The Use of Alternative Data Source as A Proxy to Approach More Frequent Updates of CPI Expenditure Weight

Meeting of the Group of Experts on Consumer Price Indices

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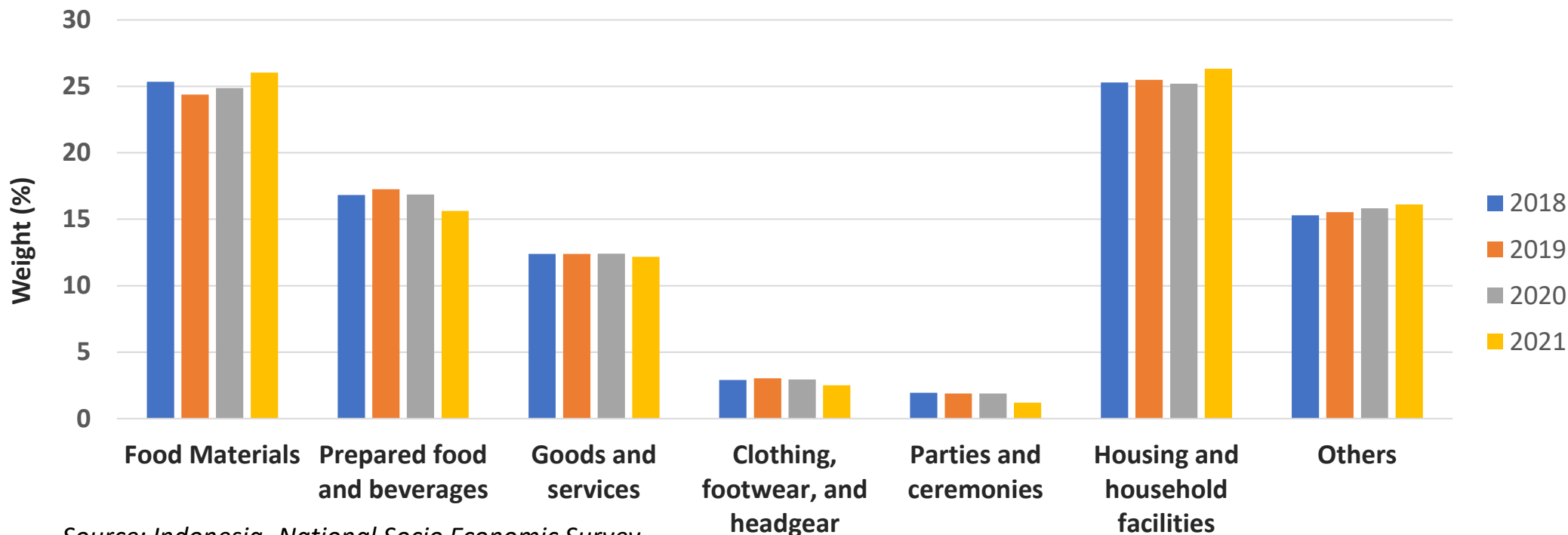
Outline

01

INTRODUCTION

Backgrounds

- The CPI has an important role in determining a country's entire economy

- One of the crucial aspects in the CPI calculation is the weighting method

- Facing a dynamic and rapid change in consumption behavior, a fixed expenditure weight over a long period can be no longer relevant in describing the enormous shift in household expenditure patterns.

Indonesia Expenditure Weight, 2018-2021

Y-axis: Weight (%)

Legend: 2018, 2019, 2020, 2021

Categories: Food Materials; Prepared food and beverages; Goods and services; Clothing, footwear, and headgear; Parties and ceremonies; Housing and household facilities; Others

Source: Indonesia- National Socio Economic Survey

Lesson Learned From Pandemic Covid-19

Objective of This Study

BPS-Statistics Indonesia conducted this preliminary study to examine the feasibility of using Susenas data as an alternative data source to approach household expenditure weights for compiling the CPI.

