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KENYA RESIDENTIAL PROPERTY PRICE INDEX



METHODOLOGY NOTE – APRIL 2026

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Introduction

The Residential Property Price Index (RPPI) measures the average change in market prices of residential properties in Kenya over time. It provides an objective indicator of developments in the housing market, reflecting price movements that are independent of changes in property characteristics or quality. The RPPI covers the period between 2022Q1 to 2025Q4 and is constructed using data on residential property asking prices drawn from 2023/24 Real Estate Survey, property listing websites, as well as quarterly survey of real estate administered to real estate agents. The diverse data sources ensure comprehensive coverage of the residential property market across different regions and property types

The RPPI covers both apartments and standalone houses, and excludes undeveloped land, commercial properties, self-build residential units, non-market residential property transactions and transactions by non-household entities as guided by The International Monetary Fund (IMF) 2019 *Financial Soundness Indicators Compilation Guide (2019 FSI Guide)*[1] and the *RPPI Practical Compilation Guide 2020* [2]. The index is compiled using the Rolling Window Time Dummy Hedonic method, a statistical technique that adjusts for differences in property price determining characteristics such as dwelling type, location, number of bedrooms. This ensured that the index reflects pure price change over time, independent of variations in the types of properties listed. The RPPI serves as a tool for monitoring housing market trends, assessing housing affordability, and informing economic and financial policy.

Scope

The RPPI is compiled in accordance with the *2013 RPPI Practical Compilation Guide*.of the International Monetary Fund(IMF). It also aligns with the recommendations of the East African Community Guidelines on Compilation of using asking prices for residential properties from 2022-Q1 to 2025-Q4. The RPPI is mainly composed of properties in urban areas and metropolis of large cities and towns where residential properties offered for sale are concentrated, both existing and new buildings. The coverage of the index was informed by availability of data

1. https://www.imf.org/en/Data/Statistics/FSI-guide
2. https://www.imf.org/en/Data/Statistics/RPPI-guide
3. https://eac.opendataforafrica.org/xlrnoff/eac-statistics-guidelines

from all possible sources. The categorization of residential suburbs and stratification was informed by the availability of required data for index compilation. Non-market transactions such as family transfers, houses supplied free or sold at prices that are not economically significant such as inherited properties, intra-family transactions, social housing schemes at subsidized prices and affordable housing program (AHP) houses and purchases by non-household buyers, such as by companies or institutions, are specifically excluded from the index. Also excluded are self-built houses, where the land is purchased separately, and purchases of partially built dwellings as well as houses sold through off-plan arrangements.

