

# **METHODOLOGY OF PRICE COLLECTION AND COMPUTING PRICE INDICES**

## **INTRODUCTION**

Statistics play a key role in planning, policymaking and research in the modern world. Price index is one of the branches of statistics, which is widely used as a tool of measuring price changes at retail and wholesale level. The Pakistan Bureau of Statistics (PBS), previously known as Central Statistical Office (CSO) was established in 1950. Soon after its inception, due importance was given to Price Statistics and full-fledge Price Statistics Section was established which is responsible for collection, compilation and dissemination of Price Statistics. Price Statistics Section is collecting wholesale and retail prices and computing three indices namely;

- (A) Consumer Price Index (CPI)
- (B) Sensitive Price Indicator (SPI)
- (C) Wholesale Price Index (WPI)

The procedure for collection of price data and methodology of computing price indices are explained below:-

### **A. CONSUMER PRICE INDEX (CPI)**

#### **Introduction**

Consumer Price Index (CPI) is considered the most common measure of general inflation. It measure changes in the cost of buying a representative fixed basket of goods and services and generally indicates inflation rate in the country.

#### **Background**

The consumer price index was computed for the first time with 1948-49 as a base for industrial workers in the cities of Lahore, Karachi and Sialkot only. Continuous efforts were being made to make CPI more representative by improving and expanding its scope and coverage in terms of items, category of employees, cities and markets. Accordingly, the CPI series were computed with 1959-60, 1969-70, 1975-76, 1980-81 and 2000-01 as base years. At

present, the CPI is being computed with 2007-08 as base year. The details about modus operandi of computation of index are given in the subsequent paragraphs.

### **Coverage of cities and selection of markets**

The current CPI series cover 40 urban centers of Pakistan. Depending upon the size of the city, 1 to 13 markets have been selected from where the prices are collected. The markets have been chosen keeping in view the volume of sales, assuming that majority of the consumers buy goods from these markets. The number of markets covered in 40 cities is 76. The names of the cities and number of markets in each city are given below:-

S. No.	Name of City	Number of Markets	S. No.	Name of City	Number of Markets
1	Rawalpindi	06	21	Karachi	13
2	Islamabad	04	22	Hyderabad	04
3	Attock	01	23	Nawab Shah	01
4	Jhelum	01	24	Mirpur Khas	01
5	Lahore	07	25	Mithi	01
6	Sahiwal	01	26	Sukkur	02
7	Gujranwala	01	27	Larakana	01
8	Wazirabad	01	28	Dadu	01
9	Sialkot	01	29	Peshawar	03
10	Faisalabad	02	30	Mardan	01
11	Jhang	01	31	Abbottabad	01
12	Multan	03	32	Bannu	01
13	Muzaffargrah	01	33	D.I.Khan	01
14	D.G.Khan	01	34	Mingora	01
15	Vehari	01	35	Quetta	02
16	Sargodha	01	36	Turbat	01
17	Mianwali	01	37	Gawadar	01
18	Bahawalpur	01	38	Loralai	01
19	Bahawalnagar	01	39	Khuzdar	01
20	R. Y.Khan	01	40	Dera Murad	01
Total number of Markets					76

### **Income groups**

As the consumption pattern of individuals depends on their income level, the population under observation is therefore, categorized under various income quintiles. The income quintiles used in CPI with base 2007-08 are given below:-

Quintile	Income
Q-1	upto Rs. 8000/-
Q-2	Rs. 8001/- to Rs. 12000/-
Q-3	Rs. 12001/- to Rs.18000/-
Q-4	Rs. 18001/- to Rs.35000/-
Q-5	Above 35000/-

### **Basket of goods and services**

The current CPI covers 487 items in the basket of goods and services, which represent the taste, habits and customs of the people. This basket has been developed in the light of results generated through the Family Budget Survey conducted in 2007-08. The basket of goods and services comprises of 12 major groups. The weights of commodity groups are given below:-

