Statistical Consulting Follow-Up Meeting

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Research Question:

“What variations exist in the detection rates of observed SARS-CoV-2 seroconversion through nucleocapsid antibody assays across demographic and health-related predictor variables?"

Agenda

- Review of data and variables
- Statistical analysis approach and explanation
- Key Findings

Review of Data and Variables

Dataset:

- Sample size of 33,604 blood donors
- Collected from the National Blood Donor Cohort
- One dataset tracks primary infection and one tracks reinfection
- For analysis, we merged the two datasets

Variables:

- Gender
- Age
- Race/Ethnicity
- Region
- Vaccination Status
- Urban or Rural
- Seroconversion (Response Variable)

Statistical Analysis Approach and Explanation

Logistic Regression Model:

$$log_e\left[\frac{\pi(x)}{1-\pi(x)}\right] = \alpha + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + \beta_7 x_7 + \beta_8 x_8 + \beta_9 x_9 + \beta_{10} x_{10} + \beta_{11} x_{11} + \beta_{12} x_{12} + \beta_{13} x_{13} + \beta_{14} x_{14} + \beta_{15} x_{15} + \beta_{16} x_{16} + \beta_{17} x_{17} + \varepsilon$$

where

x_1 = gender (binary: male=0, female=1)
x_2 = age category 1 (16-29=1, otherwise=0)
x_3 = age category 2 (30-49=1, otherwise=0)
x_4 = age category 3 (50-64=1, otherwise=0)
x_5 = ethnicity Hispanic (Hispanic=1, otherwise=0)
x_6 = race non-Hispanic Asian (Asian=1, otherwise=0)
x_7 = race non-Hispanic Black (Black=1, otherwise=0)
x_8 = race non-Hispanic Other (Other=1, otherwise=0)
x_9 = race non-Hispanic White (White=1, otherwise=0)
x_{10} = census region 1 (Northeast=1, otherwise=0)
x_{11} = census region 2 (Midwest=1, otherwise=0)
x_{12} = census region 3 (South=1, otherwise=0)
x_{13} = census region 4 (West=1, otherwise=0)
x_{14} = DHQ vaccinated status 0 (unvaccinated=1, otherwise=0)
x_{15} = DHQ vaccinated status 1 (vaccinated during=1, otherwise=0)
x_{16} = urban rural classification 1 (urban=1, otherwise=0)
x_{17} = urban rural classification 2 (rural=1, otherwise=0)
ε = error term

- Significant difference found in PI and RI datasets

		Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
	Intercept	0.2719	0.096	8.087	0.005
Gender	Female	-0.08	0.011	51.022	<0.001
Donor's Age at Baseline	16-29Y	-0.160	0.046	12.317	~0
	30-49Y	-0.080	0.024	11.744	~0
	50-64Y	0.034	0.021	2.554	0.110
Donor Race/ Ethnicity	Hispanic	-0.086	0.061	2.002	0.157
	Asian	-0.045	0.083	0.298	0.585
	Black	0.511	0.100	26.212	<0.001
	Other	0.023	0.097	0.056	0.811
	White	-0.101	0.042	5.780	0.016
Location (Census Regions)	Northeast	-0.008	0.088	0.009	0.926
	Midwest	0.246	0.086	8.218	0.004
	South	0.143	0.087	2.683	0.101
	West	0.015	0.087	0.029	0.864
Self-Reported Vaccine Status	Not Vaccinated	0.060	0.180	11.145	0.001
	Vaccinated	-0.140	0.180	61.133	<0.001
2013 NCHS Urban-Rural Classification Scheme of Counties	Urban	-0.244	0.028	77.099	<0.001
	Rural	0			
Data Source	PI	-0.073	0.014	26.678	<0.001

Key Findings

- The odds of self-reporting a swab within the seroconversion interval is 0.149 times lower for donors who are male compared to donors who are female.
- The odds of self-reporting a swab within the seroconversion interval is 1.628 times higher for donors who are black compared to a donor with an ethnicity different than the ones listed.

Variables	Values		Overall	Unadjusted		Adjusted	
Total		N	Rate/100	OR	95% CI	OR	95% CI
Donor's Gender	Male	15295	45.52%	0.846	0.810, 0.883	0.851	0.814, 0.889
	Female	18309	54.48%				
Donor's Age at Baseline	30-49Y	8114	3.45%	1.129	0.998, 1.277	1.091	0.963, 1.235
	50-64Y	14006	24.15%	1.275	1.075, 1.131	1.228	1.087, 1.386
	65+Y	10323	41.68%	1.458	1.291, 1.647	1.458	1.288, 1.651
Donor Race/ Ethnicity	Hispanic	1316	3.92%	0.848	0.670, 1.073	0.894	0.705, 1.134
	Asian	520	1.55%	0.842	0.642, 1.104	0.938	0.714, 1.232
	Black	357	1.06%	1.672	1.238, 2.260	1.628	1.201, 2.206
	White	30879	91.89%	1.005	0.815, 1.241	0.885	0.715, 1.095
Location (Census Regions)	Midwest	11965	35.61%	1.401	1.312, 1.497	1.296	1.211, 1.386
	South	6549	19.49%	1.204	1.119, 1.296	1.162	1.078, 1.251
	West	10050	29.91%	1.010	0.944, 1.081	1.015	0.947, 1.088
Self-Reported Vaccine Status	Vaccinated Prior	14626	43.52%	0.774	0.740, 0.809	0.787	0.751, 0.825
2013 NCHS Urban-Rural Classification Scheme of Counties	Urban	26067	77.57%	0.718	0.682, 0.756	0.784	0.742, 0.827

