SIAP Training Program for Supporting the Monitoring of Sustainable Development Goals (SDGs) 2030 in the Asia Pacific Region

SDG Indicators under FAO Custodianship

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Food and Agriculture Organization of the United Nations | SUSTAINABLE DEVELOPMENT GOALS

GOAL 2. END HUNGER, ACHIEVE FOOD SECURITY AND IMPROVED NUTRITION AND PROMOTE SUSTAINABLE AGRICULTURE

2.c Adopt measures to ensure the proper functioning of food commodity markets and their derivatives and facilitate timely access to market information, including on food reserves, in order to help limit extreme food price volatility

2.c.1 Indicator of food price anomalies

IMPORTANCE OF PRICE MONITORING

- Extreme price movements of agricultural commodities pose a threat to agricultural markets and to food security
- The connection between food and national security was brought into sharp focus during the food price crisis of 2007/2008
- In a globalised world, keeping an eye on food commodity prices and a careful watch for price hikes has never been more important
- In many countries, market prices are sometimes the only source of information to assess the severity of a local shock to either access or availability of food
- The Indicator of Food Price Anomalies (IFPA) is an indirect indicator of Target 2.c, as it is a measure of food price volatility, detecting abnormal growth of prices in food markets

IMPORTANCE OF PRICE MONITORING

- The variability of a price series around its central value i.e. the tendency for individual price observations to vary significantly from their mean value, is defined as **price volatility**
- Agricultural prices vary because production supply and consumption demand are variable:
  - ✓**Production** can vary either because of variations in area planted or because of yield variations, typically due to weather
  - ✓**Consumption** varies because of changes in incomes, prices of substitutes and shifts in tastes
- The extent to which given production and consumption shocks translate intro price volatility depends on supply and demand **elasticity**
- It is generally supposed that the most important source of price variability in agriculture is **weather shocks to agriculture yields** (Gilbert and Morgan, 2010)
- Price volatility generates **uncertainty,** which increases risks for producers, traders, consumers and governments and may lead to sub-optimal decisions compared with those achieved under more stable price conditions

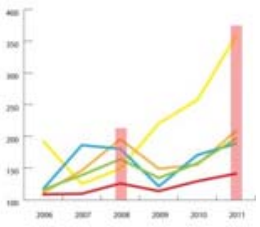
INDICATOR CONCEPT

The **Indicator of Food Price Anomalies (IFPA)** is an indirect indicator of **Target 2.c.1** as it is a measure of food price volatility and may help to put in place policies that limit extreme price volatility

The **Indicator of Food Price Anomalies (IFPA)** evaluates growth in food prices over a particular month over many years, taking into account seasonality in agricultural markets and inflation, offering an answer to the question of whether or not a change in prices is abnormal for any particular period

Is the rate of change in prices normal for the period of time being observed?

The **IFPA** provides an answer to this question, as it detects **abnormal price growth** in food markets.



Through this indicator, countries can measure the number of months or years of abnormally high and volatile prices, due to improper functioning of local markets and various shocks affecting the food system, relative to a base period or period

This indicator is **only a guide** to understanding market dynamics. It cannot be relied on as the sole element for determining whether a food price in a particular market at a given time is abnormally high or low. Results must be weighed together with other available information on market fundamentals, macroeconomic context and external shocks. This is especially important when evaluating whether or not to flag the price as an anomaly.

INDICATOR FORMULA

To deal with **price volatility**, the IFPA relies on a **compound growth rate approach**

A compound growth rate is a **geometric mean** which assumes that a random variable grows at a steady rate, compounded over a specific period of time

$$CGR_t = \left(\frac{P_{t_B}}{P_{t_A}}\right)^{\frac{1}{n}} - 1 \qquad \textit{Equation 1}$$

P_{t_A} = The price at the beginning of the period

P_{t_B} = The price at the end of the period

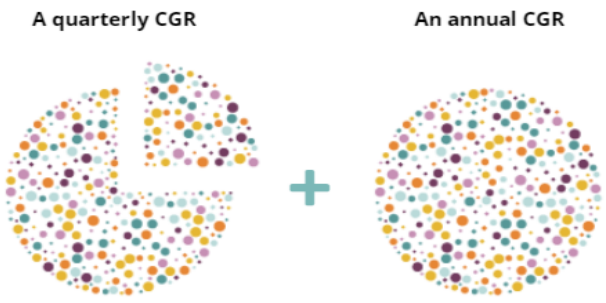
n = The time in months between periods A and B

