

U.S. Housing Affordability Crisis

Assessing the impact of
essential expenses and
housing costs

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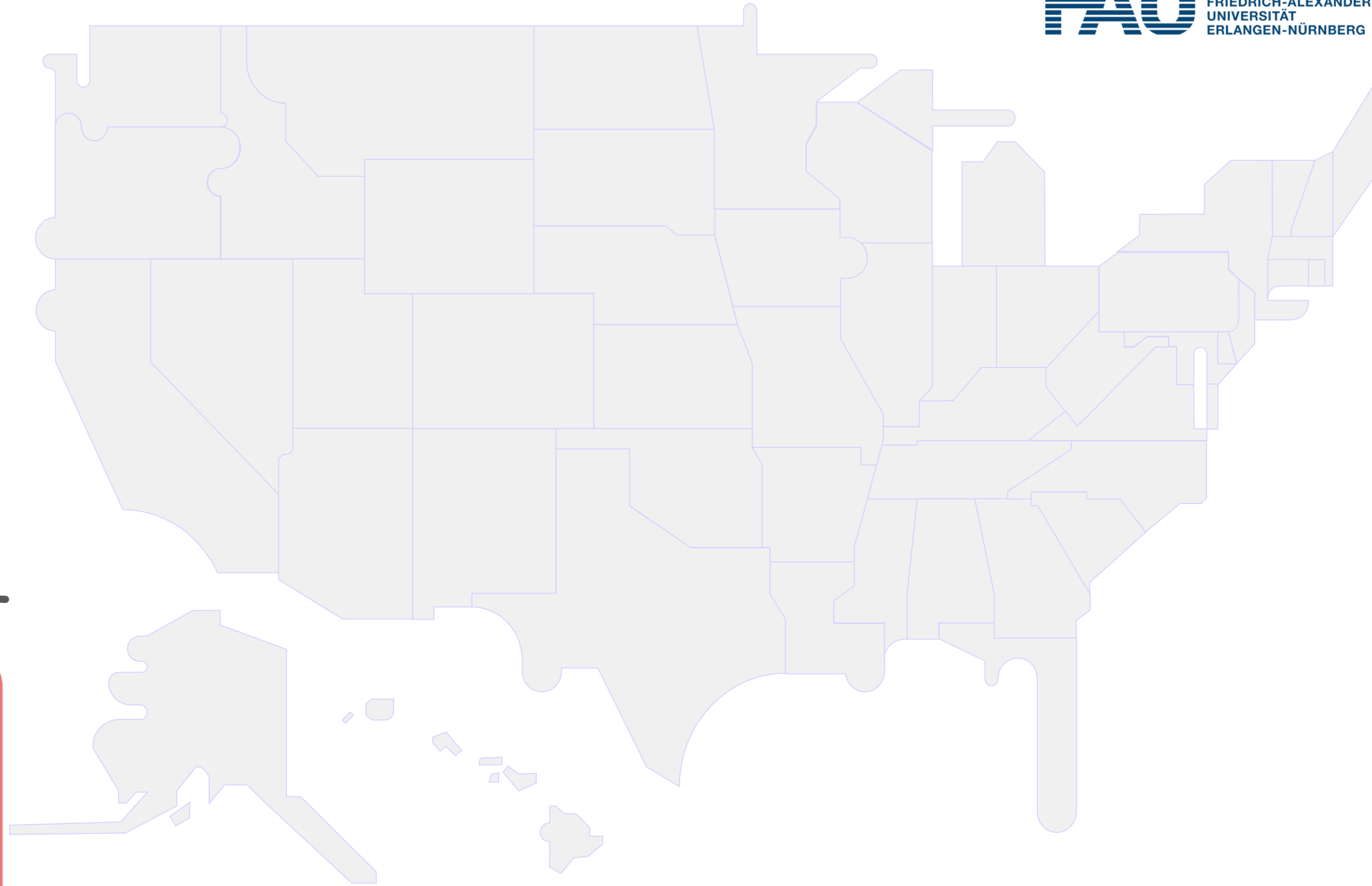


Introduction

01



*What makes housing
affordability a critical
issue in the U.S. ...*



A look into the U.S. households' expenses

Housing affordability is more than just an economic challenge; it's a critical social issue.

Over the last four years, essential living expenses, like housing, food, and healthcare, have risen faster than income levels.

This has left many Americans struggling to maintain a good quality of life.

What about affordability?

An increase of living expenses could possibly affect people in various forms, considering low investment rates, and diminished housing affordability.

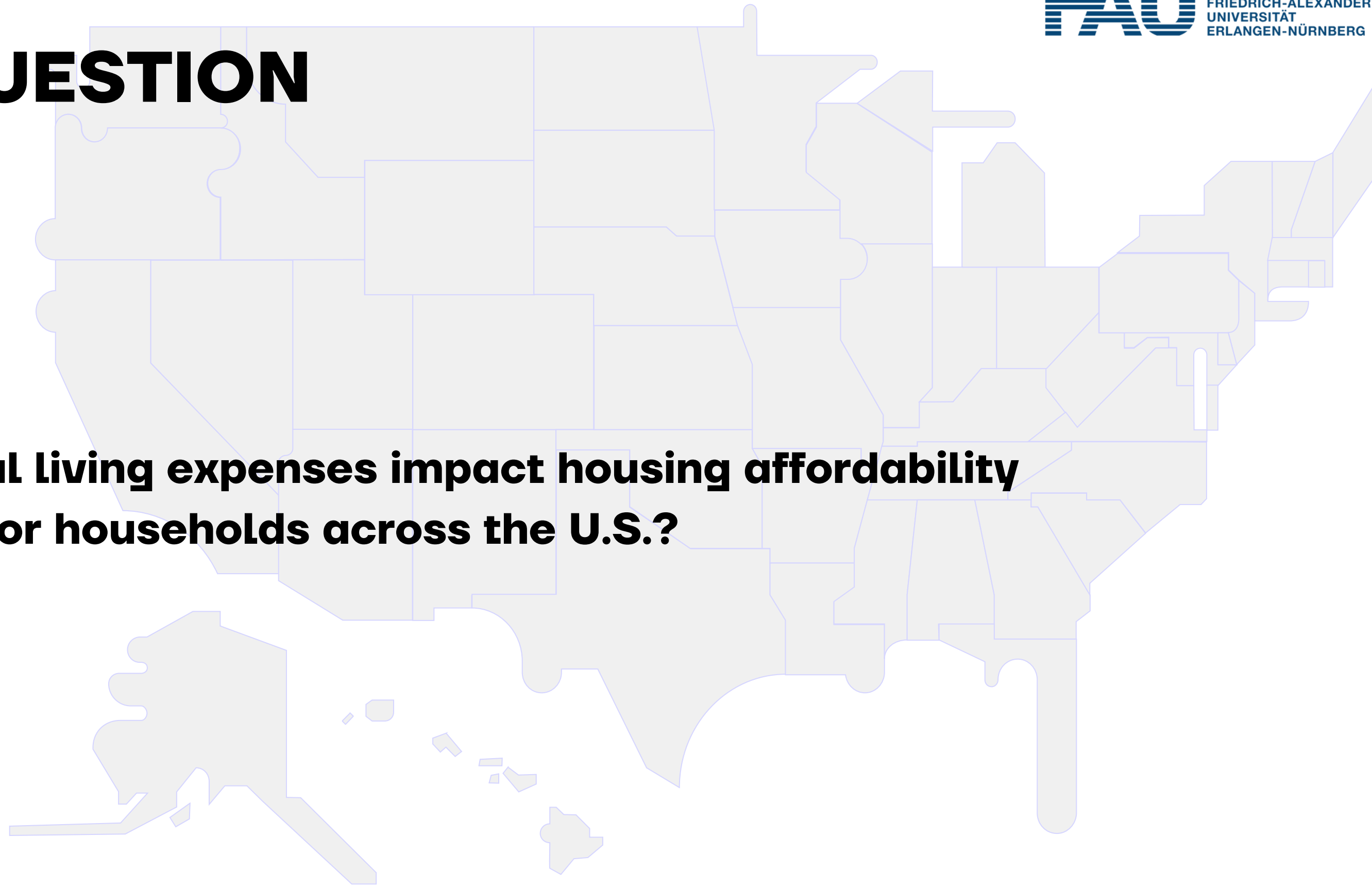
Studies show:

Many people struggle to keep a roof over their heads, and many households are unable to purchase a home.