Overview of Consumer Price Survey and Household Budget Survey

Consumer Price Survey

- Monthly release CPI and inflation
- 90 cities and national
- Fixed basket and weights currently used from HBS 2018
- Using the Classification of Individual Consumption by Purpose (COICOP)

Household Budget Survey

- Held every 5 years
- Currently held in 2022 and will be introduced in January 2024
- Expenditure on food and non-food household consumptions
- Using the Classification of Individual Consumption by Purpose (COICOP)

Headline CPI

Group

Subgroup

Commodity

Price

Overview of National Socio-Economy Survey

Capture household consumption/ expenditure in city level every year in March

02

Using The Classification of Individual Consumption by Purpose (COICOP)

03

01

Availability of data on household welfare, including education, health, and purchasing power

04

Expenditure on food and non-food household consumptions

03

METHODOLOGY

Methodology

1. DATA PROCESSING

PROCESS

- **Data Source**

  The Indonesian National Socio-Economic Survey (Susenas), 2018-2021

- **Total of commodities**

  296 commodities, 596 fewer than HBS 2018

- Estimating total household consumption value per month by commodity

- Aggregrate the expenditure value for 90 cities covered in CPI

Methodology
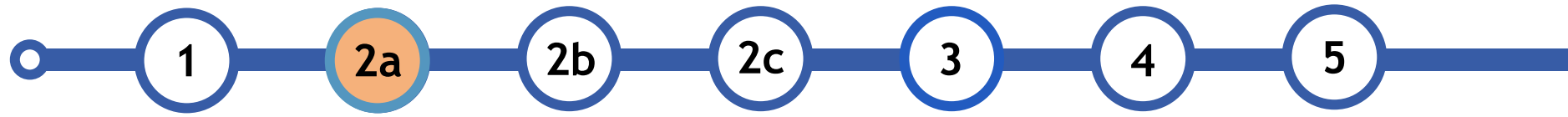
2. CONDUCTING THE ALTERNATIVE WEIGHT BASED ON SUSENAS DATA

a. MAPPING COMMODITIES

For example:

HBS2018 commodities	Susenas Commodities
011101001-Rice	2-Rice
011101001-Rice	3-Sticky Rice
011101008-Sweet Potatoes	10-Cassava/Sweet Potatoes
054501001- Checkup Rates	252-Health test/early detection/Medical Check Up
054501001- Laboratorium Rates	252-Health test/early detection/Medical Check Up
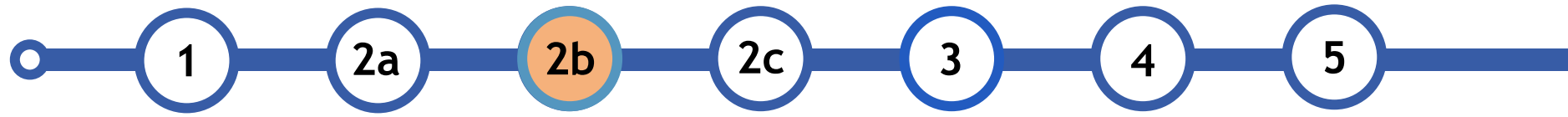
2. CONDUCTING THE ALTERNATIVE WEIGHT BASED ON SUSENAS DATA

b. CALCULATING THE CONSUMPTION VALUE AND IMPUTATION PROCESS

$$NK_i' = \frac{NK_i^{(hbs)}}{\sum_{1,2,\dots I} NK_i^{(hbs)}} \times \sum NK_j^{(ssn)}$$

Notation
NK'i : Updated expenditure value for ith commodity based on Susenas
NKi(hbs) : expenditure value for ith commodity based on HBS
NKj(ssn) : Susenas expenditure value for commodity j which is mapped to ith commodity
i : index for commodity in HBS.
j : index for commodity in Susenas

Commodities Baskets	Expenditure Value based on Susenas Data
011101001-Rice	The sum of the rice and sticky rice consumption
011101008-Sweet Potatoes	Equals to the Cassava/Sweet Potatoes consumption
054501001- Checkup Rates	Use the consumption value of "252-Health test/early detection/Medical Check Up" proportionally based on HBS 2018
054501001- Laboratorium Rates	Use the consumption value of "252-Health test/early detection/Medical Check Up" proportionally based on HBS 2018

