

Analyzing Geographic Disparity in U.S. Heart Allocation System

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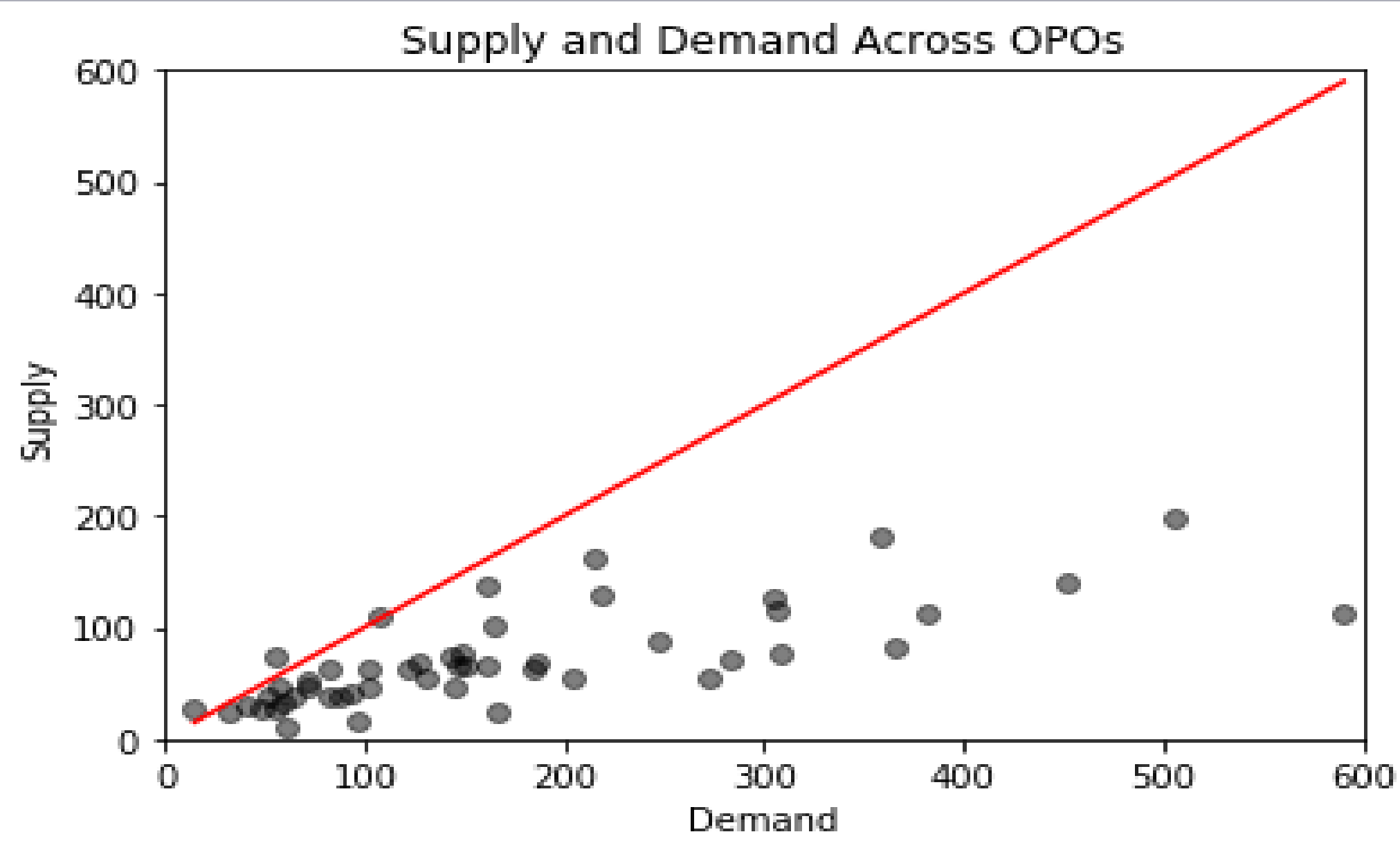
Background

- ❖ In the United States, the allocation of solid organs for transplantation is regulated and maintained by the United Network for Organ Sharing (UNOS).
- ❖ Organ Procurement Organizations (OPO) are responsible for evaluation and procurement of deceased-donor organs. There are 58 OPOs overseen by UNOS across United States.
- ❖ The Department of Health and Human Services Final Rule clearly states that **“neither place of residence nor place of listing shall be a major determinant of access to a transplant”** [1].
- ❖ UNOS/OPTN recently approved a major nationwide change to the allocation algorithm of hearts for adult candidates.
- ❖ The newly approved heart policy alters the categorization of patients into severity status and the sequence of allocation for the most urgent candidates.

