STATISTICS SIERRA LEONE
(Stats SL)
Credible Data for National Development

Consumer Price Index (CPI)

Technical Methodological Guide

March 2023

Price and Labour Statistics Section, Division of National Accounts and Economic Statistics

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACKNOWLEDGEMENT

The Sierra Leone Consumer Price Index (CPI) Technical Methodological Guide is the first technical guide developed for the compilation of CPI and inflation rate in Sierra Leone. It is a reference document for CPI and inflation rate compilation for anyone who wants to understand how it is done in Sierra Leone.

It explains the general concepts and technical terms, field activities, practical processes and procedures practised in Sierra Leone and the formulas in the workbooks that produce the estimates. It has been put together by Mwaluma Andrew Bryma Gegbe, Director of National Accounts and Economic Statistics and Isata Allieu-Keikura, Head/Principal Statistician of Price and Labour statistics with technical support from Barra Casey, IMF Price statistics consultant.

Other contributors are the CPI staff and Mrs Olive Odia of the Communication division at StatsSL. Finally, the document was reviewed by Mr. Andrew Bob Johnny, Deputy Statistician General and approved for publication by Prof. Osman Sankoh, the Statistician General.

1 INTRODUCTION

Statistics Sierra Leone （Stats SL） is the central authority in Sierra Leone for the collection, processing, analysis and dissemination of accurate, clear, relevant, timely and high quality Statistical information on social, health, demographic, economic and financial activities to serve the needs of users including government, development partners and the general public. There are nine （9） divisions in Stats SL including the following:

I. National Accounts and Economic Statistics Division

II. National Statistical System Division

III. Health and Social Statistics Division

IV. Census, Cartographic and Information System and the Environment Division

V. Data Science Division

VI. Communications and Public Relations Division

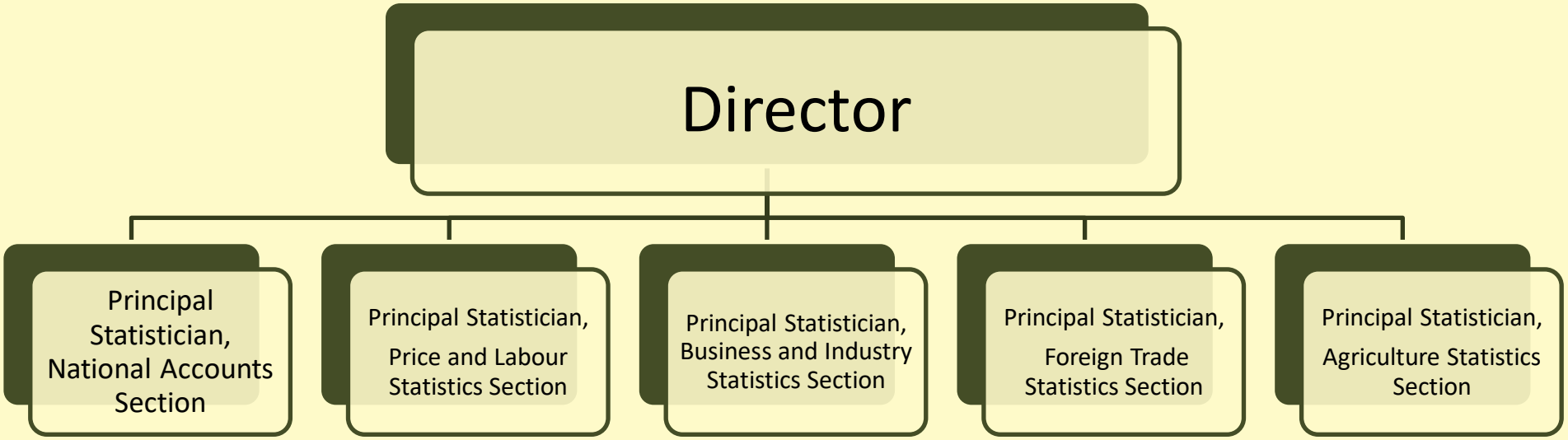
VII. Audit and Compliance Division

VIII. Finance and Support Services Division

IX. Operations Support Division

The CPI is compiled in the National Accounts and Economic Statistics division （NAESD） by the Price and Labour Statistics section. The NAESD has five section that compiles various economic Statistics.

1.1 Organogram of National Accounts and Economic Statistics Division



1.2 Consumer Price Index (CPI) explained

CPI is a type of index number. An index number is a value that estimates changes in a variable or group of variables with regards to geographical location, time, and other features like price and quantity. One of the fundamental properties of an index number is there should be a base period against which changes in all subsequent periods are measured.

The base value of the index number is usually 100, which indicates price, date, level of production, and more; depending on the purpose of the index number.

CPI, therefore, is a single value, an index, that summarizes the changes in the prices of consumer goods and services of a fixed basket for a specific time. The CPI is designed to measure, in index form, the change in the average level of prices paid for consumer goods and services by all private households in the country. It is compiled and published every month by Stats SL; and it is an accurate, objective, and independent measure of price change of consumer goods and services.

1.3 Uses and significance of Consumer Price Inflation

Generally （consumer price） inflation is derived from consumer price index. Inflation rate is one of the macroeconomic indicators used to assess the performance of an economy. It also serves as a proxy indicator to Cost of Living Index which measures the Standard of living of a country's citizens.

Inflation rate is important because it affects the consumption pattern of consumers; this means a significant change in prices will cause the consumers to either reduce/increase the consumption of a particular item or Stop/Start the consumption of another item. Also, producers, government and development partners are affected by inflation because continuous price increases can affect production cost, government policies estimates and uncertainty in planning and investment decisions. A sustained increase in the rate of inflation may create chaos in a country and if not properly managed may lead to unrest; because inflation depletes and erodes savings.

