

# Salad Bar Study: Time to Eat and Fruit and Vegetable Intake

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# 1 Demographic Characteristics

\*note - restricted to: - pre (selected) > post (waste) - time to eat is not NA and is > 0 - pre (selected) is not NA - post (waste) is not NA - missing data for any covariates used in models (age not included in models)

Table 1: Demographic Characteristics and Variables of Interest

Group	Characteristic	Full Sample		School Type				p-value
		N	Overall	N	Elementary	Middle School	High School	
	Gender	2,216		2,216				0.8
	F		1,036 (47%)		284 (46%)	330 (47%)	422 (47%)	
	M		1,180 (53%)		337 (54%)	368 (53%)	475 (53%)	
	Grade	2,216	7.4 (3.1)	2,216	3.4 (1.3)	7.0 (0.8)	10.4 (1.1)	<0.001
	Age, yr	2,121	12.4 (3.1)	2,121	8.6 (1.4)	12.2 (1.0)	15.6 (1.3)	<0.001
	Unknown		95		0	0	95	
	Race/Ethnicity	2,216		2,216				<0.001
	Hispanic or Latino		1,400 (63%)		350 (56%)	449 (64%)	601 (67%)	
	White		524 (24%)		157 (25%)	147 (21%)	220 (25%)	
	Other		168 (7.6%)		62 (10.0%)	61 (8.7%)	45 (5.0%)	
	Black or African American		124 (5.6%)		52 (8.4%)	41 (5.9%)	31 (3.5%)	
	Free-Reduced Lunch	2,216		2,216				0.004
	Free/Reduced		1,768 (80%)		468 (75%)	576 (83%)	724 (81%)	
	Paid		448 (20%)		153 (25%)	122 (17%)	173 (19%)	
	F/V Selected	2,216		2,216				<0.001
	N		354 (16%)		6 (1.0%)	103 (15%)	245 (27%)	
	Y		1,862 (84%)		615 (99%)	595 (85%)	652 (73%)	
	F/V Self-Served, g	1,862	141.3 (70.3)	1,862	132.5 (64.3)	152.8 (73.4)	139.3 (71.5)	<0.001
	Lunch Period	1,862	28.4 (12.4)	1,862	24.1 (9.7)	28.6 (16.0)	32.3 (9.2)	<0.001
	Eating Duration	1,862	10.9 (4.8)	1,862	10.7 (5.7)	10.0 (3.7)	11.8 (4.7)	<0.001
	F/V Consumed Any	1,862		1,862				<0.001
	N		204 (11%)		59 (9.6%)	48 (8.1%)	97 (15%)	
	Y		1,658 (89%)		556 (90%)	547 (92%)	555 (85%)	
	F/V Consumed, g	1,862	60.7 (55.9)	1,862	48.0 (52.1)	68.8 (55.8)	65.2 (57.5)	<0.001
	F/V Waste, g	1,862	80.7 (67.5)	1,862	84.5 (57.8)	84.0 (74.4)	74.1 (68.8)	<0.001
	F/V Percent Waste (post/pre), %	1,862	55.0 (35.0)	1,862	64.4 (31.6)	51.2 (35.3)	49.6 (36.0)	<0.001

<sup>1</sup> n (%); Mean (SD)

<sup>2</sup> Pearson's Chi-squared test; Kruskal-Wallis rank sum test

\*intake data means and standard deviations restricted to those who selected F/V. Means for consumed restricted to those with FV consumption > 0 is in text with that model.

Negative eating duration values:

```
salad_bar_dat[!is.na(salad_bar_dat[['time_to_eat']])] & salad_bar_dat[['time_to_eat']] < 0, 'time_to_eat'
```

```
[1] -58.96667 -35.33333 -37.31667 -35.81667 -57.96667 -58.83333 -58.81667
[8] -57.06667 -49.96667 -53.81667 -53.71667
```

## 1.1 Follow-up Tests by School Type

Total Sample Sizes: Full N = 2226, Elementary N = 630, Middle School N = 699, High School N = 897

### 1.1.1 gender

Pearson's Chi-squared test

```
data: xtabs(~school_type + gender, data = salad_bar_dat_use)
X-squared = 0.36782, df = 2, p-value = 0.832
```

### 1.1.2 age

Anova Table (Type III tests)

Response: age

	Sum Sq	Df	F value	Pr(>F)
(Intercept)	45850	1	29809	< 2.2e-16 ***
school_type	17482	2	5683	< 2.2e-16 ***
Residuals	3258	2118		

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

contrast	estimate	SE	df	t.ratio	p.value
Elementary - High School	-7.05	0.0663	2118	-106.415	<.0001
Elementary - Middle School	-3.61	0.0684	2118	-52.695	<.0001
High School - Middle School	3.45	0.0642	2118	53.730	<.0001

P value adjustment: tukey method for comparing a family of 3 estimates

### 1.1.3 race/ethnicity

Pearson's Chi-squared test

```
data: xtabs(~school_type + race_ethnicity, data = salad_bar_dat_use)
X-squared = 39.504, df = 6, p-value = 5.7e-07
```

### 1.1.4 free-reduced lunch

Pearson's Chi-squared test

```
data: xtabs(~school_type + paid_free_reduced, data = salad_bar_dat_use)
X-squared = 11.251, df = 2, p-value = 0.003605
```

### 1.1.5 fruit/veg selected

Pearson's Chi-squared test

```
data: xtabs(~school_type + fv_selected, data = salad_bar_dat_use)
X-squared = 190.9, df = 2, p-value < 2.2e-16
```

### 1.1.6 lunch duration

Type III Analysis of Variance Table with Satterthwaite's method

```
Sum Sq Mean Sq NumDF DenDF F value Pr(>F)
school_type 120.95 60.476 2 32.306 2.8445 0.0728 .
```

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

contrast	estimate	SE	df	t.ratio	p.value
Elementary - High School	-10.50	4.41	32.0	-2.380	0.0591
Elementary - Middle School	-6.08	4.42	32.2	-1.378	0.3642
High School - Middle School	4.41	4.30	31.8	1.026	0.5661

Degrees-of-freedom method: kenward-roger

P value adjustment: tukey method for comparing a family of 3 estimates

### 1.1.7 time to eat

Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)

Response: time\_to\_eat

```
      F Df Df.res Pr(>F)
(Intercept) 273.3478 1 31.164 <2e-16 ***
school_type  1.2463 2 30.999 0.3016
```

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

contrast	estimate	SE	df	t.ratio	p.value
Elementary - High School	-0.667	0.878	30.3	-0.760	0.7302
Elementary - Middle School	0.682	0.894	31.8	0.762	0.7285
High School - Middle School	1.348	0.854	30.9	1.579	0.2698

Degrees-of-freedom method: kenward-roger

P value adjustment: tukey method for comparing a family of 3 estimates

### 1.1.8 fruit/veg amount selected

Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)

Response: fv\_pre

```
      F Df Df.res Pr(>F)
(Intercept) 92.6926 1 31.171 7.44e-11 ***
school_type  0.2689 2 31.358 0.766
```

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

contrast	estimate	SE	df	t.ratio	p.value
Elementary - High School	-4.31	19.2	31.0	-0.225	0.9725

Elementary - Middle School	-13.73	19.3	31.6	-0.712	0.7584
High School - Middle School	-9.42	18.7	31.5	-0.504	0.8701

Degrees-of-freedom method: kenward-roger

P value adjustment: tukey method for comparing a family of 3 estimates

### 1.1.9 fruit/veg consumed

Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)

Response: fv\_consumed

	F	Df	Df.res	Pr(>F)
(Intercept)	59.9006	1	28.915	1.587e-08 ***
school_type	2.5823	2	29.922	0.09235 .

