Licking County Coalition for Housing

DENISON

Final Project Report

Licking County Housing Development

Affordable Housing Challenges

Licking County Coalition for Housing

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A. Executive Summary

1. Objective

To better support the Licking County Coalition for Housing in improving housing affordability for its residents, our Real Estate team conducted an analysis with two main objectives:

- **(1)** Identify the most vulnerable groups to access housing affordability
- **(2)** Determine the factors/barriers that contribute to housing prices and analyze how COVID-19 has impacted housing prices from 2019 to 2022.

To achieve these objectives, we conducted an analysis of the Licking County area as well as the broader context of Central Ohio, allowing us to evaluate its performance relative to neighboring counties.

2. Findings

Objective (1):

- Both the Extreme Low Income (ELI) and Very Low Income (VLI) groups are particularly vulnerable.
- In Central Ohio, ELI group has a significantly lower rate of available and affordable housing than the VLI group.
- For Licking County, the situation is even more challenging, with only 45% of affordable housing available for the ELI group compared to 90% for the VLI group.
- However, Licking County is performing well in supporting housing affordability for these two groups, with the rates being relatively high compared to other counties.

Objective (2): two of the factors that affect monthly rental prices in Licking County are location and number of bedrooms.

- Location: houses closer to the Columbus Metropolitan area tend to have higher monthly rental prices
- Number of bedrooms: rental price increases relative to the number of bedrooms.
- The impact of COVID-19 on housing prices varies depending on the number of bedrooms in a house.
    - One and two-bedroom houses have been significantly affected

- Three and four-bedroom houses saw little to no effect.

Implication: This suggests that homeowners with three or four bedrooms may benefit from the current housing market conditions. However, the situation is more challenging for low-income groups such as the ELI and VLI, who can only afford one or two-bedroom houses. For them, the post-COVID period has made it even more difficult to secure affordable housing, as the monthly rental prices for one and two-bedroom houses have significantly increased.

Additional finding on crime rates

Licking County experiences a slightly higher number of both property crimes and violent crimes compared to its neighboring counties. This finding is not surprising, given that a significant portion of Licking County is situated near Columbus, a major metropolitan area with higher crime rates. It is reasonable to assume that this factor may contribute to the general housing prices in the county. However, this information can provide valuable insight to **LCCH** in developing evidence-based strategies to address housing affordability challenges in the region.

3. Limitations and recognition

One of the most significant challenges we faced during our project was the insufficient availability of high-quality data. While housing data is typically collected at the state level, we encountered limitations in accessing relevant data on the county and district levels. This hindered our ability to conduct more in-depth analyses and draw more robust conclusions. However, we are confident that the findings we have presented offer a starting point for future research into the Licking County housing market. We believe that our insights can pave the way for further investigation into various factors that may impact housing affordability, such as school regions, race demographics, and economic trends. By continuing to study these factors, we can develop a more complete understanding of the challenges facing the Licking County housing market in recent years. With this information, our client, the **Licking County Coalition for Housing**, can better target the right groups and develop effective strategies to support residents in the region.

B. Technical Section

1. Background/Problem Statement and Scope

The primary objective of our project is to examine the recent rental cost increase in the Central Ohio region, with a focus on Licking County. Located in central Ohio, Licking County is experiencing a surge in demand for affordable and accessible housing options. A critical challenge faced in the area is the scarcity of options for low- and moderate-income families. This issue has significant implications for the overall economic and social well-being of the region.

The scope of our team's work encompasses an in-depth analysis of the current housing market trends, particularly for low- and moderate-income families. Our analysis aims to provide insights into the demand for housing, challenges faced by in-need renters, and the need for new construction. We will also explore the potential social implications of these changes in the housing market. However, our work will not include detailed analyses of individual commercial or industrial projects, as our focus is on the broader implications for the housing market and community well-being.

Some assumptions agreed upon during the project include the reliability of housing market data and the continued growth of the local economy. These assumptions are essential for our data-driven analysis and for drawing accurate conclusions from the available information.

In summary, our project is designed to assist local authorities and community organizations in understanding the challenges posed by the increasing housing costs in Licking County. By providing data-driven insights, we hope to support the development of effective strategic plans that address the need for affordable housing options and contribute to the overall well-being of the region.

2. Personnel

Member	Individual role
Josh Vo Data Analytics & Psychology	Conducting in-depth research, and ensuring technical accuracy and clarity
Varun R Data Analytics & Anthropology	Conducting statistical analysis and writing technical sections (methodology, results, and visuals)
Minh Nguyen Data Analytics & Economics	Conducting statistical analysis and writing technical sections (methodology, results)
Ha Tieu Data Analytics & Economics	Designing and implementing methodology and creating visuals

3. Ethical Considerations

When dealing with housing data, it is crucial to safeguard the personal information of individuals, including their addresses, financial records, and demographic details. It is essential to exercise caution to prevent any potential unfair treatment or discrimination in the housing market, such as biases based on race or economic background, and to ensure that our analysis does not contribute to these issues. We are committed to presenting information accurately, avoiding any misrepresentation or distortion of facts. Additionally, we maintain transparency about our research methods and objectives, handling the data ethically to earn and maintain public trust.

