

Plan and Results for Basic Seasonal Paper

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Plan Summary

Based on a review of analyses, we decided to construct all analyses using the same sets of independent variables. Models will be constructed sex specific, and overall. When including independent variables, we always include both a cross-sectional and a longitudinal variable. We use the BLUP estimates (after controlling for day of the week and interviewer) of these independent variables in all analyses. Initial results indicate that the models fit better. The cross-sectional variables correspond to the average BLUP estimate for a subject (over quarters). The longitudinal variable corresponds to the actual BLUP estimate of the independent variable for the subject-quarter.

The independent variables are:

Variable	Original Variable Name	Cross-Sectional Variables	Longitudinal Variables
BMI	Cc5b	Cc5b_m	Cc5b
Total Kcal	Energy	Ener_pm	Ener_p
Saturated Fat as a Percent of Kcal	Sfapcnt	Sfap_pm	Sfapct_p
Total Fat as a percent of Kcal	Totalfat	Tfat_pm	Tfat_p
Total waking activity (MET)	Haactmet	Hamet_pm	Hamet_p
Time spent in outdoor light	HLdir_t	HLt_pm or (abs) HLDP_PM (relative)	HLt_p or (abs) HLDP_P (relative)

Initial Considerations

There was a question as to whether to include outdoor light time as a percent of available light, or as an absolute measure of light. We compare the results of each to decide which way to represent the variable. We agreed that if comparable results occur for the two approaches, we'll use the light exposure as a percent of available light.

The question of how to include outdoor light was considered by constructing parallel models for men and women, with the sole difference the scale of the light exposure variable. We summarize partial results below:

Scale	Males (n=327, obs=1300)					Females (n=308, obs=1256)				
	-2Log(8)	Amp	Phase	Light Cross sec	Light Long	-2Log(8)	Amp	Phase	Light Cross sec	Light Long
Absolute	11907.5	3.81*	333	8.80***	-0.34	11598.6	3.98*	2	6.59	0.76
Relative	11895.6	3.91*	334	116.3***	-5.92	11588.2	3.66*	1	84.97	8.5
Neither	11931					11608				
Both	11884.3					11572.3				

Source: sne99p128.sas

Based on these results, including light as a percent of the available light better explains variation in TC. Therefore, we will use light expressed on this scale in subsequent analyses.

Basic Results

The results of these analyses will be summarized in the following Tables.

Table 1a. Summary of Model Fitting Statistics and Amplitude and Phase Estimates for

Chol	Group	# Obs	# Subjects	-2Log(8)(a)	Subject Variance	Residual Variance	Mean	Amplitude	Phase
TC	Overall								
	Male								
	Female								
HDL	Overall								
	Male								
	Female								
LDL	Overall								
	Male								
	Female								
TG	Overall								
	Male								
	Female								

(a) -2Log(8) given is for the model fitted with sine and cosine terms. The significance level is indicated for a test the fit of this model with a base model with a simple mean.

* p<0.05

** p<0.01

*** p<0.001

Results for Table 1a.

Note: Analyses with Sine and Cosine models are constructed by SNE99p129.sas, and create data set TAB1A.sd2 with these basic results. For testing the log likelihood, null models are fit with SNE99P130.sas, which creates TAB1A1.sd2. The results are combined in SNE99P131.SAS to generate this table.

Source: sne99p131.SAS SEASON 9/1/99 EJS

Table 1a. Summary of Model Fitting Statistics and Amplitude and Phase Estimates for Seasons Study of Cholesterol

Cholesterol	Subjects	# Obs	# Subj .	-2Log(L) +	Subject Variance	Residual Variance	Mean	Amplitude	Phase
TC	Overall	2556	635	23695***	1550	295	218	4.5***	358
TC	Male	1300	327	12010***	1436	288	221	5.0***	349
TC	Female	1256	308	11672**	1662	302	215	4.2**	3
HDL	Overall	2556	635	17431***	135	25	47	2.5***	45
HDL	Male	1300	327	8566.7***	100	20	43	1.7***	32
HDL	Female	1256	308	8715.6***	131	30	52	3.3***	51
LDL	Overall	2480	626	22433*	1184	237	143	2.3**	350
LDL	Male	1239	319	11195	1056	240	146	2.0	349
LDL	Female	1241	307	11224*	1300	233	140	2.7*	350
TG	Overall	2556	635	29876**	13437	3591	144	9.3**	306
TG	Male	1300	327	15754***	20555	5539	169	15**	337
TG	Female	1256	308	13558**	4557	1572	116	9.3**	250

* p<0.05

** p<0.01

*** p<0.001

+ Seasonal effect test relative to null model

Table 1b. Summary of Model Fitting Statistics and Amplitude and Phase Estimates for Cholesterol after controlling for 12 covariates.