Group No.	Commodity Groups	Average Weights
1	Food & Non-Alcoholic Beverages	34.84
2	Alcoholic Beverage, Tobacco	1.41
3	Clothing & Footwear	7.57
4	Housing, Water, Electricity, Gas and Other Fuels	29.41
5	Furnishing & Household Equipment Maintenance	4.21
6	Health	2.19
7	Transport	7.20
8	Communication	3.22
9	Recreation & Culture	2.03
10	Education	3.94
11	Restaurants & Hotels	1.23
12	Miscellaneous Goods & Services	2.76
	Total	100

### **Conceptual basis of consumer price collection**

Consumer prices for computation of CPI are being collected from retail stores and service establishments. These are the prices at which CPI items are sold to the consumers. In other words, PBS collects prices actually prevailing in the market, rather than list or tag prices fixed by the manufacturers or various price-monitoring agencies.

### **Method and frequency of data collection**

PBS staff located in 34 Regional/Field offices collects CPI data regularly on monthly basis. They personally visit shops, stores, and establishments according to a

predetermined time schedule and collect the prices of the selected items. Prices are reported in schedules specifically developed for the purpose. The contents of the schedules include name of the city, item, its specification and unit price quoted by four different shopkeepers in a market. The time schedule for collection of CPI prices is as under:-

Name of Schedule	Frequency of data	Date of collection
<b>Part-I</b> Food & Non-Alcoholic Beverages, Alcoholic Beverage & Tobacco	Monthly	11-14 of each month
<b>Part-II</b> Clothing and Footwear, Housing, Water, Electricity, Gas and Other Fuels	Monthly	1-3 of each month
<b>Part-III</b> Furnishing, Household Equipment & Routine Household maintenance, Health and Medicine etc.	Monthly	4-6 of each month
<b>Part-IV</b> Transport, Communication, Recreation & Culture, Education and Miscellaneous goods and services.	Monthly	7-10 of each month

### **Supervision of price data collection**

One Statistical Officer in every Regional/Field office has been made responsible for the technical supervision of work done by the price collectors. He is required to ensure that technical aspects of price collection are clearly understood and instructions laid down in this regard are followed by the price collectors. For this purpose, he is required to visit the markets for random checking of the prices.

The Chief Statistical Officers of Regional offices also undertake field checking of price data collected by the price collectors. Senior Officers from Head Office also carryout surprise field inspections/visits to ensure authenticity of data.

### **Data entry of price data**

Computer software for data entry has been developed and installed at 34 Regional/Field Offices. This software has special features like comparison with previous month, computation of average, computation of center average etc.

### **Editing/checking of price schedules at headquarters**

Price data are checked and scrutinized at the headquarters to ensure its accuracy. In the event of any doubt or abnormal variations, clarifications are immediately obtained from the concerned price reporting center.

### **Calculation of average prices at market, city and national level**

For each item, four quotations from different shops in a market are obtained. Average of these four quotations is taken as a representative price for that market.

The city average price for each item is computed by averaging its prices in all the selected markets of the city. The National average price of an item is thus obtained by taking the average of all the 40 cities covered under CPI.

### **Weights**

Data collected through Family Budget Survey provide the details of commodity-wise expenditure of households of different income groups. The results of Family Budget Survey provide the average percentage expenditure of households on different commodities for each income group in each city. These average percentage expenditure on commodities and commodity groups are called weights and used in the computation of the CPI. These weights are different for different income groups.

### **Formula used for computation of index**

Laspeyre's formula as given below is being used for the computation of CPI:

$$I_n = \frac{\sum (P_n/P_o) \times w_i}{\sum w_i} \times 100$$

Where  $I_n$  = CPI for the nth period

$P_n$  = price of an item in the nth period.

$P_o$  = price of an item in the base period

$w_i$  = weight of the ith item in the base period =  $P_o \times q_o$   $\sum P_o \times q_o$

$\sum w_i$  = Total weight of all items.

