Supplementary document

- Fig1-5: SHAP dependence plot of each infrastructure features for the five cities:
- Fig 6-9: Comparison results for quantity-based infrastructure provision and infrastructure quality provision:
- Table 1: Silhouette Score of K-Means
- Table 2: Parameter ranges and optimal values for XGBoost Model

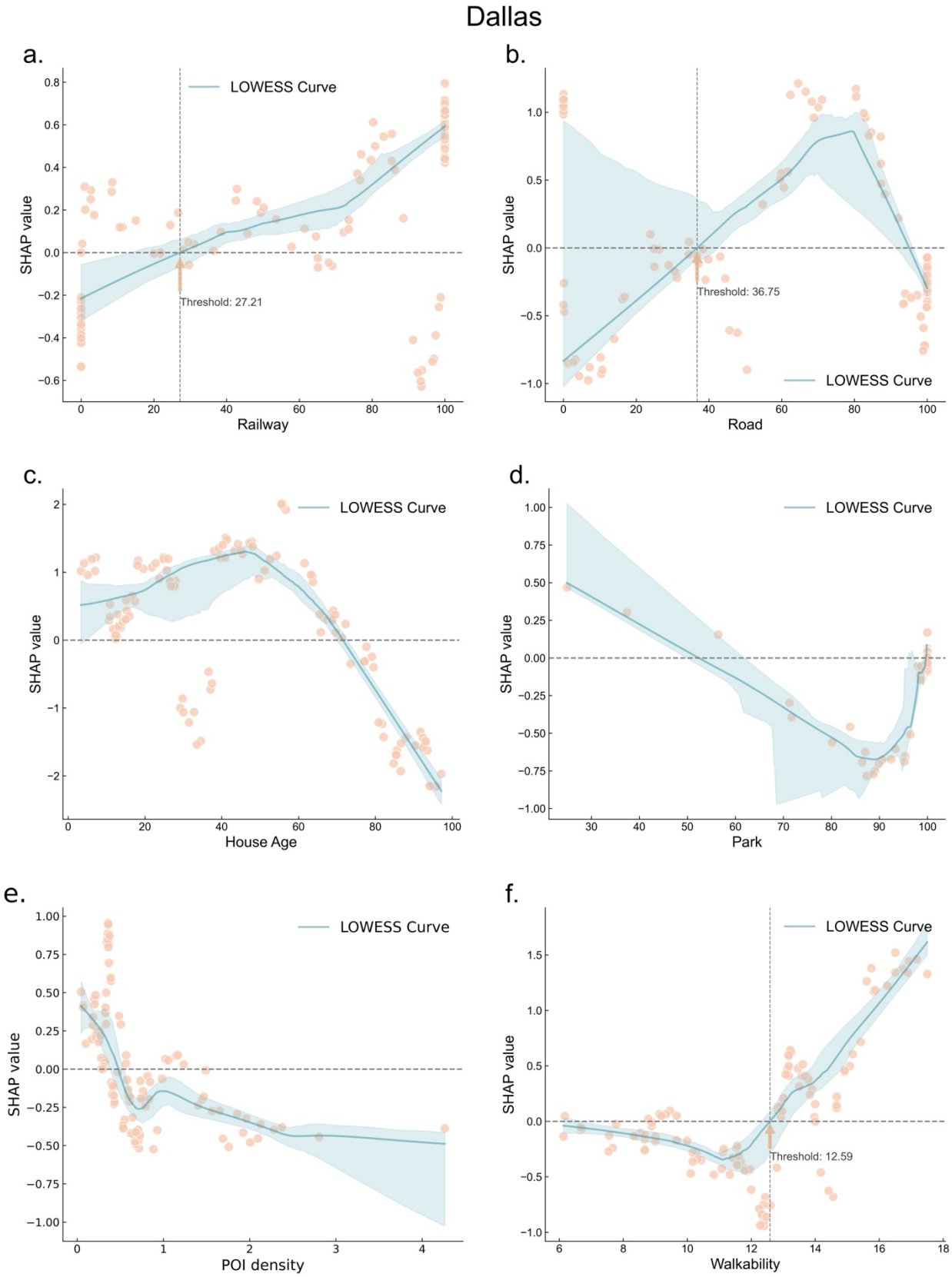

Fig 1. SHAP dependence plot for Dallas

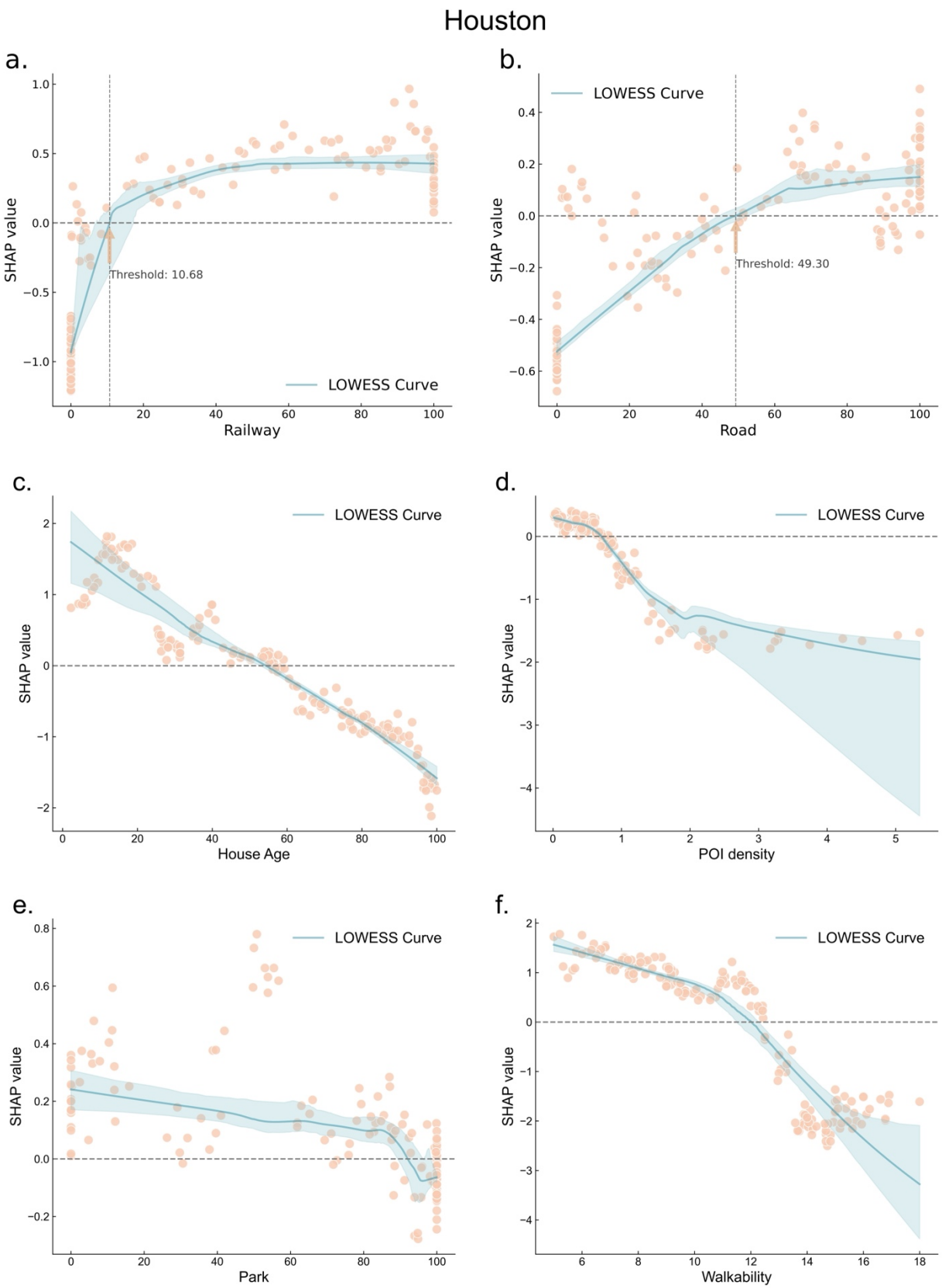

Fig 2. SHAP dependence plot for Houston

