

ENHANCING AFLATOXIN MANAGEMENT IN GHANA'S MAIZE AND GROUNDNUTS

Gender Analysis Report

PROJECT:

EAMMAG | **STDF/PG/786**

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LIST OF ACRONYMS

AGRA – Alliance for a Green Revolution in Africa
CGIAR – Consultative Group on International Agricultural Research
EAMMAG – Enhancing Aflatoxin Management in Ghana's Maize and Groundnuts
FAO – Food and Agriculture Organization of the United Nations
FDA – Food and Drugs Authority (Ghana)
FGD – Focus Group Discussion
GALS – Gender Action Learning System
GSA – Ghana Standards Authority
GEII – Gender Equality and Inclusivity in Innovation
ILRI – International Livestock Research Institute
IFAD – International Fund for Agricultural Development
JHS – Junior High School
KII – Key Informant Interview
M&E – Monitoring and Evaluation
MoFA – Ministry of Food and Agriculture (Ghana)
NGO – Non-Governmental Organisation
SPS – Sanitary and Phytosanitary
STDF – Standards and Trade Development Facility
SHS – Senior High School

EXECUTIVE SUMMARY

This gender analysis was undertaken under the Enhancing Aflatoxin Management in Ghana's Maize and Groundnuts (EAMMAG) Project, implemented by the Council for Scientific and Industrial Research in Ghana and funded by the Standards and Trade Development Facility (STDF), in accordance with the STDF Gender Action Plan. The project seeks to strengthen maize and groundnut value-chain actors' capacity to manage aflatoxin contamination to improve public health, market access, trade and incomes. Aflatoxin contamination remains a food-safety, livelihood and market-access challenge in Ghana. This analysis examined how gender roles, access to resources, decision-making authority and institutional arrangements influence the exposure of women and men to aflatoxin risks and their ability to adopt mitigation measures.

The mixed-methods study involved 302 value-chain actors in the Upper West, Bono East and Greater Accra Regions, complemented by 11 focus group discussions (FGDs) and 29 key informant interviews (KIIs). Findings were validated through a stakeholder workshop. Women constituted about two-thirds of respondents, reflecting their participation in trading, processing and post-harvest activities. The findings demonstrate economic consequences of contamination. About one-quarter of respondents reported rejection of maize or groundnut produce because of quality or contamination concerns, mainly in local markets. More than 40 percent indicated that contamination had negatively affected household income. Fewer households reported direct impacts on food availability, but some experienced shortages lasting several months.

Gender strongly shapes responsibilities and outcomes across the value chain. Women are concentrated in trading, processing and post-harvest activities, including drying, shelling, sorting and cleaning, which are critical to aflatoxin prevention. They also bear a considerable share of losses from rejected produce and frequently employ coping strategies such as price reductions, reprocessing and sales through alternative markets. Such practices may create food-safety risks where contaminated products re-enter consumption channels. A major constraint is the mismatch between women's operational responsibilities and their control over investments. While decisions on crop sales and income are often shared, decisions concerning storage and drying technologies are more commonly controlled by male household heads. Men are also more likely to own land and access subsidised inputs, while women often depend on marital or family arrangements for land access. Despite women's participation in producer, trader and processor organisations, these platforms have not consistently translated into equitable access to technologies, inputs or institutional support. Qualitative evidence shows that extension and training often target male farmers, despite women's dominance in post-harvest functions where contamination risks are high. Consequently, knowledge, technology and institutional-support gaps persist at critical control points. Overall, aflatoxin management is both a technical food-safety issue and a gendered livelihood challenge.

Key Recommendations for EAMMAG

- Promote joint household decision-making on productive investments.
- Target women, men and youth at critical control points with accessible awareness and educational materials.
- Facilitate group-based and shared access to drying, storage and other aflatoxin-management technologies.
- Provide gender-responsive extension and training adapted to participants' time, language and accessibility needs.
- Strengthen market-level food-safety practices and market linkages.
- Integrate gender into monitoring, evaluation and learning through sex-disaggregated data and qualitative assessment of changes in resource access, decision-making power, technology adoption and unintended effects.

Chapter 1 - CONTEXT AND PROBLEM STATEMENT

Aflatoxin contamination remains a major food-safety, public-health, livelihood and trade challenge in Ghana's maize and groundnut value chains and across sub-Saharan Africa (FAO, 2013; Wild & Gong, 2010). Produced mainly by Aspergillus species of fungi under high temperature, moisture stress, inadequate drying and poor storage, aflatoxins threaten health while reducing crop safety and quality, household income, food security and access to higher-value markets. Contamination can arise from pre-harvest production through delayed harvesting, drying, shelling, storage, processing, transportation and marketing; its persistence therefore reflects not only technical factors but also unequal access to technologies, weak food-safety enforcement, inadequate extension coverage, limited market-regulatory linkages and insufficient gender integration.

Maize and groundnut value chains are strongly gender differentiated. Men are generally more prominent in primary production and exercise greater control over land, capital and major investments, while women are highly engaged in processing, trading and post-harvest management, especially drying, shelling, sorting, storage and local marketing, all critical control points for aflatoxin prevention. Yet women often have less secure land tenure, finance, improved storage and drying technologies, extension services and institutional support. This produces a persistent responsibility–authority gap: women manage post-harvest quality and safety but may have limited influence over the investments required for effective control, a pattern reinforced by household decision structures, land-tenure arrangements, subsidy systems and programmes that preferentially reach household heads or primary producers, who are often men.

Gendered vulnerability is also evident in markets. Women's strong presence in trading and aggregation exposes them to income losses when produce is rejected, discounted or fails quality requirements; coping through reprocessing, discounted sales or alternative markets may protect short-term income but can sustain food-safety risks. Effective aflatoxin management must therefore integrate technical, social, economic and institutional dimensions. This gender analysis identifies who performs key value-chain functions, controls resources and decisions, bears contamination-related risks and benefits from interventions. It provides an evidence base for gender-responsive action that aligns responsibility with authority and improves equitable access to knowledge, technologies, markets and institutional support for women, men, youth and other vulnerable actors.

Chapter 2 - METHODOLOGY

2.1 Study Design and Analytical Framework

The study used a mixed-methods, gender-transformative design to examine how gender roles, resource access, decision-making power and institutional arrangements shape aflatoxin management in Ghana's maize and groundnut value chains (FAO, 2011; CGIAR GENDER Platform, 2020). Quantitative household/value-chain surveys were combined with 11 focus group discussions (FGDs), 29 key informant interviews (KIIs), policy and institutional review, and stakeholder validation. Analysis integrated the Harvard Gender Analysis Framework (division of labour; access to and control over land, inputs, storage, finance, extension and income), gendered value-chain analysis, and a gender–aflatoxin risk pathway tracing how norms, labour allocation and structural constraints influence exposure and adoption. Together, these frameworks captured both measurable gender-differentiated patterns and the relational and institutional processes that reproduce inequality.

2.2 Study Areas and Sampling

The study covered Upper West (100 respondents; 33.1%), Bono East (100; 33.1%) and Greater Accra (102; 33.8%) to capture rural production and urban/peri-urban market contexts. A purposive, resource-sensitive approach selected regions, districts, communities and markets based on crop importance, aflatoxin challenges, women processors/traders and market connectivity. District representation was Sissala East (16.23%) and Wa East (16.89%) in Upper West; Kintampo North (12.58%) and Kintampo South (20.53%) in Bono East; and Accra Metropolis (13.58%) and La Nkwantanang Madina (20.20%) in Greater Accra. The quantitative sample comprised 302 farmers, traders and processors (66% female; 34% male), including household heads and spouses, varied age/education groups and multiple value-chain roles, enabling sex- and household-role-disaggregated analysis.

2.3 Quantitative Data Collection and Analysis

A structured questionnaire captured socio-demographics; maize/groundnut roles and responsibilities; access to and control over land, inputs, storage technologies, finance and organisations; household decision-making; contamination and market rejection; economic losses; food and income security; coping strategies; and external support. Key variables were disaggregated by sex and, where relevant, household role (male head, female head, spouse). Analysis used frequencies, cross-tabulations and gender-disaggregated comparisons, with analysis of variance (ANOVA) and Tukey post-hoc tests used to assess regional differences. Detailed inferential outputs are retained in the annexes, while the main text reports the policy-relevant patterns.

2.4 Qualitative Data, Coding and Mixed-Method Integration

Qualitative evidence came from purposively selected women and men farmers, traders and processors; extension and district agricultural staff; food-safety regulators (including Food and Drugs Authority [FDA] and Ghana Standards Authority [GSA]); and project implementers and institutional partners. Separate all-male and all-female FGDs supported open discussion of gender norms, power, income and decision-making, while KIIs provided institutional and policy perspectives. Data were thematically coded using a project-

specific codebook and a hybrid deductive–inductive approach. Predefined STDF-aligned themes (roles, resources, decision-making, markets and institutional capacity) were combined with emergent themes such as coping, informal practices and risk perceptions. The final framework comprised ten core themes with cross-cutting attention to intersectionality, norms, power, behavioural change and formal/informal systems. Integration occurred at analysis and reporting stages: survey data established the scale and distribution of patterns, while FGD/KII evidence explained the "why" and "how".

2.5 Policy Review, Ethics and Stakeholder Validation

Relevant policy, regulatory and institutional frameworks were reviewed for gender integration and aflatoxin-control strengths and gaps. The CSIR Institutional Review Board approved the study. Participation was voluntary, informed consent was obtained, data were anonymised, and gender-sensitive facilitation was used to minimise harm or discomfort in discussing income, household decision-making and power. A draft report was subsequently presented at a stakeholder validation workshop to verify the accuracy and practical relevance of findings, identify gaps, strengthen recommendations, build ownership and co-create feasible actions for policy, programming and practice.

Chapter 3 - POLICY AND INSTITUTIONAL CONTEXTS FOR AFLATOXIN MANAGEMENT

Ghana's aflatoxin-management environment spans ministries, regulators, research and extension institutions, private-sector and market actors, and development partners operating from national to community level. Although regulatory frameworks and technical standards have advanced, implementation remains uneven, especially in domestic and informal markets where women are strongly represented as processors and traders, and is constrained by coordination, capacity and limited gender integration.

3.1 Policy and Regulatory Framework

The National Policy for Aflatoxin Control in Food and Feed (2022) provides the strategic framework for awareness, prevention and control in crops, livestock, processed products and feed, supported by the Technical Regulation for aflatoxin control in maize and groundnuts (L.I. 2428, 2020), which specifies regulatory requirements and sanctions. The framework is informed by the National Food Safety Policy and Public Health Act, 2012 (Act 851), and by regional and continental instruments including ECOWA Aflatoxin Control Action Plan (ECOACAP) and the strategy of African Union Partnership for Aflatoxin Control in Africa (PACA). Agricultural and trade frameworks, including Food and Agricultural Sector Development Policy (FASDEP II), Planting for Food and Jobs (PFJ I & II), the National Trade Policy and Feed Ghana Programme (2025–2028), also emphasis safe production, post-harvest management, quality assurance and market access.

Ghana's regulatory limits for aflatoxins include: raw groundnuts, 10 µg/kg total aflatoxins and 5µg/kg aflatoxin B1 (GS 313); groundnut paste, 4µg/kg total aflatoxins (GS 49); and raw maize grain, 15µg/kg total aflatoxin (GS 211). Ghana's previous National Gender Policy (MoGCSP, 2015) and the updated National Gender Policy (2025–2034) mandate gender mainstreaming and gender-responsive service delivery across sectors, including agriculture and food systems. In practice, however, gender is often reduced to participation targets rather than analysis of labour, intra-household control of income and structural barriers to land, finance and technology.

Enforcement of standards and regulations is strongest in formal/export value chains and weaker in domestic markets, creating a dual system in which small-scale processors and traders, many of them women, face food safety and economic risks with less institutional protection. Compliance incentives can therefore coexist with exclusion where actors lack the capital, technologies and support required to meet standards.

3.2 Institutional Architecture and Delivery

Policy leadership involves the Ministry of Food and Agriculture (MoFA), Ministry of Trade, Agribusiness and Industry (MOTAI), Ministry of Health (MoH) and Ministry of Environment, Science and Technology (MEST), which jointly adopted the national aflatoxin control policy, alongside the Ministry of Gender, Children and Social Protection and the Ministry of Local Government for gender and subnational implementation, respectively.

Key regulatory and standards institutions include the Food and Drugs Authority (FDA) under Act 851; MoFA's Plant Protection and Regulatory Services Directorate (PPRSD) under the Plants and Fertilizer Act, 2010 (Act 803); the Ghana Standards Authority (GSA) for standards, metrology, conformity assessment, testing, inspection and certification; the Veterinary Services Directorate for animal health, residues and feed surveillance; the Fisheries Commission for fish/aquaculture permits and technical oversight; and Metropolitan, Municipal and District Assemblies (MMDAs), guided by the Local Government Act, 2016 (Act 936) and local food-handling by-laws.

MoFA district extension services are the main channel for good agricultural and post-harvest practices, supported by the National Aflatoxin Sensitisation and Management Plan (NASMP), but delivery is constrained by staffing, resources, inconsistent aflatoxin content and gender-insensitive timing/targeting that can favour male household heads. Ghana Export Promotion Authority (GEPA), the Ghana Commodity Exchange and Ghana Enterprise Agency support compliance and market access, while Council for Scientific and Industrial Research (CSIR) generates evidence, tests technologies and supports policy, however, explicit gender integration in technical research remains limited.

Private processors, traders, aggregators and input suppliers shape incentives through pricing, procurement and quality requirements. Women processors and traders often operate at smaller scale in informal markets with weak quality differentiation, reducing incentives and capacity to invest in aflatoxin control technologies while women-dominated trader associations and market leadership remain underused as food-safety partners. Development partners including STDF, FAO, USAID, GIZ, AGRA and the World Bank support research, capacity building and policy engagement, but gender is still often tracked as participation rather than decision-making, behavioural change and differentiated outcomes.

3.3 Institutional Gaps and Implications for EAMMAG

The review identifies five linked gaps: (1) weak coordination across food safety, agriculture, trade and gender institutions; (2) limited gender mainstreaming in aflatoxin control programmes; (3) inadequate targeting of women in extension, training and technology dissemination; (4) weak enforcement/incentives in informal markets; and (5) insufficient women's empowerment opportunities. For EAMMAG, this requires alignment of technical interventions with gender-responsive institutional reforms, stronger collaboration among regulators, extension services and women-dominated market actors, and sex-disaggregated monitoring of access, decisions, adoption and outcomes. This institutional framing is consistent with evidence that food safety governance and extension often lack the capacity and gender responsiveness needed to reach women in informal and post-harvest market segments (Grace et al., 2015; STDF, 2020).