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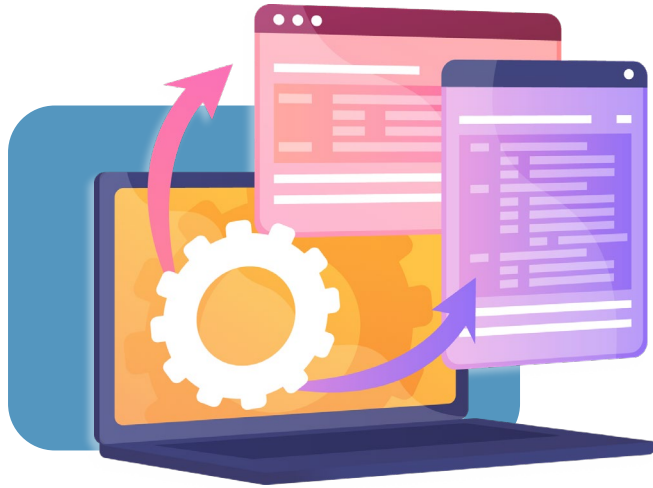2. CONDUCTING THE ALTERNATIVE WEIGHT BASED ON SUSENAS DATA

c. ADJUSMENTS

Adjustments were carried out to overcome the differences in HBS and Susenas commodity details such as:

- ○ Estimating the true value of expenditure

- ○ Proportional approach: In this case, the proportion of expenditure on more detailed commodities in the HBS is allocated to broader categories in the Susenas data

- ○ Excluding the expenditure value of the insurance, and the party and ceremonies category

3. EVALUATION THE WEIGHT BASED ON SUSENAS DATA

Evaluation the Susenas 2018 weight
Calculate the correlation

$$r_{xy} = \frac{cov(x, y)}{\sigma_x \sigma_y}$$

Identify changes in trends of household expenditure patterns year to year based on Susenas weight

4. COMPILING THE ALTERNATIVE PRICE INDICES

Elementary Level Indices

○ Use the same published commodity price change

○ As BPS-Indonesia's practice, for elementary level we use the **Jevon Formula**

$$I_{Jevons}^{0;t} = \prod_i \left(\frac{p_i^t}{p_i^0}\right)^{1/n}$$

$$I_{Jevons}^{0;t} = \frac{\prod_i \left(p_i^t\right)^{1/n}}{\prod_i \left(p_i^0\right)^{1/n}}$$

Upper Level Indices

○ Method : modified Laspeyres

○ Price reference period = weight reference period

$$I_t = \frac{\sum_{i=1}^n p_i^t q_i^0}{\sum_{i=1}^n p_i^0 q_i^0}$$

Linking the index :

$$I^{19/21} = I^{18/19} \times I^{19/20} \times I^{20/21}$$

In this study, we started by comparing the published CPI with the Susenas price index, to see how feasible it is that Susenas data can be used as an approach to calculate the CPI

5. VALIDATION

Calculate the MAPE and RMSE for :

- HBS18 weight and Susenas 18 weight in the commodity level
- CPI and Alternative Price Indices in 2018

MAPE	Interpretation
<10%	Highly Accurate Forecasting
10-19%	Good Forecasting
20-49%	Reasonable Forecasting
>50%	Inaccurate Forecasting
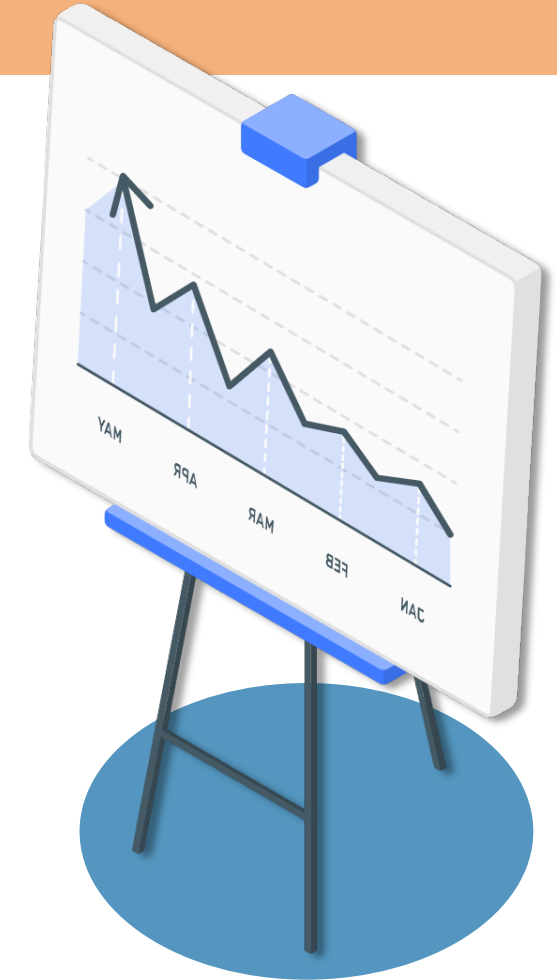
03

