2020 Asia–Pacific Statistics Week
A decade of action for the 2030 Agenda: Statistics that leaves no one and nowhere behind
15-19 JUNE 2020 | Bangkok, Thailand

Virtual Event 15-18 June 2020
2020 Asia-Pacific Statistics Week
Leaving no one and nowhere behind

PRICE STATISTICS: COLLECTION, REFORMS AND PUBLIC CONFIDENCE IN PAKISTAN

1) **Haseeb ur Rehman** — **Pakistan Bureau of Statistics, Islamabad.**
2) **Syed Shahzad Ahmad** — **Pakistan Bureau of Statistics, Islamabad.**
3) **Fayaz Ahmad** — **Statistics department Abdul Wali Khan University, Mardan.**

UNITED NATIONS ESCAP
Economic and Social Commission for Asia and the Pacific

DECADE OF ACTION

UKaid
from the British people

1. Introduction:

There is no free lunch. This famous idiom has one important implication that everything has some cost and ultimately has a price. Price is value of a good or service consumed or availed. Such price is normally paid in monetary terms. In other words, price is a value at which both seller and buyer agree for a good or service. In earlier days, barter system of paying price was prevailed in various economies but fails due to numerous drawbacks in that price mechanism.

Economists use the term 'supply and demand' for computing price of a good or service. Actually those two terms refer to behavior of person and their interaction in market. Famous law of price and quantity demand is also illustration of such behavior and interaction. Price statistics show different behavior of consumers in the market. In other words, price statistics are basically the signal of average consumer sentiments in the market and thus connected to public inclusion and confidence These statistics are critical for both government and masses at large. These statistics provide market position at first instance. Generally, these statistics are collected and disseminated by national statistical offices (NSOs). Any misrepresentation of these statistics will erode public confidence. So NSOs have a critical role in inclusion of public trust in official statistics, particularly price statistics.

This paper makes an effort to highlight reform in price statistics and public confidence on these statistics. The paper also gives some important insight for further research and reform on the subject area.

Three different price statistics in shape of indices are computed in the country. Detail of these is given as under:

1.1 Consumer Price index (CPI)

Consumer Price Index (CPI) is commonly used for measuring inflation in the country is based on basket of good derived from a house hold survey. This household survey is carried out after five to ten years. The latest household survey conducted for investigate the pattern of consumption has been carried out in 2015-16. CPI Subsequently, all important commodities and services, which consumer used are fixed and weights are given according to the expenditure incurred on these items. The latest commodities and their weight are given in following table.

Table 1: List of Commodities group and Their Weights

Name of Commodity Group	Weights	Number of items
Food & Non-alcoholic Beverages	34.58	90
Alcoholic Beverages, Tobacco and Narcotics	1.02	3
Clothing & Footwear	8.60	39
Housing, Water, Electricity, Gas and other Fuels	23.63	29
Furnishing and household Equipment maintenance	4.10	42
Health	2.79	30
Transport	5.91	31
Communication	2.21	5
Recreation & Culture	1.59	5
Education	3.79	35
Restaurants & Hotels	6.92	14
Miscellaneous	4.87	28

These weights are utilized in computation of consumer price index (CPI) using following Laspeyre's formula.

$CPI_n = \sum (Pn/Po) \times Wi/\sum Wi$

Where CPI_n = Consumer Price Index for the nth period

Pn= price of an item in the in the nth period.

Po= price of an item in the base period

Wi = weight of the ith item in the base period

1.2 Sensitive Price Index

Sensitive price index measures variation in prices with short span of time. PBS calculate SPI on weekly basis, it consist of 51 commodities. Data on this index is collected from fifty markets in 17 cities of the country. Detail of these necessary daily life items along with its weights is given in the following table.

