shows on both television and radio can be significant in influencing changes in behaviors, attitudes, and public policies. Participatory programs that incorporate comments and feedback via telephone or SMS also enhance not only uptake of new knowledge and technologies, but also the refinement of communications efforts, research agendas, and program implementation.

The definition of media continues to widen with the expansion of new social media, such as mobile phone-based interactions and applications. While many rural households and those living in informal urban areas may have limited access to electrical power, television, or Internet, the massive expansion of mobile phone use provides a key platform for dissemination and participatory communications. Moreover, even audiences who do not have direct access to social media find ways to participate, as evidenced by the highly popular appeal of Facebook and other sites among youths, for example.

The situational analyses undertaken for this strategy pointed to numerous existing media opportunities and channels for integrating preventive practices that can mitigate aflatoxin exposure and enhance health, agriculture, and economic outcomes. In addition, partnering with media provides a cost-effective way to reach wide audiences. However, the EAC needs to devise a coordinated approach and set of messages for working with media or responding to their inquiries to ensure consistency and validity. The EAC communications staff must play a key role in facilitating and managing media relations on aflatoxin for the EAC and among the internal audience members identified above. Media audiences are presented in **Table 4**.

Table 4: Media

Media	As initiators of communications	As recipients of communications
International/ national media	• Sharing stories of practices that promote aflatoxin mitigation, including in the context of its overlapping with other "hot topics," such as climate change adaptation • Sharing stories of ways behavior changes have bettered lives/livelihoods while also promoting the aflatoxin safe agenda • Sharing stories highlighting the benefits of new technologies (e.g., SMS, AflaSafe™, diet diversification) • Responding to media inquiries regarding aflatoxin risks, mitigation, and policies across the EAC	• Science-based information, especially as connected to news-worthy topics and events • Anecdotal examples that put a human face on wider issues surrounding the effects of aflatoxin and its control and mitigation • Reliable sources of information on regional/national issues related to aflatoxin awareness, control, and abatement

Goals and Objectives

The overarching goal of the EAC's aflatoxin activities is to achieve an aflatoxin safe East African Community. This goal reflects the long-term expectations of the EAC aflatoxin agenda and establishes the overall direction and focus of the communications activities. Achieving this goal requires the production of sufficient amounts of aflatoxin safe food and feed to meet human and livestock needs. The result would lead to improved health and nutrition, enhanced agricultural production and economic gains, and increased trade capacity and market share across the EAC and globally.

Selective objectives drive the EAC's communication strategy on aflatoxin. They have been identified based on the findings and recommendations of the 11 technical papers, prepared as part of the APPEAR program. The objectives delineate the steps to be taken to achieve the overarching goal, and they establish criteria against which to measure performance achievement. The objectives have been formulated to fit within the 5-year timeline of aflatoxin communication strategy.

There are multiple types of objectives. Process objectives reflect activities, services, and strategies that are key to the process of achieving identified goals. They may include such elements as building trust, improving awareness, bolstering engagement, and aligning partners. Outcome objectives target changes in the attitudes, knowledge, or behaviors of target groups or individuals. These are particularly important in the context of aflatoxin because so many of the currently attainable mitigation methods involve the adoption of positive behaviors and practices that reduce contamination risks. Impact objectives define expected results and help to measure quantifiable progress against benchmarks and goals.

The EAC is primarily focused on strengthening processes through its role as facilitator, coordinator, and influencer of policy and program advances at the regional level. It is not a direct implementer of aflatoxin control programs, but functions instead as a force for policy integration and standardizations that raise the bar for the whole region. The EAC is also poised to infuse urgency into high-level responses, due to its elevated profile and ability to coordinate and leverage the multiple aflatoxin-related activities of individual governments, international programs, and key partners. Thus, it plays an important role in fostering efficiencies and the uptake of new technologies, lessons learned, and promising strategies. While the activities of the communications strategy on aflatoxin will support the advancement of outcomes and impacts to promote an aflatoxin safe EAC, they will primarily support the process objectives necessary for achieving that goal.

Objectives for Agriculture

- **GAP:** Attain widespread adoption of GAPs that help mitigate aflatoxin exposure and spread
    - **Short term –** To insert aflatoxin awareness and control in GAP training for extension workers

  - **Medium term –** To expand GAP training and awareness among producers in aflatoxin hot spots, through extension programs, media, and SMS; to commercialize affordable technologies that address the harvesting and storage constraints of small-scale farmers
  - **Long term** – To expand and reinforce GAP training and awareness more broadly, through extension programs, media, and SMS

- **Testing:** Promote commercialization and dissemination across EAC partner states of affordable, easy-to-use aflatoxin testing methods for food and feed across the food chain
  - **Short term –** To identify affordable, easy-to-use testing technologies (e.g., mobile phone-based devices) that can be taken to scale and disseminated to producers
  - **Medium term –** To develop modalities for disseminating the testing technologies to producers and processors, along with training on how to mitigate further spread of contamination and safe alternative uses or disposal
  - **Long term –** To have widespread dissemination and use of aflatoxin testing methods among producers and processors

- **Biocontrol:** Facilitate generalized use of the biocontrol agent, AflaSafe™, developed specifically for East African conditions
  - **Short term** – To scale up capacity for distribution and training on safe use and handling of AflaSafe™ in Kenya, particularly targeting high-risk crops and areas
  - **Medium term** – To negotiate the safe cross-border trade and transport of AflaSafe™ for use in EAC partner states beyond Kenya
  - **Long term –** To have safe, generalized use of AflaSafe™ in crops and areas at high risk of aflatoxin exposure

Objectives for Health

- **Dietary diversity:** Promote greater dietary diversity toward staple foods and food products that rely less on crops most at risk of aflatoxin contamination, are more climate smart, and promote higher nutrition.
  - **Short term –** To partner with existing programs and organizations for the integration of strategies to promote dietary diversity in staple foods; to integrate the promotion of aflatoxin safe foods and dietary diversity in public health outreach and agricultural extension services
  - **Medium term –** To increase the production of alternative staple crops that are drought resistant, more diverse, and offer a greater range of nutrients in high-risk areas
  - **Long term –** To increase the production of more diverse staple crops more broadly

- **Training:** Revise education and training curricula in academic, extension, and outreach programs to incorporate aflatoxin risks and mitigation methods.
  - **Short term** – To identify existing training programs, materials, and curricula on aflatoxin
  - **Medium term –** To adapt existing programs and curricula to ensure they include both awareness and mitigation, and for use in various training programs: medical, nursing, nutrition, public health, veterinary, agricultural extension services, health care outreach worker services
  - **Long term –** To apply aflatoxin adapted training programs across the spectrum of medicine, nursing, nutrition, public health, veterinary sciences, agricultural extension, and health care outreach services
- **Vaccination:** Expand vaccinations for hepatitis A and B.
  - **Short term –** To comply with existing hepatitis B vaccination protocols
  - **Medium term –** To expand vaccination for hepatitis B among all age groups and to introduce or strengthen vaccination for hepatitis A
  - **Long term –** To reach 90 percent or more vaccination coverage for hepatitis B among all populations
- **1,000 days:** Focus on promotion of aflatoxin prevention during the first 1,000 days of life, targeting pregnant women and mothers of infants.
  - **Short term –** To promote breastfeeding for at least the first 6 months of life, along with delayed introduction of complementary foods at risk of aflatoxin contamination; to revise nutrition education curricula and outreach activities so that they focus on aflatoxin prevention in the first 1,000 days
  - **Medium term –** To promote aflatoxin safe foods for the first 1,000 days of life reaching children and mothers through antenatal care, feeding programs, health outreach, community leaders, media, etc.
  - **Long term –** To reduce aflatoxin exposure rates in blood samples of infants and milk samples of breastfeeding women by 50 percent

Objectives for the Environment

- **Mapping and response:** Monitor aflatoxin "hot spots" as part of seasonal risk mapping, and initiate early warning and quick-response systems.
  - **Short term –** To integrate seasonal risk mapping and early warning systems to predict high-risk zones for aflatoxicosis outbreaks into food security forecasting models, such as Famine Early Warning Systems Network (FEWSNET) and the FAO Early Warning Systems

  - **Medium term –** To apply quick-response mechanisms to reduce the consumption of dangerously high levels of aflatoxin, especially those associated with on-farm consumption
  - **Long term –** To improve systems for tracking the etiology and epidemiology of aflatoxin-associated health impacts (registries, records, diagnostics, etc.)

- **Alternative uses and disposal:** Institute functional systems and standards for alternative use and disposal of contaminated commodities.
  - **Short term –** To identify responses or alternative land management/uses for high-risk areas
  - **Medium term –** To reduce reintegration of contaminated commodities into the food chain; to find safe alternative uses for contaminated products
  - **Long term –** To have an enabling environment for alternative uses of contaminated commodities; to have a fully functional disposal system for contaminated commodities

Objectives for Trade

- **Awareness:** Heighten consumer awareness and demand for aflatoxin safe food products.
  - **Short term –** To identify existing awareness promotion tools and activities, along with opportunities to boost them with partner programs/entities
  - **Medium term –** To develop tailored, tested communication strategies and materials that emphasize positive behavior changes that mitigate aflatoxin risk
  - **Long term –** To implement wide-scale awareness-raising strategies that focus on positive messages and behaviors for promoting aflatoxin safe foods
- **Monitoring:** Increase inspection staff and capacity within and between partner states.
  - **Short term –** To identify training materials and protocols for aflatoxin control to be used by inspection staff
  - **Medium term –** To expand training for aflatoxin awareness and control among inspection agents
  - **Long term –** To ensure aflatoxin safe foods and feed that meet regional standards
- **Markets:** Institute regulatory protocols adapted to formal and informal markets.
  - **Short term –** To create control codes and guidelines appropriate for small-scale farmers, millers, processors, and feed manufacturers
  - **Medium term –** To apply control codes and guidelines for small-scale farmers, millers, processors, and feed manufacturers
  - **Long term –** To create large-scale demand for aflatoxin safe products

- **Certification:** Standardize labeling certification for aflatoxin safe foods and animal feeds.
  - **Short term –** To design and test aflatoxin safe labels for food and animal feeds
  - **Medium term –** To address questions of feasibility, standardization and linkages with national standards bureaus, how to ensure enforcement and avoid counterfeiting; to ensure availability of aflatoxin safe foods
  - **Long term –** To design logo awareness campaign and garner political will and financial resources for roll-out; ultimately, to apply logos with accompanying wide-scale awareness campaign

Strategies for Meeting the Objectives

The following communications strategies will be employed to meet the objectives of the regional agenda for creating an aflatoxin safe EAC. The strategies are briefly described here. They are linked more specifically to activities and objectives in the Operational Matrix.