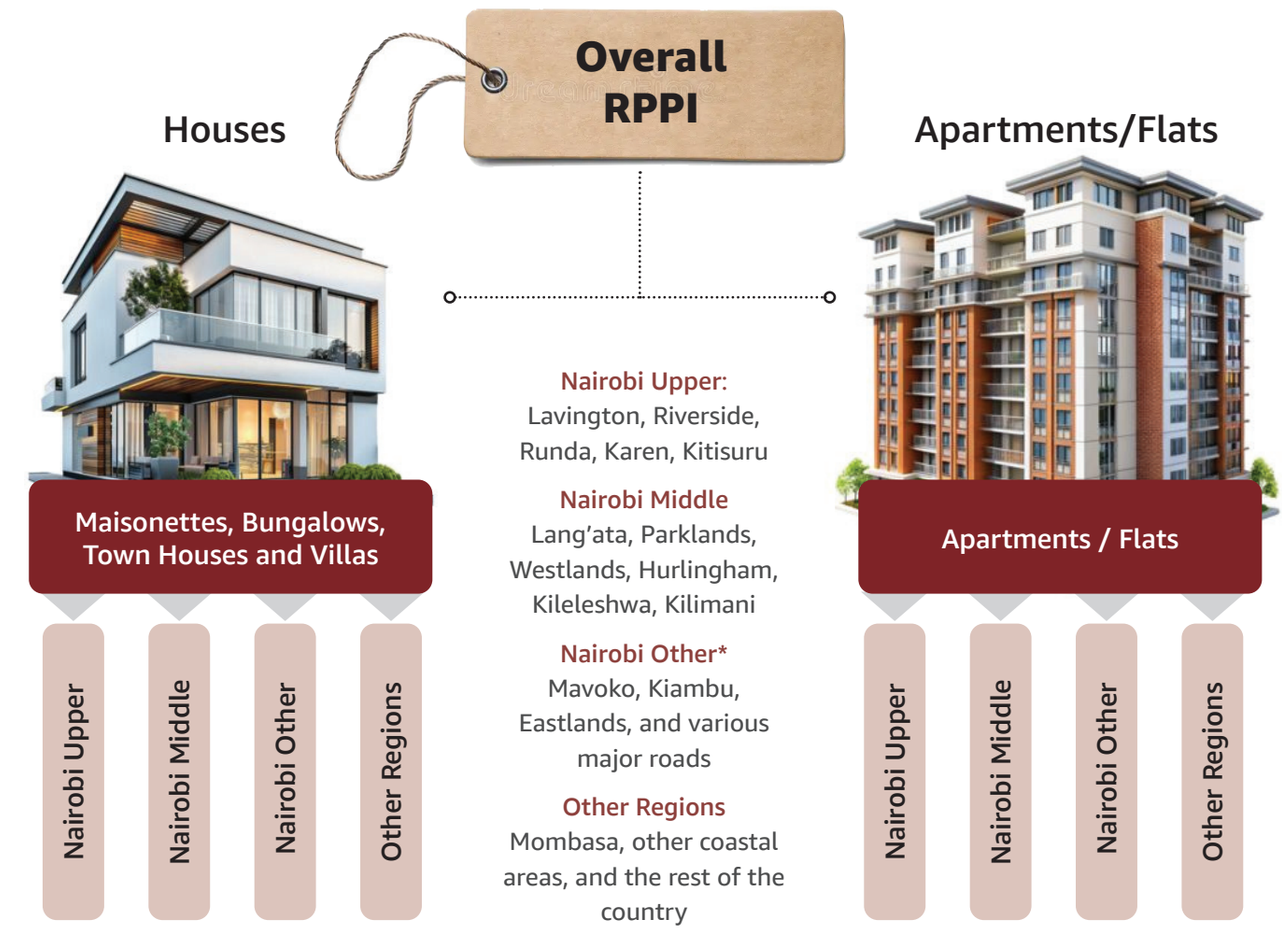
Data Sources

The data used in the compilation of Residential Property Price Index is collected from quarterly Real Estate surveys and from selected real estate listing websites through web scraping. In addition, data from the 2023/24 Real Estate Survey, which covered the year 2023 informed the RPPI compilation.

Stratification

The stratification process for compilation of this index involves categorizing residential properties based on dwelling type and geographical location. This results in eight distinct strata, enabling development of separate price indices for the different segments of the housing market, and more nuanced analysis of price trends.The residential market is first classified into two main categories: apartments (including flats, and duplexes) and stand-alone houses (comprising maisonette, bungalows, townhouses,

Figure 1: Stratification Process



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* Includes Nairobi Eastlands and Metropolitan areas of Nairobi.

and villas). Geographically, the residential property market is stratified into four segments (zones) namely: Nairobi Upper (includes Lavington, Riverside, Runda, Karen, Kitisuru, Gigiri and environs), Nairobi Middle (includes Lang'ata, Parklands, Westlands, Hurlingham, Kileleshwa, Kilimani and environs), Nairobi Other (includes Nairobi East, Thika Road, Mavoko, Kiambu, Eastlands and other areas that are part of Nairobi Metropolitan, and Other Regions (includes Mombasa, other coastal areas, and the rest of the country). This stratification framework allows for the generation of price indices that reflect variations in both types of residential property and location, offering more precise insights into market dynamics across different segments.

Quality adjustment

Residential properties differ widely in characteristics, making it difficult to measure price changes over time using simple comparisons. Unlike the Consumer Price Index (CPI), which tracks identical goods and services each month, housing transactions involve units that vary by location, size, number of bedrooms, and dwelling type, and the number of sales in any period is limited. To address this, the RPPI is compiled using rolling-window time-dummy hedonic regression method. This is a statistical technique that models the effect of key property attributes on observed property prices. By controlling for property characteristics, the method isolates the component of price movement attributable solely to market conditions rather than differences in property quality. This enables the production of an index that reliably measures pure price change over time.

RPPI Model: Rolling Window Time Dummy Hedonic Model

Rolling Window Time Dummy Hedonic (RWTDH) method is used to compile this index. The model balances flexibility of period-by-period hedonic models with the stability of pooled time-dummy models. Instead of estimating a separate hedonic regression for each period, the model uses a moving window made up of four consecutive quarters to estimate the regression. This allows the implicit prices of property characteristics such as property type, number of bedrooms, and location to evolve gradually over time, reflecting market dynamics without overfitting.