Chol	Group	# Obs	# Subjects	-2Log(8)(a)	Subject Variance	Residual Variance	Mean	Amplitude	Phase
TC	Overall								
	Male								
	Female								
HDL	Overall								
	Male								
	Female								
LDL	Overall								
	Male								
	Female								
TG	Overall								
	Male								
	Female								

(a) -2Log(8) given is for the model fitted with 12 covariates. The significance level is indicated for a test the fit of this model with a base model omitting the 12 covariates.

* p<0.05

** p<0.01

*** p<0.001

The second set of models were fit by the program sne99p132.sas. This program abstracted results into two data sets, TAB1B.sd2 and TAB2.sd2. By combining $-2\log(L)$ from Table 1a with data in TAB1B.sd2, we can test whether the additional covariates (12 in number) are statistically significant in the model. We use program SNE99P133.sas to develop the table for these results as given below. [Note that there is an error in program sne99p132.sas, in that the Overall results for HDL, LDL, and TG are not recorded correctly. This will be redone.]

Source: sne99p133.SAS SEASON 9/2/99 EJS

Table 1b. Summary of Model Fitting Statistics and Amplitude and Phase Estimates for Seasons Study of Cholesterol after control for BMI, Kcal, %Kcal from SFat, %Kcal from Fat, Total Waking Activity (MET), and Proportion of Daily Outdoor Light

Cholesterol	Subjects	# Obs	# Subj .	-2Log(L)+	Subject Variance	Residual Variance	Mean	Amplitude	Phase
TC	Overall	2556	635	23530***	1428	279	218	3.6***	349
TC	Male	1300	327	11896***	1249	272	221	3.9**	334
TC	Female	1256	308	11588***	1587	287	215	3.7*	1
HDL	Overall	2556	635	17314***	112	25	47	2.9***	44
HDL	Male	1300	327	8515.6***	86	20	43	2.4***	32
HDL	Female	1256	308	8669.0***	116	29	52	3.6***	51
LDL	Overall	2480	626	22337***	1086	232	143	1.7	334
LDL	Male	1239	319	11124***	924	235	146	1.6	334
LDL	Female	1241	307	11171***	1235	229	140	2.0	328
TG	Overall	2556	635	29703***	11721	3487	144	9.7**	286
TG	Male	1300	327	15634***	18351	5337	169	12*	308
TG	Female	1256	308	13455***	3928	1534	116	7.7*	261

* p<0.05

** p<0.01

*** p<0.001

+ Co-variable test relative to sine/cosine model

Table 2. Regression Coefficients based on models for Cholesterol

Chol	Metric	Group	BMI	Kcal	% Sfat	% Fat	Activity	Light
TC	Cross-sec.	Overall						
		Male						
		Female						
	Long.	Overall						
		Male						
		Female						
HDL	Cross-sec.	Overall						
		Male						
		Female						
	Long.	Overall						
		Male						
		Female						
LDL	Cross-sec.	Overall						
		Male						
		Female						
	Long.	Overall						
		Male						
		Female						
TG	Cross-sec.	Overall						
		Male						
		Female						
	Long.	Overall						
		Male						
		Female						

* p<0.05
 ** p<0.01
 *** p<0.001

We summarize the regression coefficients for the various models in Table 2.

Source: sne99p134.SAS SEASON 9/2/99 EJS

Table 2. Summary of Regression Coefficients for Covariates in Seasonal Cholesterol Models