1.4Consumer Price Index (CPI) compared with Cost of Living Index (COLI)

Consumer Price Index measures the changes in the prices of a fixed basket of goods and services over a period of time; on the other hand, Cost of Living Index is the measure of the minimum expenditure needed to maintain a certain lifestyle (Standard of living). Whereas the CPI may be fixed for a geographical area, COLI may vary from person to person, household to household and city to city etc. The objective of COLI is to measure the changes in the cost of living that result from significant life cycle progression. Hence, COLI takes into account expenditure patterns that improve welfare as one progresses in life. Changes in these expenditure patterns are only incorporated in the CPI every time the weights are updated. Finally, CPI is a price index, while COLI is an expenditure index.

2 SIERRA LEONE CPI COMPILATION

Introduction

Generally (consumer price) inflation is derived from consumer price indexes. The national Consumer Price Index (CPI) is the measure of the average price level of selected goods and services in a country; it is a representation of prices of goods and services in the country. Price Statisticians cannot price every goods and services in the market because of reasons such as their expenditure weights in the national total expenditure and the cost of canvassing the price of every items in the country. Therefore, since most items have insignificant weights, Stats SL CPI team therefore conduct market surveys rather than market censuses to compute average price levels, called CPI. The inflation rate is the percentage change between the CPIs of any two periods; which could be monthly, 3-monthly or 12-monthly also known as year-on-year (YOY). The YOY rate is the mostly considered for economic decision making and macroeconomic analyses because it compares current situation with one year back.

2.1 Scope and coverage of the CPI

Consumer Price Index compilation in Sierra Leone, before 2022, was limited to Bo in the South, Kenema and Kono in the East, Makeni in the North-East and Freetown in the West. CPI and inflation rate have never been compiled for the North-west region that was carved-out from the 2015 Population census. In 2022, the geographical coverage of CPI was expanded to include the newly created North-west region. This means, the National CPI now measures the change in prices, on average, from month to month, of the goods and services bought by households in all the regions and for all expenditure groups. Prevailing retail market prices are collected for 440 items from six (6) open markets in Freetown and, three (3) each in Bo, Kenema, Kono, Makeni, Port Loko-Kambia weekly; and other outlets for monthly, quarterly, semi-annualy and annually items whose prices are less likely to fluctuate rapidly.

At the moment, Stats SL collects prices for 440 goods and services from twenty-one (21) open markets. Price data is only collected in urban market centres in all regions regardless of whether the items are produced in Sierra Leone or not. For every item three quotations are requested in that market. There are seventy-two (72) items that are priced weekly, three hundred and eleven (311) are priced monthly, thirty-three (33)priced quarterly, ten (10) priced semi-annually and fourteen (14) priced annually. Therefore, StatsSL CPI collects 5,469 quotations per month, 5,568 quotations per quarter, 5,598 quotations semi-annually and 5,640 quotations in the last month of the year. See table below:

Table 2.1: Estimated quotations per period

Periods	Number of items	Number of markets	Quotations per item	Total products/ quotations	Cumulative/ quotations
Weekly priced items	72	21	3	4,536	
Monthly priced items	311	6	3	5,598	10,134
Quarterly priced items	33	6	3	594	10,728
Semi-annually priced items	10	6	3	180	10,908
Annually priced items	14	6	3	252	11,160
Totals	**440**			**11,160**	

Not every goods and service in the market the Sierra Leone households spend money on is potential item in the CPI basket. While some items do not make into the CPI basket because of their expenditure shares; others are actually omitted because of their nature. For instance, purchase of a dwelling house, buying of Stocks and bonds are considered to be investment expenditure and are therefore not included in the basket irrespective of their weights.

2.2 Selection of markets and outlets

The prices of goods and services are collected from sellers in selected outlets and from selected markets. What, then, is an outlet and a market? For CPI, a market is considered as a collection of market Stalls, Stores, open markets, supermarkets, hospitals, schools, etc in a single town or city. An outlet is a selected price data collection point in the market. This means, that even though we have several places in the market where items are sold, not all of these are outlets because they were not selected for CPI price data collection.

2.2.1 Sampling of outlets and centres

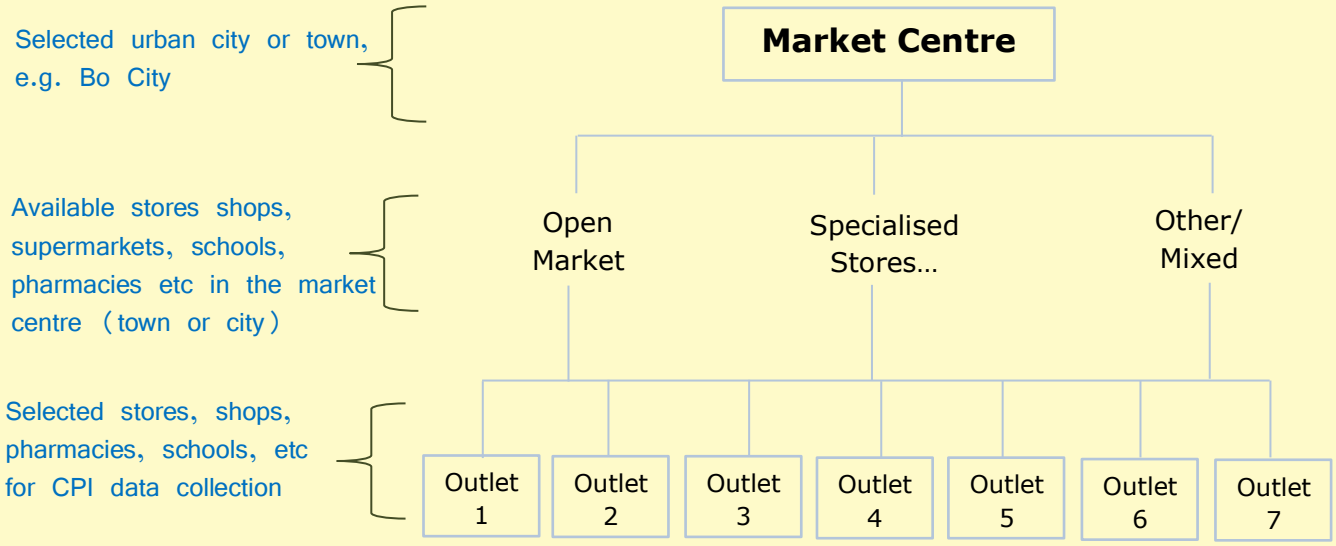
It is obvious that we cannot be in all markets and we also cannot get to all item selling places (Stores, shops etc) in the selected market. How do we select the markets and the outlets? There is no complete sampling frame for the selection of the markets and the outlets; and even where there is one, it may not be effective in selecting the items for pricing. This is because, an outlet can be selected from the sampling frame but may not have the selected items for price data; or many outlets would have to be visited to collect prices.