RESULTS

The comparison of HBS 2018 Weight & Susenas Weight

Household Budget Survey 2018
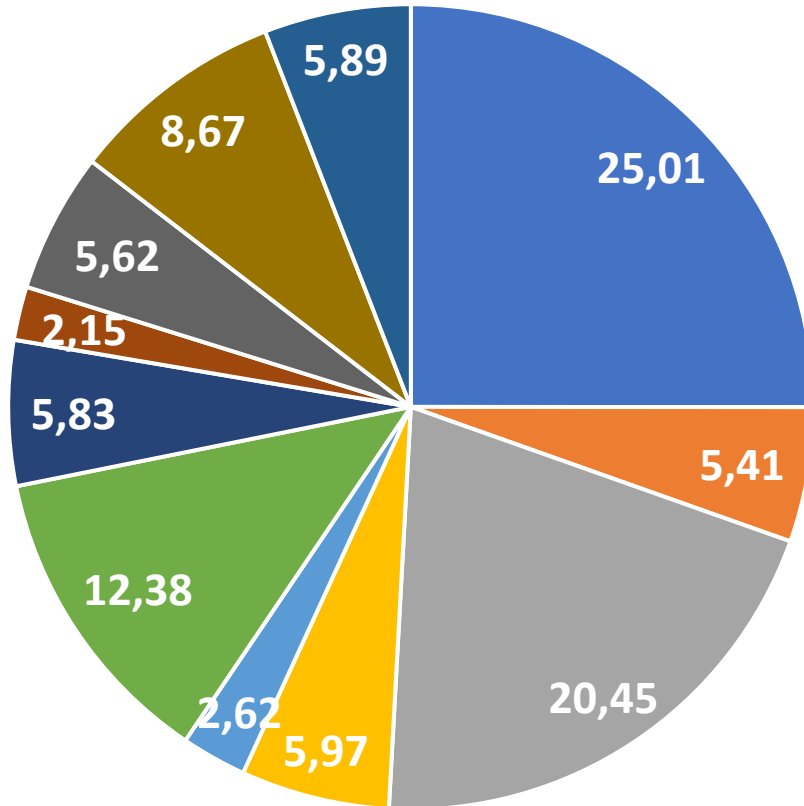
Susenas 2018
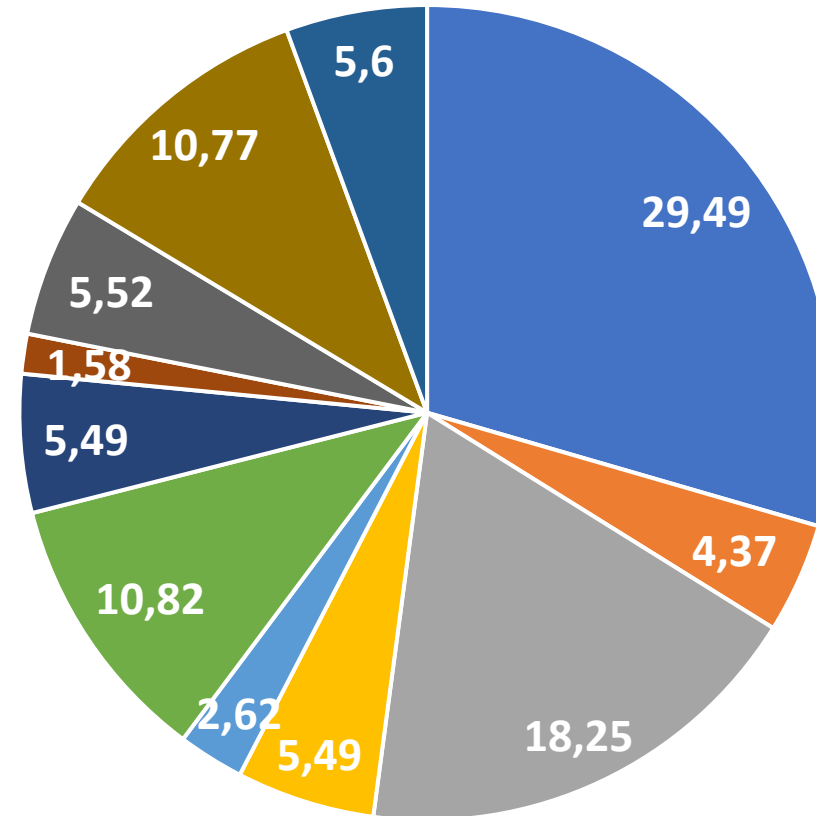
Legend:
- Food, Beverages, and Tobacco
- Clothing and Footwear
- Housing, Water, Electricity, and Household Fuel
- Furnishings, Household Equipment, and Routine Household Maintenance
- Health
- Transport
