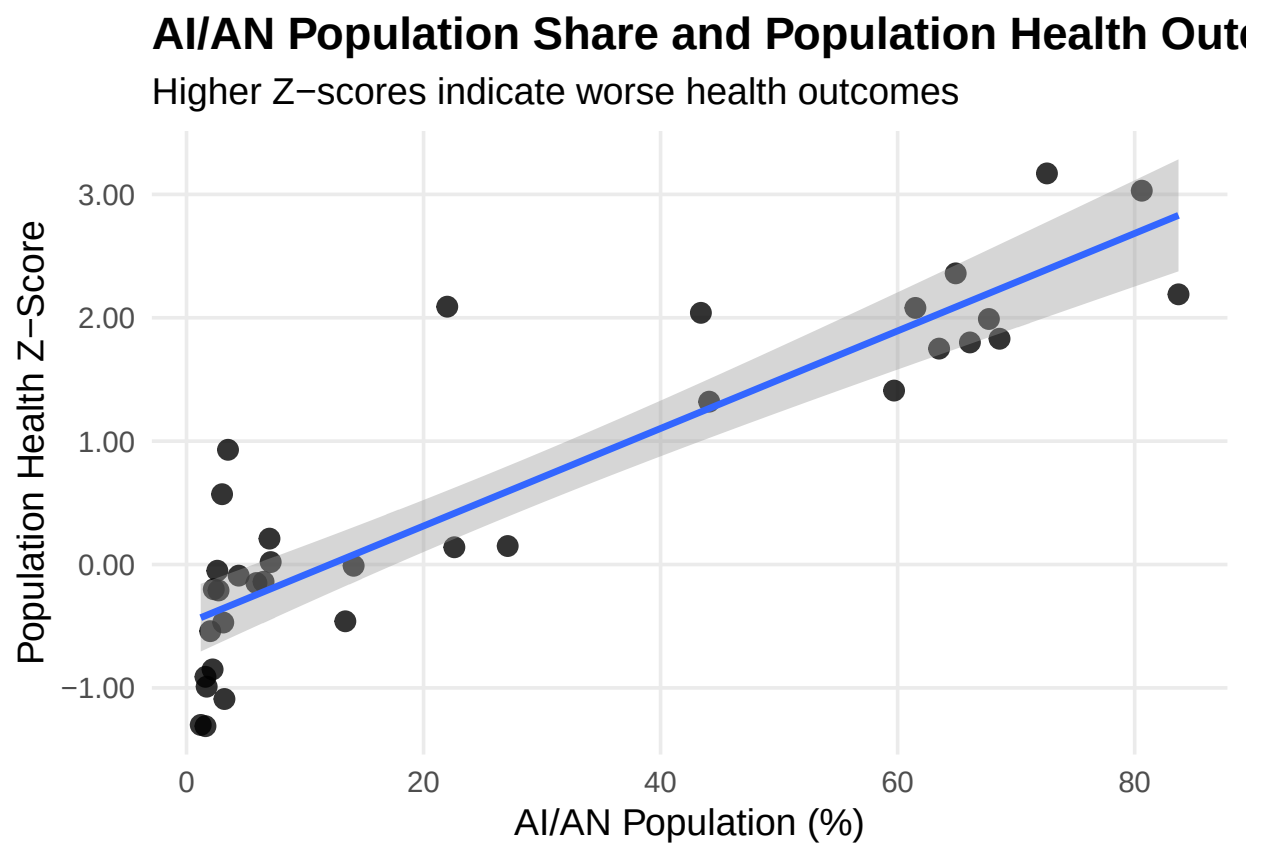


AI/AN Population Share and County Health Disparities

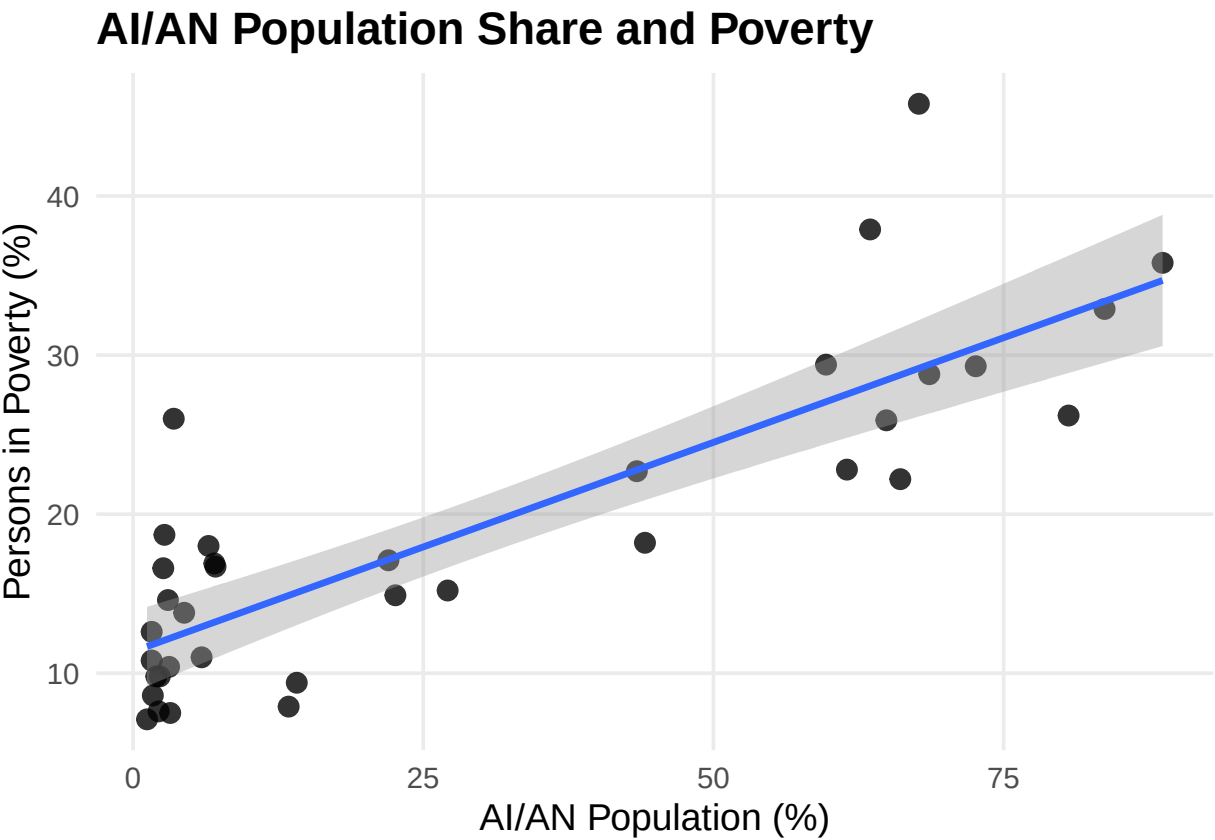
