

Evaluating the Impact of Monetary Incentives on Health Equity : A Distributional Cost-Effectiveness Analysis of COVID-19 Vaccination Strategies



Jae Man Park¹; Henry S. Brown²; Xiao (Lilac) Li³; David R. Lairson²; Youngran Kim²

¹San Diego State University; ²UTHealth Houston School of Public Health; ³University of Nebraska at Kearney | ISPOR 2026 | Poster Code EE89

INTRODUCTION

- Monetary incentives, including cash payments and lotteries, were used to increase COVID-19 vaccination uptake.
- Conventional CEA summarizes average value but does not show who gains health or who bears health opportunity costs.
- DCEA evaluates efficiency-equity trade-offs by modeling health gains and opportunity costs across population subgroups.

OBJECTIVE

To evaluate the cost-effectiveness and health equity impact of Cash \$25, Cash \$50, Cash \$100, and Lottery incentives versus no incentive using DCEA.

METHODS

Data Sources / Inputs

- Inputs came from an Ohio-scaled dynamic SVIR CEA model of vaccine-eligible residents aged ≥12 years.
- Lottery and cash incentive effects were informed by published U.S. studies.
- Strategies: no incentive, Cash \$25, Cash \$50, Cash \$100, and Lottery.
- Base case: 1-year payer perspective; realized program spending; WTP = \$150,000/QALY.

Study Population

- Ohio vaccine-eligible population aged ≥12 years: 10,108,203 people.
- Stratified into 25 race/ethnicity × SVI subgroups: 5 race/ethnicity categories × 5 SVI quintiles.
- Race/ethnicity categories: Hispanic, NH Black, NH White, API, and AIAN.
- NH = non-Hispanic; API = Asian/Pacific Islander; AIAN = American Indian/Alaska Native.

Measures / Analysis



- Efficiency: incremental HALYs (QALY-equivalent in this analysis), net costs, ICER, and NMB at \$150,000/QALY.
- Equity: subgroup net health benefit and Atkinson EDE/100k across 25 race/ethnicity × SVI subgroups.
- CEA/NMB used net costs; DCEA converted strategy-specific program spending into health opportunity costs.
- Threshold sensitivity assessed WTP values from \$50,000 to \$300,000/QALY.