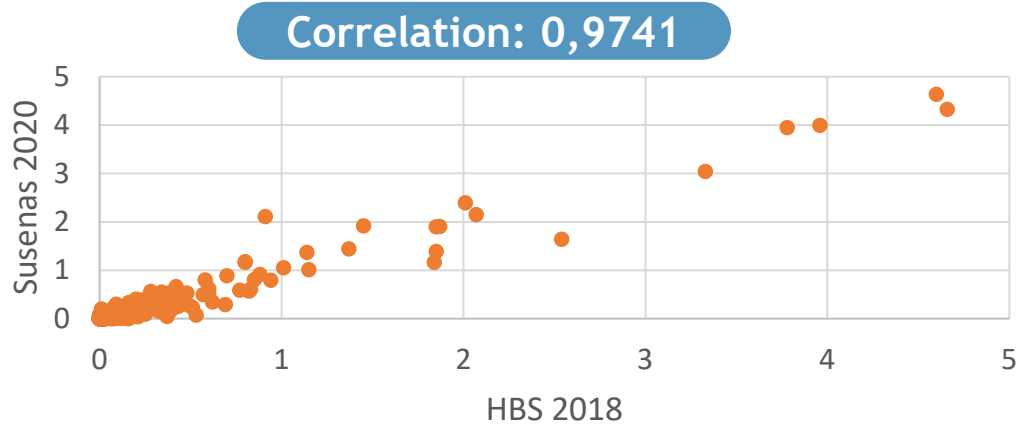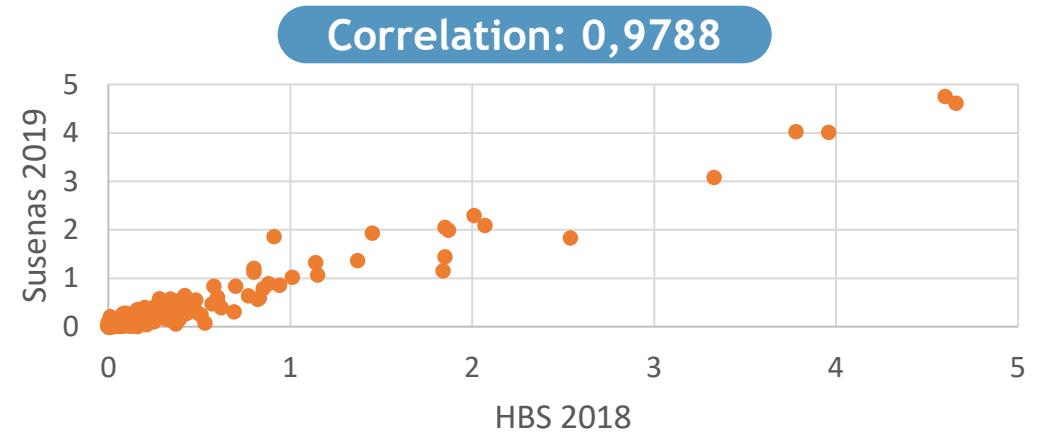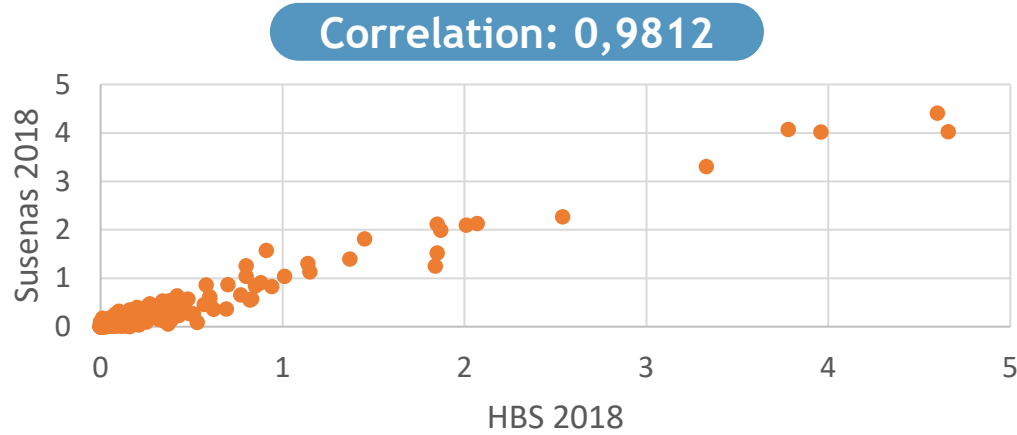- Information, Communication, and Financial Services
- Recreation, Sport, and Culture
- Education
- Food and Beverage Serving Services/Restaurant
- Personal Care and Other Services
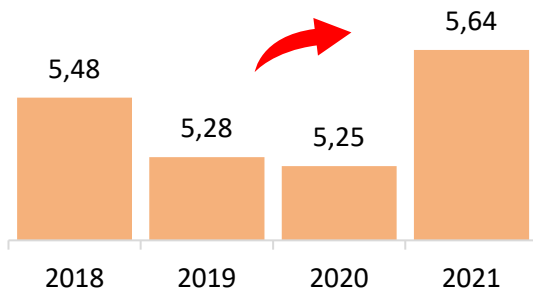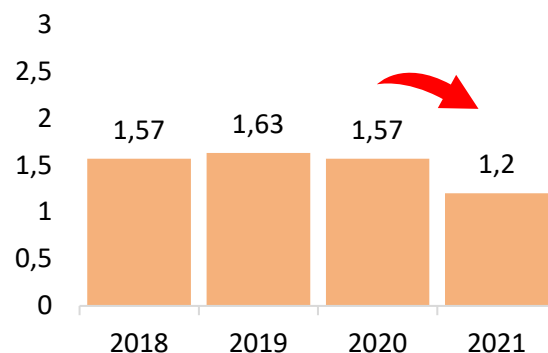
The correlation of HBS 2018 and Susenas