George Stenberg

2026-04-29

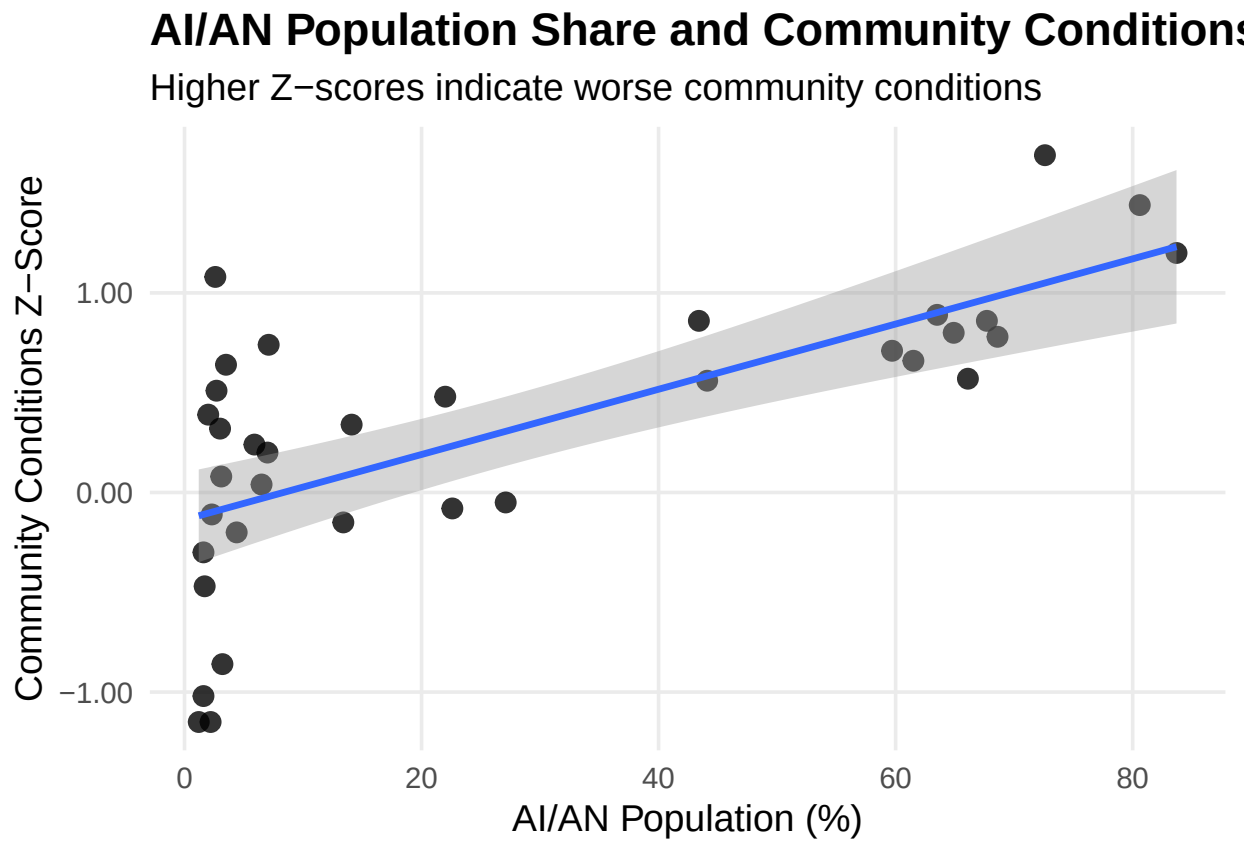
Main Figure: AI/AN Population Share and Health Outcomes



