Analysis Plan

What are the anticipated Tables and Figures?

Figures

- Flow diagram for data
  - Inclusions and Exclusions
- Prevalence of High BMI
  - By Ethnicity?
  - By age?
  - By Time?
- Trend lines vs. bar charts?

Table 1

- Purpose: Partly descriptive
  - Gives the reader description of who is in the data
- Partly to show comparability of groups
  - Show the distribution of pertinent determinants of overweight/obesity by Ethnicity Categories
- What factor should be included
  - Demographics
  - Potential Confounders?

	Native Hawaiian	Samoan	Filipino	White	Total?	P-Value?
Age						
Sex						
Insurance						
?						

Table 1

- Question: Include Total Column?
- Question: Include p-values?
  - Does not rule-in or rule-out confounding

Table 2

- Prevalence of High BMI by race/ethnicity
- Crude Analysis vs. Stratify vs. Standardize
- Entries
  - Proportion?
  - Standard Error?
  - Confidence Interval?
  - Measure of Association
    - Risk Ratios, Odds Ratio, Mean difference, …
  - P-Value?

Proportions and Odds

- Proportion
  - Part / Whole
  - Range: 0 – 1
- Odds
  - Part/ Non-Part
  - Range: 0 - infinity

Proportion and Odds

- Odds = Proportion/(1-Proportion)

Example: Proportion = .20

Odds = .20/.80 = .25

- Proportion = Odds/(1+Odds)

Example: Odds = .25

Proportion = .25/1.25 = .20

Relationship between Proportion and Odds.

Proportion	Odds	Proportion	Odds
0.01	**0.01**	0.60	1.50
0.02	**0.02**	0.70	2.33
0.03	0.03	0.80	4.00
0.04	0.04	0.90	9.00
0.05	0.05	0.95	19.00
0.10	0.11	0.96	24.00
0.20	0.25	0.97	32.33
0.30	0.40	**0.98**	**49.00**
0.40	0.67	**0.99**	**99.00**
0.50	1.00		

Implications: Small Versus Large Proportions

- Example: Small Proportions
  - **Proportions = .02 and .01**
    - Ratio = .02/.01 = 2.0
  - **Odds = .02/.98 = .0204 and .01/.99 = .0101**
    - Ratio = .0204/.0101 = 2.02
- Example: Large Proportions
  - **Proportions = .99 and .98**
    - Ratio = .99/.98 = 1.01
  - **Odds = .99/.01 = 99 and .98/.02 = 49**
    - Ratio = 99/49 = 2.02

TABLE 1. RATE OF REFERRAL FOR CARDIAC CATHETERIZATION, ODDS OF REFERRAL, ODDS RATIO, AND RISK RATIO ACCORDING TO SEX AND RACE.*

PATIENTS	MEAN REFERRAL RATE	ODDS OF REFERRAL	ODDS RATIO (95% CI)	RISK RATIO (95% CI)
	%			
Four strata				
White men†	90.6	9.6 to 1	1.0	
Black men	90.6	9.6 to 1	1.0 (0.5–2.1)	
White women	90.6	9.6 to 1	1.0 (0.5–2.1)	
Black women	78.8	3.7 to 1	0.4 (0.2–0.7)	0.87 (0.80–0.95)
Aggregate data				
White†	90.6	9.6 to 1	1.0	
Black	84.7	5.5 to 1	0.6 (0.4–0.9)	0.93 (0.89–0.99)
Men†	90.6	9.6 to 1	1.0	
Women	84.7	5.5 to 1	0.6 (0.4–0.9)	0.93 (0.89–0.99)
Overall	87.7	7.1 to 1		

*Referral rates for the four strata were inferred from aggregate rates and odds ratios reported by Schulman et al.[1] The odds of referral were calculated according to the following formula: referral rate÷(100%−referral rate). The risk ratio was calculated as the referral rate for the group in question divided by the referral rate for the reference group. CI denotes confidence interval.

†This was the reference group.

Schwartz et al.
N Eng J med
1999;341:279-83

TABLE 2. PRESENTATION OF STUDY FINDINGS IN SELECTED MAJOR NEWS MEDIA.