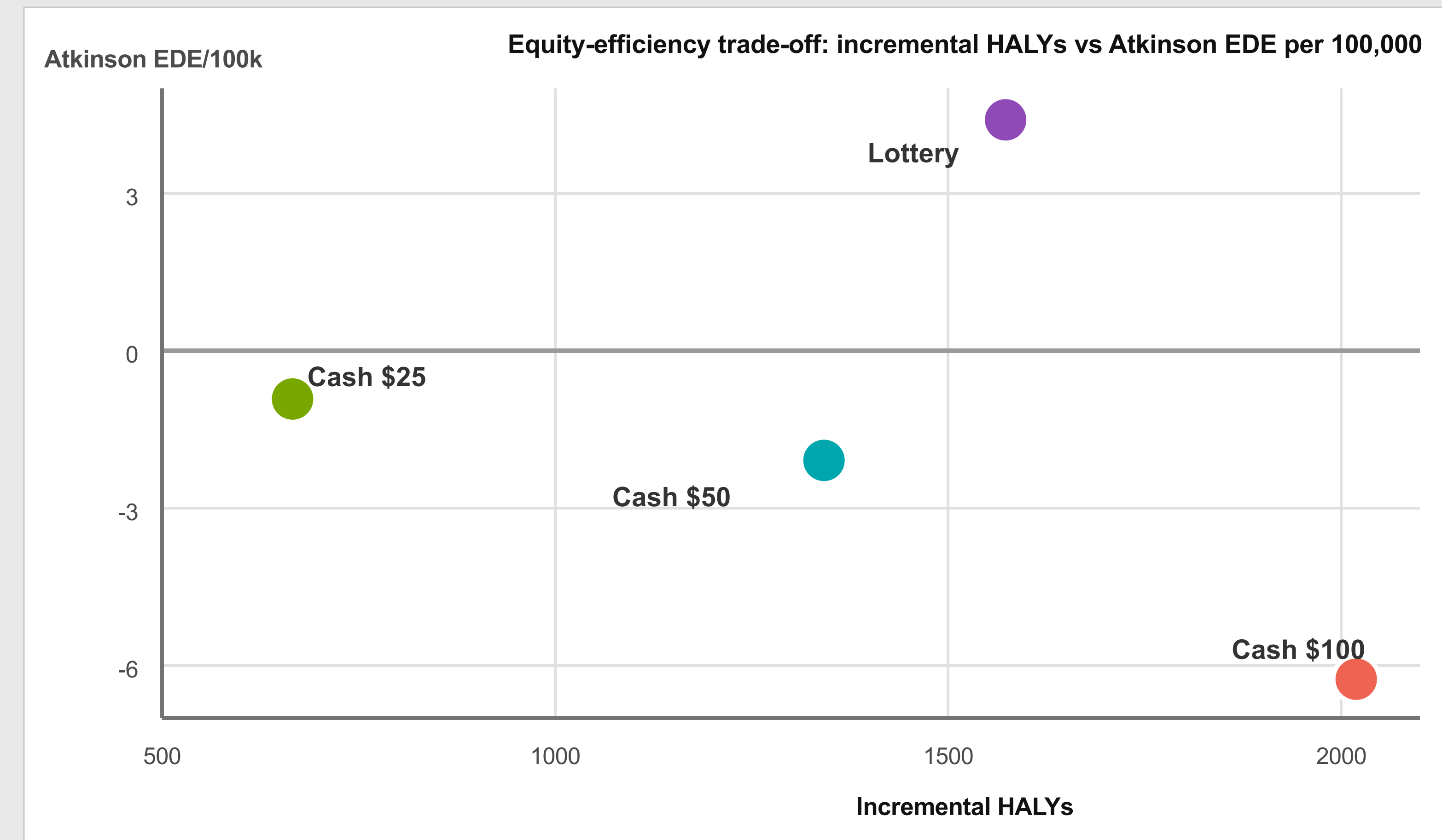
RESULTS: EFFICIENCY AND COSTS

Strategy	Incremental HALYs	Net costs	ICER	NMB
Cash \$25	666	\$13.5M	\$20,308	\$86.4M
Cash \$50	1,342	\$28.5M	\$21,209	\$172.9M
Cash \$100	2,019	\$67.2M	\$33,256	\$235.7M
Lottery	1,573	-\$3.55M	Cost-saving	\$239.5M

Base case: payer perspective, WTP threshold = \$150,000/QALY. All HALYs, costs, ICERs, and NMBs are incremental vs no incentive.

- All incentive strategies improved health compared with no incentive.
- Cash \$100 maximized incremental HALYs (2,019), while Lottery maximized NMB and equity-adjusted performance.
- Lottery had the highest NMB at \$150,000/QALY, narrowly exceeding Cash \$100.

