

Progression of Chronic Kidney Disease Among Adults in a Managed Care Organization

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Background

- Incidence of end-stage renal disease (ESRD) has been associated with socioeconomic status (SES)
 - Lower SES → Higher ESRD incidence
- Association of chronic kidney disease (CKD) incidence and progression with SES is less studied.
 - Major challenge is availability of databases to construct CKD cohorts over multiple years
 - MCO databases can be adapted to this purpose

Objectives

- Evaluate the association of race/ethnicity and low SES with:
 1. CKD stage at time of CKD ascertainment
 - H_0 : Lower SES \rightarrow More adverse CKD stage at ascertainment
 2. CKD progression in subsequent years
 - H_0 : Lower SES \rightarrow Accelerated deterioration in renal function (i.e. worse CKD stage)

Study Population

- Adult Kaiser Permanente Georgia (KPGA) members
- KDOQI CKD stages 2-4 during 2000-2003 and CKD assessed again in 2001-2004
 - Stage 4: severe CKD, GFR 15-29 ml/min/1.73 m²
 - Stage 3: moderate CKD, GFR 30-59 ml/min/1.73 m²
 - Stage 2: mild CKD, GFR 60-89 ml/min/1.73 m²
- 25,176 adults with CKD (53,798 patient-years)
 - 23,726 newly ascertained (“incident”) CKD patients

Data for Analysis

- KPGA computerized administrative data: outpatient laboratory test results, outpatient pharmacy dispensings, membership eligibility and demographics
 - CKD cases ascertained from serum creatinine results converted to GFR values using the MDRD formula.
 - A CKD case was defined as a patient with 2 GFRs within 365 days but no closer than 60 days with an average GFR < 90 ml/min/1.73 m²

Data for Analysis

- Area-based race/ethnicity and SES measures
 - US Census (2000) SF3 files
 - KPGA members' residential addresses geocoded to Census tract and block group
 - Moderate to strong associations (Pearson correlations) between Census tract characteristics and KPGA member characteristics (KPGA Survey on Health Behaviors)

		US Census Characteristics by Tract		
KPGA Survey Respondents within Tract	N of tracts	Percent African American	Median HH Income Less than \$50,000	Percent with High School Education or Less
Census tract with 1 or more survey respondent	550	0.700	0.355	0.339
Census tract with 5 or more survey respondents	163	0.872	0.593	0.505
Census tract with 10 or more survey respondents	36	0.840	0.337	0.496