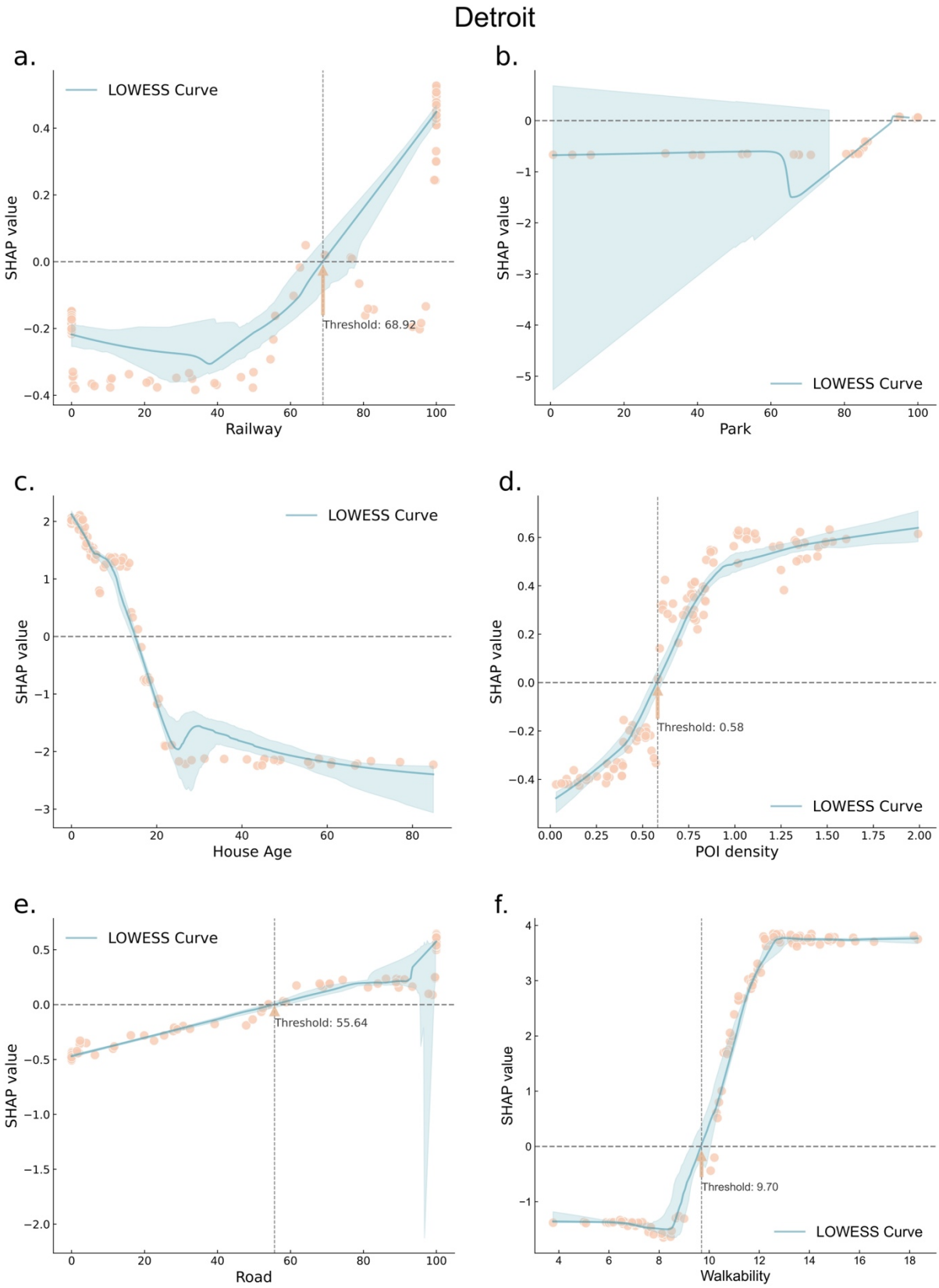

Fig 3. SHAP dependence plot for Detroit

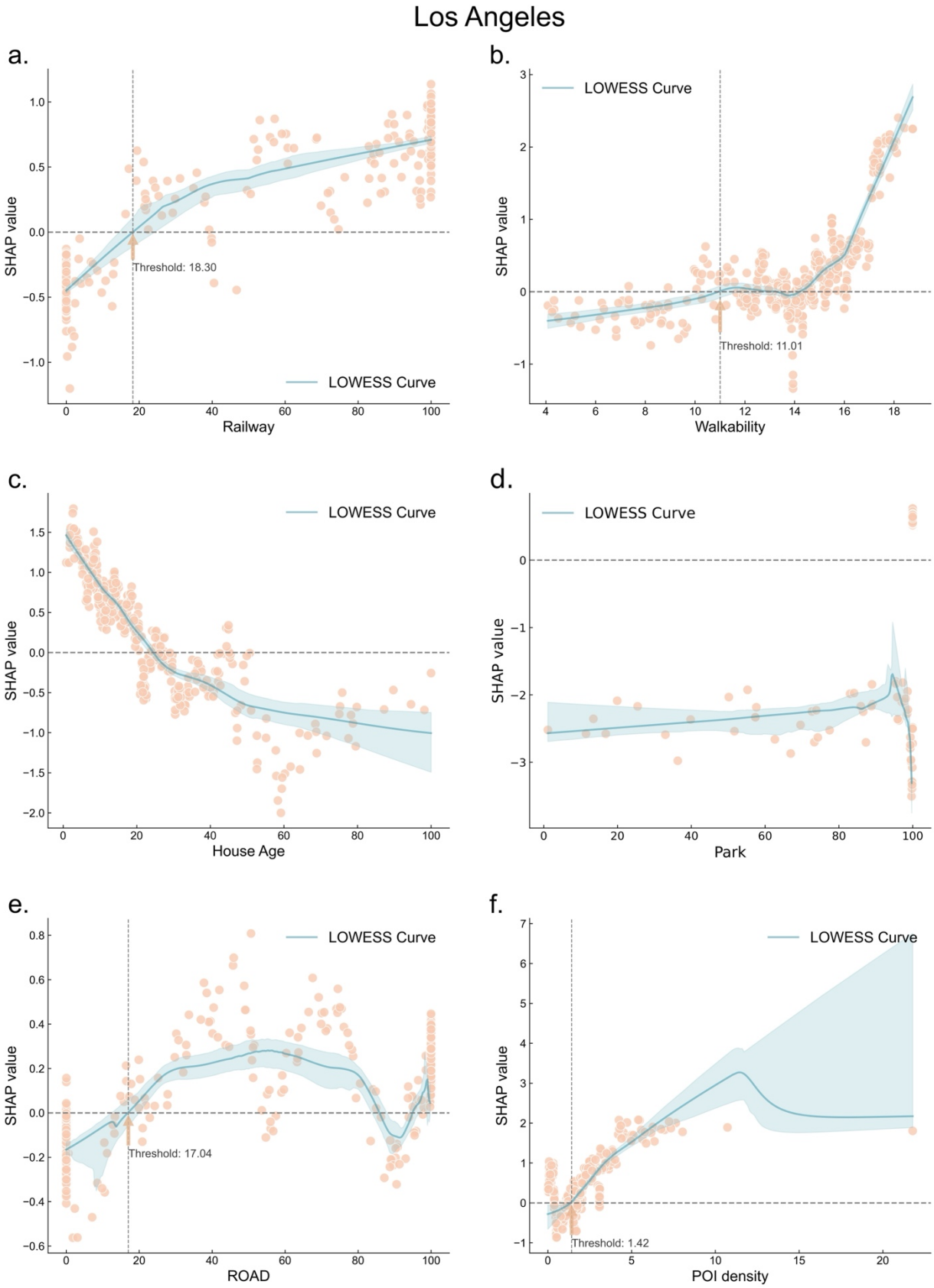

Fig 4. SHAP dependence plot for Los Angeles