CPI in Sierra Leone covers 21 open markets across all the regions and in the urban towns only. All regional headquarter towns were purposefully selected and serve as market centres. Where we cannot get all the items in the regional town, a second town in that region is selected based on its population in relation to the regional population as in the case of the North-west region. In these towns, we purposively select the bigger open markets where we collect more price data in other to minimise the cost of price data collection but maximise precision.

Once the open market has been selected, next we select the outlets. This will require a team of price Statisticians and the local field Staff to do a feasibility tour in those markets. The essence of the feasibility tour is to identify outlets that have products that are in the national basket. Normally, outlets with wide range of products are preferred to outlets with limited products. We also consider outlets with some kind of permanent structure and address that will remain available for price collection for multiple years and can be regularly visited.

When a shop/Stall is finally selected for an outlet, we collect detailed information such as name of owner, address and other contact details. This is to ensure that the Store/Stall can be visited at any time by some other person for price data collection. These details put together is called **CPI Code book**.

Figure 2.1: Market Structure



2.3 Selection of Items

CPI SL cannot carry out price data collection for all the consumer goods and services in the market because of the cost it takes to carry-out the activity and the time it takes to collect, analyse and publish the results. Price Statisticians, therefore, use sampled items selected from the array of goods and services available to consumers in the economy.

In Sierra Leone, the selection of these goods and services is done from the conduct of the Sierra Leone Integrated Household Survey (SLIHS) that is done every five years. SLIHS is a 12-cycle/month survey with the data collection lasting for full 12 months. One of the main objectives of SLIHS is to measure household consumption expenditure for the compilation of National Accounts and CPI. The sampled households are asked of the consumption expenditure for purchased food, own food consumption and non-food items. These estimates are blown-up by a national raising factor to estimate the national values for all items. Furthermore, an expenditure shares is calculated for each item to determine the item's significance and for selection of the items for the national basket. For an item to make it into the basket, two factors are considered: its expenditure share and the representativity of the basic heading of the COICOP classification. Additionally, the average work load per field Staff is also taken into consideration when determining the total number of items to be selected which eventually may lead to some items been left out. This means, each time a basket is determined, some items are dropped from the basket and some new items

are added. These items are dropped because they are no longer the preferences of the consumers and are replaced by those which have become the consumers' preferences.

Once the fixed basket of goods and services is determined, no change to the basket is made until after another SLIHS is conducted. However, an item/product can be replaced by a closed substitute in the same basic heading where the item completely disappears from the market; leading to missing data. This is explained further in another chapter in this manual.

2.4 Price Adjustment Techniques

2.4.1 Missing data

Product data collected can be permanently and temporarily missing. Temporarily missing products are products which are not available and not priced in a certain month, but that are priced in subsequent months. This may happen, either because it is not in Stock or because an outlet has closed after the last price and quantity observations. If a product is not available for three consecutive months, the head office is informed to determine if that product will be available again or not. During this period, it is assumed to be temporarily missing. For such product, the last price and quantity observations that were recorded are carried forward for three months to determine if the product will return to the market or not. If that product returns to the market in the same quantity pack, the new price and same quantity should be Recorded. If the quantity is different from previous one, the new price and quantity must be recorded and the head office must be notified.

If the product is determined to be permanently unavailable because of outlet closure, a replacement outlet is found that sells the product. But, also a product can be determined to be no longer available on the market because the specific model/brand is no longer produced; for example. In such a case, our automated system will compute the price of the missing item using price imputation method.

Replacement of Outlet: When a specific outlet is permanently out of business/closed in a given centre, another outlet with similar characteristics is selected to replace it.

Replacement of products: When a product is permanently unavailable a similar product with the same elementary aggregate that most closely meets the specifications of the previous product is selected as a replacement product.

Quality differences: Adjustments are made to correct quality differences. Overlap imputation procedure is used (where information on the price of other products in the same outlet is available); otherwise we use class mean imputation.

2.5 Weights

The CPI measures the changes in the price of a representative basket of goods and services; this means not all individual goods in the market are used in calculating the overall CPI and consumer inflation. At the lowest level, an item's weight equals to the ratio of total expenditure on that good or service to all expenditure in Sierra Leone on goods and services within the scope of the SLIHS conducted that year. These weights computed for each item are the estimates of preferences consumers assign to the items; the larger the weight, the significance the preference. For instance, as most people spend far more on rice than on cigarette, a price rise for rice must have a greater effect on overall CPI than a similar-sized increase for cigarette. At the upper levels, the items are added to give the sub-class level, the sub-classes are added to give the class level, the classes are added to give the group level and the groups added to give the division level.

It is also important to note that weights vary across regions in the country for the same item; and in some instances the items will not be available in the region at all. This, therefore, means that every region develops its own basket from the selected items in the national basket.

In CPI terms, these different weights and the fact that not all items are collected in every region, mean that different regional CPIs are based on different baskets of goods. These regional CPIs are not based on a single national basket of items, but on different baskets of items representative for households in the different regions.

It is advisable to update the weights more often, to reflect consumer current preference, than rebasing the index.

The figures below illustrate the weights of items aggregated at divisional level as estimated from the 2018 SLIHS.