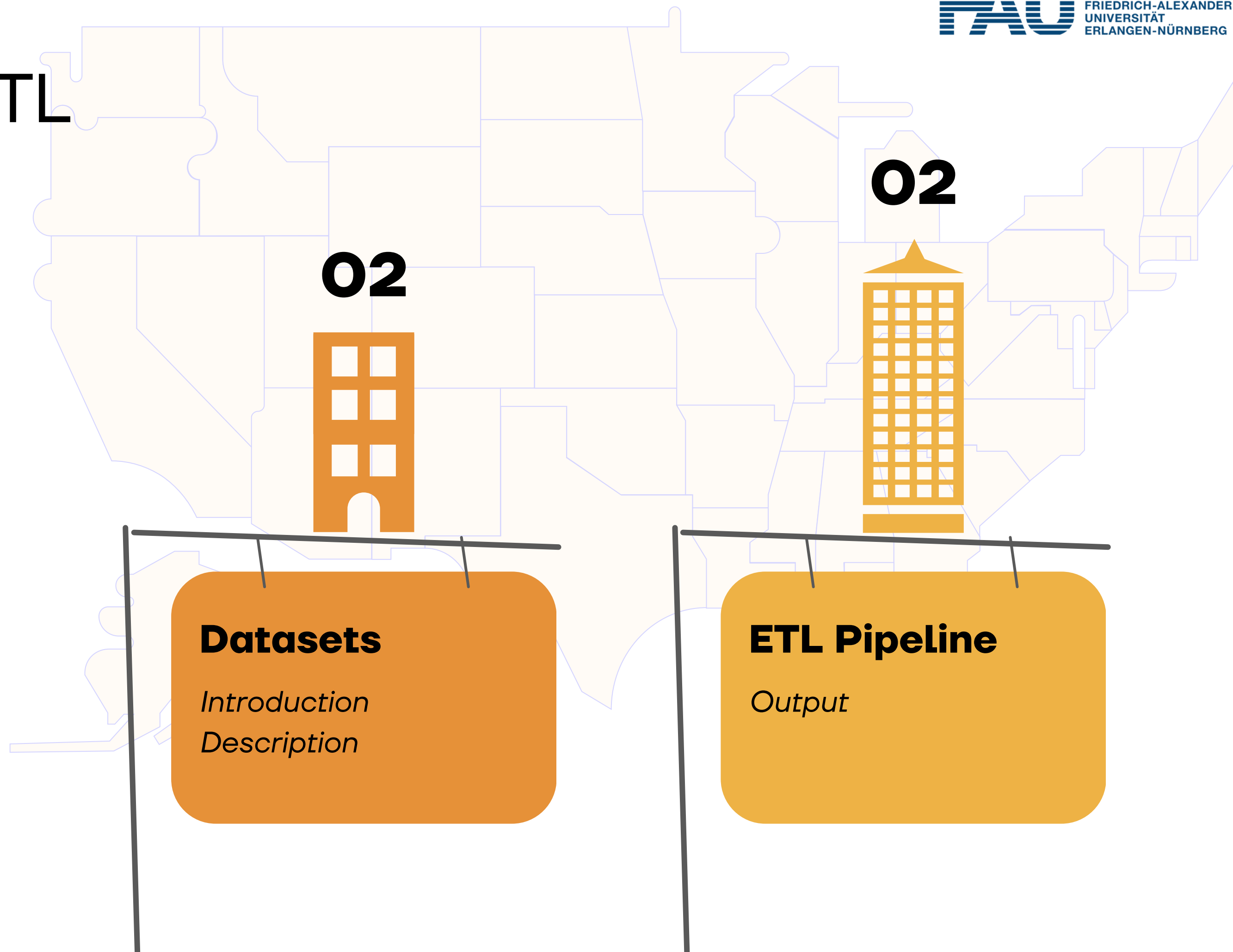
OBJECTIVE: To understand if current living expenses are preventing people from affording housing.

MAIN QUESTION

**How do essential living expenses impact housing affordability
for households across the U.S.?**



Datasets and ETL Pipeline



Dataset 1

Title: U.S. Cost of Living Dataset (1877 Counties)

License: Creative Commons Zero v1.0 Universal (CCO 1.0)

Data Shape: 31429 rows and 11 columns after transformations.

Relevance: it offers valuable insights about households' **essential expenses** and their **income** across all U.S. states in 2023.

The dataset, currently available on Kaggle, is derived from the Family Budget Calculator developed by the Economic Policy Institute (EPI).

Dataset 2

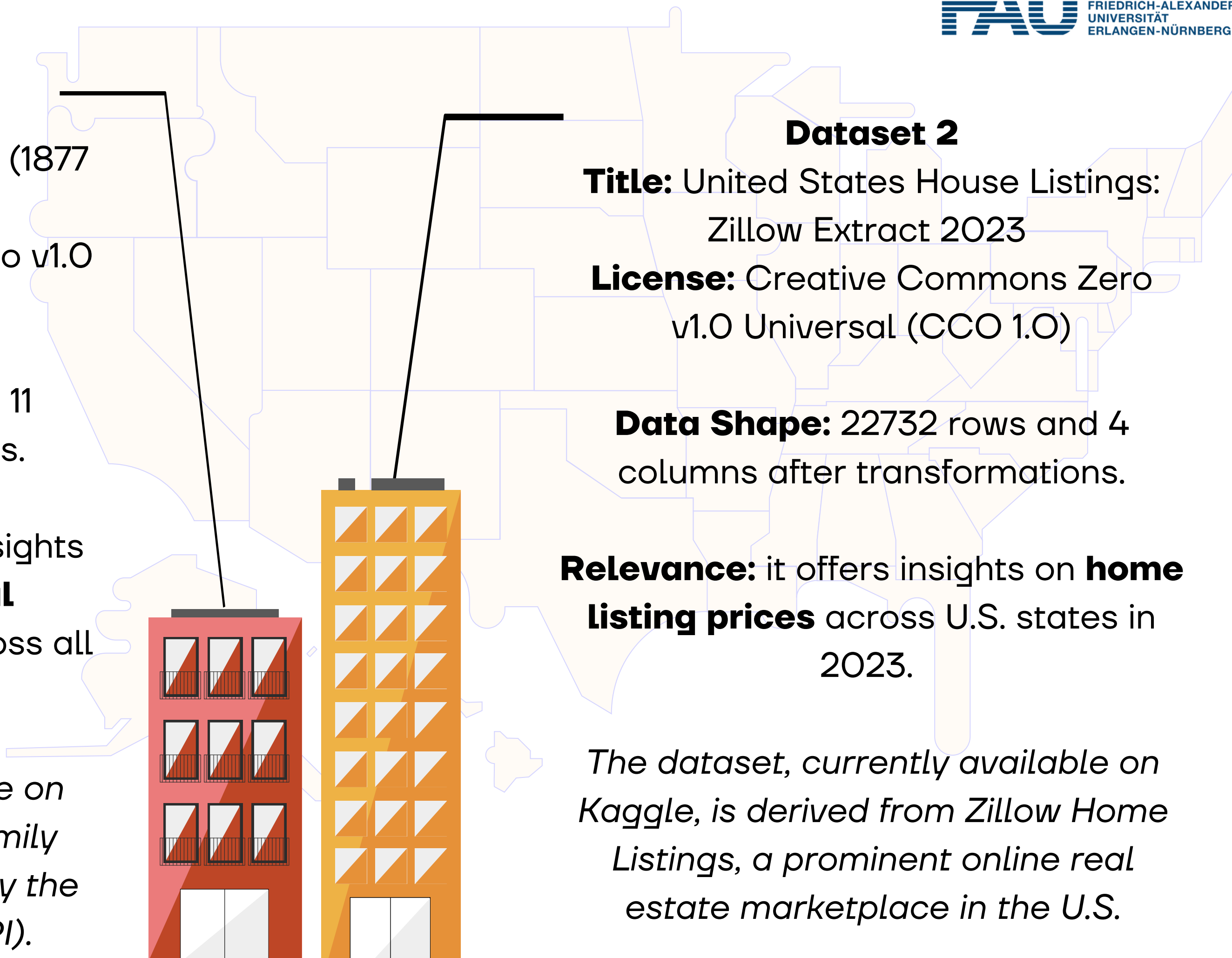
Title: United States House Listings: Zillow Extract 2023

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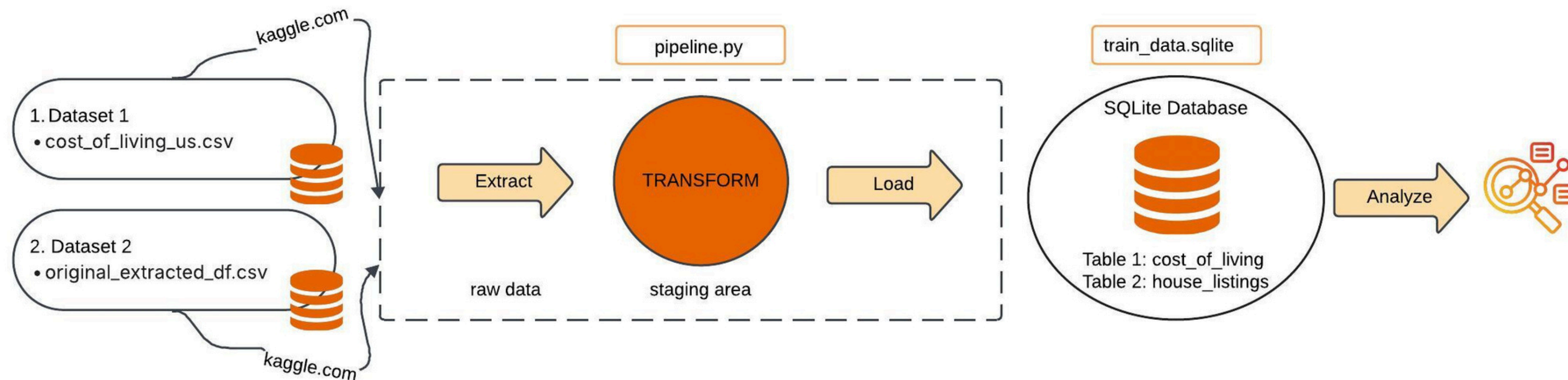
Data Shape: 22732 rows and 4 columns after transformations.

