

Index Numbers

Consumer Price Index (or Cost of Living Index Numbers):

This index number measures the changes in the cost of living or purchasing power of a particular class of society during any given period.

Note: Consumer price index numbers are constructed separately for different class of people and different geographical areas like town, city, rural and urban areas.

Methods of Constructing Consumer Price Index:

(I) Aggregate Expenditure Method: In this method CPI is given

by

$$CPI = \frac{\sum P_1 Q_0}{\sum P_0 Q_0} \times 100$$

(II) Family Budget Method:

$$CPI = \frac{\sum WP}{\sum W}$$

$P = \text{relative price} = \frac{P_1}{P_0} \times 100$ and $W = P_0 Q_0$

Ques (1) Calculate the Consumer Price Index for the year 2021 with 2016 as base year from the following data

(I) Aggregate Expenditure method (II) Family Budget method

Commodity	Quantity (2016)	Price	
		2016	2021
A	50	12	20
B			
B	100	10	12
C			
D	60	24 14	15
E	30	16	18
F	40	18	20
F	80	15	18

\Downarrow q_0 \Downarrow p_0 \Downarrow p_1

Solution: (I) Aggregate Expenditure Method:

Commodity	q_0	p_0	p_1	$p_1 q_0$	$p_0 q_0$
A	50	12	20	600	1000
B	100	10	12	1000	1200
C	60	14	15	840	900
D	30	16	18	480	540
E	40	18	20	720	800
F	80	15	18	1200	1440
				$\sum p_1 q_0 = 4840$	$\sum p_0 q_0 = 5880$

$$\text{Consumer Price Index} = \frac{\sum p_1 q_0}{\sum p_0 q_0} \times 100 = \frac{4840}{5880} \times 100 = 121.49$$

(II) Family Budget Method:

Commodity	q_0	p_0	p_1	$P = \frac{p_1}{p_0} \times 100$	$W = p_0 q_0$	WP
A	50	12	20	$\frac{20}{12} \times 100 = 166.67$	600	100000.2
B	100	10	12	$\frac{12}{10} \times 100 = 120$	1000	120000.0
C	60	14	15	$\frac{15}{14} \times 100 = 107.14$	840	89997.6
D	30	16	18	$\frac{18}{16} \times 100 = 112.50$	480	54000.0
E	40	18	20	$\frac{20}{18} \times 100 = 111.11$	720	79999.2
F	80	15	18	$\frac{18}{15} \times 100 = 120$	1200	144000.0
					$\sum W = 4840$	$\sum WP = 587998.8$

$$\text{Consumer Price Index} = \frac{\sum WP}{\sum W} = \frac{587998.8}{4840} = 121.49$$

Ques: An enquiry into the budgets of a middle class families in a certain city gave the following information:

Expenses on	Food	Fuel	Clothing	Rent	Miscellaneous
	35%	10%	20%	15%	20%
Price (in Rs) in 2020	1500	250	750	300	400
Price (in Rs) in 2021	1450	230	650	300	450

What is the cost of living index number of 2021 as compared to 2020?

Solution:

Items	$P_0 (2020)$	$P_1 (2021)$	$P = \frac{P_1}{P_0} \times 100$	W	WP
Food	1500	1450	$\frac{1450}{1500} \times 100 = 96.67$	35	3383.45
Fuel	250	230	$\frac{230}{250} \times 100 = 92$	10	920
Clothing	750	600	$\frac{600}{750} \times 100 = 80$	20	1733.40
Rent	300	300	$\frac{300}{300} \times 100 = 100$	15	1500
Misce.	400	450	$\frac{450}{400} \times 100 = 112.50$	20	2250
				$\Sigma W = 100$	$\Sigma WP = 9786.55$

$$\begin{aligned} \text{Cost of living index number} &= \frac{\Sigma WP}{\Sigma W} = \frac{9786.55}{100} \\ &= 97.8655 \\ &= 97.86 \text{ Ans} \end{aligned}$$

Ques(3) Calculate cost of living index Number from the following data

Items	Price		Weights
	Base year	Current year	
Food	30	47	4
Fuel	8	12	1
Clothing	14	18	3
House Rent	22	15	2
Misc	25	30	1