## Computation of CPI: an illustration

The computation of CPI can be illustrated with help of an example. Suppose we want to calculate index of pulses for the month of February, 2012. The same is computed as under:-

Item	Unit	Base Price P <sub>0</sub>	Price Feb.12 P <sub>n</sub>	Weight W	Price relative (P <sub>n</sub> /P <sub>0</sub> )	Weighted Price relative (P <sub>n</sub> /P <sub>0</sub> ) x
Moong Pulse	Kg.	52.45	122.8	0.2336	2.34	0.54692
Mash Pulse	Kg.	69.87	145.47	0.2098	2.08	0.43681
Masoor Pulse	Kg.	69.36	105.13	0.1869	1.52	0.28329
Gram Pulse	Kg.	44.81	72.33	0.2361	1.61	0.38110
<b>Total</b>				0.8664		1.64812

As per formula

$$I_n = \frac{\sum (P_n/P_0) \times w_i}{\sum w_i} \times 100$$

$$= \frac{1.64812}{0.8664} \times 100 = 190.23$$

Same methodology is being used for computing indices for each income group using their respective weights and prices. For preparing overall index, average prices of 40 cities and combined weights are used.

## B. SENSITIVE PRICE INDICATOR (SPI)

### Introduction

The Sensitive Price Indicator (SPI) is computed on weekly basis to assess the price movement of essential commodities at short interval so as to review the price situation in the county.

### Background

Sensitive price indicator was originally computed with 1969-70 as base which was subsequently switched over to 1975-76, 1980-81 and 1990-91, 2000-01 as base year.

Presently, the SPI is being computed with base 2007-08. The methodology for computing SPI is explained in the next paragraphs.

### **Coverage of cities and markets**

SPI is based on the prices prevailing in 17 major cities. The number of markets covered in each city is as under:

<b>S. No.</b>	<b>NAME OF CITY</b>	<b>No. OF MARKET</b>
1	Islamabad	4
2	Rawalpindi	6
3	Gujranwala	1
4	Sialkot	1
5	Lahore	7
6	Faisalabad	2
7	Sargodha	1
8	Multan	3
9	Bahawalpur	1
10	Karachi	13
11	Hyderabad	4
12	Sukkur	2
13	Larkana	1
14	Peshawar	3
15	Bannu	1
16	Quetta	2
17	Khuzdar	1
<b>Total</b>		<b>53</b>

### **Income groups**

The SPI is being computed for the 5 income quintiles as per details given below:

<b>Quintile</b>	<b>Income</b>
Q-1	upto Rs. 8000/-
Q-2	Rs. 8001/- to Rs. 12000/-
Q-3	Rs. 12001/- to Rs.18000/-
Q-4	Rs. 18001/- to Rs.35000/-
Q-5	Above 35000/-

## **Basket of goods**

Following 53 items are included in SPI with base 2007-08.

S. No.	Item	S. No.	Item	S. No.	Item	S. No.	Item
1	Wheat	15	Milk fresh	29	Tea packet	43	Energy Saver
2	Wheat flour	16	Milk powdered (Nido)	30	Tea (prepared)	44	Match box
3	Rice basmati (broken)	17	Curd	31	Cooked beef (plate)	45	Washing soap
4	Rice irri-6	18	Vegetable ghee (tin)	32	Cooked dal (plate)	46	Bath soap (Lifebuoy)
5	Masoor pulse	19	Vegetable ghee (loose)	33	Cigarettes K-2	47	Chicken farm
6	Moong pulse	20	Mustard oil	34	Long cloth	48	Gas Charges
7	Mash pulse	21	Cooking oil (Dalda)	35	Lawn	49	L.P.G.
8	Gram pulse	22	Potatoes	36	Georgette	50	Electric Charges
9	Beef with bone	23	Onions	37	Shirting	51	Petrol
10	Mutton	24	Tomatoes	38	Sandal gents (Bata)	52	Diesel
11	Eggs	25	Bananas	39	Sandal ladies (Bata)	53	Telephone Charges (Local)
12	Bread plain	26	Salt	40	Chappal sponge (Bata)		
13	Sugar	27	Red chillies	41	Kerosene oil		
14	Gur	28	Garlic	42	Firewood		