EFFICIENCY-EQUITY TRADE-OFF



THRESHOLD SENSITIVITY

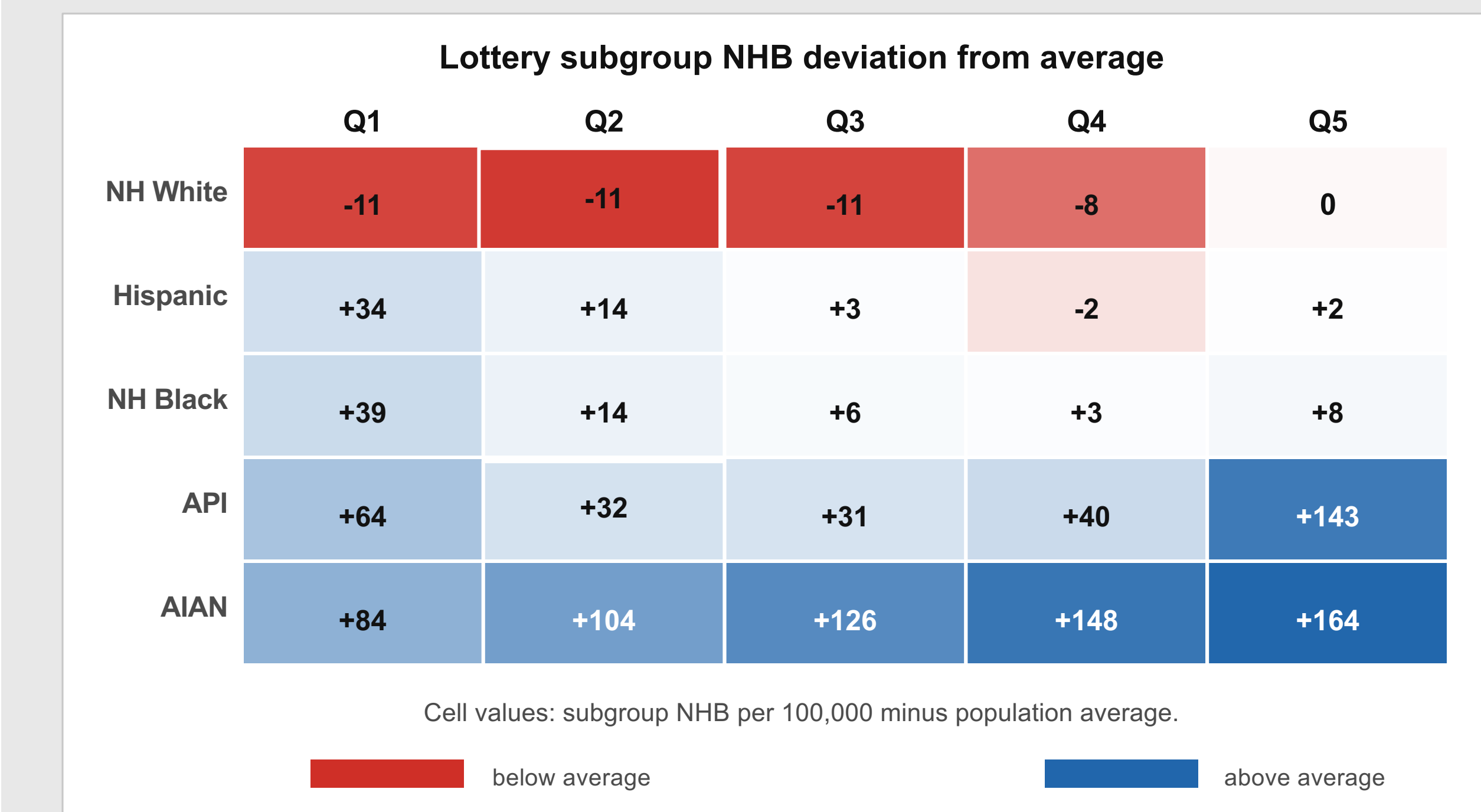
- Lottery was preferred at thresholds below approximately \$158,000/QALY.
- Above this threshold, Cash \$100 became NMB-preferred.
- Equity rankings remained stable from \$50,000 to \$300,000/QALY, with Lottery highest on EDE.

RESULTS: EQUITY-ADJUSTED PERFORMANCE

Strategy	Incremental HALYs	Atkinson EDE/100k (epsilon=10)	Rank
Lottery	1,573	+4.40	1
Cash \$25	666	-0.92	2
Cash \$50	1,342	-2.09	3
Cash \$100	2,019	-6.26	4

- Lottery ranked first on the Atkinson EDE metric, with EDE +4.40 per 100,000 population.
- Cash incentives showed larger equity penalties as incentive size increased.
- Cash \$100 maximized incremental health gains but had the weakest equity performance.

RACE × SVI SUBGROUP PATTERNS



- Under Lottery, NH White Q1-Q3 showed the largest below-average per-capita NHB deviations.
- API subgroups were above average across SVI quintiles, with the largest deviation in Q5.
- AIAN subgroups had increasingly above-average per-capita NHB from Q1 to Q5.

DISCUSSION AND CONCLUSION

- In this model, the preferred strategy depended on policy priorities.
- Cash \$100 generated the largest health gain; Lottery was cost-saving, had the highest NMB at \$150,000/QALY, and ranked highest on Atkinson EDE.
- DCEA clarified trade-offs among total health gain, economic value, and equity.

Limitations

- Cash \$100 uptake was modeled/extrapolated because direct empirical evidence for this incentive level was limited.
- Transmission dynamics and subgroup heterogeneity were simplified.

Selected references

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TAKEAWAY

Cash \$100 maximized health gains, but Lottery provided the strongest value-equity balance: cost-saving, highest NMB, and highest Atkinson EDE in this model.