The growth in any random variable from the beginning of the period t_A to the end of the period t_B, raised to the power of one over the length of the period of time being considered n

The Compound Growth Rate is a geometric and **not an arithmetic mean,** as the latter is affected by the level of volatility in prices

INDICATOR FORMULA

The IFPA indicator is a **weighted sum of two compound growth rates** (CGR):



The indicator captures the two main source of price variations: **seasonality** and **shocks** within the year and across years. In addition, to further account for seasonal effects, the compound growth rates are calculated as a moving average over the immediately preceding 3 and 12 month period of month t

INDICATOR FORMULA

- The indicator of food price anomalies is calculated as follows:

$$IFPA_t = \alpha\left(\frac{CQGR_{yt} - \overline{CQGR_t}}{\hat{\sigma}_{CQGR_t}}\right) + (1-\alpha)\left(\frac{CAGR_{yt} - \overline{CAGR_t}}{\hat{\sigma}_{CAGR_t}}\right)$$

Where α is equal to 0.40

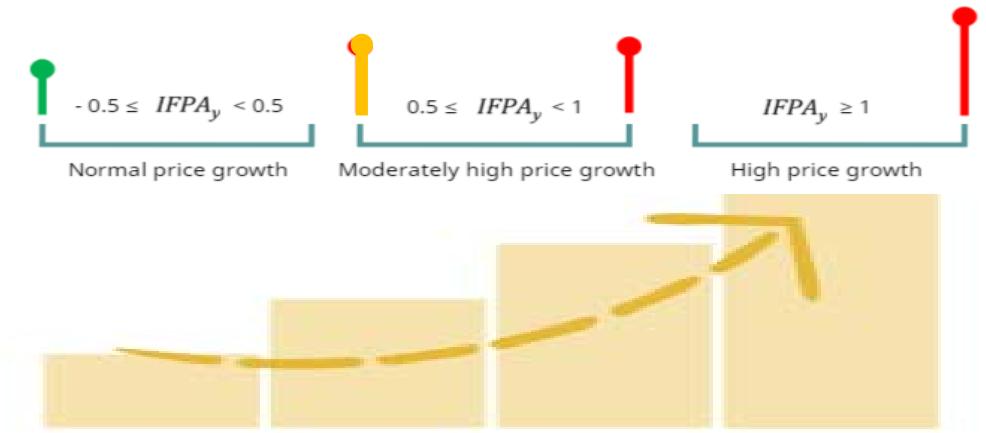
- ✓ $CQGR_{yt}$ and $CAGR_{yt}$ are the quarterly and annual compound growth rates in year y and month t respectively
- ✓ $\overline{CQGR_t}$ and $\overline{CAGR_t}$ are weighted means of the quarterly and annual compound growth rates in month t
- ✓ The weights are increasing time weights, so the more recent past has a higher weight in the calculation of the mean and standard deviation than the beginning of the price series.
- ✓ $\hat{\sigma}_{CQGR_t}$ and $\hat{\sigma}_{CAGR_t}$ are weighted standard deviations of the quarterly and annual compound growth rates in month t

DATA SOURCES

- The indicator monitors price anomalies in:
  - ✓Commodity level price data is harvested from national market Information systems and national statistics agencies
  - ✓Food CPI data originates from the IMF, and UNSD for countries not covered by the IMF. The FAO Food CPI dataset consists of a complete and consistent set of time series from January 2000 onwards.
  - ✓For the commodity prices please visit FAOs Food Price Monitoring and Analysis (FPMA) Tool http://www.fao.org/giews/food-prices/tool/public/#/home
  - ✓For the Food Indices visit http://www.fao.org/faostat/en/#data/CP

INDICATOR METHODOLOGY

- Three levels are defined for the indicator:



- "Price Anomaly" is defined as the recording of a difference between the monthly CGR and the historic average CGR, greater than one standard deviation

INDICATOR CALCULATION AND DISSEMINATION

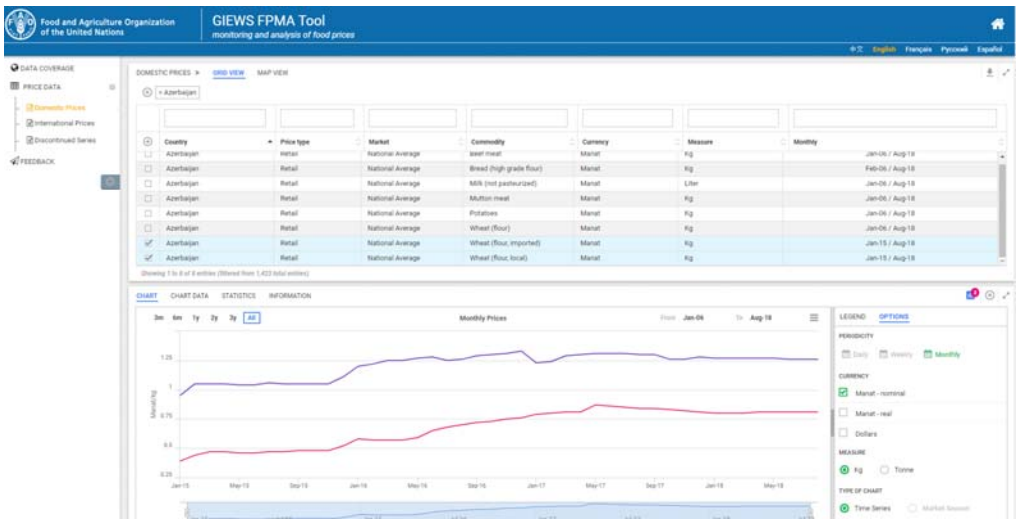
- Adoption of this indicator will require countries to identify relevant, official monthly food price series and inform calculations, data collection and publication on a monthly basis
- The amount of years need to calculate the indicator with confidence is 4 years. We need 3 years to estimate the averages and standard deviations and then the data on the 4th year to make an analysis.
- We are only concerned with **upward** price movements. This is because all the price data used is consumer-focused. This is more true with the Food CPI, which also includes processed foods.
- While there may be a price transmission from consumer to producer prices this is not always strong or maybe negligible because of asymmetric market power or a small share of the cost of the commodity in the processed product. Clear example is flours, where the cost of the commodity is negligible and electricity, salaries, marketing costs are more important.

INDICATOR CALCULATION AND DISSEMINATION

Results for key commodities are calculated, disseminated and analysed through the FPMA website and bulletin on a monthly basis, with the aim of providing early warning to countries where there is a potential impact on economic access to key food products as a result of abnormally high food prices. It helps countries ensure appropriate measures can be taken to soften the blow when consumer markets fluctuate.

http://www.fao.org/giews/food-prices/tool/public/#/home

INDICATOR CALCULATION AND DISSEMINATION



- The FPMA Tool has been adapted for use at **country level.** The tool is linked to existing data collection systems and allows national and international stakeholders to easily monitor, analyze and disseminate price information for a wide range of commodities in markets of their choice with daily or monthly frequency. In the country version of the tool, the **Indicator of Food Price Anomalies feature (IFPA)** is available.