Chapter 4 - RESULTS AND DISCUSSIONS

4.1 Socio-Demographic Characteristics and Value Chain Roles

The survey profile establishes the gendered context of aflatoxin risk. Women constituted 65.9% of respondents and men 34.1%; household roles were 33.8% male heads, 21.2% female heads, 44.0% spouses and about 1% other household members. The prominence of women, especially spouses, traders and processors, reflects their central role in post-harvest handling and informal markets, while men are more concentrated in land- and capital-intensive production activities (FAO, 2011; Doss et al., 2018).

4.1.1 Age, Marital Status and Education

Respondents were predominantly of prime working age, 67.9% were 36–64 years, 26.5% were 15–35 and 5.6% (17 people) were 65+. Table 1 shows both women and men concentrated in the 36–64 group, with women more represented in older brackets, indicating that most value-chain labour is supplied by prime-age adults.

Table 1: Working Age Groups and Sex of Respondent

Age Groups	Male	Female	Total
15-35	32	48	80
	31.1%	24.1%	26.5%
36-64	66	139	205
	64.1%	69.8%	67.9%
65+	5	12	17
	4.9%	6.0%	5.6%
Total	103	199	302
	100.0%	100.0%	100.0%

Source: Authors' calculations based on Field Survey (2025)

Most respondents were married (72.2%), 9.2% were single and 1.9% cohabiting, with the remainder widowed, divorced or separated. Education was limited: 32.5% had no formal education, 43.4% had up to nine years of basic schooling, 14.2% high school, 1.0% vocational education and 8.9% tertiary education. These patterns matter for household negotiation, training design, literacy-sensitive communication and the vulnerability of women managing households without secure access to land, credit or labour.

4.1.2 Value-Chain Roles and Livelihoods

Overall, 54.6% of respondents identified primarily as farmers, 31.8% as traders and 13.6% as processors. Table 2 shows clear specialisation: farming was reported by 85.4% of men, 38.7% of women and 61.3% of youth; trading by only 1.9% of men but 47.2% of women and 21.3% of youth; processing was more balanced (12.6% men, 14.1% women, 17.5% youth). Women's concentration in trading and processing places them at post-harvest control points where quality and aflatoxin risks are managed.

Table 2: Gendered Main Role of Respondent in the value chain

	Respondent Role in Value Chain					
	Farmers		Traders		Processors	
Male	88	85.4%	2	1.9%	13	12.6%
Female	77	38.7%	94	47.2%	28	14.1%
Youth (male & female)	49	61.3%	17	21.3%	14	17.5%

Source: Authors' calculations based on Field Survey (2025)

The livelihood matrix (Table 3) likewise shows crop farming as the dominant activity (174 respondents), followed by trading (92) and processing (60), with livestock, wage employment and other activities far less common. Male household heads are more engaged in crop farming, livestock and wage employment, whereas female heads and spouses concentrate on trading and processing. Women more often combine several value-chain activities with unpaid care and operate at smaller scale, while men more often report larger farms, mechanised operations and bulk marketing; groundnut was also commonly described qualitatively as a women's crop.

With respect to the livelihood activities in the study area, the livelihood matrix shows crop farming as the dominant activity (174 respondents), with trading (92) and processing (60) also significant. Meanwhile livestock, wage employment and other activities are less common. However, male household heads are more involved in crop farming, livestock and wage employment, while female heads and spouses concentrate on trading and processing activities that directly influence post-harvest handling, product safety and quality, and market access as shown in table 3.

Table 3: Livelihood Activities by Respondent in the Study Area

Respondent role in household	**Livelihood activities**					
	Crop farming	Livestock	Trading	Processing	Wage employment	Other (specify)
Household head (male)	88	8	8	14	4	3
	50.57%	100%	8.7%	23.33%	80%	37.5%
Household head (female)	23	0	32	12	0	1
	13.22%	0%	34.78%	20%	0%	12.5%
Spouse of head	62	0	50	34	1	4
	35.63%	0%	54.35%	56.67%	20%	50%
Other (specify)	1	0	2	0	0	0
	0.57%	0%	2.17%	0%	0%	0%
Total	174	8	92	60	5	8
	100%	100%	100%	100%	100%	100%

Source: Authors' calculations based on Field Survey (2025)

4.2 Gendered Participation, Labour and Exposure Along the Value Chain

Figure 1 confirms marked gender specialisation in post-harvest work. Women reported the highest involvement in drying (70.2%), dehusking (53%) and shelling (48%), with sorting/cleaning also prominent (26.5%). Youth were strongly involved in bagging (64.4%) and carrying from farm to storage (58.8%), while men dominated physically demanding logistics such as bagging (72.8%) and carrying to storage (74.2%). Women's concentration at quality-preserving stages makes them central to prevention but also exposes them to contamination risks where drying space, storage and testing technologies are inadequate.

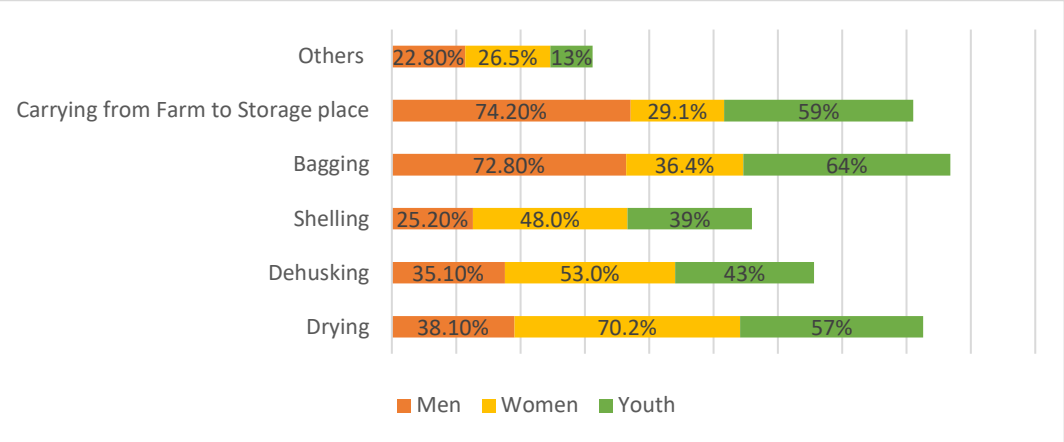


Figure 1: Post-Harvest activities carried out by Men, Women and Youth

Source: Field Survey (2025)

FGDs corroborated the survey pattern and the division of authority between production and post-harvest work:

> *"Land preparation and spraying are done by the men because we are the ones who own the land and decide when to hire the tractor" (Male farmer, FGD – Bono East).*

> *"After harvesting, the maize is mostly handled by us women. We do the drying, the shelling, and the sorting before it is stored or sold. The men usually finish their work at harvesting" (Woman farmer, FGD – Upper West).*

Women linked their exposure to inadequate drying spaces, open-air drying and porous storage materials, together with limited access to improved drying, storage and testing technologies. Men more often described aflatoxin through market rejection, price penalties and loss of formal/high-volume buyers. Women also spend more time on post-harvest handling and household food management, compounded by childcare, food preparation and other unpaid care work. These time burdens constrain training attendance and labour-intensive control practices, while men more often control hired labour and equipment investment. Much of women's drying, sorting and storage work is unpaid or underpaid despite its food-safety value, reinforcing the central finding that responsibility for prevention is not matched by time, resources or decision authority.

4.3 Access to and Control Over Productive Resources

4.3.1 Land Access

Figure 2 shows pronounced differences in land access. Men reported the highest ownership (50%), with hiring/renting (35%) and sharecropping (32%) also important. Women had lower ownership (31%) and the highest use of "other" arrangements (49%), reflecting family allocation, customary rights or negotiated access; youth ownership was 44%, with lower leasing (11%) and hiring/renting (28%). Women's dependence on spouses or relatives reduces tenure security and can discourage long-term investments in soil, drying and storage infrastructure.

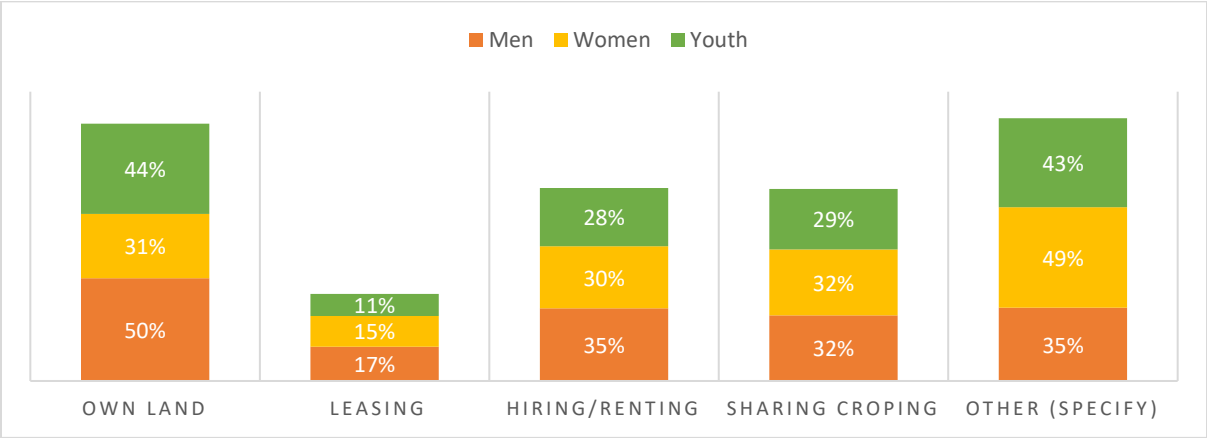


Figure 2: Various ways by which men, women and youth access land for crop production

Source: Field Survey (2025)

Qualitative evidence explains why land matters for aflatoxin control: women frequently reported that customary inheritance and control norms limit independent ownership, while men exercise greater autonomy over crop choice and strategic investment. As one participant stated:

> *"Even though I handle the groundnuts after harvest, I cannot invest in better storage because the land is not mine and I cannot get a loan." (Woman farmer, FGD – Upper West).*

These tenure and finance constraints are directly relevant to post-harvest technology adoption: women may manage groundnuts or maize after harvest but lack the secure asset base or borrowing power needed to invest in improved storage, drying or testing.

4.3.2 Subsidised Inputs and Technologies

Access to subsidised inputs was low overall. Table 4 indicates that about 10.6% of respondents reported receiving subsidised seed, fertiliser, hermetic bags or related support; by gender, 16.5% of men, 7.5% of women and 11.3% of youth had benefited in the previous three years. Male household heads were over-represented among beneficiaries, while female heads and spouses were under-represented. KIIs linked this to distribution through registered household heads or leaders of Farmer-Based Organisations (FBOs), positions more often held by men, while FGDs highlighted affordability and women's limited control over cash as additional barriers.

> *"We know drying on tarpaulin is better, but buying it is difficult. Sometimes we just dry on the ground because that is what we can afford." (Woman trader, FGD – Bono East)*

Table 4: Have you received subsidised inputs (seed, hermetic bags, fertilizer)

Respondent role in household	Yes	No	Total
Male (total)	17	86	103
Female (total)	15	184	199
Household head (male)	17	85	102
	53.13%	31.48%	33.77%
Household head (female)	3	61	64
	9.38%	22.59%	21.19%
Spouse of head	12	121	133
	37.50%	44.81%	44.04%
Other (specify)	0	3	3
	0.00%	1.11%	0.99%
Total	32	270	302
	100.00%	100.00%	100.00%

Source: Authors' calculations based on Field Survey (2025)

4.3.3 Organisational Membership

Organisational membership can provide information, training and market access, but participation varies by role (Table 5). Membership among farmers was 90.7% for men, 55% for women and 77.8% for youth; among traders it was 2.3% for men, 43.8% for women and 14.8% for youth; processor membership was very low (7% men, 1.3% women, 7.4% youth). Female-headed households were less represented, and time, mobility, meeting schedules and male-dominated leadership can limit women's influence. Nonetheless, women's groups and trader associations were repeatedly identified as promising entry points for aflatoxin information, collective learning and shared technologies.

Table 5: Are you a member of a farmers'/Traders'/Processors' organisation/cooperative

	Male	Female	Youth
Farmers	90.7%	55.0%	77.8%
Traders	2.3%	43.8%	14.8%
Processors	7.0%	1.3%	7.4%

Source: Authors' calculations based on Field Survey (2025)

Taken together, derivative land access, lower subsidy reach and constrained organisational influence reduce women's capacity to invest in drying, storage and processing despite their central post-harvest role. EAMMAG therefore needs gender-responsive targeting, particularly through its innovation platforms, so that access to resources reflects where aflatoxin risk is actually managed.

4.4 Knowledge, Information and Skills for Aflatoxin Management

Knowledge is uneven across value-chain roles, and formal information does not consistently reach the actors most responsible for post-harvest quality. The survey and qualitative evidence show gaps in awareness, control-technology adoption and extension access, especially among women, youth and processors (FAO, 2011; World Bank & FAO, 2018).

4.4.1 Awareness and Information Sources

Figure 3 shows highest awareness among farmers, more than 65% of male and female farmers had heard of aflatoxin, while nearly four in ten youth farmers had not. Awareness among traders was 50% for both men and women and 41.2% for youth; processors were least aware, with fewer than 40% of male and female processors and 42.9% of youth processors reporting awareness. This is particularly important because processors and traders are critical points for preventing contaminated products from reaching consumers.

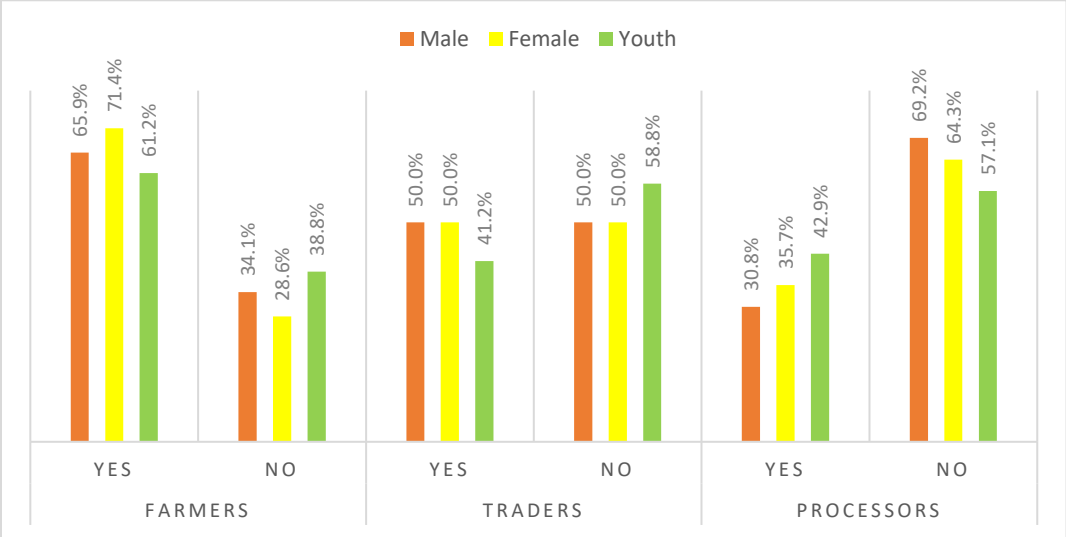


Figure 3: Have you heard about Aflatoxins

Source: Field Survey (2025)

FGDs suggested that women often recognise visible mould and poor storage but have less understanding of invisible contamination and long-term health effects, whereas men exposed to buyers more often frame aflatoxin in terms of rejection and price penalties. One woman farmer explained:

> *"We hear about aflatoxin sometimes on the radio, but nobody has really explained how it affects the food we eat at home"* (Woman farmer, FGD – Upper West).