Support Interagency and Inter-Sector Coordination

The building of awareness, efficiency, and consistency in aflatoxin policies and activities needs to begin within the EAC's internal audience, as designated in **Section 4**. The EAC has been very engaged in holding regional meetings on aflatoxin since the launch of its Aflatoxin Control and Improved Nutrition Programme in 2012. However, to increase the understanding of the aflatoxin threat and urgent need for responsive actions among EAC institutions and member ministries, greater emphasis must be placed on internal communications capacity. Potential benefits include:

- Increased collaboration
- Enhanced synergies
- Improved alignment across functions and policies
- Greater mobilization of communication resources, with added efficiencies
- Heightened motivation and commitment to aflatoxin program on the part of EAC staff and internal partners

Resource allocation. Dedicated staff and time must be assigned to the task of leveraging existing internal communications channels. Resources should be allocated to investigating which of those are most effective, as well as any new communication strategies that can help boost awareness, information sharing, and engagement with the aim of bolstering the achievement of aflatoxin communications objectives.

Channels. News and press releases regarding EAC aflatoxin meetings and workshops currently are posted on the EAC website. Further existing channels for internal communications include:

- Email
- E-newsletter
- SMS broadcasts to mobile phones
- Social media sites (e.g., Twitter, LinkedIn, Facebook)
- Intranet
- Notice boards
- Staff meetings, special meetings
- Annual conferences, such as EAC Health and Scientific Conference, Exhibit, and Trade Fair

Baseline survey. An internal electronic survey should be conducted to establish a baseline of aflatoxin awareness among internal EAC audiences. It also should be used to identify user-preferred channels of communications and to launch greater participatory involvement among internal stakeholders.

Build Awareness

The EAC region is characterized by low levels of aflatoxin awareness, along with a poor understanding of the risks associated with aflatoxin contamination. This is true for the full range of audiences, from small-scale farmers and livestock keepers to high-level decision makers. Even among groups that report some awareness of aflatoxin, myths and misunderstandings prevail about the causes, effects, and control of aflatoxin.

Focus on positive behaviors and tailored approaches. Building awareness is essential to reducing the risks and impacts of aflatoxin contamination across the food chain. Confusion regarding the source, spread, and identification of aflatoxin needs to be addressed in terms that are adapted, accessible, and relevant to diverse audiences. Because the term and concept of aflatoxin are difficult to explain, particularly in languages that have no word for it, they need to be couched in terms that do resonate with target audiences, such as how to keep food safe, promote healthy babies, or reduce food damage and losses.

Communication materials must be pretested with target audiences and be adapted to their preferred modes of communication, including how and when people like to receive information. Communication efforts should be multifaceted, combining approaches that enhance one-on-one discussion, ease of access, and participation. They need to be repeated through sustained approaches and via different formats to reinforce the understanding and uptake of positive practices. The infusion of hope and positive messages are also critical.

Leveraging common objectives. The positive practices that help mitigate aflatoxin risks overlap with strategies and behaviors that promote the objectives of many other high-priority initiatives (e.g., cancer prevention, nutrition promotion, "climate-smart" strategies). Thus, there is great opportunity for collaboration and for dovetailing off of other program efforts for mutually beneficial ends.

Examples of initiatives offering potential partnering opportunities at the EAC level:

- PACA
- International programs (One Health Initiative; Scaling Up Nutrition; US President's Emergency Plan for AIDS Relief; Global Fund for Malaria, TB, and AIDS)
- UN organizations (e.g., UNICEF, FAO, World Food Programme)
- CGIAR aflatoxin initiatives (e.g., AflaControl, CRP on Agriculture for Nutrition and Health)
- International organizations working on the ground in EAC partner states (e.g., WorldVision, ACDI/VOCA, Save the Children)
- National Ministry outreach and extension services
- National programs (e.g., nutrition education, cancer prevention)

A partnership mapping exercise should be conducted to identify the pathways and linkages that could promote mutually supportive activities that would promote aflatoxin awareness and mitigation.

Greater consumer awareness of aflatoxin risks in common foods could help drive tighter control standards and labeling of aflatoxin safe products. However, there is a need to balance greater demand with the assurance of available supplies of aflatoxin safe commodities.

Among high-level policy makers at the EAC and national levels, aflatoxin awareness communications efforts need to stress urgency. Solid data and illustrative, evidence-based examples can be transmitted to this target audience to inform policy development and argue for greater prioritization of aflatoxin across policies, programs, and funding allocations.

Promote Positive Behavioral Changes That Reduce Aflatoxin Risk and Exposure

Agriculture

Awareness building, while important, is not sufficient. Small-scale farmers and processors, especially, need access to necessary resources and infrastructure for control measures (Williams et al. 2004; Daniel et al. 2011).

The scale-up of appropriate behaviors and technology requires a strong extension service capacity and training programs focused on the technical transfer of knowledge, practice, and oversight to those most closely associated with aflatoxin control and mitigation. Thus, for example, the adoption of AflaSafe™ by small farmers will require not only distribution, but also extensive outreach and training to ensure farmers are aware of appropriate use, storage, and management of this biological agent. In addition, it will require either government support and subsidies or an appropriate business model that increases access and affordability. Potential models exist, such as where capitalized entrepreneurs aggregate small-scale farmers under their corporate umbrella to purchase and provide inputs with the aim of increasing both production and food safety (CGIAR 2014).

Below are key behaviors that have been identified for the region. Each country will need to prioritize the behaviors, taking into account their particular context, needs, priorities, and barriers. Once this is done, individual messages will need to be developed in locally appropriate languages targeting the priority groups in the country.

- Use of early warning systems for aflatoxin abatement
- Land-use planning to promote alternative crops/use in high-risk areas
- GAPs:
    a. Use of drought and insect-resistant varieties
    b. Selection of healthy seeds
    c. Early planting
    d. Crop selection, rotation (avoidance of monocropping), and diversification – use of crops less susceptible to aflatoxin
    e. Well-timed planting and harvest

f. Use of biological control agents to prevent aflatoxin from entering the crops in the first place
g. Application of inputs to ensure soil and plant (e.g., tillage, fertilization, water management)
h. Appropriate pesticide use in field and storage
i. Appropriate drying methods to discourage growth of fungi and bacteria, both on-farm and throughout the value chain
j. Storage techniques to preserve quality and integrity, with improved ventilation to reduce moisture and pests
k. Hand sorting of damaged grains/crops
l. Training and access to equipment to change inappropriate practices, e.g., facilitating access to mechanized shellers to replace hand shelling
m. Application of processing methods that mitigate aflatoxin exposure (e.g., ammonization)
n. Proper sorting and disposal of contaminated products

- Use of implementation packages. GAPs are more effective if used in combination. Research shows that implementing a package or set of procedures to prevent aflatoxin contamination in crops is more effective than individual practices alone (Turner et al. 2005).
- Livestock feed practices:
  a. Use of ammonization to decontaminate affected feed
  b. Use of binders
  c. Blending of contaminated feed with clean feed reduces the concentrations of toxins but is not allowed in some EAC partner states
  d. Alkaline treatment, including the use of ammonia, urea, and calcium hydroxide (*nixtamalization*), can reduce the levels of aflatoxins in maize and cottonseed by 50–99 percent
  e. Physical processes, such as sorting, fractionation (wet and dry milling), and floatation can also reduce aflatoxins by similar percentages
  f. Increasing protein and vitamins in feed acts as a palliative for livestock; providing exercise, good environmental conditions, and reducing other stressors on livestock and fish also help reduce aflatoxin exposure risks

Health

The human health effects of aflatoxins were reported as early as the 1960s. However, it has rarely received high-level public or policy maker attention, particularly in the face of other health, social, or economic priorities. **Figure 2** illustrates the connection between aflatoxin and various disease pathways in humans. The darker arrows denote linkages that have been well established in agricultural and toxicological research. White arrows denote linkages with less scientific backing.