Figure 2.2: Distribution of weights by region

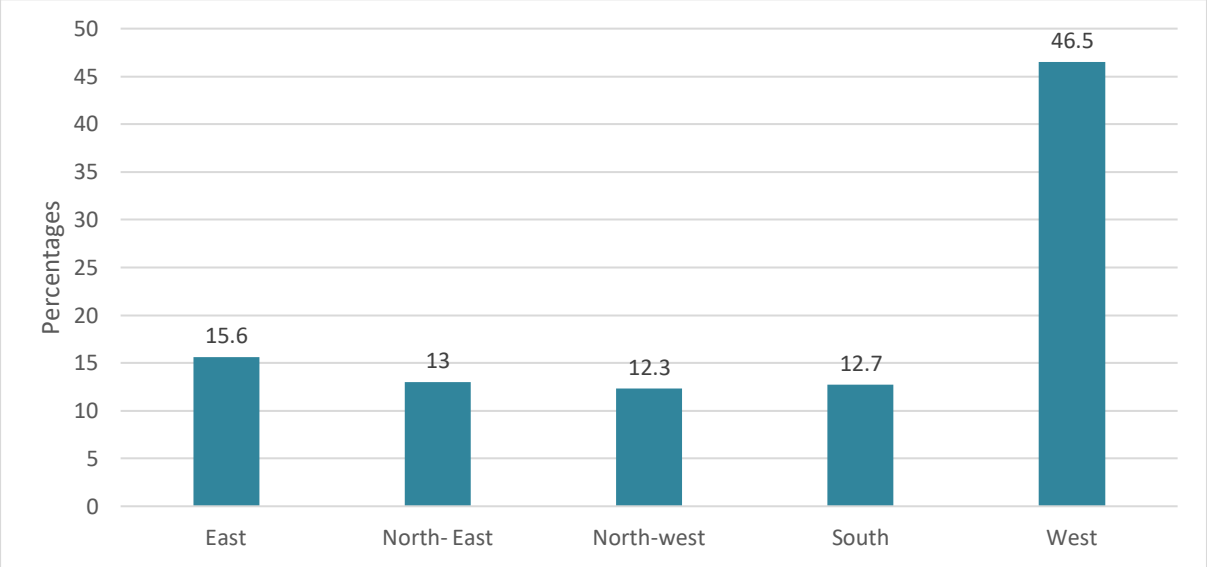
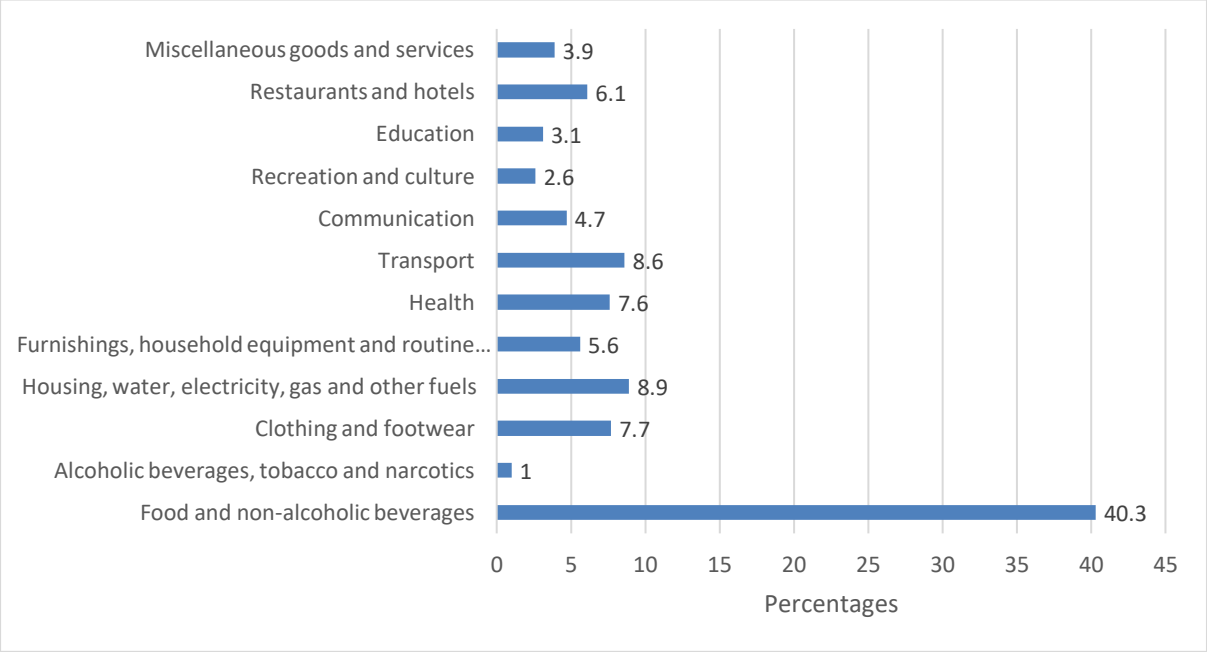