Correlation: 0,9812 — Susenas 2018 vs HBS 2018

Correlation: 0,9788 — Susenas 2019 vs HBS 2018

Correlation: 0,9741 — Susenas 2020 vs HBS 2018

Correlation: 0,9659 — Susenas 2021 vs HBS 2018

The larger the year gap between the HBS and Susenas, the less correlation in the weights produced by the two data sources
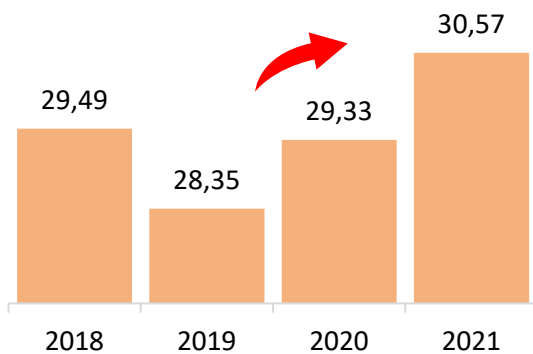
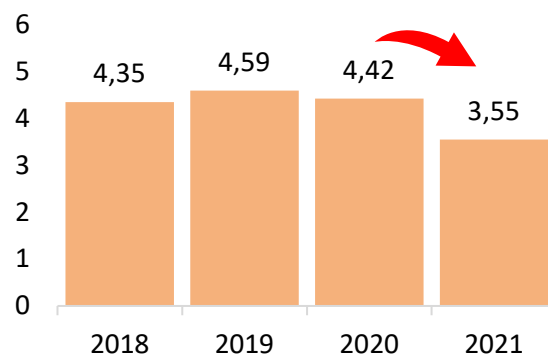# Changes in Consumption Patterns Between Years Based on Susenas

