

BACKGROUND

- No regional legal framework for regulation of fertilizer quality.
- Very limited implementation of regulations developed by few countries.
- Low quality of fertilizer products impacts the economy of countries and finances of farmers.

OBJECTIVES

- To make a fertilizer quality diagnostic of products found in the markets.
- Identify factors involved in quality problems.
- Support development of a regulatory system in ECOWAS member countries.

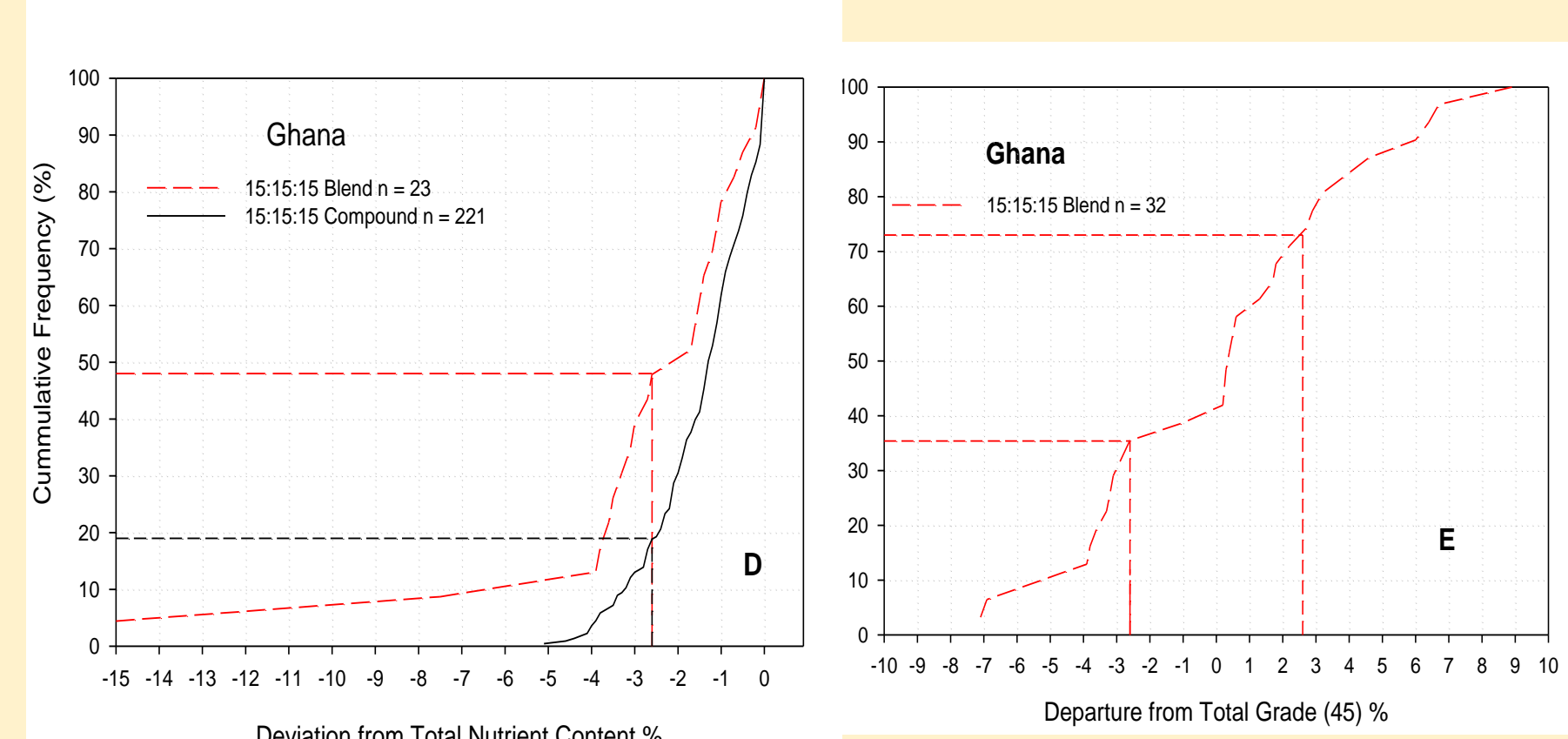
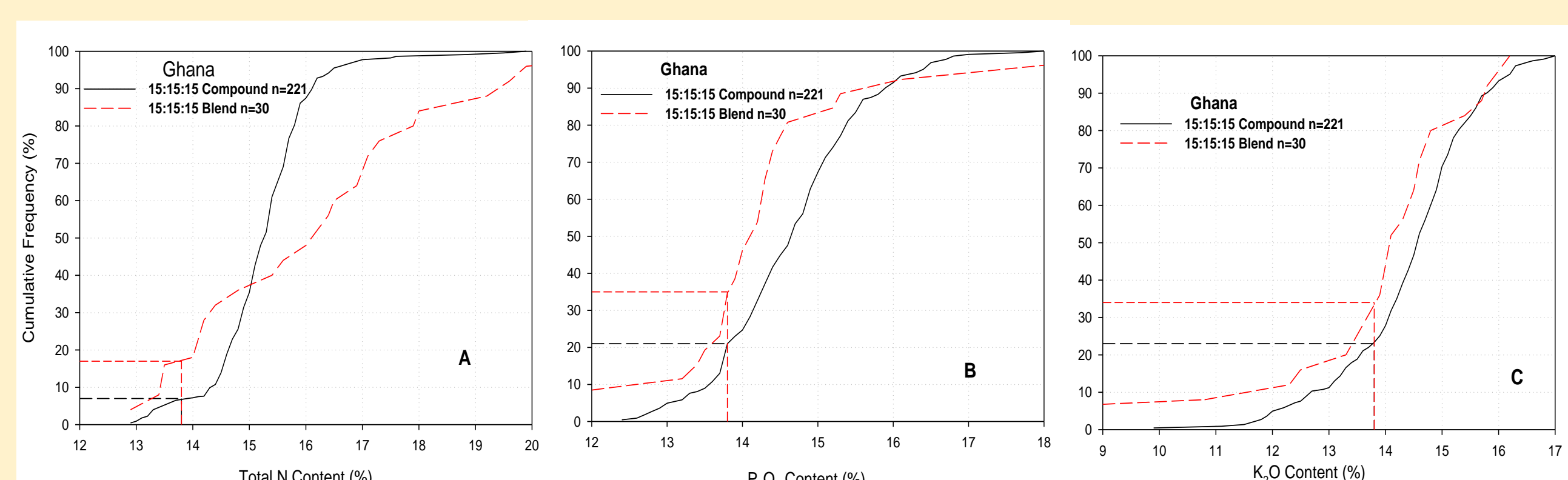
METHODOLOGY