4. Literature Review

Ohio is a financially stable state for residence in the United States, boasting popular cities such as Cincinnati, Cleveland, and Columbus that draw many to their unique charms. The

S&P/Case-Shiller U.S. National Home Price Index (2021) reported rising home values in Ohio, which is advantageous for current homeowners, but can present obstacles for aspiring buyers as warned by the Ohio Housing Finance Agency (OHFA, 2021). Rural areas of Ohio have notably higher homeownership rates than their urban counterparts, underscoring potential inequality in homeownership access and the difficulties faced by those seeking to break into the housing market (Haurin, et al., 2002).

Licking County, Ohio, is a case in point where increasing housing prices can be attributed to several key factors. The county's thriving economy has resulted in heightened demand for housing (Mallach, 2018). Its proximity to major cities like Columbus and Newark has made it an attractive location for urban amenities, while still retaining affordability when compared to neighboring urban areas (Mallach, 2018). Population growth and an influx of new residents also contribute to the demand for housing within the county (Mallach, 2018). Besides, the county's high quality of life, highlighted by a strong sense of community, exceptional educational institutions, and diverse outdoor recreational activities, also adds to the increase in housing prices in the region (Mallach, 2018).

5. Methodology

We held weekly meetings with team members either remotely through platforms such as Zoom and GroupMe or in-person to review progress, share findings, and make revisions to ensure the final deliverables were of high quality and aligned with project objectives. Biweekly meetings with LCCH clients were conducted to update them on progress, provide solutions and recommendations, and discuss next steps. To facilitate statistical analysis, we utilized R as our programming language. For interactive data visualization, we used Tableau software. To collaborate on technical data analysis, team members used Gmail to send compiled code files, which were combined into a completed technical file.

We had five datasets (listed below), and data cleaning was unnecessary as the collected data was already in the correct format, readable by users and programming languages/software for analysis.

Data Description	Variables	Summary/Statistical Analysis	Data sources
Available and Affordability Housing rate for Extremely Low-Income (ELI) and Very Low-Income (VLI) group (**Finding I**)	1 - Available and Affordability rate per 100 Unit: the number of affordable rental units per 100 residents in need 2 - Counties in Central Ohio area	- Using **R** to create box plot and density plot to represent the difference between *Available and Affordability rate* for ELI and VLI group. => Is there any housing affordability gap between 2 groups? - Using **Tableau** to plot the density plot which shows *Available and Affordability rate* distribution in Central Ohio area => Is Licking County doing well to support ELI and VLI, compared to other areas in Central Ohio?	Ohio Housing Finance Agency (Sheet 2.19 & 2.20)
Factors affecting monthly rental price in Licking County (**Finding II**)	1 - Monthly rental price (in US dollars) 2 - Zip code in Licking County 3 - Number of bedrooms per rental unit	- Using **Tableau** to plot a density map showing the *monthly rental price* based on Zip Code in Licking County. => What Licking County area has the highest and lowest rent? - Using **Tableau** to create scatter plot represent difference between house having 1-4 bedrooms => How does the number of bedrooms affect the monthly rental price? • Using **ANOVA test** to re-examine and confirm to difference gap between 4 types of bedrooms	Office Policy Development and Research (choose year of 2019 and 2022)
COVID affect on	1 - Monthly rental	- **Statistically**: using **R** to do T-test	Office Policy

rental price in Licking County (**Finding III**)	price (in US dollars) 2 - Year (2019 and 2022)	and obtain P-value, which determine whether the COVID has a significant impact, or not, on rental price between 2019 and 2022 - **Visually**: ● Using **Tableau** to make scatter plot to compare the difference between *monthly rental rate* before and after COVID (2019 & 2022) ● Using **Tableau** to create bar chart, explaining why there is no significant change for three and four bedroom	Development and Research (year of 2019 and 2022)
Crime across Ohio county wise (**Finding IV**)	1 - Crime rate 2 - Counties in Central Ohio (2019 - 2020)	- Using **R** to create a scatter plot and bar chart to represent these crime rates and how they pertain to Licking county.	FBI

6. Findings

From our original domain knowledge, we want to find the Income Group that needs Housing Support the most and what factors prevent them from accessing Housing Affordability. There are three **key findings** in our reports:

- ELI and VLI situation in Licking County and Central Ohio
- Factors affecting monthly rental price in Licking County
- COVID's effect on monthly rental price in Licking County
- Crime rate in Licking County, compared to other counties in Central Ohio

Definition:

- We have two income groups of renters:

- Very Low Income (VLI): households earning 50% or less than the median income in their area.
- Extremely Low Income (ELI): households earning 30% or less than the median income in their area.