Method and Data

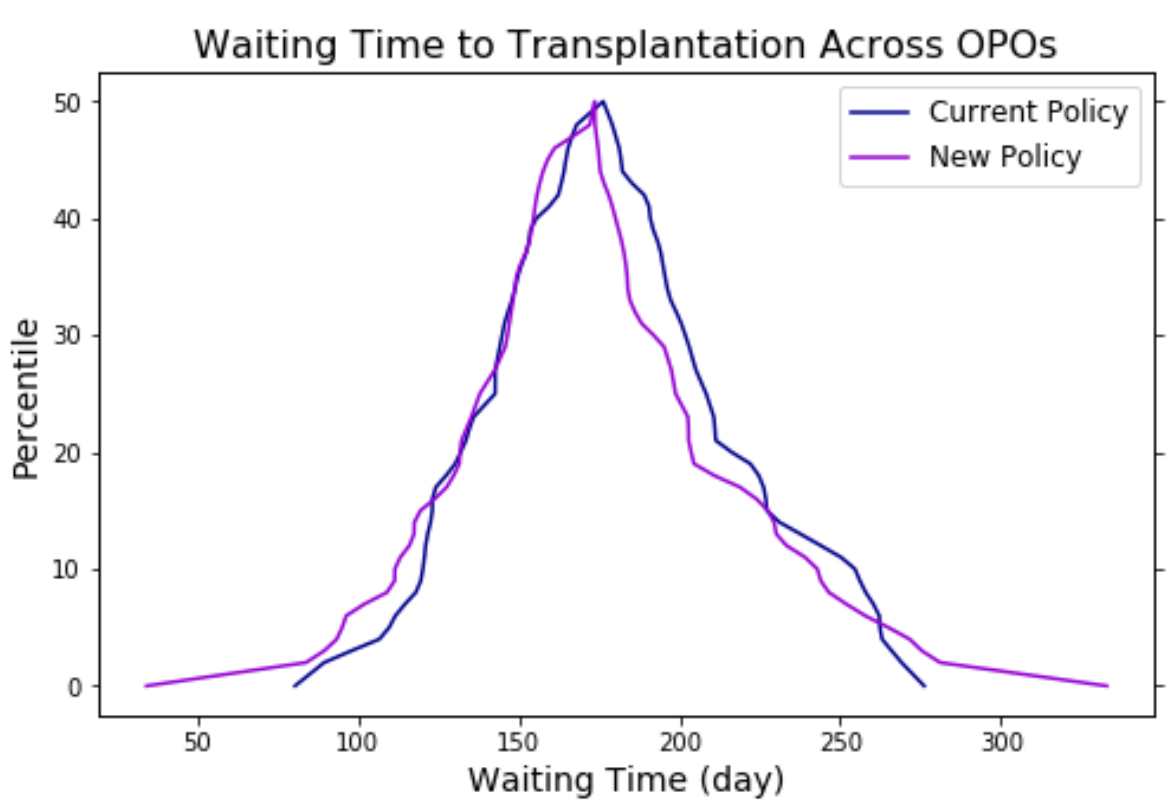
- ❖ **Aim:** Comparing geographic disparity in access to heart transplant based on current policy vs the newly proposed 6-tiers with broader sharing allocation model (new policy).
- ❖ **Method:** We compared the transplant results of the two heart allocation models by simulating the policies using TSAM.
- ❖ **Data:** 2009-2011 UNOS data. We considered only adults (age ≥ 18). The data contains 8434 adult patients who needed heart. (excluding the patients in need for lung)
- ❖ **Disparity metrics:** We measured disparity at the OPO level and at the regional level computing the following metrics:
 - ❖ Standard deviation
 - ❖ Range
 - ❖ Mean squared difference from the best rate (MSBR)
 - ❖ Interquartile range (20th – 80th)

- ❖ For two OPOs, supply is greater than demand: PRLL and SCOP
- ❖ For one OPO, supply is equal to demand: WMOP
- ❖ The three OPOs, NYRT, CAOP and TXGC on the far right have the largest gap between supply and demand.