When fitting the Rolling-Window Time-Dummy Hedonic model, the "window" moves forward period by period with coefficients re-estimated at each step using only transactions within the current window. This produces smooth, dynamic estimates of property characteristic prices while capturing temporal changes in the market. By isolating the component of price change not attributable to price determining characteristics, the method derives a measure of pure price change that reflects variation in the underlying market value of comparable properties over time. This pure price change is then used to construct the RPPI. The functional form of the RWTDH model is specified as follows:

Where:

t – period

$$ln\, p_n^t = \beta_0 + \sum_{t=1}^{T} \delta^t D_n^t + \sum_{k=1}^{K} \beta_k z_{nk}^t + \varepsilon_n^t$$

n – number of properties in period t

k – characteristics

$ln\, p_n^t$ – logarithm of price

β_0 – intercept

δ^t – coefficient of the time dummy variable that will generate the index

D_n^t – time dummy variables

β_k^t – "shadow" price of characteristic k in period t

Z_{nk}^t – quantity of characteristic k in period t and property n

ε_n^t – error term

During estimation, one dummy is omitted as the reference period inside the window. The choice of window length w: 4 quarters (1 year) with the window advanced by one period (overlapping windows) in every step.

The index for each stratum for period t is derived by exponentiation of the time dummy parameters $\beta^{(\omega)}$ and multiplying by 100.

$$Index = exp(\beta^{(\omega)}) * 100$$

After deriving sub-indices for each stratum, annually updated expenditure weights are applied to aggregate

the sub-indices into composite indices for apartments, houses, and overall RPPI. This weighting approach ensures that each segment's relative market importance is accurately reflected over time, resulting in a robust and representative measure of residential property price changes. Expenditure weights represent the relative importance of each housing market segment (stratum) in overall residential property market activity. Furthermore, these weights ensure that price changes in each stratum exert proportionate influence on the overall index. The expenditure weights are calculated as:

$$\omega_{s,t} = \frac{E_{s,t}}{\sum_s E_{s,t}}$$

Where:

$E_{s,t}$ – is total expenditure (transaction value) for stratum s in year t

$\omega_{s,t}$ – is the weight of stratum s in year t

The computed weights used in respective years from 2022 to 2025 are as indicated in **Table 1**.

Table 1: Annual weights for RPPI Computation

Strata	Apartment				House				Total
	Nairobi			Other Regions	Nairobi			Other Regions	
	Upper	Middle	Other		Upper	Middle	Other		
2022	6.0	20.4	3.3	1.2	46.7	8.5	9.0	5.1	100.0
2023	5.2	16.3	3.4	4.6	33.9	8.4	11.8	16.3	100.0
2024	4.2	15.7	2.4	5.9	38.4	11.1	8.9	13.5	100.0
2025	4.1	17.8	2.8	2.2	45.6	12.0	10.1	5.3	100.0

* Includes other areas in Nairobi Metropolitan Area

Index aggregation

The RPPI is compiled as a weighted aggregate of stratum-level indices, with expenditure weights updated annually to reflect changing market conditions. Chain-linking is undertaken to ensure that each period's index reflects both current price movements and the evolving structure of the residential property price market. This provides a more accurate and up-to-date measure of residential property price changes.

Laspeyres method is used to aggregate the 8 stratum level indices into the overall index using the following formula.

$$P_L^{0,t} = \sum_{i=1}^{N} w_i^0 \cdot P_i^{0,t}$$

Where:

$P_L^{0,t}$ – is the price index in period t

w_i^0 – are the weights in base period (0)

$P_i^{0,t}$ – are the price relatives in period t

The Laspeyres approach ensures a stable, transparent, and up-to-date index as it uses weights from the previous period, and it allows each stratum to contribute proportionately according to significance in the housing market.

Explanatory variables used in the RWTDH model

The explanatory variables included in the RWTDH model are presented in **Table 2**. These indicate and explain homogeneity of characteristics in properties which determine price changes and variations.