⇒ Understanding the differences between VLI and ELI household needs can help policymakers and service providers tailor their programs to more meet their specific requirements.

- Variable - **Availability and Affordability Rate**: the percentage of people within each income group that can access affordable housing. A higher rate indicates higher availability of affordable rental units for each income group.

I. ELI and VLI in Licking County and Ohio

There are two main finding in this section:

- ELI renters are suffering the most from the lack of affordable housing
  - In Central Ohio, on average, there is a large gap between the Availability and Affordability Rate between ELI and VLI. *(***Figure 1***)*
  - For Licking County, the Availability and Affordability Rate for ELI's (90%) is double that for VLI's group (45%) (**Figure 2**)
- Licking is doing better than most central-Ohio counties
  - For both ELI and VLI groups, Licking County's Availability and Affordability Rate is higher than the average of the Central Ohio range (**Figure 3 & 4**)

Figure 1: *Income Groups Box Plot (2014 - 2018)*

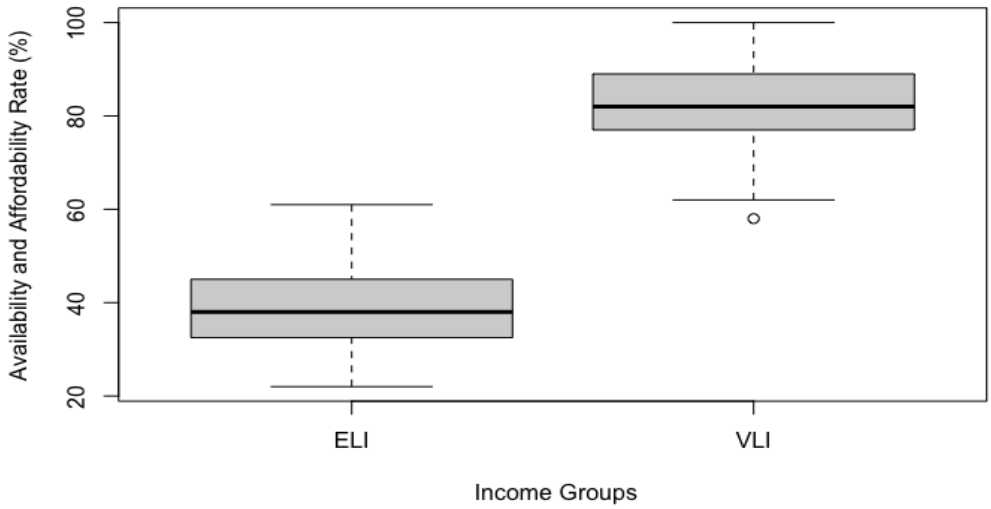


Figure 2: *Density Plot for ELI and VLI (2014 - 2018)*

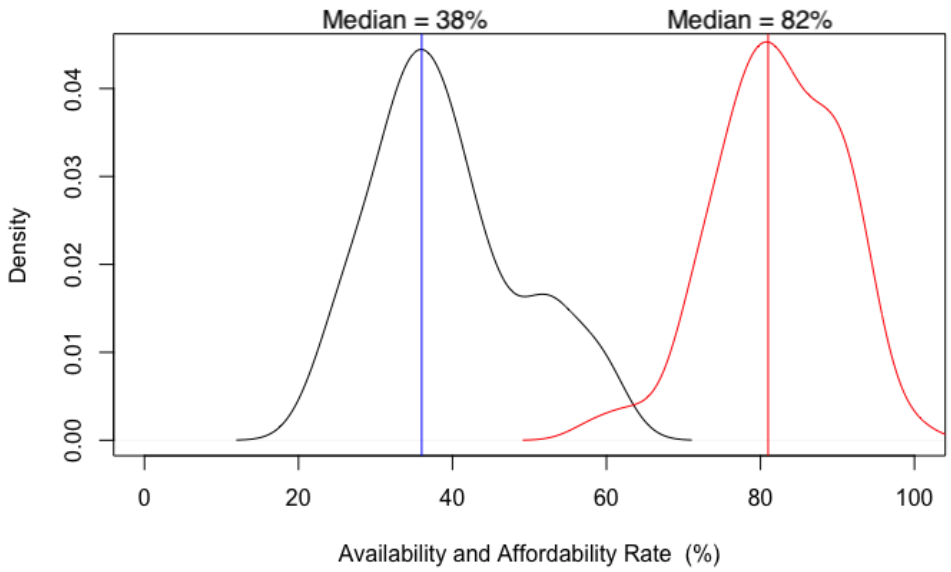


Figure 3: *Housing Availability and Affordability Rate for Extreme Low Income group in Central Ohio (2014-2018)*