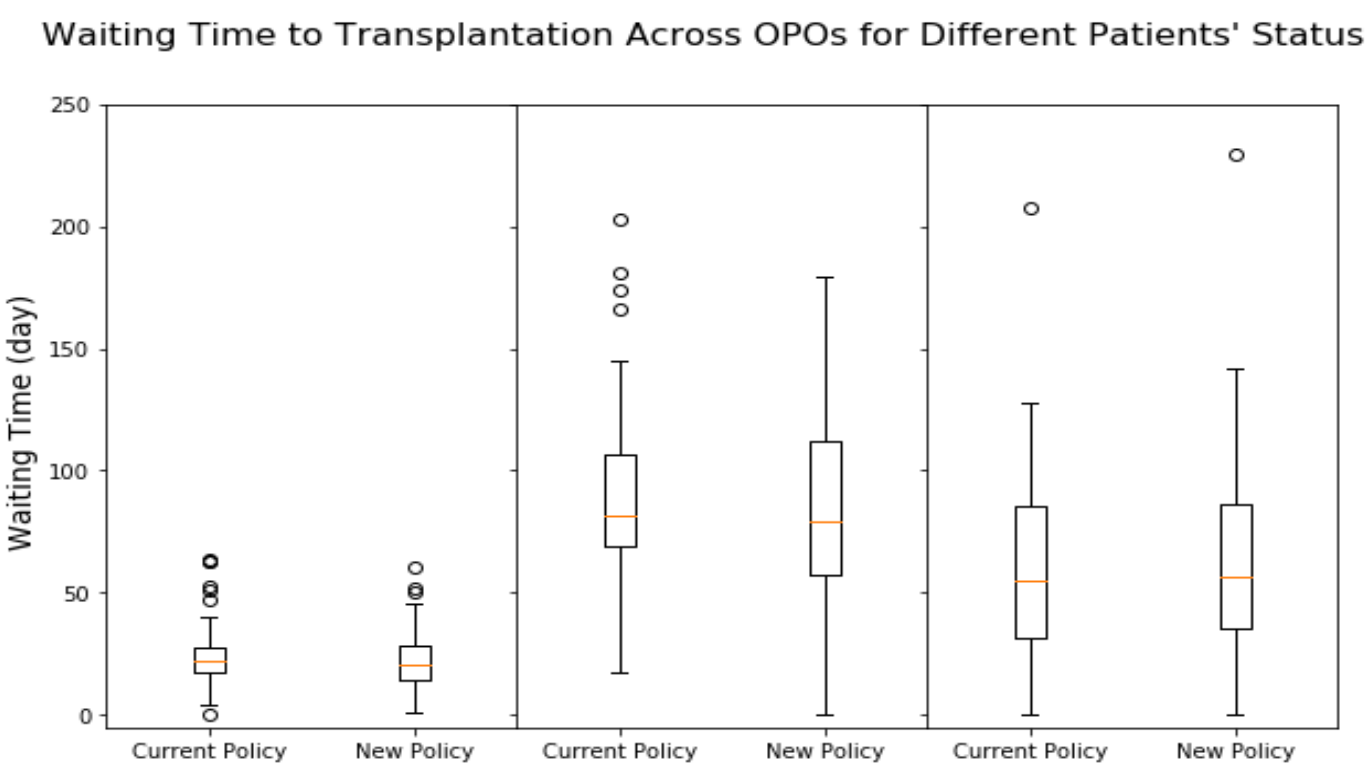
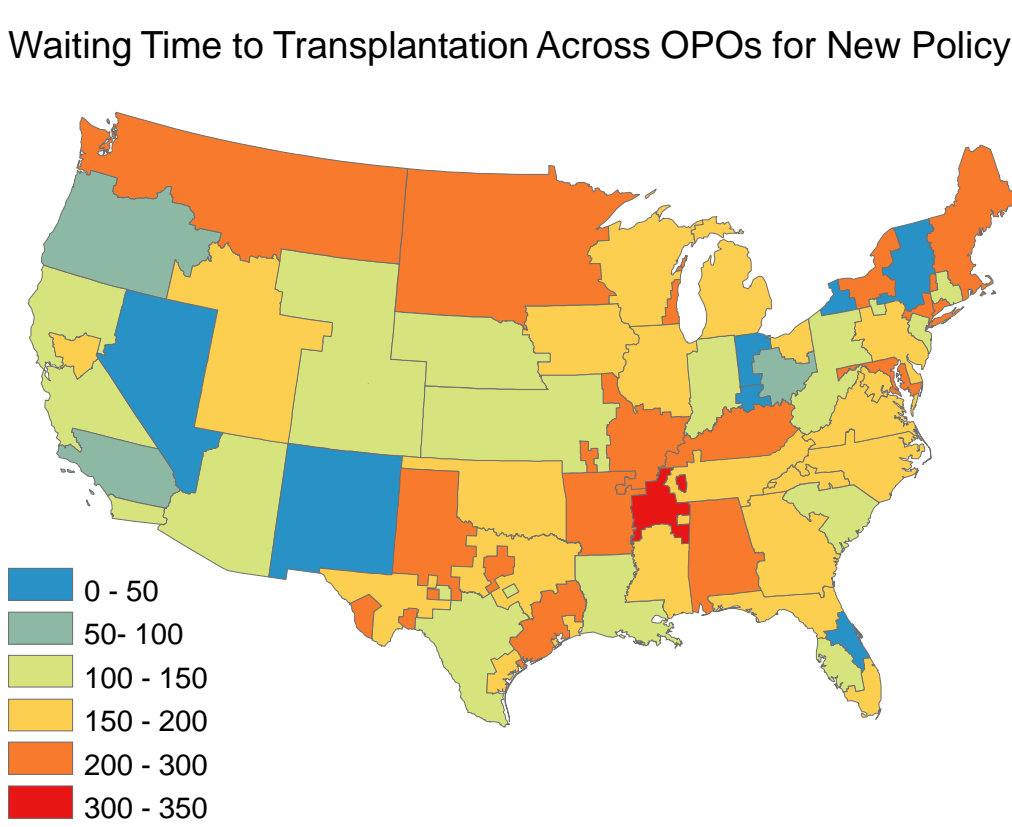
Results

