32146 Data Visualization and Data Analytics

Assessment Task 1: Data Visualisation Foundations
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1   Data Collection

Data collection was carefully conducted to ensure the dataset for analyzing the Mortdale property market was accurate and comprehensive. The data was sourced from two key platforms Price Finder, and the Australian Bureau of Statistics (ABS).
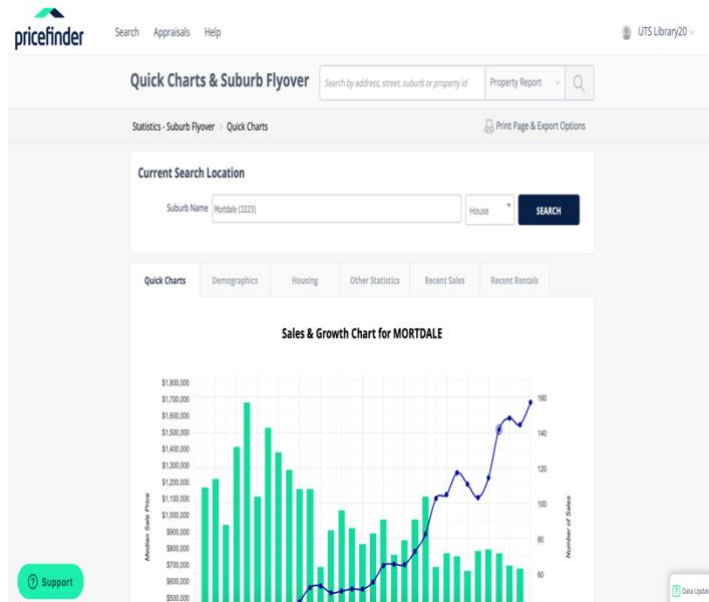

Figure 1. Price Finder
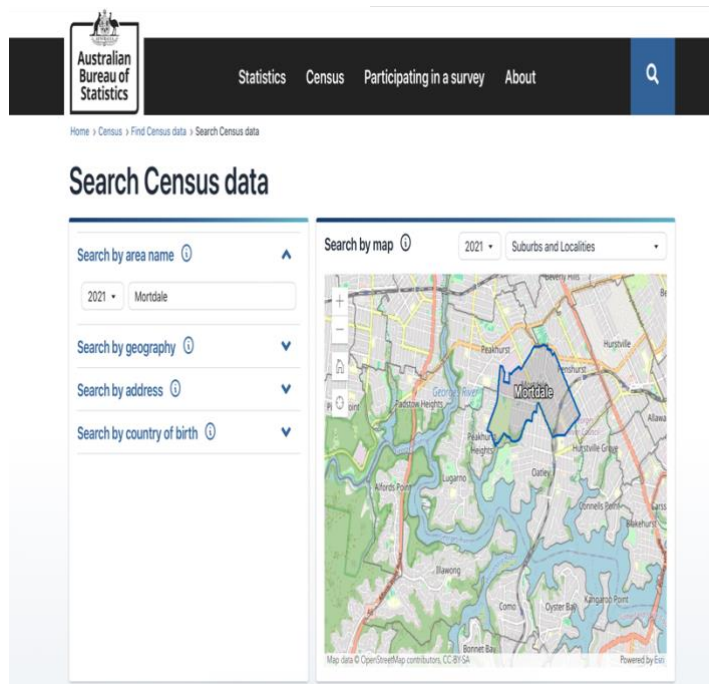
It was possible to gain access to Price Finder and obtain the historical performance information in terms of median house price and median unit price in Mortdale. This web portal provided an overview of how property values were trending up and down within the selected tine, 2006-2021, based on its strong database (Pricefinder, n.d.).

Figure 1, The Sales & Growth Chart for Mortdale visually provides these trends and, therefore, allows permitting effective analysis on the movement of property prices.

The ABS Census data provided relevant socio-demographic and economic variables, including workforce participation, marriage status, family composition, dwelling types, and ownership patterns. (Australian Bureau of Statistics, n.d.).

Figure 2. ABS

Figure 2 identifies the geographic boundaries of Mortdale, according to the 2021 Census, with respect to which the structure of the demographics data has been gathered.

The data has been organized onto an Excel spreadsheet, per the format instructions provided. Each point of data was then cross-checked to ensure 100% accuracy, based on requirements. Thus, robust data collection will ensure the forthcoming analysis is based on sound and complete data to provide valid and actionable insights.

2   Dataset Overview

This analysis provides a detailed examination of the Mortdale property market, focusing on key economic indicators, demographic shifts, and housing trends. Its objective is to generate insights that will help potential buyers and investors make informed decisions by understanding the underlying dynamics influencing property values, affordability, and market demand.

2.1   Supply and Demand Analysis

Purpose of Analysis

The **Supply and Demand** analysis assesses whether housing supply in Mortdale kept pace with population growth over time. This analysis helps identify surpluses or shortages, which affect property prices, affordability, and overall market conditions.