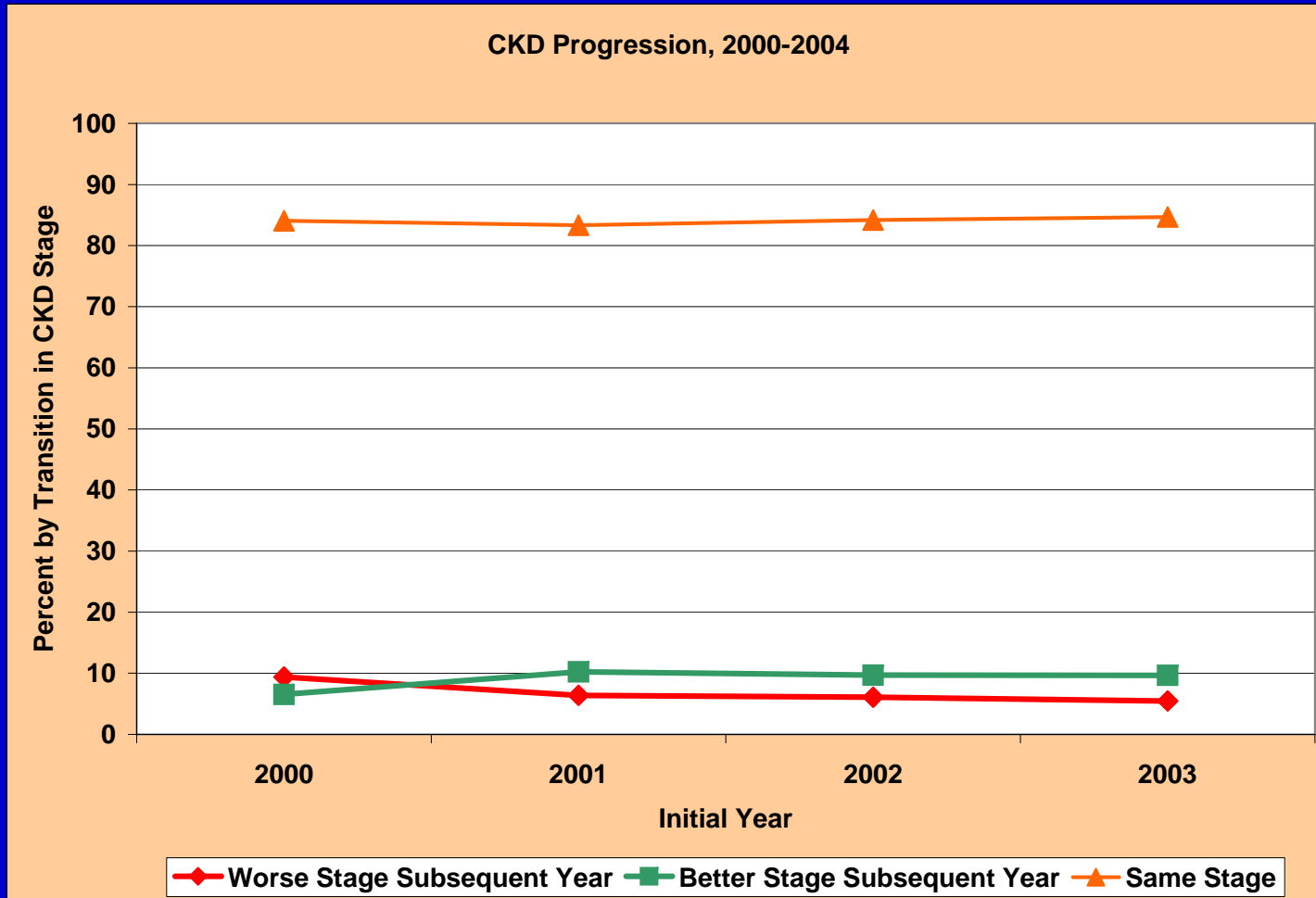
Methods

- Markov models:
 - Transition probabilities for a CKD stage in one year to a CKD stage in the subsequent year
 - Tests of stationarity, symmetry
- Ordinary logistic regression:
 - Dependent variables: Transition to a worse CKD stage compared to no change in CKD stage
 - Independent variables: SES (recoded into dichotomous measures, race/ethnicity (African American vs. Other))
 - Covariates: KDOQ/I stage, age, gender, calendar year