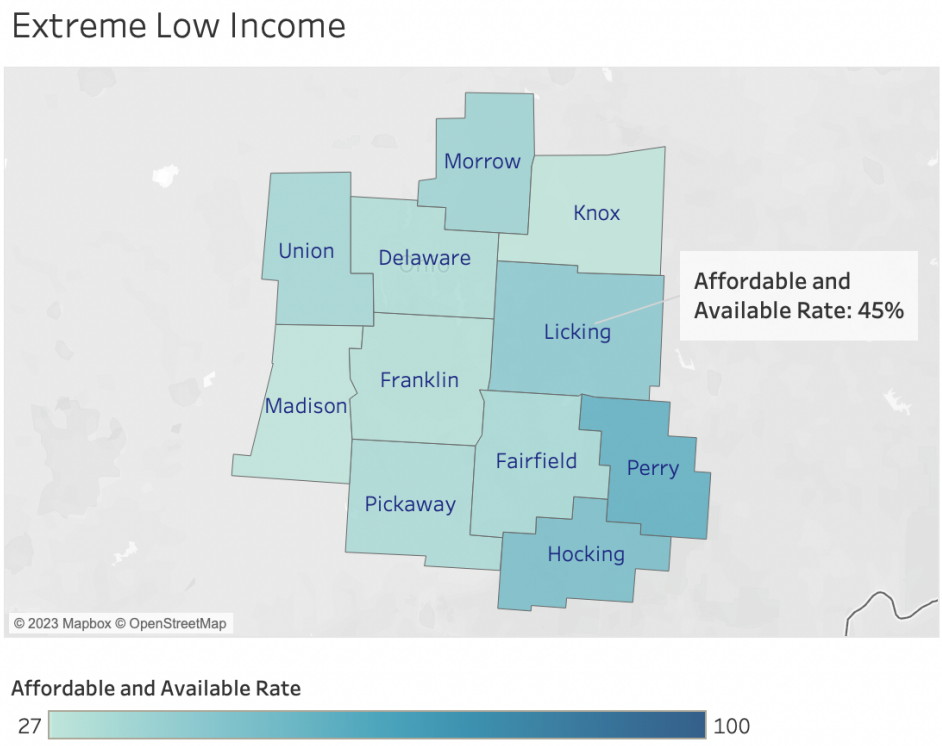
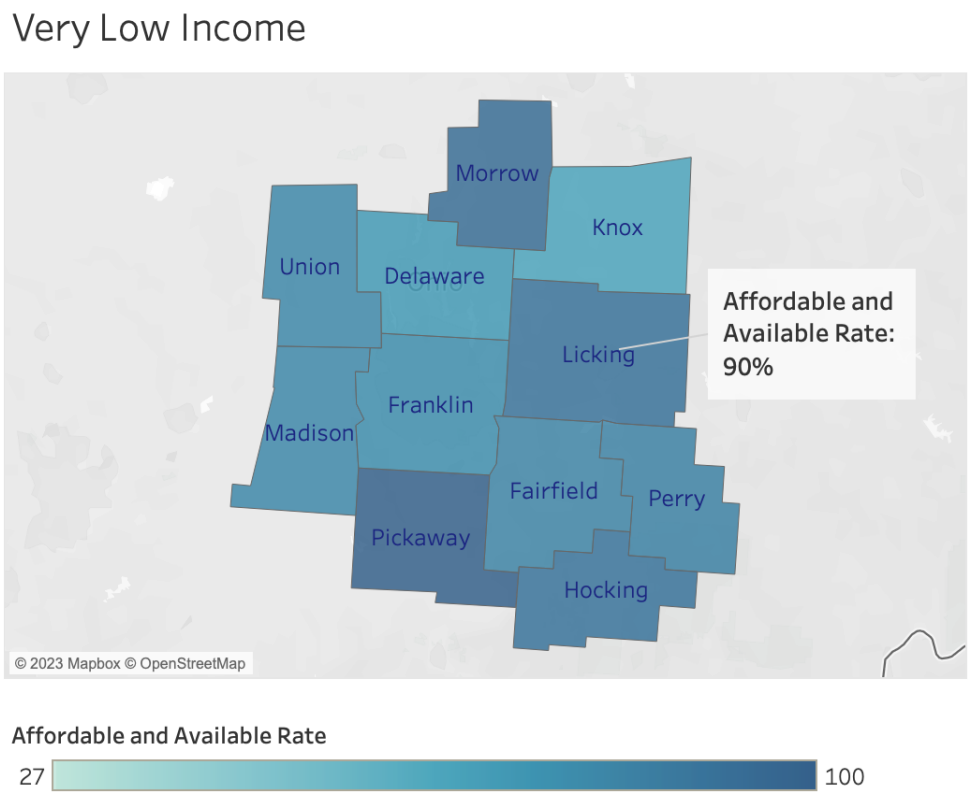


Figure 4: *Housing Availability and Affordability Rate for Very Low Income group in Central Ohio (2014-2018)*



II. Factors affecting monthly rental price in Central Ohio

There are two main factors affecting month rental price in Central Ohio that we found:

- **Location**: The areas located near Columbus Metropolitan has highest rental rates, compared to other regions in Licking County (**Figure 5**)
- **Number of Bedrooms**: the more bedrooms the house has, the higher the rental price is. In general, monthly rent rates in the county decrease in the following order: four-bedroom, three-bedroom, two-bedroom, and one-bedroom (**ANOVA test & Figure 1, 2, 3**)

a. Statistically using ANOVA:

We ran two ANOVA tests comparing average rental prices between units with different numbers of bedrooms: one for 2019 and the other for 2022. The test for 2019 returned a p-value of $1.74 * 10^{-32}$ while the one for for 2020 returned a p-value of $2.09 * 10^{-40}$, both are <0.05. Therefore we

can conclude that for both years, the average price for rental units significantly increased relative to the number of bedrooms (**Table 1**).