Table 2: Explanatory Variables

Dwelling type	Type of residential property
Location	The geographical suburban location of the residential property
Bedrooms	Number of bedrooms per property

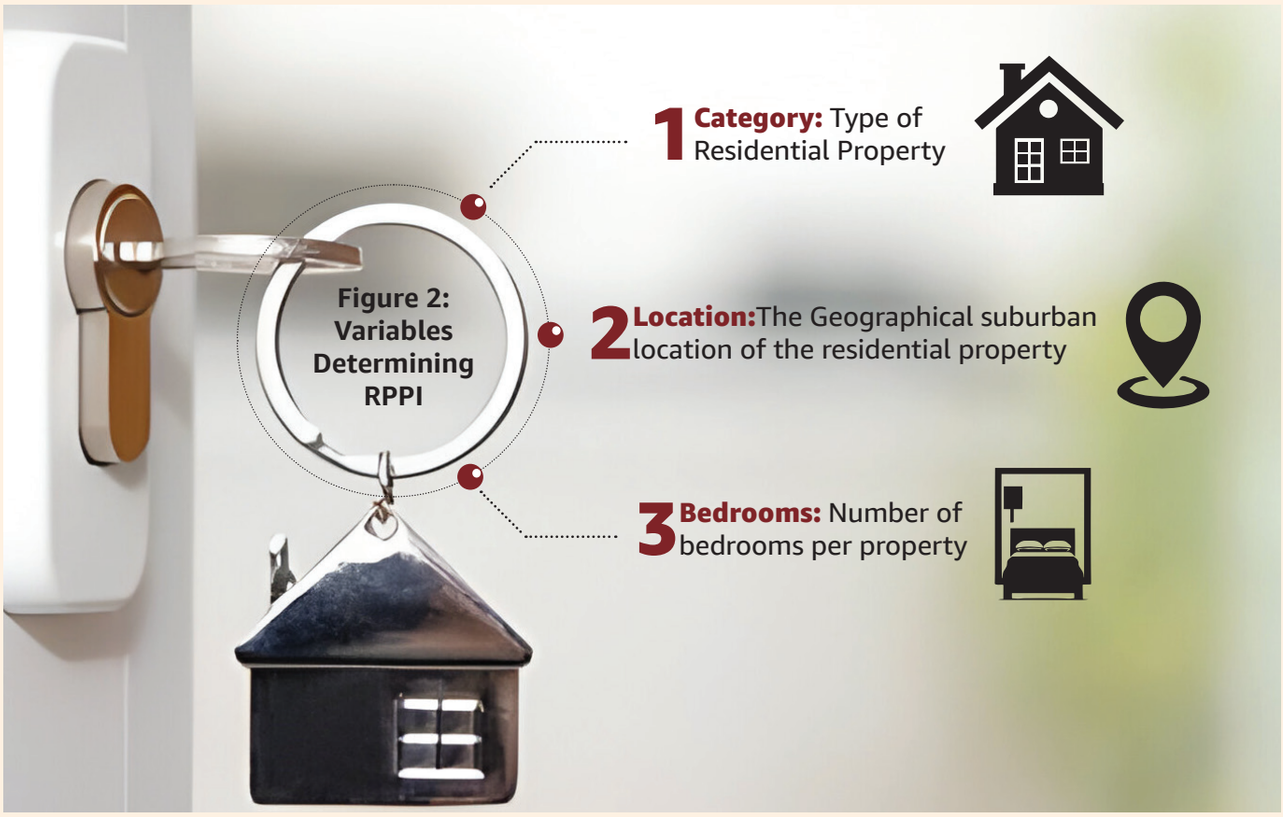


Figure 2: Variables Determining RPPI

Base and Index reference period

The base period for the RPPI is the year 2022, which marks the period when residential property price data were first systematically compiled and analyzed. The index is normalized to the value of 100 for 2022, providing a benchmark against which all subsequent price movements are measured. In accordance with international best practices, the base year remains fixed to ensure temporal consistency in the index series. The expenditure weights are updated annually to reflect changes in preferences and prices by strata thereby maintaining the representativeness of the RPPI while preserving comparability with the base year.

Duplicates check

Even though the index is compiled using asking prices, duplicates within the same time period are removed. To deal with duplicates, a duplicate check is undertaken. This ensures that no residential property appears more than once within the same quarter, thereby preventing multiple observations of the same transaction from biasing the regression estimates. The procedure involves creating a composite identification based on key variables namely property name, price, location, period (year and quarter), and number of bedrooms and then applies the duplicates drop command to identify and remove repeated records within these fields. The removal of exact matches that occur within the defined period safeguards data quality, eliminates artificial inflation of sample size, and ensures that each property contributes only one transaction per quarter to the RPPI compilation.