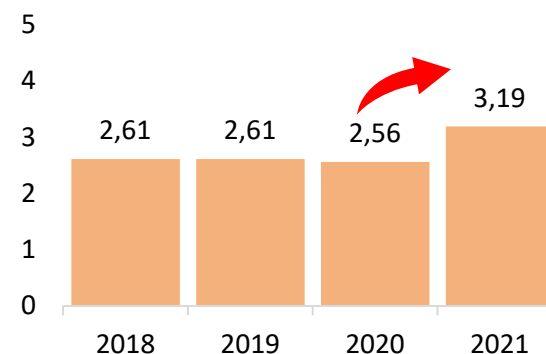## The Expenditure Weight by Groups Based on Susenas, 2018-2021 (%)
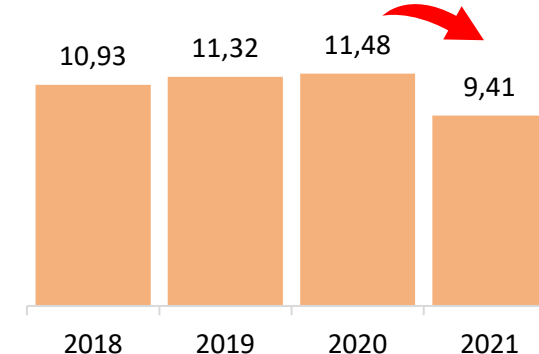
Food, Beverages, and Tobacco