Cholesterol	Metric	Group	BMI	Kcal	%SFat	%TFat	Activity	Light
TC	xsec	Overall	-3.54***	-0.06***	-5.00**	0.78*	1.01	117.33***
TC	xsec	Male	-3.46***	-0.06***	-6.92**	0.86*	1.30	116.34***
TC	xsec	Female	-3.64***	-0.08**	-3.48	1.02	-0.01	84.97
TC	Long	Overall	4.85***	0.03**	3.49***	-0.40*	-1.19*	-1.12
TC	Long	Male	5.39***	0.03*	3.09	-0.31	-1.35*	-5.92
TC	Long	Female	4.49***	0.04*	4.17**	-0.61	-0.72	8.51
HDL	xsec	Overall	-0.48**	-0.02***	-0.52	0.16	0.05	-25.94***
HDL	xsec	Male	-0.06	-0.01*	0.19	0.14	0.09	-6.95
HDL	xsec	Female	-0.74**	-0.02*	-1.30	0.32	0.01	-7.72
HDL	Long	Overall	-0.28	0.01**	0.82**	-0.10	0.09	7.37*
HDL	Long	Male	-0.82***	0.01	-0.53	-0.03	-0.02	7.94*
HDL	Long	Female	0.10	0.01	1.33**	-0.06	0.28	6.17
LDL	xsec	Overall	-1.82**	-0.03*	-3.04*	0.39	0.77	109.54***
LDL	xsec	Male	-1.76*	-0.03*	-5.26*	0.39	1.18	82.80***
LDL	xsec	Female	-2.05**	-0.06*	-1.71	0.72	-0.31	118.59*
LDL	Long	Overall	2.72***	0.00	1.97*	0.00	-0.77	-2.55
LDL	Long	Male	2.73***	0.00	3.01	0.08	-0.97	2.40
LDL	Long	Female	2.76***	0.02	1.89	-0.27	-0.38	-11.54
TG	xsec	Overall	-6.20**	-0.06	-5.75	1.12	2.77	194.69**
TG	xsec	Male	-8.27*	-0.11	-5.71	1.49	2.83	216.02*
TG	xsec	Female	-3.93*	-0.01	-2.18	-0.42	1.57	-148.0
TG	Long	Overall	12.84***	0.12***	3.17	-1.78*	-4.55*	-7.83
TG	Long	Male	19.10***	0.17**	1.92	-2.17	-4.62	-48.67
TG	Long	Female	8.09***	0.07	4.71	-1.24	-3.37	79.38

* p<0.05
 ** p<0.01
 *** p<0.001

Figures: We plan on constructing two sets of figures comparable to the figures constructed for the preliminary Season's analyses on the WEB (see http://www-unix.oit.umass.edu/~seasons/re_demog.html, and program sne125.sas. The figures will correspond to not controlling for any covariates, and controlling for all 12 covariates. The figures are constructed using programs sne99p137.sas and sne99p139.sas.

Figure 1a. Seasonal Variation in Total Cholesterol
Overall and by Gender for the Seasons Study
(No Covariates)