4.4.2 Prevention Knowledge and Technology Adoption

Respondents could often name at least one preventive practice, timely harvesting, drying, sorting or improved storage, but comprehensive knowledge of the full control pathway remained limited. Figure 4 shows extension officers as the dominant source for farmers (60.7–66.7%), with radio important for men and youth and farmer groups/NGO training particularly relevant to women. Traders relied more on radio, market networks and groups, while processors used extension and market contacts. These patterns support multi-channel communication rather than a single information pathway.

Use of aflatoxin-control products/technologies was low in figure 5. Among farmers, reported use was 15.9% for men, 27.3% for women and 16.3% for youth; among traders, 0% for men, 16.0% for women and 5.9% for youth; among processors, 7.7% for men and 0% for women and youth. Figure 6 further shows that chemical treatment was used by over 60% of male and youth farmers who reported a control

method, compared with 38% of female farmers; hermetic bags were less common (about 29% among male farmers), while women, traders and processors relied more on tarpaulins, manual sorting/hand-picking and other informal practices. Awareness therefore does not automatically translate into access or adoption.

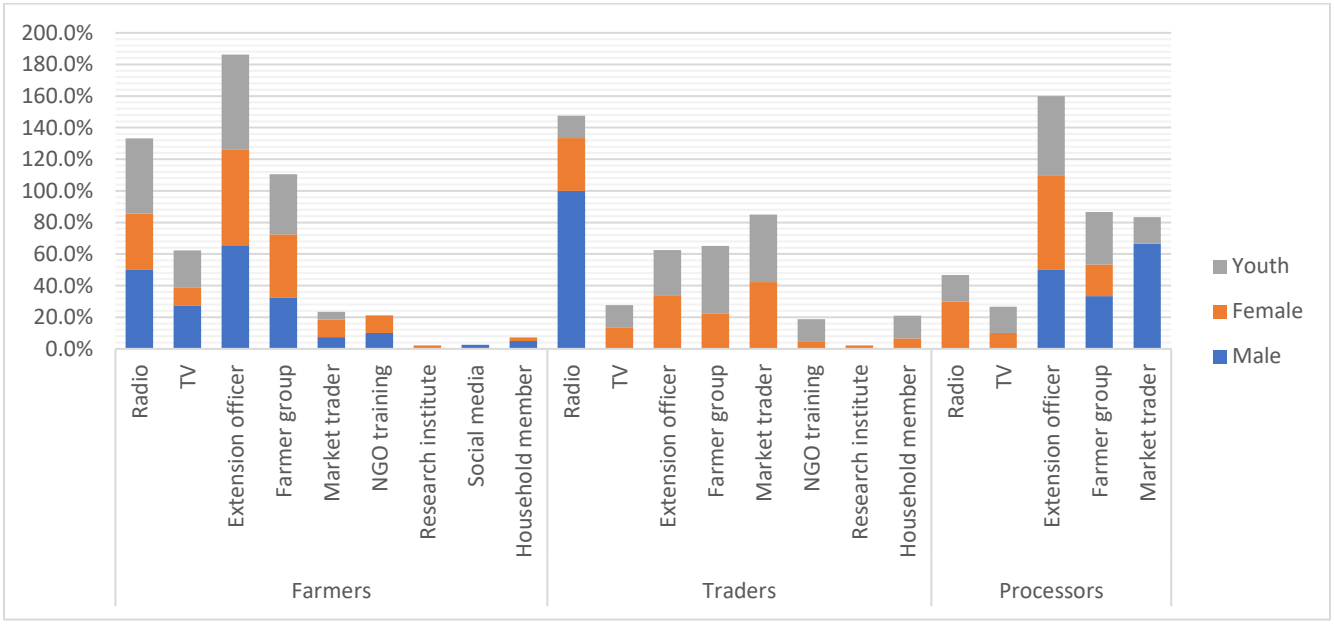


Figure 4: How did you hear about Aflatoxin

Source: Field Survey (2025)

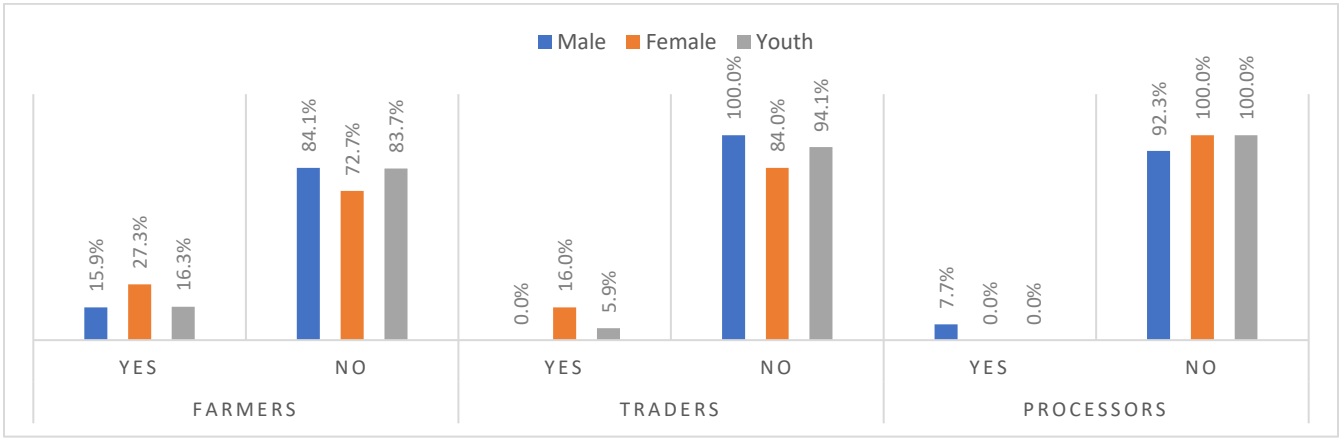


Figure 5: Have you ever used any aflatoxin control product/technology

Source: Field Survey (2025)

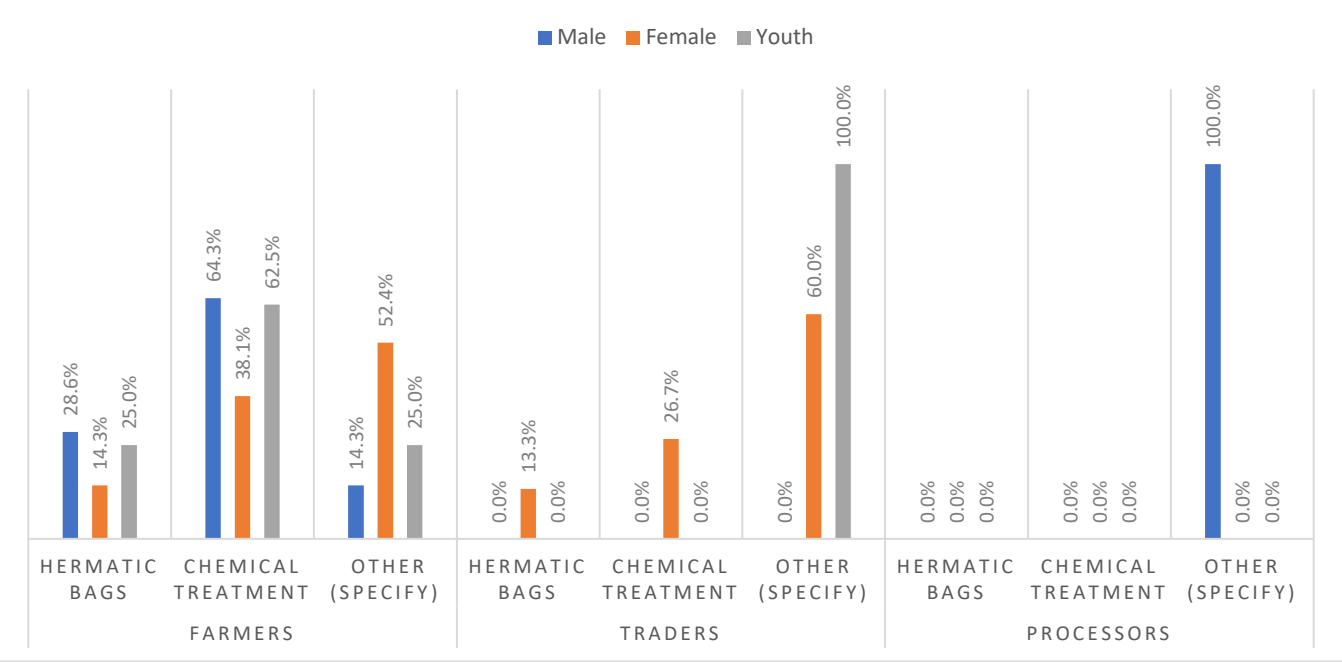


Figure 6: Aflatoxin control product/technology ever used

Source: Field Survey (2025)

Qualitative evidence indicates that women often hold strong experiential knowledge of drying, sorting and storage, but lack formal guidance on moisture testing, hermetic storage and other improved methods; men are more likely to receive formal training but are less engaged in daily post-harvest control points.

4.4.3 Extension Access, Delivery Barriers and Implications

Extension access is clearly gendered, 53% of men reported an agricultural extension visit/advice compared with only 24% of women and 31% of youth. Among those reached, content was generally considered relevant to post-harvest handling/aflatoxin (69% men, 72% women, 64% youth), showing that the main problem is reach rather than perceived usefulness. KIIs and FGDs identified inconvenient timing and location, targeting through male heads/FBOs, limited aflatoxin-specific content, literacy and English-language materials as barriers; women therefore rely more heavily on peer and market networks.

> *"Most women feel reluctant to attend trainings organised for farmers. By the time the information reaches us women, it is already late" (Woman processor, FGD – Bono East).*

The combined evidence shows a mismatch between practical responsibility and formal knowledge access: women possess substantial experiential post-harvest knowledge but receive less extension, training and technical information, while men receive more formal information but may be less involved at critical control points. Gender-responsive delivery should therefore use local languages, practical demonstrations, accessible timing and channels that directly reach women, men and youth according to their value-chain roles.

4.5 Decision-Making and Power Dynamics

Decision-making evidence in Table 6, interpreted alongside FGDs and KIIs, shows that participation in decisions does not necessarily equal control. Women often carry responsibility for quality management and household food safety without equivalent authority over major investments (FAO, 2011; IFAD, 2019).

Table 6: Decision Making at the Household Level

	Male Head	Female Head	Both jointly	Other (Independent Decisions)
Who usually decides when to sell crops (maize/groundnut)	30.80%	32.50%	26.50%	10.30%
Who decides how to use the income from crop sales?	29.80%	31.80%	30.10%	8.30%
Who decides to buy storage or drying equipment (e.g., hermetic bags, tarpaulin)?	33.40%	28.80%	22.20%	15.60%

NB: Legends – Red (Highest), Yellow (Midpoint), Green (Lowest)

Source: Authors' calculations based on Field Survey (2025)

4.5.1 Crop Sales and Income Use

Crop-sale decisions were reported as 32.5% female-head led, 30.8% male-head led, 26.5% joint and 10.3% independently decided by either spouse. Income-use decisions were similarly distributed, 31.8% female head, 29.8% male head, 30.1% joint and 8.3% independent, suggesting substantial negotiation. Qualitative evidence adds that women often initiate small local-market sales for immediate household needs, while men exercise stronger influence over bulk sales and larger expenditures; "joint" decisions may therefore mask unequal final authority.

> *"I do the drying and sorting, but when it is time to sell, my husband decides where and when it will be sold." (Woman farmer, FGD – Bono East).*

Men, however, tend to exert stronger influence over bulk sales or timing linked to anticipated price changes. This dynamic indicates that although women appear prominently in sale decisions, their authority is often exercised within constrained market segments.

4.5.2 Investment Decisions and Authority Beyond the Household

The largest gender gap concerns storage and drying equipment. Male household heads accounted for 33.4% of such decisions, female heads 28.8%, joint decision-making 22.2% and independent decisions 15.6%. This is critical because women perform much of the drying, sorting and storage but may need to negotiate for tarpaulins, hermetic bags or improved storage. KIIs also indicated that men more often represent households in farmer organisations and collective decisions on storage, bulk marketing and

standards, further limiting women's influence beyond the household. The resulting responsibility–authority gap constrains adoption of aflatoxin mitigation technologies. Effective interventions should therefore engage women and men jointly in investment decisions, strengthen women's bargaining power and leadership, and design finance, subsidy and training mechanisms that recognise intra-household power asymmetries rather than assuming a unitary household.

4.6 Market Access, Losses and Coping Strategies

Market quality enforcement converts contamination into livelihood losses, particularly for women traders and post-harvest actors. Qualitative evidence captures the household consequences:

> *"When the maize is rejected at the market, it affects the whole household, but managing the shortage becomes the woman's responsibility"* (Female trader, FGD – Bono East).

4.6.1 Produce Rejection and Distribution of Losses

Overall, 26% of respondents had experienced produce rejection for quality/contamination concerns, compared with 74% who had not. Rejection can occur after substantial production, drying, storage and transport costs have already been incurred and can damage traders' and processors' reputations. Among farmers reporting rejection, 77.8% were men, 62.5% youth and 31.1% women; among traders, 55.7% were women, 16.7% youth and 5.6% men; processor rejection was 16.7% for men, 13.1% for women and 20.8% for youth.

Losses were highly gendered. 60% reported that women bore the loss, about 11% indicated men did, 28% said losses were shared and 1% that cooperatives bore them. This reflects women's concentration in storage, processing and local trade, and qualitative evidence indicates that women often absorb losses through reduced income or reallocation of rejected produce.

4.6.2 Market Nodes and Coping Responses

Rejection occurred predominantly in local markets (about 72%), followed by district (20.3%) and regional markets (12.7%); none was reported at farm-gate, processor or export nodes. Figure 7 shows the same concentration by gender, local markets accounted for 61.1% of men's, 75.4% of women's and 70.8% of youth rejection experiences, confirming local markets as critical filtering points and a barrier to higher-value market access.

