AFSI Overview

PACA Secretariat, AU Commission

June 2021
Background: Africa is disproportionately impacted by unsafe food

- According to WHO (2015), 91 million people in Africa fall ill each year and it represents one-third of the 400,000 global death toll for foodborne diseases although Africa accounts for only 16% of the world population.
- Unsafe food costs low and middle income countries US$110 billion annually, from productivity loss and medical expenses alone (World Bank, 2018) – mostly in SSA, SA, SEA.
- Food safety is an important precondition for access to global food markets and increasingly, for high-value domestic markets.
- Therefore, focus on production and productivity alone can not guarantee healthy diets/food security and nutrition, nor net trade.
Food safety is crucial to attainment of AU Malabo Declaration Commitments

• In 2014, AU leaders signed Malabo Declaration on Accelerated Agriculture Growth and Transformation for Shared prosperity and Improved Livelihoods in Africa

• Among the seven Malabo Commitments (targets to be achieved by 2025), food safety is crucial to achieve the following:
  – Ending hunger: Malabo Decl. 3d
  – Tripling intra-Africa trade: Malabo Decl. 5a &b
  – Halving poverty: Malabo Decl. 4

• ‘Malabo Declaration’ also committed AU member states to Mutual Accountability, which requires to conduct a Biennial Review of Agriculture and related sectors: tracking, monitoring and reporting on progress

• However, food safety not adequately captured when the Biennial Review was launched.
“Biennial Review” and food safety

- The inaugural biennial review report was presented to the January 2018 Summit with 43 indicators.
- Food safety is part of the Malabo Declaration Implementation Plan but was not tracked in the First Biennial Review.
- The BR has seven indicators tracking nutrition outcomes, which is a move in the right direction.
- However, among 43 indicators in the BR, food safety is not adequately captured.
- Food safety identified as one of the gaps in the first BR, as unsafe foods will hold back Commitments 3, 4, and 5 on ending hunger, poverty reduction (raising incomes), and tripling intra-African trade in agricultural commodities.
Food safety tracking and country level efforts to meet food safety benchmarks expected to have a domino effect on:

1. Prioritization of food safety in AU member states
2. Inclusion of food safety tracking in government systems
3. Improvements in data availability and quality
4. Improvements in food safety and reductions in food borne disease burden, trade rejections

Thus, Africa Food Safety Index was borne to contribute to realization of the AU Malabo Declaration Commitments!
Steps in institutionalizing food safety (AFSI) through AU BR

- Stakeholder consultation
- Development of the index
- Establishment of Food Safety Experts Network (FSEN)
- Capacity building training to national experts and technical backstopping using FSEN members
- Development of a bi-directional digital platform for data submission/reporting – alignment to the AU eBiennial
- Data collection and submission
- Validation studies to improve AFSI
Consultations (mostly expert) on inclusion of food safety indicator in the 2\textsuperscript{nd} Malabo BR