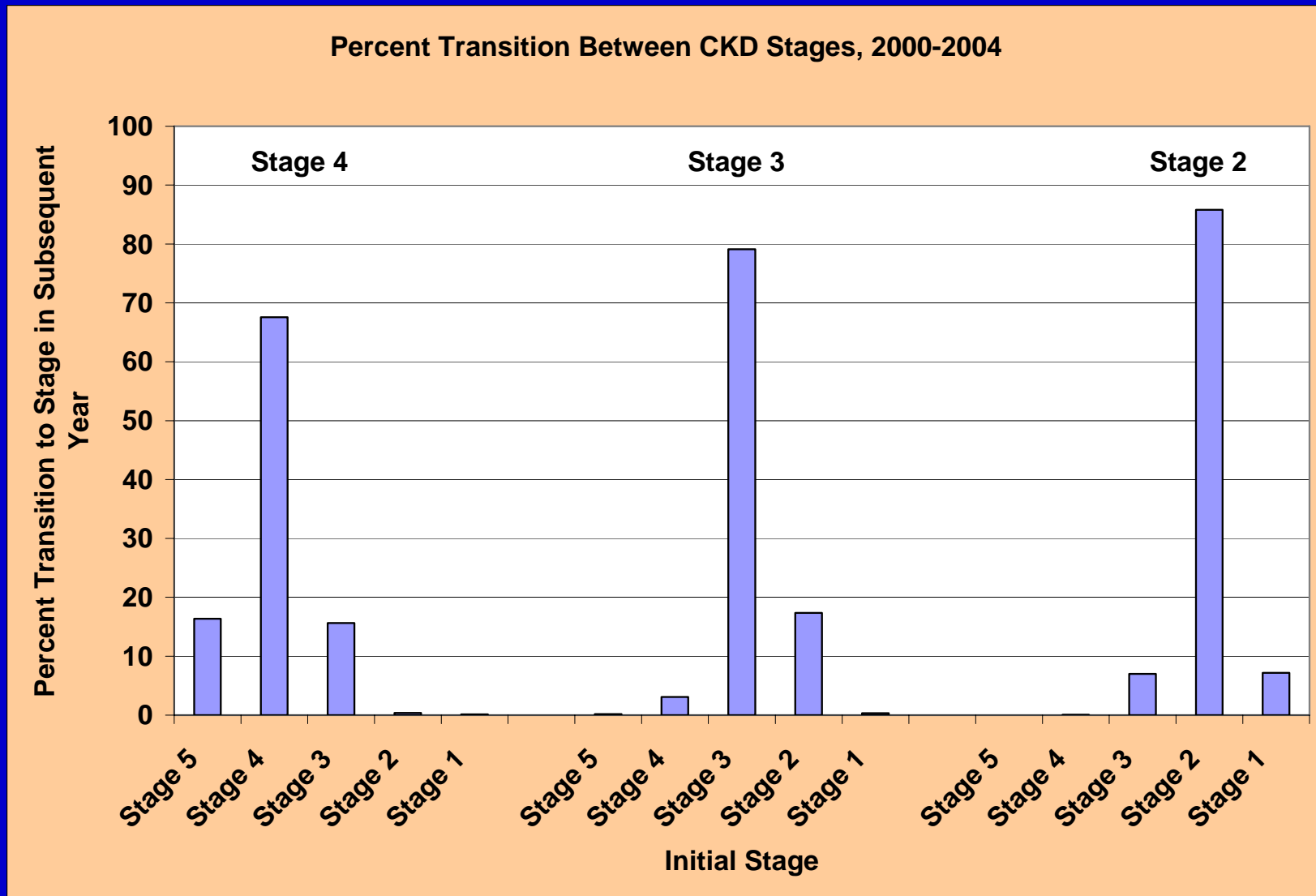
Results

- Year-to-year transitions from 2000-2004:
 - 84.2% same CKD stage
 - 6.4% worse CKD stage
 - 9.4% better CKD stage
- General decline in the percent of adults with CKD transitioning to a worse stage (9.4% in 2000/2001 to 5.5% 2003/2004)
- Most transitions in CKD stage occur among adults in CKD stage 4 (16.4% to stage 5, 15.6% to stage 3)

