The Health Equity Impact of a Hypothetical Disease-Modifying Treatment for Alzheimer's Disease in the United States: A Distributional Cost-Effectiveness Analysis

Patricia G. Synnott, MS, MALD[1]; Pei-Jung Lin, PhD[1] ; Daniel A. Ollendorf, PhD[1]; Yolanda Zhu, PhD[1]; Thomas Majda, PharmD, MS[2]; Stacey Kowal, MS, MSc[2]

[1]Tufts Medical Center, Boston, MA, USA; [2]Genentech, Inc., South San Francisco, CA, USA

Poster: EE80

Background & Objective

- The arrival of new medications for Alzheimer's disease (AD) has prompted efforts to measure their value using conventional cost-effectiveness analyses (CEAs)

- The health and economic impacts of AD disproportionately affect older adults, women, people of color, and individuals with lower levels of wealth and education.

- Distributional cost-effectiveness analysis (DCEA) can quantify the potential impact of AD and its treatment on concerns of health equity.

- **Objective:** Evaluate the health equity impact of a hypothetical treatment for early AD to provide insights that are generalizable across the emerging landscape of therapeutics for AD in the United States.

Methods

- We conducted a US population-based distributional CEA of AD treatment among 25 subgroups defined by race and ethnicity (5 categories) and social vulnerability (5 quintiles).

- A CEA aligned to published models was updated to reflect disparities in AD diagnosis trends (timing, stage) and treatment access (Figure 1).

- We assumed a hypothetical disease-modifying treatment that reduced cognitive decline by 45% and 35% for mild cognitive impairment (MCI) and mild dementia, respectively, and had an annual price of $16,000 (i.e., the median annual average wholesale price of specialty drugs for chronic medical conditions approved over two decades).

- Modeling a hypothetical treatment enabled us to illustrate how a novel drug could alter health equity in the United States, given current health care disparities and health system constraints.

- We expressed opportunity costs in terms of lost quality-adjusted life-years (QALYs), and assumed each subgroup bore a share proportionate to its population size.

- We quantified changes in population health resulting from health gains and opportunity costs from treatment, and used the Atkinson Index to examine equity tradeoffs.

Conclusion

- Our analysis suggests AD treatment could improve population health and health equity.
- Health systems changes (e.g., expanding diagnostic testing and starting patients on treatment at earlier disease stages) are key to strengthening treatment and equity impacts.