Outlier detection

For each rolling window and stratum, the regression is first estimated using the pooled four-quarter dataset to identify transactions with unusually large influence on the model. In this preliminary run, Cook's Distance is calculated for every observation. Cook's Distance evaluates how much the estimated regression coefficients would change if a given transaction were removed, thereby capturing both its leverage and its residual influence. Observations with unusually large impact, that is, typically those with exceptionally high or low prices relative to their characteristics show high Cook's Distance values. Any



transaction with a Cook's Distance greater than 4/n, where n is the number of pooled observations, is classified as an outlier. These outliers are removed, and the regression is re-estimated on the cleaned dataset to obtain the final time-dummy coefficients.

Model fit assessment

A model fit assessment was conducted to evaluate the adequacy and reliability of the hedonic regression models used in index estimation. This process involved examining key goodness-of-fit measures to ensure that the selected model appropriately captured the relationship between residential property prices and their associated characteristics. The model performance was monitored overtime with data of several years to ensure structural changes in the market, inconsistencies in the data and specification issues were addressed. The assessment of model fit contributed to strengthening the robustness of the estimated price movements and its overall quality.

Metadata description

1. **Property price**
   The index is compiled using asking/advertised prices as a proxy for actual transaction prices. The prices for house category of residential properties primarily include the price of the land on which residential building are built.

2. **Data collection method**
   The major mode of data collection is the survey of real estate agents administered to real estate agents. In addition, data is collected through web scraping from selected real estate websites.

3. **Data collection calendar/period**
   Data is collected based on calendar years and respective months. The web scraping from the selected websites is done twice every month.

4. **Index Release Calendar**
   The RPPI is released on a quarterly basis of each calendar year with a lag of 90 days in accordance with the implementation work plan and advance release calendar for official statistics.

5. **Data providers**
   Data providers are real estate agents and selected real estate listing websites from whom data on properties offered for sale is collected.

6. **Institutional mandate**
   The Bureau is mandated by the Statistics Act, CAP

112 Laws of Kenya [Rev. 2022], to collect, analyze and disseminate statistical information including RPPI.

7. Geographical coverage

The index covers most parts of the country, including Nairobi and its Metropolitan Area, the Coastal Region, as well as other major urban centers outside Nairobi and the Coast.

8. Method of Index computation

The Rolling Window Time Dummy Hedonic regression model is used to compile the indices. The method isolates the component of price movement attributable solely to market conditions rather than differences in property quality, thus enabling compilation of an index that reliably measures pure price change over time.

9. Data Adjustments/Outliers Correction

Cook's Distance is used to detect and remove outliers in the data before running the model.

10. Index aggregation

The index is aggregated on strata informed by type of property and geographical location of the properties. From the eight strata, aggregation is done to have two sub-indices for houses and apartments. These are then aggregated to form the overall RPPI.

11. Weights

Expenditure weights are computed for each calendar year and assigned to the eight strata based on the total transaction value, that is, aggregate expenditure on residential properties within each stratum. These weights reflect the relative importance of each segment in the overall housing market and are used to derive the composite RPPI.

12. Quality assurance

Data is cleaned on a continuous basis to ensure data accuracy.

a) Completeness check

Prior to compiling the RPPI, a completeness check is undertaken to ensure that the dataset contains no gaps in the core property characteristics required for reliable index estimation. A flag variable is generated to automatically identify observations with missing values in essential fields, including price, dwelling type, location, number of bedrooms, listing date, and reference period. This enables a systematic assessment of data quality. The flagged records are summarized in a table disaggregated by dwelling type and period to determine where missing values occurs and to assess whether the pattern is systematic or random. Appropriate measures are then carried out.

b) Duplicates check

To ensure that each property transaction is uniquely represented in the dataset, a duplicate-record detection and removal procedure is applied prior to compiling the RPPI. The procedure involves the use of a combination of key identifying variables—including property name, price, location, reference period, and number of bedrooms. The dataset is systematically scanned for repeated observations that appear to refer to the same property within the same period and from the same source. Any duplicated transactions identified through this procedure are automatically removed to prevent double counting, which could otherwise distort price levels and introduce bias into the hedonic regression estimates.