Location	Mortdale	Mortdale	Mortdale	Mortdale
Time	Y2006	Y2011	Y2016	Y2021
Population	9,641	9,702	10,419	10,745
TotalPrivateDwelling	4,136	4,110	4,203	4,379
Ratio (Supply to Demand)	1.02960274	1.05905999	1.04883386	1.05959981

Table 1. Supply and Demand Data Collection

The dataset includes the relevant variables which are population numbers, total number of private dwellings, and calculated supply to demand ration for the years 2006, 2011, 2016, and 2021. To calculate the supply to demand Ratio, the following approach was followed by computation of demand: To determine housing demand, the total population was considered and divided by average household size. This measure gives an estimate of the total number of housing units to accommodate the people.

Demand = Population / Average Number of People per Household

Determination of the supply to demand ratio: The relation between demand and supply has been established through the calculation of total number of private dwellings in relation to demand. It helps to show whether there is a surplus or deficit in housing supply.

Supply to Demand = Total Private Dwellings / Demands

A ratio above 1 indicates oversupply in housing, and below 1, shortage.

Visualisation Technique

In Figure 3, a combo chart was utilized to represent the total number of private dwellings alongside the supply-demand ratio. The bars in the chart indicate the total number of private dwellings over the years, while the line graph tracks the ratio of housing supply to population demand. This visualization technique effectively highlights how well Mortdale's housing supply met population needs from 2006 to 2021. By employing dual metrics in a single chart, this combo chart enables a clearer comparison of changes in population size relative to housing availability.
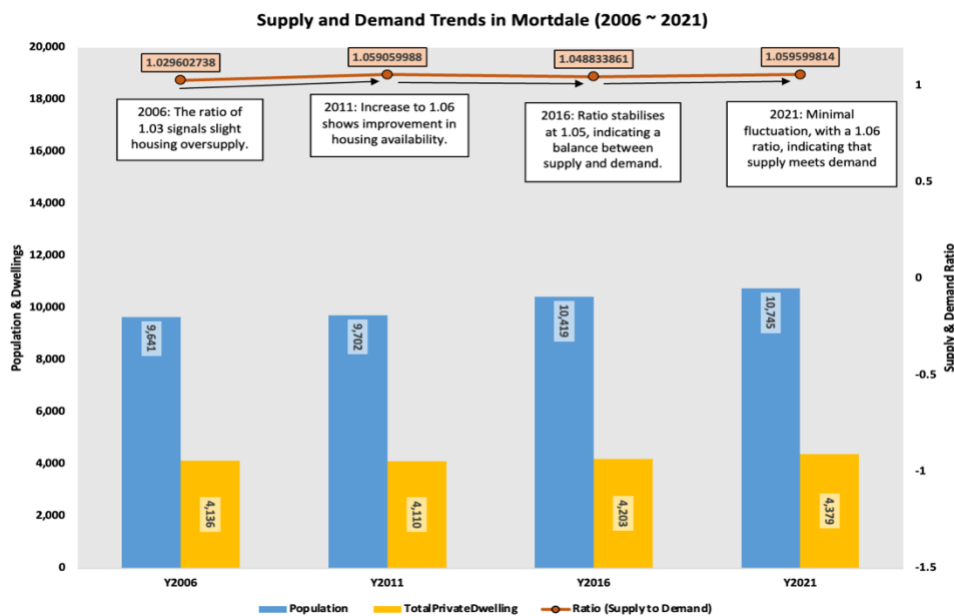
Figure 3. Supply and Demand Combo Chart

Summary of Findings

In 2006, Mortdale had a supply to demand ratio of 1.03, indicating a slight oversupply of houses relative to the population's needs. This increased to 1.06 by 2011, showing that housing supply kept pace with population growth. In 2016, the ratio further posted at 1.05, and in 2021, it remained at 1.06, indicating that the supply of houses in Mortdale has consistently met the population's needs without any significant housing shortages.

The stable supply-to-demand ratio suggests that Mortdale has maintained a balanced housing market, avoiding major imbalances. As the population continues to grow, it will be essential to ensure that housing development keeps pace with demand. Ongoing monitoring will be critical to prevent any future housing shortages and to ensure that future population growth is adequately supported by housing development.

2.2 Affordability Analysis

Purpose of Analysis

The **Affordability** analysis benchmarks Mortdale's housing affordability using median household income. Affordability indicates how accessible real estate is for the average household, guiding prospective buyers and investors in their decision-making.