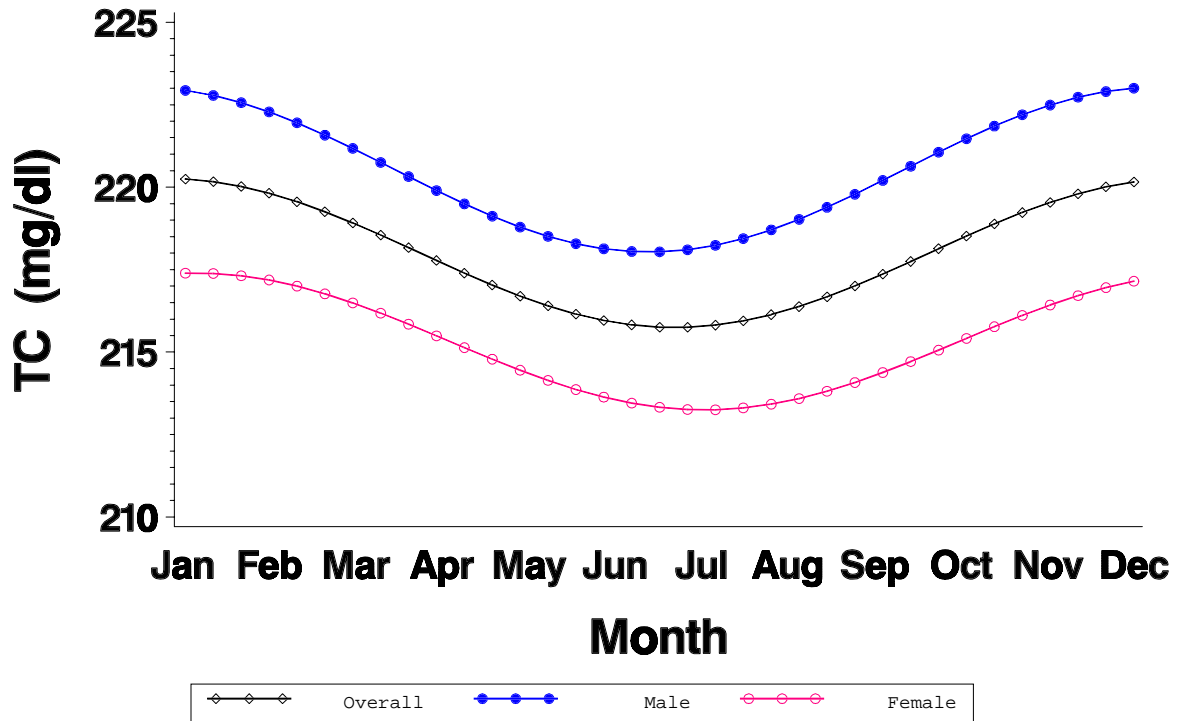


Figure 1b. Seasonal Variation in HDL
Overall and by Gender for the Seasons Study
(No Covariates)

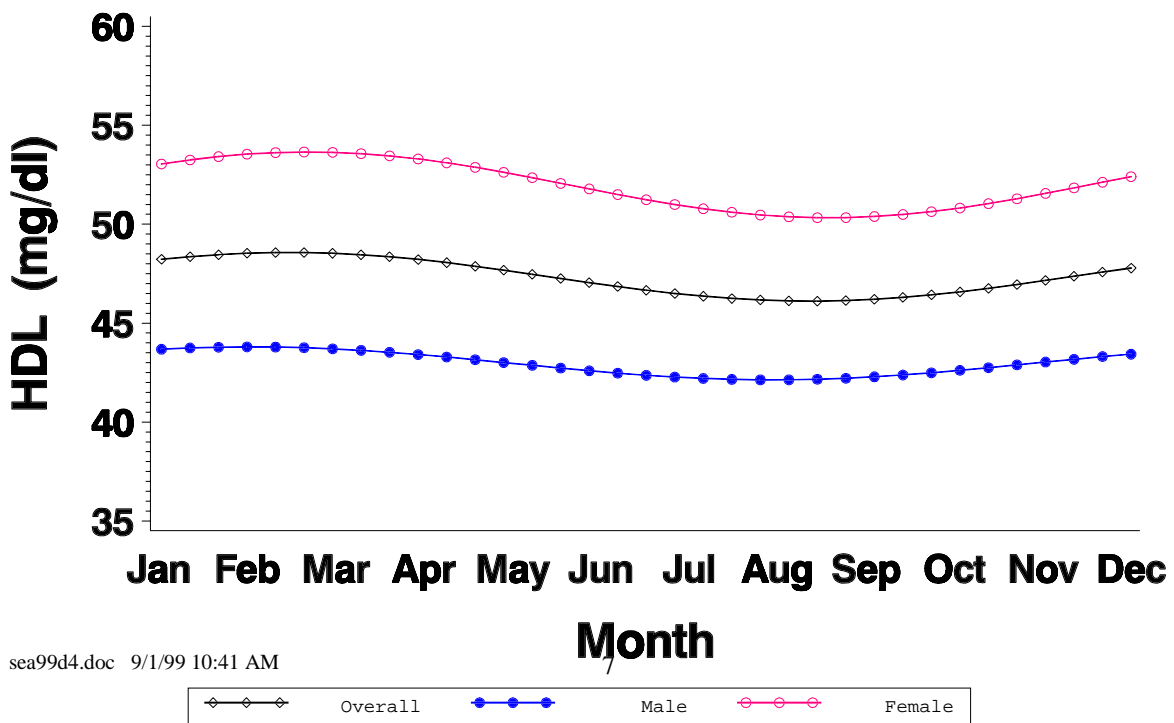


Figure 1c. Seasonal Variation in LDL
Overall and by Gender for the Seasons Study
(No Covariates)