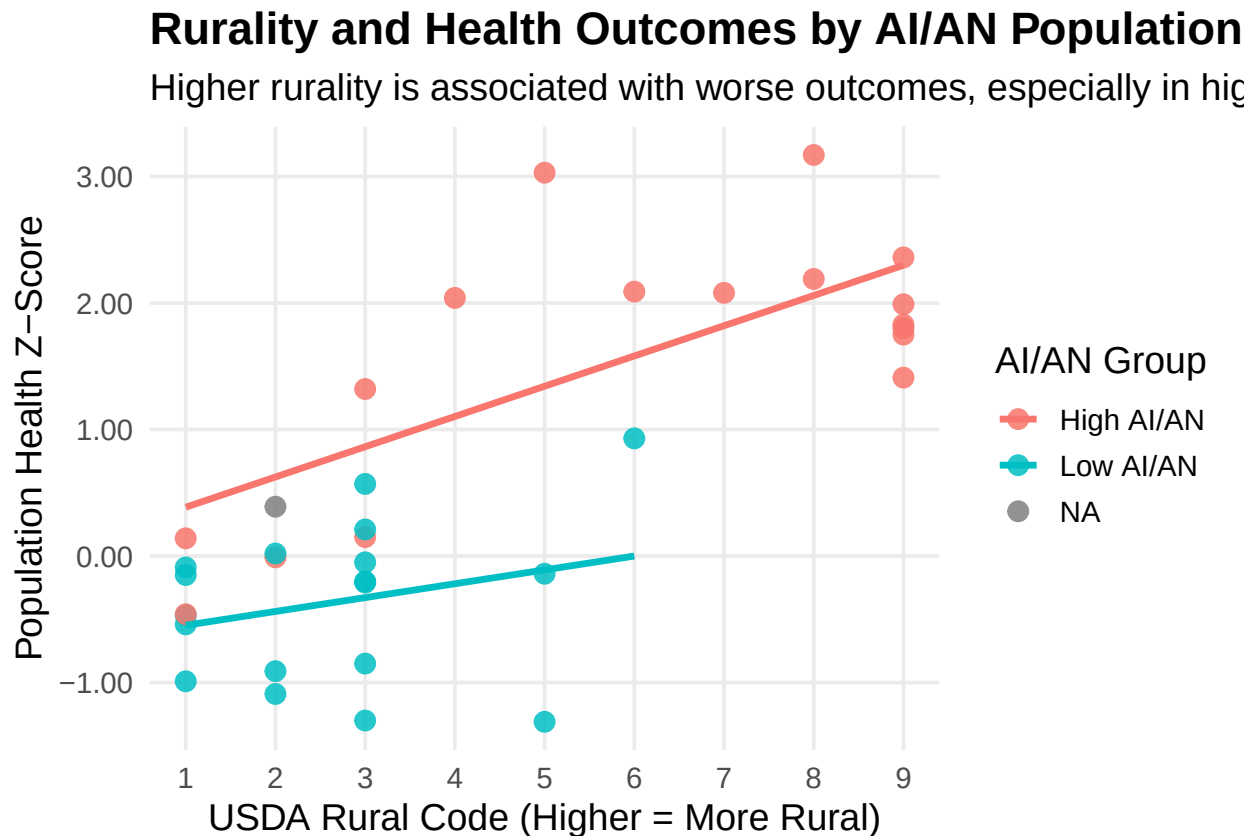
Mechanism Figure: AI/AN Population Share and Poverty