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

contrast	estimate	SE	df	t.ratio	p.value
Elementary - High School	-18.35	8.82	29.4	-2.080	0.1114
Elementary - Middle School	-16.67	8.95	29.9	-1.863	0.1669
High School - Middle School	1.68	8.71	30.5	0.193	0.9796

Degrees-of-freedom method: kenward-roger

P value adjustment: tukey method for comparing a family of 3 estimates

### 1.1.10 fruit/veg waste

Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)

Response: fv\_post

	F	Df	Df.res	Pr(>F)
(Intercept)	44.6117	1	30.899	1.835e-07 ***
school_type	0.5962	2	31.223	0.557

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

contrast	estimate	SE	df	t.ratio	p.value
Elementary - High School	16.675	17.4	30.8	0.956	0.6099
Elementary - Middle School	0.946	17.6	31.4	0.054	0.9984
High School - Middle School	-15.729	17.0	31.4	-0.923	0.6302

Degrees-of-freedom method: kenward-roger

P value adjustment: tukey method for comparing a family of 3 estimates

### 1.1.11 fruit/veg waste proportion

\*restricted to selected only

Analysis of Deviance Table (Type III Wald F tests with Kenward-Roger df)

Response: fv\_prop\_waste

	F	Df	Df.res	Pr(>F)
--	---	----	--------	--------

```

(Intercept) 170.0856  1 29.627 8.292e-14 ***
school_type  3.1896  2 30.471  0.05524 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

contrast          estimate    SE    df t.ratio p.value
Elementary - High School      16.80 6.70 29.9   2.506  0.0457
Elementary - Middle School    10.69 6.78 30.6   1.577  0.2709
High School - Middle School   -6.11 6.59 30.9  -0.928  0.6270

Degrees-of-freedom method: kenward-roger
P value adjustment: tukey method for comparing a family of 3 estimates

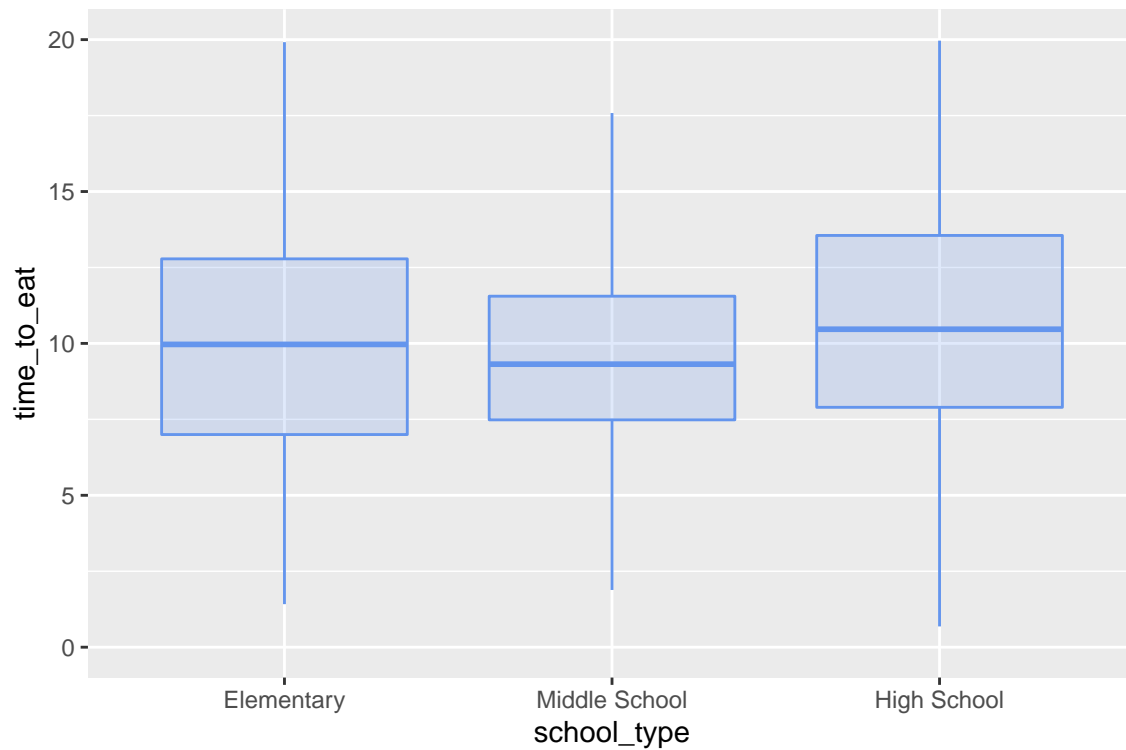
```

## 2 Association between TTE and Lunch Duration

Pearson's product-moment correlation

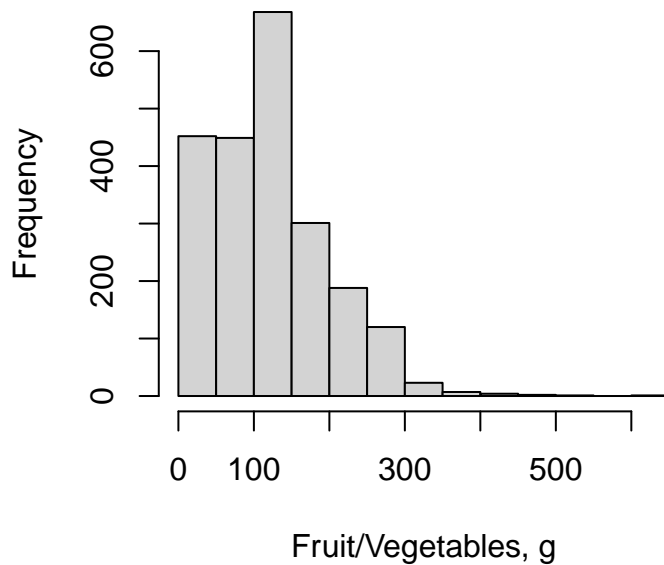
```
data: salad_bar_dat_use[["time_to_eat"]] and salad_bar_dat_use[["lunch_dur"]]
t = -1.0389, df = 2214, p-value = 0.2989
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 -0.06365592  0.01958270
sample estimates:
      cor
-0.02207487
```

There is no association between time to eat and lunch duration for the whole sample ( $r = 0.03$ ,  $p = 0.172$ ).