Analyzing Geographic Disparity in Waiting Time to Transplantation

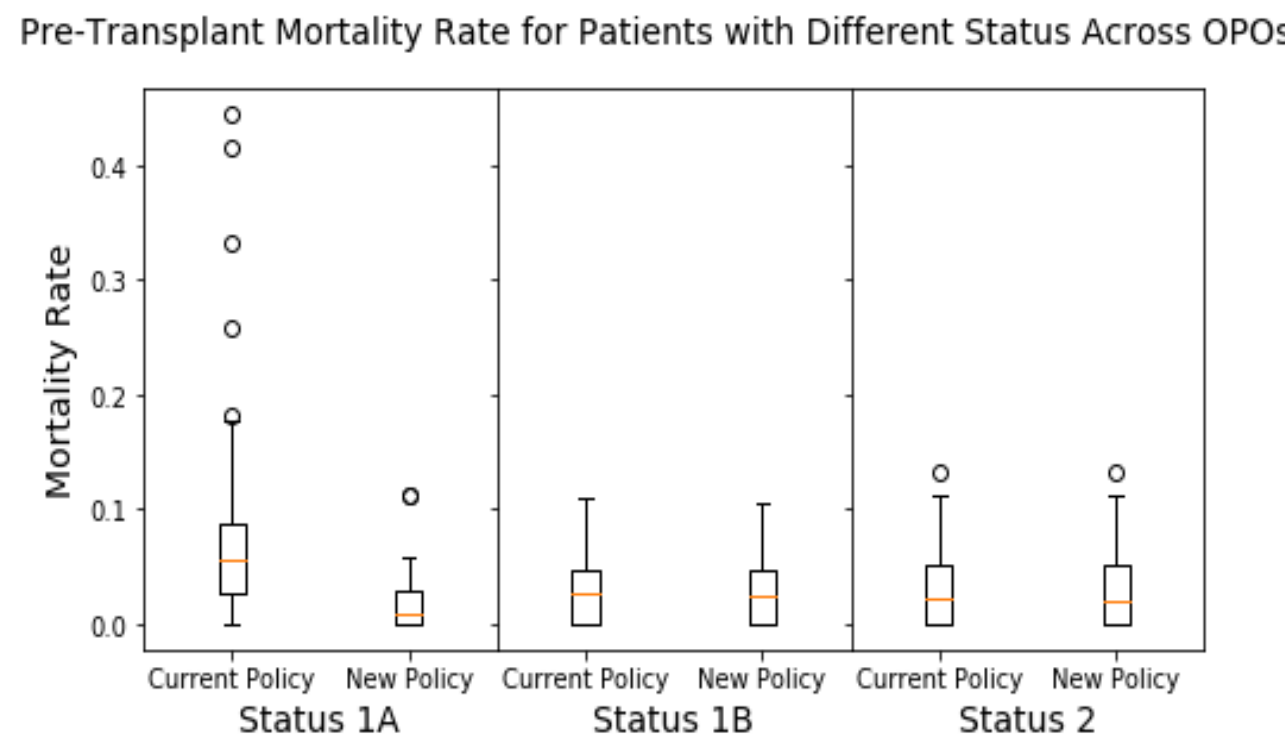
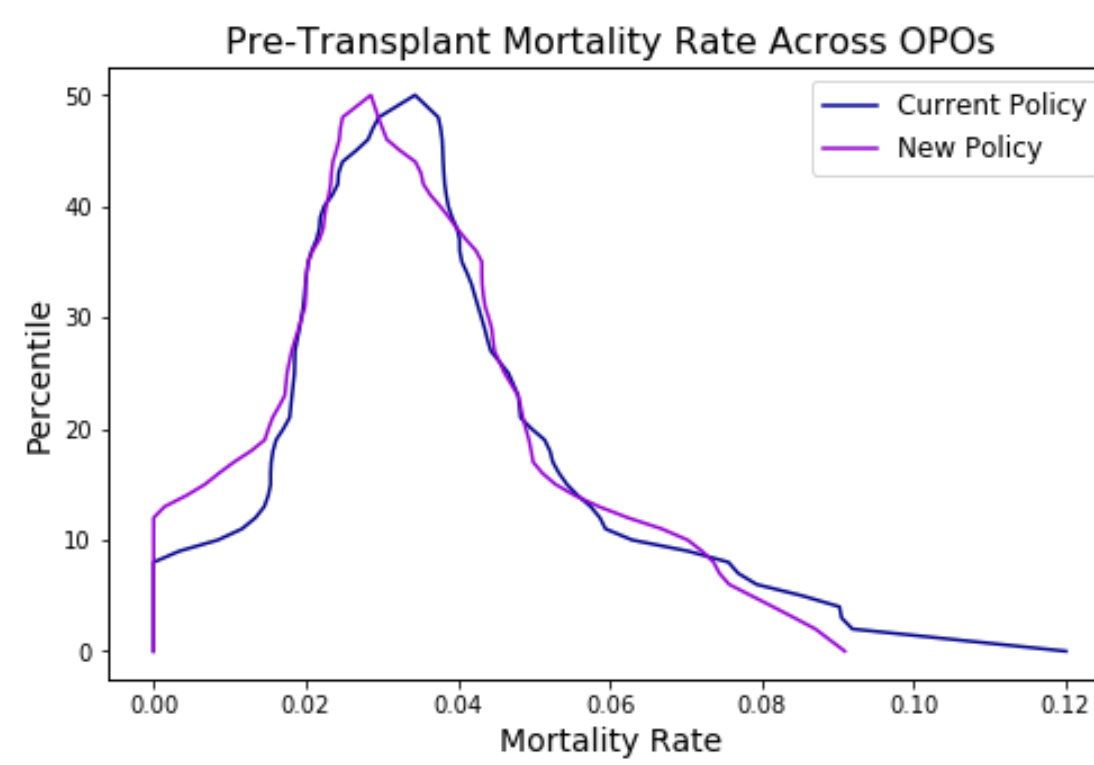