Structural Conditions Figure



Rurality vs Health, colored by AI/AN group



Model 1: Main Relationship

```
model_aian <- lm(pop_health_z ~ aian_pct, health_clean)
summary(model_aian)
```

```
##
## Call:
## lm(formula = pop_health_z ~ aian_pct, data = health_clean)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.89515 -0.45096 -0.08922  0.24518  1.69853
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -0.478086   0.137615  -3.474  0.00145 **
## aian_pct      0.039525   0.003496  11.306 6.87e-13 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.5967 on 33 degrees of freedom
```

```
## (2 observations deleted due to missingness)
## Multiple R-squared: 0.7948, Adjusted R-squared: 0.7886
## F-statistic: 127.8 on 1 and 33 DF, p-value: 6.869e-13
```

Model 2: Poverty as a Mechanism

```
model_poverty <- lm(poverty_pct ~ aian_pct, health_clean)
summary(model_poverty)
```

```
##
## Call:
## lm(formula = poverty_pct ~ aian_pct, data = health_clean)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -6.987 -3.553 -1.071  2.363 16.630
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) 11.36245    1.25154   9.079 1.30e-10 ***
## aian_pct      0.26304    0.03013   8.729 3.36e-10 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 5.463 on 34 degrees of freedom
## (1 observation deleted due to missingness)
## Multiple R-squared: 0.6915, Adjusted R-squared: 0.6824
## F-statistic: 76.2 on 1 and 34 DF, p-value: 3.358e-10
```

Model 3: Full Model with Controls

```
model_full <- lm(pop_health_z ~ aian_pct + poverty_pct + rural_code, health_clean)
summary(model_full)
```

```
##
## Call:
## lm(formula = pop_health_z ~ aian_pct + poverty_pct + rural_code,
##     data = health_clean)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.83697 -0.42619 -0.06342  0.27747  1.71720
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -0.856772    0.249653  -3.432  0.00172 **
## aian_pct      0.031122    0.006396   4.866 3.15e-05 ***
## poverty_pct  0.034821    0.021755   1.601  0.11960
## rural_code   -0.008424    0.069000  -0.122  0.90362
```

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.5852 on 31 degrees of freedom
## (2 observations deleted due to missingness)
## Multiple R-squared:  0.8146, Adjusted R-squared:  0.7967
## F-statistic: 45.41 on 3 and 31 DF,  p-value: 1.866e-11
```

Optional: Rurality Alone

```
model_rural <- lm(pop_health_z ~ rural_code, health_clean)
summary(model_rural)
```

```
##
## Call:
## lm(formula = pop_health_z ~ rural_code, data = health_clean)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.14488 -0.38781  0.00751  0.40544  2.19512
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -0.83577    0.25387  -3.292  0.00232 **
## rural_code   0.33413    0.04984   6.704 1.07e-07 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.852 on 34 degrees of freedom
## (1 observation deleted due to missingness)
## Multiple R-squared:  0.5693, Adjusted R-squared:  0.5566
## F-statistic: 44.94 on 1 and 34 DF,  p-value: 1.065e-07
```

t-test comparison

```
t.test(pop_health_z ~ aian_group, health_clean)
```

```
##
## Welch Two Sample t-test
##
## data:  pop_health_z by aian_group
## t = 6.6322, df = 25.789, p-value = 5.123e-07
## alternative hypothesis: true difference in means between group High AI/AN and group Low AI/AN is not
## 95 percent confidence interval:
##  1.342759 2.549594
## sample estimates:
## mean in group High AI/AN  mean in group Low AI/AN
##           1.581176           -0.365000
```

The results show a strong and consistent relationship between AI/AN population share and health outcomes. Counties with higher percentages of AI/AN residents tend to have worse population health, and this relationship remains clear in the initial model.

When poverty is introduced, AI/AN population share is also positively associated with higher poverty rates. This suggests that part of the observed disparity in health outcomes operates through socioeconomic conditions.

The full model provides the most important insight. After accounting for both poverty and rurality, AI/AN population share and poverty remain associated with worse health outcomes, while the effect of rurality becomes negligible. This indicates that the earlier relationship between rurality and health was largely driven by its overlap with population composition and poverty.

Taken together, the results suggest that these disparities are not simply a function of geographic location, but are more closely tied to population concentration and underlying socioeconomic inequality.