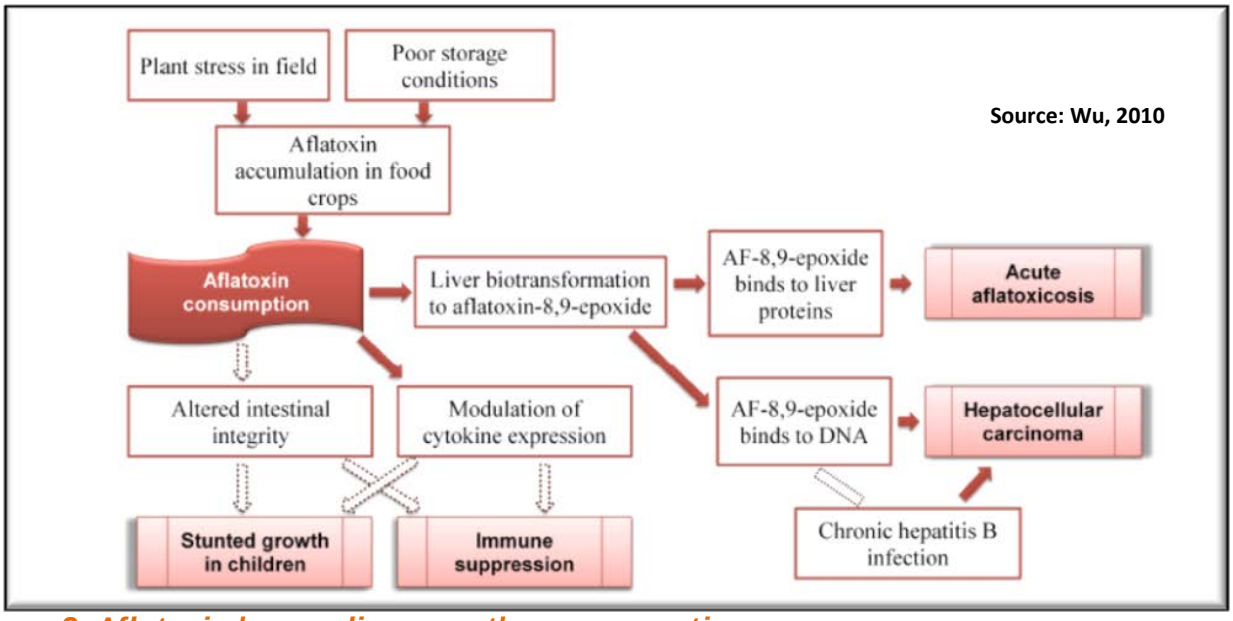

Figure 2: Aflatoxin-human disease pathways connection

With the exception of periodic outbreaks of acute aflatoxin poisoning (aflatoxicosis), most cases of aflatoxin exposure are chronic, leading to slower, more insidious health effects that garner little attention. Yet from a societal perspective, the health impacts of aflatoxin exposure are substantial, affecting not only human well-being, but also the development and potential of current and future populations.

As noted previously, the impacts of aflatoxin are particularly significant during the first 1,000 days of life, affecting not only early growth and development, but also longer term capacity, health, and productivity.

The most clearly established health outcome associated with chronic aflatoxin exposure is primary hepatocellular carcinoma (liver cancer), which is common in regions with high aflatoxin exposure and endemic hepatitis B infection (see **Box 4**). The EAC community faces high rates of hepatitis B, as well as hepatitis A, HIV/AIDS, and malnutrition. The combination with aflatoxin exposure results in a double-disease burden that increases disease severity, reduces survivability, and heightens liver cancer prevalence.

Box 4. Aflatoxin and Liver Cancer

Hepatocellular carcinoma (liver cancer) is the third leading cause of cancer deaths in the world.

Chronic hepatitis B infection is the most common cause of liver cancer, accounting for 23 percent of cases worldwide and up to 80 percent of cases in regions where hepatitis B is endemic, as seen in the EAC. Aflatoxin acts synergistically with hepatitis B to increase liver cancer risk, and studies in Kenya and Swaziland point to dietary aflatoxin exposure as an explanation for the high incidence of liver cancer in certain African countries.

A recent systematic review and meta-analysis determined that the risk of developing liver cancer was over 6 times higher in individuals with detectable aflatoxin exposure than in those without, more than 11 times higher in individuals with chronic hepatitis B infection than in those without, and 73 times higher in individuals with both detectable aflatoxin exposure and hepatitis B (Liu et

al. 2012). Since liver cancer is the third-leading cause of cancer deaths worldwide, and mortality rapidly follows diagnosis, the contribution of aflatoxins to this deadly cancer is significant.

Studies presented in the technical paper on hepatitis A and B estimate annual Disability Adjusted Life Years (DALYs) lost due to aflatoxin contamination-related liver cancer cases for EAC partner states from the added burden of aflatoxin-related liver cancer cases. The cost metric used is the Value per a Statistical Life (VSL). Ranges per EAC partner state were as follows:

Burundi = $18,000–$72,000 VSL; Kenya = $49,000–$207,000 VSL; Rwanda = $33,000–$134,000 VSL; Tanzania = $37,000–$161,000 VSL; and Uganda = $31,000–$128,000 VSL

Vaccination against hepatitis is an important measure for combating both the negative impacts of the virus and its complicating factors with aflatoxin. The hepatitis B vaccine was introduced in the EAC in 2002. It is frequently part of the primary infant immunization program, delivered in combination with the diphtheria-tetanus-pertussis (DTP) and haemophilus influenza type B (Hib) vaccines. As a result, reported rates of vaccination coverage for children ages 0–12 years are 70–90 percent. Adults are less likely to be immunized for hepatitis B, and vaccination for hepatitis A is not included in immunization programs.

Among livestock, as with humans, exposure to highly concentrated levels of aflatoxin causes acute toxicosis and death. Chronic consumption at lower levels can cause liver damage and gastrointestinal dysfunction. It decreases appetite, reproductive function, growth, and production, and increases susceptibility to other diseases due to immune suppression. These effects are accentuated when there is co-contamination with other mycotoxins.

Positive behaviors to mitigate the health effects of aflatoxin in human and animal health include:

- Strengthening vaccination against hepatitis A and C – currently, not widely available or used
- Expanding vaccination against hepatitis B – should be expanded to follow current protocols, and ultimately to reach further populations (e.g., youths over age 16, adults)
- Dietary diversification – using a wider assortment of food staples, including those less susceptible (e.g., millet, sorghum) to aflatoxin contamination and those that have detoxifying effects (e.g., leafy greens, broccoli); both lessen exposure risks and contribute to a more nutritionally diversified diet (Jubert et al. 2009)
- Uptake of antenatal care, which offers an opportunity for engagement and education
- Extended exclusive breastfeeding (beyond 4 months) – evidence suggests that encouraging exclusive breastfeeding for 6 months is more beneficial for infant health and will result in lower levels of aflatoxin exposure in comparison to early introduction of complementary foods; even if the breast milk is exposed, it is less toxic than exposure through baby food
- Early diagnosis of aflatoxin exposure, with application of appropriate treatment (adsorbent, chemoprevention, detoxification)
    a. Chemical treatments (e.g., Oltipraz) boost the body's defenses by inducing *glutathione S. transferase* (GST) enzymes responsible for detoxification of aflatoxin

b. Natural dietary components (e.g., polyphenol compounds in green tea, glucosinolates in broccoli sprouts, chlorophyllin in green leafy vegetables)
c. Processed calcium montmorillonite clay (Novasil) used as an anti-caking agent in animal feeds also binds to aflatoxin in the gastrointestinal to eliminate its effects on other organs

- Application and dissemination of epidemiological surveillance systems in high-risk areas, and application of early warning systems with response protocols
- For livestock:

a. General methods of aflatoxin management (plant breeding, biocontrol, pre- and post-harvest practices, and nutritional strategies).

b. Binders: The addition of binding agents, such as zeolite clays and aluminosilicates, is effective in reducing toxicity. When binding agents are included in feed at a ratio of 200 parts feed to 1 part binding agent, they reduce most of the harmful effects of aflatoxins at levels of 1,000 ppb for pigs and 7,000 ppb for poultry.

c. Blending: One method of reducing moderate levels of aflatoxin contamination is to blend contaminated grain with clean grain (blending 1 kg of grain with aflatoxin contamination five times above the limit with 9 kg of grain exhibiting no detectable aflatoxins would result in 10 kg of grain with aflatoxins at 50 percent of the permissible amount.

d. Decontamination: Ammonization is a safe and effective way to decontaminate aflatoxins; it has been used with success in many countries, yet is not legal in others. Nixtamalization, a traditional alkaline treatment, can reduce toxicity and has the potential for wider applications. Other chemical and biological agents have been effective in experiments but are not yet commercially developed.

Environment

Climate has a direct causal impact on crop growth and health. Strains of *Aspergillus flavus* are common between the latitudes of 40˚ north and 40˚ south worldwide, which includes the entire EAC region. Crop contamination occurs at temperatures between 24˚C and 35˚C with 7–10 percent relative humidity (Williams et al. 2004). Both dry and warm humid climates are affected, where the combination of heat and wetness facilitate fungal growth. Drought and extreme climates add stress to plants, undermining their health and vitality. This leaves them more susceptible to damage from pests and disease, which facilitates aflatoxin contamination. Crops are affected differently by climate conditions. For example, drought is a major factor in the contamination of corn and peanut crops, while rain and increased humidity correlate with contamination in cotton.

Crops and varieties that are more resistant to environmental stressors are less likely to be contaminated by the *Aspergillus flavus* fungus. Breeders have spent decades trying to develop

aflatoxin-resistant crop varieties, but with little success. IITA has identified several maize lines with aflatoxin resistance, but their grain yields are too low to make them viable options. As a result, other aflatoxin management practices need to be put in place across the food value chain to reduce aflatoxin contamination and risk.

Ideally, aflatoxin management starts with the collection of crop-specific agronomic data and regional crop surveillance information that can assess risk levels, along with the areas and crops most likely to be affected. This information can then be used to inform decisions about the timing and types of crops to be planted. Clearly, any attempts to change planting practices need interventions that will be accepted, adopted, and maintained by smallholder farmers. As noted previously, the use of biocontrols is an effective way to mitigate aflatoxin contamination at its point of origin in farmers' fields, and good pre- and post-harvest agricultural practices are important for limiting exposure along the food value chain.