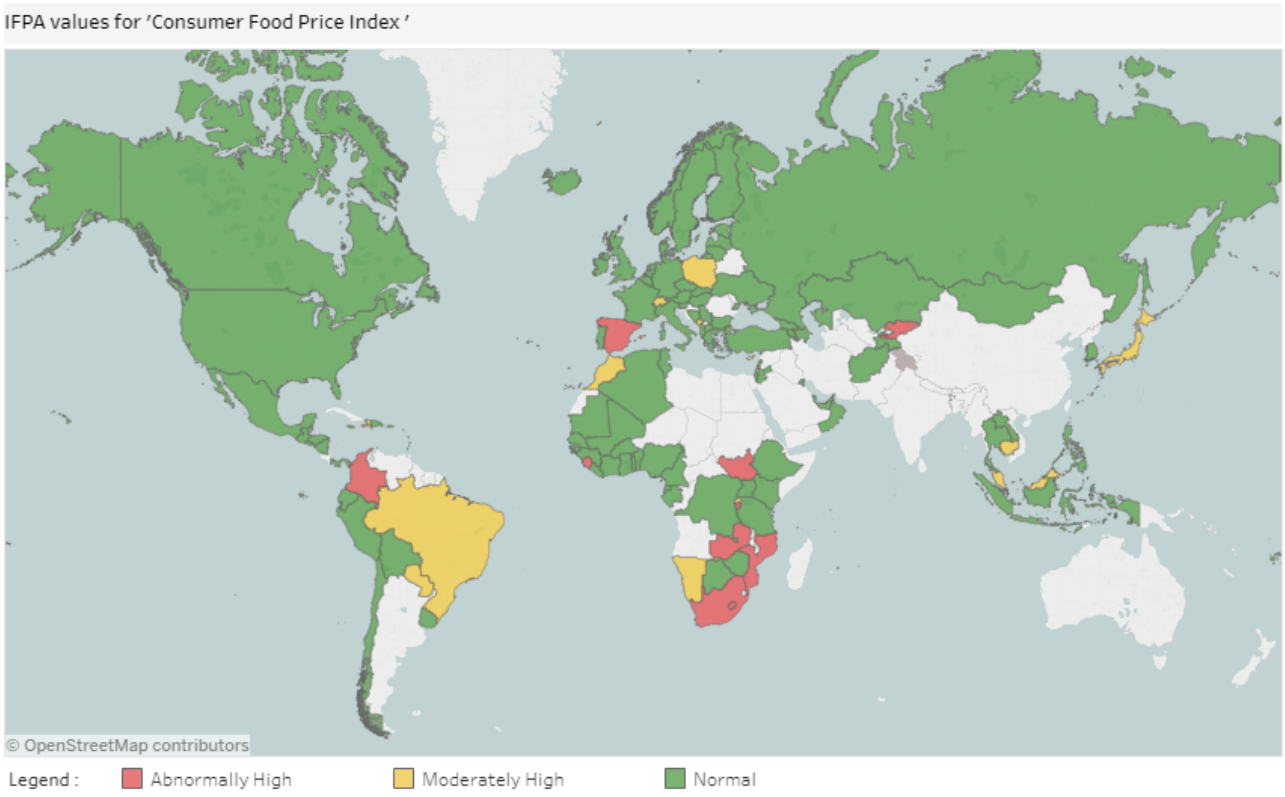
INDICATOR CALCULATION AND DISSEMINATION

- The FPMA database contains 34 price series for 56 commodities in 27 markets of 10 Asia Pacific countries (**Afghanistan, Bhutan, India, Japan, Lao PDR, Mongolia, Pakistan, Samoa, Thailand, Uzbekistan**).

The SDG indicator 2.c.1 can only be calculated in certain cases however:

- ✓ for global comparability, it is only calculated for five commodities
- ✓ it is only calculated at national level (price is either nationally representative or of the key market/markets
- ✓ price series is sufficiently long and consistent
- ✓ commodities with government controlled prices are not included yet

Country	2.c.1 Food CPI	2.c.1 Maize	2.c.1 Wheat	2.c.1 Rice
Afghanistan	0.446		-0.21	
Bhutan				
India			1.17	-0.28
Iran				
Japan	0.968			1.59
Lao PDR	-0.225			0.02
Malaysia	0.65			
Maldives	-0.081			
Mongolia	-0.352		0.08	0.23
Pakistan			-0.31	-0.41
Papua New Guinea				
Republic of Korea	0.087			
Samoa	1.187			0.23
Thailand	-0.334		0.12	-0.57
Turkmenistan				
Uzbekistan				



KEY GLOBAL RESULTS

- In 2016, 24 countries experienced high or moderately high levels of general food prices, while in 29 countries prices for one or more cereal products (maize, wheat, rice, sorghum/millet) were at high or moderately high levels.