Relevance: it offers insights on **home listing prices** across U.S. states in 2023.

The dataset, currently available on Kaggle, is derived from Zillow Home Listings, a prominent online real estate marketplace in the U.S.



ETL Pipeline



Extract

`download_kaggle_datasets(url, _path)`
Loads datasets into pandas DataFrames after downloading them from Kaggle.

Load

`initialize_sqlite_db(db_name)`
Loads the cleaned data into SQLite tables

Transform

`rename(columns={...})`
`drop(columns=[...])`
`fillna(value)`

Renames columns, drops irrelevant columns, imputes missing values (using median).

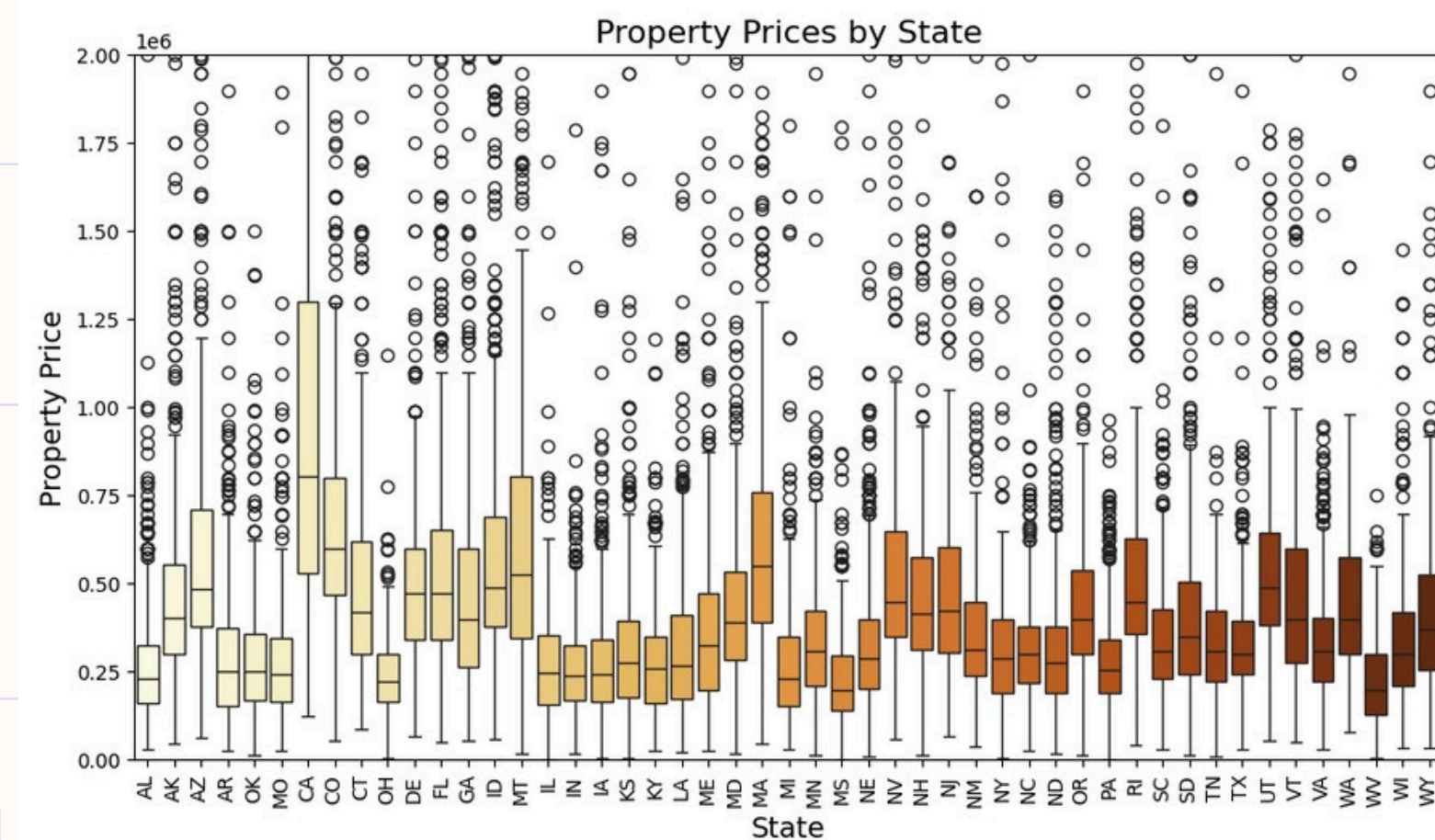
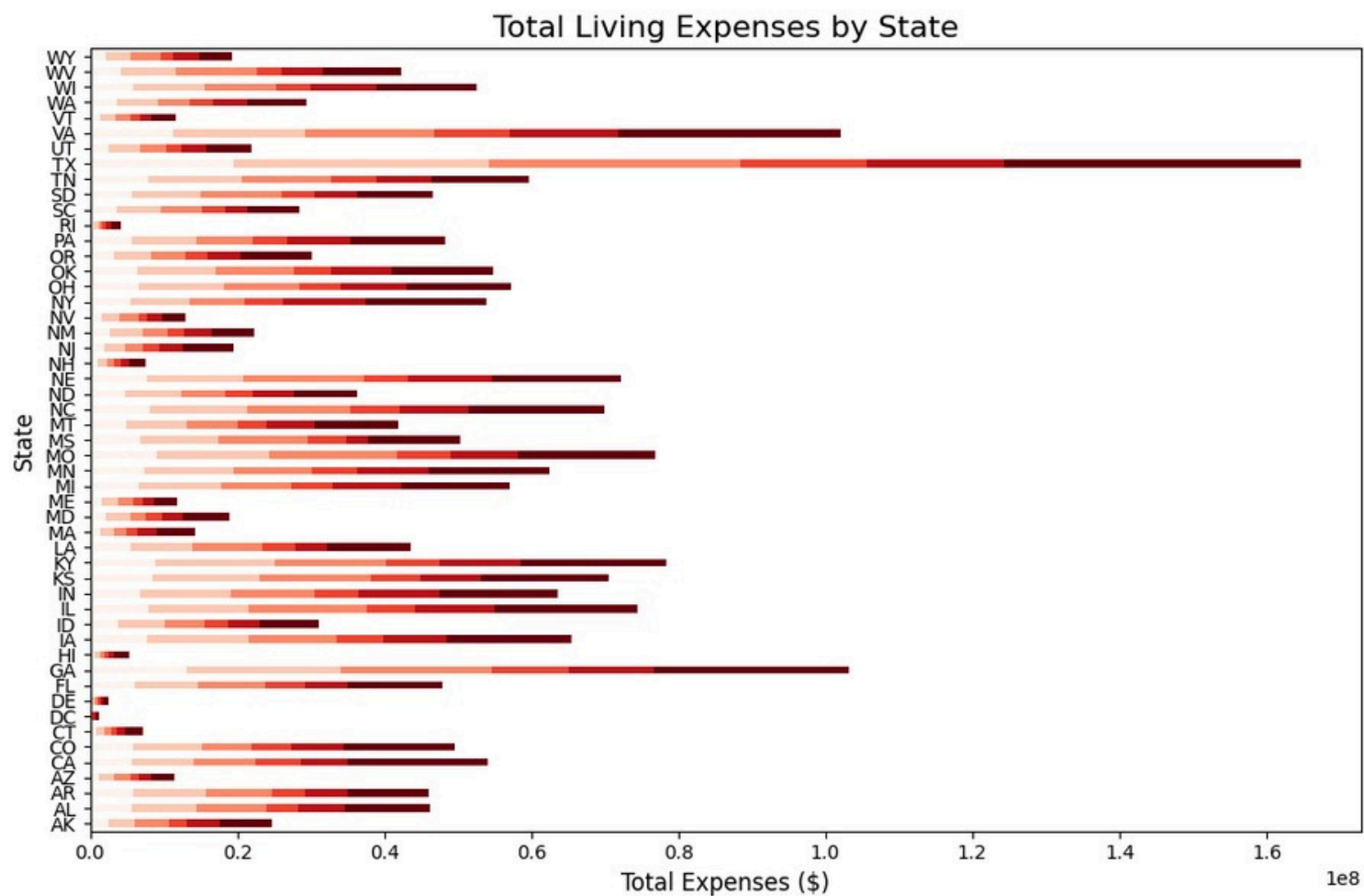
Cost of Living in the U.S

