

KING COUNTY
HEALING ASSOCIATION



BUDGET ANALYSIS FOR KCHA HOUSING PROGRAM

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OBJECTIVE

- **King County Healing Association**, a nonprofit dedicated to helping previously incarcerated individuals re-enter their communities, needs **a budget estimate** for their new program to help relieve aspiring homeowners of discrimination in the housing process
- KCHA will purchase homes for applicants and take care of the down payment. The new tenants can then pay off their mortgage to the organization monthly, while additionally paying back the down payment over time
- KCHA has selected 5 families to assist during their first year of the program, which they plan to roll out in 3 years. The program needs to estimate the sum of down payments based on the applicant's parole office location (**applicant is required to live within the same zip code of the office if applicable**), household size, and other general preferences.
- The organization would **ideally choose a budget of 500k** for the first year
- KCHA is also interested in **which factors affect price the most**, and if they need to add any limitations to their program

DATA / METHODOLOGY

- Dataset used for modeling contains 21,597 house sale prices for King County, Washington sold between May 2014 and 2015
 - source: <https://www.kaggle.com/harlfoxem/housesalesprediction>
- Definitions:
 - price: sale price of house
 - bedrooms: number of bedrooms
 - bathrooms: number of bathrooms
 - grade: overall grade given to the housing unit, based on King County grading system (1 – 13)
 - zipcode: zip code where house is located
- Multiple Ordinary Least Squares Regression was performed to create the prediction model

KEY INSIGHTS

A predicted budget of at least \$556k is required to cover the down payments of all five families.

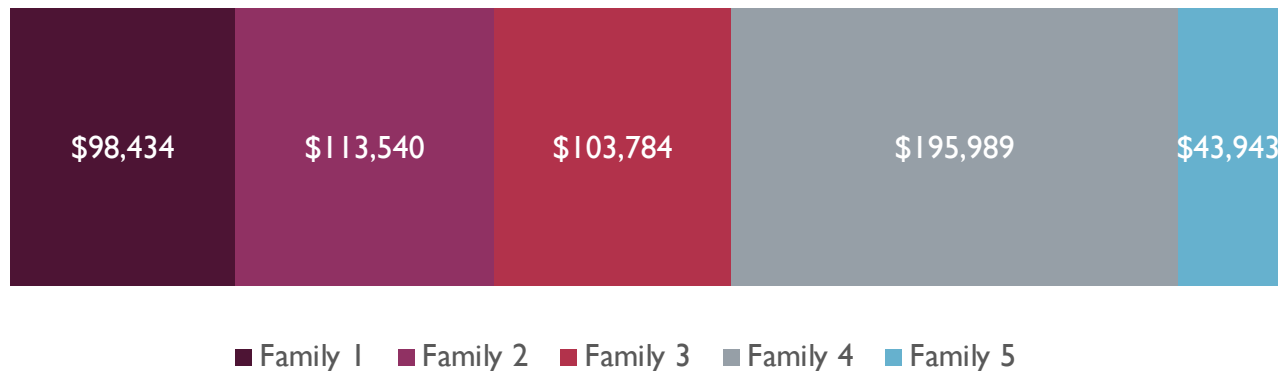
Grade, number of bedrooms, and number of bathrooms are all effective predictors on house prices. 94% of King County zip codes were significant in predicting price as well.

Among continuous predictors, an increase in grade had the biggest effect on house price with a 22% expected increase per unit increase, followed by bathrooms, with a 9% expected increase in sales per additional bathroom.

Among zip codes, homes in 98039, 98004 and 98112 generated the largest increases in house price.