Key Findings

- Age of the donor was a key variable we wanted to interpret.
- Feature of the data shows that the odds of self-reporting a swab within the seroconversion interval for older donors tends to be higher when compared with younger donors.
- May be due to health concerns.

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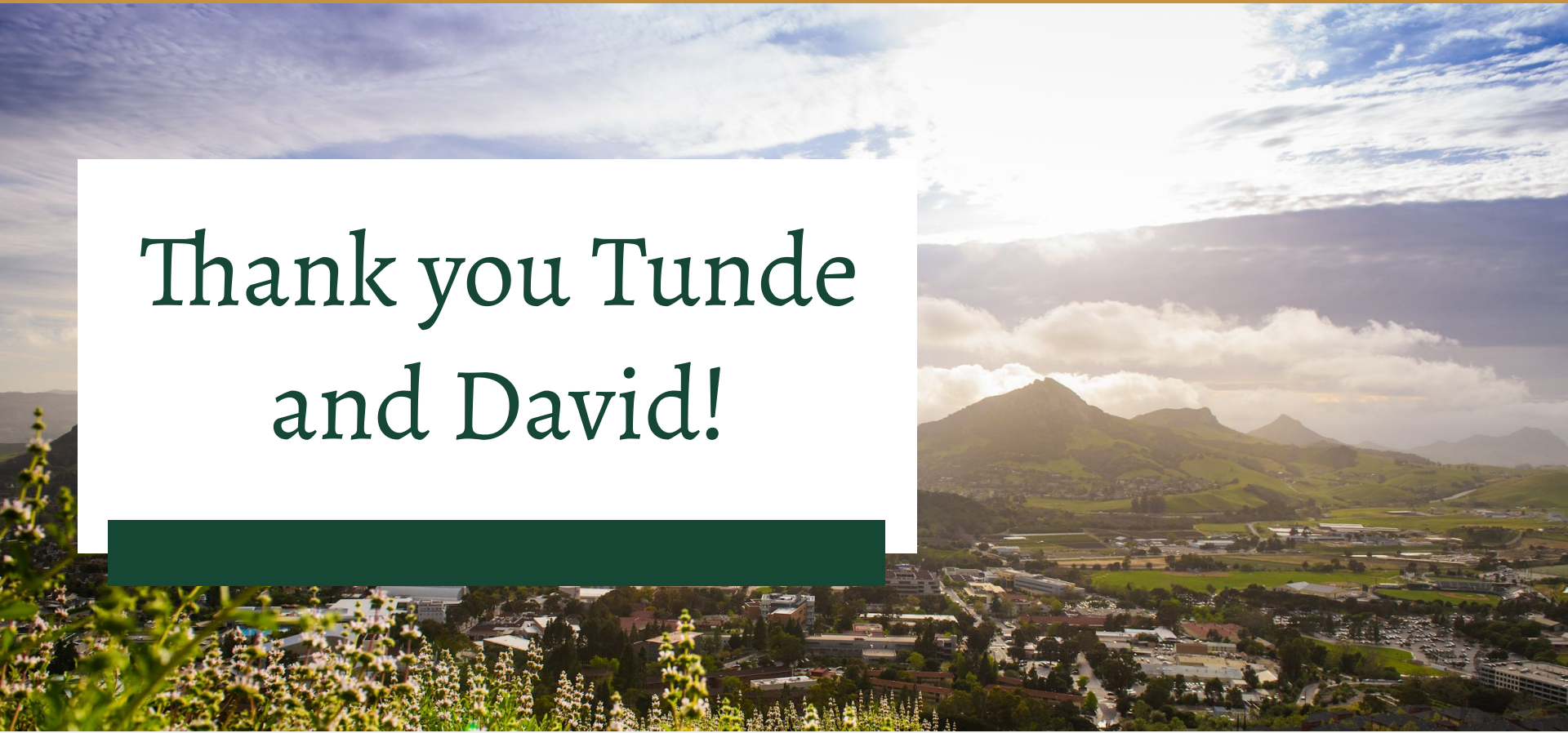

Thank you Tunde and David!

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