Figure 2.3: Distribution of weights by COICOP divisions



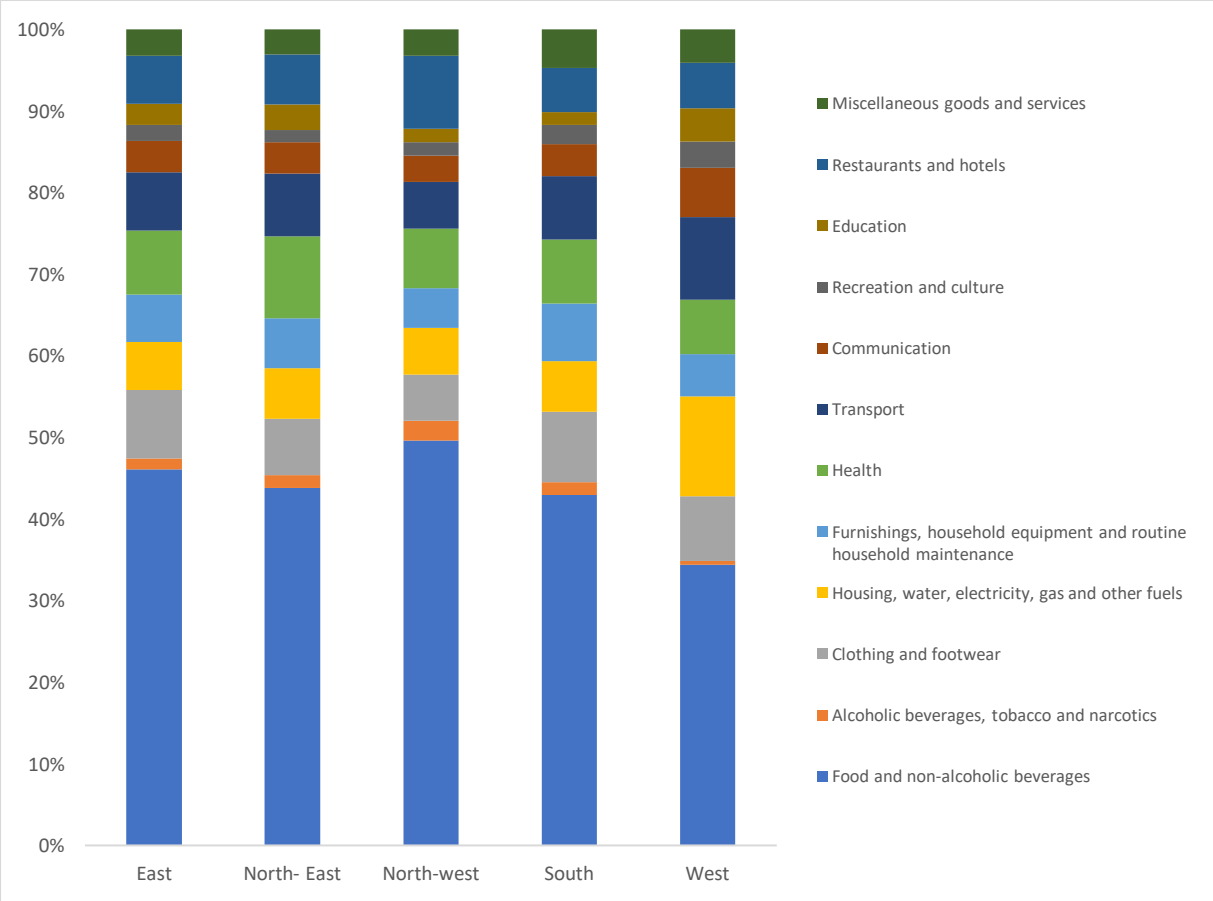
The new weights from 2018 represent the best estimate of consumption patterns in Sierra Leone. The Western Area accounts for the largest share of total expenditure at 46.5% in Sierra Leone with the four provinces accounting for similar proportions of the remaining 53.5%; East 15.6%, Northeast 13.0%, Northwest 12.3% and South 12.7%. In terms of products, Food & Non-Alcoholic Beverages accounts for the

largest proportion of total expenditure at 40.3% followed by Housing at 8.9% and Transport at 8.6%.

There have been some significant changes to the weights compiled from the SLIHs 2018 compared to the previous iteration of the SLIHs in 2008.

Further analyses within the region at the division level is illustrated in the figure below and shows that Food & Non-Alcoholic Beverages account for the largest proportion of total expenditure in all regions.

Figure 2.4: Distribution of COICOP divisions within the regions



2.6 Data Validation – On field, Imputation, Processing and Report writing

Data validation is an end-to-end process that commences from the field unto the report writing. In the field, prices taken are compared with previous month's prices and field Staff may ask questions where a huge price variation is noticed. When the data is taken to headquarters for compilation, a round table verification is done with technical Staff and data supervisors to validate the prices.

During data entry, Staff review each other's entries to ensure no mistake is made. The compilation tool also has in-built consistency check mechanism for the attention of the technical Staff. Such attention will trigger either review of the data entry forms and/or make calls to the field staffs in the regions for verification.

Detailed manual editing is done before prices are inputted into the computer. Inputted data is also subjected to computer editing. Limits to price increases or decreases which identify exception cases for analyst review are set at 30 per cent. Any price change (up or down) above 30% from the previous month, would require field verification to confirm the actual price as well as the reasons for the change, and only the verified price is included in the estimation of the CPI for that month.

The final stage of the CPI data, before publication, is the report writing. The CPI report, called the Press Release, is written by the head of the Price and Labour Statistics section and the Director of the division; is reviewed by the Deputy Statistician General and approved by the Statistician General. Finally, quarterly field monitoring of price data collection is done in all the six data centres by the technical team and the management team represented by the director.

3 SYSTEM CONSTRUCTION OF THE SIERRA LEONE CPI

Data is collected using paper-based questionnaire and brought to StatsSL HQ, every month, by the data collection supervisors in the regions for manual inputting. Micro soft Excel is the sole tool for CPI data entry, compilation and analyses; and there is no specialised software for this activity. There is a separate data entry spreadsheet for each region and they cannot be used for any region other than the assigned region.

3.1 Structure of the Data entry File (Spreadsheet)

There are 18 worksheets on each of the regional data entry spreadsheets. For example, on the data entry spreadsheet for the Western area (Freetown), the worksheets are as follows:

- GMP
- FRE_W1_W2
- FRE_M1
- FRE_M2
- FRE_M3
- FRE_M4
- FRE_M5
- FRE_M6
- FRE_M7
- FRE_M8
- FRE_M9
- FRE_M11
- FRE_M12
- FRE_Q4
- FRE_Q6
- FRE_Q7
- FRE_SA4
- FRE_A10

Each worksheet is used for data entry for a division in the COICOP classification and a frequency of data collection, apart from "GMP" worksheet. The prefix "FRE" before the name indicates it is a Freetown data entry worksheet. The M1 unto M12 are the various COICOP heading for which the data entry is done. For example, "FRE_M1" should be used for data entry for monthly data collection in the "01 Food & Non-Alcoholic Beverages" category for Freetown. The Q4, Q6 and Q7 are quarterly data entry forms for that COICOP divisions with codes 04, 06 and 07. For example, "FRE_Q4" should be used for entering data for quarterly data collection in the "04 Housing, Water, Electricity, Gas & Other Fuels" category for Freetown. The SA and the A worksheets are the Semi Annual and Annual data entry forms for the COICOP codes assigned to them for Freetown. This system is the same format for all our data collection centres (cities/towns) where the data is collected.