However, until methods for eliminating aflatoxin exposure in food crops and animal feed are widely put into use, there remains a critical issue of what to do with contaminated crops or processed products, including detoxification, alternative uses, and proper disposal. The very idea of destroying food crops, even contaminated ones, meets great resistance in regions where food can be scarce and provides both needed sustenance and income. It should be a solution of last resort.

Safe alternatives to disposal involve chemical and physical processing to reduce aflatoxin levels. For example, the use of ammonia, urea, and calcium hydroxide (nixtamalization) can lower aflatoxin levels in maize and cottonseed by 50–99 percent. Physical processes, such as sorting, fractionation (wet and dry milling), and floatation, also reduce contamination by similar percentages, as can industrial processing (see **Figure 3** below). The blending of contaminated products with uncontaminated ones is used for animal feed in some countries, but it is forbidden in many countries, including several EAC partner states.

All of the EAC partner states consider aflatoxin-contaminated commodities destined for disposal to fit in the category of toxic waste. As a result, they require appropriate neutralization or detoxification prior to their disposal. Unfortunately, many of the processes that are used, such as milling and plowing products back into the field, putting them out to sea, burying them, or incineration, violate environmental statutes. Moreover, products designated as unfit for human or animal consumption frequently find their way back into informal markets to be sold as food or feed.

While processing procedures cannot completely eliminate aflatoxin exposure, certain processing methods can significantly decrease aflatoxin levels in end products. For example, in the production of peanut butter, each stage of processing from groundnut to finished product helps to diminish aflatoxin contamination levels, as illustrated below (Siwela et al. 2011).

Figure 3: Diminishing levels of contamination through peanut processing

Positive behaviors that can mitigate aflatoxin risks and impacts in the environment include:

- Zoning of ecological systems in which the growth of the fungus is favored
- Adaptation of early warning systems so that they can be applied to help warn of aflatoxin and aflatoxicosis risks or events
- Efforts to promote soil quality (e.g., mulching, interplanting, or rotation of crops, which promote soil nutrition and decrease erosion)
- Good land and water management
- Crop rotation between those crops such as maize and groundnuts that are most susceptible to aflatoxin contamination with less susceptible crops
- Adoption of integrated pest management practices
- Planting with drought- and pest-resistant crops and crop varieties
- Application of alternative uses for contaminated crops, depending on levels (e.g., animal feed (low levels/mixtures), ethanol production)
- Proper disposal measures following EAC protocols, including neutralization and/or detoxification prior to disposal

Trade

In the 1960s, Sub-Saharan Africa controlled 90 percent of the international groundnut market, valued in today's money at US$220 million annually. Although the market has since rocketed to $1.2 billion, African shares have plummeted to just 5 percent (Rios and Jaffee 2008). A key factor in this substantial decline in earnings has been the strict food import regulations on safe levels of aflatoxins imposed by highly regulated Western markets.

The World Bank estimates that the EU's tightening of the Maximum Allowable Levels (MALs) of aflatoxins to 4 ppb has cost Sub-Saharan African countries $670 million in annual export losses of cereals, dried fruits, and nuts (Fapohunda 2011). Underinvestment in infrastructure and systems, coupled with a lack of incentives and information, has made it difficult for smallholders in Africa to respond to the market demands for better aflatoxin controls. China, Argentina, and the United

States have emerged as global leaders by continuously investing and improving aflatoxin management practices.

Different legislations, codes, and standards are a major source of trade conflict, and harmonized standards (such as the *Codex Alimentarius*) have been shown to increase trade. However, where countries have different priorities, or different capacity to enforce regulations, it may not be possible or useful to move too quickly to harmonize regulations.

In East Africa, most farmers are smallholders; many farmers mix their own feeds or buy from small mills. Organic farmers and fair trade value chains may also need special consideration.

In Africa, food safety is often the responsibility of multiple agencies and departments. It is important to align and coordinate food safety legislation across sectors (Pinstrup-Andersen 2012).

The EAC has set 10 µg/kg as the maximum permitted amount of aflatoxin in both foods and feeds. Two partner states, Burundi and Tanzania, have lowered the limit to 5 µg/kg for some food stuffs. These maximal limits align the region with international bodies, such as the Codex Alimentarius Commission.

The existence of maximum levels (MLs) for aflatoxins in foods cannot be effective in the absence of effective and efficient compliance by the private sector, coupled with enforcement by governments. Whereas developed countries have very effective food control systems, such as the USDA—which regulates across both the public and private sectors—developing countries have very weak enforcement by regulatory agencies and largely uncontrolled food marketing and processing systems. This situation is exacerbated by high on-farm household consumption of food products, informal trading systems, and the threat of significant economic losses throughout the value chain, which could result from enforcement of standards. In rare cases when potentially contaminated commodities are scrutinized, the lack of quality control standardized testing protocols and sparse availability of laboratory facilities is a further hindrance. When contaminated commodities are rejected, they are often reintroduced into the marketplace for low-income consumers. Currently, the onus falls mainly on large-scale commercial exporters for global markets to ensure compliance with the importing countries' requirements or risk significant financial losses.

With regard to animal feeds, most monitoring of aflatoxins is carried out by the private sector, while the public sector oversees the process. However, for small feed mills and small-scale farmers, the cost and complexity of monitoring aflatoxins is prohibitive.

In East Africa, most livestock is kept by smallholder farmers. They either produce their own livestock feed or purchase it from small, local mills. Likewise, the majority of livestock products are sold through the informal sector. Commercial farmers and large-scale millers provide only a small portion of livestock feed and products. They mostly operate under-capacity and will require "infant industry" government support to enable them to support the rapid intensification of livestock industries predicted to occur over the next decades.

Positive behaviors that can mitigate aflatoxin risks and impacts in trade include:

- Increased use of testing in the informal market (with access to affordable, easy-to-use testing technology)
- Increased testing in the formal market
- Promotion of decontamination processes for both food and feed
- Implementation of policies that would legally permit use of aflatoxin-contaminated products unfit for human consumption to be processed to safe standards for use as animal feed
- Application of standards for aflatoxin limits according to food stuffs, products, and intended use
- Increased monitoring and enforcement of import/export standards
- Logos identifying aflatoxin safe products
- Creating large-scale demand for aflatoxin safe products (WFP Purchase 4 Progress)
- Creation of codes/guidelines appropriate for farmers, small-scale millers and processors, and small-scale feed manufacturers

Box 5, which follows, addresses how high-profile partners can enhance awareness and adoption of positive changes when discussing aflatoxin control.

Box 5. How High-Profile Partners Can Greatly Enhance Awareness and Adoption of Positive Changes Regarding Aflatoxin Control

The World Food Programme (WFP)—a United Nations humanitarian organization involved in emergency response, food relief, and food security—has developed a presence in local markets that provides a platform for raising awareness about aflatoxin and food quality. WFP's Purchasing for Progress Programme buys maize from small-scale farmers offering fair prices to boost their incomes and livelihoods. Although WFP tries to purchase its grain supply locally, it also relies on commercial farmers and traders, who can supply the large quantities needed. Before any purchase, WFP uses independent inspection services to test that aflatoxin levels do not exceed 20 ppb.

In 2010, WFP rejected two sets of Kenyan and Indian maize consignments, finding levels of aflatoxin reaching up to 110 ppb. Following these findings, WFP introduced a Standard Operating Procedure for sampling and testing of maize grain at the farm gate. Adherence to program standards ensures that farmers enforce safety regulations while giving them access to a high-paying market for their products. Spillover effects include stronger links with local inspection authorities to influence policy design and execution as well as a shift from end-product testing to preventive measures not only for aflatoxin, but also regarding more general quality and safety parameters. The Programme is thus a promising partner and interface for transmitting innovative approaches and tools for the management of aflatoxin (Kang'ethe 2011; Meaux et al. 2013).

Monitoring, Evaluation, and Feedback

Monitoring and Evaluation

M&E are an integral part of the communications strategy to ensure that activities are being implemented according to planned timelines and priorities. M&E of the communications strategy will build on the existing models and structures of the EAC. It will need to be coordinated with the existing EAC M&E team, which holds quarterly meetings and reports out to the EAC every 6 months. Further coordination should also include collaboration with regional and national committees working on related issues, such as non-tariff barriers to trade, where assessments and feedback will inform shared priorities.

Annual progress reviews will include rapid assessment of implementation, with indicators such as:

- Communications strategy timelines and milestones – are they being followed/met?
- Allocation of resources (funds, time, people) to communications activities
- Evidence of linkages for tapping into other resources, partners, regional networks, etc.
- New policies introduced, adapted, and implemented
- Media engagement
- New or increased donor engagement

Integrating Feedback

Communications is as much about listening as it is about telling. As underscored by the research literature, the inclusion of participatory methods and horizontal knowledge sharing in communications-based approaches is important for improving technical innovation, enhancing adaptation, bridging gaps between global research and local knowledge, and strengthening policy dialog between institutions and small farmers. Participatory approaches foster dialog through interactive methods that give voice to multiple points of view, especially those that reflect the varying social, cultural, and economic contexts of key stakeholders. Key principles to guide participatory approaches are presented in **Box 6**, below.

Box 6: Key Principles to Guide Participatory Approaches

The right to participate – all people have a right to play a part in shaping the decisions that affect their lives; maximizing the participation of the less powerful is key.