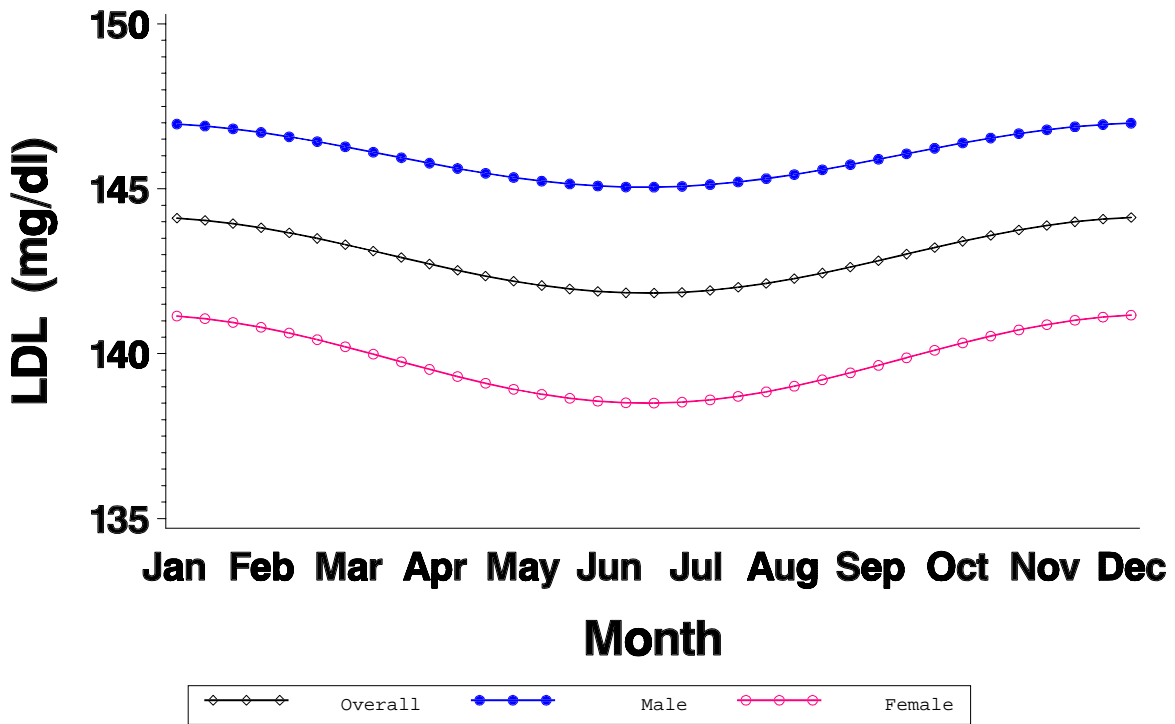


Figure 1d. Seasonal Variation in TG
Overall and by Gender for the Seasons Study
(No Covariates)