The worksheet "GMP" has a different purpose. This worksheet has been designed to bring together the data entered in the other worksheets into a format required for further processing and aggregation. There is no need for manual intervention in the "GMP" worksheet, the formulas have already been set up. ***The formulas in this worksheet should not be amended or changed in any way, as this might cause an error in the processing.***

3.2 Structure of the Data entry Worksheets

The structure of the data entry worksheets is the same for each combination of COICOP division and frequency of data collection (apart from weekly data collection which is structured differently). ***The worksheets are only used for data entry and to ensure that the structure of the spreadsheets is not changed.*** The structure is as follows:

- Columns A to E – These should not change. These are the specifications for data collection.
- Column F "Outlet Address" – This column should be updated as outlets are replaced in the sample.
- Column G "Observed Product Variety" – This column is updated as products are replaced in the sample.
- Column H "Observed Quantity" – It is important that data entry is carried out correctly in this column as the quantity information is transferred to the worksheet "GMP" for further processing. Column H is an important column for

data entry. This is the observed quantity of the product. ***Ensure that the quantity entered in this column is consistent with the requested quantity.*** For example, if 500 grams is requested in column D, then you also need to use the same measurement units here e.g. 450 grams or 500 grams or 550 grams depending on the observed quantity of the product. If 0.75 liters was requested, then you should enter 0.6 liters or 0.7 liters or 0.8 liters depending on the observed quantity of the product.

- ***Only enter numbers in column H, do not enter text / characters.*** The reason for this is because the numbers are used in a calculation in worksheet "GMP" to Standardize the collected prices based on the requested quantity (i.e. see details below on calculating "Price Per Requested Quantity"). By Standardizing the observed prices, this allows a geometric mean to be calculated. These Means can be compared from month to month as they are based on a consistent quantity of a product over time.
- Column I "Last Month's Price" – This is the observed price information for the previous month.
- Column J "Observed Price This Month" – This is the observed price information for the current month. ***The reported price observations for the current month is placed in this column after copying the existing data into Column I "Last Month's Price".***
- Column K "Price Relative for Validation Purposes" – This column is used for validation purposes. Significant changes in prices is investigated and checked to ensure they are correct.
- Column L "Last Month for Imputation Relative" and column M "This Month for Imputation Relative" – These columns are used to store the price information used in the calculation of the imputation relative. If the current price of a product observation is missing, neither the current nor the last month's price will be used in the calculation.
- Column N "Imputation Relative" – This is the geometric mean of the prices in column M divided by the geometric mean of the prices in column L. If the price of a product observation is missing in the current month, this imputation relative is used to calculate an imputed price.
- Column O "Price This Month" – These are the prices that are taken into the worksheet "GMP" for further processing. For each product observation, it is either the observed price or an imputed price.

3.3 Imputation

Where a product price is missing temporarily, an imputation is carried out to estimate the price based on the price changes of other similar product varieties. In the data entry worksheets (apart from the weekly data collection), the calculated imputation relative in Column N is used for this purpose. This is the geometric mean of the prices in column M divided by the geometric mean of the prices in column. An imputation relative is calculated for each item in the basket. If a product price is missing in the current month, the imputation relative is multiplied by last month's price to estimate the price in the current month.

3.4 Calculations in GMP worksheet

The GMP worksheet should only be used for extracting the current month's price information which is required to be pasted into the aggregation worksheets. The variables pulled into the GMP worksheet from the data entry worksheets are "Requested Quantity", "Units" (of requested quantity), "Observed Quantity" and "Observed Price".

Note: For weekly price collection the "Observed Price" is the "Price Per Unit" multiplied by the "No. of Units". For all other data collection, the "Observed Price" is the collected price in the outlet or an imputed price if the price is missing for that collection period i.e. Column O "Price This Month".

For each product observation, "Price Per Requested Quantity" is calculated as follows:

$$P_Q = \frac{P_0}{Q_0} \; X \; Q_R$$

Where P_Q = Price per requested Quality
P_0 = Observe Price
Q_0 = Observe Quality
Q_R = *Requested Quantity*

For each item in the basket, a geometric mean of the "Price Per Requested Quantity" is calculated (see column AE) by multiplying the 'n' values altogether and taking the nth root of the numbers, where n is the total number of observed products. For example, if there are three product observations, you multiply the "Price Per Requested Quantity" for the three products and then take the third root.

Geometric Mean = $\sqrt[n^{th}]{V_1 \text{ x } V_2 \text{ x } \ldots V_n}$

= $\sqrt[3]{450 \text{ x } 400 \text{ x } 500}$

It is the geometric mean of the "Price Per Requested Quantity" that we compare across months for each item in the basket.

The following table shows a worked example of how the geometric mean of the "Price Per Requested Quantity" is calculated:

Table 3.1: Computation of the geometric mean price of a Requested Quantity

Product Observations for Item in the Basket	Requested Quantity	Observed Quantity	Observed Price	Price per Requested Quantity
	(Litres)	(Litres)	(Leones)	(Leones)
Observation 1	1	1	450	450
Observation 2	1	1.4	560	400
Observation 3	1	1.2	600	500
Geometric Mean of the Price Per Requested Quality	Geometric Mean = $\sqrt[n^{th}]{V_1 \text{ x } V_2 \text{ x } \ldots V_n}$ = $\sqrt[3]{450 \text{ x } 400 \text{ x } 500}$			448.14

NOTE

The "GMP" worksheet is the only processing worksheet in the data entry spreadsheet and its output should be copied and pasted in the "PastePrices" worksheet in the compilation spreadsheet of the data collection center.

For instance, the output of the GMP worksheet in the "West data entry" sheet is copied and pasted in the "PastePrices" worksheet of the "West_CPI_Compilation_New" spreadsheet.

Exceptions:

For the rent survey in COICOP "04 Housing, Water, Electricity, Gas & Other Fuels", the "Price Per Requested Quantity" is simply the reported annual rent.

For 04.2.1 "Imputed Rentals of Owner-Occupied Main Resident" and 04.2.2.01 "Imputed Rent for Free Dwelling" a different method is used.