FAMILY 4 ACCOUNTED FOR THE BIGGEST CHUNK OF THE BUDGET, REQUIRING A DOWN PAYMENT OF ALMOST 196K

Total Predicted Down Payment
Budget by Family

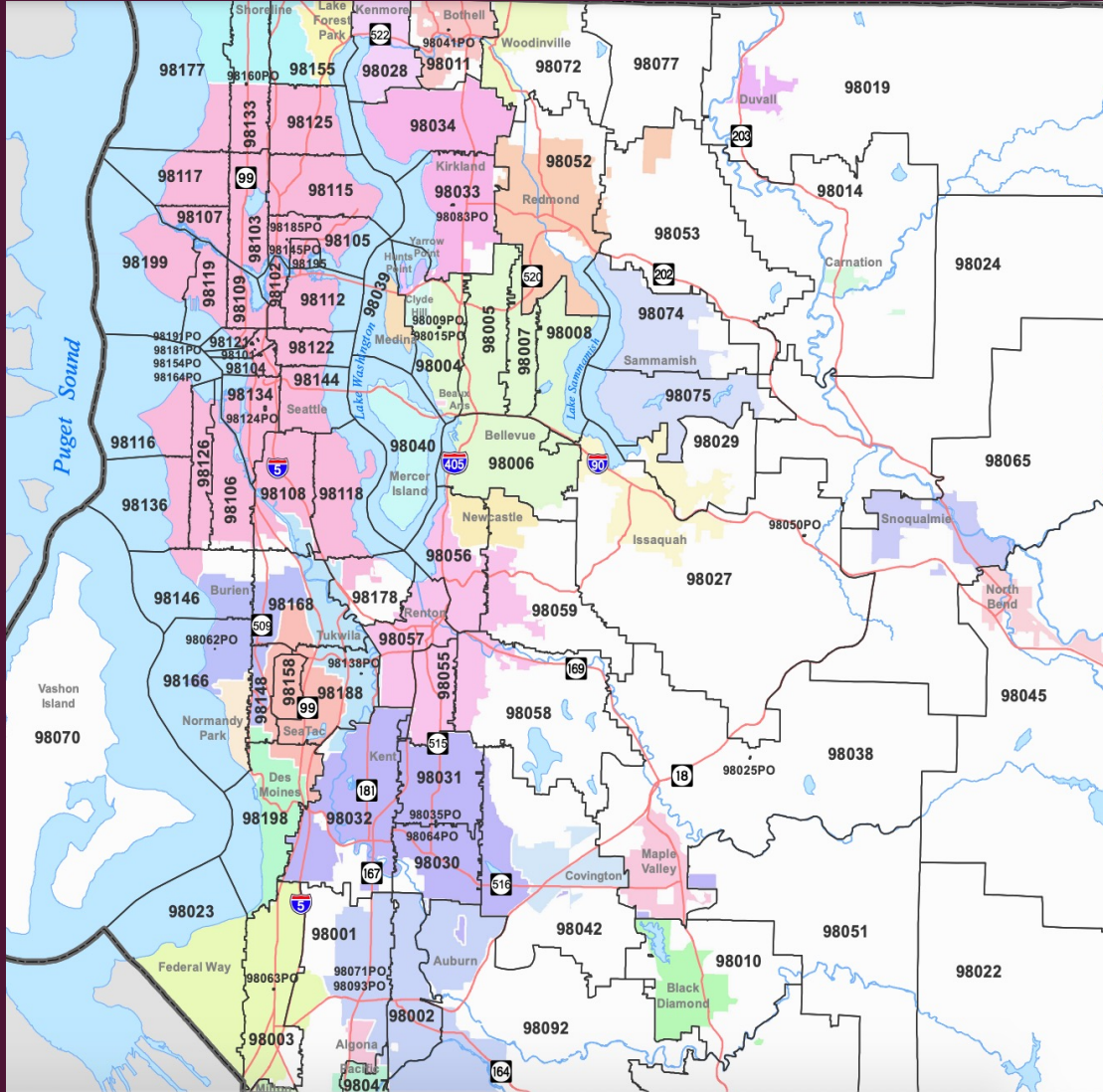


- The predicted budget needed to purchase homes for all 5 families is **at least \$555,691**, assuming a down payment of 30%.
- Family 4 requires a predicted **\$196k** due to their preference of a 4 bedroom, 3 bedroom home in 98112, with a basement and grade of at least 6.
- Family 5 accounted for the lowest portion of the budget at **\$43k** due to their preference of a 1 bedroom, 2 bathroom house in 98001, with a grade of at least 5.

KING COUNTY'S HOUSING GRADE WAS ONE OF THE STRONGEST PREDICTORS OF PRICE

Predictor	Correlation with sale price	Change in sale price with one unit change of predictor (%)
Grade	0.67	21.8
Bathrooms	0.53	9.3
Bedrooms	0.32	5.5

- Decreasing the grade value by one would decrease the price by about 22%
- For Family 4, decreasing grade from 6 to 5 would decrease the sale price by an expected 117k (or 35k off the down payment)
- Decreasing the number of bathrooms by one would decrease the price by about 9%
- Decreasing the number of bedrooms by one would decrease the price by about 6%



LOCATION PLAYS AN IMPORTANT FACTOR IN HOUSE PRICE

- Homes in zip codes 98039, 98004 and 98112 are generally expected to sell for the highest prices
- It's expected that a home in zip 98039 would increase the price by almost 4 times a house in zip 98001,
- If Family 4 chose adjacent zip code 98144 rather than 98112, we'd expect a decrease of almost 62k in the down payment.

CONCLUSIONS AND RECOMMENDATIONS:



KCHA can keep a budget of 500k for the first year of launch, contingent on adding limitations to their service

Consider less flexibility in applicants requesting a specific grade, as decreasing this value would expect a decrease in sales of 22%, allowing KCHA to keep families within the budget if it exceeds the limit.

Consider exceptions for requiring applicants to choose a home in the same zip code as their parole officer if these zip codes are expected to double the price.



APPENDIX

ZIP CODES AND THEIR EXPECTED CHANGE IN SALE PRICE COMPARED TO ZIP 98001

Predictor	Change in sale price if home in chosen zip rather than 98001(%)
98039	289%
98004	216%
98112	170%
98040	161%
98109	151%
98105	148%
98119	144%
98102	129%
98199	126%
98033	121%
98115	116%
98005	114%
98117	110%
98103	106%
98116	104%
98107	103%
98122	98%
98006	98%
98008	97%
98053	92%
98136	90%
98177	89%
98075	86%
98007	86%
98052	86%
98144	85%
98070	77%
98074	75%
98024	74%
98125	71%
98077	70%
98029	69%
98027	69%

Predictor	Change in sale price if home in chosen zip rather than 98001(%)
98034	68%
98072	68%
98126	64%
98065	61%
98011	56%
98118	54%
98155	53%
98028	52%
98014	52%
98133	50%
98166	48%
98059	45%
98019	44%
98045	43%
98056	42%
98010	40%
98108	35%
98146	34%
98106	27%
98038	20%
98178	19%
98022	17%
98058	17%
98055	14%
98148	13%
98198	11%
98188	9%
98168	8%
98042	8%
98031	6%
98092	4%
98023	-5%

FAMILY DETAILS

- Family 1 would like a 3 bedroom, 2 bathroom house in zip code 98011. They would prefer a basement and a home quality of at least 6/13
- Family 3 would like a 2 bedroom, 1 bathroom house in zip code 98032. They would prefer a home quality of 10/13
- Family 3 would like a 1 bedroom, 1 bathroom house in zip code 98045. They would prefer a home quality of at least 8/13
- Family 4 would like a 4 bedroom, 3 bathroom house in zip code 98112. They would prefer a basement and a home quality of at least 6/13
- Family 5 would like a 1 bedroom, 2 bathroom house in zip code 98001. They would prefer a home quality of at least 5/13