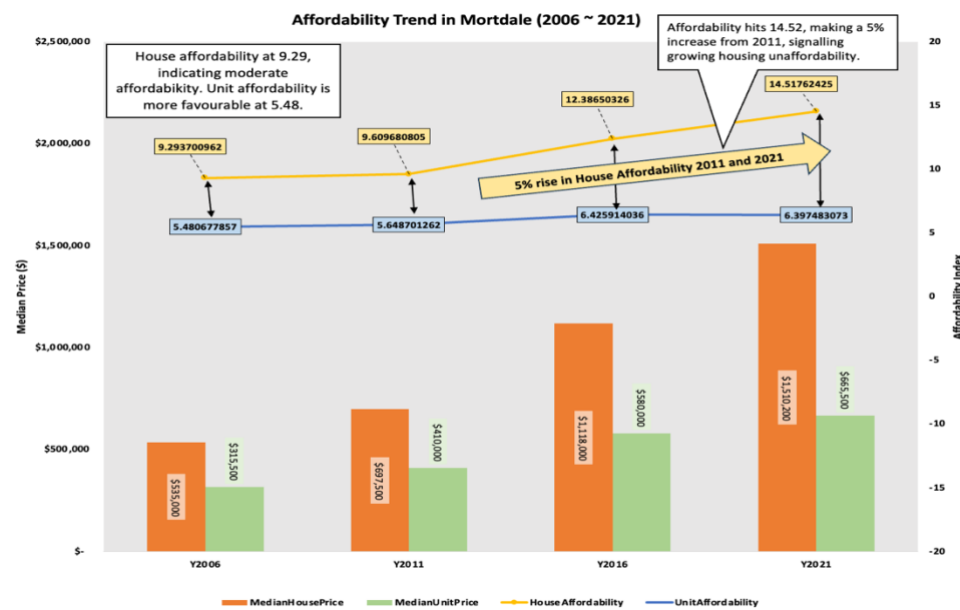| Location	Mortdale	Mortdale	Mortdale	Mortdale
Time	Y2006	Y2011	Y2016	Y2021
MedianHousePrice	$ 535,000	$ 697,500	$ 1,118,000	$ 1,510,200
MedianUnitPrice	$ 315,500	$ 410,000	$ 580,000	$ 665,500
HouseAffordability	9.293700962	9.609680805	12.38650326	14.51762425
UnitAffordability	5.480677857	5.648701262	6.425914036	6.397483073

Table 2. Affordability Data Collection

Affordability will thus be determined by the formula:

Affordability = Property Price / Annual Household Income = Property Price / (Household Weekly Income × 52.143)

In this context, house and unit affordability are calculated separately since median prices for houses and units differ.

Visualisation Technique

Figure 4, a combo chart was employed to compare median property prices and affordability indices for houses and units. The bars in the chart depict median property prices, while the line graph illustrates house and unit affordability. This chart effectively demonstrates the growing gap between rising housing costs and household income, showing how affordability has changed over time. The use of dual Y-axes allows for clear representation of both price and affordability trends, providing valuable insights into housing affordability for potential buyers and investors.

Figure 4. Affordability Combo Chart

Summary of Findings

The affordability analysis highlights a consistent rise in housing prices, significantly impacting affordability. In 2006 the house affordability was 9.29, indicating that the average household income would need approximately 9.29 times its annual income to afford a house. Similarly, unit affordability was more favourable at 5.48. In 2011, the affordability eased slightly backward to 9.61 for houses, while unit affordability barely moved from 5.65. In 2016, due to the high increase in residential property prices, it led to an increase in escalation of housing affordability to 12.39, reflecting that families are less able to buy homes, and unit affordability excalated to 6.43. In 2021, affordability rose sharply to 14.52, meaning a significant loss in housing affordability over years. On the other hand, unit affordability was more stable and stood at 6.40. The remarkable 5% gain in housing affordability from 2011 to 2021 reflects the continued erosion between households' income and prices of housing.

2.3   Finance Analysis

Purpose of Analysis

The purpose of this **Financial** analysis is to assess the changes in personal, family, and household income, mortgage payments, and rent levels in the Mortdale are between 2006 and 2021. This analysis aims to provide insights into the evolving financial burdens that households in Mortdale face, particularly about homeownership and rental housing. By evaluatinf trends over time, we can better understand how the cost of living has shifted and how these shifts have affected residents.