3.5 Imputed Rents and Owner-Occupied Housing (OOH)

It should be noted that there is no specific data collection for 04.2.1 "Imputed Rentals of Owner-Occupied Main Resident" and 04.2.2.01 "Imputed Rent for Free Dwelling". As part of the rebase, it was decided to split the weights between actual and imputed rents. This was the first Step toward fully incorporating Owner-Occupied Housing (OOH) into the index.

In the "GMP" worksheet, imputed rents are dealt with on line 536 (04.2.1 Imputed Rentals of Owner-Occupied Main Resident Imputed Rentals of Owner-Occupied Main Resident) and line 542 (04.2.2.01 Imputed Rent for Free Dwelling). The method is to use the same price information for imputed rents and actual rents. To calculate a mean price for imputed rents, a geometric mean of the prices collected for actual rents is calculated.

3.6 Structure of the Compilation Spreadsheet

There are two layers of compilation sheets: the data collection centre compilation sheets and the National compilation sheets.

3.6.1 Structure of Data Collection centers Compilation Spreadsheet

The data collection centre compilation spreadsheet is the file that compiles, for each centre, the average prices, price relatives and the indexes at subclass, class, group and division levels. There is one and unique compilation spreadsheet each, for all the six data collection centres in the country. This means, every compilation spread-sheet for a particular centre can only be used for that centre. However, these spreadsheets are similar in terms of the compilation worksheets they contain and the processes involved to compile the regional indexes.

Each compilation spreadsheet bears the name of the centre and has the following worksheets:

PastePrices: This is the worksheet that connects the data entry spreadsheet to the compilation spreadsheet. It receives the processed data from the "GMP" worksheet in the data entry spreadsheet by simple copying and pasting values.

GeoMeans: This worksheet computes the geometric mean prices of items that are similar or are within the same subclass. For instance, a single price is computed for local rice which may consist of: long grained, medium grained and short grained varieties using this worksheet. Geometric mean formula is used to compute the mean of prices observed for each product by elementary aggregate.

ElementPrices: This worksheet lists the indexes compiled at subclass level in the previous worksheet. The content of this worksheet is the list of average prices at subclass level in readiness for the compilation of price relatives and the indexes.

Relatives: This compares the elementary prices at the subclass level in the current month with the elementary prices of the previous month. That is: Pc/Pc-1; where Pc is the elementary price of the current month and Pc-1 is the elementary price of the previous month of the same subclass item.

PriceUpdating: This worksheet computes the weighted price relative of the item by combining the price relative computed in the previous worksheet with the weight of the item. This can be expressed as:

$(P_c/P_{c-1}) * W;$

where W is the weight of the item.

CalculateIndices: This worksheet computes the weighted price indexes at the basic level (subclass) and aggregates them at the other levels in the COICOP: class, group and division levels. For every COICOP level, the indexes are estimated by multiplying the price relative by the weight, as below:

Formula for aggregation:

For the aggregation of basic indexes Modified Laspeyres aggregation is used.

$$CPI^t = \sum_{i=1}^{4} w_i^b \times I_i^t$$

Where w_i^b is the basic weight of the group of product and I_i^t is the elementary index for the group of product (i) in the period (t).

SubClassIndices: This worksheet does no computation but picks the items for this level from the "***CalculateIndices"*** worksheet.

ClassIndices: This worksheet does no computation but picks the items for this level (Class) from the "***CalculateIndices"*** worksheet.

GroupIndices: This worksheet does no computation but picks the items for this level (Group) from the "***CalculateIndices"*** worksheet.

DivisionIndices: This worksheet does no computation but picks the items for this level (Division) from the "***CalculateIndices"*** worksheet.

3.6.2 Structure of National Compilation Spreadsheet

The national compilation spreadsheet is split into two because of the size of the file and the link to several other files. The "National Spreadsheet_1" is linked to all the centres compilation sheets for collation of the indexes by region. ***This spreadsheet should be opened first before opening the second spreadsheet called "National Spreadsheet_2"***. Both spreadsheets are report/output files which are used to prepare the CPI report (CPI Press Release) for dissemination to the wider public but also for further analyses.

The "National Spreadsheet_1" has the following worksheets:

Subclass, which collates the indexes at subclass level by region

Class, which collates the indexes at class level by region

Group, which collates the indexes at Group level by region and

Division, which collates the indexes at division level by region

There are other worksheets in this spreadsheet which contains linked series at group and division levels. These are the worksheets where the old series and the new series are linked to avoid break in the series.

The table below shows the total indexes compiled in each category.

Category	Total indexes compiled
Subclass	**198**
Class	**90**
Group	**43**
Division	**12**

The "National Spreadsheet_2" has the following worksheets:

Item Prices, which aggregates the prices of the regional item average prices from the various regions to national item average prices. This worksheet picks data from the ***Past prices*** worksheet in the centres' compilation spreadsheet and computes the national average prices for these items.

Dissemination National Group, which collates the national indexes at group level for dissemination and report writing. The Year-on-Year (YoY), Month-on-Month (MoM) and 3-month inflation rates are first computed here.

Dissemination National Division, which collates the national indexes at division level for dissemination and report writing. It also computes the national Non-food index and inflation rates. The Year-on-Year (YoY), Month-on-Month (MoM) and 3-month inflation rates are computed here as well.

Dissemination National Table 1.1, which collates the nation indexes at division level but also detailed by group level for dissemination and report writing. The Year-on-Year (YoY), Month-on-Month (MoM) and 3-month inflation rates are computed here as well.

Dissemination (Kenema), which collates the Kenema indexes at division level but also detailed by group level for dissemination and report writing. The Year-on-Year (YoY), Month-on-Month (MoM) and 3-month inflation rates are computed here as well.

Dissemination (Kono); which collates the Kono indexes at division level but also detailed by group level for dissemination and report writing. The Year-on-Year (YoY), Month-on-Month (MoM) and 3-month inflation rates are computed here as well.

Dissemination (East), which collates the Eastern region indexes at division level but also detailed by group level for dissemination and report writing; using the Kenema and Kono dataset. The Year-on-Year (YoY), Month-on-Month (MoM) and 3-month inflation rates are computed here as well.