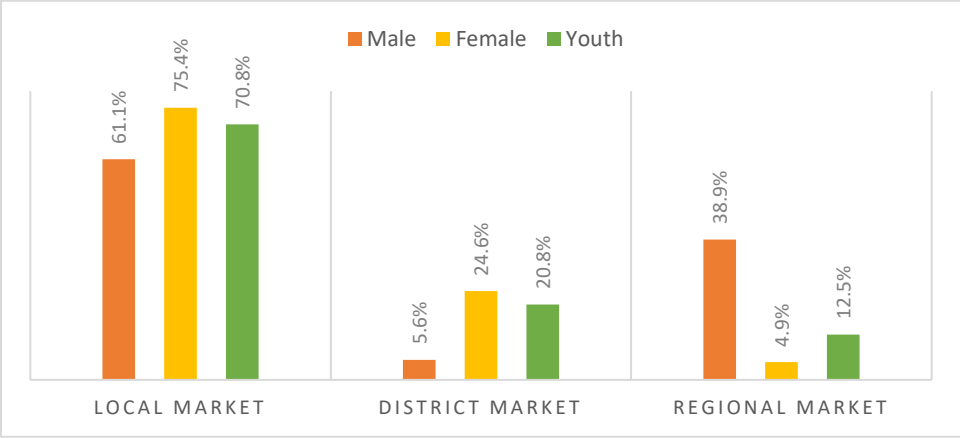


Figure 7: Gendered Aflatoxin Rejection Market

Source: Field Survey (2025)

Women were also more likely to execute coping responses, 43% of respondents identified women as primarily responsible, 23.84% men and about 33% both jointly. FGDs linked this to women's responsibility for re-drying, sorting, food allocation and household consumption, adding labour and emotional burden to the economic loss.

4.6.4 Extent of Contamination and Market Implications

Perceived contamination severity was usually limited but not trivial. 31% reported no loss, 61% "just a little" contaminated, 5% more than half, 2% more than two-thirds and about 1% all produce. Figure 8 shows that women reported the higher tail of severe contamination (7% more than half, 2.5% more than two-thirds and 1% all products), while most men and youth reported only a little. Severe events can nonetheless be catastrophic for income and food security, especially where households lack alternative income or safety nets (Hell & Mutegi, 2011; FAO, 2013).

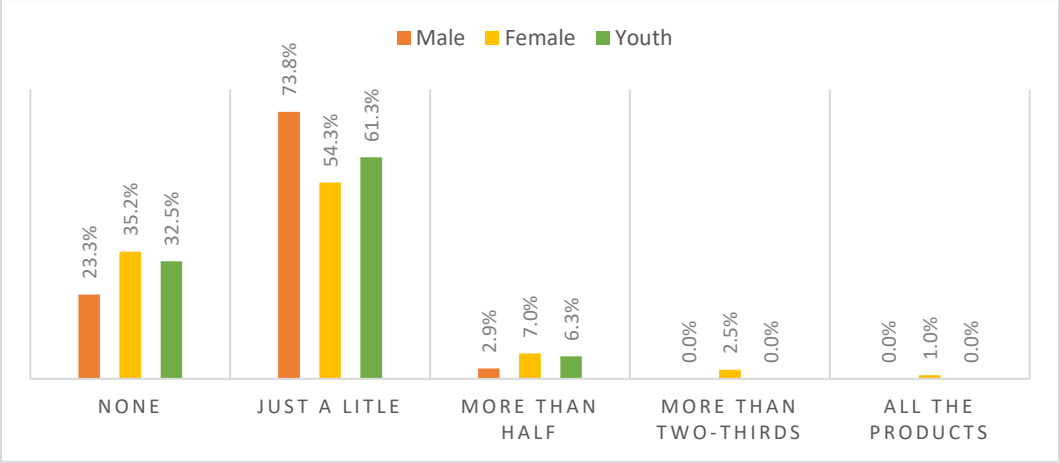


Figure 8: Gendered estimated quantities of products usually contaminated

Source: Field Survey

Gender-responsive market action should therefore combine food-safety enforcement with livelihood support: targeted training and infrastructure for women traders/processors; affordable tarpaulins, Dry Cards or moisture meters and rapid test kits; market information and buyer linkages focused on local/district markets; and links to programmes such as the Ghana Enterprises Agency and Youth Employment Agency. This reduces the risk that compliance costs are transferred to women at the end of the value chain.

4.7 Food and Income Security Impacts

Most households did not report direct food-supply effects, but 16% experienced food insecurity linked to mouldiness/aflatoxin; reported impact was 14% among men, 18% among women and 23% among youth. Among affected households, figure 9 shows that more than half experienced shortages lasting two to three months, with a smaller share reporting six or twelve-month shortages. FGDs described reduced portions, substitution with less preferred foods and sale of clean produce to buy food, with female-headed and poorer households having fewer buffers.

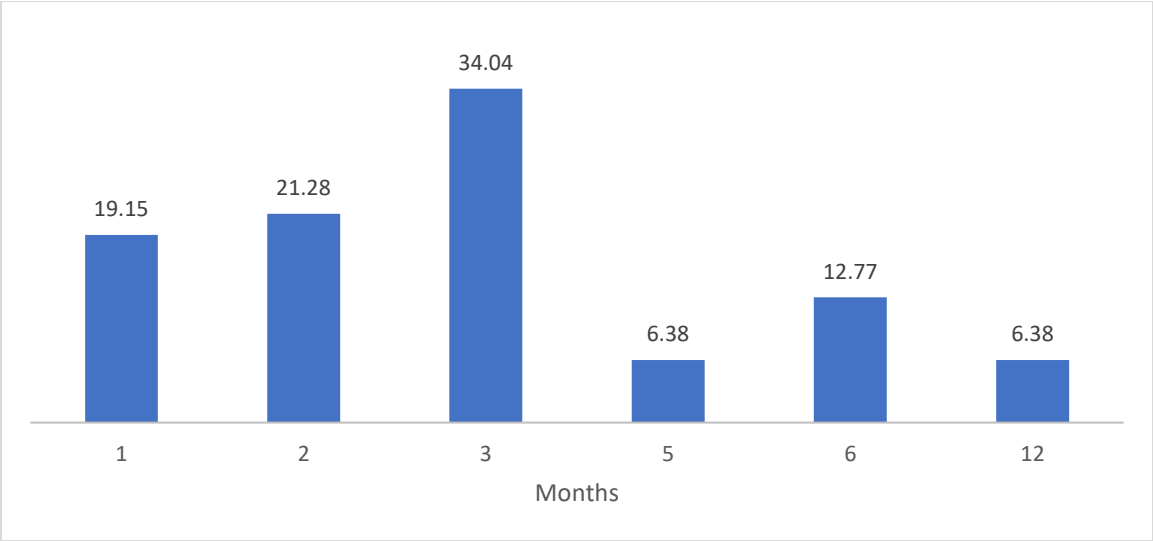


Figure 9: Months of food shortage

Source: Field Survey (2025)

Income impacts were more widespread, about 40% reported substantial negative effects, with mouldiness affecting income for 37% of men, 42.2% of women and 38% of youth. Women's roles in storage, aggregation, processing and local sales expose them directly to rejection and discounted sales. External assistance was almost absent, only 2% reported government/NGO support such as training, hermetic bags, fertiliser, finance or advice, leaving households to self-manage losses. In this context, risky responses such as mixing contaminated grain with clean produce or reselling after minimal drying/sorting can perpetuate food-safety risks.

Thus, even where food shortages affect a minority, contamination creates significant gendered livelihood stress: women bear a disproportionate share of income loss and the labour of coping, while limited institutional assistance constrains safer recovery options.

4.8 Integrated Gender Synthesis and Implications

Across the evidence, five linked mechanisms explain gendered aflatoxin vulnerability. First, the division of labour places women at drying, sorting, storage, processing and local-market control points, while men dominate land preparation and major investment decisions. Second, relatively joint crop-sale and income decisions coexist with more male-dominated technology investment, creating a responsibility authority gap. Third, women's weaker land ownership, subsidy reach and formal extension access constrain preventive investment despite strong practical knowledge. Fourth, quality enforcement is concentrated in local markets, translating contamination into losses borne disproportionately by women and prompting coping strategies that can undermine food safety. Fifth, income effects are more widespread than direct food-availability effects, and the near absence of external assistance increases household, and especially women's coping burdens.

Effective aflatoxin management must therefore move beyond awareness alone and align technical solutions with gendered power, resources, markets and institutional delivery. EAMMAG should engage women and men in investment decisions; target post-harvest technologies and training to the actors

responsible for drying, storage, processing and marketing; adapt extension to women's and youth constraints; strengthen market-level food-safety support and buyer linkages; and track sex-disaggregated changes in access, authority, adoption and unintended effects. This integrated conclusion is consistent with wider evidence that aflatoxin is both a technical food-safety problem and a gendered livelihood risk (FAO, 2011; Grace et al., 2015; STDF, 2020).

Chapter 5 - CONCLUSIONS AND GENDER-RESPONSIVE RECOMMENDATIONS

5.1 Conclusions

Aflatoxin contamination in Ghana's maize and groundnut value chains is not gender neutral. Women's stronger involvement in post-harvest handling, local marketing and household food management places them at the frontline of prevention, quality rejection and coping. Yet decisions on storage and drying technologies remain more male-dominated, and inequalities in land ownership, subsidised inputs, extension and institutional support limit women's ability to act on the responsibilities they carry. Market enforcement therefore converts contamination into income losses that disproportionately affect women, while direct food-availability impacts are less widespread but can be prolonged for vulnerable households.

Technical measures alone are consequently insufficient. Sustainable aflatoxin control requires gender-responsive approaches that address intra-household power, equitable resource and technology access, extension delivery, market dynamics and institutional capacity. Integrating these dimensions into EAMMAG design, implementation and monitoring is essential to improve food safety, protect livelihoods and ensure equitable benefits for women, men and youth.

5.2 Gender-Responsive Recommendations, Activities and Indicators

Building on the findings of this gender analysis, the following recommendations translate key gender constraints into practical and actionable interventions that can be implemented within the scope of the EAMMAG project. The recommendations are designed to improve aflatoxin management outcomes by addressing gendered power relations, enhancing equitable access to resources, and strengthening institutional delivery systems. Each recommendation is accompanied by proposed activities and gender-responsive indicators to support implementation, monitoring, and learning. The following recommendations outline priority areas for action:

1. Promote Joint Decision-Making on Post-Harvest Investments

To address the gap between women's responsibility for post-harvest management and their limited influence over related investments, the EAMMAG project will promote more equitable household decision-making on storage and drying technologies. The analysis highlights that women are often responsible for post-harvest handling yet have limited authority over investments in technologies that are critical for aflatoxin control. Addressing this imbalance is important for strengthening both household-level food safety and post-harvest outcomes.

Activities

- Conduct awareness raising and dialogue sessions targeting both women and men beneficiaries to encourage joint decision-making on investments especially for post-harvest activities.
- Integrate awareness of the benefits of joint decision-making into all training modules, with emphasis on improved household income, reduced losses, and better food safety outcomes.
- Facilitate couple-based training sessions, where feasible, to promote shared responsibility for post-harvest decisions.

Approach: All interventions will adopt a do-no-harm approach**,** taking account of existing household and community power dynamics. Messaging will be framed positively in the local languages as well use of simple infographics and images to emphasize the benefits of collaboration rather than directly challenging social norms.

Indicators

- Percentage of beneficiaries reporting joint decision-making on investments in storage and drying technologies.
- Number of women and men participating in joint training sessions on pre- and post-harvest investment decisions.
- Percentage of beneficiaries reporting joint decision-making on the adoption of improved pre- and post-harvest practices.
- Number of training materials that integrate gender considerations including joint decision-making.

2. Target Women at Critical Control Points for Aflatoxin Management

To improve prevention at key points in the value chain, the EAMMAG project will prioritize women's access to knowledge and skills on aflatoxin management while ensuring a fair representation of men and youth. Women's concentration in post-harvest handling, processing, and trading places them at critical control points for aflatoxin prevention, while also exposing them to heightened risks. Targeted, women-centred action at these control points is therefore central to reducing aflatoxin contamination along the value chain.

Activities

- Deliver targeted training for women traders, processors, and farmers on improved drying techniques, safe storage practices, sorting and grading, and the safe handling and disposal of contaminated produce.
- Develop simple and accessible communication materials, such as posters and radio messages, to raise awareness of aflatoxin risks and prevention measures.
- Train extension agents through trainer and trainers' modules so they are well equipped with knowledge and skills to continuously educate or train value chain actors as part of their routine extension delivery activities.
- All training will be done by adopting the Communication for Behavioral Impact (COMBI) approach, which emphasizes behaviour change through a combination of community dialogue, interpersonal communication, and targeted messaging, rather than one-off information sessions alone.

Indicators

- Percentage of women trained in aflatoxin prevention and post-harvest risk reduction practices.
- Percentage of trained participants able to identify key health risks associated with aflatoxin.
- Percentage reduction in unsafe coping practices**,** including the reintroduction of contaminated produce into the food chain.

3. Facilitate Group-Based Access to Aflatoxin Management Technologies

To address affordability barriers, the EAMMAG project should support collective mechanisms that improve access to aflatoxin technologies for women and men value chain actors. The analysis indicates that individual households may be unable to afford improved technologies such as tarpaulins or hermetic storage systems.

Activities

- Promote collective access through the EAMMAG innovation platforms established by the STDF-EAMMAG project.
- Facilitate bulk purchasing and shared-use arrangements for drying and storage technologies.
- Link groups to existing government or donor-supported input programmes that can improve access to relevant post-harvest technologies.

The EAMMAG project will provide equipment and resources such as dryers, packaging materials, moisture meters, and rapid test kits, and will link beneficiaries with suppliers to facilitate and improve access. Equitable access will be safeguarded by setting minimum participation targets for women within beneficiary groups, prioritizing women-headed households and women's groups in equipment allocation, and monitoring uptake using sex-disaggregated data.

Indicators

- Number of groups (women's groups, mixed farmer groups, and cooperatives) supported to access shared post-harvest technologies.
- Percentage of participants in group-based access mechanisms who are women.
- Percentage increase in the use of improved drying and storage practices among participating groups.

4. Deliver Gender-Responsive Extension and Training Services

To ensure that women benefit equitably from project support, extension and training services should be designed and delivered in ways that respond to their needs and constraints. The findings show that women are frequently underserved by extension systems because of time constraints, targeting biases, and communication barriers.