Results

Figure 1. Equity Pathway for Treatment of Early Alzheimer's Disease
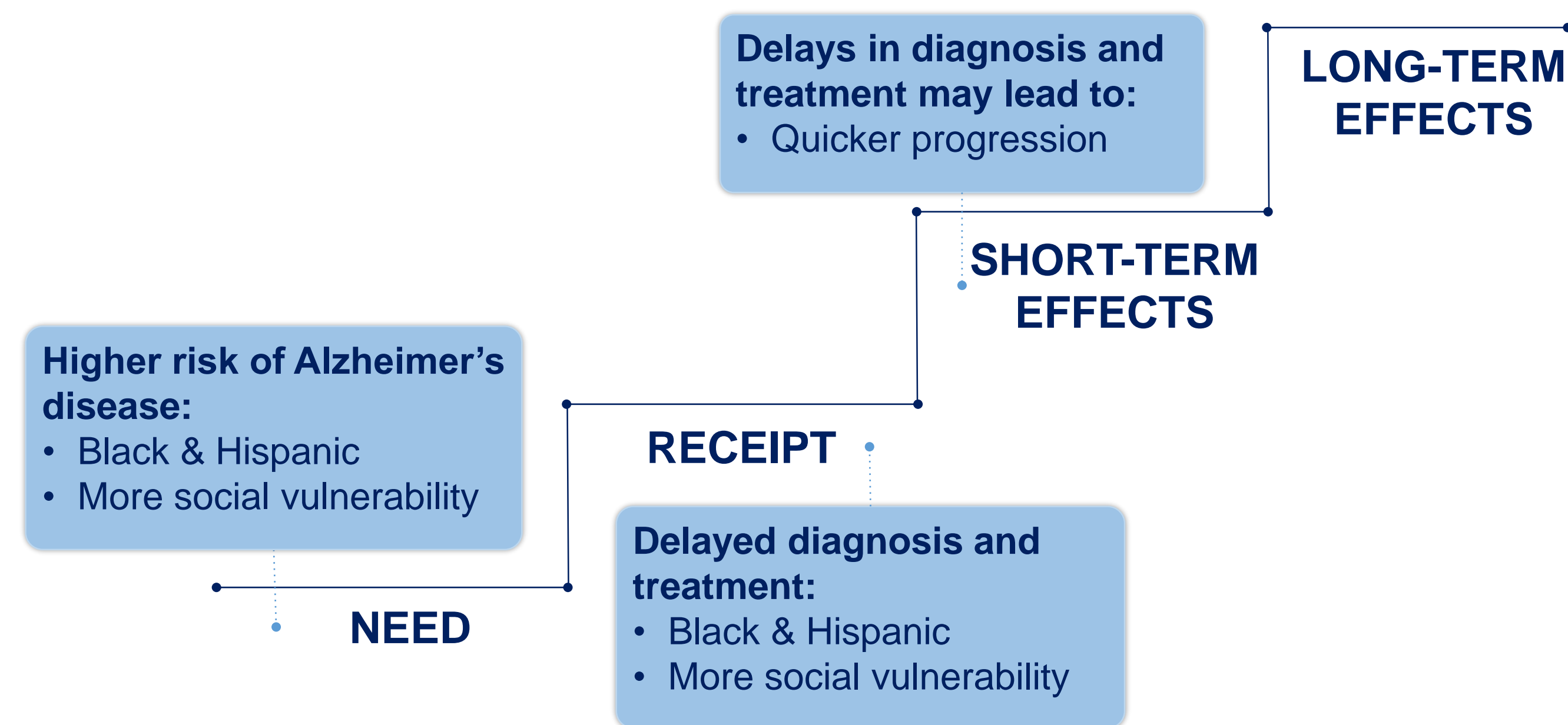