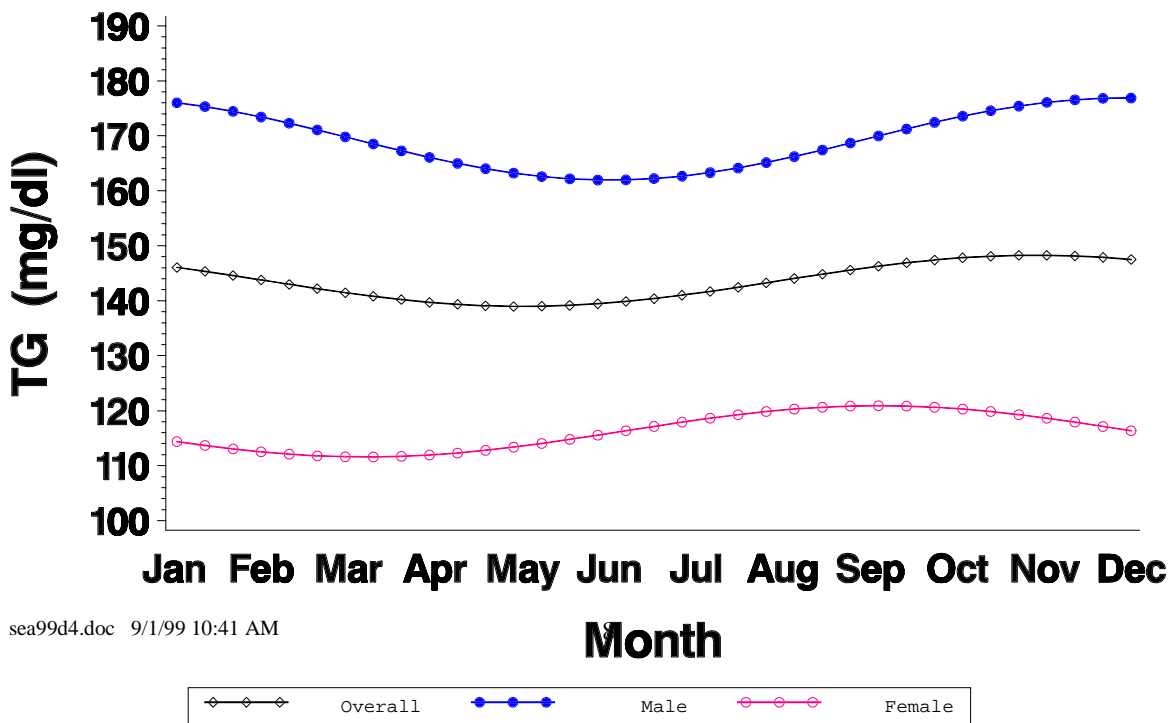


Figure 2a. Seasonal Variation in Total Cholesterol

Overall and by Gender for the Seasons Study
(Covariates: BMI, Kcal, Pct SatFat, Pct Total Fat
Waking Activity, Pct of Available Outdoor Light)

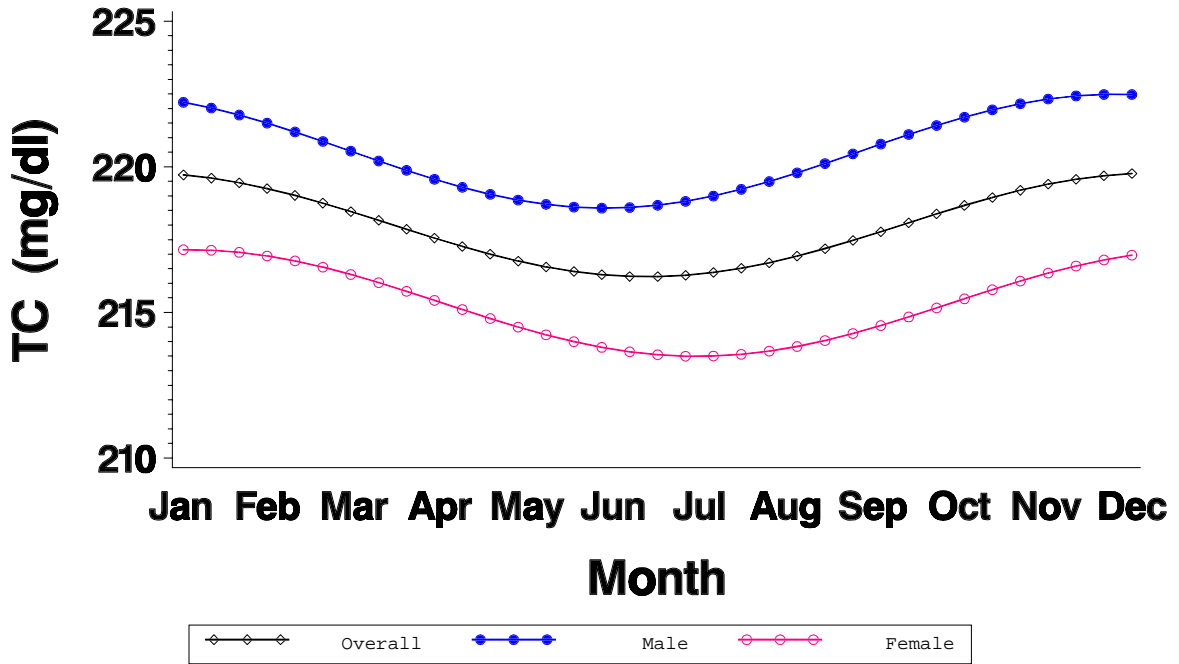


Figure 2b. Seasonal Variation in HDL

Overall and by Gender for the Seasons Study
(Covariates: BMI, Kcal, Pct SatFat, Pct Total Fat
Waking Activity, Pct of Available Outdoor Light)