Activities

- Adapt training delivery so that sessions are held at times convenient for both women, men and youth**.**
- Use local languages and practical demonstrations to improve accessibility and comprehension.
- Ensure that women and men are explicitly targeted in extension outreach based on their respective needs.
- Build the capacity of extension agents in gender-responsive facilitation methods**.**

Target Groups Key target groups should include men and women value chain actors including traders and processors, farmers, farmer-based organisations, and extension agents.

Indicators

- Percentage of training participants who are women, men and youth.

- Percentage of training sessions applying gender-responsive approaches.
- Percentage of participants reporting improved knowledge of aflatoxin prevention practices.

5. Strengthen Market-Level Food Safety Practices

To reduce market-related risks and improve compliance, the EAMMAG project should strengthen food safety practices among market actors, particularly women operating in informal market systems. The analysis shows that non-compliance with regulatory requirements and subsequent market rejection can disproportionately affect women.

Activities

- Provide training on food safety and quality standards and other regulatory requirements.
- Facilitate linkages between traders and processors and buyers with clear quality expectations.
- Promote safe handling and disposal practices to reduce health risks and prevent the circulation of contaminated products.

Indicators

- Percentage of women traders adopting improved quality and food safety practices.
- Percentage reduction in reported aflatoxin-related produce rejection.
- Percentage reduction in unsafe coping strategies related to contaminated produce.

6. Integrate Gender into Monitoring, Evaluation, and Learning (MEL)

To support sustained impact and adaptive learning, gender considerations should be systematically integrated into the project's monitoring, evaluation, and learning systems. The analysis emphasises the importance of tracking not only participation, but also changes in access, decision-making, and adoption outcomes.

Activities

- Collect sex-disaggregated data across all project activities**.**
- Track changes in access to resources, decision-making power, and adoption of technologies**.**
- Incorporate qualitative monitoring to assess power dynamics and identify unintended effects.

Indicators

- Number of women and youth having access to relevant technologies.
- Percentage increase in women's participation in decision-making.
- Percentage reduction in differences between women, men, and youth in the adoption of aflatoxin mitigation practices.

7. Ensure Feasibility within Project Scope

To maintain realism and sustainability, all recommended interventions should be implemented through delivery mechanisms that are consistent with the project's mandate and available resources, including the budget. The recommendations are designed to be delivered through existing extension systems, farmer groups and associations, and partnerships with relevant institutions. The EAMMAG project's role should therefore remain primarily one of facilitation and capacity-building. In practice, this means the STDF-EAMMAG project will provide training, technical guidance, and coordination support so that government extension services, farmer groups and associations, and partner institutions can deliver these interventions sustainably beyond the life of the project.

Overall, these recommendations translate the findings of the gender analysis into practical and actionable interventions that:

- Address gendered power relations;
- Improve aflatoxin management at critical control points;
- Strengthen food safety and health outcomes; and
- Remain feasible within project scope.

By aligning technical solutions with gender-responsive approaches, the project can enhance both effectiveness and equity in aflatoxin management across the maize and groundnut value chains.

Chapter 6 - REFERENCES

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Annex 1 - Post-Harvest Activities

POST-HARVEST ACTIVITIES FOR MEN – ANOVA

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
D3a.....Which of the following post-harvest activities are Men Responsible for? Drying	Between Groups	2.796	2	1.398	6.109	.003
	Within Groups	68.413	299	.229		
	Total	71.209	301			
D3a.....Which of the following post-harvest activities are Men Responsible for? Dehusking	Between Groups	5.885	2	2.942	13.984	.000
	Within Groups	62.910	299	.210		
	Total	68.795	301			
D3a.....Which of the following post-harvest activities are Men Responsible for? Shelling	Between Groups	2.421	2	1.211	6.647	.001
	Within Groups	54.453	299	.182		
	Total	56.874	301			
D3a.....Which of the following post-harvest activities are Men Responsible for? Bagging	Between Groups	9.604	2	4.802	28.642	.000
	Within Groups	50.131	299	.168		
	Total	59.735	301			
D3a.....Which of the following post-harvest activities are Men Responsible for? Carrying from Farm to Storage place	Between Groups	14.157	2	7.079	48.436	.000
	Within Groups	43.697	299	.146		
	Total	57.854	301			

Multiple Comparisons							
Tukey HSD							
Dependent Variable	(I) S2.....Region	(J) S2.....Region	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
D3a.....Which of the following post-harvest activities are Men Responsible for? :: Drying	Upper West	Bono East	-.120	.068	.180	-.28	.04
		Greater Accra	.115	.067	.202	-.04	.27
	Bono East	Upper West	.120	.068	.180	-.04	.28
		Greater Accra	.235*	.067	.002	.08	.39
	Greater Accra	Upper West	-.115	.067	.202	-.27	.04
		Bono East	-.235*	.067	.002	-.39	-.08
D3a.....Which of the following post-harvest activities are Men Responsible for? :: Dehusking	Upper West	Bono East	-.040	.065	.811	-.19	.11
		Greater Accra	.273*	.065	.000	.12	.43
	Bono East	Upper West	.040	.065	.811	-.11	.19
		Greater Accra	.313*	.065	.000	.16	.47
	Greater Accra	Upper West	-.273*	.065	.000	-.43	-.12
		Bono East	-.313*	.065	.000	-.47	-.16
D3a.....Which of the following post-harvest activities are Men Responsible for? :: Shelling	Upper West	Bono East	-.030	.060	.873	-.17	.11
		Greater Accra	.173*	.060	.012	.03	.31
	Bono East	Upper West	.030	.060	.873	-.11	.17
		Greater Accra	.203*	.060	.002	.06	.34
	Greater Accra	Upper West	-.173*	.060	.012	-.31	-.03
		Bono East	-.203*	.060	.002	-.34	-.06
D3a.....Which of the following post-harvest activities are Men Responsible for? :: Bagging	Upper West	Bono East	-.050	.058	.664	-.19	.09
		Greater Accra	.350*	.058	.000	.21	.49
	Bono East	Upper West	.050	.058	.664	-.09	.19
		Greater Accra	.400*	.058	.000	.26	.54
	Greater Accra	Upper West	-.350*	.058	.000	-.49	-.21
		Bono East	-.400*	.058	.000	-.54	-.26
D3a.....Which of the following post-harvest	Upper West	Bono East	.070	.054	.399	-.06	.20
		Greater Accra	.489*	.054	.000	.36	.62

activities are Men Responsible for? :: Carrying from Farm to Storage place	Bono East	Upper West	-.070	.054	.399	-.20	.06
		Greater Accra	.419*	.054	.000	.29	.55
	Greater Accra	Upper West	-.489*	.054	.000	-.62	-.36
		Bono East	-.419*	.054	.000	-.55	-.29
*. The mean difference is significant at the 0.05 level.							

POST-HARVEST ACTIVITIES WOMEN

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
D3c.....Which of the following post-harvest activities are Women Responsible for? :: Drying	Between Groups	11.999	2	6.000	35.051	.000
	Within Groups	51.180	299	.171		
	Total	63.179	301			
D3c.....Which of the following post-harvest activities are Women Responsible for? :: Dehusking	Between Groups	7.158	2	3.579	15.721	.000
	Within Groups	68.074	299	.228		
	Total	75.232	301			
D3c.....Which of the following post-harvest activities are Women Responsible for? :: Shelling	Between Groups	10.487	2	5.244	24.160	.000
	Within Groups	64.894	299	.217		
	Total	75.381	301			
D3c.....Which of the following post-harvest activities are Women Responsible for? ::Bagging	Between Groups	.511	2	.255	1.100	.334
	Within Groups	69.423	299	.232		
	Total	69.934	301			
D3c.....Which of the following post-harvest activities are Women Responsible for? :: Carrying from Farm to Storage place	Between Groups	3.399	2	1.700	8.619	.000
	Within Groups	58.958	299	.197		
	Total	62.358	301			

Multiple Comparisons

Tukey HSD							
Dependent Variable	(I) S2.....Region	(J) S2.....Region	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
D3c.....Which of the following post-harvest activities are Women Responsible for? :: Drying	Upper West	Bono East	-.120	.059	.102	-.26	.02
		Greater Accra	.349*	.058	.000	.21	.49
	Bono East	Upper West	.120	.059	.102	-.02	.26
		Greater Accra	.469*	.058	.000	.33	.61
	Greater Accra	Upper West	-.349*	.058	.000	-.49	-.21
		Bono East	-.469*	.058	.000	-.61	-.33
D3c.....Which of the following post-harvest activities are Women Responsible for? :: Dehusking	Upper West	Bono East	-.110	.067	.235	-.27	.05
		Greater Accra	.256*	.067	.000	.10	.41
	Bono East	Upper West	.110	.067	.235	-.05	.27
		Greater Accra	.366*	.067	.000	.21	.52
	Greater Accra	Upper West	-.256*	.067	.000	-.41	-.10
		Bono East	-.366*	.067	.000	-.52	-.21
D3c.....Which of the following post-harvest activities are Women Responsible for? :: Shelling	Upper West	Bono East	-.100	.066	.284	-.26	.06
		Greater Accra	.335*	.066	.000	.18	.49
	Bono East	Upper West	.100	.066	.284	-.06	.26
		Greater Accra	.435*	.066	.000	.28	.59
	Greater Accra	Upper West	-.335*	.066	.000	-.49	-.18
		Bono East	-.435*	.066	.000	-.59	-.28
D3c.....Which of the following post-harvest activities are Women Responsible for? :: Bagging	Upper West	Bono East	.100	.068	.308	-.06	.26
		Greater Accra	.037	.068	.845	-.12	.20
	Bono East	Upper West	-.100	.068	.308	-.26	.06
		Greater Accra	-.063	.068	.627	-.22	.10
	Greater Accra	Upper West	-.037	.068	.845	-.20	.12
		Bono East	.063	.068	.627	-.10	.22
D3c.....Which of the following post-harvest activities are Women Responsible for? :: Carrying from Farm to Storage place	Upper West	Bono East	-.200*	.063	.005	-.35	-.05
		Greater Accra	.044	.062	.762	-.10	.19
	Bono East	Upper West	.200*	.063	.005	.05	.35
		Greater Accra	.244*	.062	.000	.10	.39
	Greater Accra	Upper West	-.044	.062	.762	-.19	.10
		Bono East	-.244*	.062	.000	-.39	-.10
*. The mean difference is significant at the 0.05 level.							

Annex 2 - Access to Resources for Production

Access to Land for Production by Men

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
E11.....What are the various ways by which men access land for crop production? :: Own land	Between Groups	19.898	2	9.949	53.505	.000
	Within Groups	55.598	299	.186		
	Total	75.497	301			
E11.....What are the various ways by which men access land for crop production? :: Leasing	Between Groups	8.937	2	4.468	40.753	.000
	Within Groups	32.785	299	.110		
	Total	41.722	301			
E11.....What are the various ways by which men access land for crop production? :: Hiring/renting	Between Groups	15.358	2	7.679	42.967	.000
	Within Groups	53.437	299	.179		
	Total	68.795	301			
E11.....What are the various ways by which men access land for crop production? :: Sharing Cropping	Between Groups	2.231	2	1.115	5.273	.006
	Within Groups	63.253	299	.212		
	Total	65.483	301			

Multiple Comparisons							
Tukey HSD							
Dependent Variable	(I) S2.....Region	(J) S2.....Region	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
E11.....What are the various ways by which men access land for crop production? :: Own land	Upper West	Bono East	.000	.061	1.000	-.14	.14
		Greater Accra	.543*	.061	.000	.40	.69
	Bono East	Upper West	.000	.061	1.000	-.14	.14
		Greater Accra	.543*	.061	.000	.40	.69
	Greater Accra	Upper West	-.543*	.061	.000	-.69	-.40
		Bono East	-.543*	.061	.000	-.69	-.40
E11.....What are the various ways by which men access land for crop production? :: Leasing	Upper West	Bono East	-.370*	.047	.000	-.48	-.26
		Greater Accra	-.009	.047	.980	-.12	.10
	Bono East	Upper West	.370*	.047	.000	.26	.48
		Greater Accra	.361*	.047	.000	.25	.47
	Greater Accra	Upper West	.009	.047	.980	-.10	.12
		Bono East	-.361*	.047	.000	-.47	-.25
E11.....What are the various ways by which men access land for crop production? :: Hiring/renting	Upper West	Bono East	-.450*	.060	.000	-.59	-.31
		Greater Accra	.053	.059	.643	-.09	.19
	Bono East	Upper West	.450*	.060	.000	.31	.59
		Greater Accra	.503*	.059	.000	.36	.64
	Greater Accra	Upper West	-.053	.059	.643	-.19	.09
		Bono East	-.503*	.059	.000	-.64	-.36
E11.....What are the various ways by which men access land for crop production? :: Sharing Croping	Upper West	Bono East	-.180*	.065	.016	-.33	-.03
		Greater Accra	.005	.065	.997	-.15	.16
	Bono East	Upper West	.180*	.065	.016	.03	.33
		Greater Accra	.185*	.065	.013	.03	.34
	Greater Accra	Upper West	-.005	.065	.997	-.16	.15
		Bono East	-.185*	.065	.013	-.34	-.03
*. The mean difference is significant at the 0.05 level.							

Access to Land for Production by Women

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
E12.....What are the various ways by which women access land for crop production? :: Own land	Between Groups	7.818	2	3.909	20.533	.000
	Within Groups	56.924	299	.190		
	Total	64.742	301			
E12.....What are the various ways by which women access land for crop production? :: Leasing	Between Groups	9.424	2	4.712	48.799	.000
	Within Groups	28.871	299	.097		
	Total	38.295	301			
E12.....What are the various ways by which women access land for crop production? :: Hiring/renting	Between Groups	19.370	2	9.685	65.501	.000
	Within Groups	44.210	299	.148		
	Total	63.579	301			
E12.....What are the various ways by which women access land for crop production? :: Sharing Cropping	Between Groups	6.729	2	3.364	17.121	.000
	Within Groups	58.755	299	.197		
	Total	65.483	301			

Multiple Comparisons							
Tukey HSD							
Dependent Variable	(I) S2.....Region	(J) S2.....Region	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
E12.....What are the various ways by which women access land for crop production? :: Own land	Upper West	Bono East	-.170*	.062	.017	-.32	-.02
		Greater Accra	.222*	.061	.001	.08	.37
	Bono East	Upper West	.170*	.062	.017	.02	.32
		Greater Accra	.392*	.061	.000	.25	.54
	Greater Accra	Upper West	-.222*	.061	.001	-.37	-.08
		Bono East	-.392*	.061	.000	-.54	-.25
E12.....What are the various ways by which women access land for crop production? :: Leasing	Upper West	Bono East	-.370*	.044	.000	-.47	-.27
		Greater Accra	.010	.044	.969	-.09	.11
	Bono East	Upper West	.370*	.044	.000	.27	.47
		Greater Accra	.380*	.044	.000	.28	.48
	Greater Accra	Upper West	-.010	.044	.969	-.11	.09
		Bono East	-.380*	.044	.000	-.48	-.28
E12.....What are the various ways by which women access land for crop production? :: Hiring/renting	Upper West	Bono East	-.510*	.054	.000	-.64	-.38
		Greater Accra	.052	.054	.603	-.08	.18
	Bono East	Upper West	.510*	.054	.000	.38	.64
		Greater Accra	.562*	.054	.000	.43	.69
	Greater Accra	Upper West	-.052	.054	.603	-.18	.08
		Bono East	-.562*	.054	.000	-.69	-.43
E12.....What are the various ways by which women access land for crop production? :: Sharing Croping	Upper West	Bono East	-.320*	.063	.000	-.47	-.17
		Greater Accra	-.006	.062	.995	-.15	.14
	Bono East	Upper West	.320*	.063	.000	.17	.47
		Greater Accra	.314*	.062	.000	.17	.46
	Greater Accra	Upper West	.006	.062	.995	-.14	.15
		Bono East	-.314*	.062	.000	-.46	-.17
*. The mean difference is significant at the 0.05 level.							