Dissemination (North), which collates the Northeast region indexes at division level but also detailed by group level for dissemination and report writing. The Year-on-Year (YoY), Month-on-Month (MoM) and 3-month inflation rates are computed here as well.

Dissemination (Northwest), which collates the Northwest region indexes at division level but also detailed by group level for dissemination and report writing. The Year-on-Year (YoY), Month-on-Month (MoM) and 3-month inflation rates are computed here as well.

Dissemination (South), which collates the Southern region indexes at division level but also detailed by group level for dissemination and report writing. The Year-on-Year (YoY), Month-on-Month (MoM) and 3-month inflation rates are computed here as well.

4 COICOP CLASSIFICATION

The overall CPI is not estimated from the prices of random products. Instead, products are ordered in a hierarchical system of Divisions, Groups, Classes, Subclasses and then; the items. CPIs are produced in stages, with indices derived at each stage weighted together to produce higher-level indices. To order products into these different categories, StatsSL uses the United Nations Classification of Individual Consumption by Purpose (COICOP) 2018 manual.2).

The Classification of Individual Consumption by Purpose (COICOP) is the international reference classification of household expenditure with an objective to provide a framework of homogeneous categories of goods and services, which are considered a function or purpose of household consumption expenditure. COICOP is used for several other Statistical areas, such as: household expenditure Statistics based on household budget surveys and the analysis of living Standards; consumer price indices; international comparisons of Gross Domestic Product (GDP) and its component expenditures through Purchasing Power Parities (PPP); and Statistics relating to culture, sports, food, health, and tourism.

In the latest COICOP, released in 2018, there are 15 Divisions, 63 Groups, 186 Classes, and 338 Subclasses. Most of the classes and subclasses comprise either goods or services. Any class or subclass containing goods are denoted by "ND", "SD" or "D" indicating non-durable, semi-durable or durable respectively. "S" denotes classes or subclasses consisting of services.

Below are the highest COICOP classification levels called the division:

1. Food and Non-Alcoholic Beverages
2. Alcoholic Beverages, Tobacco and Narcotics
3. Clothing and Footwear
4. Housing, Water, Electricity, Gas and Other Fuels
5. Furnishings, Household Equipment and Routine Household Maintenance
6. Health
7. Transport
8. Information and communication
9. Recreation, Sport and Culture
10. Education Services

11. Restaurants and Accommodation Services
12. Insurance and Financial Services
13. Personal Care, Social Protection and Miscellaneous Goods and Services
14. Individual Consumption Expenditure of Non-profit Institutions Serving Households (NPISHS)
15. Individual Consumption Expenditure of General Government

Each division above is further classified into groups, each group into classes, each class into sub-classes and within the subclasses are the items to price. Below is an example of how these divisions are classified right down to subclass:

Category/Level	Code	Description
Division	06	Health
Group	06.1	Medicines and Health product
Class	06.1.1	Medicines
Subclass	06.1.1.1	Medicines, Vaccines and other Pharmaceutical preparations (ND)

4.1 COICOP Coverage in Sierra Leone

Normally, households, NPISH and general government are the main institutional sectors that incur individual consumption expenditures. All household consumption expenditures are classified as individual and are presented in COICOP 2018 Divisions 01 through 13. All consumption expenditures of NPISH are considered, by convention, as being for the benefit of individual households and are presented in COICOP 2018 Division 14. However, the general government expenditure is classified into two: individual and collective consumptions expenditures. Expenditures on general public services, defence, public order and safety, economic affairs, environmental protection, etc are considered to benefit the community as a whole rather than an individual household; these are collective consumption expenditures and are excluded from COICOP for CPI purposes. On the other hand, there are those government expenditures that are considered as individual expenditure and are classified in division 15 of COICOP 2018. They include housing, health, education, social protection, recreation, and culture; these are included in the CPI compilation.

StatsSL CPI uses the 12-function COICOP classification out of the 15 functional classifications narrated above. In the StatsSL CPI, like most countries in the ECOWAS sub region, the individual consumption expenditures of both NPISH (division 14) and general government (division 15), if priced, are added to similar divisions of individual consumption expenditures of households. Division 12 (Insurance and Financial Services) and division 13 (Personal Care, Social Protection and Miscellaneous Goods and Services) are merged together into one division and called Miscellaneous goods and services.

5 REBASING AND CHAIN INDEXING

5.1 Rebasing

One of the fundamental properties of the index is there should be a base period against which changes in all subsequent periods are measured. This means that every CPI starts with a new base period that is changed often when the basket and compilation require updating. That change of the base period, which is the conversion from one reference year or month to another, is what is called rebasing. For example, the previous series had a reference base period of 2008 = 100 and covered the period January 2008 to November 2021. The current series has a reference period of December 2021 = 100 and will be updated after five years.

Before this time, the base year used for the compilation of CPI in Sierra Leone was 2008 and the basket was developed in 2003; these do not present the true consumption pattern of the current population. It is also a best practice set by international standards to rebase after every five years and our 2008 base-year was way out of that standard. Additionally, using a very old basket shows that CPI is computed for some items that are no longer the preference of consumers and NOT computed for some items that have become the preference of consumers because they are not in the basket.

Hence, the need to rebase the CPI and update the market basket.

5.2 Chain-indexing/linking

After rebasing, it is necessary to link these two separate series together at their common period in order to avoid break in the series. In order to chain indices across baskets (meaning that the weights have been updated), expenditure weights for the two baskets must be expressed at the prices of a common period; which is either a month or a full year. To chain index, therefore, a selected period (year or month) must have overlap data set of the two series to be linked. This chain-linking does not affect relative change in CPI between two periods and thus the inflation rate is unaffected by chain-linking.

To complete the updating of the CPI series, it is necessary to back cast old CPI numbers linked to the current index. This means normalizing old indexes to the current index, such that the reference period for both old and new series equals 100.

For our recent rebasing, chain-indexing and back-casting, our overlap period was December 2021; the only period for which we had data set for both the old and new series for the new region added to the compilation. This was the reason for the choice of a single month (December 2021) and not a whole year for rebasing.