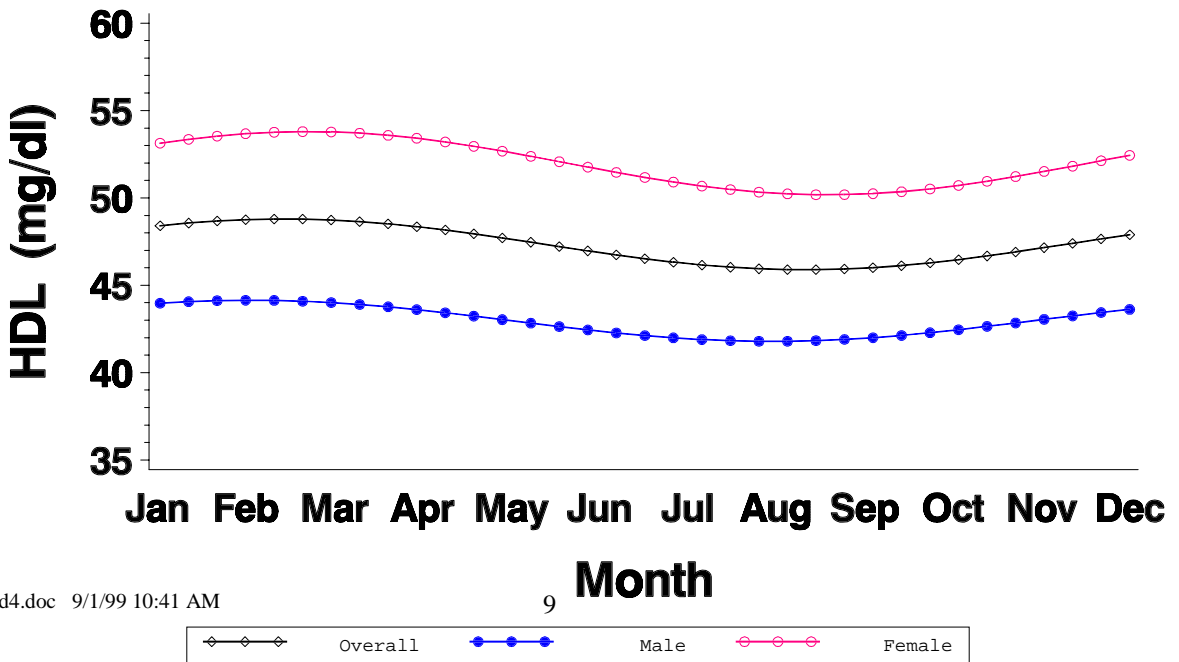


Figure 2c. Seasonal Variation in LDL
 Overall and by Gender for the Seasons Study
 (Covariates: BMI, Kcal, Pct SatFat, Pct Total Fat
 Waking Activity, Pct of Available Outdoor Light)