household_id	state	areaname	housing_expenses	food_expenses	transport_expenses	healthcare_expenses	other_necessities_expenses	childcare_expenses	household_taxes	median_family_income
1	AL	Montgomery, AL MSA	8505.72876	3454.91712	10829.16876	5737.47984	4333.81344	0.0	6392.94504	73010.4140625
1	AL	Montgomery, AL MSA	12067.5024	5091.70788	11588.19288	8659.5564	6217.45896	6147.8298	7422.07836	73010.4140625
1	AL	Montgomery, AL MSA	12067.5024	7460.20308	12361.7772	11581.6326	7075.65816	15824.694	9769.56228	73010.4140625
1	AL	Montgomery, AL MSA	15257.1504	9952.23924	13452.186	14503.7076	9134.3562	18802.1892	13101.7032	73010.4140625
1	AL	Montgomery, AL MSA	15257.1504	12182.214	13744.5984	17425.7856	9942.36396	18802.1892	13469.2188	73010.4140625
1	AL	Montgomery, AL MSA	10180.2942	6334.01436	12861.8868	11474.95968	5983.78524	0.0	8236.73076	73010.4140625
1	AL	Montgomery, AL MSA	12067.5024	7883.31888	13589.112	14397.0372	7228.96944	6147.8298	9459.9024	73010.4140625
1	AL	Montgomery, AL MSA	12067.5024	9984.05268	14723.6076	17319.1128	7990.1484	15824.694	11168.75028	73010.4140625
1	AL	Montgomery, AL MSA	15257.1504	12189.7704	14994.6	20241.1872	9945.10176	18802.1892	13210.1484	73010.4140625
1	AL	Montgomery, AL MSA	15257.1504	14917.3584	15064.2636	23163.2652	10933.41504	18802.1892	13417.2192	73010.4140625
2	AL	Daphne-Fairhope-Foley, AL MSA	8616.0	3714.29484	10731.65256	5593.47984	4467.7518	0.0	6455.71512	77884.7578125
2	AL	Daphne-Fairhope-Foley, AL MSA	11064.0	5473.96836	11522.93844	8444.00688	5992.35828	5962.7142	7096.60908	77884.7578125
2	AL	Daphne-Fairhope-Foley, AL MSA	11064.0	8020.27812	12869.3352	11294.53344	6914.98608	15348.1992	9477.63648	77884.7578125
2	AL	Daphne-Fairhope-Foley, AL MSA	14988.0	10699.404	13452.9648	14145.0612	9307.55928	18236.04	12997.8444	77884.7578125
2	AL	Daphne-Fairhope-Foley, AL MSA	14988.0	13096.794	13773.354	16995.588	10176.22776	18236.04	13433.5236	77884.7578125

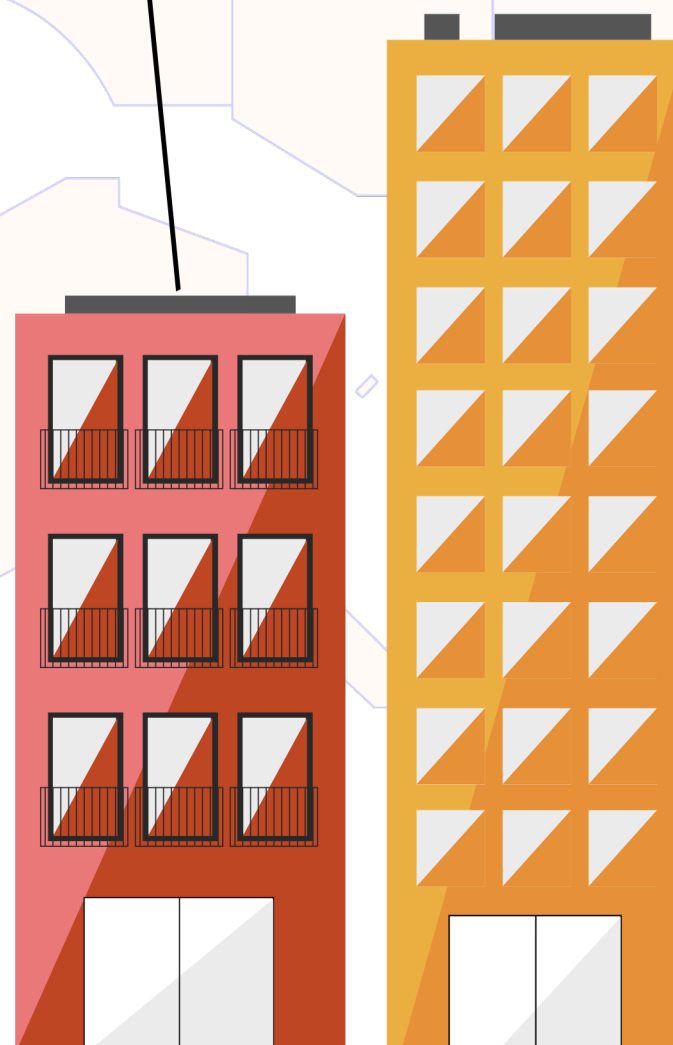
House Prices in the U.S

state	property_area_meters	price_per_sq_meter	property_price
AL	1614.0	148.636926889715	239900.0
AL	1800.0	144.38888888888889	259900.0
AL	1250.0	274.0	342500.0
AL	2224.0	150.6294964028777	335000.0
AL	1225.0	204.08163265306123	250000.0
AL	1564.0	96.54731457800511	151000.0
AL	1717.0	139.1962725684333	239000.0
AL	1674.0	149.2831541218638	249900.0
AL	2190.0	134.70319634703196	295000.0
AL	3030.0	173.23432343234325	524900.0
AL	2099.0	94.80705097665556	199000.0
AL	1194.0	125.6281407035176	150000.0
AL	2094.0	136.1031518624642	285000.0
AL	800.0	181.25	145000.0
AL	2451.0	20.57894736842105	50439.0