SOURCE*	HEADLINE	CHARACTERIZATION OF PRIMARY FINDING	INTERPRETATION	IMPLICATION
Nightline[7]	"A Recent Study Shows That Doctors Diagnose Black and White Patients Differently"	"In our main analysis we found that blacks were 40 percent less likely to be referred for cardiac catheterization compared to whites."	"A recent study shows that doctors diagnose black and white patients differently."	"It's having an adverse effect on the health of their patients and there is growing statistical evidence that if a patient is black he or she is significantly likely to get a lesser quality of medical care."
USA Today[6]	"Heart Care Reflects Race and Sex, Not Symptoms"	"Blacks and women with chest pain are 40% less likely than whites or men to be referred by physicians for cardiac catheterization."	"Race and sex of patients with chest pain influence whether they're sent for the most definitive test for heart disease."	" . . . the new study truly does indicate that a bias exists."
Washington Post[5]	"Georgetown University Study Finds Disparity in Heart Care; Doctors Less Likely to Refer Blacks, Women for Cardiac Test"	"Physicians said they would refer blacks and women to heart specialists for cardiac catheterization tests only 60 percent as often as they would prescribe the procedure for white male patients."	"Doctors are far less likely to recommend sophisticated cardiac tests for blacks and women than for white men with identical complaints of chest pain."	"Authors suggest the differences are the consequences of race and sex bias [and that] the attitudes demonstrated in the survey exist in all medical specialties . . you don't have to be consciously racist to see the influence of race and gender playing out in treatment. That's what this study confirms."
Los Angeles Times[4]	"Heart Study Points to Race, Sex Bias"	"[Doctors] refer blacks and women to heart specialists 60% as often as they would white male patients."	"Doctors are far less likely to recommend sophisticated cardiac tests for blacks and women than for white males."	"Authors suggest the differences are the consequences of race and sex bias."
Wall Street Journal[2]	"Study Suggests Race, Sex Influence Physicians' Care"	"Doctors are only 60% as likely to order cardiac catheterization for women and blacks as for men and whites."	"Women and blacks complaining of chest pain are less likely than men and whites to receive the best cardiac testing."	"Unconscious prejudices among doctors may help explain [the findings]."
New York Times[3]	"Doctor Bias May Affect Heart Care, Study Finds"			

*Since the *Wall Street Journal* and *New York Times* stories were based on the same Associated Press report, the characterization of the primary finding, interpretation, and stated implication were the same in the two newspapers. The quotations in the table are from the *New York Times*.

	Odds of BMI85=1	Odds Ratio
Caucasian	413/739 =.5589	1.0
Filipino	352/968 = .3636	.3636/.5589 = .6506
Hawaiian	2459/3211= .7658	.7658/.5589 = 1.3702
Samoan	533/243 = 2.1934	2.1934/.5589 = 3.9245

Model:

$\text{Log}(P/(1-P)) = B_o + B_1(\text{Samoan}) + B_2(\text{Hawaiian}) + B_3(\text{Filipino})$

Interpretation of Coefficients

Caucasian $\log(P/(1-P)) = B_0$

Samoan $\log(P/(1-P)) = B_0 + B_1$

Hawaiian $\log(P/(1-P)) = B_0 + B_2$

Filipino $\log(P/(1-P)) = B_0 + B_3$

B_1 = log(OR) comparing Samoan to Caucasian

$OR = \exp(B_1)$

Table 3

- Regression Analysis
  - Data Set 1 vs. Data Set 2
  - Data Set 1 has multiple measurements per person
    - More Information
    - Problem: Measurements on same person probably not independent
    - Violates assumption of most common analyses
    - Variation in outcomes reflect both within and between person variation