Table 2: List of Commodities Group and Their Weights for SPI

Name of Commodity Group	Weights	Number of items
Food & Non-alcoholic Beverages	40.12	32
Alcoholic Beverages, Tobacco and Narcotics	4.02	1
Clothing & Footwear	7.60	7
Housing, Water, Electricity, Gas and other Fuels	25.63	4
Furnishing and household Equipment maintenance	5.10	3
Transport	7.45	2
Communication	3.21	1
Miscellaneous	6.87	1

1.3 Wholesale Price Index (WPI)

This indicator is used for changes measured in wholesale market. As this index consist of industry raw material besides of house hold items, fluctuations in prices impact both household and industry simultaneously. This index is compiled on monthly basis. Currently, the index is computed on base year 2015-16. It consists of 110 commodities with seven different groups. Detail of these groups is given in the following table:

Table 3: List of Commodities Group and Their Weights for WPI

Name of Commodity Group	Weights	Number of items
Agriculture, Forestry and Fishery products	25.76	23
Minerals, Electricity and Gas	12	4
Food products including beverages and tobacco	20.07	23
Textile and apparels	10.32	15
Leather Products	0.71	3
Transportable Goods	22.40	25
Metal Product, Machinery and Equipment	8.71	17

2 Methodology:

The paper used two methods for measuring public confidence on price statistics. The first one is comparing two series of Consumer Price indices (CPIs) for measuring enhancement of public confidence on price statistics. CPI is mainly related with household consumption and more representative for public so it is selected for analysis. The first series is consumer price index (CPI) on base year 2007-08 while second one is with 2015-16. Monthly data from July 2017 to April, 2020 has been taken for the analysis. For base year 2015-16, various reforms have been taken for collection and compilation of these statistics. For CPI 2015-16, many reforms are taken, so it is considered will consider as agent for enhancement of public confidence on price statistics (after applying treatment). The paper will analyze public confidence using following t-statistics.

$$t = \bar{d}/(\frac{s}{\sqrt{n}})$$

Where $\bar{d}$ is mean of difference between two CPIs values and s is standard error.

The second method for measuring public confidence on price statistics is using OLS method for estimating the following regression equation.

$CCI= \alpha_0+\beta_1 CPI+ €$

Where CCI is consumer confidence index computed by State Bank of Pakistan using consumer survey and α_0 is intercept. β_1 and € are slope and error term.

Before finding the result, a brief of reforms taken by PBS is given.

2.1 Reforms taken in collection of Price Statistics

Pakistan Bureau of statistics (PBS) begin national statistical office (NSO) has the mandate to collect, compile and publish different sector data including price statistics. The organization introduced many reforms in price statistics. Some of these are as follow.

Soon after the independence, data collection on price statistic was started. The coverage of price statistic data at that time was limited to only three cities. Over the time, scope and coverage of price statistics are expanded. On the technical side, threshold for comparison have also changed. These thresholds known as base year are indicating pattern and taste of people. In the recent past, PBS has changed base year for price statistics from 2007-08 to 2015-16. In this process, the organization collects data on rural prices for the first time. In the earlier series, data of urban market were collected only. In Pakistan, 63% populations are resident in rural areas where markets are relatively less developed. The phenomenon of price discrimination is widely observed in these rural markets due to low check & balance mechanism. Inclusion of rural markets in price statistics will depicts overall picture of inflation.

Another important development in collection of price statistics is introduction of latest technology in collection process. Now price data is collected through tablets using app(Android application). The field staff collects data and send to the central server. The data is then compiled. This process of data collection and compilation lessen human interface resulted in production of quality data.

Similarly, formula for computation of indices on new base year has changed. Now Geometric mean is used for more representative value of each commodity. This is at per international practice. On the other hand, standardization of various commodities have been taken. In the same way, rationalization of energy prices, introduction of consumption quintiles, and population based weights for selection of markets are other feathers added in PBS crown.