## **Methods of derivation of weights**

Computation of weights of SPI is the same as that of the CPI. Weights are drawn on the basis of Family Budget Survey conducted in 2007-2008. The weights for each group are combined by taking simple average of weights of 17 cities for each item. Then, all income groups are combined at Pakistan level taking simple average of weights of 5 income quintiles.

## **Periodicity of price collection**

Prices are being collected on weekly basis on every Thursday. The field staff collects retail prices of SPI items by personally contacting the shopkeeper of the markets covered under SPI. Prices are obtained by the headquarters on email/telephone/fax from the concerned Field/Regional Offices on the same day.

## **Formula used for computation of spi**

The formula used is the same as was explained in CPI.



## **C. WHOLESALE PRICE INDEX (WPI)**

### **Introduction**

The Wholesale Price Index (WPI) is designed to measure the directional movement of prices for a set of selected items in the primary and wholesale markets. Items covered in the series are those which could be precisely defined and are offered in lots by producers/manufacturers. Prices used are generally those, which conform to the primary sellers realization at ex-madi, ex-factory or are an organized Wholesale level.

### **Background**

The WPI initially was computed with 1959-60 as base. Since then, continuous efforts have been made to make the WPI more representative by improving and expanding its scope and coverage in terms of commodities, quotations/markets, etc. Subsequently, WPI series were computed with 1969-70, 1975-76, 1980-81, 1990-91 and 2000-01 as base years. Presently, the WPI is being computed with 2007-08 as base.

### **Coverage of cities and markets**

The wholesale prices are being collected from wholesale markets of following 21 cities:

S. No.	Cities	S. No.	Cities
1	Karachi	12	Sukkur
2	Lahore	13	Bahawalpur
3	Faisalabad	14	Sahiwal
4	Rawalpindi	15	Nawabshah
5	Hyderabad	16	Larkana
6	Multan	17	Mirpurkhas
7	Gujranwala	18	Mingora
8	Peshawar	19	Kasur
9	Sialkot	20	Gujrat
10	Sargodha	21	Bannu
11	Quetta		

### **Basket of goods**

The WPI covers 463 items in the base 2007-2008. The items have been divided into five groups. The groups and number of items are given below:-

S. No.	Commodity Group	Items	Weight
		2007-08	2007-08
1	Agriculture Forestry & Fishery Products	92	25.77
2	Ores & Minerals, Electricity, Gas & Water	12	31.11
3	Food Products, Beverages & Tobacco, Textile, Apparel and Leather Products	125	12.04
4	Other Transportable Goods except Metal Products, Machinery & equipment	143	22.37
5	Metal Products, Machinery & Equipment	91	8.71
Total		463	100.00

### **Methodology of data collection**

Wholesale prices of 463 items included in WPI are being collected from 21 cities as per procedure explained under CPI.

### **Frequency of data collection**

The wholesale prices are being collected by the staff of Regional/Field offices from 12<sup>th</sup> to 15<sup>th</sup> of each month.

### **Supervision of price data collection**

As explained under CPI.

### **Editing/checking of price schedules at headquarter**

As explained under CPI.

### **Calculation of average prices at market/city level**

For each commodity 4 quotations from different shops of a market are obtained. Average of these 4 quotations is taken as a representative price for the commodities in the market/city.

### **Weights**

The value of marketable surplus has been used for deriving the weights of items. The value of marketable surplus is the value of item available for sale in the wholesale market, which is equal to the total value of product less consumption by producer plus imports, minus export if any. The weights are derived at item level (Aggregate value of items in base year) and average price of all the markets for the particular item is used for computation of WPI.