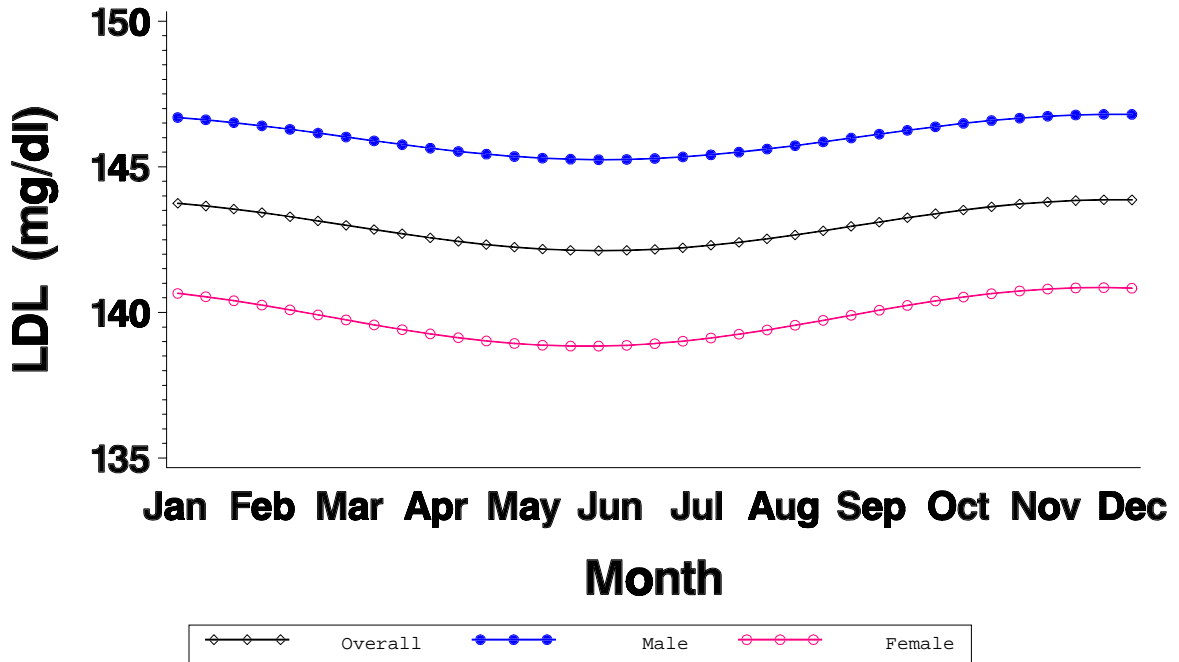
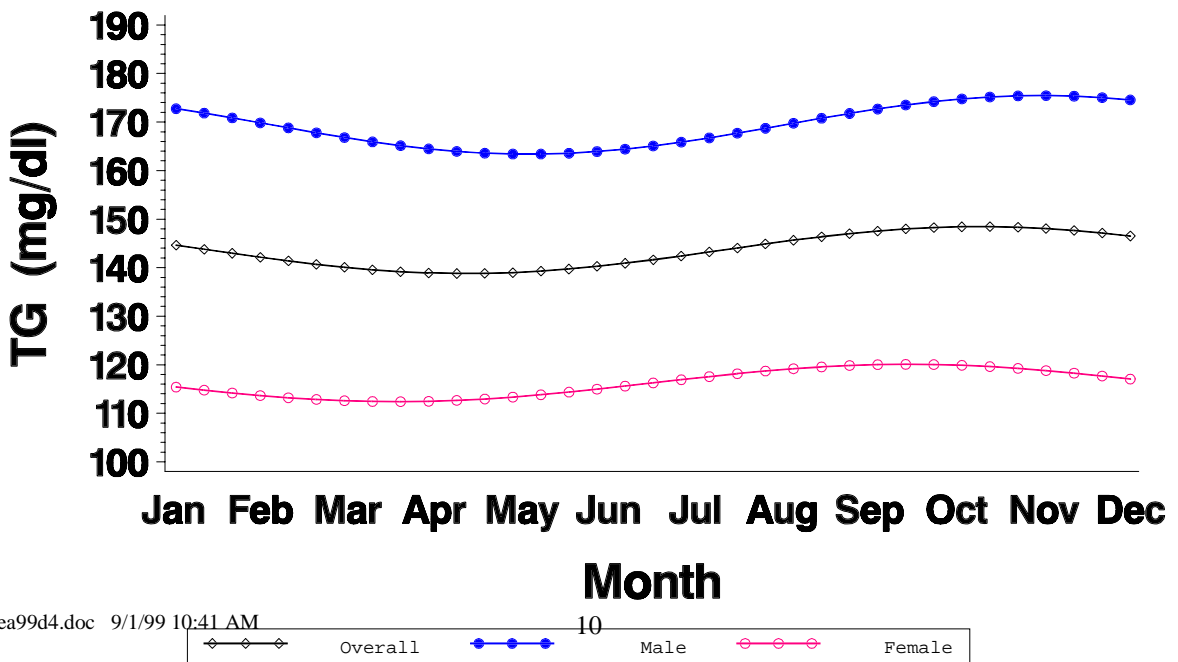


Figure 2d. Seasonal Variation in TG
 Overall and by Gender for the Seasons Study
 (Covariates: BMI, Kcal, Pct SatFat, Pct Total Fat
 Waking Activity, Pct of Available Outdoor Light)



Additional Analyses

We plan on developing additional analyses for different groupings of subjects. These groupings will look for interactions in the seasonal patterns between subjects. There will be 4 models for each set:

- A model with a mean
- A model with sine and cosine
- A model with 12 covariates.
- A model with sine, cosine and 12 covariates

The models will be developed based on the following breakdowns:

Cholesterol Measure: 2 groups, divide at mean
 3 groups, divide at 1st and 3rd quartiles of std between quarters for subjects

Age divide in 3 groups: < 40, 40-55, 55+
BMI: divide in 3 groups: <25; 25-29, 30+
Kcal: divide in 2 groups, divide at mean
%Sfat divide in 2 groups, divide at mean
%TotFat divide in 2 groups, divide at mean
Activ. divide in 2 groups, divide at mean
Light divide in 2 groups, divide at mean