### 3 Fruit/Vegetable Selected

#### Histogram of Selected Fruits/Vegetables,



#### 3.1 Interaction

```
Linear mixed model fit by REML. t-tests use Satterthwaite's method [  
lmerModLmerTest]  
Formula: time_to_eat ~ grade + gender + race_ethnicity + paid_free_reduced +  
        lunch_dur + fv_pre * school_type + (1 | school_name)  
Data: salad_bar_dat_use
```

REML criterion at convergence: 13053

Scaled residuals:

Min	1Q	Median	3Q	Max
-2.9115	-0.5852	-0.0963	0.4548	9.0341

Random effects:

Groups	Name	Variance	Std.Dev.
school_name	(Intercept)	4.465	2.113
Residual		20.087	4.482

Number of obs: 2216, groups: school\_name, 35

Fixed effects:

	Estimate	Std. Error	df
(Intercept)	9.541e+00	9.914e-01	1.017e+02
grade	-3.167e-02	9.109e-02	2.191e+03
genderM	-5.089e-01	1.941e-01	2.179e+03
race_ethnicityWhite	-6.949e-01	3.061e-01	2.184e+03
race_ethnicityOther	-4.040e-02	3.918e-01	2.198e+03
race_ethnicityBlack or African American	-3.311e-01	4.396e-01	2.198e+03



paid_free_reducedPaid	3.027e-01	3.417e-01	2.073e+03
lunch_dur	4.526e-02	1.819e-02	4.366e+02
fv_pre	4.958e-03	3.470e-03	2.108e+03
school_typeMiddle School	-4.307e-01	1.161e+00	6.390e+01
school_typeHigh School	5.575e-01	1.242e+00	8.383e+01
fv_pre:school_typeMiddle School	-3.088e-03	4.422e-03	1.997e+03
fv_pre:school_typeHigh School	5.243e-05	4.020e-03	2.136e+03
	t value	Pr(> t )	
(Intercept)	9.624	5.71e-16	***
grade	-0.348	0.72810	
genderM	-2.622	0.00881	**
race_ethnicityWhite	-2.270	0.02329	*
race_ethnicityOther	-0.103	0.91788	
race_ethnicityBlack or African American	-0.753	0.45138	
paid_free_reducedPaid	0.886	0.37583	
lunch_dur	2.488	0.01323	*
fv_pre	1.429	0.15326	
school_typeMiddle School	-0.371	0.71195	
school_typeHigh School	0.449	0.65459	
fv_pre:school_typeMiddle School	-0.698	0.48514	
fv_pre:school_typeHigh School	0.013	0.98959	

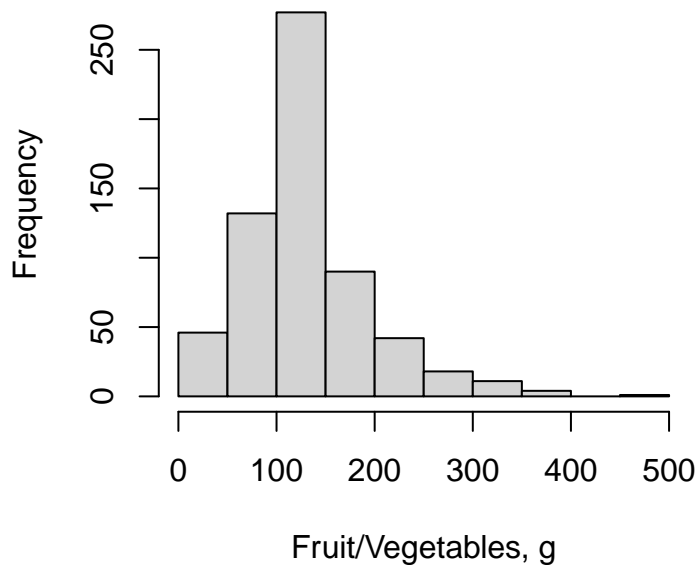
---  
Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

### 3.2 Overall

	Estimate	Std. Error	df	t value
(Intercept)	9.341	0.837	156.844	11.155
grade	-0.007	0.076	317.761	-0.091
genderM	-0.511	0.194	2182.098	-2.635
race_ethnicityWhite	-0.687	0.306	2191.646	-2.247
race_ethnicityOther	-0.030	0.390	2201.422	-0.077
race_ethnicityBlack or African American	-0.354	0.439	2200.282	-0.806
paid_free_reducedPaid	0.309	0.341	2092.105	0.906
lunch_dur	0.047	0.018	449.373	2.635
fv_pre	0.004	0.001	2119.951	2.696
	Pr(> t )			
(Intercept)	0.000			
grade	0.927			
genderM	0.008			
race_ethnicityWhite	0.025			
race_ethnicityOther	0.939			
race_ethnicityBlack or African American	0.420			
paid_free_reducedPaid	0.365			
lunch_dur	0.009			
fv_pre	0.007			

### 3.3 Elementary

#### Histogram of Selected Fruits/Vegetables,



	Estimate	Std. Error	df	t value
(Intercept)	14.713	2.208	29.477	6.665
grade	-0.571	0.162	583.999	-3.534
genderM	-0.459	0.400	603.836	-1.146
race_ethnicityWhite	-0.679	0.655	611.918	-1.037
race_ethnicityOther	-0.538	0.724	604.682	-0.743
race_ethnicityBlack or African American	-0.617	0.772	609.305	-0.799
paid_free_reducedPaid	0.687	0.631	611.652	1.089
lunch_dur	-0.101	0.074	27.302	-1.373
fv_pre	0.005	0.004	603.894	1.229
	Pr(> t )			
(Intercept)	0.000			
grade	0.000			
genderM	0.252			
race_ethnicityWhite	0.300			
race_ethnicityOther	0.458			
race_ethnicityBlack or African American	0.425			
paid_free_reducedPaid	0.277			
lunch_dur	0.181			
fv_pre	0.220			