Hearing unheard voices – actively seeking out unheard voices and creating the safe spaces that allow them to be heard. It is often people who have the least say in decisions about their lives who have the most to gain or lose.

Seeking local knowledge and diversity – an important starting point, recognizing that within local communities there exist diverse perspectives, experiences, interpretations, and realities.

Reversing learning – by letting go of preconceptions, strategies can learn from the wisdom of community members, which may require "unlearning" preconceived ideas and knowledge.

Using diverse methods – adapted to varying conditions and needs, reflecting cultural differences and realities on the ground (e.g., literacy levels, access to electricity or information technology).

Handing over the stick (or pen, or chalk) – keeping quiet and allowing space for others to participate, reversing the common imbalance between those who have the power to speak and those who do not.

Being willing to change attitudes and behaviors – not only among stakeholders on the ground, but also among decision makers, planners, and policy makers.

Collaborating with other partners and programs that share related goals – reaching beyond the boundaries of one initiative to embrace commonalities and shared purposes to enhance reach, effect, and efficiencies.

Source: Adapted from http://www.participatorymethods.org/page/about-participatory-methods

The collection and incorporation of feedback into the communications process helps to build buy-in, incorporate unexpected issues, and address problems. It also informs the research and planning agendas and contributes to evidence-based policy. Interactive communication strategies strengthen rapid-response capacity and help build credibility for communication actors, activities, and agendas. Finally, participatory approaches and feedback mechanisms help to ground communications activities in both real time and on-the-ground realities. As a result, the communications strategy framework needs to be supple, not static, and able to incorporate different input and ideas, along with new opportunities, shifting priorities, funding fluctuations, and other changes. As described by the Participatory Methods website (cited in Box 6 above):

> *Participatory communications recognizes the importance and value of iterative processes, not just of a final communications product, which emerges from the last stages of a linear project process, or a public relations or marketing exercise. Integrating communications into each stage of research or practice – from inception to evaluation – allows for the creation of more nuanced products, often representative of a greater number of viewpoints* (PPSC Team, References section).

Participatory communications methods follow a two-way, horizontal model and not the traditional one-way, vertical model of sender-message-channel-receiver. They increasingly make use of emerging interactive communications forms made possible through new technologies, such as mobile phones. Traditional unidirectional methods, such as campaigns, also can include field

testing, feedback, or monitoring to boost the inclusion of diverse priorities, perceptions, and levels of knowledge.

Examples of communications channels that promote stakeholder dialog, input, and engagement include:

- Town hall-style meetings
- Networking activities and platforms
- Stakeholder meetings/workshops
- Policy forums
- Field visits to elicit feedback
- Surveys
- SMS, to convey information and gather questions and feedback
- Call-in radio or television programs
- Agricultural shows, fairs, trade fairs
- Interactive art projects and shows
- Participatory mapping (land use, changing landscapes, traditional knowledge/practices, etc.)
- Face-to-face trainings
- Social media platforms
- Interviews and focus groups
- Media trainings and forums
- Youth clubs and youth dialogs
- Digital storytelling and participatory video

Operational Plan

Regional Dimension of the Strategy

The Five-Year Communications Strategy for an Aflatoxin Safe East African Community is a regional strategy. It is not meant to drill down to the details of national and local aflatoxin communication planning and implementation. Instead, this strategy is designed to take advantage of the special role and vantage points of the EAC as a critical regional entity focused on political integration and the consolidation of regional economic cooperation.

The EAC mandate goes beyond representing the interests of individual states to those affecting the broader community. It holds a unique position from which to coordinate and link aflatoxin communication efforts among EAC partner states, as well as with other regional and international entities. The EAC is well poised to reflect the latest science and findings regarding aflatoxin risks, surveillance, and mitigation as they apply to social and economic development. Its high level of influence and political status brings visibility to the problems and solutions of aflatoxin control. It also aids the development of cross-sectoral approaches needed to address the complexity and far-reaching effects of aflatoxin contamination.

The strategy's Operational Plan Matrix, presented after the Policy Recommendations section below, outlines the region-wide objectives and the types of activities that are in the purview of the EAC to help address and attain those objectives. However, it is clear that the complexity of aflatoxin control will require cross-cutting engagement from multiple sectors, both public and private, ranging from the international to the local levels. The EAC's regional communications strategy on aflatoxin is meant to serve also as a framework for more targeted national communications plans that will reflect country-level needs, opportunities, and priorities. With sustained initiatives, and the engagement of key partners at multiple levels, the hope is that it will help spur further advances, coordination, and capacity to build an aflatoxin safe EAC.

Policy Recommendations

The policy recommendations for the communications strategy include:

1. A multisectoral 5-year communications strategy to build an aflatoxin safe East Africa Region will be designed and implemented by the EAC partner states. This will cover the health, agriculture, trade, and environment sectors.
2. The policy recommendations for communications programs validated by the EAC Regional Expert Working Groups will be incorporated into the communications strategy. This includes human and animal health; expansion of hepatitis A and B vaccination programs; standards for food and feed; GAPs, including the biological control of aflatoxin, addressing economic impacts on trade; and the development of alternative uses and disposal systems for contaminated commodities.
3. A specialized communications package focusing on vulnerable groups will be developed as a priority under the larger communications initiative.
4. The strategy and programs will include short-, medium-, and long-term objectives to allow for phased implementation, an M&E system providing real-time information, and incremental resource allocations.
5. Behavioral change and communications (BCC) programs directed at consumers and livestock producers will be delivered in a timely manner to ensure that the demand for aflatoxin safe food and feed is harmonious with the supply of these same products.
6. Ministry-based communication staff within each of the focus sectors will collaborate with technical advisors and donors to ensure appropriate aflatoxin communications are embedded into production, value chain development, and food and feed processing activities for aflatoxin-prone crops, and that adequate resources are allocated to support these programs.
7. The 5-year communications strategy will embrace the concept of an aflatoxin safe EAC "from field to fork."
8. Aflatoxin abatement communications throughout each of the four sectors of health, agriculture, trade, and the environment will be integrated into existing programs to the fullest extent to maximize efficiencies and effectiveness, rather than creating a new vertical aflatoxin communications network.
9. Because of their unique challenges, priority will be given to activities that address issues related to on-consumption for families and their livestock, in tandem with food and feed moving through the informal trade and processing sectors.
10. The EAC Communications Secretariat will take a leadership role in the formulation and delivery of communications on aflatoxin issues to inform partner state legislators, policy makers, donors, and other influential stakeholders to ensure their support of the strategy.

Operational Plan Matrix

Overarching Activities

The following overarching activities are essential to promote the achievement of the objectives of the EAC's aflatoxin agenda.

Objective	Audience	Activity	Measure or outcomes
Improve internal communications regarding aflatoxin awareness and activities	EAC internal audience (EAC Secretariat; REWGA; EAC Comms staff and those of EAC partner states; Ministerial officials from health, trade, agriculture, livestock, environment; IITA representatives; USAID representatives; representatives from Ministries of EAC Affairs in partner states)	Conduct an electronic survey to assess current aflatoxin awareness among internal audiences and the level of aflatoxin trainings, workshops, or other activities to which they have been exposed. Include survey questions regarding their favored channels of communications. Based on survey outcomes, establish an EAC Knowledge Hub for Aflatoxin, with regular communications activities, such as an expert series, e-calendar of aflatoxin events, newsletters, email updates, etc. Identify the best ways to link these activities with existing EAC communications sites and resources. Campaign to identify internal aflatoxin champions (one per country) from within EAC internal audience.	Increased EAC internal audience awareness. This should be measured annually to monitor progress. Stronger internal coordination and linkages of EAC aflatoxin activities.
Improve knowledge management of EAC aflatoxin resources	EAC internal audience	Conduct a detailed assessment of aflatoxin trainings and materials produced by the EAC and its internal communications partners. Conduct detailed audits of aflatoxin resources, activities, materials, events, etc., for partner states, similar to the one conducted in Tanzania by IITA. As part of the EAC Knowledge Hub for Aflatoxin, develop a database of existing resources and make them downloadable via the EAC/Knowledge Hub website.	Greater coordination, sharing of, and access to EAC aflatoxin resources.

Objective	Audience	Activity	Measure or outcomes
Clarify impact pathways for aflatoxin communications efforts, leveraging linkages with internal and external partners and programs	EAC internal audience and external partners	Conduct mapping exercises to identify high-level EAC partners and programs that are undertaking activities that can benefit aflatoxin awareness and control across key sectors, including pathways to implementation. Produce a framework for collaborations around issues promoting aflatoxin objectives.	Greater understanding of other projects and identifying areas for collaboration. Improved integration through the generation of a feeling of common purpose. Better programmatic integration with increased effects and efficiencies.

Activities Addressing Targeted Objectives

This matrix reflects the types of activities that are within the EAC's mandate and contribute to the overall objectives of the communications strategy. These activities are not meant to be exhaustive. Achieving the impact objectives would primarily be achieved through activities undertaken at the national level, as part of specific national communications and implementation plans.