Example: Twelve Independent Observations

5	8	13
9	7	4
1	4	2
4	1	2

Mean = 5.0 , Standard Deviation = 3.6

Example: Three Observations for Four Person

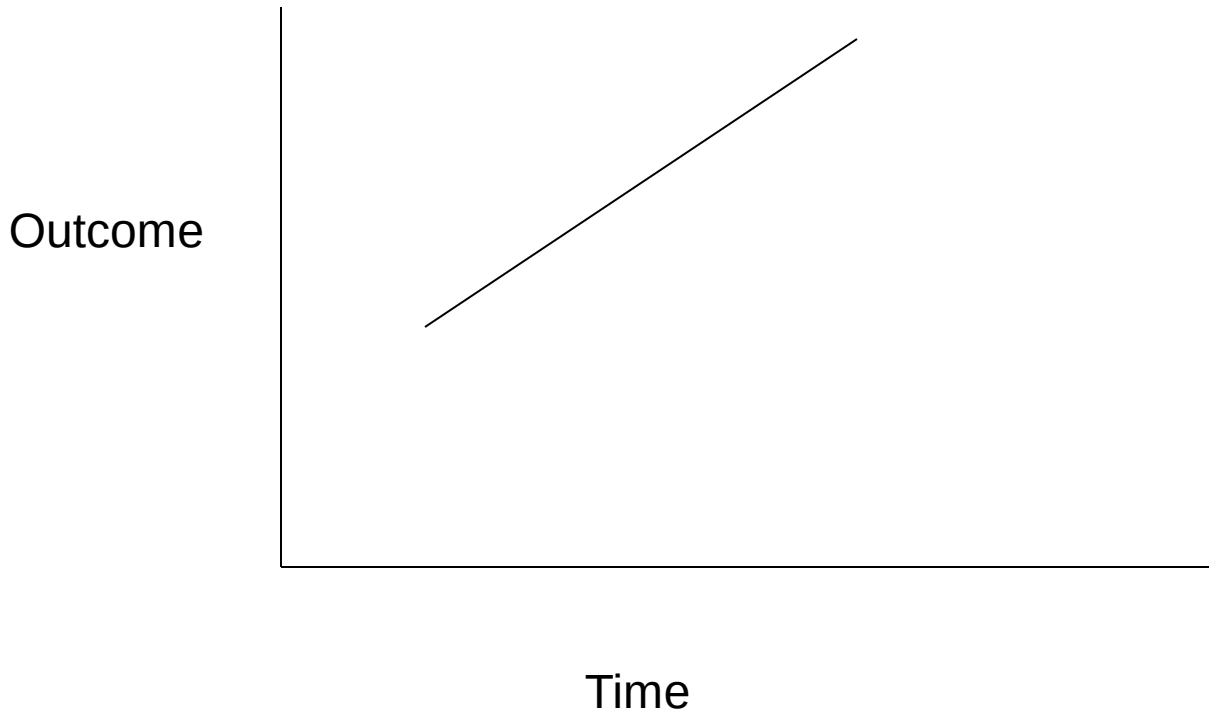
5	6	6
9	9	10
1	1	2
4	3	4

Mean = 5.0 , Standard Deviation = 3.1

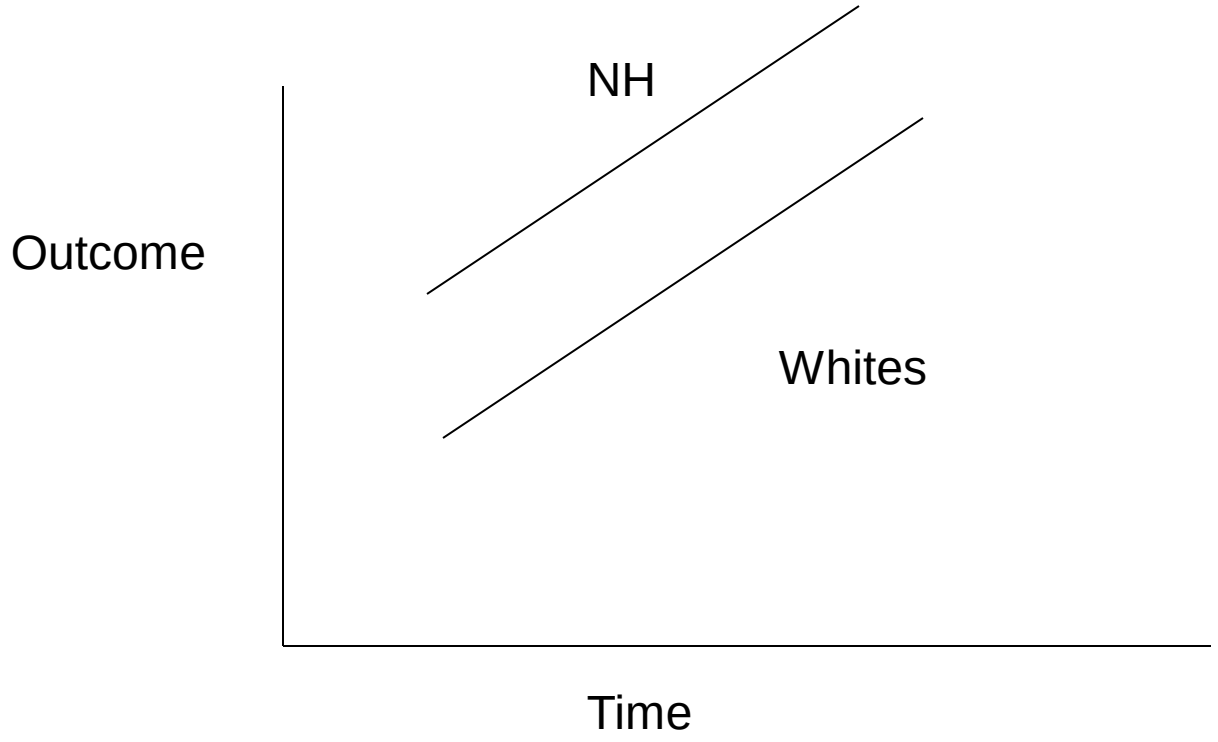
Table 3

- Usual Goal of Longitudinal Analysis: Does outcome change over time?
  - Candidates for time: Age, Calendar Year
  - Does same trend exist for all ethnicity groups but at different levels?
  - Is the trend over time the same for all Race/Ethnic Groups?
  - Detected by examining interaction terms
- Do you need to control for other factors (**potential confounders**)?
  - sex, insurance (?), other (?)

Trend Over Time



Same Trend but Different Mean Outcome



Different Trends