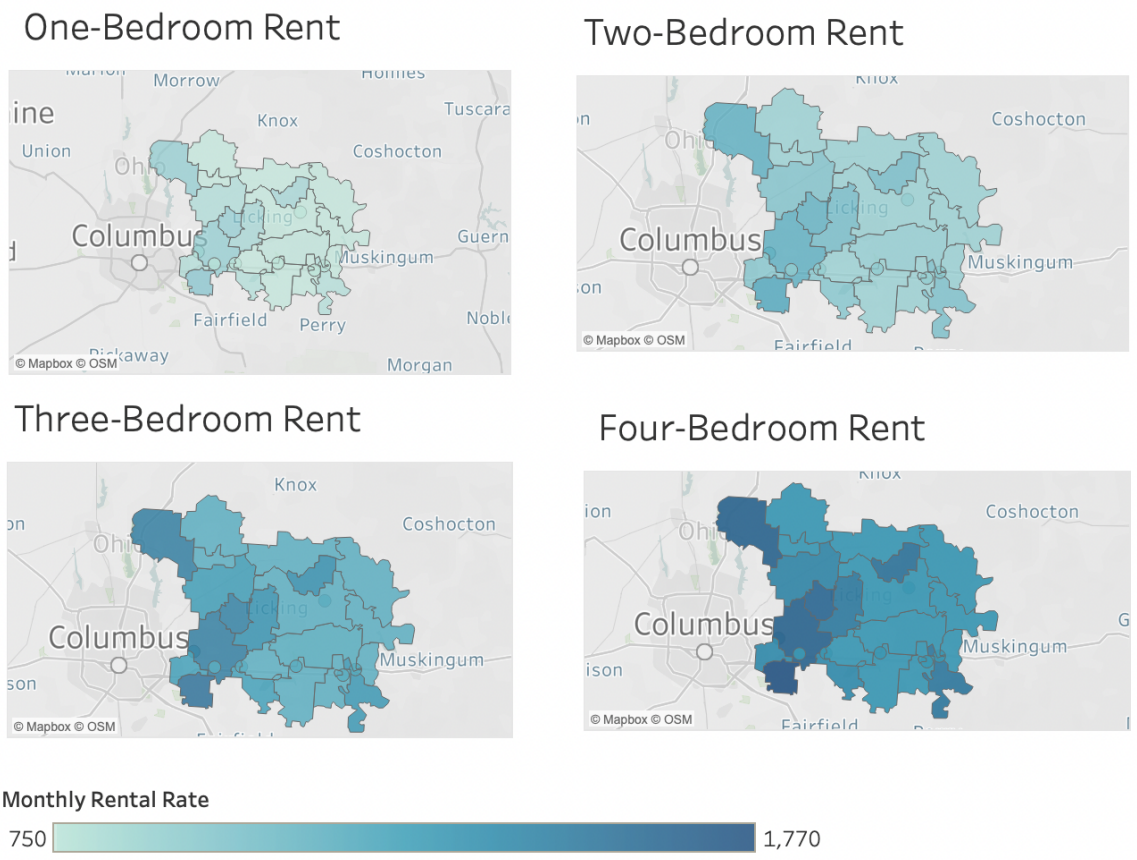
Table 1: *Average rental prices based on number of bedrooms (2019 and 2022)*

	1 bedroom	2 bedroom	3 bedroom	4 bedroom
2019	$736	$927	$1188.966	$1383
2022	$803	$1000	$1251	$1411

b. Visually using Tableau:

Figure 5 below shows the median price at each Central Ohio county based on the number of bedrooms. The price is color coded: the higher it is, the darker the color gets.dc

Figure 5: *Median monthly rent for -4 bedroom houses across counties in Central Ohio (2022)*



III. Rental Price relative to the number of bedrooms before and after COVID (in 2019 and 2022)

There are two main insights we found in this section;

- COVID impacted households residing in smaller homes with 1-2 bedrooms, with rental prices for these units increasing significantly (**Figure 5 & t-test**)
- For three and four-bedroom properties, the price to increase, but this increase was not meaningful
    - **T-test** shows non-significant results ($p > 0.05$)
    - **Figure 6 & 7** shows COVID has small increase on three and four bedrooms

a. Statistically using t-test:

- Properties with one or two bedrooms witnessed a statistically significant increase in rental price after COVID. Specifically, the monthly average price for one-bedroom units increased by $67 ($p = 0.008$) after 3 years (from $736 to $803). Similarly, the monthly average price for two-bedroom units increased by $73 (p-value = 0.022) after 3 years (from $927 to $1000).
- Properties with one or two bedrooms **did not** witness a statistically significant increase in rental price after COVID. When comparing the average prices, these property did seem to increase on the surface level:
    - Three-bedroom units: an increase of $62 ($p = 0.116$) from $1,189 to $1,251
    - Four-bedroom units: an increase of $27 ($p = 0.528$) from $1,383 to $1,411

  However, from a statistical standpoint, the p-values for both of these increases were >0.05, so they are not statically significant, hence not meaningful. Therefore, we visually investigated why this is the case by plotting the price distribution of three and four-bedroom units (**Figures 6 & 7**).

b. Visually explaining for little change in three and four bedroom:

Prior to the COVID-19 pandemic in 2019, the distribution of rental prices for both three and four-bedroom units were slightly right-skewed (**Figures 6 & 7)**, meaning that most properties were priced on the lower end of the range. However, in 2022, after the pandemic, the distribution became markedly more right-skewed, with even more properties priced on the very lower end of the

range. In other words, even though prices generally went up, the increases were not big enough to drive the average price up statistically. In essence, while one and two-bedroom units became more expensive after COVID, this trend did not apply to three and four-bedroom units.

Figure 6: *Distribution of **three-bedroom** rental rates in 2019- 2022*

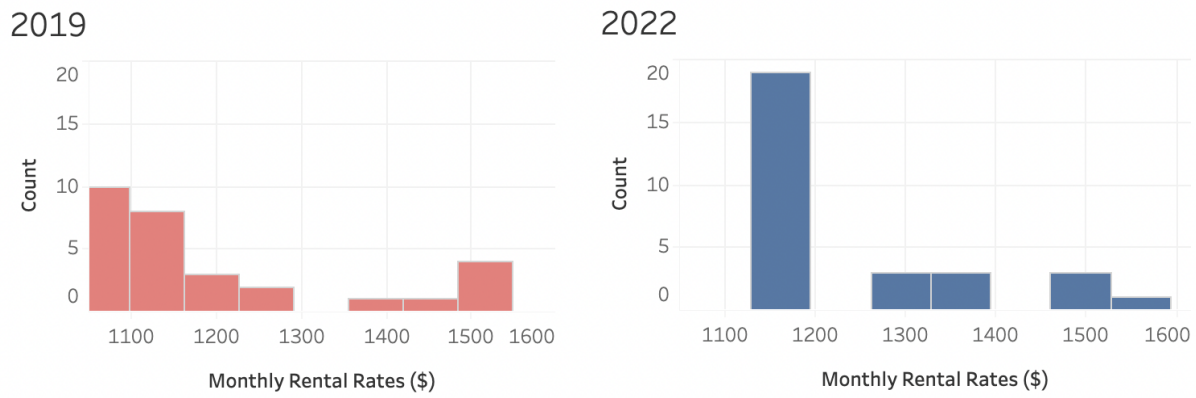
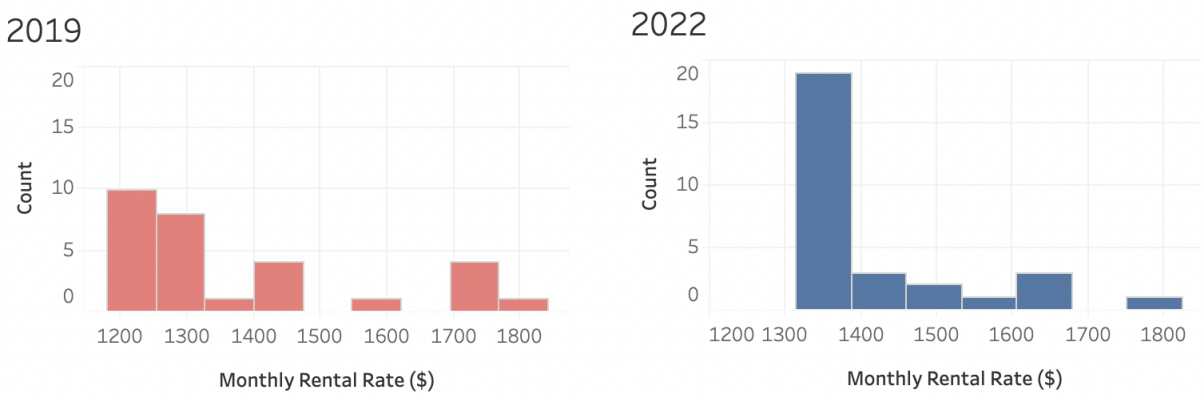


Figure 7: *Distribution of four-bedroom rental rate in 2019-2022*



IV. Crime rate in Licking County, compares to other area in Central Ohio

Our team analyzed the crime rate in Licking County and compared it to neighboring counties to evaluate the county's safety and security. This analysis can offer insights into potential explanations for the housing market price and inform strategies to improve housing affordability for the Licking County Coalition for Housing.