Access to Subsidized Inputs and Technologies

ANOVA					
E5.....Have you received subsidised inputs (seed, hermetic bags, fertilizer) in the past 3 years?					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.010	2	.005	.051	.951
Within Groups	28.600	299	.096		
Total	28.609	301			

Multiple Comparisons						
Dependent Variable: E5.....Have you received subsidised inputs (seed, hermetic bags, fertilizer) in the past 3 years?						
Tukey HSD						
(I) S2.....Region	(J) S2.....Region	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Upper West	Bono East	.000	.044	1.000	-.10	.10
	Greater Accra	-.012	.044	.959	-.11	.09
Bono East	Upper West	.000	.044	1.000	-.10	.10
	Greater Accra	-.012	.044	.959	-.11	.09
Greater Accra	Upper West	.012	.044	.959	-.09	.11
	Bono East	.012	.044	.959	-.09	.11

Annex 3 – Aflatoxin Knowledge and Information

ANOVA					
C1.....Have you ever heard of aflatoxin (or mould toxins in crops)?					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.873	2	2.437	10.601	.000
Within Groups	68.720	299	.230		
Total	73.593	301			

Multiple Comparisons						
Dependent Variable: C1.....Have you ever heard of aflatoxin (or mould toxins in crops)?						
Tukey HSD						
(I) S2.....Region	(J) S2.....Region	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Upper West	Bono East	-.020	.068	.953	-.18	.14
	Greater Accra	-.278*	.067	.000	-.44	-.12
Bono East	Upper West	.020	.068	.953	-.14	.18
	Greater Accra	-.258*	.067	.000	-.42	-.10
Greater Accra	Upper West	.278*	.067	.000	.12	.44
	Bono East	.258*	.067	.000	.10	.42
*. The mean difference is significant at the 0.05 level.						

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
C2.....How did you hear about aflatoxin? :: Radio	Between Groups	.437	2	.219	.919	.401
	Within Groups	33.556	141	.238		
	Total	33.993	143			
C2.....How did you hear about aflatoxin? :: TV	Between Groups	.371	2	.185	1.378	.255
	Within Groups	18.956	141	.134		
	Total	19.326	143			
C2.....How did you hear about aflatoxin? :: Extension officer	Between Groups	2.471	2	1.235	5.191	.006
	Within Groups	41.166	173	.238		
	Total	43.636	175			
C2.....How did you hear about aflatoxin? :: Farmer group	Between Groups	2.215	2	1.107	5.509	.005
	Within Groups	28.341	141	.201		
	Total	30.556	143			
C2.....How did you hear about aflatoxin? :: Market trader	Between Groups	1.956	2	.978	6.503	.002
	Within Groups	21.204	141	.150		
	Total	23.160	143			
C2.....How did you hear about aflatoxin? :: NGO training	Between Groups	.262	2	.131	1.869	.158
	Within Groups	9.897	141	.070		
	Total	10.160	143			
C2.....How did you hear about aflatoxin? :: Research institute	Between Groups	.021	2	.011	.774	.463
	Within Groups	1.951	141	.014		
	Total	1.972	143			
	Between Groups	.009	2	.004	.640	.529

C2.....How did you hear about aflatoxin? :: Social media	Within Groups	.984	141	.007		
	Total	.993	143			
C2.....How did you hear about aflatoxin? :: Household member	Between Groups	.069	2	.035	.860	.425
	Within Groups	5.681	141	.040		
	Total	5.750	143			

Multiple Comparisons							
Tukey HSD							
Dependent Variable	(I) S2.....Region	(J) S2.....Region	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
C2.....How did you hear about aflatoxin? :: Radio	Upper West	Bono East	-.111	.092	.450	-.33	.11
		Greater Accra	.000	.112	1.000	-.27	.27
	Bono East	Upper West	.111	.092	.450	-.11	.33
		Greater Accra	.111	.108	.561	-.15	.37
	Greater Accra	Upper West	.000	.112	1.000	-.27	.27
		Bono East	-.111	.108	.561	-.37	.15
C2.....How did you hear about aflatoxin? :: TV	Upper West	Bono East	-.077	.069	.510	-.24	.09
		Greater Accra	-.135	.084	.247	-.34	.06
	Bono East	Upper West	.077	.069	.510	-.09	.24
		Greater Accra	-.059	.081	.751	-.25	.13
	Greater Accra	Upper West	.135	.084	.247	-.06	.34
		Bono East	.059	.081	.751	-.13	.25
C2.....How did you hear about aflatoxin? :: Extension officer	Upper West	Bono East	.258*	.084	.007	.06	.46
		Greater Accra	.042	.096	.898	-.18	.27
	Bono East	Upper West	-.258*	.084	.007	-.46	-.06
		Greater Accra	-.216	.097	.070	-.45	.01
	Greater Accra	Upper West	-.042	.096	.898	-.27	.18
		Bono East	.216	.097	.070	-.01	.45
C2.....How did you hear about aflatoxin? :: Farmer group	Upper West	Bono East	.043	.084	.867	-.16	.24
		Greater Accra	.325*	.103	.006	.08	.57
	Bono East	Upper West	-.043	.084	.867	-.24	.16
		Greater Accra	.283*	.099	.014	.05	.52
	Greater Accra	Upper West	-.325*	.103	.006	-.57	-.08
		Bono East	-.283*	.099	.014	-.52	-.05
C2.....How did you hear about aflatoxin? :: Market trader	Upper West	Bono East	-.128	.073	.190	-.30	.05
		Greater Accra	-.322*	.089	.001	-.53	-.11
	Bono East	Upper West	.128	.073	.190	-.05	.30
		Greater Accra	-.194	.086	.066	-.40	.01
	Greater Accra	Upper West	.322*	.089	.001	.11	.53
		Bono East	.194	.086	.066	-.01	.40

C2.....How did you hear about aflatoxin? :: NGO training	Upper West	Bono East	.038	.050	.724	-.08	.16
		Greater Accra	.118	.061	.134	-.03	.26
	Bono East	Upper West	-.038	.050	.724	-.16	.08
		Greater Accra	.079	.059	.370	-.06	.22
	Greater Accra	Upper West	-.118	.061	.134	-.26	.03
		Bono East	-.079	.059	.370	-.22	.06
C2.....How did you hear about aflatoxin? :: Research institute	Upper West	Bono East	-.016	.022	.754	-.07	.04
		Greater Accra	-.033	.027	.437	-.10	.03
	Bono East	Upper West	.016	.022	.754	-.04	.07
		Greater Accra	-.017	.026	.782	-.08	.04
	Greater Accra	Upper West	.033	.027	.437	-.03	.10
		Bono East	.017	.026	.782	-.04	.08
C2.....How did you hear about aflatoxin? :: Social media	Upper West	Bono East	-.016	.016	.573	-.05	.02
		Greater Accra	.000	.019	1.000	-.05	.05
	Bono East	Upper West	.016	.016	.573	-.02	.05
		Greater Accra	.016	.019	.669	-.03	.06
	Greater Accra	Upper West	.000	.019	1.000	-.05	.05
		Bono East	-.016	.019	.669	-.06	.03
C2.....How did you hear about aflatoxin? :: Household member	Upper West	Bono East	.011	.038	.953	-.08	.10
		Greater Accra	.059	.046	.412	-.05	.17
	Bono East	Upper West	-.011	.038	.953	-.10	.08
		Greater Accra	.048	.045	.535	-.06	.15
	Greater Accra	Upper West	-.059	.046	.412	-.17	.05
		Bono East	-.048	.045	.535	-.15	.06
*. The mean difference is significant at the 0.05 level.							

Annex 4 – Aflatoxin Control Management

ANOVA					
D7.....Have you ever used any aflatoxin control product/technology?					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.557	2	2.278	18.007	.000
Within Groups	37.831	299	.127		
Total	42.387	301			

Multiple Comparisons						
Dependent Variable: D7.....Have you ever used any aflatoxin control product/technology?						
Tukey HSD						
(I) S2.....Region	(J) S2.....Region	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Upper West	Bono East	.150*	.050	.009	.03	.27
	Greater Accra	-.150*	.050	.008	-.27	-.03
Bono East	Upper West	-.150*	.050	.009	-.27	-.03
	Greater Accra	-.300*	.050	.000	-.42	-.18
Greater Accra	Upper West	.150*	.050	.008	.03	.27
	Bono East	.300*	.050	.000	.18	.42
*. The mean difference is significant at the 0.05 level.						

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
D8.....If Yes, which? :: Hermatic Bags	Between Groups	.134	2	.067	.443	.645
	Within Groups	7.278	48	.152		
	Total	7.412	50			
D8.....If Yes, which? :: Improved Dryers	Between Groups	.000	2	.000	.	.
	Within Groups	.000	48	.000		
	Total	.000	50			
D8.....If Yes, which? :: Aflasafe/Biocontrol	Between Groups	.000	2	.000	.	.
	Within Groups	.000	48	.000		
	Total	.000	50			
	Between Groups	.399	2	.199	.801	.455

D8.....If Yes, which? :: Chemical Treatment	Within Groups	11.954	48	.249		
	Total	12.353	50			

Multiple Comparisons							
Tukey HSD							
Dependent Variable	(I) S2.....Region	(J) S2.....Region	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
D8.....If Yes, which? :: Hermatic Bags	Upper West	Bono East	.079	.117	.778	-.20	.36
		Greater Accra	.235	.291	.700	-.47	.94
	Bono East	Upper West	-.079	.117	.778	-.36	.20
		Greater Accra	.156	.284	.847	-.53	.84
	Greater Accra	Upper West	-.235	.291	.700	-.94	.47
		Bono East	-.156	.284	.847	-.84	.53
D8.....If Yes, which? :: Chemical Treatment	Upper West	Bono East	.064	.150	.903	-.30	.43
		Greater Accra	.471	.373	.424	-.43	1.37
	Bono East	Upper West	-.064	.150	.903	-.43	.30
		Greater Accra	.406	.364	.508	-.47	1.29
	Greater Accra	Upper West	-.471	.373	.424	-1.37	.43
		Bono East	-.406	.364	.508	-1.29	.47

Annex 5 - Membership in Organisations

Membership in Farmers', Traders' and Processors' Organisations

ANOVA					
E6.....Are you a member of a farmers'/Traders'/Processors' organisation/cooperative?					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.920	2	2.460	10.820	.000
Within Groups	67.984	299	.227		
Total	72.904	301			

Multiple Comparisons						
Dependent Variable: E6.....Are you a member of a farmers'/Traders'/Processors' organisation/cooperative?						
Tukey HSD						
(I) S2.....Region	(J) S2.....Region	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Upper West	Bono East	.210*	.067	.006	.05	.37
	Greater Accra	-.095	.067	.330	-.25	.06
Bono East	Upper West	-.210*	.067	.006	-.37	-.05
	Greater Accra	-.305*	.067	.000	-.46	-.15
Greater Accra	Upper West	.095	.067	.330	-.06	.25
	Bono East	.305*	.067	.000	.15	.46
*. The mean difference is significant at the 0.05 level.						

Annex 6 - Access to Extension Services and Training

In the last 12 months, did you receive any visit/advice from an agricultural extension agent?

ANOVA					
E1.....In the last 12 months, did you receive any visit/advice from an agricultural extension agent?					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.477	2	1.739	8.113	.000
Within Groups	64.073	299	.214		
Total	67.550	301			

Multiple Comparisons
Dependent Variable: E1.....In the last 12 months, did you receive any visit/advice from an agricultural extension agent?

Tukey HSD						
(I) S2.....Region	(J) S2.....Region	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Upper West	Bono East	-.220*	.065	.003	-.37	-.07
	Greater Accra	-.235*	.065	.001	-.39	-.08
Bono East	Upper West	.220*	.065	.003	.07	.37
	Greater Accra	-.015	.065	.971	-.17	.14
Greater Accra	Upper West	.235*	.065	.001	.08	.39
	Bono East	.015	.065	.971	-.14	.17
*. The mean difference is significant at the 0.05 level.						

Was the extension content relevant to post-harvest handling/aflatoxin?

ANOVA					
E4.....Was the extension content relevant to post-harvest handling/aflatoxin?					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.707	2	.353	.846	.432
Within Groups	41.381	99	.418		
Total	42.088	101			

Multiple Comparisons						
Dependent Variable: E4.....Was the extension content relevant to post-harvest handling/aflatoxin?						
Tukey HSD						
(I) S2.....Region	(J) S2.....Region	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Upper West	Bono East	-.172	.155	.512	-.54	.20
	Greater Accra	.039	.157	.966	-.33	.41
Bono East	Upper West	.172	.155	.512	-.20	.54
	Greater Accra	.211	.178	.464	-.21	.63
Greater Accra	Upper West	-.039	.157	.966	-.41	.33
	Bono East	-.211	.178	.464	-.63	.21

Annex 7 - Decision-Making and Power Dynamics

Decision Making at the Household Level

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
F1.....Who usually decides when to sell crops (maize/groundnut)?	Between Groups	14.047	2	7.023	7.636	.001
	Within Groups	275.003	299	.920		
	Total	289.050	301			
F2.....Who decides how to use the income from crop sales?	Between Groups	3.357	2	1.678	1.865	.157
	Within Groups	269.031	299	.900		
	Total	272.387	301			
F3.....Who decides to buy storage or drying equipment (e.g., hermetic bags, tarpaulin)?	Between Groups	48.057	2	24.028	24.270	.000
	Within Groups	296.023	299	.990		
	Total	344.079	301			

Multiple Comparisons							
Tukey HSD							
Dependent Variable	(I) S2.....Region	(J) S2.....Region	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
F1.....Who usually decides when to sell crops (maize/groundnut)?	Upper West	Bono East	-.080	.136	.826	-.40	.24
		Greater Accra	-.491*	.135	.001	-.81	-.17
	Bono East	Upper West	.080	.136	.826	-.24	.40
		Greater Accra	-.411*	.135	.007	-.73	-.09
	Greater Accra	Upper West	.491*	.135	.001	.17	.81
		Bono East	.411*	.135	.007	.09	.73
F2.....Who decides how to use the income from crop sales?	Upper West	Bono East	-.050	.134	.926	-.37	.27
		Greater Accra	-.244	.133	.163	-.56	.07
	Bono East	Upper West	.050	.134	.926	-.27	.37
		Greater Accra	-.194	.133	.316	-.51	.12
	Greater Accra	Upper West	.244	.133	.163	-.07	.56
		Bono East	.194	.133	.316	-.12	.51
F3.....Who decides to buy storage or drying equipment (e.g., hermetic bags, tarpaulin)?	Upper West	Bono East	.090	.141	.798	-.24	.42
		Greater Accra	-.795*	.140	.000	-1.12	-.47
	Bono East	Upper West	-.090	.141	.798	-.42	.24
		Greater Accra	-.885*	.140	.000	-1.21	-.56
	Greater Accra	Upper West	.795*	.140	.000	.47	1.12
		Bono East	.885*	.140	.000	.56	1.21
*. The mean difference is significant at the 0.05 level.							