Objective	Audience	Activity	Measure or outcome
AGRICULTURE			
Attain widespread adoption of GAPs that help mitigate aflatoxin exposure and spread: • **Short term – To insert aflatoxin awareness and control in GAP training for extension workers.** • **Medium term – To expand GAP training and awareness among producers in aflatoxin hot spots, through extension programs, media, and SMS; to commercialize affordable technologies that address the harvesting and storage constraints of small-scale farmers.** • **Long term – To expand and reinforce GAP training and awareness more broadly, through extension programs, media, and SMS.**	Ministries of Agriculture Agricultural extension services and beneficiaries Partner organizations and programs Media	Identify EAC partner entities and programs that can help promote the insertion of aflatoxin awareness and control in GAP training as part of their activities. Identify existing aflatoxin-related training models, curricula, materials, etc., that promote GAP and aflatoxin awareness and control, which could be adapted in different EAC partner states and regions. Convene workshops and meetings focused on lessons learned and information sharing around public or private initiatives that are successfully integrating aflatoxin abatement in agricultural training and extension. Develop an EAC standardized GAP toolkit for aflatoxin mitigation based on workshop findings (ensure gender and youth sensitivity). Disseminate it through member country ministries of agriculture and partner	Increased awareness of aflatoxin among partner, programs, and program beneficiaries. Increased integration of aflatoxin mitigation practices in agricultural extension programs. Increased application of GAP toolkit recommended practices, including post-harvest.

Objective	Audience	Activity	Measure or outcome
		networks; develop media interest through demonstrations, site visits, and media materials.	
Promote commercialization and dissemination across EAC partner states of affordable, easy-to-use aflatoxin testing methods for food and feed across the food chain: • **Short term – To identify affordable, easy-to-use testing technologies (e.g., mobile phone-based devices) that can be taken to scale and disseminated to producers.** • **Medium term – To develop modalities for disseminating the testing technologies to producers and processors, along with training on how to mitigate further spread of contamination and safe alternative uses or disposal.** • **Long term – To have widespread dissemination and use of aflatoxin testing methods among producers and processors.**	EAC partner state policy makers Ministries of Agriculture and Trade Private-sector industries and investors Partner programs Media	Convene a workshop to identify affordable, easy-to-use testing technologies (e.g., mobile phone-based devices) and ways they have been or can be taken to scale and disseminated to producers. Use the findings from the workshop to establish a strategy to scale up existing technologies, which would include a pilot testing to see if the technical and financial models are scalable. Following the pilot testing, engage private- and public-sector partners around proof of concept to launch the technologies.	Produce materials and media stories based on workshop findings that can influence policy makers, private-sector, and partner programs to further the distribution and training associated with these technologies.
Facilitate generalized use of the biocontrol agent, AflaSafe™, developed specifically for East African conditions: • **Short term – To scale up capacity for distribution and training on safe use and handling of AflaSafe™ in Kenya, particularly targeting high-risk crops and areas.** • **Medium term – To negotiate the safe cross-border trade and transport of AflaSafe™ for use in EAC partner states beyond Kenya.**	EAC partner state policy makers Ministries of Agriculture, Trade, & Environment Media IITA	Identify policies to be adapted in EAC partner states to support the safe use and handling of AflaSafe™ Negotiate safe cross-border trade and transport agreements and regulations for AflaSafe™ across EAC partner states. Designate Centers of Excellence to ensure the highest quality of research, development, product assurance, scale-up, and sustainability for biocontrol.	Expanded use of biocontrol, especially in high-risk zones. Decreased contamination of crops at their point of origin on the food value chain.

Objective	Audience	Activity	Measure or outcome
• **Long term – To have safe, generalized use of AflaSafe™ in crops and areas at high risk of aflatoxin exposure**			
HEALTH			
Revise education and training curricula in academic, extension, and outreach programs to incorporate aflatoxin risks and mitigation methods: • **Short term – To identify existing training programs, materials, and curricula on aflatoxin.** • **Medium term – To adapt existing programs and curricula to ensure they include both awareness and mitigation, and to use in various training programs: medical, nursing, nutrition, public health, veterinary, agricultural extension services, and health care outreach worker services.** • **Long term – To apply aflatoxin-adapted training programs across the spectrum of medicine, nursing, nutrition, public health, veterinary sciences, agricultural extension, and health care outreach services.**	Ministries of Health Universities and Academic Health centers National health outreach programs and services International health programs and services	Conduct a study to identify existing training programs, materials, and curricula on aflatoxin along with examples of ways that have been adapted and integrated into training programs in medicine, nursing, nutrition, public health, veterinary sciences, agricultural extension services, and health care outreach worker services. Compile recommendations for ways partner states can adapt existing curricula and in-service training programs to include aflatoxin awareness and mitigation. Work with public academic institutions from partner states, and with curriculum development experts for training modules, to devise and certify curricula and training plans. Collaborate with partners to roll out developed training packages and curricula.	Recognized or certified training curricula. Expanded understanding of aflatoxin—its origins, effects, and ways to reduce its impacts—among health care trainers and service providers so that they incorporate it into their daily practices.
Expand vaccinations for hepatitis A & B: • **Short term – To comply with existing hepatitis B vaccination protocols.** • **Medium term – To expand vaccination for hepatitis B among all age groups and to introduce or strengthen vaccination for hepatitis A.** • **Long term – To reach 90 percent or more vaccination coverage for hepatitis B among all populations.**	Ministries of Health National health outreach programs and services International health programs and services	Identify key international and national partners (e.g., UNICEF, GAVI, One Health Initiative) focused on immunization, child health, and cancer prevention that can facilitate full application of hepatitis B vaccination protocols to reach all children 0-15 and institute adult vaccination campaigns. Establish a dialog among partner states on human and financial resources and linkages to other programs needed to apply full	Closing the 20 percent gap in immunization for hepatitis B among children and adolescents ages 0-15 years. Expanded adult immunization against hepatitis A and B. Reduced liver cancer incidence.

Objective	Audience	Activity	Measure or outcome
		coverage for hepatitis A and B immunizations. Provide communications technical assistance to national governments and implementing partners to increase awareness, understanding, and uptake of hepatitis vaccines for children and adults. Provide technical assistance to vaccination campaigns (e.g., ensure integration, sharing of lessons learned and best practices).	
Focus on promotion of aflatoxin prevention during the first 1,000 days of life, targeting pregnant women and mothers of infants: • **Short term – To promote breastfeeding for at least the first 6 months of life, and delayed introduction of complementary foods at risk of aflatoxin contamination; to revise nutrition education curricula and outreach activities so they focus on aflatoxin prevention in first 1,000 days.** • **Medium term – To promote aflatoxin safe foods for first 1,000 days of life to reach children and mothers through antenatal care, feeding programs, health outreach, community leaders, media, etc.** • **Long term – To reduce aflatoxin exposure rates in blood samples of infants and milk samples of breastfeeding women by 50 percent.**	National and international programs and services for pregnant and postpartum women, and infants	Collaborate with the Scaling Up Nutrition, Save the Children, Millennium Development Goals policy and program leaders, and others, as appropriate, to design and integrate food safety goals to include aflatoxin abatement measures for first 1,000 days targeting pregnant women, infants, and mothers. Conduct review of national and organizational dietary recommendations and nutrition programs that may inadvertently advocate for the consumption of aflatoxin-prone foods. Collaborate with partner states and groups to raise awareness and alternative recommendations, such as prolonged breastfeeding, and dietary diversification for mothers and children. Devise and publicize an EAC Call to Action that will give greater visibility to aflatoxin safety for the first 1,000 days and can serve as an advocacy tool for national and organizational stakeholders.	Reduced levels of aflatoxin exposure in blood samples of infants and milk of breastfeeding women.
Promote greater dietary diversity toward staple foods and food products that rely less on crops most at risk of aflatoxin contamination, are more	Partner programs and organizations focused on food and nutrition	Convene a high-level meeting with key partner programs and organizations focused on food and nutrition to link aflatoxin mitigation with strategies that target	Stronger linkages and coordination with major food and nutrition programs. Decreased reliance on staple

Objective	Audience	Activity	Measure or outcome
climate smart, and promote higher nutrition: • **Short term – To partner with existing programs and organizations for the integration of strategies to promote dietary diversity in staple foods; to integrate the promotion of aflatoxin safe foods and dietary diversity in public health outreach and agricultural extension services.** • **Medium term – To increase the production of alternative staple crops that are drought resistant, more diverse, and offer a greater range of nutrients in high-risk areas.** • **Long term – To increase the production of more diverse staple crops more broadly.**		climate change, nutrition, income generation, or other objectives that also reinforce a greater diversification of staple crops away from heavy reliance on those most at risk of contamination (e.g., maize, groundnuts). Devise and disseminate an action plan for the promotion of dietary diversity based on that meeting. Convene a meeting with the key partner programs and organizations at the 3-year and 5-year marks to assess progress regarding the action plan for dietary diversity and adopt lessons learned or needed revisions.	foods at highest risk of aflatoxin contamination. Increased dietary diversity and nutrition. Increased food production.
ENVIRONMENT			
Monitor aflatoxin "hot spots" and initiate quick-response systems: • **Short term – To integrate seasonal risk mapping and early warning systems to predict high-risk zones for aflatoxicosis outbreaks into food security forecasting models, such as Famine Early Warning Systems Network (FEWSNET), and the FAO Early Warning Systems.** • **Medium term – To initiate quick-response mechanisms to reduce the consumption of dangerously high levels of aflatoxin, especially those associated with on-farm consumption.** • **Long term – To apply quick-response mechanisms to reduce the**	FAO and other surveillance monitoring partners Member State Ministries of Environment, Lands, Health, and Agriculture Media	Work with FAO and others to support the integration of aflatoxin surveillance as part of seasonal risk mapping and food security forecasting models, such as FEWSNET and the FAO Early Warning Systems. Apply mechanisms to work in identified hot spot regions with biocontrol, crop diversity, or other GAP and land management responses. Share and distribute the findings through the EAC Knowledge Hub, and additional alerts to key partners, including media.	Increased mapping and monitoring of aflatoxin at-risk periods and regions. Lowered contamination rates in identified hot spot areas.