- Countries Sampled:** Ghana, Nigeria, Côte d'Ivoire, Senegal, Togo.
- Two-Step Sampling:** 1. Distributor's random sample → 2. Fertilizer sampling at each distribution point in the distributor's sample.
- Chemical Analysis:** Total N, available P_2O_5 , soluble K_2O .
- Physical Attributes:** Granule integrity, moisture content, segregation, caking, bag weight.
- Other Data Collected:** Storage conditions, bag type, market characteristics, dealer characteristics, evidences of adulteration.

DATA ANALYSIS

- Cumulative Frequency Distribution Functions (CFDF)** for quantitative characteristics: Nutrient content, segregation, bag weight.
- Frequency Distribution Functions (FDF)** for qualitative characteristics: Physical attributes of fertilizers.
- Compliance/Non-Compliance Probabilities** from CFDF and ECOWAS regulation rules.
- Associations between Fertilizer Quality with Market, Dealer, Product and Handling Characteristics**, using contingency tables and independence tests.

All analysis were done with aggregated and per country data



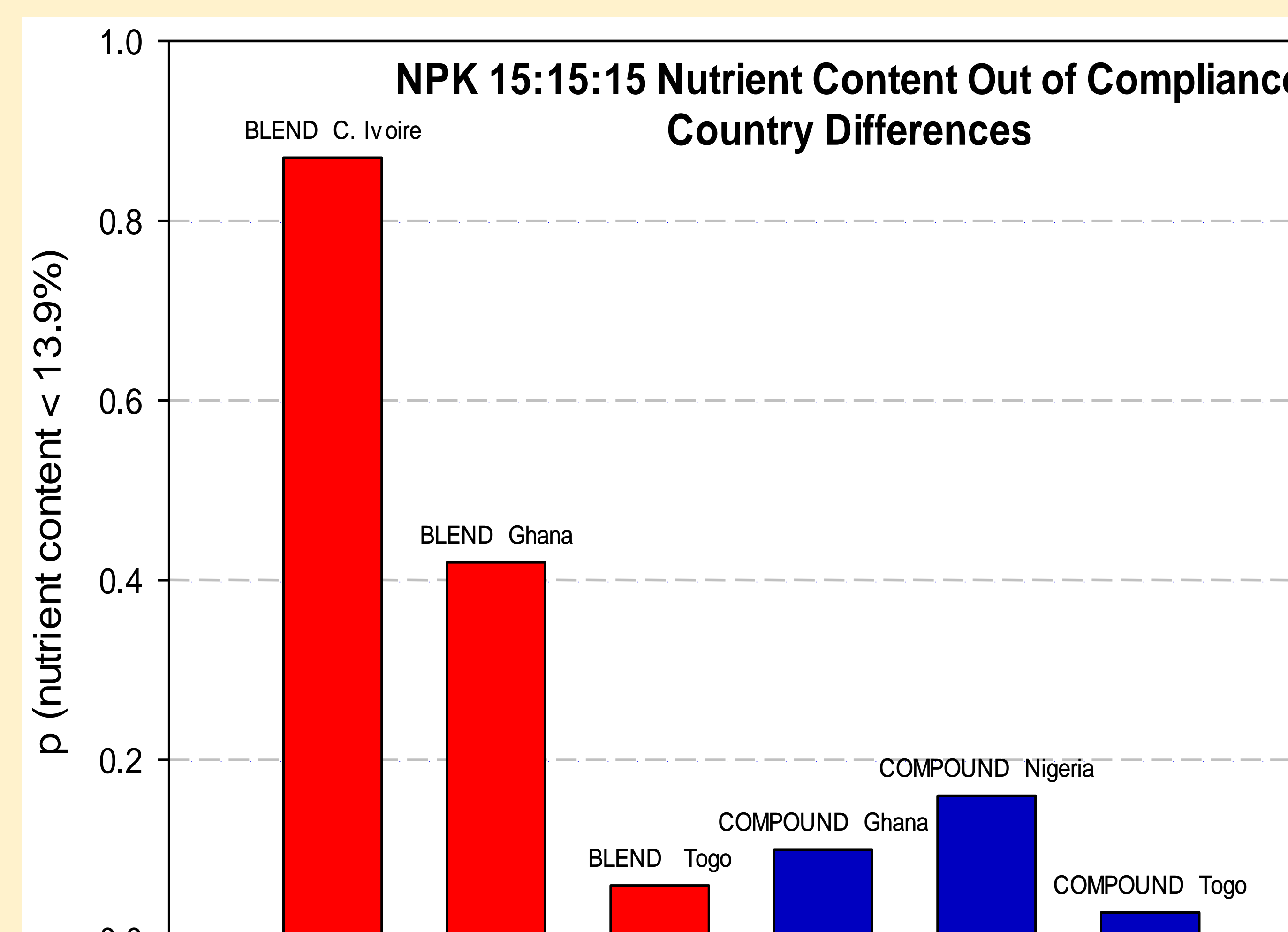
CFDFs for nutrient content of 15:15:15 in Ghana

RESULTS

827 fertilizer distributors (wholesalers, government depots, retailers of various sizes) sampled; 2,037 fertilizer samples collected.

- NPK bulk blends present the most frequent and severe cases of nutrient content deficiencies. Out of compliance for nutrient content: 86% NPK 20:10:10, 51% NPK 15:15:15, 26% Cocoa Feed, 23% Asaase Wura, 12% NPK 6:20:10.
- High granule segregation explains nutrient deficiencies in few cases: 92% Asaase Wura, 66% Cocoa Feed, 50% NPK 15:15:15, 31% NPK 6:20:10.
- Nutrient deficiency in many bulk blends is due to insufficient input of nutrients during manufacture.
- Compound imported NPKs also presented nutrient content deficiencies: 10% NPK 15:15:15, 15% NPK 16:16:16, 4% Sulfan, 1% NPK 23:10:5.