- 11 countries experienced both abnormally high levels of general food prices and cereal prices. Maize was the commodity that recorded the highest number of countries and markets with price anomalies.

- Sub-Saharan Africa was the region that had the most number of countries with both high levels of food prices (ten countries) and cereal prices (18 countries). The main causes of the high price levels were domestic output declines, currency depreciation and, in some countries, insecurity. Localized increases in fuel prices provided further support.

Country	2.c.1 Food CPI	2.c.1 Maize	2.c.1 Wheat	2.c.1 Rice
Afghanistan	FAOSTAT		Vulnerability Analysis and Mapping (VAM) - WFP	
Bhutan			Department of Agricultural Marketing & Cooperatives, Ministry of Agriculture and Forests	Department of Agricultural Marketing & Cooperatives, Ministry of Agriculture and Forests
India			Ministry of Consumer Affairs	Ministry of Consumer Affairs
Iran				
Japan			Ministry of Agriculture, Forestry and Fisheries	Ministry of Agriculture, Forestry and Fisheries
Lao PDR				Market Analysis Division, Domestic Trade Department, Ministry of Industry and Commerce
Malaysia				
Maldives				
Mongolia			National Statistical office of Mongolia	National Statistical office of Mongolia
Pakistan			Pakistan Bureau of Statistics	Pakistan Bureau of Statistics
Papua New Guinea				
Republic of Korea				
Samoa				Samoa Bureau of Statistics
Thailand		Department of Internal Trade, Ministry of Commerce		Department of Internal Trade, Ministry of Commerce
Turkmenistan				
Uzbekistan			Uzbek commodity exchange	

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INDICATOR INTERPRETATION

- The indicator of food price anomalies offers governments regular price information on a basket of goods.
- Provides early warning to countries where there is a potential impact on economic access to key food products as a result of abnormally high food prices. It helps countries ensure appropriate measures can be taken to soften the blow when consumer markets fluctuate.
- However, the indicator does not attempt to directly assign causality to the implementation of any given policy or market strategy, nor can it do so.

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INTERVENTIONS TO REDUCE PRICE VOLATILITY

- **Improving market information**: Information on prices allow markets to function more efficiently and monitoring food prices is crucial for evidence-based policy decisions
- **Stockholding:** accumulated stocks might reduce volatility, as long as they are accumulated in periods of excess supply and released in times of excess demand
- **Trade policies and buffer stocks**: governmental interventions to stabilize prices, including the use of a combination of import/export levies, as well as food reserve stockpiles
- **Coping mechanism**: targeted safety-net mechanisms in an effort to reduce the negative consequences of price volatility, while in the long term, investment in agriculture can prevent price volatility

CAPACITY DEVELOPMENT INITIATIVES

- FAO calculates the indicator of food price anomalies using country level data, but no country calculates the indicator on its own yet. However, during 2018 FAO has assisted certain countries in calculating the indicator.

- For instance, FAO has received calculation sheets by **B. Khuderchuluun** on the indicator values for six Mongolian commodities, three of which (wheat, rice, millet) are part of the core set of commodities that can be reported as part of the SDG indicator. FAO experts have reviewed the data sent replied to Mongolia.

- FAO is now finalizing a **module** in the FPMA Tool, which would **allow all countries to calculate the indicator** automatically.

CAPACITY DEVELOPMENT INITIATIVES

- In addition an e-learning course can be found at http://www.fao.org/elearning/#/elc/en/course/SDG2C1

- The course is a clear and easy-to-use guide to understand Indicator 2.c.1 (Indicator of food price anomalies) and the methodology to estimate it. It covers basic concepts related to market functioning, prices determination and price volatility and explains how to calculate the indicator and use the online Food Price Monitoring and Analysis (FPMA) tool to interpret indicator results, at national and international level.

- This course is primarily intended for: staff of public institutions responsible for monitoring domestic food markets or involved in price data collection, dissemination and analysis within the reporting of SDG Indicator 2.c.1; as well as professionals working in public or private organizations interested in price monitoring and market stability.

THANK YOU

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For more detailed information please see:

- http://www.fao.org/sustainable-development-goals/indicators/2c1/en/