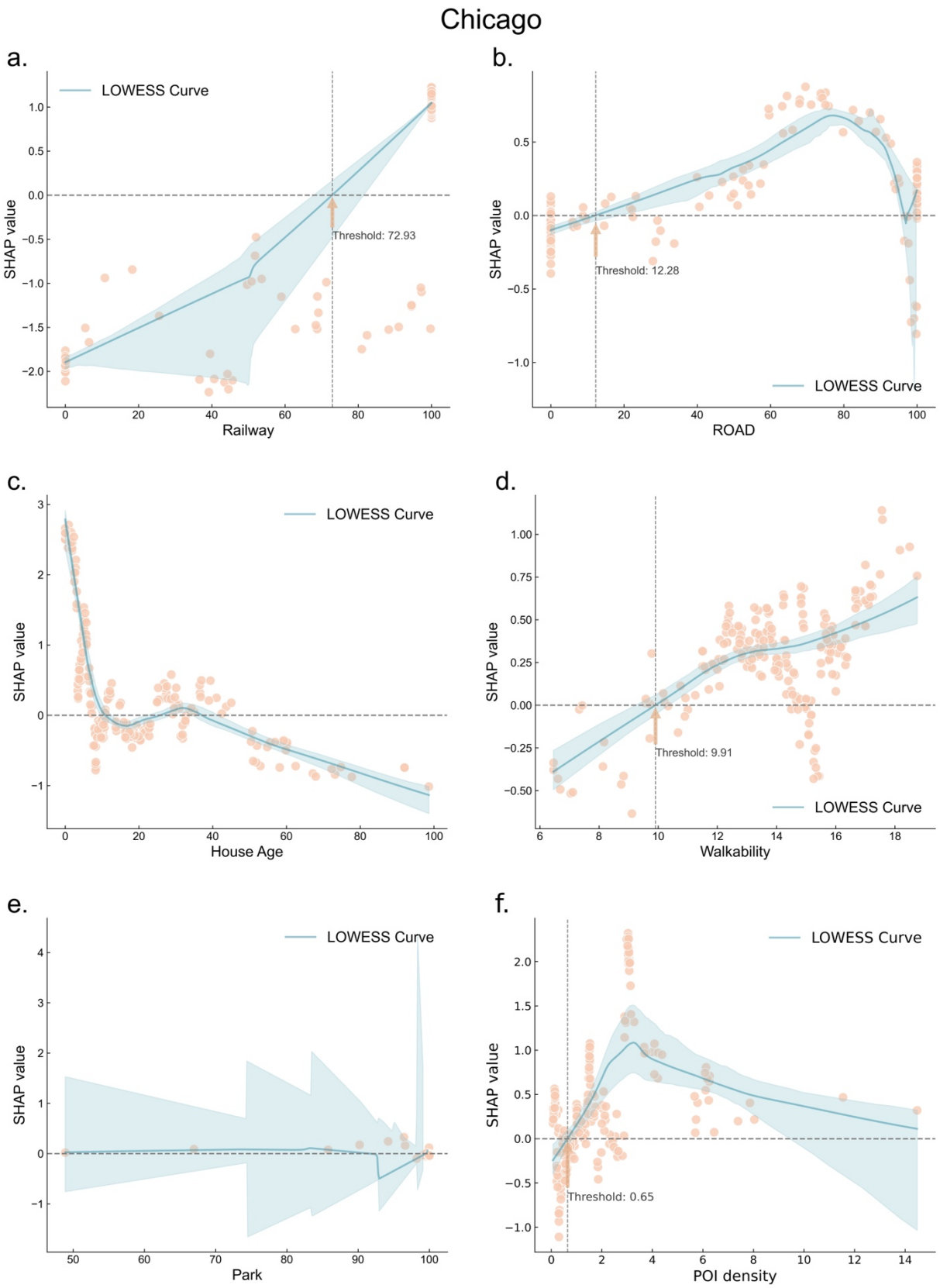

Fig 5. SHAP dependence plot for Chicago

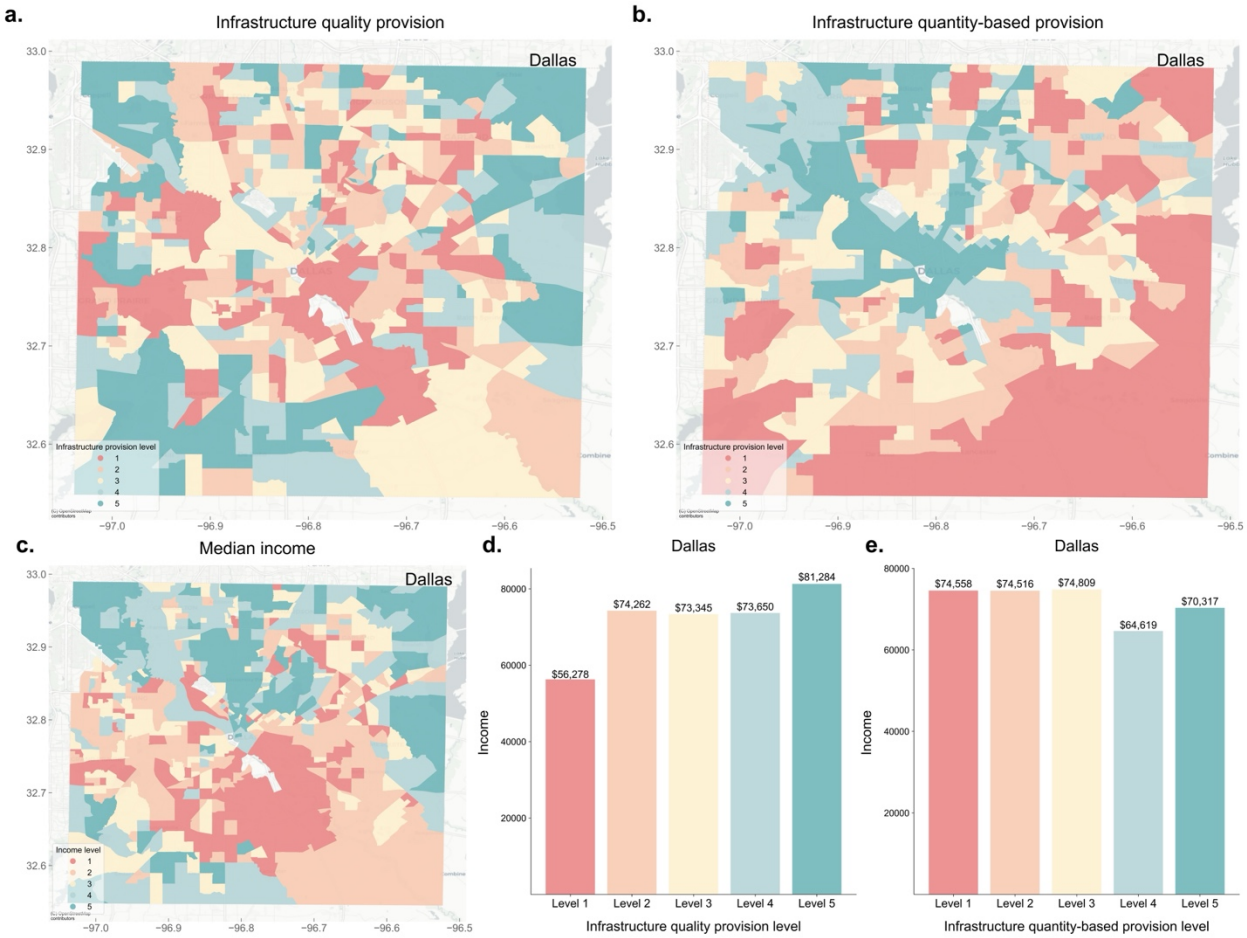

Fig 6. Comparison between quality- and quantity-based