Annex 1: Variables Description

Variable Name	Description
Bedrooms	Number of bedrooms in each listed property
County	County where the property is located
Date	Date of price data collection
Dwelling	Indicates if the property is an Apartment or a House (Bungalow, Maisonette)
Location	A geographical area where the property is located. This variables groups together several sub urban areas based on their homogeneity
Month	Month of price data collection
Nairobi Peri-urban	Geographical areas adjacent to Nairobi e.g Ngong, Kitengela, Kiserian, Athi River, Mlolongo, Kamulu, Mala, Limuru, Kiambu, Joska, Syokimau, Utawala, Thika
Price	Selling price of a residential property. The type of price used in computation of this index is the Asking Price for the property
Property ID	A Unique identifier assigned to each property with a distinct price
Property Name	A short description of Property which includes type and amenities included in the property
Strata	Stratification involves categorizing residential properties based on dwelling type and geographical location, resulting in the formation of eight distinct strata.
Sub-urban	Area where the property is located as described in property name

Annex 2: Summary of RPPI compilation methods and rationale for selection

	Method	Description	Used if
1	**Stratification or mix adjustment**	• Involves dividing residential property transactions into relatively homogeneous groups (strata) based on key characteristics such as location, dwelling type, market segment, or size categories. • Price indices are then computed within each stratum, and a weighted average is used to produce the overall RPPI	• The residential property market is thin, and detailed characteristics are not consistently captured. That is, when prices and at least one characteristic such as location are available. • Data availability is limited (typical for developing data sources or registries). • Institutional capacity for advanced modelling is still developing or when starting to compile the index for the first time. • As an interim method until better administrative datasets are established

	Method	Description	Used if
2	**Repeat sales**	• Tracks price changes for properties that have been sold at least twice. Compares the price at the first sale to the price at the second sale for the same property, assuming constant quality over time. • By comparing the price of the same property across two different time points, the method assumes that any price change reflects pure market appreciation or depreciation, since the characteristics of the property are held constant.	• There is a sufficiently large volumes of repeat transactions (ideal for mature/ developed urban residential property markets). • Data sources reliably identify properties across time. • Detailed property attributes are unavailable, but resale activity is strong. • As part of a hybrid approach when combined with hedonic methods.
3	**Time-Dummy (Pooled) Hedonic**	• A single (“pooled”) regression that is estimated using all transactions across multiple periods. • Time dummy variables capture the pure price change across periods, holding property characteristics constant	• Residential property markets are relatively stable. • Sample sizes per period vary and pooling improves estimation precision.
4	**Repeated (Period-by-Period) Hedonic**	• The method estimates a separate hedonic regression for each time period t. This allows the implicit prices of characteristics to vary across periods. • Each period t has its own estimated characteristic prices β_t, which provides flexibility but requires sufficient sample size	• Transaction volumes are high. • Value(s) of price determining characteristics changes over time (e.g., importance of location increases).
5	**Characteristics Hedonic**	• Measures the price evolution of a “typical” property. It relies on the use of a detailed set of property characteristics and is generally preferred to the time dummy when the compiler has access to a large number of transactions for each period. • The “typical” property is estimated by averaging the characteristics of all the properties in the stratum	• Housing market is highly heterogeneous • Transaction volumes are sufficient but repeat sales are limited • Detailed and reliable property characteristics are available • Timely and disaggregated indices are required • There is significant product innovation or redevelopment • Broad market coverage is needed



	Method	Description	Used if
6	**Hedonic/ Re-pricing Imputation**	• Imputes a price for each property for each period (regardless as of whether a transaction occurred) and calculates an index using the imputed prices. • It requires detailed information on property characteristics and a large number of transactions.	• Some residential property records lack key characteristics, but prices are available. • Some residential property records have characteristics, but no recent transaction prices. • There is a need to fill gaps in thin markets to obtain sufficient coverage. • Administrative datasets contain non-transactional records that need to be converted into pseudo prices. • Survey-based datasets have missing fields that can bias index estimation.
7	**Rolling-Window Hedonic**	• Hybrid method that balances the flexibility of period-by-period hedonic models with the stability of pooled time-dummy models. • Instead of estimating a separate hedonic regression for each period, the model uses a moving window of consecutive periods (e.g., 4 quarters or 12 months) to estimate the regression, allowing the implicit prices of property characteristics to evolve gradually over time, reflecting market dynamics without overfitting • The rolling "window" moves forward period by period with coefficients re-estimated at each step using only transactions within the current window, producing smooth, dynamic estimates of property characteristic prices while capturing temporal changes in the market.	• Residential property markets are evolving (dynamic markets) as property preferences or characteristics change over time (urban expansion, new housing types). • Residential property markets are moderately thin - Transaction volumes are insufficient for period-by-period models but too volatile for pooled models. • There is consistent characteristics data to estimate stable coefficients. • There is desire for smoothed index series and quality adjustment. This reduces abrupt jumps due to sparse or extreme transactions and adjusts for changing property characteristics over time.

Source: KNBS. *Kenya Residential Property Price Index 2026.* Nairobi, Kenya.

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