Output



Output in details

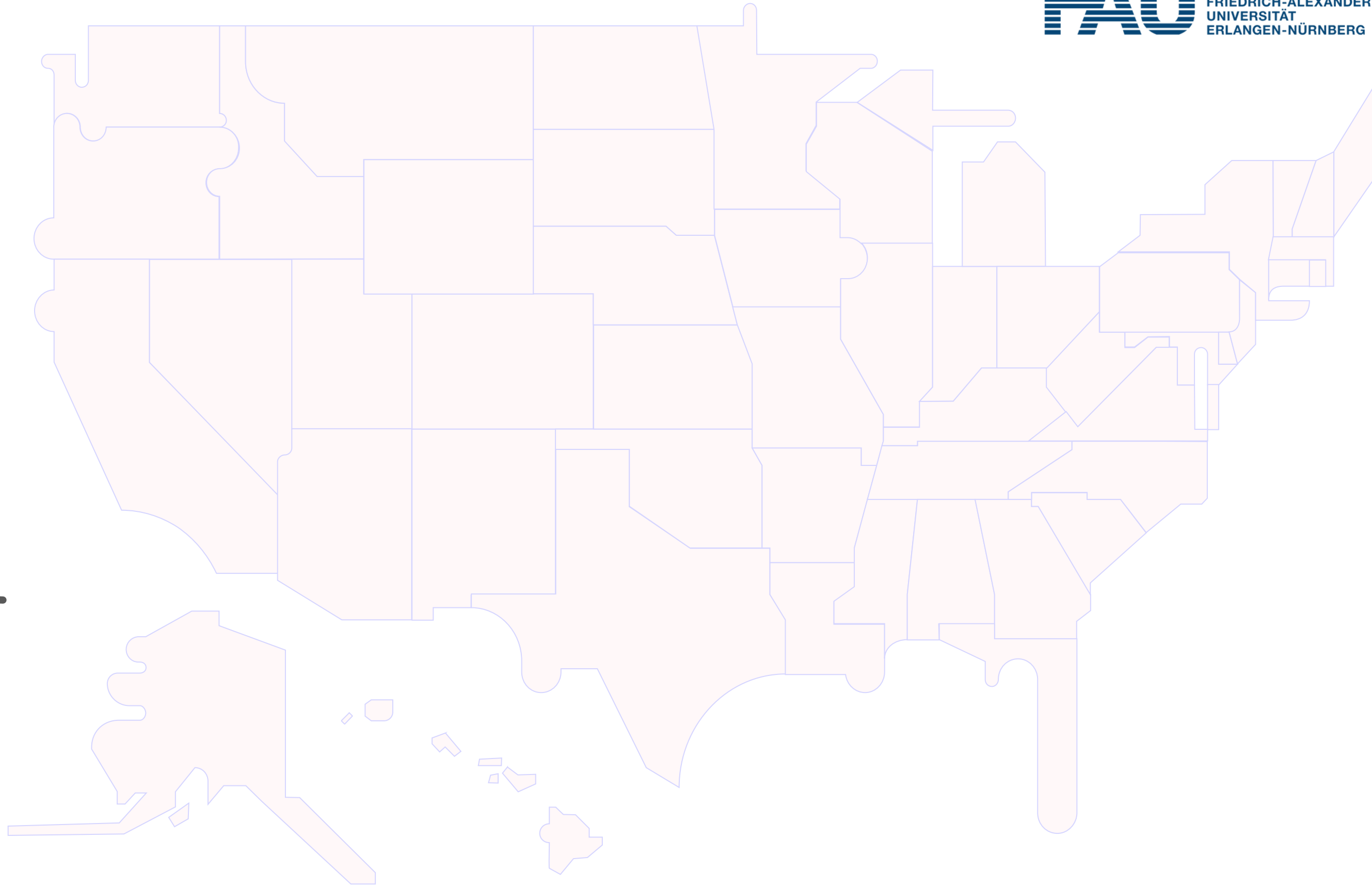


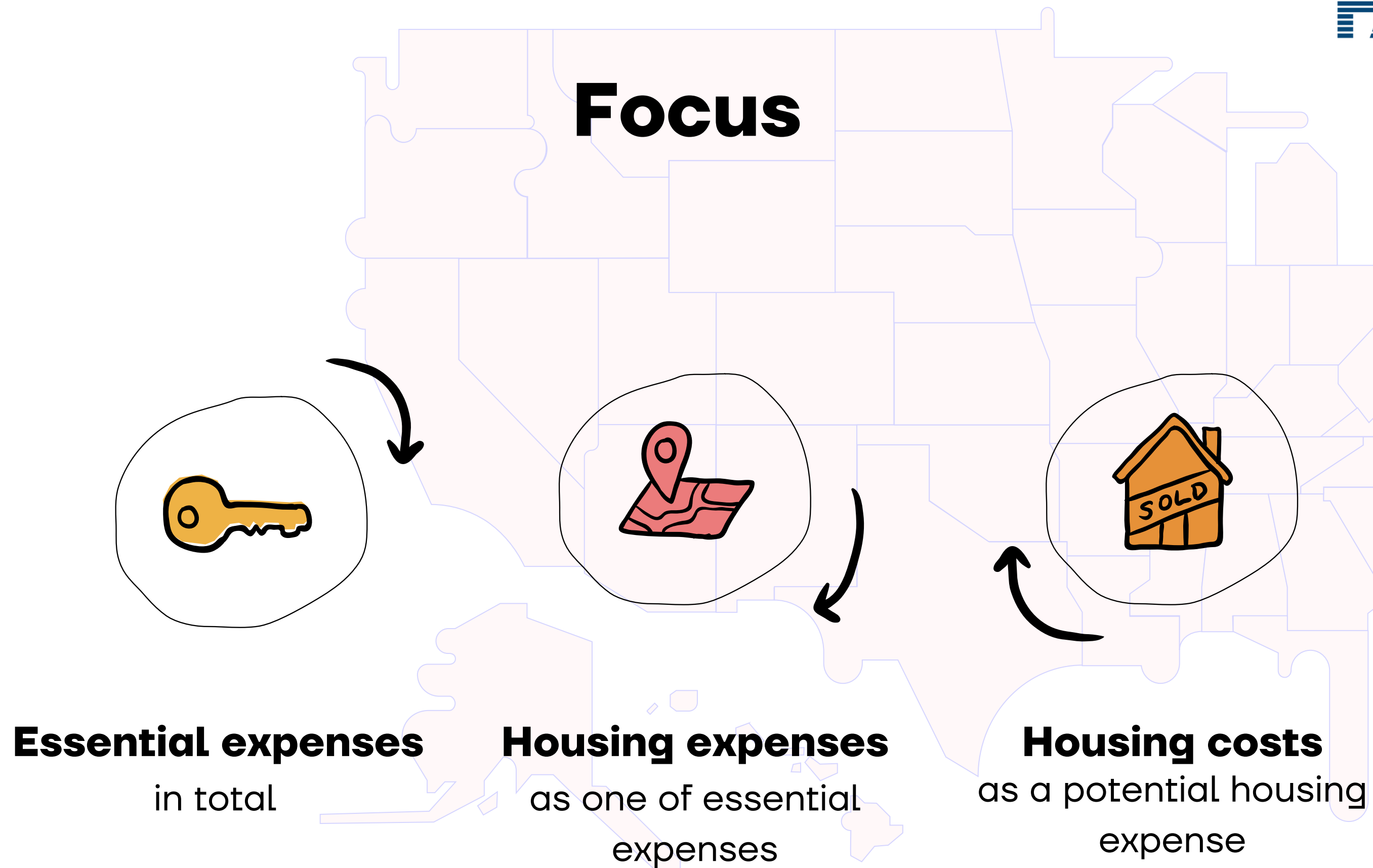
Data Analysis

03



*Understanding the
metrics of affordability
across U.S. states*



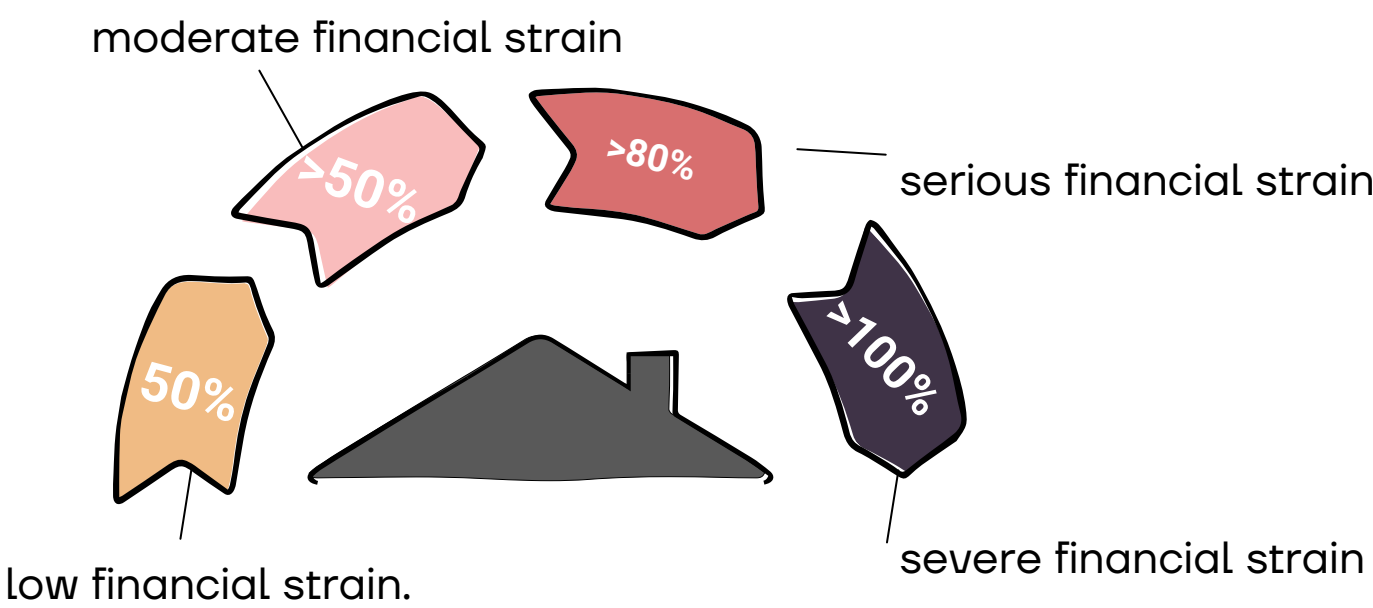


The essential cost of living to income ratio

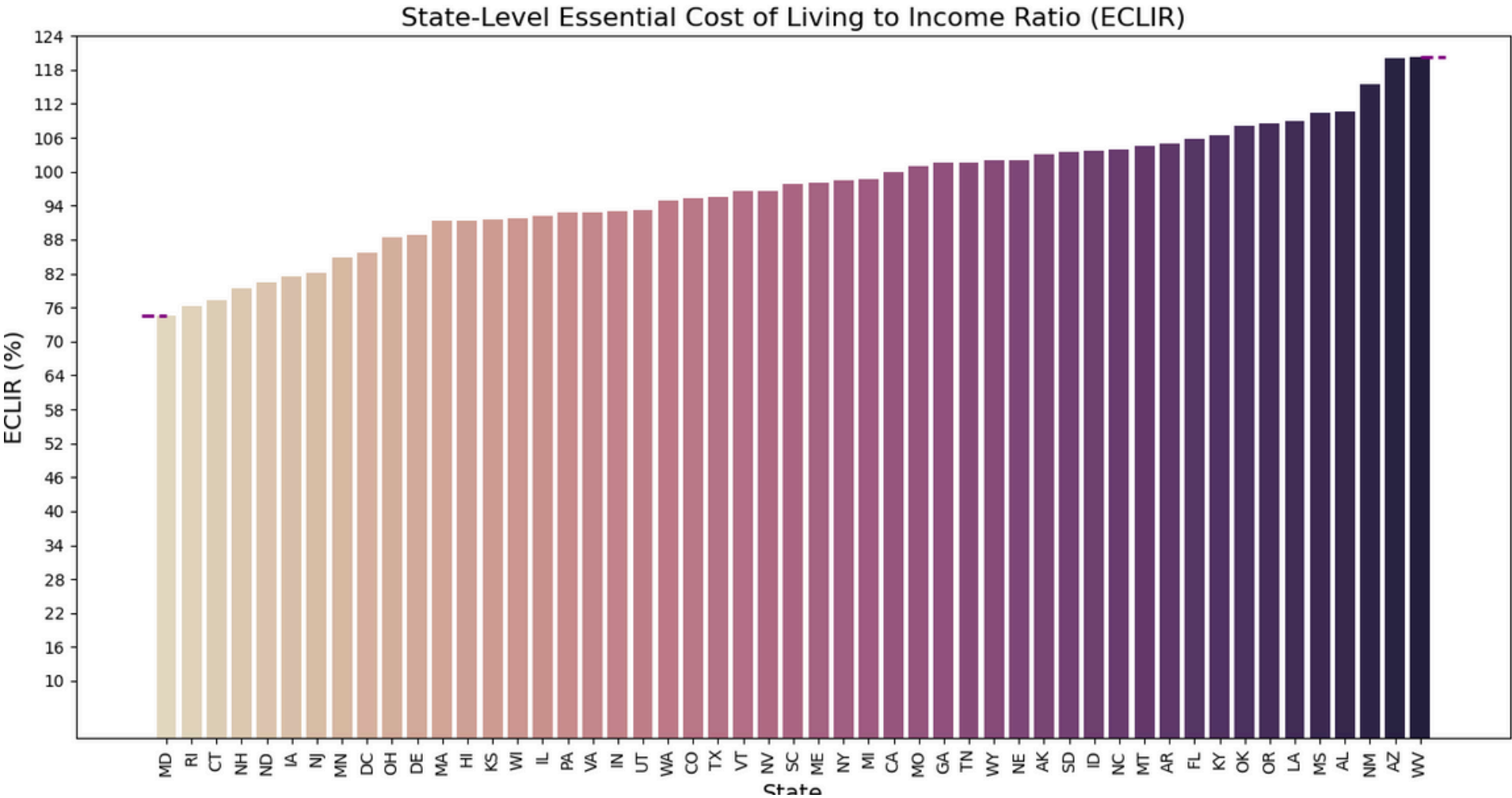
The portion of a typical household's income that is required to cover essential expenses (housing, food, transport, healthcare, childcare, other).