Objective	Audience	Activity	Measure or outcome
consumption of dangerously high levels of aflatoxin, especially those associated with on-farm consumption.			
Institute functional systems and standards for alternative use and disposal of contaminated commodities: • **Short term – To develop and adopt a harmonized policy framework for alternative uses and disposal systems for the EAC, and as a model for partner states.** • **Medium term – To reduce reintegration of contaminated commodities into the food chain, finding safe alternative uses for or disposal of contaminated products.** • **Long term – To have an enabling environment for alternative uses of contaminated commodities; to have a fully functional disposal system for contaminated commodities.**	Member State Ministries of Environment, Lands, and Agriculture	Develop and adopt a harmonized policy framework of guidelines and standards for alternative uses and disposal systems for the EAC, to be reflected at the national levels of partner states. Create tools to publicize and disseminate the guidelines and standards (e.g., PSAs, videos, pocket guides, storylines for edutainment programs).	Reduced reintegration of contaminated goods into the food value chain.
Promote modern decontamination processes	EAC Partner State Ministries of Environment, Lands, and Agriculture Private-sector processors and traders	Institute a research-based call to action to highlight decontamination thresholds and processes, such as the use of alkalis; include the development of protocols in the call to action, along with monitoring processes and recommendations. Disseminate the call to action and protocols to trade associations, processors, and other relevant stakeholders.	Reduced contamination levels, especially in feed and process foods.

Objective	Audience	Activity	Measure or outcome
TRADE			
Heighten consumer awareness and demand for aflatoxin safe food products: • **Short term – To identify existing awareness promotion tools and activities, along with opportunities to boost them with partner programs/entities.** • **Medium term – To develop tailored, tested communication strategies and materials that emphasize positive behavior changes that mitigate aflatoxin risk.** • **Long term – To implement wide-scale awareness-raising strategies that focus on positive messages and behaviors for promoting aflatoxin safe foods.**	Consumers Media National Bureaus of Standards	Collaborate with existing programs targeting consumer education related to food and health issues to integrate positive aflatoxin awareness messages that highlight food safety, diversity, and nutrition. Engage media through briefings and the development of media stories to raise both awareness and positive practices that can support consumer demand for safe foods. Support policies that put the burden of proof for compliance with minimum-level standards for aflatoxin on private-sector traders, processors, producers, wholesalers, and retailers, with partner state agencies serving in a regulatory and oversight role. Collaborate with and give visibility to high-profile partners, such as the World Food Programme's Purchasing for Progress Programme, to build demand for aflatoxin safe food supplies through the power of purchasing incentives for suppliers.	Increased demand for aflatoxin safe foods.
Increase inspection staff and capacity within and between countries: • **Short term – To identify training materials and protocols for aflatoxin control to be used by inspection staff.** • **Medium term – To expand training for aflatoxin awareness and control among inspection agents.** • **Long term – To ensure aflatoxin safe foods and feed that meet regional standards.**	Member State Ministries of Trade Bureaus of Standards	Collaborate with COMESA, the private sector, Ministries of Trade, Bureaus of Standards, and others to ensure inspection staff are trained to monitor for aflatoxin among formal traders, processors, and wholesalers and at border inspection stations. Develop inspection training modules and ensure their implementation through member state partners.	Reduced trade of contaminated goods across the EAC and within partner states.

Objective	Audience	Activity	Measure or outcome
Institute regulatory protocols adapted to formal and informal markets: • **Short term – To create control codes and guidelines appropriate for small-scale farmers, millers, processors, and feed manufacturers.** • **Medium term – To apply control codes and guidelines for small-scale farmers, millers, processors, and feed manufacturers.** • **Long term – To create large-scale demand for aflatoxin safe products.**	Member State Ministries of Trade Bureaus of Standards	Review existing aflatoxin standards based on current assessments of regional risks and dietary consumption patterns, with consideration of updates for at-risk subgroups, such as infants and people with HIV or hepatitis. Promote and help facilitate the alignment of food safety legislation across sectors and agencies. Devise a "ladder approach" for working with informal producers, processors, and traders to gradually improve standards and controls in the informal market; develop communication tools and strategies that support its implementation among informal producers, processors, and traders.	Increased alignment and monitoring of aflatoxin safety standards.
Standardize labeling certification for aflatoxin safe foods and animal feeds: • **Short term – To design and test aflatoxin safe labels for food and animal feeds.** • **Medium term – To address questions of feasibility, standardization and linkages with national standards bureaus, how to ensure enforcement and avoid counterfeiting; to ensure availability of aflatoxin safe foods.** • **Long term – To design logo awareness campaign and garner political will and financial resources for roll-out; ultimately, to apply logos with accompanying wide-scale awareness campaign.**	Bureaus of Standards Ministries of Trade Private-sector processors, traders, supermarkets	Orient and audit national bureaus of standards on aflatoxin certification labeling to introduce the proposed regional labeling, and to understand what systems and processes they have in place. With the collaboration of private-sector stakeholders, too, develop a strategy that supports application and enforcement of standardized labels for aflatoxin safe foods and feed. Garner political will and financial resources for a roll-out and education campaign surrounding the launch of an EAC aflatoxin safe label for foods and feed. Develop and roll out the aflatoxin safe label campaign.	Increased consumer awareness. Increased supply of aflatoxin safe foods.

Appendix A: Matrix of Policy and Program Actions – Five-Year Road Map for an Aflatoxin Safe East Africa Region

GROUP 1: HUMAN HEALTH

Human Health

Short-term recommendation	Medium-term recommendation	Long-term recommendation
• Integrate dietary diversification and food safety into primary and secondary school-based health promotion, and school feeding. • Encourage dietary diversity for the general population and vulnerable groups. • Address special circumstances for on-farm consumption and the informal sector.	• Develop and implement 5-year regional and national road maps to address aflatoxin issues. • Collaborate with PEPFAR and the Global Fund for risk reduction protocols. • Intensify food safety monitoring systems for susceptible products.	• Strengthen relevant national cancer registries and other relevant epidemiological surveillance systems. • Develop curriculum for community health workers and university medical sciences. • Review and revise enrichment, fortification, and biofortification initiatives to consider aflatoxin issues. • Integrate early warning systems for quick response, especially for on-farm consumption.

1,000 Days

• Continue to promote exclusive breast feeding for the first 6 months of life. • Design and implement nutrition education modules to reduce aflatoxin ingestion. • Promote dietary diversity for the 1,000 days.	• Collaborate with SUN to include aflatoxin abatement measures. • Include populations with special needs in updated standards for foods.	• Conduct reviews of the current dietary recommendations and revise accordingly. • Advocate for research on the impacts of aflatoxin on morbidity and mortality.

Hepatitis A and B

• Intensify efforts for hepatitis B birth dose. • Address hepatitis B birth dose for out-of-clinic deliveries. • Coordinate with GAVI on supply response and logistical support. • Eliminate FGC and nonsterile male circumcision.	• Conduct clinic outreach for unvaccinated HBV 0–15 year olds. • Initiate public vaccination campaigns for 16+ year olds for HBV. • Take steps to introduce hepatitis A vaccination.	• Strengthen cold chain supply systems. • Include full hepatitis A and B coverage in the "Zero Policy Draft for an Aflatoxin Safe EAC." • Implement BCC interventions for scarification, tattooing, and other body piercing, especially among youth.

GROUP 2: GOOD AGRICULTURAL PRACTICES

Animal Health

Short-term recommendation	Medium-term recommendation	Long-term recommendation
• Determine magnitude of the aflatoxin problem. • Create awareness along the industry value chains. • Harmonize regional aflatoxin standards for feed.	• Develop legislation, policies, regulations, and practices for a safe feed supply. • Equitably budget for longer term development of the livestock and feed sectors. • Develop action plan to address constraints and formulate solutions. • Develop multisectoral policies, programs, and action plans.	• Use livestock as a ladder to increase rural incomes and strengthen resilience and livelihoods. • Include use of binders, blending, and decontamination technologies. • Integrate aflatoxin issues into livestock development strategies.

Biocontrol

• Pilot AflaSafe™ business models, including public-private partnerships. • Give priority to on-farm consumption and small-scale producers. • Make affordable and reliable test kits accessible along the value chain.	• Develop regionally harmonized regulations. • Treat maize and groundnut as priority crops. • Distribute AflaSafe™ through emergency relief and development programs. • Expand early warning systems to identify "aflatoxin hotspots."	• Include biocontrol in GAP. • Promote equitable distribution of aflatoxin safe foods.

PHL

• Prioritize maize, groundnuts, and milk for PHL reduction interventions. • Reduce tariffs on modernized PHL equipment. • Customize BCC programs by gender, language, and literacy levels.	• Prioritize resource allocation to aflatoxin-prone staple food crops. • Be comprehensive, covering GAPs, GHPs, and GMPs. • Expand all biological control methods.	• Focus on locally adapted and validated best practices. • Conduct best practices analysis. • Support PACA as lead knowledge platform.

GROUP 3: STANDARDS

Standards for Food

- Participate in international standards-setting bodies.
- Establish updated standards for vulnerable populations.
- Promote appropriate technologies from "field to fork."
- Include food safety in BCC interventions.
- Establish regionally harmonized standards.
- Conduct risk assessments based on regional factors.
- Establish Centers of Excellence for aflatoxin testing in foods.
- Establish regionally harmonized sampling and testing protocols.
- Lead Africa-wide standardization of methods.
- Shift the burden of compliance to private sector.
- Refocus government agencies to regulatory and oversight role.
- Consider logos to identify aflatoxin safe foods.