- 2018: 29,49
- 2019: 28,35
- 2020: 29,33
- 2021: 30,57

Clothing and Footwear

- 2018: 4,35
- 2019: 4,59
- 2020: 4,42
- 2021: 3,55

Health

- 2018: 2,61
- 2019: 2,61
- 2020: 2,56
- 2021: 3,19

Transport

- 2018: 10,93
- 2019: 11,32
- 2020: 11,48
- 2021: 9,41

Information, Communication, and Financial Services

- 2018: 5,48
- 2019: 5,28
- 2020: 5,25
- 2021: 5,64

Recreation, Sport, and Culture

- 2018: 1,57
- 2019: 1,63
- 2020: 1,57
- 2021: 1,2

Food and Beverage Serving Services/Restaurant

- 2018: 10,77
- 2019: 11,12
- 2020: 10,8
- 2021: 9,67

Personal Care and Other Services

- 2018: 5,58
- 2019: 5,55
- 2020: 5,63
- 2021: 5,88
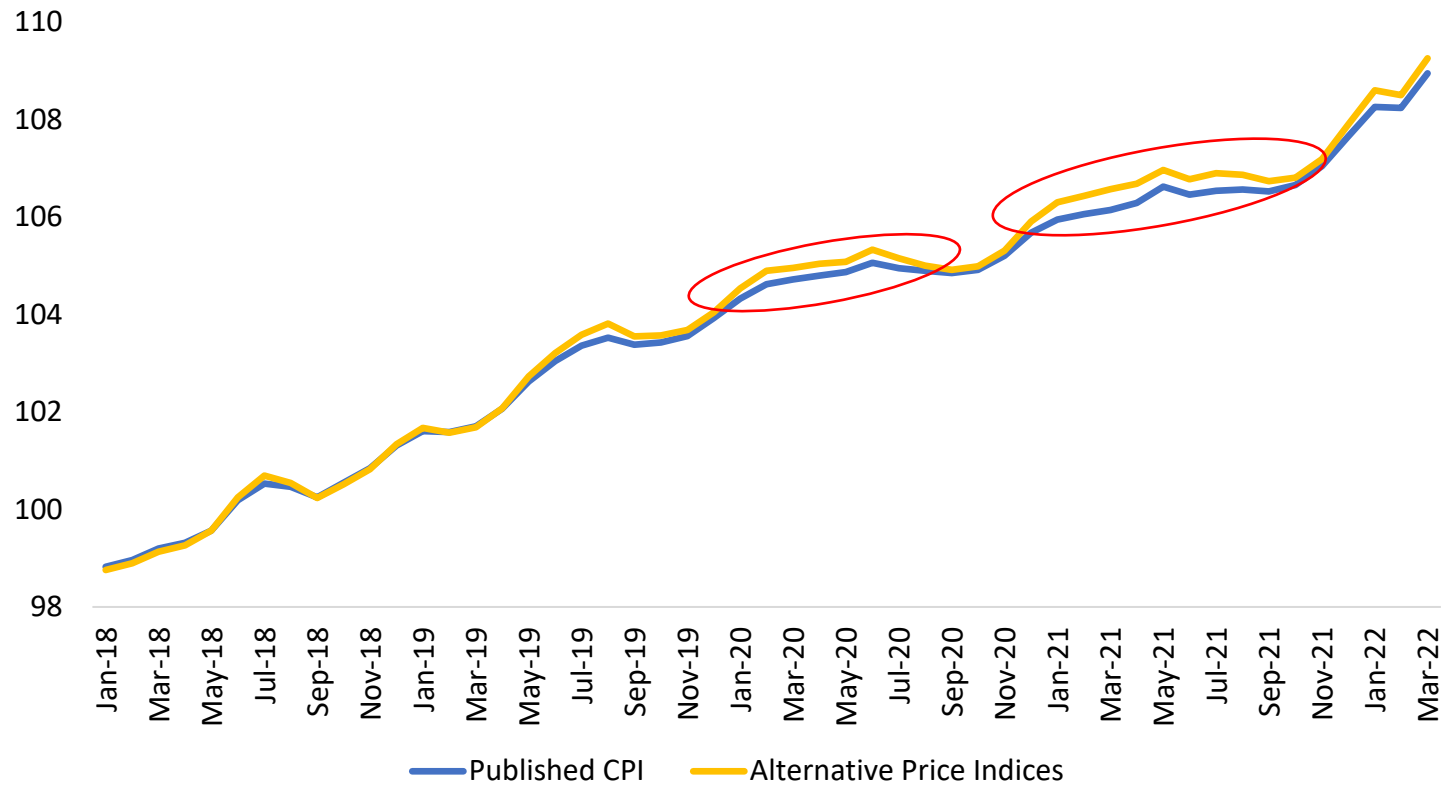
Using the Susenas Weight to Condutct the Alternative Price Indices

The Comparison of CPI and Susenas Price Index

Legend: Published CPI — Alternative Price Indices

Validation

Validity	Weight Expenditure	CPI
RMSE	1.74	0.39
MAPE	12.11%	0.30%

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CONCLUSION, IMPLEMENTATION PLAN, AND LIMITATION

Conclusion and Implementation Plan

Conclusion

- The HBS-18 and Susenas-18 show similar pattern of expenditure weight
- The availability of susenas weight every year allows it to be more responsive to the shifting of consumption patterns.
- As the result of data evaluation (correlation, MAPE, and RMSE), Susenas data can be considered as a feasible method for generating more frequent of CPI expenditure weight
- Household Budget Survey (HBS) is still considered as the **most established** survey to obtain CPI weight

Implementation Plan

- Future research to approach National Account data (HFCE) as one of the data source recommended in the CPI Manual
- Further studies in building a superlative index to estimate the substitution bias of the CPI
- We will continue to review the strategy to implement the Susenas weight or other alternative data sources in compiling the CPI

Our Concern

Susenas only capture the household expenditure in only one month. The differences in the classification and coverage of commodities in the Susenas data, where the coverage of commodities is more limited and not as detailed as the commodities in the HBS.

BADAN PUSAT STATISTIK

ST2023
SENSUS PERTANIAN

THANK YOU

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