This helps assessing the financial strain on households.

$$ECLIR = \left(\frac{\text{Median Essential Expenses}}{\text{Median Household Income}} \right) \times 100$$



Key observations	Key findings
<p>U.S states of MD, RI in the range of 75-80% moderate financial stress.</p> <p>33 states in the range of 80%- 99% serious financial stress.</p> <p>15 states in an severe financial strain situation.</p>	<p>The U.S. appears to be in a non-healthy financial situation.</p> <p>Households can't comfortably cover essential expenses.</p> <p>Especially in the states of NM, AZ, WV, the ratio exceeds even 100%, which suggests that households require assistance, or need debts to cover their expenses.</p>

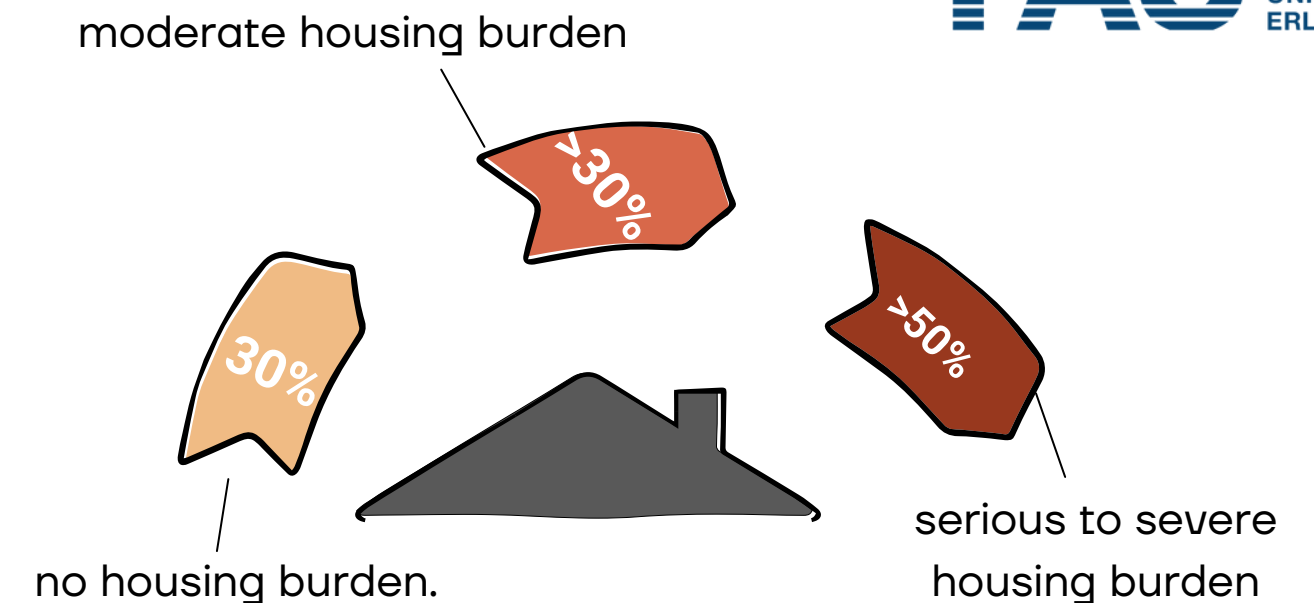


The Housing Cost Burden

The exact portion of income that is being spent on housing expenses.

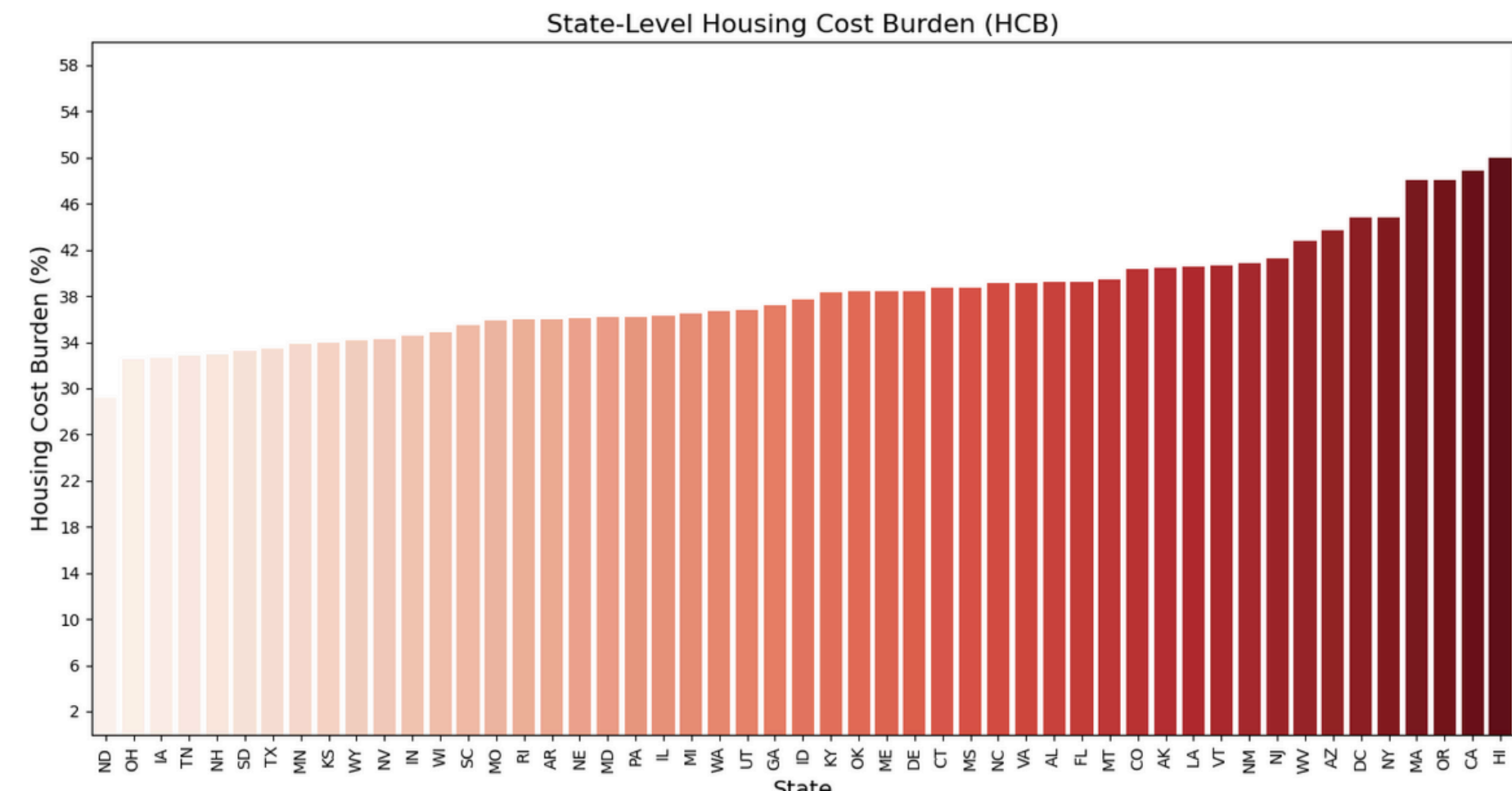
Housing is **one of the core essential expenses**, along with food, healthcare, transportation, and childcare.

$$HCB = \left(\frac{\text{Median Housing Expenses}}{\text{Median Household Income}} \right) \times 100$$



Affordable housing is typically defined as housing that costs 30% or less of a household's income.