infrastructure provision for Dallas

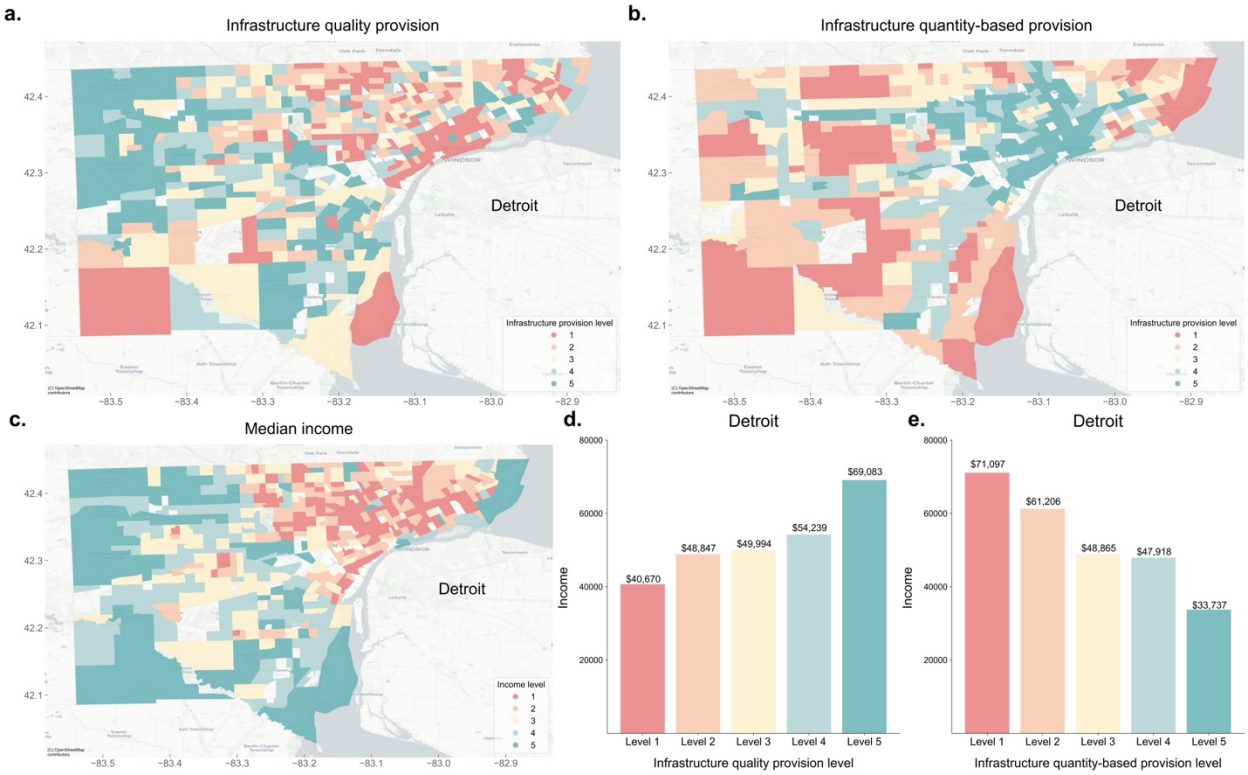

Fig 7. Comparison between quality- and quantity-based infrastructure provision for Detroit