Annex 8 - Produce Rejection

Produce rejection due to quality/contamination concerns (including aflatoxin)

ANOVA					
G1a.....Have you ever had produce rejected due to quality/contamination concerns (including aflatoxin)?					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.111	2	.056	.286	.751
Within Groups	58.223	299	.195		
Total	58.334	301			

Multiple Comparisons						
Dependent Variable: G1a.....Have you ever had produce rejected due to quality/contamination concerns (including aflatoxin)?						
Tukey HSD						
(I) S2.....Region	(J) S2.....Region	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Upper West	Bono East	.010	.062	.986	-.14	.16
	Greater Accra	-.035	.062	.842	-.18	.11
Bono East	Upper West	-.010	.062	.986	-.16	.14
	Greater Accra	-.045	.062	.752	-.19	.10
Greater Accra	Upper West	.035	.062	.842	-.11	.18
	Bono East	.045	.062	.752	-.10	.19

Annex 9 - Losses from Rejected Produce

Who bore the loss (male/female/both)

ANOVA					
G1b.....If Yes, who bore the loss (male/female/both)?					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.860	2	1.430	3.711	.029
Within Groups	29.292	76	.385		
Total	32.152	78			

Multiple Comparisons
Dependent Variable: G1b.....If Yes, who bore the loss (male/female/both)?
Tukey HSD

(I) S2.....Region	(J) S2.....Region	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Upper West	Bono East	.444*	.167	.026	.04	.84
	Greater Accra	.319	.174	.165	-.10	.74
Bono East	Upper West	-.444*	.167	.026	-.84	-.04
	Greater Accra	-.125	.173	.750	-.54	.29
Greater Accra	Upper West	-.319	.174	.165	-.74	.10
	Bono East	.125	.173	.750	-.29	.54
*. The mean difference is significant at the 0.05 level.						

Annex 10 - Market Nodes Where Rejection

Markets Nodes Where Rejection Occurred

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
G1d……..At which market(s) was it rejected :: Local market	Between Groups	4.350	2	2.175	14.343	.000
	Within Groups	11.524	76	.152		
	Total	15.873	78			
G1d……..At which market(s) was it rejected :: District market	Between Groups	2.495	2	1.247	9.236	.000
	Within Groups	10.265	76	.135		
	Total	12.759	78			
G1d……..At which market(s) was it rejected :: Regional market	Between Groups	.612	2	.306	2.866	.063
	Within Groups	8.122	76	.107		
	Total	8.734	78			
G1d……..At which market(s) was it rejected :: Farm gate	Between Groups	.000	2	.000	.	.
	Within Groups	.000	76	.000		
	Total	.000	78			
G1d……..At which market(s) was it rejected :: Processors	Between Groups	.000	2	.000	.	.
	Within Groups	.000	76	.000		
	Total	.000	78			
G1d……..At which market(s) was it rejected :: Export	Between Groups	.000	2	.000	.	.
	Within Groups	.000	76	.000		
	Total	.000	78			

Multiple Comparisons							
Tukey HSD							
Dependent Variable	(I) S2.....Region	(J) S2.....Region	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
G1d…....At which market(s) was it rejected :: Local market	Upper West	Bono East	.349*	.105	.004	.10	.60
		Greater Accra	-.222	.109	.111	-.48	.04
	Bono East	Upper West	-.349*	.105	.004	-.60	-.10
		Greater Accra	-.571*	.108	.000	-.83	-.31
	Greater Accra	Upper West	.222	.109	.111	-.04	.48
		Bono East	.571*	.108	.000	.31	.83
G1d…....At which market(s) was it rejected :: District market	Upper West	Bono East	-.280*	.099	.016	-.52	-.04
		Greater Accra	.148	.103	.327	-.10	.39
	Bono East	Upper West	.280*	.099	.016	.04	.52
		Greater Accra	.429*	.102	.000	.18	.67
	Greater Accra	Upper West	-.148	.103	.327	-.39	.10
		Bono East	-.429*	.102	.000	-.67	-.18
G1d…....At which market(s) was it rejected :: Regional market	Upper West	Bono East	-.066	.088	.735	-.28	.14
		Greater Accra	.148	.092	.245	-.07	.37
	Bono East	Upper West	.066	.088	.735	-.14	.28
		Greater Accra	.214	.091	.054	.00	.43
	Greater Accra	Upper West	-.148	.092	.245	-.37	.07
		Bono East	-.214	.091	.054	-.43	.00
*. The mean difference is significant at the 0.05 level.							

Annex 11 - Coping Strategies

Coping Strategies Following Produce Rejection

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
G1e……..What did you do with the rejected produce :: Sold at lower prices to feed producers	Between Groups	2.579	2	1.290	6.030	.004
	Within Groups	16.256	76	.214		
	Total	18.835	78			
G1e……..What did you do with the rejected produce :: Feed to Livestock	Between Groups	2.056	2	1.028	5.078	.009
	Within Groups	15.387	76	.202		
	Total	17.443	78			
G1e……..What did you do with the rejected produce :: Discard/bury the Produce	Between Groups	1.676	2	.838	3.762	.028
	Within Groups	16.931	76	.223		
	Total	18.608	78			

Multiple Comparisons							
Tukey HSD							
Dependent Variable	(I) S2.....Region	(J) S2.....Region	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
G1e…....What did you do with the rejected produce :: Sold at lower prices to feed producers	Upper West	Bono East	-.091	.125	.746	-.39	.21
		Greater Accra	-.431*	.130	.004	-.74	-.12
	Bono East	Upper West	.091	.125	.746	-.21	.39
		Greater Accra	-.339*	.129	.027	-.65	-.03
	Greater Accra	Upper West	.431*	.130	.004	.12	.74
		Bono East	.339*	.129	.027	.03	.65
G1e…....What did you do with the rejected produce :: Feed to Livestock	Upper West	Bono East	.190	.121	.265	-.10	.48
		Greater Accra	-.208	.126	.231	-.51	.09
	Bono East	Upper West	-.190	.121	.265	-.48	.10
		Greater Accra	-.399*	.125	.006	-.70	-.10
	Greater Accra	Upper West	.208	.126	.231	-.09	.51
		Bono East	.399*	.125	.006	.10	.70
G1e…....What did you do with the rejected produce :: Discard/bury the Produce	Upper West	Bono East	.090	.127	.760	-.21	.39
		Greater Accra	.352*	.132	.026	.04	.67
	Bono East	Upper West	-.090	.127	.760	-.39	.21
		Greater Accra	.262	.131	.120	-.05	.58
	Greater Accra	Upper West	-.352*	.132	.026	-.67	-.04
		Bono East	-.262	.131	.120	-.58	.05
*. The mean difference is significant at the 0.05 level.							

Annex 12 - Responsibility for Executing Coping Strategies

Primarily responsible for executing coping strategies

ANOVA					
H3.....Who is primarily responsible for executing those coping strategies					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.253	2	1.126	1.981	.140
Within Groups	169.963	299	.568		
Total	172.215	301			

Multiple Comparisons						
Dependent Variable: H3.....Who is primarily responsible for executing those coping strategies						
Tukey HSD						
(I) S2.....Region	(J) S2.....Region	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Upper West	Bono East	.210	.107	.122	-.04	.46
	Greater Accra	.132	.106	.431	-.12	.38
Bono East	Upper West	-.210	.107	.122	-.46	.04
	Greater Accra	-.078	.106	.740	-.33	.17
Greater Accra	Upper West	-.132	.106	.431	-.38	.12
	Bono East	.078	.106	.740	-.17	.33

Annex 13 - Contamination and Severity of Losses

Estimated quantities of products usually contaminated

ANOVA					
H4.....What estimated quantities of your products are usually contaminated.					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.359	2	.179	.393	.675
Within Groups	136.320	299	.456		
Total	136.679	301			

Multiple Comparisons					
Dependent Variable: H4.....What estimated quantities of your products are usually contaminated.					
Tukey HSD					
			Std. Error	Sig.	95% Confidence Interval

(I) S2.....Region	(J) S2.....Region	Mean Difference (I-J)			Lower Bound	Upper Bound
Upper West	Bono East	-.030	.095	.947	-.25	.19
	Greater Accra	-.083	.095	.657	-.31	.14
Bono East	Upper West	.030	.095	.947	-.19	.25
	Greater Accra	-.053	.095	.842	-.28	.17
Greater Accra	Upper West	.083	.095	.657	-.14	.31
	Bono East	.053	.095	.842	-.17	.28

Annex 14 - Food and Income Security

Effects on Household Food Availability and Income

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
H5.....Has mouldiness or aflatoxin contamination ever affected household food security in the last 3 years?	Between Groups	3.739	2	1.869	14.981	.000
	Within Groups	37.311	299	.125		
	Total	41.050	301			
H7.....Has aflatoxin contamination ever affected household income?	Between Groups	1.754	2	.877	3.696	.026
	Within Groups	70.961	299	.237		
	Total	72.715	301			

Multiple Comparisons							
Tukey HSD							
Dependent Variable	(I) S2.....Region	(J) S2.....Region	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
H5.....Has mouldiness or aflatoxin contamination ever affected household food security in the last 3 years?	Upper West	Bono East	-.110	.050	.072	-.23	.01
		Greater Accra	-.270*	.050	.000	-.39	-.15
	Bono East	Upper West	.110	.050	.072	-.01	.23
		Greater Accra	-.160*	.050	.004	-.28	-.04
	Greater Accra	Upper West	.270*	.050	.000	.15	.39
		Bono East	.160*	.050	.004	.04	.28
H7.....Has aflatoxin contamination ever affected household income?	Upper West	Bono East	-.100	.069	.316	-.26	.06
		Greater Accra	-.186*	.069	.019	-.35	-.02
	Bono East	Upper West	.100	.069	.316	-.06	.26
		Greater Accra	-.086	.069	.420	-.25	.08
	Greater Accra	Upper West	.186*	.069	.019	.02	.35
		Bono East	.086	.069	.420	-.08	.25
*. The mean difference is significant at the 0.05 level.							

How many months of food shortage due to Aflatoxin Contamination

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
H6.....If Yes, how many months of food shortage?	Between Groups	28.014	2	14.007	1.900	.161
	Within Groups	339.088	46	7.371		
	Total	367.102	48			
H8.....To what extent was your income reduced?	Between Groups	1.180	2	.590	2.439	.092
	Within Groups	28.795	119	.242		
	Total	29.975	121			

Multiple Comparisons							
Tukey HSD							
Dependent Variable	(I) S2.....Region	(J) S2.....Region	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
H6.....If Yes, how many months of food shortage?	Upper West	Bono East	.130	.815	.986	-1.84	2.10
		Greater Accra	-3.759	1.985	.152	-8.57	1.05
	Bono East	Upper West	-.130	.815	.986	-2.10	1.84
		Greater Accra	-3.889	2.024	.144	-8.79	1.01
	Greater Accra	Upper West	3.759	1.985	.152	-1.05	8.57
		Bono East	3.889	2.024	.144	-1.01	8.79
H8.....To what extent was your income reduced?	Upper West	Bono East	.215	.104	.103	-.03	.46
		Greater Accra	.015	.111	.990	-.25	.28
	Bono East	Upper West	-.215	.104	.103	-.46	.03
		Greater Accra	-.200	.117	.204	-.48	.08
	Greater Accra	Upper West	-.015	.111	.990	-.28	.25
		Bono East	.200	.117	.204	-.08	.48

Coping Capacity and External Support

ANOVA					
H9.....Have you received any assistance (government/NGO) to cope with contamination?					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.021	2	.010	.525	.592
Within Groups	5.860	299	.020		
Total	5.881	301			

Multiple Comparisons						
Dependent Variable: H9.....Have you received any assistance (government/NGO) to cope with contamination?						
Tukey HSD						
(I) S2.....Region	(J) S2.....Region	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Upper West	Bono East	-.010	.020	.869	-.06	.04
	Greater Accra	-.020	.020	.562	-.07	.03
Bono East	Upper West	.010	.020	.869	-.04	.06
	Greater Accra	-.010	.020	.863	-.06	.04
Greater Accra	Upper West	.020	.020	.562	-.03	.07
	Bono East	.010	.020	.863	-.04	.06

Annex 15 – Interpretations to ANOVA Analyses

Regional Analysis - Participation Along the Value Chain

Analysis of variance (ANOVA) in annex 1 results reveal statistically significant regional differences in men's involvement across all post-harvest activities examined which includes drying ($F = 6.109$, $p = 0.003$), dehusking ($F = 13.984$, $p < 0.001$), shelling ($F = 6.647$, $p = 0.001$), bagging ($F = 28.642$, $p < 0.001$), and carrying from farm to storage ($F = 48.436$, $p < 0.001$). The magnitude of the F-statistics, particularly for bagging and carrying, indicates strong regional differentiation in men's responsibility for logistics-related and physically intensive tasks. Tukey post hoc comparisons show that these differences are largely driven by contrasts involving Greater Accra, which consistently differs significantly from Upper West and Bono East, while the latter two regions do not significantly differ from each other in most cases.

For women, the ANOVA results similarly demonstrate statistically significant regional differences in drying ($F = 35.051$, $p < 0.001$), dehusking ($F = 15.721$, $p < 0.001$), shelling ($F = 24.160$, $p < 0.001$), and carrying ($F = 8.619$, $p < 0.001$), but not in bagging ($F = 1.100$, $p = 0.334$). The non-significant result for bagging suggests that women's participation in this activity is relatively uniform across the three regions.