Figure 2. Disparities in Prevalence and Diagnosis of Early AD among Adults Aged 65 and Older, per 100,000 People
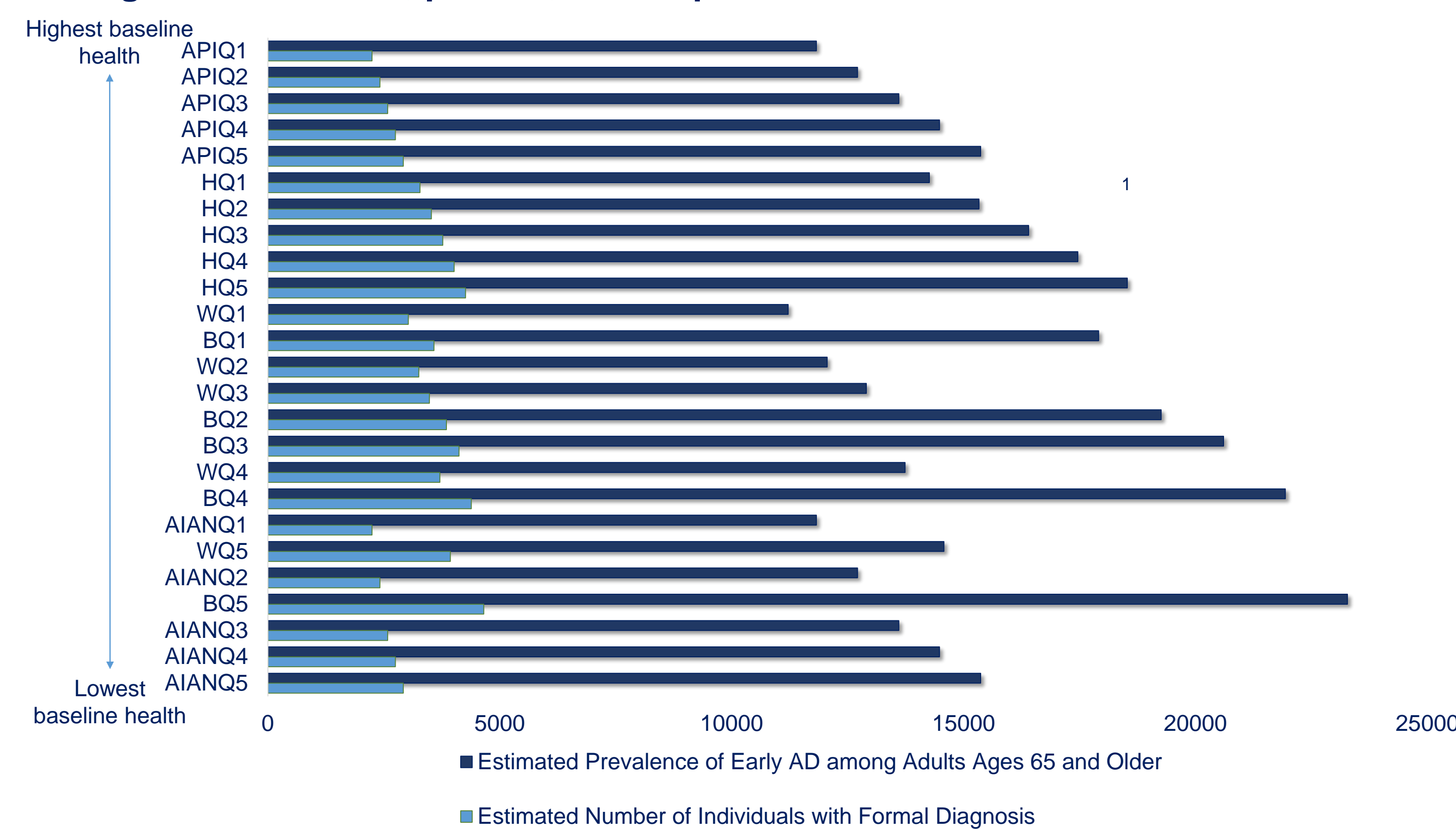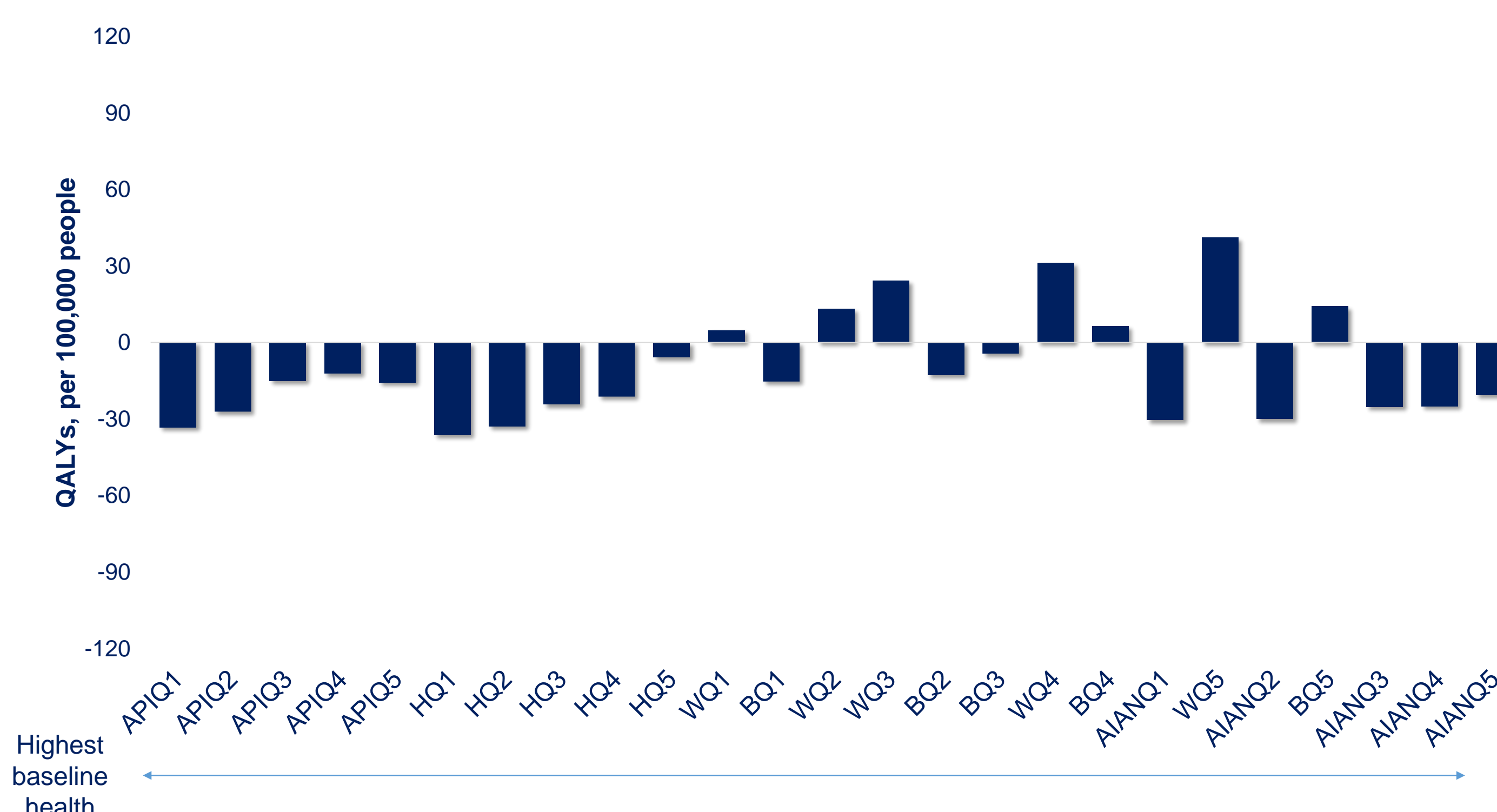