3 Result:

The summary statistics of two series of indices that is CPI 2007-08 base and 2015-16 base are given as follow:

Table 4: Summary Statistics of CPI

Name of Index	Number of Observation (Months)	Mean	Standard Deviation	Minimum Value	Maximum Value
CPI (at 2007-08)	34	237.18	17.81	212.3	267.12
CPI (at 2015-16)	34	118.14	8.39	107.1	133.03

After descriptive statistics, value of t-statistics has been computed using Stata 13 and SPSS-17 and is given at Annexure-I. The value of t-statistics is 73.23 which illustrate that reforms have significant impact on people trust. This shows that public trust has increased with reforms.

Similarly, result of regression equation is given at Annexure-II. Result shows that consumer confidence that is CCI is significantly explained by consumer price index. Although R^2 value is less (0.38) and inclusion of other relevant variables may increase this value but analysis show people trust official price statistics

4 Discussion, Conclusion and Recommendations:

Price Statistics is important indicators of the commodity market of a country. Consumer Price Index (CPI) is one among of them. This statistics shows the price level of retail market and thus highly correlated with masses. This study took two possible methods for examination of public trust on price statistics. Result of both are indicating significant boost in public trust.

Boost in public trust on price statistics is due to its indication of consumption pattern/consumers' preference. The weights which are used for computation of indices are computed on the basis of consumption survey. Such survey is carried out with a specific interval. The survey investigates household about their income, expenditure and saving. On the basis of income or expenditure, quintiles are formed. Price Statistics in connection with consumption pattern based on the latest survey is discussed for understanding of enhancement of public trust.

Latest consumption survey in Pakistan known as Household Integrated Economic Survey (HIES) was carried out for the year 2015-16. Some important insight of that report and its linkages with price statistics are given below.

Average consumption for a family with six persons is Rs. 32578 per month. The household spent heavy chunk (35%) of their money on food items. This shows the sensitivity of food items. Poor (lower 20% household) spend almost half of their expenditure on food items. In food items, Pakistani society consumes huge amount of wheat, rice and milk. Any disruption in supply of these products soar prices due to inelastic demand.

Another important group of commodities on which consumers spent mostly their income is energy. The household on average consumes 24% per month on fuel which include fire wood, electricity and gas. Electricity is too much expensive commodity which consumes half of household budget. The urban population of the country pays 81% for two major commodities electricity and gas. Similarly, fire wood and electricity are main source of heating and cooking for rural population. One important fact that rural population is widely used biomass for cooking purpose. This trend should not be discouraged for conservation and suitable use of energy resources.

Some important implication many be drawn from Household Integrated Economic Survey (HIES) and price statistics. Average household consume more money on food items. Price statistics explicitly provide their latest level and its impact. These food items mostly come from agriculture sector which need long term planning. The price statistics also provide first sight of the problem. Food items are not part of core inflation and government is never blamed public responsible for surge in there prices. However, government improved management of these items long term policy.

Further, energy products dried blood of average household. Electricity, natural gas in form of LPG & through pipeline and firewood are main components. The price of electricity and natural gas are regulated by government. Impact of price hike on these commodities is readily available via price statistics. It is duty of government to use these statistics for policy planning.

4.1 Conclusion and Recommendation

To wrap up, price is an important barometer for economy. It is the value paid for good or service consumed/availed. Law of demand states relationship between price and quantity of a good. Price of goods and services are collected by national statistical offices (NSO). In Pakistan, PBS is responsible for collection of price and thus generated three indices of prices. The CPI is used measuring inflation as made on fix basket of goods derived from household integrated Economy Survey (HIES). The other two indices are measured for capturing the prices of basic necessaries and portion of whole sale market. The price statistics are closely related to consumer taste and consumption pattern.

PBS adopted transparency and automation in collection of this important statistics by introduction some vital reforms. These reforms include expanding the number of shops for price collection. Standardization of commodities, geometric means for average, radicalization of energy prices and last but not least, tablet based collection. The paper tries to analyze impact of these reforms on consumer confidence. Results of the study revealed that public confidence significantly increased over these statistics and now they are widely cited by newspapers, policy maker and government.