<table>
<thead>
<tr>
<th>Experts at 4\textsuperscript{th} CAADP Partnership Platform recommended to include food safety in 2\textsuperscript{nd} BR, Libreville</th>
<th>PRC of AU appreciated the efforts to initiate food safety tracking in the 2\textsuperscript{nd} BR, AUC</th>
<th>BR Technical Working Group Lead Experts approved inclusion of AFSI in BR, AUC</th>
<th>PACA PPM reviewed draft AFSI, Dakar</th>
<th>A side event at the 1\textsuperscript{st} FAO/WHO/AU Int. Food Safety Conf. applauded AFSI, AUC</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 2018</td>
<td>May 2018</td>
<td>Aug 2018</td>
<td>Sep 2018</td>
<td>Oct 2018</td>
</tr>
<tr>
<td>BR Experts Task Force identified food safety as one of the critical gaps, Cotonou</td>
<td></td>
<td></td>
<td>Writeshop to draft the Africa Food Safety Index, AUC</td>
<td>Peer-to-Peer Meeting of AU MS endorsed inclusion of AFSI, Nairobi</td>
</tr>
</tbody>
</table>
AFSI is composed of three indicators looking at two dimensions in an attempt to capture the complexity of food safety; taking into account the state of data availability and country level capacity but also needed to drive improvements towards optimal systems.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Sub-parameter</th>
<th>Description</th>
<th>Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fss1 (n=48)</td>
<td>Lw1</td>
<td>Food safety policy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lw2</td>
<td>RB FS standards</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lw3</td>
<td>Regulatory institution</td>
<td></td>
</tr>
<tr>
<td>Fss2 (n=48)</td>
<td>MS1</td>
<td>RB FS monitoring plan</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MS2</td>
<td>Database of FBD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MS3</td>
<td>FBD Response system</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MS4</td>
<td>Participation in FS notification systems</td>
<td></td>
</tr>
<tr>
<td>Fss3 (n=46)</td>
<td>Lab1</td>
<td>Assessment lab capacity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lab2</td>
<td>Lab capacity (3 elements)</td>
<td>L2-Elt1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L2-Elt2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L2-Elt3</td>
</tr>
<tr>
<td></td>
<td>Lab3</td>
<td>Existence of labs (5 elem)</td>
<td>L3-Elt1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L3-Elt2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L3-Elt3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L3-Elt4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L3-Elt5</td>
</tr>
<tr>
<td>Fss4 (n=46)</td>
<td>Prog1</td>
<td>CapDev programs (3 elem)</td>
<td>P1-Elt1</td>
</tr>
<tr>
<td></td>
<td>Prog2</td>
<td>CapDev HACCP</td>
<td>P1-Elt2</td>
</tr>
<tr>
<td></td>
<td>Prog3</td>
<td>Sensitization programs (4 elem)</td>
<td>P1-Elt3</td>
</tr>
<tr>
<td></td>
<td>Prog4</td>
<td>Incentives for private sector</td>
<td></td>
</tr>
<tr>
<td>Fsh1 (n=26)</td>
<td>FBDD</td>
<td>FBD related diarrhea cases/100,000/yr</td>
<td>TP</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NCDD</td>
</tr>
<tr>
<td>Fsh2 (n=12)</td>
<td>FBDM</td>
<td>FBD related child&lt;5 mortality/100000/yr</td>
<td>TPC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NCDM</td>
</tr>
<tr>
<td>Fsh3 (n=13)</td>
<td>FBHCC</td>
<td>FBD related liver cancer cases/100000/year</td>
<td>TP</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NHCC</td>
</tr>
<tr>
<td>Fst</td>
<td>TRt (n=11)</td>
<td>Total number of FS related rejections in a year (2018)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>URRt (n=8**)</td>
<td>Unit rejection rate - Rejections/total value of export/year (per 1M USD)/year</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TRRt (n=9)</td>
<td>Rate of rejection – Rejections/total shipments/year (2018)</td>
<td></td>
</tr>
</tbody>
</table>
Scoring of the AFSI: like any index AFSI is a score

Note: AFSI is scored as arithmetic mean of the 3 indicators (sub-indices), which are in turn average of respective parameters and elements.
Computations:

**I-score 3.6** | Estimating progress on establishing operational and functional food safety systems

- Existence of national food safety policy, act or law updated in the last 10 years and covering the entire food chain, \( Lw_1 \)
- Existence of competent regulatory institutions with clear mandates and coordination mechanism, \( Lw_2 \)
- Existence of risk based food safety standards \( Lw_3 \)
- Existence of a risk-based and coordinated food safety monitoring/surveillance plan, \( MS_1 \)
- Existence of a national epidemiological database/system for food borne diseases \( MS_2 \)
- Existence of a food safety response system with standard operating procedure, traceability and recall systems \( MS_3 \)
- Participation in reliable food safety information notification systems, \( MS_4 \)
- Existence of national assessment of in-country laboratory capacity, \( Lab_1 \)
- Existence of demonstrable government programmes to build, equip (including human resource) and sustain competent laboratories, \( Lab_2 = \text{Average} (El_{Lab}) \)
- Existence of competent laboratories (government, official or private) and their demonstrable fitness for purpose, \( Lab_3 = \text{Average} (El_{Lab}) \)
- Existence of national food safety awareness raising programs/activities, \( Prog_1 = \text{Average} (El_{Prog}) \)
- Existence of support/incentive for industry and producers (including private sector/SMEs), \( Prog_2 = \text{Average} (El_{Prog}) \)

**Existence of legal or policy and institutional frameworks on food safety \( FSSI_1 \)**

\[ FSSI_1 = \text{average}(Lw_{1(1-3)}) \]

\[ W_1 = 20\% \]

**Quality of monitoring and surveillance programmes \( FSSI_2 \)**

\[ FSSI_2 = \text{average}(MS_{(1-3)}) \]

\[ W_2 = 30\% \]