Standards for Feed

- Revise existing standards for fish and animal feed.
- Specify type of feed to which the standard applies.
- Specify the species, age, and purpose of animals in standards.
- Establish regionally harmonized standards.
- Address feed safety on-farm and for the informal sector.
- Develop regionally harmonized sampling and testing protocols.
- Adopt ammoniation, blending, and binding for feeds.
- Continue research and data collection and analyses to inform policy and standards development.
- Improve quality assurance for testing.

GROUP 4: TRADE AND ENVIRONMENT

Economic Impacts on Trade

- Establish effective, safe, and rapid disposal systems.
- Lead pan-African harmonization of standards.
- Protect poorer households and other vulnerable groups.
- Decentralize testing.
- Address issues within the informal sector.
- Phase in enforcement of standards across the region.
- Shift responsibility for compliance from government to private traders.
- Develop a credible "aflatoxin safe" certification.

Alternative Uses and Disposal Systems

- Modernize regulations on use of contaminated commodities.
- Design social safety nets for subsistence farmers.
- Address potential food security consequences preemptively.
- Develop and adopt harmonized codes of practice.
- Pursue alternative uses for feed and energy.
- Address differences between formal and informal sectors.
- Mainstream aflatoxin into national development priorities.
- Collaborate with private sector to maximize use of food and feed.
- Strengthen the EAC Food Safety Coordination System.

GROUP 5: COMMUNICATIONS

- A multisectoral 5-year communications strategy to build an aflatoxin safe East Africa Region will be designed and implemented by the EAC partner states. This will cover the health, agriculture, trade, and environment sectors.
- The policy recommendations for communications programs validated by the EAC Regional Expert Working Groups will be incorporated into the communications strategy. This includes human and animal health; expansion of hepatitis A and B vaccination programs; standards for food and feed; GAPs, including the biological control of aflatoxin, addressing economic impacts on trade; and the development of alternatives uses and disposal systems for contaminated commodities.
- The strategy and programs will include short-, medium-, and long-term objectives to allow for phased implementation, an M&E system providing real-time information, and incremental resource allocations.
- The 5-year communications strategy will embrace the concept of an aflatoxin safe EAC "from field to fork."
- A specialized communications package focusing on vulnerable groups will be developed as a priority under the larger communications initiative.
- Ministry-based communication staff within each of the focus sectors will collaborate with technical advisors and donors to ensure appropriate aflatoxin communications are embedded into production, value chain development, and food and feed processing activities for aflatoxin-prone crops, and that adequate resources are allocated to support these programs.
- Because of their unique challenges, priority will be given to activities that address issues related to on-consumption for families and their livestock, in tandem with food and feed moving through the informal trade and processing sectors.
- The EAC Communications Secretariat will take a leadership role in the formulation and delivery of communications on aflatoxin issues to inform partner state legislators, policy makers, donors, and other influential stakeholders to ensure their support of the strategy.
- Behavioral change and communications (BCC) programs directed at consumers and livestock producers will be delivered in a timely manner to ensure that the demand for aflatoxin safe food and feed is harmonious with the supply of these same products.
- Aflatoxin abatement communications throughout each of the four sectors of health, agriculture, trade, and the environment will be integrated into existing programs to the fullest extent to maximize efficiencies and effectiveness, rather than creating a new vertical aflatoxin communications network.

Appendix B: Stakeholder Interviews for Situational Analyses

Burundi

Ministry of Health
- Nutrition officer
- Nurse
- Pharmacist
- Physician

University of Burundi, Faculté d'Agronomie et de Bio-Ingénieurie (School of Agronomy and Bioengineering)
- Senior administrator
- Professor of Veterinary Sciences

Radio Télévision Nationale du Burundi, government-run public television station
- Head of Programming

UN Food and Agriculture Organization (FAO)
- Official

National Center for Agricultural Technology
- Senior official
- Veterinary laboratory representative

Ministry of Environment
- Officials

Ministry of Agriculture,
- Officials, representing Plant Safety, Aquaculture, Communications

Clinicians
- Members of a large clinic, including director
- Members of a health program, including director

Institut des Sciences Agronomiques du Burundi (National Institute of Agronomic Sciences)
- Researcher, working with IITA on aflatoxin

Kenya

Farmers

Egerton University
- Animal Husbandry
- Agronomist
- Environmental Management
- Agronomist

Kenya Agricultural Research and Livestock Organization (KARLO), Njoro
- Researchers

Amani Millers
- Manager

County Government
- County Livestock Officer
- County Director of Environment
- County Director of Agriculture
- County Public Health Officer

Kenya Farmers Association
- Marketing manager

Ministry of Agriculture, Livestock, and Fisheries
- Official, Crop Postharvest subdivision

Ministry of Health
- Environmental Health Officer

Kenya Plant Health Inspectorate Services-KEPHIS
- Official, Inorganic Chemistry Laboratory and Food Safety

Isinya Feeds Limited
- Manager

Ministry of Environment, National Environmental Management Agency
- Official, Compliance and Enforcement

Kenya Bureau of Standards
- Official

Rwanda

Farmers

Public-sector extension agency
- Extension agents

Kigali Institute of Science and Technology
- Professor of Food Science

Rwanda Standards Board
- Officials

Ministry of Agriculture
- Officials

SOSOMA Industries (commercial food producer, trader, transporter)
- Representatives

Rwanda Agricultural Board
- Officials

Food and Drug Authority
- Officials

Tanzania

Farmers Association
- Local farmers

Sokoine University
- Agronomist

Mvomero District Council
- District Agriculture, Irrigation, and Cooperative Officer
- District Executive

NAFAKA Staples Value Chain Project field office
- Agronomist

Kongwa Super Sembe Millers
- Director

Local farmers from Mvomero District

Kibaigwa International Market
- Formal and informal market traders

Ministry of Health, Morogoro referral hospital
- Medical Officer

Lactating mothers

Tanzania Bureau of Standards, Ministry of Trade and Industry
- Officials, Agriculture and Food; Trade Ministry of Agriculture
- Official, Plant Health Services

National Environmental Management Council (NEMC)
- Official

Ministry of Livestock and Fisheries Development
- Veterinary Officer

Tanzania Food and Nutrition Council (TFNC)
- Official

Tanzania Food and Drug Authority
- Food Safety Official

Uganda

Office of the Prime Minister
- Policy analysts and officials on National Guidance; Disaster Management and Preparedness
- Information officers

National Environment Management Authority
- Officials

Ministry of Health
- Officials from County Health, Nutrition, and National Drug Authority
- Officials

East Africa Basic Foods Limited
- Representatives

Uganda National Farmers Federation
- Numerous members

Mulago Hospital, Nutrition Unit
- Health care providers (nursing, nutrition, pediatrics)
- Patients (mothers)

Makarere University
- Professor

RECO Industries Limited
- Representatives

Uganda Bureau of Standards
- Officials

Zanzibar

Farmer associations
- Members

Public agricultural extension services
- Extension agents

Lactating mothers and mothers of children under age 2 years

Ministries of Trade, Industry, Markets
- Officials

Ministry of Health
- Officials

Local market
- Traders

Chamber of Commerce
- Officials

Ministries of Agriculture, Environment, and Livestock
- Officials

List of Abbreviations and Definitions

Term	Definition
ACDI/VOCA	Agricultural Cooperative Development International/Volunteers in Overseas Cooperative Assistance
AMA	Anti-Mycotoxin Additive
APHLIS	African Postharvest Losses Information System
APPEAR	Aflatoxin Policy and Program for Eastern Africa
BCC	Behavioral Change Communications
CAADP	Comprehensive Africa Agricultural Development Programme
CIMMYT	International Maize and Wheat Improvement Center
COMESA	Common Market for Eastern and Southern Africa
DALYs	Disability-Adjusted Life Years
DTP	Diphtheria-Tetanus-Pertussis
EAC	East African Community
ECOWAS	Economic Community of West African States
EU	European Union
FAO	Food and Agricultural Organization
FEWSNET	Famine Early Warning Systems Network
FFP	Food for Peace
GAP	Good Agricultural Practices
GAVI	GAVI Alliance
GDP	Gross Domestic Product
GHP	Good Handling Practices
GMP	Good Manufacturing Practices
GST	Glutathione S. Transferase
HAV	HIV A Virus
HBV	HIV B Virus
HCC	Hepatocellular Carcinoma
HCV	HIV C Virus
Hib	Haemophilus Influenza Type B
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IEC	Information, Education, and Communication

Term	Definition
IITA	International Institute of Tropical Agriculture
ILRI-BecA	International Livestock Research Institute-Biosciences eastern and central Africa
KAIS	Kenya AIDS Indicator Survey
KARI	Kenyan Agricultural Research Institute
LIMAS	Lindi and Mtwara Agribusiness Support
M&E	Monitoring and Evaluation
MALs	Maximum Allowable Levels
MDG	Millennium Development Goals
MENA	Middle East and North Africa
ML	Maximum Level
MOH	Ministry of Health
NAFSIP	National Agriculture and Food Security by Investment Plan
NGO	Nongovernmental Organization
OECD	Organization for Economic Co-operation and Development
PACA	Partnership for Aflatoxin Control in Africa
PEPFAR	U.S. President's Emergency Plan for AIDS Relief
PHL	Post-Harvest Losses
ppb	Parts per Billion
REWGA	Regional Working Group on Aflatoxins
SADC	Southern African Development Community
SUN	Scaling Up Nutrition
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
USDA	U.S. Department of Agriculture
VAD	Vitamin A Deficiency
VSL	Value per a Statistical Life
WFP	World Food Programme
WHO	World Health Organization

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