On the basis of our study, following are some suggestions given for improvement in these statistics are related area.

i. A special survey should be conducted for measuring public trust following the pattern of UK Statistical Authority.
ii. Provincial Bureau of Statistics should be included in the generation of these statistics.
iii. Provincial Bureau of Statistics should also carry out family budget survey for development or province consumer price index.
iv. Government should effectively utilized these statistics in minimum wage rate laws, social safety net programs and poverty reduction strategies.

References:

1. *Principles of Microeconomics 5th Edition*, Gregory Mankiw
2. *Methodology of Price Statistics BASE YEAR 2015-16*, Pakistan Bureau of Statistics (PBS), Government of Pakistan, Islamabad
3. *Introduction to Statistics*, Ronald E. Walpole
4. *Household Integrated Economic Survey (HIES) 2015-16*, Pakistan Bureau of Statistics (PBS), Government of Pakistan, Islamabad
5. *Public confidence in official statistics-2018*, Hannah Morgan & Joe Cant, UK Statistical Authority
6. *Inflation Expectations and Economic Perceptions in a Developing Country Setting, HASSAN ABBAS, SABRIN BEG and M. ALI CHOUDHARY*

Annexure-1: Output of t- paired statistics using Stata-13 and SPSS 17

```
. ttest before == after

Paired t test

Variable |     Obs        Mean    Std. Err.   Std. Dev.   [95% Conf. Interval]
---------+--------------------------------------------------------------------
  before |      34    237.1774    3.054081    17.8082    230.9638    243.3909
   after |      34    118.1397    1.439489    8.39359     115.211    121.0684
---------+--------------------------------------------------------------------
    diff |      34    119.0376    1.625415    9.477718    115.7307    122.3446
------------------------------------------------------------------------------
    mean(diff) = mean(before - after)                             t =  73.2352
Ho: mean(diff) = 0                     degrees of freedom =       33

 Ha: mean(diff) < 0           Ha: mean(diff) != 0           Ha: mean(diff) > 0
 Pr(T < t) = 1.0000         Pr(|T| > |t|) = 0.0000          Pr(T > t) = 0.0000

.
```

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	CPI (2007-08 Base) - CPI (2015-16 Base)	119.038	9.478	1.625	115.731	122.345	73.235	33	.000

UNITED NATIONS ESCAP
Economic and Social Commission for Asia and the Pacific

DECADE OF ACTION

UKaid
from the British people

Annexure-II: Output of Regression Model Using Stata-13 and SPSS 17

```
. reg cpi cci

      Source |       SS       df       MS              Number of obs =      50
-------------+------------------------------           F(  1,    48) =   30.60
       Model |  13919.9035     1  13919.9035            Prob > F      =  0.0000
    Residual |  21835.1284    48  454.898509            R-squared     =  0.3893
-------------+------------------------------           Adj R-squared =  0.3766
       Total |  35755.0319    49  729.694529            Root MSE      =  21.328

------------------------------------------------------------------------------
         cpi |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         cci |    2.437741   .4406834     5.53   0.000     1.551688    3.323794
       _cons |    103.0672   19.21397     5.36   0.000     64.43488    141.6994
------------------------------------------------------------------------------
```

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.624[a]	.389	.377	5.4590768	.389	30.600	1	48	.000

a. Predictors: (Constant), CPI

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	911.927	1	911.927	30.600	.000[a]
	Residual	1430.473	48	29.802		
	Total	2342.400	49			

a. Predictors: (Constant), CPI

b. Dependent Variable: CCI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	9.836	6.055		1.624	.111
	CPI	.160	.029	.624	5.532	.000

a. Dependent Variable: CCI

UNITED NATIONS ESCAP
Economic and Social Commission for Asia and the Pacific

UKaid from the British people

Virtual Event 15-18 June 2020
2020 Asia-Pacific Statistics Week
Leaving no one and nowhere behind

Thank you all

UNITED NATIONS ESCAP
Economic and Social Commission for Asia and the Pacific

DECADE OF ACTION

UKaid
from the British people