Visualisation Technique
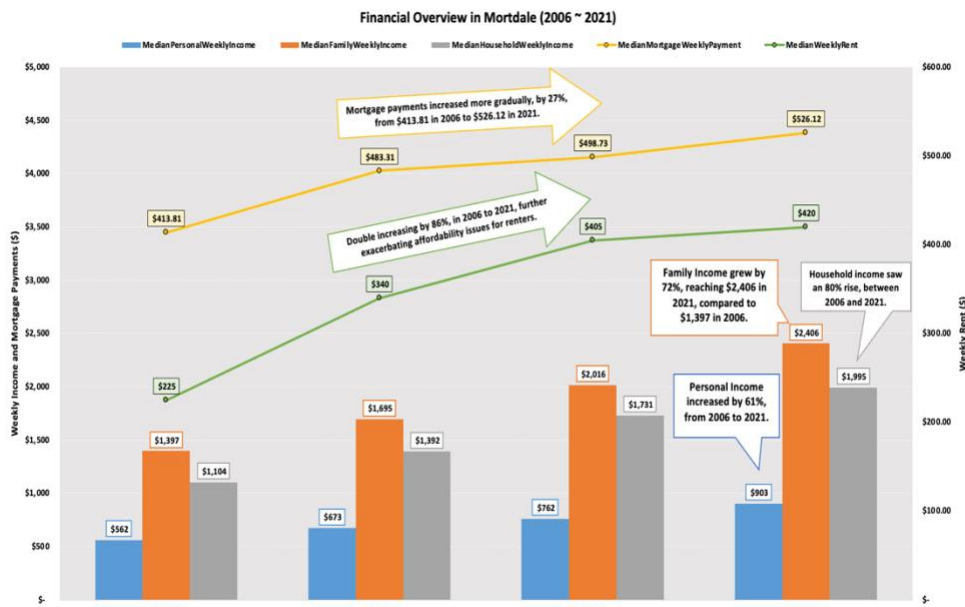

Figure 5. Finance Combo Chart

Figure 5, a combo chart was used to display key financial metrics such as personal, family, and household incomes, as well as mortgage payments and rent. The bars represent income levels, while the line graph tracks the trends in mortgage payments and rent. The dual Y-axes in this chart ensure that both income growth and rising housing costs are displayed clearly, helping to reveal the disparity between income increases and the cost of housing. This chart provides a comprehensive view of how economic factors impact affordability over time.

Summary of Findings

Between 2006 and 2021, the increase in personal, family, and household incomes was remarkable in Mortdale. Personal income surged by 61%, rising from $562 to $902, while family income expanded by 72%, from $1,397 to $2,406. In its turn, household income grew by 80%, increasing from $1,104 to $1,995 within the period under consideration. Along with such impressive growth, the increase in rent and mortagage costs became rather burdensome for the residents. It increased by 86% from $225 to $420. A comparison is that mortgage payments only increased from %413.81 to $526.12, an increase of 27%. The percentage increase in rentals was far greater then the rise in incomes – an indication that the financial stress of renters would continue to increase because rents were moving much more sharply than incomes. The increeasing gap shows the affordability of renters in Mortdale outstripping that of mortgagees, whose housing costs had been moving at a much more modest pace.

2.4 Population Analysis

Purpose of Analysis

The **Population** analysis aimed to explore the changes in Mortdale's population and its marital status composition over the years. Understanding shifts in population and marital trends provides insight into household dynamics, potentially influencing housing demand and the social fabric of the suburb.
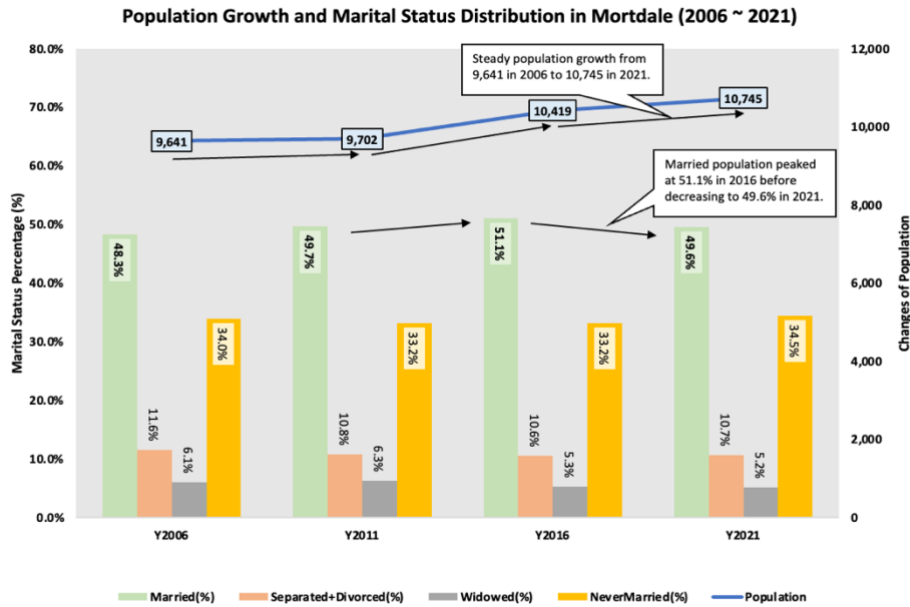
Visualisation Technique

Figure 6. Population Line & Clustered Column Chart

In Figure 6, line and clustered column chart was employed to present changes in population growth and marital status distribution. The line graph shows the steady growth in Mortdale's population, while the clustered columns represent the distribution of different marital statuses. The use of dual axes in this chart allowed for both sets of data to be displayed clearly, avoiding overlap and ensuring that trends in population growth and marital status were easy to interpret. The addition of distinct colors for the population line and the marital status bars further improved the clarity of the data.

In the Population Analysis, I encountered a challenge when creating a clustered column and line graph to display both population growth and marital status changes. The population numbers were much larger than the marital status percentages, making the population line appear almost flat. To resolve this, I used dual axes—one for population and another for marital status percentages. This allowed both trends to be shown clearly. I also applied distinct colours to the population line and marital status bars to make the graph easier to read and interpret.