Results



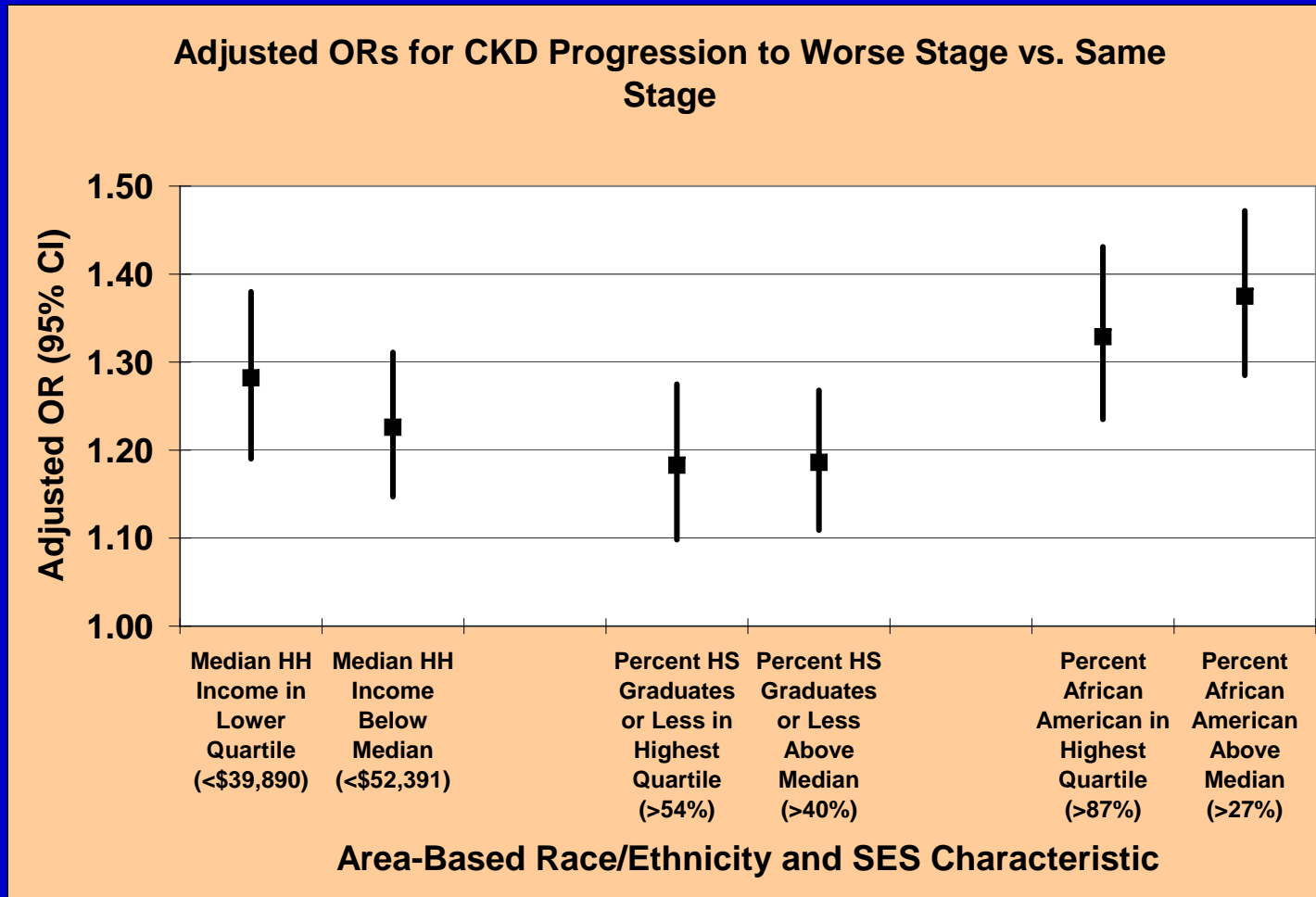
Results



Results

- Likelihood of transition to a worse CKD stage (vs. same CKD stage) was significantly ($p < 0.05$) associated with area-based measures of SES and race/ethnicity. Increased likelihood was associated with:
 - Low median household income
 - High percents of adults with HS education or less
 - High percents of African American residents
- Greater likelihood of transition to a worse CKD stage also associated with:
 - Gender (↑ females)
 - Age (↑ younger adults)
 - CKD stage (↑ Stage 4)
 - Year (↓ more recent years)