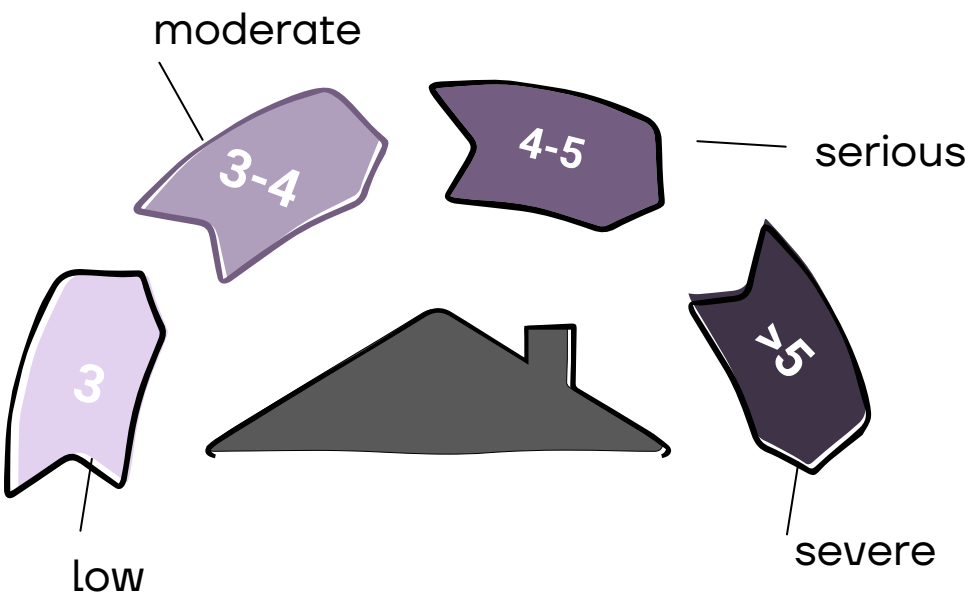
Key observations	Key findings
<p>North Dakota (ND) as non-house-burdened with HCB around 28%,</p> <p>48 states are included in the batch of moderate housing burden, including New York (NY), Florida (FL), and Louisiana (LA).</p> <p>~50% of the households' expenses in California go towards housing-> serious housing cost burden.</p>	<p>50 out of 51 states require households to allocate a large part of their income to cover housing expenses.</p> <p>HCB indicates low housing affordability across U.S. states.</p>



The Price to Income Ratio

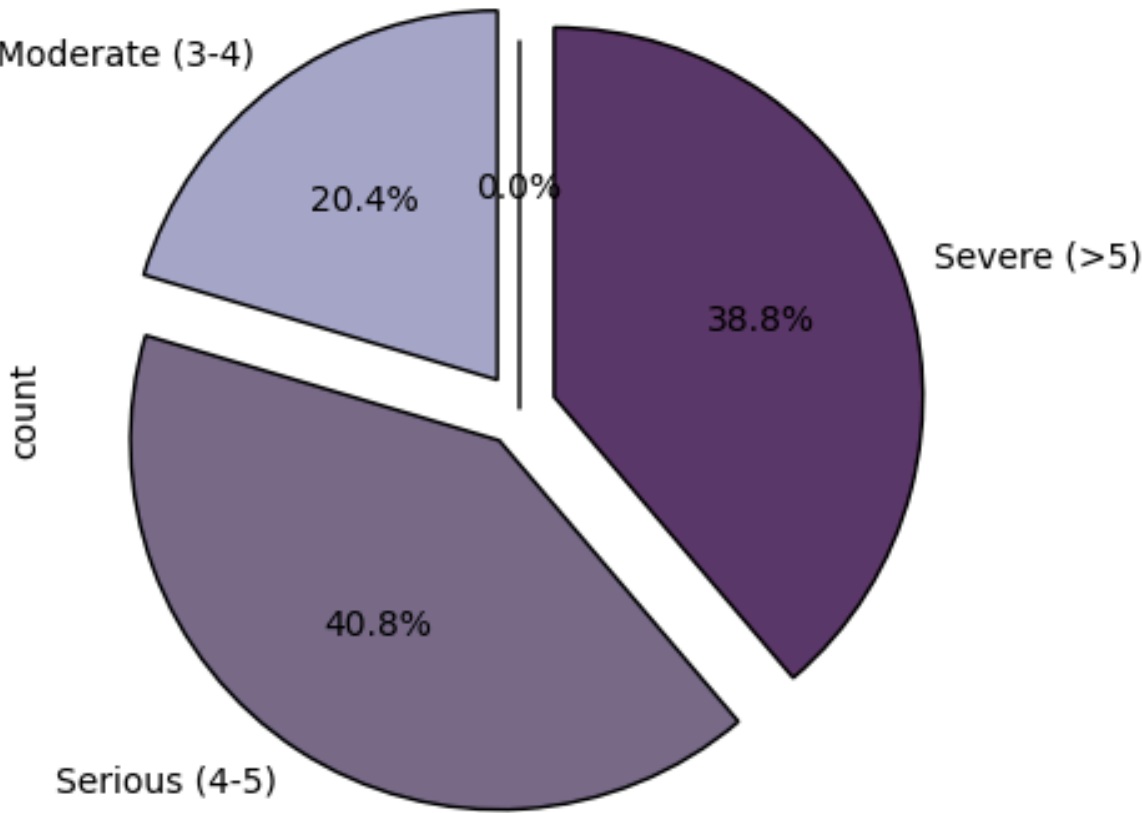
directly measures the housing affordability by **comparing** the house market prices with household incomes.

$$PIR = \frac{\text{Median House Price}}{\text{Median Household Income}}$$



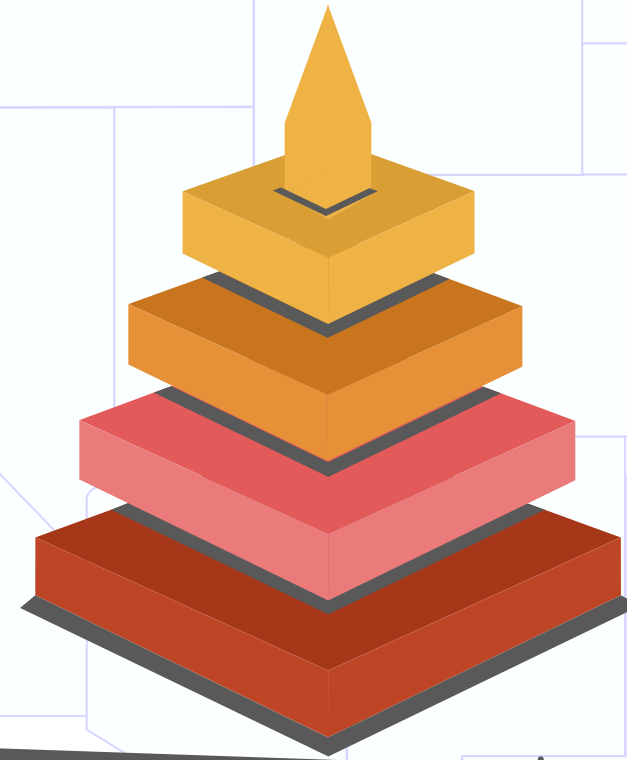
Housing is generally considered affordable if the cost of it does not exceed three times the median income of a household.

Key observations	Key findings
<p>0 states have a PIR 3 or less.</p> <p>20.4% of U.S. states have moderate housing affordability .</p> <p>40.8% of the U.S. is at range 4-5 - > a serious housing affordability.</p> <p>A poor affordability for PIR values above 5, and affects 38.8% of U.S. states.</p>	<p>20% of U.S. are not at immediate risk of housing affordability.</p> <p>41% of the U.S. is at concern for housing affordability.</p> <p>39% of the U.S. has poor housing affordability.</p>



Conclusions

04



Conclusions

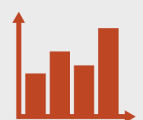
Limitations...

Essential living expenses are reducing the financial flexibility.



All U.S. states can't comfortably cover essential expenses.
Thus, households are **unable** to save for housing expenses: down payments, cover rising rents, invest on buying houses, or maintain housing quality.

Housing expenses exceed the affordable thresholds (30%) in most states.



50 out of 51 states are **house burdened**.
This implies a risk of long-term housing affordability.
In particular, the **West region** emphasizes the need for affordable housing solutions.

House prices are inaccessible relative to incomes.

No state achieves the affordability standard of $PIR \leq 3$.
This confirms that housing affordability is a **systematic issue** in the market.



RESULT

High essential expenses, housing costs, and house prices together **confirm** housing affordability challenges in the U.S.



Limitations of this study

The study doesn't include **predictive modeling** for housing future challenges.

01

The data used is **static** from year 2023 and doesn't consider **dynamic factors** e.g., inflation, wage growth, evolving housing market prices.