	Average of Total Waiting Time (days) Across OPOs	
	Current Policy	New Policy
Mean	176.6	170.81
STD	56.4	59.7
MSBR	150.6	172.47
Range	229.5	285.8
Interquartile range	176.3	173.6

- ❖ The two policies have very close mean waiting time among OPOs.
- ❖ Geographic disparity exists in both policies in terms of waiting time.
- ❖ The new policy has increased geographic disparity in waiting time across OPOs.
- ❖ The new policy improved geographic disparity for waiting time for Status 1B and Status 2.
- ❖ The new policy increased geographic disparity in waiting time for Status 1A.



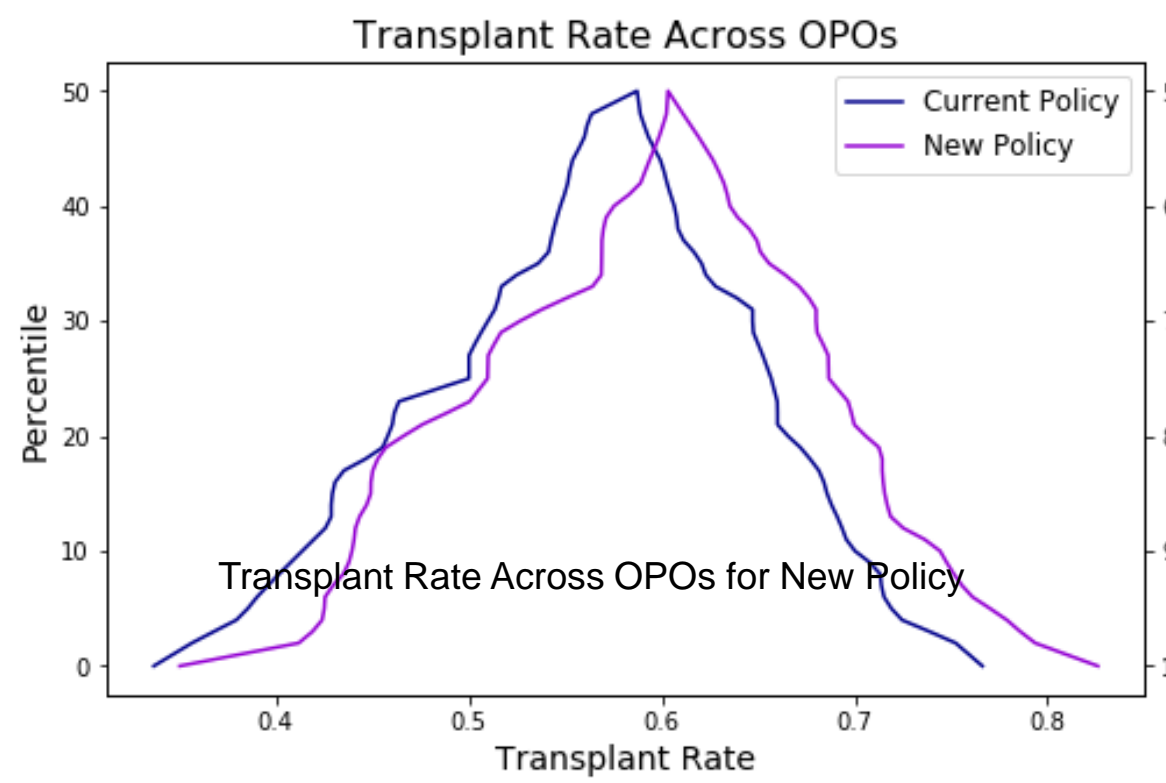
Analyzing Geographic Disparity in Pre-Transplant Mortality Rate