We found two main insights from this section:

- Property crimes are more common than violent crimes in all counties, including Licking County, which has a relatively high number of both property and violent crimes (**Figure 8**).
- There is a positive correlation between violent and property crimes, indicating that regions with higher property crimes may also experience more violent crimes. Licking County's crime rates fall within the general trend of other counties, but if this trend continues, the county may be slowly moving towards a more criminal environment (**Figure 9**)

Figure 8: *Violent crimes vs. Property crimes by county (2019/2020)*

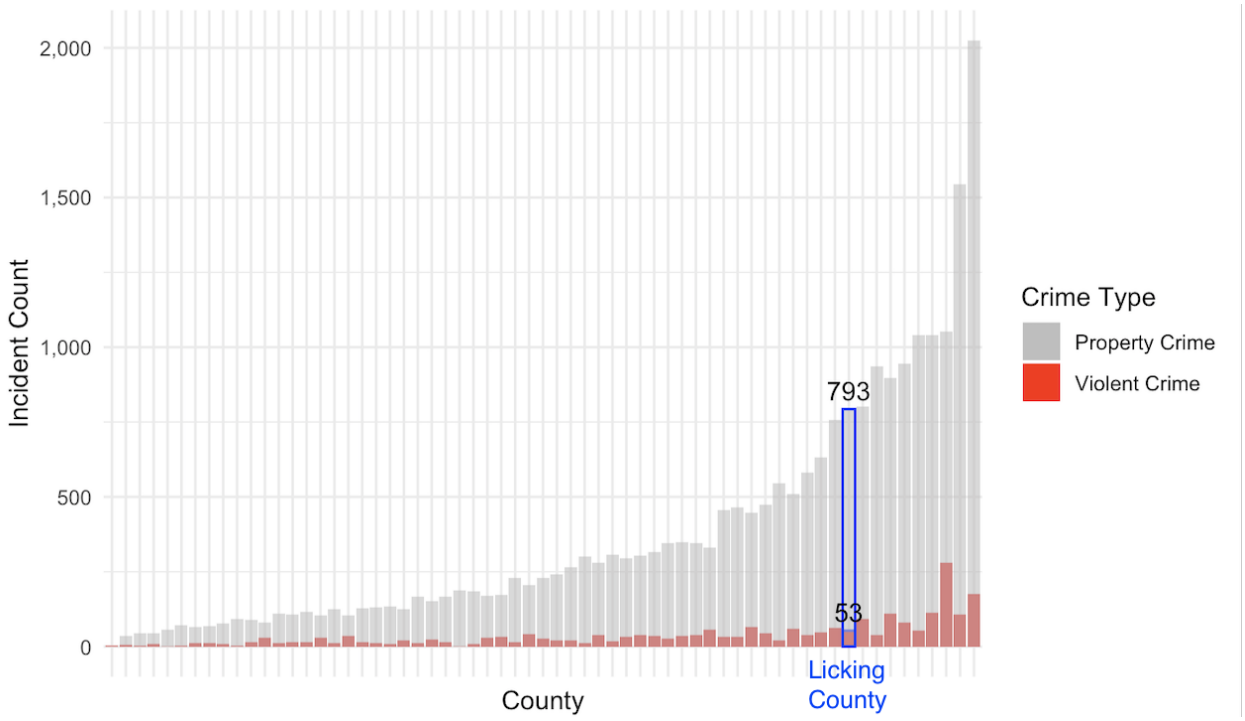
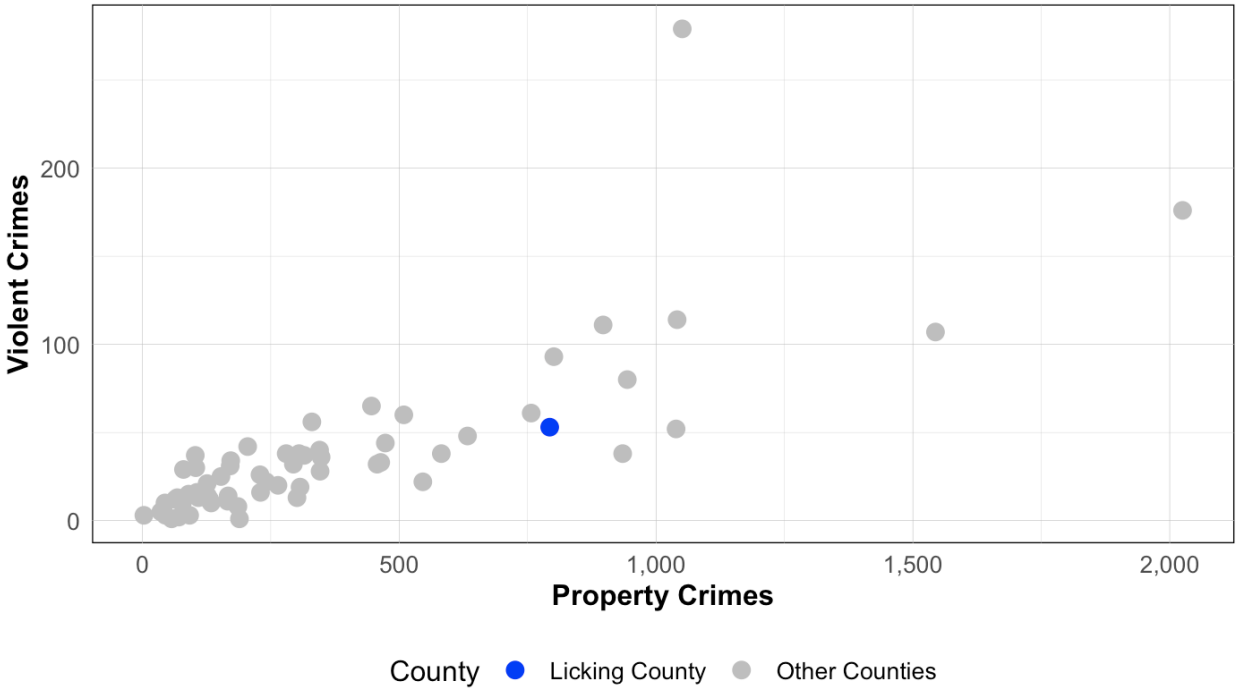