Results

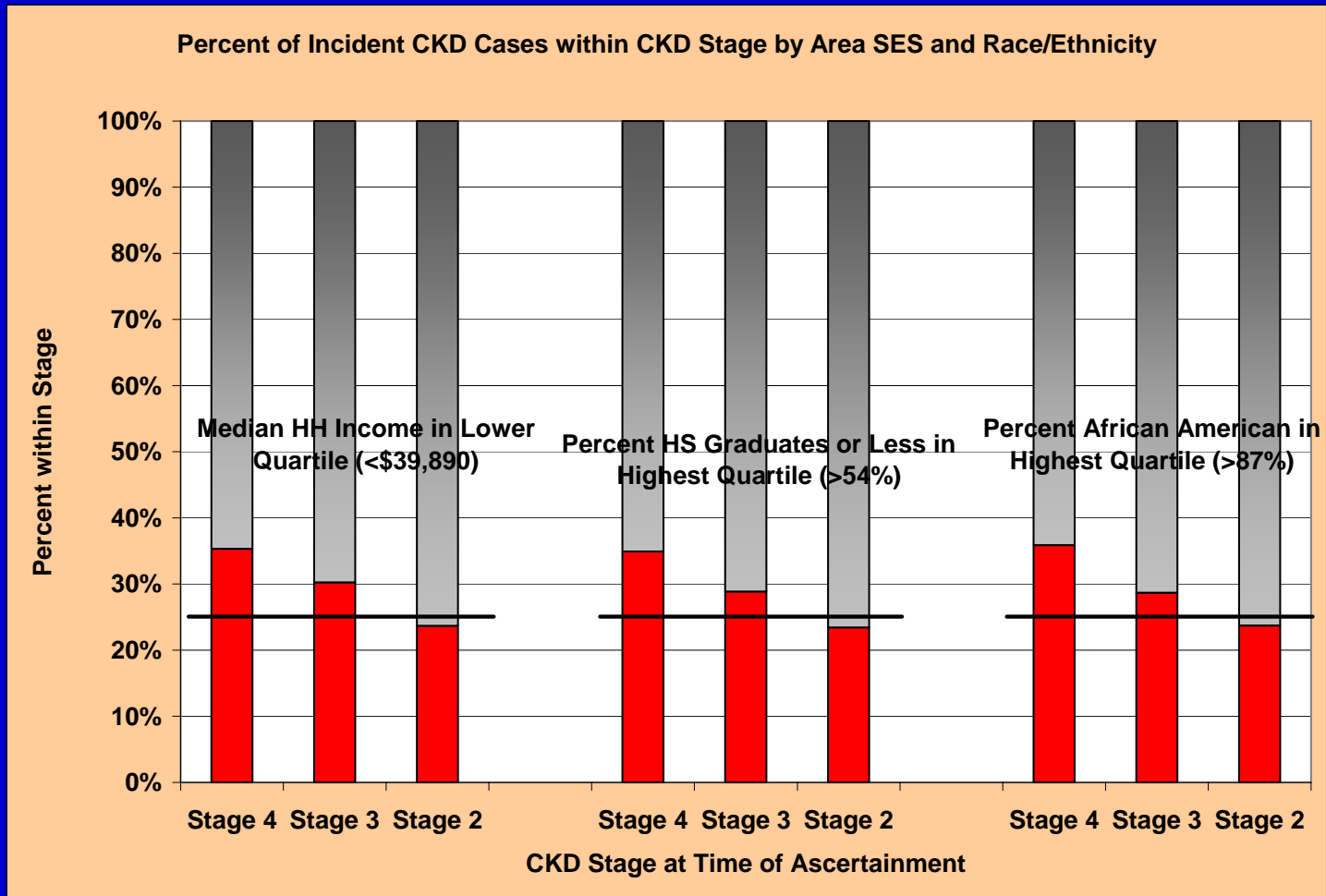


Results

- CKD patients living in areas of relatively lower income, less formal education, and higher proportions of African American residents were more likely to have a worse CKD stage in the incident year.
 - 35.3% of residents in areas with median household income < \$39,890 *
 - 34.9% of residents in areas with >54% of adults with a HS education or less *
 - 35.9% of residents in areas with >87% African American residents *

* versus 25% expected by chance, $p < 0.01$

Results



Conclusions

- Adults with CKD living in areas of lower income, less formal education, and more African American residents were:
 - More likely to have CKD ascertained at a stage of greater renal impairment, and
 - More likely to experience deterioration in renal function over a 4-year periodthan adults with CKD who lived in neighborhoods with higher SES or fewer racial/ethnic minorities.

Conclusions

- Results are (somewhat) consistent with analyses of the Atherosclerotic Risk In Communities (ARIC) study population.
 - Lower SES was associated with higher risk of progression in CKD among Caucasian men and African American women, but not among Caucasian women or African American men.
 - ARIC sample has limited middle and upper SES representation.
- Study limitations:
 - Individual race not available for MDRD formula
 - Current models do not account for right censoring
 - CKD “ascertainment” may not be true CKD “incidence”

Implications for Policy and Practice

- Within the context of this MCO, members receive health benefits through employer groups. Benefit plans underwrite most of the costs of medical services, with generally modest levels of patient cost-sharing.
- Nevertheless, results from this study of MCO adults with CKD suggests that lower SES might affect affordability of MCO services or recommended self-care activities (e.g. food selection) leading to delayed detection of CKD or accelerated decline in renal function.