Summary of Findings

The Mortdale population has grown linearly over time, increasing from 9,641 in 2006 to 10,745 in 2021. Lastly looking at the marital status of the population, minor growth among those married increased from 48.3% in 2006 to 51.1% in 2016, then down to 49.6% in 2021 – perhaps indicating something about larger family and social trends. While the proportion of never-married individuals was 34.0% in 2006, increased to 38.2% in 2011, and fell to 34.5% in 2021, indicating somewhat of a shift in the single population. The proportion of those separated or divorced remained stable at about 10-11% over the years. The population of widowers slightly contracted, from 6.1% in 2006 to 5.2% in 2021, perhaps due to changes in life expectancy and demographic shifts.

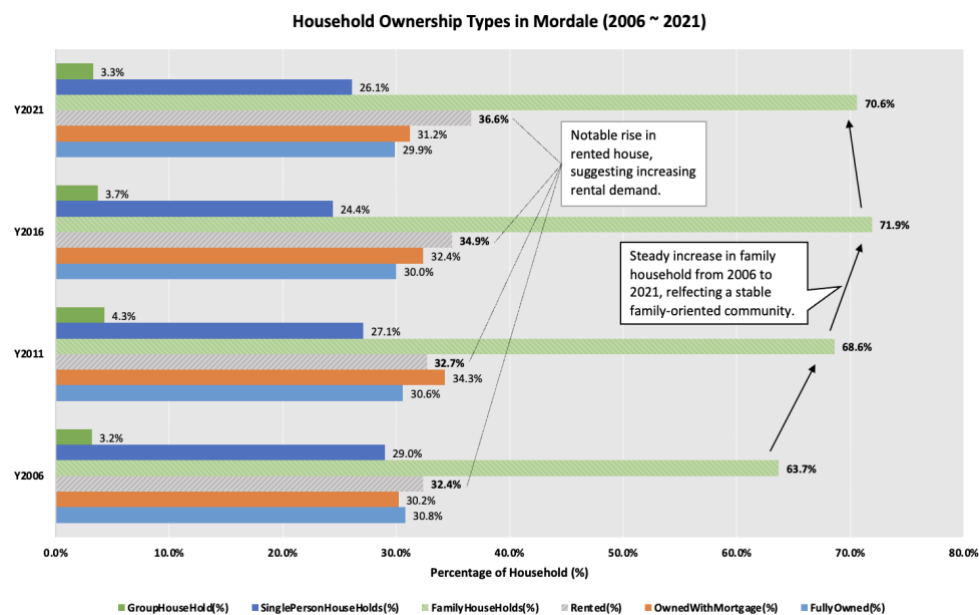## 2.5   Ownership Analysis

Purpose of Analysis

The **Ownership** analysis aids in ascertaining the temporal change in the composition of household ownership of Mortdale. From the family household's distribution to single-person households, one

will be able to comprehend the housing trend that has emerged in Mortdale and its change between the years 2006 and 2021.

Visualisation Technique

In Figure 7, clustered bar chart was used to compare changes in household ownership types over time. The bars represent the proportions of fully owned, mortgaged, and rented homes across different census years. This chart effectively shows the gradual increase in rental properties, alongside the relatively stable proportions of fully owned and mortgaged homes. By presenting the different ownership types side by side, the clustered bar chart enables easy comparison of how homeownership preferences have shifted over time, reflecting broader social and economic trends.

Summary of Findings

The analysis of ownership in Mortdale has thus followed a consistent trend for furnished configurations between 2006 and 2021. The respective increases during this time for family households were from 63.7% percent

Figure 7. Ownership Clustered Bar Chart

to 70.6%. This would indicate that Mortdale is increasingly attractive for families based on the expanding housing opportunities and appeal that the community presents. Such changes are further supported by the rise in independent living. Influenced by the life-course changes and ease of home buying.

Fully owned homes decreased from 30.8% in 2006 to 29.9% in 2021, while homes with a mortgage remained steady between 30.2% and 31.2%. Thus, households slightly preferred either leasing or taking mortgages, though the overall ownership level remained the same. On the other hand, the share of households that are rented increased significantly from 32.4% in 2006 to 36.6% in 2021, which is a demand for rentals, this trend is due to a decline in the ease of home buying and a highly mobile population. These housing trends reflect broader social and economic factors that are affecting Mortdale.

2.6   Workforce Analysis

Purpose of Analysis

The **Workforce** analysis has been done based on the employment in Mortdale between 2006 and 2021, concerning full-time/part-time and unemployment. The Labor Force Participants Rate (LFPR) is estimated to understand the overall workforce engagement. From this, and idea about the

changing nature of employment patterns, and their implications for the local economy and job market can be extracted.

| Location	Mortdale	Mortdale	Mortdale	Mortdale
Time	**Y2006**	**Y2011**	**Y2016**	**Y2021**
Worked full-time (%)	66.0%	65.5%	62.9%	54.8%
Worked part-time (%)	23.6%	23.8%	27.5%	27.4%
Unemployment (%)	5.1%	5.1%	5.1%	4.6%
LabourForceParticipationRate	95%	94%	96%	87%

Table 3. Workforce Data Collection

Table 3 above shows the percentage distribution of full-time and part-time employment and unemployment for the years 2006, 2011, 2016, and 2021. The summation of above percentages gives LFPR, which shows the greater picture of economic participation in the community

The formula for Labor Force Participation Rate (LFPR) is:

LFPR = Worked Full-time (%) + Worked Part-time (%) + Unemployed (%)

Visualisation Technique
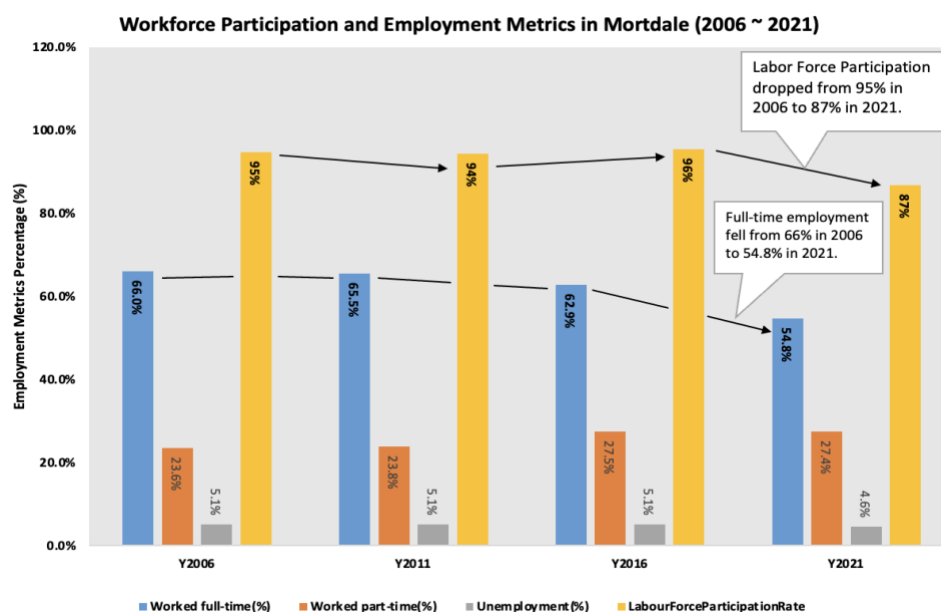
In Figure 8, clustered column chart was employed to display the percentage of full-time, part-time, and unemployed workers in Mortdale from 2006 to 2021. The columns represent each employment type, while the use of different colors helped distinguish between full-time

Figure 8. Workforce Clustered Column Chart   and part-time employment, which were often close in value. Additionally, slight rescaling of the axes provided more separation between the categories, making it easier to observe shifts in employment patterns. This visualization technique provided clear insights into workforce participation and trends over time.

In the Workforce Analysis, I faced a challenge with data overlap between the full-time and part-time employment percentages, as their values were quite similar in certain years, making them hard to distinguish. To address this, I used different color shades for the full-time and part-time employment bars, enhancing clarity. Additionally, I slightly rescaled the axes, which provided more separation between the two categories. These adjustments improved the readability of the

visualization, making the employment trends easier to understand and ensuring that the key insights were clearly communicated.

Summary of Findings

Full-time employment declined notably, from 66.0% in 2006 to 54.8% in 2021. Meanwhile, part-time employment showed a modest increase from 23.6% to 27.4%. Unemployment remained stable, fluctuating between 4.6% and 5.1%.

The most noticeable trend is the drop in the Labor Force Participation Rate (LFPR) from 95% in 2006 to 87% in 2021, indicating a reduction in the overall participation of the working-age population in the Labor market. This could reflect changes in the local economy, such as fewer available full-time job opportunities or an aging population existing the workforce.

2.7   Dwelling Analysis

Purpose of Analysis

The **Dwelling** analysis observes the kind of change in dwelling type in Mortdale from 2006 to 2021. Understanding the proportion of a separate house, semi-detached houses, and flatunitapartments gives insight into the housing preferences of residents in Mortdale and changes on those preferences over time. These data have been found useful in drawing out trends of housing density and urban development that could characterize future housing policies and market behaviours in the suburb.

Visualisation Technique
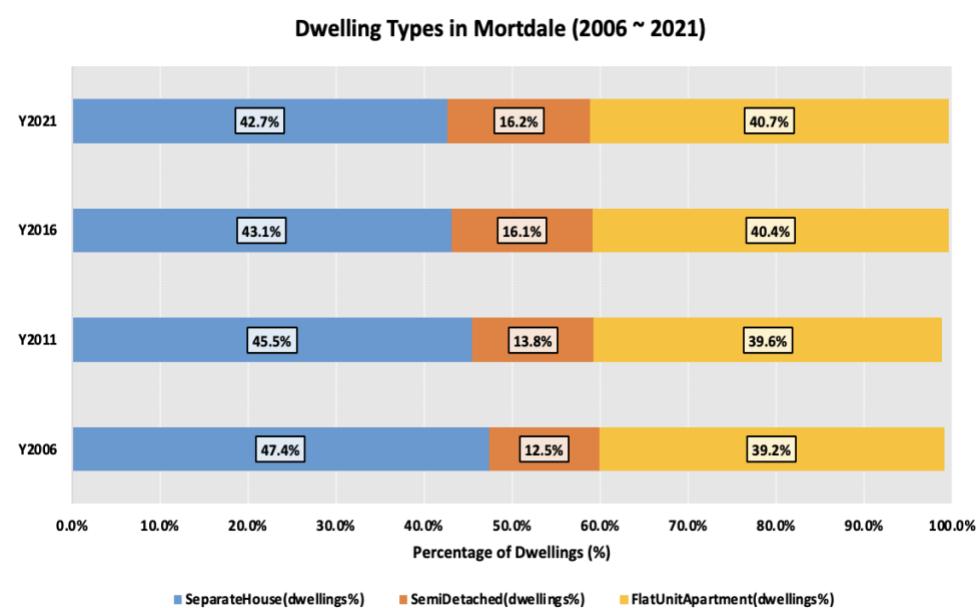
Figure 9 a stacked bar chart was used to display the change in dwelling types over the years. The bars are segmented to represent separate houses, semi-detached dwellings, and apartments. This chart allowed for a clear comparison of how the housing market has evolved, showing the gradual