**Laboratory infrastructure, analytical capacity and laboratory performance, \( FSSI_3 \)**

\[ FSSI_3 = \text{average}(Lab_{(1-3)}) \]

\[ W_3 = 30\% \]

**Existence of programmes to facilitate/encourage compliance to food safety standards, \( FSSI_4 \)**

\[ FSSI_4 = \text{average}(Prog_{(1-3)}) \]

\[ W_4 = 20\% \]

**Food Safety Systems Index, \( FSSI \)**

\[ FSSI = \sum_{i} (FSSI_i \times w_i) \]

**TARGET \( T_{3.6i} = 100\% \)**

**2018 Benchmark**

\[ 2018 B_{3.6i} = \frac{2018 \mu_{3.6i} \times 10}{T_{3.6i}} = 3.33 \]

**2018 Milestone**

\[ 2018 \mu_{3.6i} = \frac{(2018 - 2015)}{(2025 - 2015)} \times T_{3.6i} = 33\% \]
I-score 3.6ii | Estimating progress on reaching at least 50% for the Food Safety Health Index (FSHI), by 2025.

Baseline Yr  2015

Target Yr  2025

Computations:

- Total population in a given year, TP
- Number of diarrheal disease cases per year, NCDD
- Multiplier to correct for attribution to foodborne causes, Mai=0.4
- Multiplier to correct underreporting, Mui (to be provided)

Food Safety Health Index (FSHI), \( FSHI \)

\[ FSHI = \sum (FSHI_i \times W_i)_{i=1}^{3} \]

- Total population of children in a given year, TPC
- Number of cases of diarrheal mortality cases per year for children under 5, NCDM
- Multiplier to correct for attribution to foodborne causes, Mai=0.4
- Multiplier to correct underreporting, Mui (to be provided)

Foodborne diarrheal disease per year per 100,000 people, \( FBDD_t \)

\[ FBDD_t = (NCDD \times Ma \times Mu) \times 100,000/TP \]

Rate (%) of reduction of foodborne diarrheal diseases, \( FSHI_1 \)

\[ FSHI_1 = (1 - (FBDD_t / FBDD_{2015})) \times 100 \]

- Number of Liver Cancer cases per year, NHCC
- Multiplier to correct for attribution to foodborne causes, Mai=0.4
- Multiplier to correct underreporting, Mui (to be provided)

Foodborne HCC cases per year per 100,000 people, \( FBHCC_t \)

\[ FBHCC_t = (NHCC \times Ma \times Mu) \times 100,000/TP \]

Rate of reduction of the cases of liver cancer (Hepatocellular Carcinoma) caused by dietary exposure to aflatoxin, \( FSHI_3 \)

\[ FSHI_3 = (NHCC_t / NHCC_{2015}) \times 100 \]

- Multiplier to correct underreporting, Mui (to be provided)

Rate (%) of reduction of deaths in children under five years of age due to foodborne diarrheal diseases, \( FSHI_2 \)

\[ FSHI_2 = (1 - (FBDM_t / FBDM_{2015})) \times 100 \]

\[ W_i = 40\% \]

\[ W_j = 40\% \]

\[ W_k = 20\% \]

FSHI \( \times 10 \)

On Track ???

2018 Benchmark

\[ 2018 B_{3.6ii} = \frac{2018 \mu_{3.6ii} \times 10}{\tau_{3.6ii}} = 3.33 \]

2018 Milestone:

\[ 2018 \mu_{3.6ii} = \frac{(2018 - 2015)}{(2025 - 2015) \times \tau_{3.6ii}} = 15\% \]
Estimating progress on reaching at least 50% for the Food Safety Trade Index (FSTI)

Baseline Yr 2015

Target Yr 2025

Rate of reduction in unit rejection of food commodities due to food safety violation (non-compliance) disaggregated by type of violation, FSTp1

\[ \text{URR} = \frac{\text{TR}}{\text{TV}} \times \text{USD1,000,000} \]

Food Safety Trade Index, \( FSTI \)

\[ FSTI \times 10 \]

\[ \tau_{3.6iii} \]

On Track ??

2018 Benchmark

\[ 2018 \quad B_{3.6iii} = \frac{2018 \mu_{3.6iii} \times 10}{\tau_{3.6iii}} = 3.33 \]

2018 Milestone:

\[ 2018 \quad \mu_{3.6iii} = \frac{(2018 - 2015)}{(2025 - 2015)} \times \tau_{3.6iii} = 15\% \]

Total value of shipment of food commodities exported per year, \( TVSt \)

\[ \text{TR} = \sum (\text{TRV}_i) \]

On Track ??