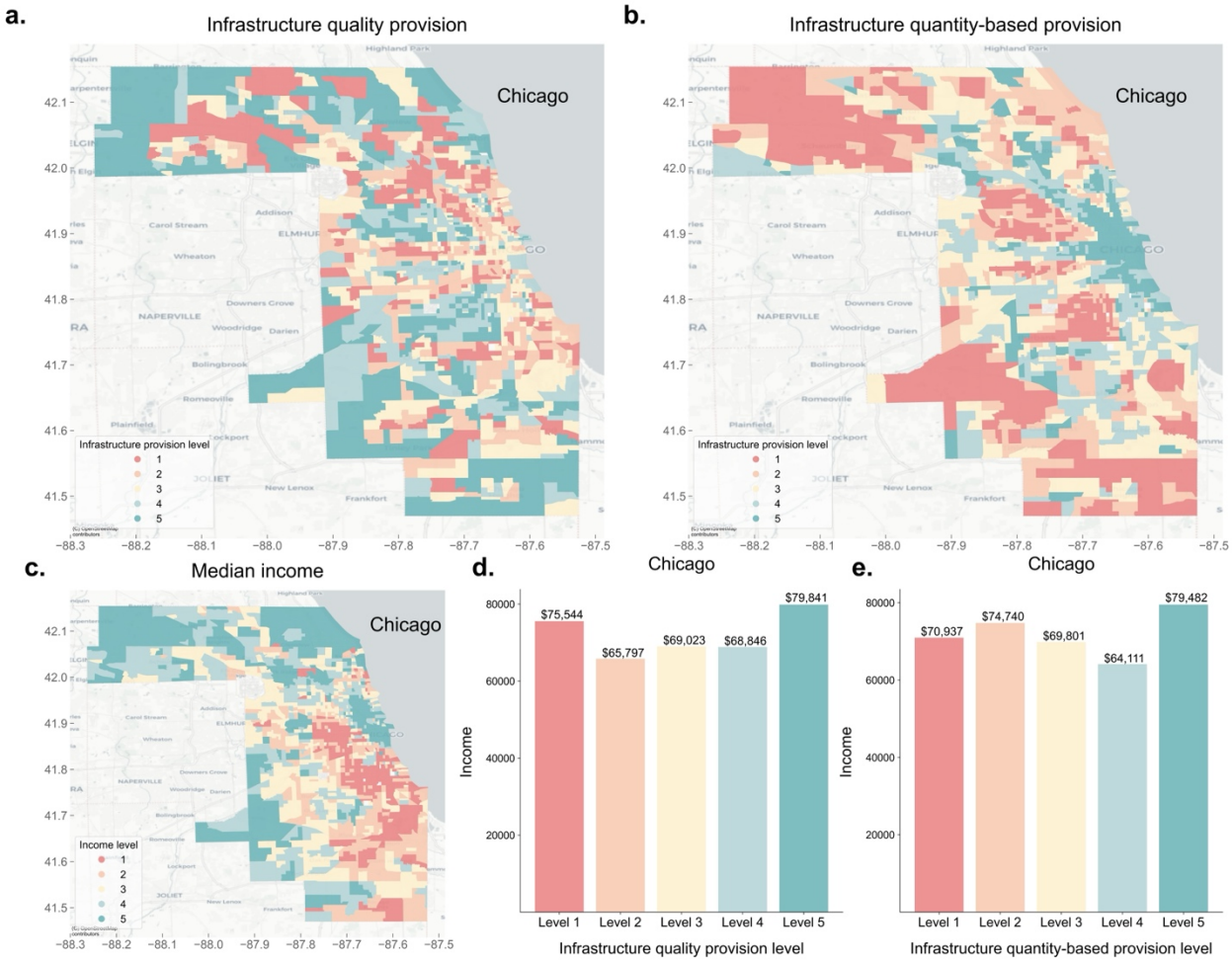

Fig 8. Comparison between quality- and quantity-based infrastructure provision for Chicago