- ❖ The new policy decreased mortality rate for patients on the waiting list.
- ❖ The new policy improved geographic disparity in pre-transplant mortality rate for status 1A patients across OPOs.

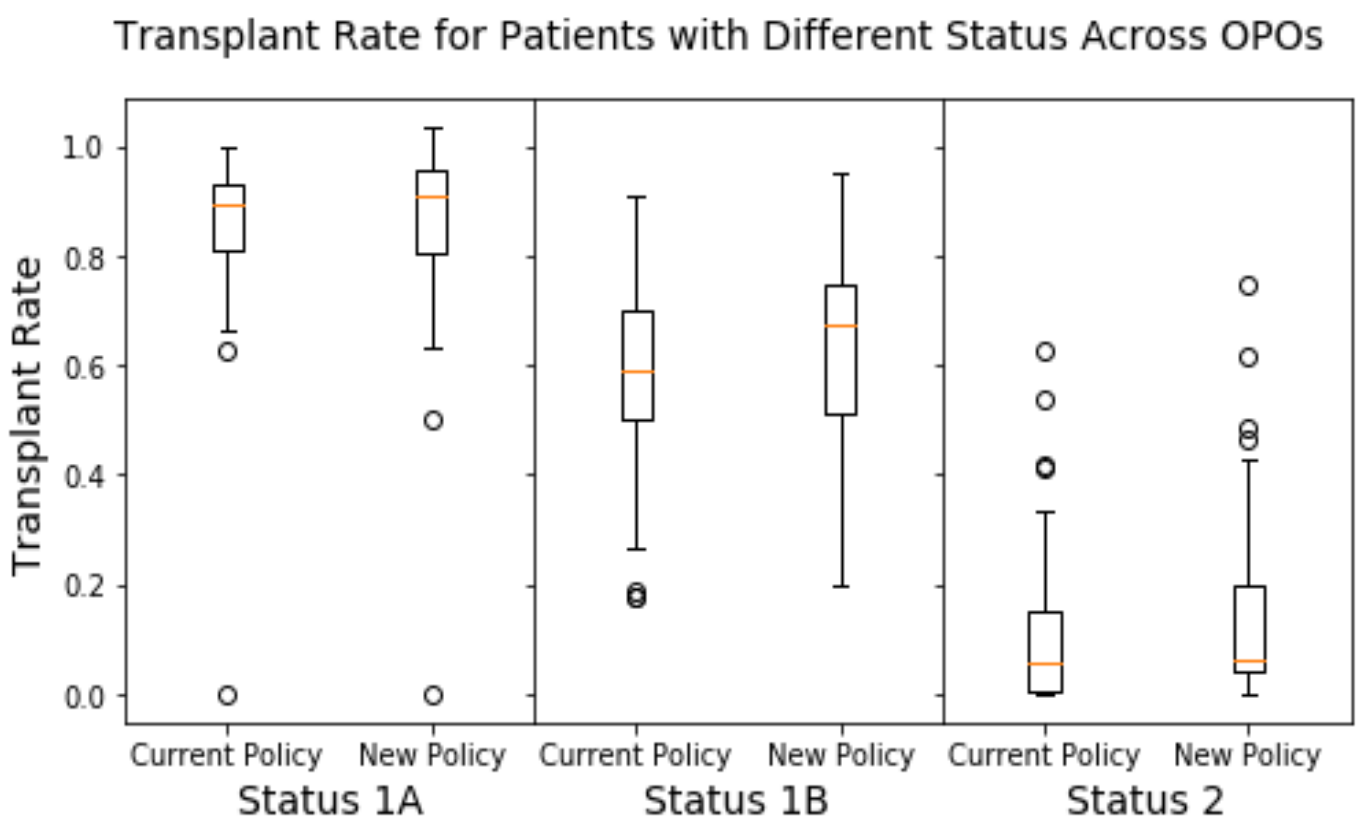
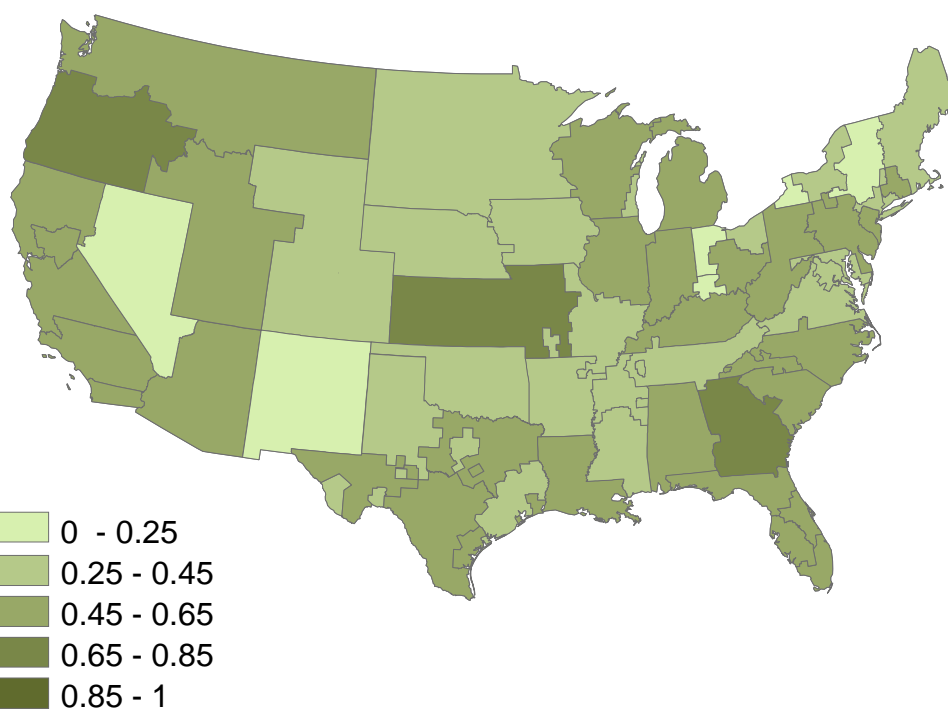
	Pre-Transplant Mortality Rate Across OPOs	
	Current Policy	New Policy
Mean	0.07	0.03
STD	0.03	0.02
MSBR	0.045	0.03
Range	1	0.08
Interquartile range	0.05	0.03