- Only one case of adulteration was completely documented in Nigeria: 7 SSP samples out of 10 contained no P_2O_5 .

- Fertilizer dealers that have received training, and dealers with license to sell fertilizers presented higher percentages of good quality products.
- Degradation of fertilizer physical attributes are degraded by manual handling of individual bags and by inadequate storage.
- Higher frequencies of granule degradation observed in countries with complex distribution chains (Ghana, Nigeria) than in simple distribution chains (Togo).



- Differences between countries.** In blends – due to technology, equipment, input materials differences. In compounds – due to importation sources, complexity of distribution chain differences.

Probability of bag weight shortage of at least 1 kg

Country	Samples Size	P(DWL* ≤ -1.0) = p
Côte d'Ivoire	18	0.28
Ghana	560	0.12
Nigeria	174	0.41
Senegal	146	0.13
Togo	157	0.06
Total	1,055	0.15

*DWL: departure from weight in label

CONCLUSIONS

- Implementation of the fertilizer quality regulatory system by ECOWAS member states is very urgent.
- Manufacture of good-quality bulk blends requires overview and regulation of blending plants.
- The expected good quality of imported products is achieved through selection of importation sources and adequate inspection at the ports.
- Adequate fertilizer quality encourages farmers to increase fertilizer use for maximizing returns and contributing to national economic growth.

Acknowledgments

This research work was implemented by the MIR Plus project of IFDC as part of the ECOWAS initiative to develop a legal framework for regulating the quality of fertilizers in West Africa.

Financial assistance was provided by the Directorate-General for International Cooperation (DGIS).