Figure 9. Dwelling Stacked Bar Chart

decline in separate houses and the increase in semi-detached and apartment dwellings. The stacked bar chart was an appropriate choice for conveying how different dwelling types have shifted in relation to one another over time.

Summary of Findings

In the two decades between 2006 and 2021, remarkable changes had been seen in the dwelling structure of Mortdale. The separated houses decreased from 47.4% in 2006 to 42.7% in 021, which means they dropped about 5%. It can be because of the rising land costs or higher demand for higher-density housing. At the same time, semi-detached dwellings have increased quite moderately from 12.5% to 16.2%, perhaps indicating a preference toward housing that balances detached home and apartments, influenced by affordability or shifting family dynamics. Flats or apartments have conventionally constituted a considerable share of the total number of Mortdale private dwellings, although their proportion increased from 39.2% in 2006 to 40.7% in 2021. Such a gradual increase corresponds to the general urbanization trend, whereby an increasingly large part of the population chooses to stay in apartments because they require less maintenance costs and are closer to facilities and transportation.

2.8   Family Analysis

Purpose of Analysis

The **Family** analysis considers the change in family structures within Mortdale between 2006 and 2021. An analysis of composition by family types – couple families with no children, couple families with children, one parent families, and other families will give insight into evolving demographic patterns. These changes are crucial to future policy decisions regarding housing, education, and community services.

Visualisation Technique
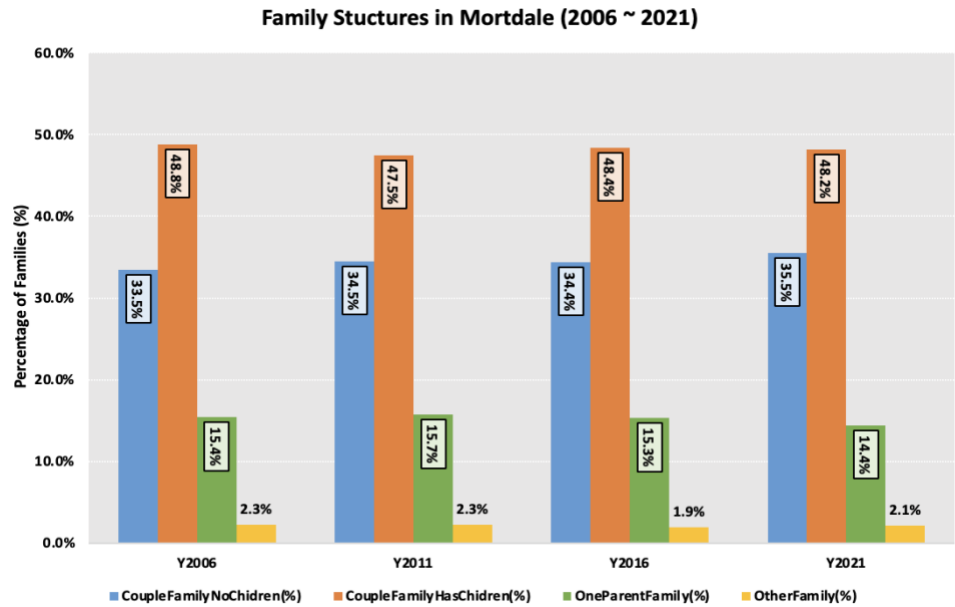
Figure 10 utilized a clustered column chart to illustrate changes in family composition in Mortdale from 2006 to 2021. The columns are grouped by census year and represent different family structures, including couple families with and without children, one-parent families, and other family types. This visualization helps to show shifts in family demographics over time, providing insight into how changing social dynamics may influence housing demand and the overall social fabric of the suburb.

Figure 10. Family Clustered Column Chart

Summary of Findings

The couple families with no children increased slightly from 33.5% in 2006 to 35.5% in 2021, indicating a growing preference for childless households. This dominant group, couple families with children, has dropped from 48.8% in 2006 to 48.2% in 2021 – a modest shift away from traditional family structures. While the one parent families remained constant at about 15%, the other families remained constant at about 2% of the total family households.