Figure 3. Net Health Impact of Funding Disease-Modifying Treatment for AD

AD: Alzheimer's disease; Q: Quintile (1= least socially vulnerable; 5 = most socially vulnerable); API = Asian/Pacific Islander; H = Hispanic; W = White non-Hispanic; B = Black, non-Hispanic; AIAN = American Indian and Alaska Native; QALY: quality adjusted life year

Figure 4. Social Welfare Impact of Funding Disease-Modifying AD Treatment, Scenario Analyses
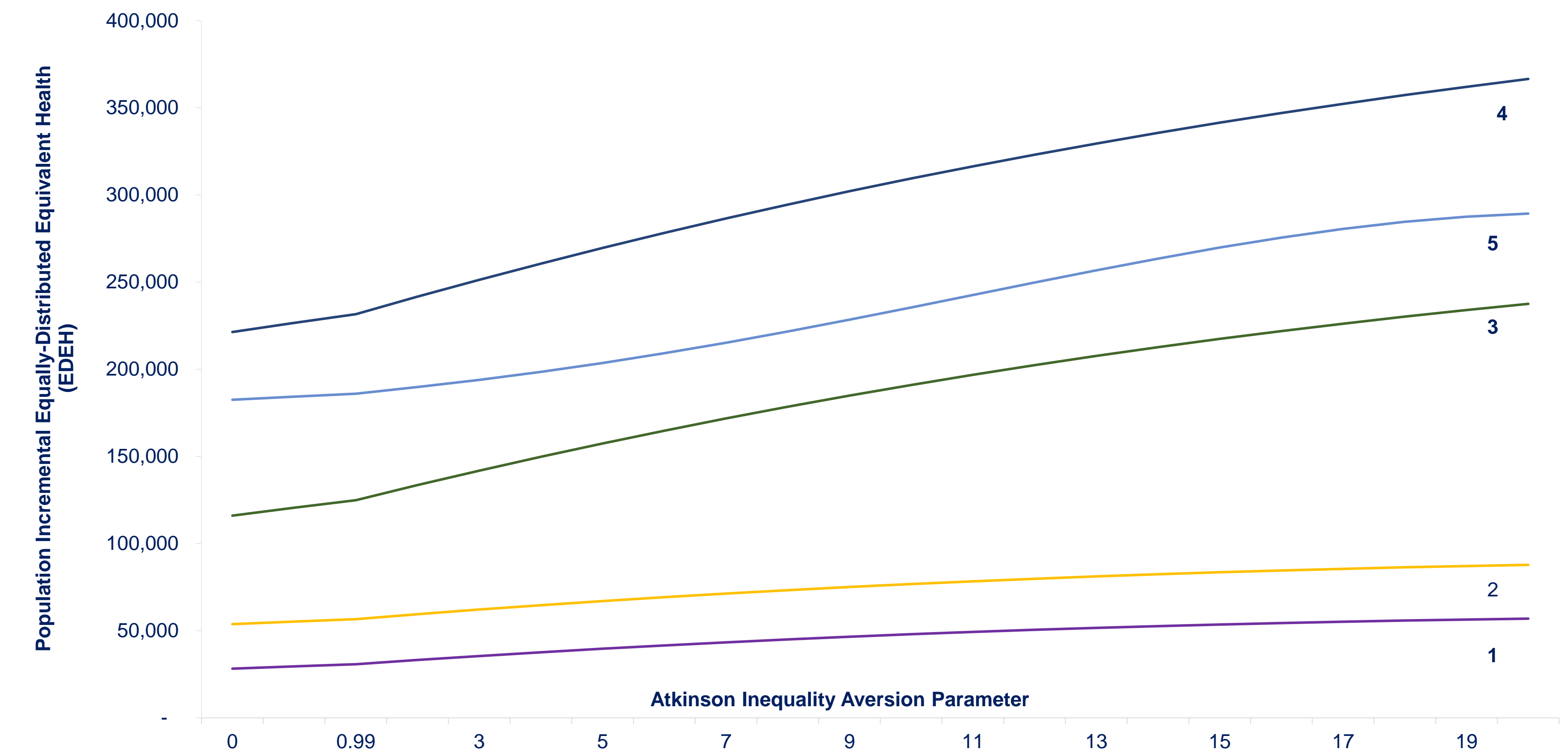

Figure Key: EDEH is the equity-weighted mean level of health per person (expressed in QALYs) that would generate the same level of social welfare as the current unequal health distribution. At an inequality aversion level of zero, which represents no equity weighting, the social welfare impact is equivalent to the net health benefit of treatment. Values above zero on the y-axis represent a positive social welfare impact. A positive slope indicates increasing equity improvement with stronger preferences (i.e., higher equity weights) for reducing health disparities.

Scenario Analyses

1. **[Inequitable Diagnosis & Access, Base Case]** Cost-effective treatment (at $150,000 per QALY) under current diagnosis and access patterns, which reflect later diagnosis and later access for historically marginalized racial and ethnic subgroups

2. **[Earlier Treatment]** Patients with an AD diagnosis start treatment during the MCI due to AD stage (i.e., all diagnosed patients are treated earlier in their disease course)

3. **[Equitable Treatment]** All patients with early AD are diagnosed and started on treatment during the MCI due to AD stage or mild AD dementia stage (i.e., there are no missed diagnoses and all eligible patients receive treatment)

4. **[Earlier & Equitable Treatment]** All patients with early AD are diagnosed and started on treatment during the MCI due to AD stage (i.e., there are no missed or delayed diagnoses, and all eligible patients receive treatment)

5. **[Targeted Equity Implications for 65+]** Focusing the analysis on the 65 and older population only, where both benefits of treatment and opportunity costs are borne only by the 65+ group. This result represents the social welfare impact among the general population aged 65 and older

Summary of Key Findings

- At an opportunity cost threshold of $150,000/QALY, treatment improved population health, adding **28,197 QALYs** a year to the U.S. population.

- Groups with a positive net health impact had the greater proportion of individuals assumed to receive treatment and a greater proportion of individuals aged 65 and older (Figure 3).

- Accounting for health inequality preferences (Atkinson inequality aversion parameter = 11), AD treatment reduced health inequality by 0.009% annually in the U.S.

- In scenario analyses, population health improved more than tenfold in comparison to the base case. Conclusions were robust across a wide range of inequality aversion parameters (Figure 4).