Analyzing Geographic Disparity in Transplant Rate

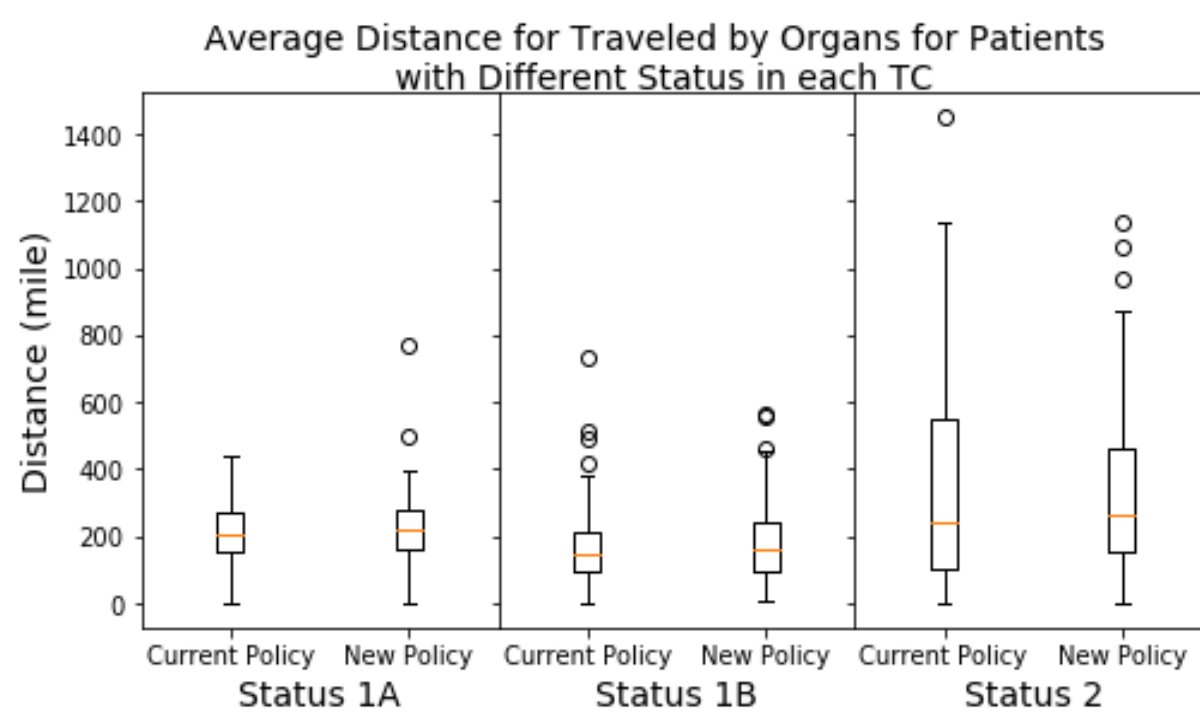
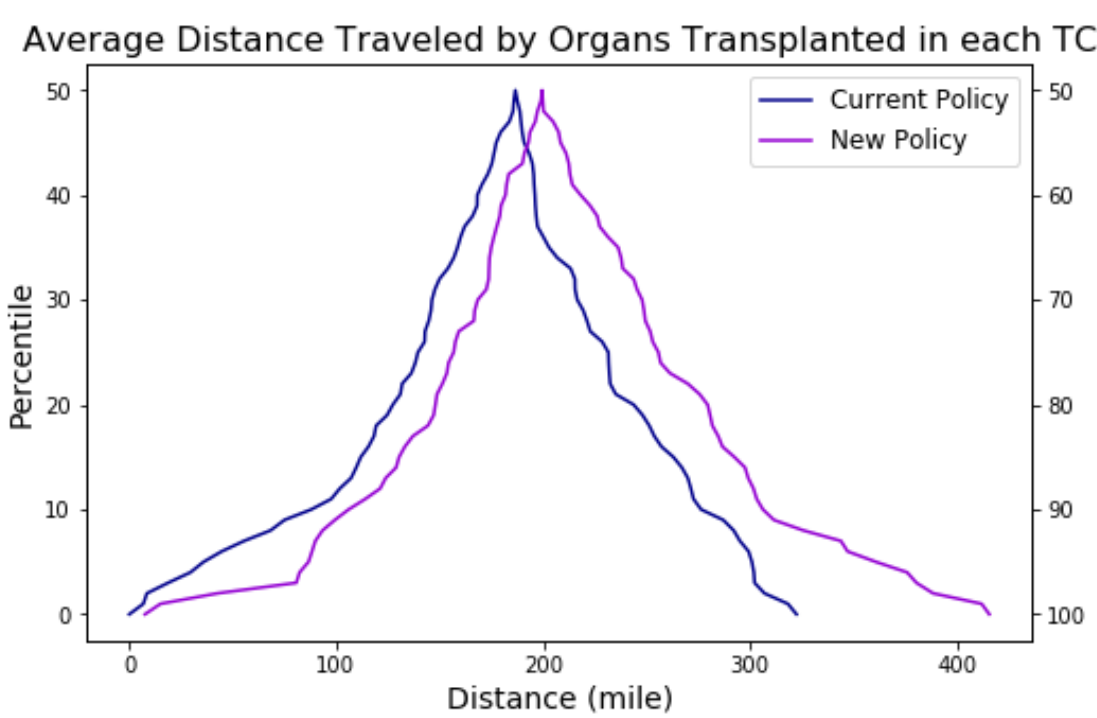


	Average of Transplant Rate Across OPOs	
	Current Policy	New Policy
Mean	0.56	0.59
STD	0.12	0.12
MSBR	0.22	0.25
Range	0.42	0.48
Interquartile range	0.23	0.25

- ❖ The two policies have very close mean waiting time among OPOs.
- ❖ Geographic disparity exists in both policies in terms of transplant rate.
- ❖ The new policy increased geographic disparity in transplant rate across OPOs.
- ❖ The new policy increased geographic disparity of transplant rate for patients with different status.



Geographic Disparity in Average Distance Traveled by Organs



- ❖ The new policy increased the average distance that an organ traveled.
- ❖ The new policy increased geographic disparity that an organ should travel across transplant centers.

	Average Distance (mile) Traveled by Organs in each TC	
	Current Policy	New Policy
Mean	193.23	219.12
STD	86.83	104.9
MSBR	211.7	235.94
Range	412.1	683.9
Interquartile range	138.3	135.9

Discussion and Conclusions

- ❖ With the new policy, transplant rate, waiting time and pre-transplant mortality rate improve.
- ❖ With the new policy, the average distance that organs should travel to be transplanted increases.
- ❖ With both policies geographic disparity is larger for transplant rate, waiting time and average distance traveled by organs.
- ❖ With the new policy geographic disparity in transplant rate, waiting time and average distance traveled by organs increase.

References

[1] DHHS. Organ Procurement and Transplantation Network; Final Rule (42 CFR Part 121). Federal Register 1998; 63(63): 16296–16338.

Disclosure Statement:
No use of off-label and/or investigational drugs/devices in this study/presentation.
No relevant financial relationship exists for this study/presentation.