These findings point to a diversification in the structure of families in Mortdale, where childless couples are on the increase and single-parent families remain constant. The slight decline in the proportion of families with children would suggest that societal preference or economic reasons are causing a change in family planning.

3   Executive Summary

This report is informed by identifying trends in the Mortdale property market between 2006 and 2021 using data extracted from Price Finder and the Australian Bureau of Statistics. Housing supply has matched the growth in population since 2011, hence indicating that the balance between supply and demand has been maintained, signaling that the area has met housing demand for its growing population over the period. Meanwhile, the affordability of houses jumped in 2021 to 14.52 from 9.29 times the average household income in 2006, whereas units showed quite fair stability in terms of affordability. Meanwhile, household incomes have increased by 80%, while rental costs have increased by 86%, which implies that rentals are worse off being afforded. This might make units more favorable for future buyers or investors in the short term. The population exhibited a consistent upward trajectory, with minor fluctuations in marital status that align with overarching societal trends. The proportion of renters rose from 32.4% to 36.6%, where homeownership partnerships experienced a slight decrease. Concurrently, full-time employment diminished from 66% to 54.8%, and the Labor Force Participation Rate declined from 95% to 87%, potentially indicating an economic transformation that could further influence housing affordability. There has also been a shift towards higher-density housing, with fewer free-standing houses and increasingly more apartments being built. The compositions of the families have altered from more childless couples to fewer families with children. All these demographic changes indicate that future housing developments should continue to be closely monitored to ensure they meet demand and align with social trends. Together, these findings paint a picture of property market trends in Mortdale that will be essential to inform future buyers, investors, and policymakers.

4   Advantages of Visualisation Techniques Used

This report employs various visualisation techniques, including clustered column charts, combo charts, and stacked bar charts, to simplify complex data and highlight trends in an easily comprehensible manner. Below are the key benefits of each technique:

- **Clarity and Ease of Comparison:** Clustered column charts allow clear comparisons across disparate points in time for distinct categories, such as family composition or workforce participation. Viewers can more easily see changes and spot the most valuable trends in such a chart.

- **Dual Metric Representation:** A combo chart integrates bar and line graphs, enabling a visual comparison of two metrics. One example is using these to portray the housing prices and affordability indices that help analyse more cogent interactions between key variables.

- **Comprehensive View of Data:** Stacked bar chart can also show proportions within categories, such as dwelling types or ownership patterns. Together, these charts provide a comprehensive view of the various components that shape the market.

- **Trends and Insights:** These line graphs reflect the long-term trends of the rise or fall in home ownership or workforce participation. Line graphs can also provide valuable insights into emerging patterns, which are helpful for forecasting and making prudent decisions.

- **Storytelling and Interpretation:** These visualisations go beyond presenting data on how the property market has evolved in Mortdale. Techniques like these transform the vital changes and trends visualised for prospective buyers and investors into actionable insights.

Overall, the visualisation methods included help to enhance the clarity and readability of the report, as certain pieces of information appeal more to and are far more understandable to the readers it targets.

5   Conclusion

This report provides an in-depth analysis of the Mortdale property market from 2006 to 2021, covering supply and demand, financial dynamics, demographic changes, and housing affordability. It deals with supply and demand, financial dynamics, demographic change, and housing affordability. The findings indicate that there is a rapid increase in the prices of property, outpacing household income and leading to reduced housing affordability. Population growth, along with changes in family composition, has led to higher housing density, reflecting broader economic and social imperatives. The report uses visualisations, such as combo and stacked bar charts, to get these trends across and, therefore, offers much insight needed by buyers, investors, and policymakers. Continuous monitoring of the Mortdale property market is vital to ensure informed decision-making on housing affordability and future development strategies.

6   Recommendation

Based on the property market evaluation in Mortdale from 2006 to 2021, the following recommendations are made for buyers, investors, and policymakers:

For Homebuyers

- Affordability: With rising house prices, buyers should prioritize financial stability and plan for larger down payments as mortgage costs increase.

- Consider Renting: With rent still more manageable than mortgages, renting could be a practical short-term option while waiting for more favourable buying conditions.

- Government Support: Use available government incentives to overcome the high initial costs; for example, the first-time home buyers grant.

About Investors

- Focus on Rental Properties: Investors should try to target high-demand rental properties, more particularly units and apartments, as renting is gaining more prominence.

- Affordable Housing Investments: Growing concerns over affordability signal strong demand for more affordable housing and an opportunity for stable returns.

- Follow the Trend: With increases in apartment living comes better investing in higher-density apartment complexes.

For Policymakers

- Affordable housing: Policymakers should incentivize the development of affordable housing to address rising costs and sustain long-term growth.

- Infrastructure Development: Invest in public infrastructure to accommodate population growth and housing density, ensuring Mortdale remains a desirable location.

- Workforce Engagement: Initiatives to enhance workforce participation, particularly full-time employment, should be introduced to ensure economic sustainability amidst a declining full-time workforce.

These recommendations would assist all parties in developing the growing market, affordability issues, and sustainable development of Mortdale.

7   Bibliography

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