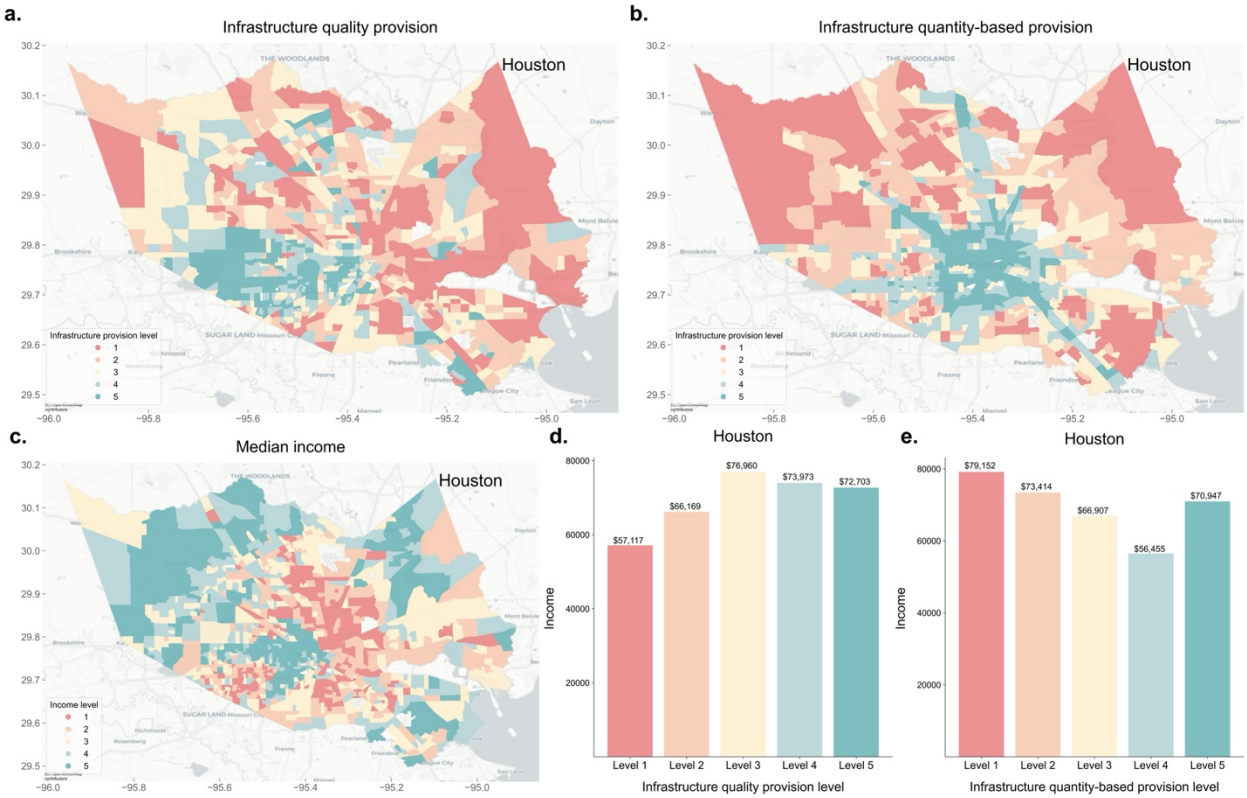

Fig 9. Comparison between quality- and quantity-based infrastructure provision for Dallas

Table 1. Silhouette Score of K-Means

Area	Silhouette Score
Houston	0.59
Dallas	0.42
Detroit	0.54
Chicago	0.52
Los Angeles	0.45

Table 2. Parameter ranges and optimal values for XGBoost Model

Parameters	Learning rate	N_estimators	Max_depth	Min_child_weight	Subsample	Gamma	Reg_lambda
Range	[0.01, 03]	[50, 51, …,200]	[3, 4, …, 10]	[1, 2, …, 6]	[0.6, 1.0]	[0, 0.5]	[0.1, 0.5, 1.0, 1.5, 2.0]
Houston	0.08	163	9	1	0.93	0.43	0.5
Dallas	0.14	105	9	2	0.88	0.22	1.0
Detroit	0.04	160	5	2	0.68	0.04	2.0
Chicago	0.20	55	8	2	0.80	0.21	1.5
Los Angeles	0.14	105	9	2	0.88	0.22	1.0