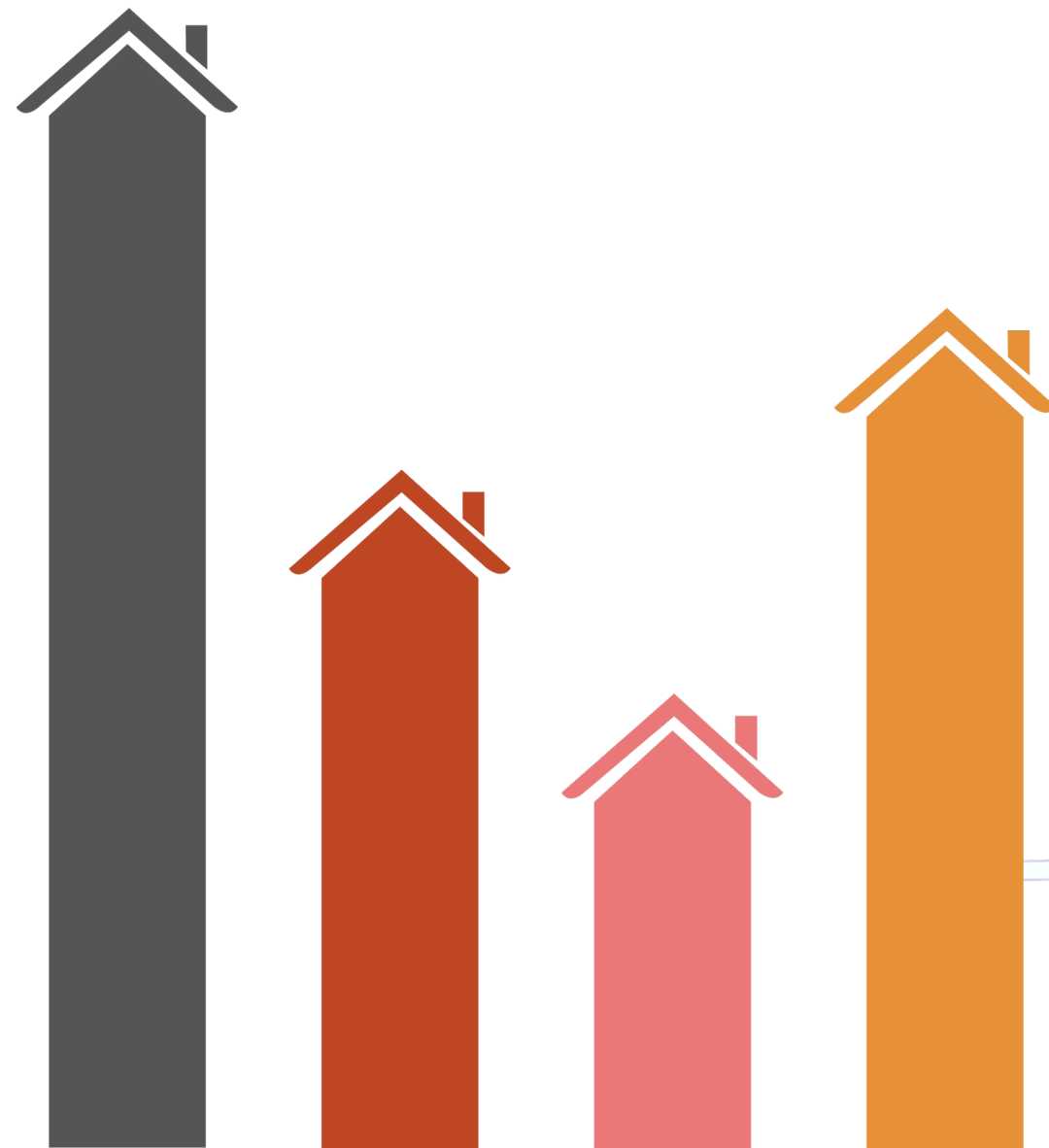
02

The analysis does not take into consideration the **household size** and its possible effect to the analysis.

03

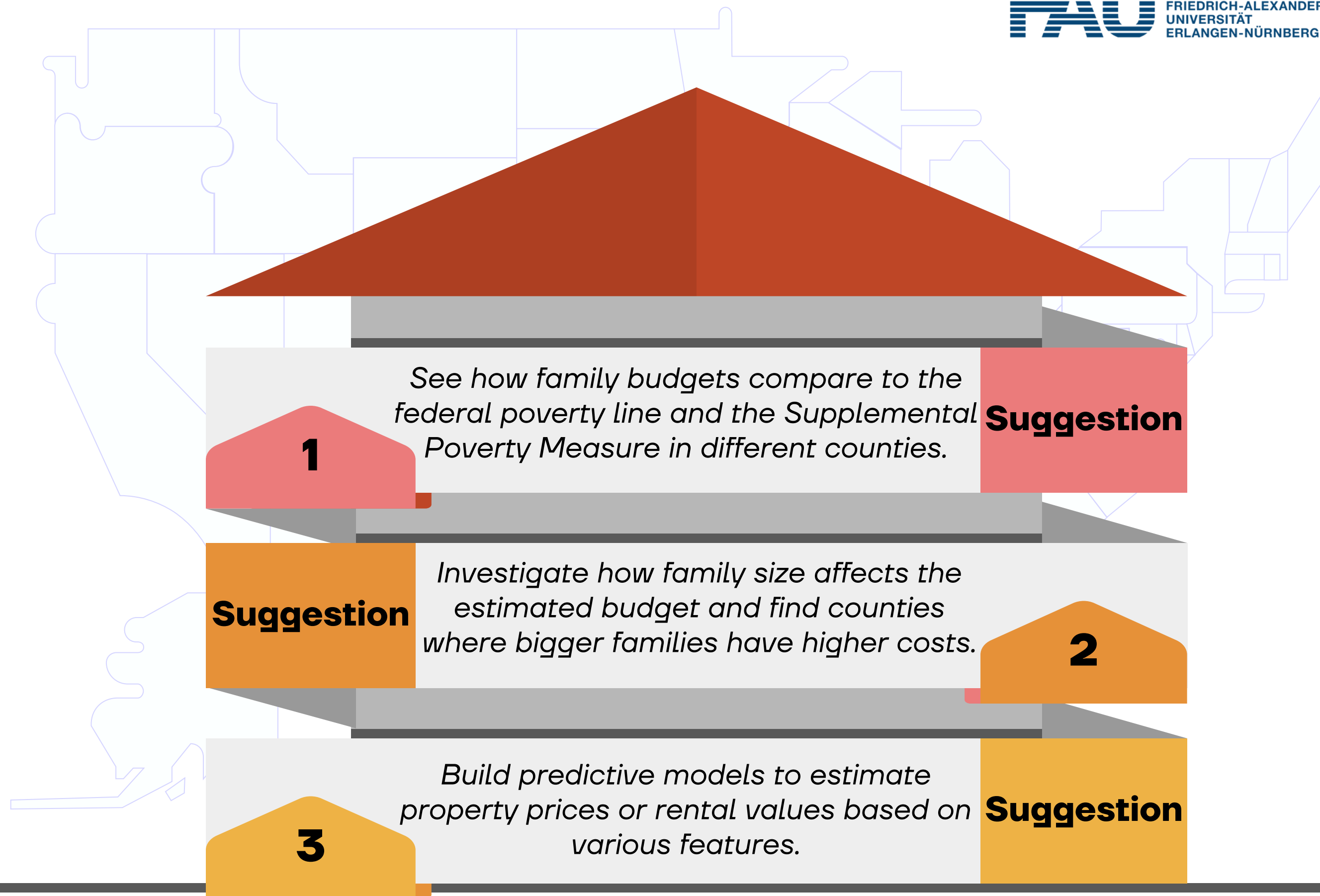
Data is **aggregated** at the state level and uses **median** values of expenses which can lead to a potential miss of variations related to urban versus rural areas.

04



Thank you for reading!

Topics for further research...



References and URLs

1

The Heritage Foundation. Facing a Cost-of-Living Crisis? You're Not Alone.

<https://www.heritage.org/budget-and-spending/commentary/facing-cost-living-crisis-youre-not-alone>

2

Business and society. The Market Alone Can't Fix the U.S. Housing Crisis

<https://hbr.org/2024/09/the-market-alone-cant-fix-the-u-s-housing-crisis>

3

Housing Affordability: A Conceptual Overview for House Price Index

https://www.researchgate.net/publication/271881506_Housing_Affordability_A_Conceptual_Overview_for_House_Price_Index

4

Housing Cost Burden, Material Hardship, and WellBeing

<https://nlihc.org/sites/default/files/Housing-Cost-Burden-Material-Hardship-and-Well-Being.pdf>

5

Calculating you expenses. What you need to know

<https://enrichest.com/en/blog/calculating-expenses-to-income-ratio-what-you-need-to-know>

6

LICENSE URL

Dataset 1 & 2: <https://creativecommons.org/publicdomain/zero/1.0/>

7

METADATA URLS

Dataset 1: <https://www.kaggle.com/datasets/asaniczka/us-cost-of-living-dataset-3171-counties/data>

Dataset 2: https://www.kaggle.com/datasets/febinphilips/us-house-listings-2023?select=original_extracted_df.csv

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