Violations and number of rejections, \( TRV_4 \)

\[ \text{RRV}_4 = \text{TRV}_4 \times 100 / \text{TNS} \]

Other violations and number of rejections, \( TRV_4 \)

\[ \text{RRV}_3 = \text{TRV}_3 \times 100 / \text{TNS} \]

Violations and number of rejections, \( TRV_3 \)

\[ \text{RRV}_3 = \text{TRV}_3 \times 100 / \text{TNS} \]

Violations and number of rejections, \( TRV_2 \)

\[ \text{RRV}_2 = \text{TRV}_2 \times 100 / \text{TNS} \]

Violations and number of rejections, \( TRV_1 \)

\[ \text{RRV}_1 = \text{TRV}_1 \times 100 / \text{TNS} \]

Total number of rejected shipments based on food safety related trade violations in exported food commodities per year, \( TRt \)

\[ C-score_{3.6iii} \]
Regional considerations in the design of AFSI indicators

• Dietary staples prone to aflatoxin account for over 60% of calorie intakes in Africa
• Aflatoxin occurs in 80% of crop samples, often at levels unfit for human consumption
• Biomarker assays of human body fluids also show high exposure of African populations to aflatoxin
• Liver cancer is the number one cause of cancer mortality in Africa
• Up to 40% of liver cancer cases attributed to aflatoxin
• It was important to capture public health impacts of both microbial and chemical hazards especially aflatoxin
• The following slides show why liver cancer was one of the health indicators
Occurrence of aflatoxin in priority crops sampled in 2015-2018 from six African countries (PACA AfricaAIMS data)

<table>
<thead>
<tr>
<th>Crop</th>
<th>Number of samples analyzed</th>
<th>Samples (%) with aflatoxin</th>
<th>Samples (%) exceeding 20 ppb*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize</td>
<td>2,296</td>
<td>77%</td>
<td>25%</td>
</tr>
<tr>
<td>Groundnut</td>
<td>2,565</td>
<td>80%</td>
<td>29%</td>
</tr>
<tr>
<td>Sorghum</td>
<td>640</td>
<td>89%</td>
<td>62%</td>
</tr>
<tr>
<td>Total for the three crops</td>
<td>5,501</td>
<td>80%</td>
<td>33%</td>
</tr>
</tbody>
</table>

* Less stringent maximum limit applied by a number of countries
Aflatoxin is a priority food safety issue for Africa: harmful + widespread + hits staple foods/ grains.
Extent of data submission in 2019: 49 of the 55 AU MS submitted data on at least 1 of the three AFSI indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Parameter</th>
<th>Number of countries</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Food Safety Systems Indicator</strong></td>
<td>Legal, policy and institutional frameworks</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>Monitoring and surveillance programs</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>Lab infrastructure, analytical capacity and lab performance</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>Programs to facilitate compliance to standards</td>
<td>46</td>
</tr>
<tr>
<td><strong>Food safety health indicator</strong></td>
<td>Rate of reduction in food borne diarrheal diseases</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>Rate of reduction in diarrheal mortality in children under 5</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Rate of reduction in liver cancer cases caused by dietary exposure to aflatoxin</td>
<td>13</td>
</tr>
<tr>
<td><strong>Food safety trade indicator</strong></td>
<td>Rate of reduction in unit rejection of food commodities due to food safety violation (non-compliance) disaggregated by type of violation</td>
<td>8-11</td>
</tr>
</tbody>
</table>
AFSI validation studies: relevance, usability and validity of AFSI

• Three-pronged approach of validation:
  1. Online questionnaire
  2. Focus group interview (data collectors and submitters) and stakeholder meetings in a sample of 9 countries
  3. Analysis of the actual 2019 data (qualitative and Item Response Theory analysis)

• In general, need to improve ability of parameters to discriminate among countries with below average to average systems

• Overall, there is a need for capacity boost in food safety data collection and submission at country level for better data availability

• Some improvements made in AFSI for the 2021 data collection and capacity building trained continued; more systemic capacity improvements will have
Item Response Theory (IRT) analysis showed that some of the parameters were able to discriminate among countries with below average to average systems (unpublished, credit: ILRI)
We thank our partners in AFSI:

**Bill & Melinda Gates Foundation**

**ILRI**

**CTA**

**FAO**