Figure 9: *Relationship between crime rates and violent crimes in Central Ohio*



From this insight, our team suspects that high crime rates in communities like Licking County can negatively impact the housing market. Crime can result in reduced property values, discouraging potential homeowners and businesses from investing in the area. Additionally, a perception of high crime rates can make it difficult for the community to attract new residents and businesses, potentially perpetuating a cycle of poverty and crime. The Licking County Coalition for Housing can use this information to develop strategies to address housing affordability challenges in the region.

7. Recommendations

Based on our findings, we recommend the following strategies to address the affordable housing challenges in Licking County:

1. Prioritize support for Extremely Low-Income (ELI) households: Since ELI households face the most significant housing affordability gap, efforts should be focused on increasing the availability of affordable housing for this income group. This can be achieved through partnerships with public and private entities to develop housing projects specifically targeted at ELI households.

2. Invest in crime prevention strategies and interventions: To tackle the issue of rising crime rates in Licking County, it is essential to invest in evidence-based crime prevention strategies such as community policing, social programs, and educational initiatives. These measures can help to improve the overall quality of life in the area and make it a safer place for residents to live and work.
3. Encourage mixed-income housing developments: Mixed-income housing developments can help to create more inclusive communities, promote social cohesion, and reduce income segregation. By encouraging developers to incorporate affordable housing units into their projects, Licking County can work towards addressing the housing affordability challenges faced by its low-income residents.

8. Conclusion

In conclusion, our analysis of the affordable housing challenges in Licking County has provided valuable insights into the issues faced by residents, particularly those with low and moderate incomes. We have identified several key strategies to address these challenges, including prioritizing support for Extremely Low-Income (ELI) households, investing in crime prevention strategies and interventions, and encouraging mixed-income housing developments.

As for the next steps, we recommend conducting further analyses to identify specific locations and opportunities for affordable housing development within Licking County, as well as establishing partnerships with public and private entities to facilitate these projects. Additionally, it is essential to monitor the impact of these recommendations on the local housing market and overall quality of life for residents, to ensure that the implemented strategies effectively address the identified challenges.

In order to implement our recommendations, stakeholders can engage in dialogue with local government officials, housing developers, community organizations, and residents to develop a comprehensive action plan. This plan should consider the potential long-term impacts of the proposed strategies on the local economy, social cohesion, and the overall well-being of Licking County residents.

While our findings and recommendations have been based on the available data and current understanding of the local housing market, it is essential to continually reassess the situation as

new information becomes available, and to be responsive to any emerging challenges or opportunities.

By taking these steps and implementing the suggested strategies, Licking County can work towards ensuring that affordable housing options are accessible to all residents, thus contributing to a more inclusive, safe, and prosperous community for everyone.

9. Deliverables and Supporting Materials

A . Programming Languages and Softwares


R & Python

These are programming languages that will facilitate our statistical analyses.

Download R and Jupyter packages. The code and dataset will be made available in the readme file.

Tableau

This is an interactive data visualization software.

Link to graph: Visual

To view the graph and its interactive features, please create a Tableau Public account and access the provided link. By moving the cursor, the graph will display corresponding numerical values.

B. Data Sources

- Licking County Tax Data
- Intel - Information on their Ohio involvement
- Ohio Housing Finance Agency
- Related Counties (Tax Information)

C. Readme file where we store all datasets and codes

10. References

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