However, the strong statistical significance in drying and shelling especially the high F-value for drying indicates substantial regional heterogeneity in women's engagement in processing-related tasks.
Post hoc comparisons again highlight Greater Accra as the principal source of variation for drying, dehusking, and shelling, where significant mean differences exist relative to Upper West and Bono East. This implies that women in Greater Accra are less involved in drying, dehusking, and shelling compared to women in Upper West and Bono East. Interestingly, for carrying crops from farm to storage among women, significant differences occur between Upper West and Bono East and between Bono East and Greater Accra. That is women in Bono East carry more than those in Upper West and Greater Accra, while Upper West and Greater Accra women carry at similar levels suggesting a more complex regional distribution compared to the pattern observed among men.

Regional Analysis – Access to Land for Crop Production

The ANOVA in annex 2 results indicate statistically significant regional disparities in access to land for crop production for both men and women, while access to subsidized inputs and technologies does not significantly differ across regions. These findings point to structural differences in land tenure systems and market arrangements across Upper West, Bono East, and Greater Accra, with important implications for land governance, gender equity, and agricultural policy design.
For men, access to land through ownership, leasing, hiring/renting, and sharecropping varies significantly across regions ($p < 0.01$ in most cases). The F-statistics are particularly high for own land ($F = 53.505$), leasing ($F = 40.753$), and hiring/renting ($F = 42.967$), indicating strong regional effects relative to within-group variability. Tukey post hoc tests show that Greater Accra differs significantly from both Upper West and Bono East in ownership, with a mean difference of 0.543 ($p = 0.000$). This suggests that male farmers in Greater Accra rely less on outright ownership compared to the other regions, likely reflecting peri-urban land pressure, commercialization, and competing non-agricultural land uses. In contrast, Bono East appears to show greater reliance on leasing and hiring arrangements compared to Upper West, indicating a more active land market.
For women, the regional disparities are even more pronounced in some tenure categories. All four modes which includes access to own land, leasing, hiring/renting, and sharecropping show statistically significant differences across regions (all $p = 0.000$). The F-statistic for hiring/renting ($F = 65.501$) is particularly high, suggesting strong spatial heterogeneity in women's access to temporary land arrangements. Post hoc results show that women in Bono East and Greater Accra differ significantly from those in Upper West across multiple access pathways. Notably, women in Greater Accra appear more constrained in ownership but relatively more engaged in leasing and hiring compared to Upper West. This likely reflects structural gender inequalities interacting with land commercialization where land markets are active, women may access land through short-term contracts rather than ownership, but such access may remain insecure and costly.

Regional Analysis - Access to Subsidised Inputs and Technologies

In contrast, access to subsidized inputs and technologies does not differ significantly across regions ($F = 0.051$, $p = 0.951$) as seen in annex 2. The absence of statistically significant mean differences suggests that public input distribution mechanisms are geographically uniform across the three regions. From an equity standpoint, this is encouraging and it implies that spatial targeting of subsidized seeds, hermetic bags, and fertilizers may be functioning without overt regional bias.

Regional Analysis - Membership in Farmers', Traders' and Processors' Organisations

The ANOVA results as seen in annex 5 on membership in farmers', traders', and processors' organisations show highly significant differences across regions ($p < .001$). The Tukey HSD comparisons reveal that Bono East respondents are significantly more likely to be members of such organisations compared to Upper West, while Greater Accra respondents are significantly less likely to be members compared to Bono East. Interestingly, there is no significant difference between Upper West and Greater Accra, suggesting that organisational membership is particularly strong in Bono East but weaker in the more urbanized Greater Accra context.

Regional Analysis – Aflatoxin Knowledge and Information

The one-way ANOVA results in annex 3 indicate statistically significant regional differences in awareness of aflatoxin across Upper West, Bono East, and Greater Accra. Specifically, the overall model for having ever heard about aflatoxin is significant ($F = 10.601$, $p < 0.001$), suggesting that awareness levels are not uniformly distributed across the three regions. Post hoc comparisons using Tukey HSD show that Greater Accra differs significantly from both Upper West and Bono East, while there is no statistically significant difference between Upper West and Bono East. This pattern implies that Greater Accra, as a more urbanized and economically dynamic region, may have higher exposure to information, training, and institutional presence related to food safety and agricultural risks. The absence of significant differences between Upper West and Bono East suggests that awareness constraints in these regions may be structurally similar, potentially reflecting comparable levels of extension penetration, media access, and market integration.

Also, the ANOVA results analysis by examining regional differences in specific information channels related to aflatoxin indicates that there are no statistically significant regional differences in awareness through radio ($p = 0.401$) or television ($p = 0.255$), suggesting that mass media channels have relatively uniform reach across the three regions. This indicates that radio and TV campaigns, when deployed nationally, are likely to generate broadly comparable exposure effects. However, the absence of significant differences does not necessarily imply high effectiveness rather, it suggests that disparities in awareness are not primarily driven by unequal access to these mass media platforms.

In contrast, statistically significant regional differences are observed for extension officers ($F = 5.191$, $p = 0.006$), farmer groups ($F = 5.509$, $p = 0.005$), and market traders ($F = 6.503$, $p = 0.002$). Post hoc comparisons reveal that Upper West differs significantly from Bono East in extension-based information flows, while Greater Accra differs significantly from the other regions in farmer group and market trader channels. These findings suggest that interpersonal and institutional channels rather than mass media are the primary sources of regional disparities in aflatoxin information diffusion. In other words, the structure and vibrancy of local agricultural networks, extension systems, and market interactions appear to shape how information circulates within value chains.

Finally, the absence of significant regional differences in channels such as NGO training, research institutes, social media, and household members suggests that these sources currently play a homogeneous role in awareness formation. This presents both a constraint and an opportunity. Project implementers, policymakers and development partners could scale up partnerships with research institutions and NGOs to create more regionally tailored outreach models. Similarly, although social media currently shows no significant differentiation, its expansion especially among youth could serve as a cost-effective complement to traditional extension approaches.

Regional Analysis on Adoption of Aflatoxin Management Practices

The ANOVA results in annex 4 reveal statistically significant regional differences in the use of aflatoxin control products or technologies. The overall model is highly significant ($F = 18.007$, $p < 0.001$), indicating that adoption of aflatoxin mitigation technologies varies systematically across Upper West, Bono East, and Greater Accra. The Tukey HSD post hoc comparisons show that all pairwise regional differences are statistically significant at the 5 percent level. Specifically, Bono East differs significantly from both Upper West and Greater Accra, and Greater Accra also differs significantly from Upper West. This pattern suggests a clear regional gradient in technology uptake rather than isolated disparities between only two regions.

When examining specific technologies under aflatoxin management, the ANOVA results as seen in annex 4 shows no statistically significant regional differences in the use of hermetic bags ($p = 0.645$) or chemical treatment ($p = 0.455$). In addition, improved dryers and biocontrol (e.g. Aflasafe) report no variance across groups, which suggests either extremely low adoption levels or uniform non-use across regions. The absence of statistically significant differences at the individual technology level indicates that while overall adoption varies regionally, the composition of technologies used does not differ substantially across regions among adopters.

Regional Analysis - Access to Extension Services and Training

The ANOVA results seen in annex 6 on extension agent visits/advice in the last 12 months show highly significant regional differences ($p < .001$). The Tukey HSD comparisons reveal that producers in Bono East were significantly more likely to have received visits or advice compared to those in Upper West and Greater Accra. Meanwhile, there was no significant difference between Bono East and Greater Accra, suggesting that Bono East stands out as a region with stronger extension engagement, while Upper West lags behind.

The ANOVA results again in annex 6 on relevance of extension content to post-harvest handling and aflatoxin show no statistically significant differences across regions ($p = .432$). The Tukey HSD comparisons confirm this, with none of the mean differences between Upper West, Bono East, and Greater Accra reaching significance. This suggests that, regardless of region, farmers who received extension services did not perceive substantial variation in whether the advice was relevant to post-harvest handling or aflatoxin control. In other words, extension content appears relatively uniform across the country, though not necessarily tailored to the specific contamination challenges producers face.

Regional Analysis on Decision-Making and Power Dynamics

The ANOVA results in annex 7 on household decision-making reveals important distinctions in who controls different aspects of crop management and income use. Decisions about when to sell crops (maize/groundnut) and whether to invest in storage or drying equipment show significant regional variation, while decisions on how to use income from crop sales do not. Specifically, Greater Accra stands out as significantly different from both Bono East and Upper West in terms of crop sale timing and equipment purchase decisions. Households in Greater Accra appear to exercise more centralized or distinct control over these decisions compared to their counterparts in the other regions. By contrast, the use of income from crop sales seems to be a more uniformly shared responsibility across regions, with no significant differences detected.

Regional Analysis on Produce Rejection due to Aflatoxin

The ANOVA results in annex 8 on produce rejection due to quality or contamination concerns, including aflatoxin, show no statistically significant differences across regions, with the p-value (.751) well above the 0.05 threshold. The Tukey HSD comparisons confirm this, as none of the mean differences between Upper West, Bono East, and Greater Accra are significant. This indicates that the experience of produce rejection due to contamination is a widespread challenge that cuts across geographic boundaries, rather than being concentrated in specific regions. In other words, aflatoxin and other quality-related rejections are systemic issues affecting households throughout the country.

Regional Analysis on distribution of Losses from Rejected Produce

The ANOVA results in annex 9 on who bore the loss following produce rejection show statistically significant differences across regions ($p = .029$). This indicates that the burden of loss whether absorbed by men, women, or shared jointly varies depending on location. The Tukey HSD comparisons reveal that producers in Bono East differ significantly from those in Upper West, with Bono East households more likely to report that women bore the loss, while in Upper West, men or both parties were more commonly identified. Greater Accra, however, did not show significant differences compared to either region, suggesting a more mixed or balanced distribution of responsibility there.

Regional Analysis on Market Nodes Where Rejection Occurs

The ANOVA results as shown in annex 10 on market nodes where rejection occurred show clear and significant differences at the local and district market levels, while regional markets were only marginally significant, and farm gate, processors, and export nodes reported no variation. Specifically, rejection was most pronounced at local markets ($p < .001$) and district markets ($p < .001$), with Tukey HSD comparisons revealing that Bono East differed significantly from both Upper West and Greater Accra in terms of local market rejections, while Greater Accra differed significantly from Bono East at the district market level. These findings suggest that the first points of sale local and district markets are the most critical nodes where quality and contamination concerns are detected and acted upon.

Regional Analysis on Coping Strategies following Produce Rejection

The ANOVA and Tukey HSD results in annex 11 reveal significant regional differences in how producers cope with rejected produce, underscoring both economic and environmental implications. Selling at lower prices, feeding to livestock, and discarding or burying produce all emerged as coping strategies, but their prevalence varied across regions. For example, Greater Accra households were significantly more likely than those in Bono East or Upper West to sell rejected produce at lower prices, while Bono East households were more inclined to feed rejected produce to livestock. Similarly, discarding or burying produce was more common in Greater Accra compared to Upper West. These findings highlight that coping strategies are not uniform but shaped by regional market dynamics, resource availability, and institutional support systems.

Regional Analysis - Responsibility for Executing Coping Strategies

The ANOVA results in annex 12 on responsibility for executing coping strategies show no statistically significant differences across regions, with the p-value (.140) above the conventional threshold of 0.05. This suggests that, regardless of whether households are in Upper West, Bono East, or Greater Accra, the burden of implementing coping strategies tends to fall on similar actors. The Tukey HSD comparisons reinforce this finding, as none of the mean differences between regions reached significance. In practical

terms, this indicates that coping strategies whether selling at lower prices, feeding to livestock, or discarding produce are not strongly differentiated by geography in terms of who carries them out. Instead, responsibility appears to be distributed in ways that reflect household or farm-level dynamics rather than regional institutional structures.

Regional Analysis - Extent of Contamination and Severity of Losses

The ANOVA results in annex 13 on estimated quantities of contaminated products show no statistically significant differences across regions, with the p-value (.675) well above the 0.05 threshold. The Tukey HSD comparisons confirm this, as none of the mean differences between Upper West, Bono East, and Greater Accra are significant. This suggests that contamination levels are relatively consistent across regions, and producers face similar challenges in terms of the proportion of their output affected. In other words, contamination is not a localized issue but a systemic one that cuts across geographic boundaries.

Regional Analysis on Food and Income Security Impacts of Aflatoxin Contamination

The ANOVA results in annex 14 reveal statistically significant regional differences in the incidence of aflatoxin-related effects on household food security and income, but not in the severity of those effects nor in access to coping assistance. This distinction between incidence and intensity is analytically important and carries strong policy implications for aflatoxin mitigation strategies in Ghana.

Regarding household food security, the results show significant regional differences ($F = 14.981$, $p = 0.000$). Post hoc comparisons indicate that Greater Accra differs significantly from both Upper West and Bono East. The mean differences (for instance Upper West vs Greater Accra = -0.270, $p = 0.000$) suggest that households in Greater Accra report higher incidence of food security disruption due to mouldiness or aflatoxin contamination compared to Upper West. This may reflect greater market dependence in Greater Accra, where households rely more on purchased food rather than own production. In such systems, contamination affects not only stored crops but also market-purchased staples, amplifying food insecurity risks. Bono East appears intermediate, with some differences relative to Greater Accra but not always statistically distinct from Upper West.

For household income, regional differences are statistically significant though more moderate ($F = 3.696$, $p = 0.026$). The significant mean difference is again primarily between Upper West and Greater Accra (mean difference = -0.186, $p = 0.019$). This suggests that income effects of aflatoxin contamination are more pronounced in Greater Accra relative to Upper West. A plausible explanation is higher commercialization levels in peri-urban systems, where rejected or discounted produce directly translates into cash income loss. In contrast, subsistence-oriented systems may absorb part of the shock through household consumption, even if quality is compromised.

However, when examining severity measures in months of food shortage and extent of income reduction the ANOVA results show no statistically significant regional differences ($p = 0.161$ and $p = 0.092$ respectively). This indicates that while the likelihood of being affected differs by region, the magnitude of hardship among affected households is broadly similar. In other words, once contamination occurs, its depth of impact does not vary significantly across Upper West, Bono East, and Greater Accra. This convergence suggests structural vulnerability across regions where contamination shocks translate into comparable food gaps and income contractions regardless of agro-ecological or market context.

Turning to coping capacity and external support, there are no statistically significant regional differences in receipt of assistance ($F = 0.525$, $p = 0.592$). This implies that government or NGO assistance is either uniformly distributed across regions or uniformly limited. Given the relatively low F-value, it is more

plausible that assistance coverage is generally low and not regionally differentiated. The absence of significant variation aligns with a broader pattern, while contamination incidence differs regionally, institutional response mechanisms do not appear spatially targeted to reflect differential exposure.