### 3.4 Middle School

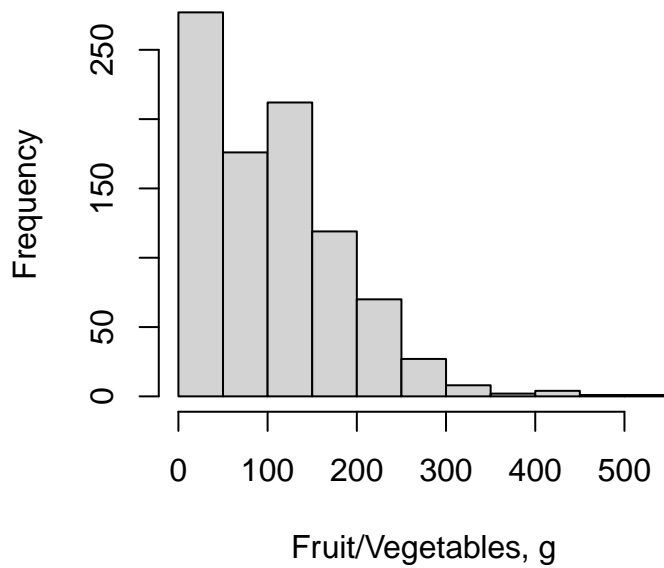
#### Histogram of Selected Fruits/Vegetables,



	Estimate	Std. Error	df	t value
(Intercept)	6.555	1.551	207.063	4.226
grade	0.321	0.180	686.945	1.783
genderM	-0.180	0.281	682.466	-0.640
race_ethnicityWhite	-0.705	0.434	664.684	-1.625
race_ethnicityOther	-0.109	0.545	688.374	-0.200
race_ethnicityBlack or African American	-0.272	0.607	688.437	-0.448
paid_free_reducedPaid	-0.474	0.485	611.741	-0.976
lunch_dur	0.050	0.019	79.004	2.651
fv_pre	0.001	0.002	497.276	0.583
	Pr(> t )			
(Intercept)	0.000			
grade	0.075			
genderM	0.522			
race_ethnicityWhite	0.105			
race_ethnicityOther	0.841			
race_ethnicityBlack or African American	0.654			
paid_free_reducedPaid	0.329			
lunch_dur	0.010			
fv_pre	0.560			

### 3.5 High School

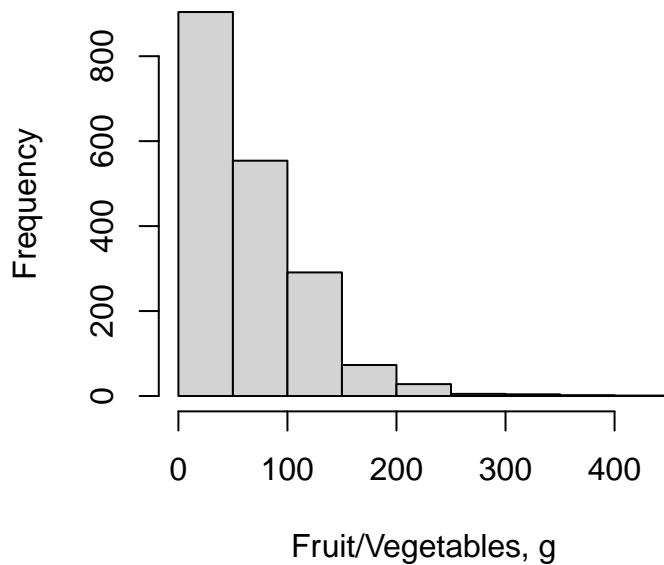
#### Histogram of Selected Fruits/Vegetables,



	Estimate	Std. Error	df	t value
(Intercept)	6.541	1.706	545.980	3.834
grade	0.280	0.152	846.413	1.847
genderM	-0.810	0.323	884.338	-2.505
race_ethnicityWhite	-0.803	0.495	794.174	-1.622
race_ethnicityOther	0.537	0.752	886.881	0.714
race_ethnicityBlack or African American	-0.191	0.897	887.965	-0.212
paid_free_reducedPaid	0.481	0.610	334.420	0.788
lunch_dur	0.061	0.030	75.302	2.056
fv_pre	0.004	0.002	843.835	2.024
Pr(> t )				
(Intercept)	0.000			
grade	0.065			
genderM	0.012			
race_ethnicityWhite	0.105			
race_ethnicityOther	0.475			
race_ethnicityBlack or African American	0.832			
paid_free_reducedPaid	0.431			
lunch_dur	0.043			
fv_pre	0.043			

## 4 Fruit/Vegetable Consumed

### Histogram of Consumed Fruits/Vegetables



Total Sample Sizes: Full N = 2226, Elementary N = 630, Middle School N = 699, High School N = 897

#### 4.1 Interaction

Call:

```
mixed_model(fixed = fv_consumed ~ grade + gender + race_ethnicity +  
  paid_free_reduced + lunch_dur + time_to_eat * school_type,  
  random = ~1 | school_name, data = salad_bar_dat_use, family = zi.negative.binomial(),  
  zi_fixed = ~grade + gender + race_ethnicity + paid_free_reduced +  
    lunch_dur + time_to_eat * school_type, zi_random = ~1 |  
    school_name)
```

Data Descriptives:

Number of Observations: 2216

Number of Groups: 35

Model:

family: zero-inflated negative binomial  
link: log

Fit statistics:

log.Lik	AIC	BIC
-9541.519	19143.04	19189.7

Random effects covariance matrix:

	StdDev	Corr
(Intercept)	0.2725	
zi_(Intercept)	1.2245	0.2913

Fixed effects:

	Estimate	Std.Err	z-value	p-value
(Intercept)	3.4529	0.1882	18.3500	< 1e-04
grade	0.0414	0.0212	1.9468	0.0515530
genderM	0.1208	0.0454	2.6594	0.0078282
race_ethnicityWhite	0.0196	0.0744	0.2629	0.7925947
race_ethnicityOther	0.2517	0.0892	2.8206	0.0047935
race_ethnicityBlack or African American	0.1658	0.1021	1.6245	0.1042611
paid_free_reducedPaid	-0.0197	0.0812	-0.2431	0.8079552
lunch_dur	0.0021	0.0037	0.5726	0.5669357
time_to_eat	0.0150	0.0094	1.5992	0.1097672
school_typeMiddle School	0.1191	0.2149	0.5544	0.5793093
school_typeHigh School	0.1298	0.2422	0.5362	0.5918298
time_to_eat:school_typeMiddle School	0.0108	0.0152	0.7085	0.4786115
time_to_eat:school_typeHigh School	0.0007	0.0129	0.0509	0.9594308

Zero-part coefficients:

	Estimate	Std.Err	z-value	p-value
(Intercept)	-1.2457	0.7635	-1.6315	0.1027829
grade	-0.0769	0.0590	-1.3033	0.1924575
genderM	0.0620	0.1218	0.5086	0.6110238
race_ethnicityWhite	0.3345	0.1730	1.9337	0.0531495
race_ethnicityOther	0.0389	0.2420	0.1610	0.8721194
race_ethnicityBlack or African American	0.4674	0.2716	1.7209	0.0852710
paid_free_reducedPaid	0.3237	0.2032	1.5934	0.1110694
lunch_dur	0.0151	0.0095	1.5970	0.1102705
time_to_eat	-0.1678	0.0629	-2.6670	0.0076527
school_typeMiddle School	0.4579	0.8556	0.5352	0.5925294
school_typeHigh School	1.6525	0.8775	1.8831	0.0596821
time_to_eat:school_typeMiddle School	0.0885	0.0706	1.2530	0.2102017
time_to_eat:school_typeHigh School	0.0797	0.0656	1.2161	0.2239626

log(dispersion) parameter:

Estimate	Std.Err
0.235	0.0373

Integration:

method: adaptive Gauss-Hermite quadrature rule

quadrature points: 11

Optimization:

method: hybrid EM and quasi-Newton

converged: TRUE

## 4.2 Overall

Call:

```

mixed_model(fixed = fv_consumed ~ grade + gender + race_ethnicity +
  paid_free_reduced + lunch_dur + time_to_eat, random = ~1 |
  school_name, data = salad_bar_dat_use, family = zi.negative.binomial(),
  zi_fixed = ~grade + gender + race_ethnicity + paid_free_reduced +
  lunch_dur + time_to_eat, zi_random = ~1 | school_name)

```

#### Data Descriptives:

Number of Observations: 2216

Number of Groups: 35

#### Model:

family: zero-inflated negative binomial

link: log

#### Fit statistics:

log.Lik	AIC	BIC
-9548.347	19140.69	19174.91

#### Random effects covariance matrix:

	StdDev	Corr
(Intercept)	0.2788	
zi_(Intercept)	1.3840	0.2191

#### Fixed effects:

	Estimate	Std.Err	z-value	p-value
(Intercept)	3.4969	0.1640	21.3209	< 1e-04
grade	0.0466	0.0152	3.0630	0.0021915
genderM	0.1202	0.0453	2.6522	0.0079964
race_ethnicityWhite	0.0256	0.0745	0.3435	0.7311961
race_ethnicityOther	0.2534	0.0891	2.8439	0.0044564
race_ethnicityBlack or African American	0.1655	0.1019	1.6247	0.1042202
paid_free_reducedPaid	-0.0205	0.0809	-0.2530	0.8002544
lunch_dur	0.0024	0.0036	0.6581	0.5104545
time_to_eat	0.0180	0.0057	3.1560	0.0015992

#### Zero-part coefficients:

	Estimate	Std.Err	z-value	p-value
(Intercept)	-1.4343	0.5294	-2.7093	0.0067425
grade	0.0238	0.0523	0.4554	0.6488562
genderM	0.0503	0.1211	0.4149	0.6782076
race_ethnicityWhite	0.3212	0.1718	1.8693	0.0615879
race_ethnicityOther	0.0196	0.2404	0.0817	0.9349157
race_ethnicityBlack or African American	0.4336	0.2691	1.6113	0.1071207
paid_free_reducedPaid	0.2862	0.2005	1.4271	0.1535476
lunch_dur	0.0183	0.0096	1.9024	0.0571184
time_to_eat	-0.0904	0.0162	-5.5771	< 1e-04

#### log(dispersion) parameter:

Estimate	Std.Err
0.2399	0.0372

Integration:  
method: adaptive Gauss-Hermite quadrature rule  
quadrature points: 11

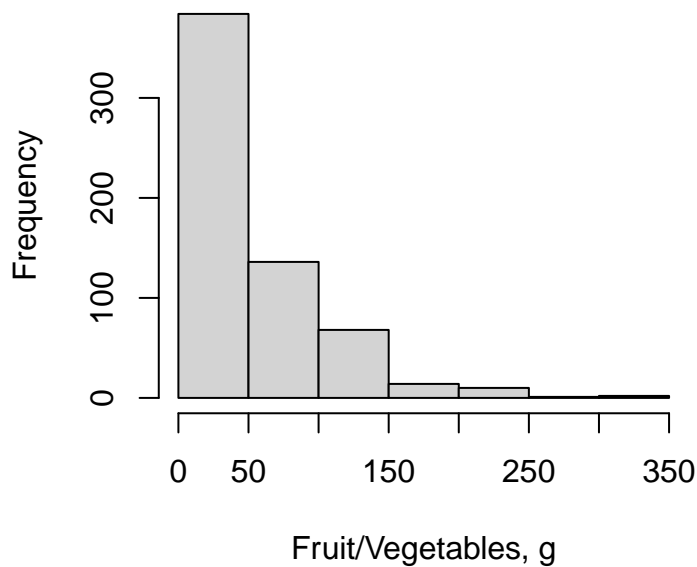
Optimization:  
method: hybrid EM and quasi-Newton  
converged: TRUE

[1] 68.13571

[1] 54.79373

### 4.3 Elementary

#### Histogram of Consumed Fruits/Vegetables



Call:  
`mixed_model(fixed = fv_consumed ~ grade + gender + race_ethnicity +  
paid_free_reduced + lunch_dur + time_to_eat, random = ~1 |  
school_name, data = salad_bar_dat_use[salad_bar_dat_use$school_type ==  
"Elementary", ], family = zi.negative.binomial(), zi_fixed = ~grade +  
gender + race_ethnicity + paid_free_reduced + lunch_dur +  
time_to_eat, zi_random = ~1 | school_name)`

Data Descriptives:  
Number of Observations: 621  
Number of Groups: 11

Model:  
family: zero-inflated negative binomial  
link: log



Fit statistics:

log.Lik	AIC	BIC
-2915.386	5874.773	5883.526

Random effects covariance matrix:

	StdDev	Corr
(Intercept)	0.3692	
zi_(Intercept)	0.5199	0.8814

Fixed effects:

	Estimate	Std.Err	z-value	p-value
(Intercept)	4.1547	0.4080	10.1834	< 1e-04
grade	-0.0107	0.0358	-0.2990	0.764967
genderM	0.2239	0.0903	2.4797	0.013150
race_ethnicityWhite	-0.0271	0.1443	-0.1876	0.851170
race_ethnicityOther	0.2269	0.1618	1.4023	0.160825
race_ethnicityBlack or African American	-0.1047	0.1733	-0.6040	0.545832
paid_free_reducedPaid	0.0473	0.1379	0.3431	0.731540
lunch_dur	-0.0210	0.0126	-1.6685	0.095223
time_to_eat	0.0110	0.0108	1.0198	0.307800

Zero-part coefficients:

	Estimate	Std.Err	z-value	p-value
(Intercept)	1.0354	1.2245	0.8456	0.397796
grade	-0.1490	0.1438	-1.0357	0.300326
genderM	0.4232	0.3947	1.0722	0.283619
race_ethnicityWhite	0.0558	0.5099	0.1094	0.912863
race_ethnicityOther	-0.0858	0.6133	-0.1399	0.888711
race_ethnicityBlack or African American	-0.0342	0.6992	-0.0490	0.960958
paid_free_reducedPaid	0.0623	0.4817	0.1292	0.897166
lunch_dur	-0.0847	0.0393	-2.1553	0.031139
time_to_eat	-0.1571	0.0633	-2.4827	0.013039

log(dispersion) parameter:

Estimate	Std.Err
-0.071	0.0711

Integration:

method: adaptive Gauss-Hermite quadrature rule

quadrature points: 11

Optimization:

method: hybrid EM and quasi-Newton

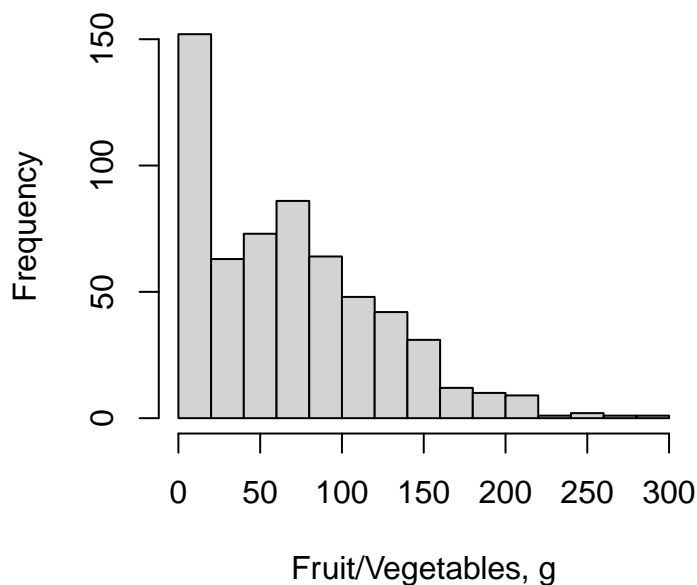
converged: TRUE

[1] 53.08813

[1] 0

#### 4.4 Middle School

##### Histogram of Consumed Fruits/Vegetables



Call:

```
mixed_model(fixed = fv_consumed ~ grade + gender + race_ethnicity +  
  paid_free_reduced + lunch_dur + time_to_eat, random = ~1 |  
  school_name, data = salad_bar_dat_use[salad_bar_dat_use$school_type ==  
  "Middle School", ], family = zi.negative.binomial(), zi_fixed = ~grade +  
  gender + race_ethnicity + paid_free_reduced + lunch_dur +  
  time_to_eat, zi_random = ~1 | school_name)
```

Data Descriptives:

Number of Observations: 698

Number of Groups: 12

Model:

family: zero-inflated negative binomial  
link: log

Fit statistics:

log.Lik	AIC	BIC
-3178.002	6400.005	6410.673

Random effects covariance matrix:

	StdDev	Corr
(Intercept)	0.2517	
zi_(Intercept)	1.3269	-0.9481

Fixed effects:

Estimate	Std.Err	z-value	p-value
----------	---------	---------	---------

(Intercept)	2.8656	0.3882	7.3813	< 1e-04
grade	0.1098	0.0491	2.2379	0.025228
genderM	0.1097	0.0749	1.4655	0.142791
race_ethnicityWhite	-0.0264	0.1192	-0.2218	0.824501
race_ethnicityOther	0.2256	0.1411	1.5991	0.109804
race_ethnicityBlack or African American	0.3371	0.1616	2.0865	0.036930
paid_free_reducedPaid	0.1131	0.1386	0.8160	0.414526
lunch_dur	0.0073	0.0035	2.0866	0.036924
time_to_eat	0.0241	0.0110	2.1929	0.028316

Zero-part coefficients:

	Estimate	Std.Err	z-value	p-value
(Intercept)	-1.9131	1.2261	-1.5603	0.1186803
grade	0.0454	0.1400	0.3242	0.7457495
genderM	-0.0581	0.2155	-0.2697	0.7873732
race_ethnicityWhite	0.0513	0.2974	0.1724	0.8630852
race_ethnicityOther	-0.2946	0.4331	-0.6803	0.4963163
race_ethnicityBlack or African American	0.2082	0.4494	0.4633	0.6431822
paid_free_reducedPaid	0.5741	0.3312	1.7336	0.0829963
lunch_dur	0.0291	0.0127	2.2918	0.0219157
time_to_eat	-0.0883	0.0327	-2.7014	0.0069039

log(dispersion) parameter:

Estimate	Std.Err
0.3602	0.0634

Integration:

method: adaptive Gauss-Hermite quadrature rule

quadrature points: 11

Optimization:

method: hybrid EM and quasi-Newton

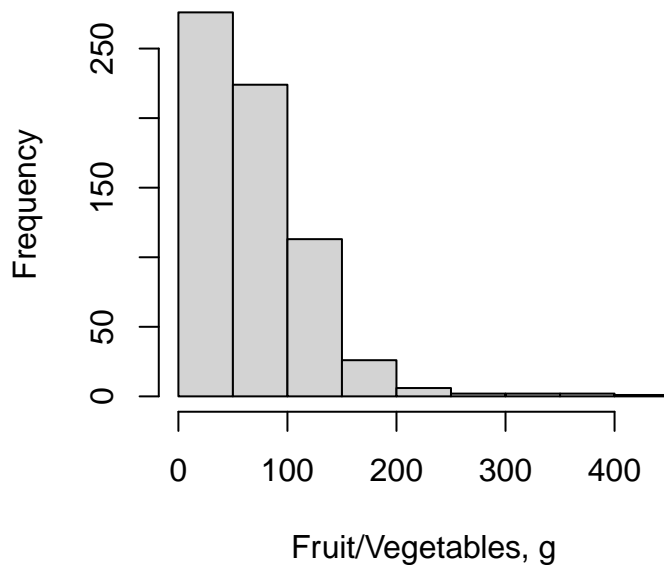
converged: TRUE

[1] 74.84095

[1] 54.18212

## 4.5 High School

### Histogram of Consumed Fruits/Vegetables



Call:

```
mixed_model(fixed = fv_consumed ~ grade + gender + race_ethnicity +  
  paid_free_reduced + lunch_dur + time_to_eat, random = ~1 |  
  school_name, data = salad_bar_dat_use[salad_bar_dat_use$school_type ==  
  "High School", ], family = zi.negative.binomial(), zi_fixed = ~grade +  
  gender + race_ethnicity + paid_free_reduced + lunch_dur +  
  time_to_eat, zi_random = ~1 | school_name)
```

Data Descriptives:

Number of Observations: 897

Number of Groups: 12

Model:

family: zero-inflated negative binomial  
link: log

Fit statistics:

log.Lik	AIC	BIC
-3398.09	6840.181	6850.849

Random effects covariance matrix:

	StdDev	Corr
(Intercept)	0.1350	
zi_(Intercept)	1.4694	0.8977

Fixed effects:

Estimate	Std.Err	z-value	p-value
----------	---------	---------	---------

(Intercept)	3.3188	0.3709	8.9487	< 1e-04
grade	0.0717	0.0318	2.2550	0.024133
genderM	0.0217	0.0697	0.3119	0.755112
race_ethnicityWhite	0.1456	0.1149	1.2668	0.205211
race_ethnicityOther	0.1967	0.1652	1.1908	0.233733
race_ethnicityBlack or African American	0.2534	0.2146	1.1810	0.237607
paid_free_reducedPaid	-0.2935	0.1410	-2.0822	0.037327
lunch_dur	0.0025	0.0051	0.4934	0.621727
time_to_eat	0.0155	0.0079	1.9610	0.049880

Zero-part coefficients:

	Estimate	Std.Err	z-value	p-value
(Intercept)	0.7014	0.9460	0.7415	0.458419
grade	-0.1017	0.0800	-1.2702	0.204019
genderM	0.0982	0.1671	0.5878	0.556668
race_ethnicityWhite	0.5367	0.2374	2.2612	0.023746
race_ethnicityOther	0.2617	0.3509	0.7458	0.455807
race_ethnicityBlack or African American	0.8925	0.4403	2.0272	0.042642
paid_free_reducedPaid	0.2833	0.3258	0.8695	0.384576
lunch_dur	0.0103	0.0162	0.6380	0.523483
time_to_eat	-0.0881	0.0191	-4.6085	< 1e-04

log(dispersion) parameter:

Estimate	Std.Err
0.4609	0.061

Integration:

method: adaptive Gauss-Hermite quadrature rule

quadrature points: 11

Optimization:

method: hybrid EM and quasi-Newton

converged: TRUE

[1] 65.20552

[1] 57.46868

## 5 Fruit/Vegetable Waste

### Histogram of Fruit/Vegetable Waste, g



Total Sample Sizes: Full N = 2226, Elementary N = 630, Middle School N = 699, High School N = 897

### 5.1 Interaction

did not converge - overly complex model (likely in random effects)

### 5.2 Overall

Call:

```
mixed_model(fixed = fv_post ~ grade + gender + race_ethnicity +  
  paid_free_reduced + lunch_dur + fv_pre + time_to_eat, random = ~1 |  
  school_name, data = salad_bar_dat_use[salad_bar_dat_use$fv_selected ==  
  "Y", ], family = zi.negative.binomial(), zi_fixed = ~grade +  
  gender + race_ethnicity + paid_free_reduced + lunch_dur +  
  fv_pre + time_to_eat, zi_random = ~1 | school_name)
```

Data Descriptives:

Number of Observations: 1862

Number of Groups: 35

Model:

family: zero-inflated negative binomial  
link: log

Fit statistics:

log.Lik	AIC	BIC
-9228.358	18504.72	18542.04

Random effects covariance matrix:

	StdDev	Corr
(Intercept)	0.2285	
zi_(Intercept)	1.2735	-0.4029

Fixed effects:

	Estimate	Std.Err	z-value	p-value
(Intercept)	3.9485	0.1226	32.2127	< 1e-04
grade	-0.0264	0.0105	-2.4989	0.01245870
genderM	-0.1109	0.0316	-3.5129	0.00044325
race_ethnicityWhite	0.0073	0.0514	0.1416	0.88741013
race_ethnicityOther	-0.1113	0.0636	-1.7518	0.07981534
race_ethnicityBlack or African American	-0.0617	0.0722	-0.8545	0.39284519
paid_free_reducedPaid	-0.0618	0.0594	-1.0399	0.29840222
lunch_dur	-0.0062	0.0027	-2.3125	0.02074992
fv_pre	0.0062	0.0003	20.6253	< 1e-04
time_to_eat	-0.0108	0.0034	-3.2003	0.00137289

Zero-part coefficients:

	Estimate	Std.Err	z-value	p-value
(Intercept)	-3.0555	0.7684	-3.9766	< 1e-04
grade	0.1309	0.0638	2.0507	0.04029683
genderM	0.5298	0.1970	2.6894	0.00715872
race_ethnicityWhite	-0.5959	0.3570	-1.6689	0.09512963
race_ethnicityOther	1.0497	0.3177	3.3043	0.00095202
race_ethnicityBlack or African American	0.6932	0.3875	1.7889	0.07362810
paid_free_reducedPaid	0.3702	0.3472	1.0661	0.28639480
lunch_dur	0.0157	0.0149	1.0523	0.29265651
fv_pre	-0.0186	0.0028	-6.6883	< 1e-04
time_to_eat	0.0368	0.0186	1.9758	0.04818098

log(dispersion) parameter:

Estimate	Std.Err
0.9427	0.0352

Integration:

method: adaptive Gauss-Hermite quadrature rule

quadrature points: 11

Optimization:

method: hybrid EM and quasi-Newton

converged: TRUE

[1] 74.9608

[1] 66.33238

### 5.3 Elementary

Call:

```
mixed_model(fixed = fv_post ~ grade + gender + race_ethnicity +  
  paid_free_reduced + lunch_dur + time_to_eat, random = ~1 |  
  school_name, data = salad_bar_dat_use[salad_bar_dat_use$fv_selected ==  
  "Y" & salad_bar_dat_use$school_type == "Elementary", ], family = zi.negative.binomial(),  
  zi_fixed = ~grade + gender + race_ethnicity + paid_free_reduced +  
  lunch_dur + time_to_eat, zi_random = ~1 | school_name)
```

Data Descriptives:

Number of Observations: 615

Number of Groups: 11

Model:

family: zero-inflated negative binomial

link: log

Fit statistics:

log.Lik	AIC	BIC
-3133.45	6310.9	6319.654

Random effects covariance matrix:

	StdDev	Corr
(Intercept)	0.3309	
zi_(Intercept)	1.5690	0.1344

Fixed effects:

	Estimate	Std.Err	z-value	p-value
(Intercept)	4.5704	0.2748	16.6314	< 1e-04
grade	-0.0022	0.0196	-0.1114	0.91126
genderM	-0.0702	0.0480	-1.4628	0.14352
race_ethnicityWhite	0.0581	0.0798	0.7276	0.46688
race_ethnicityOther	0.0769	0.0865	0.8886	0.37422
race_ethnicityBlack or African American	-0.0379	0.0971	-0.3905	0.69616
paid_free_reducedPaid	-0.1058	0.0765	-1.3817	0.16705
lunch_dur	-0.0019	0.0094	-0.2000	0.84144
time_to_eat	-0.0029	0.0048	-0.6049	0.54527

Zero-part coefficients:

	Estimate	Std.Err	z-value	p-value
(Intercept)	-4.4427	1.9883	-2.2345	0.025452
grade	0.1551	0.1441	1.0764	0.281741
genderM	0.5581	0.4032	1.3842	0.166306
race_ethnicityWhite	-0.0124	0.7005	-0.0177	0.985858
race_ethnicityOther	0.0710	0.5709	0.1244	0.900970
race_ethnicityBlack or African American	1.0770	0.5413	1.9898	0.046615
paid_free_reducedPaid	-0.1936	0.8189	-0.2364	0.813137
lunch_dur	-0.0166	0.0665	-0.2501	0.802533



time\_to\_eat 0.0081 0.0397 0.2033 0.838913

log(dispersion) parameter:

Estimate	Std.Err
1.1607	0.0599

Integration:

method: adaptive Gauss-Hermite quadrature rule

quadrature points: 11

Optimization:

method: hybrid EM and quasi-Newton

converged: TRUE

## 5.4 Middle School

Call:

```
mixed_model(fixed = fv_post ~ grade + gender + race_ethnicity +  
  paid_free_reduced + lunch_dur + time_to_eat, random = ~1 |  
  school_name, data = salad_bar_dat_use[salad_bar_dat_use$fv_selected ==  
  "Y" & salad_bar_dat_use$school_type == "Middle School", ],  
  family = zi.negative.binomial(), zi_fixed = ~grade + gender +  
  race_ethnicity + paid_free_reduced + lunch_dur + time_to_eat,  
  zi_random = ~1 | school_name)
```

Data Descriptives:

Number of Observations: 595

Number of Groups: 12

Model:

family: zero-inflated negative binomial

link: log

Fit statistics:

log.Lik	AIC	BIC
-3071.232	6186.464	6197.132

Random effects covariance matrix:

	StdDev	Corr
(Intercept)	0.4667	
zi_(Intercept)	1.7482	-0.6868

Fixed effects:

	Estimate	Std.Err	z-value	p-value
(Intercept)	4.5084	0.4051	11.1300	< 1e-04
grade	0.0519	0.0448	1.1576	0.2470305
genderM	-0.1416	0.0721	-1.9633	0.0496159
race_ethnicityWhite	-0.0951	0.1104	-0.8607	0.3893979
race_ethnicityOther	-0.2866	0.1392	-2.0593	0.0394635
race_ethnicityBlack or African American	-0.1705	0.1541	-1.1063	0.2685820
paid_free_reducedPaid	-0.1573	0.1319	-1.1925	0.2330525

lunch_dur	-0.0041	0.0056	-0.7229	0.4697386
time_to_eat	-0.0253	0.0091	-2.7751	0.0055183

Zero-part coefficients:

	Estimate	Std.Err	z-value	p-value
(Intercept)	-1.6268	2.2252	-0.7311	0.4647152
grade	-0.2848	0.2654	-1.0729	0.2832941
genderM	0.1756	0.3750	0.4683	0.6395742
race_ethnicityWhite	-1.0097	0.7509	-1.3446	0.1787638
race_ethnicityOther	1.4862	0.5401	2.7517	0.0059282
race_ethnicityBlack or African American	-1.2762	1.4147	-0.9022	0.3669716
paid_free_reducedPaid	0.8305	0.6720	1.2358	0.2165238
lunch_dur	0.0096	0.0210	0.4580	0.6469721
time_to_eat	-0.0578	0.0642	-0.9013	0.3674453

log(dispersion) parameter:

Estimate	Std.Err
0.4743	0.0604

Integration:

method: adaptive Gauss-Hermite quadrature rule

quadrature points: 11

Optimization:

method: hybrid EM and quasi-Newton

converged: TRUE

## 5.5 High School

Call:

```
mixed_model(fixed = fv_post ~ grade + gender + race_ethnicity +
  paid_free_reduced + lunch_dur + time_to_eat, random = ~1 |
  school_name, data = salad_bar_dat_use[salad_bar_dat_use$fv_selected ==
  "Y" & salad_bar_dat_use$school_type == "High School", ],
  family = zi.negative.binomial(), zi_fixed = ~grade + gender +
  race_ethnicity + paid_free_reduced + lunch_dur + time_to_eat,
  zi_random = ~1 | school_name)
```

Data Descriptives:

Number of Observations: 652

Number of Groups: 12

Model:

family: zero-inflated negative binomial

link: log

Fit statistics:

log.Lik	AIC	BIC
-3210.541	6465.082	6475.75

Random effects covariance matrix:

	StdDev	Corr
(Intercept)	0.5366	
zi_(Intercept)	1.3773	-0.9883

Fixed effects:

	Estimate	Std.Err	z-value	p-value
(Intercept)	4.6968	0.3667	12.8069	< 1e-04
grade	-0.0208	0.0302	-0.6881	0.49137
genderM	-0.0810	0.0643	-1.2594	0.20789
race_ethnicityWhite	0.0382	0.1087	0.3517	0.72505
race_ethnicityOther	-0.0876	0.1585	-0.5523	0.58072
race_ethnicityBlack or African American	-0.0832	0.2030	-0.4098	0.68197
paid_free_reducedPaid	0.1898	0.1903	0.9974	0.31857
lunch_dur	-0.0058	0.0067	-0.8724	0.38299
time_to_eat	-0.0088	0.0073	-1.2112	0.22583

Zero-part coefficients:

	Estimate	Std.Err	z-value	p-value
(Intercept)	-3.1093	1.7960	-1.7312	0.0834094
grade	0.0440	0.1306	0.3371	0.7360430
genderM	0.7560	0.2825	2.6756	0.0074592
race_ethnicityWhite	-0.4103	0.4806	-0.8536	0.3933092
race_ethnicityOther	1.1333	0.5083	2.2296	0.0257715
race_ethnicityBlack or African American	1.2035	0.7401	1.6261	0.1039367
paid_free_reducedPaid	0.6284	0.4758	1.3207	0.1865947
lunch_dur	-0.0284	0.0363	-0.7817	0.4343987
time_to_eat	0.0631	0.0255	2.4782	0.0132065

log(dispersion) parameter:

Estimate	Std.Err
0.6252	0.0593

Integration:

method: adaptive Gauss-Hermite quadrature rule

quadrature points: 11

Optimization:

method: hybrid EM and quasi-Newton

converged: TRUE

## 6 Fruit/Vegetable Percent Waste

### histogram of Percent Fruits/Vegetables Was



### 6.1 Interaction

Call:

```
mixed_model(fixed = fv_prop_waste ~ grade + gender + race_ethnicity +  
  paid_free_reduced + lunch_dur + time_to_eat * school_type,  
  random = ~1 | school_name, data = salad_bar_dat_use[salad_bar_dat_use$fv_selected ==  
    "Y", ], family = zi.negative.binomial(), zi_fixed = ~grade +  
  gender + race_ethnicity + paid_free_reduced + lunch_dur +  
  time_to_eat * school_type, zi_random = ~1 | school_name)
```

Data Descriptives:

Number of Observations: 1862

Number of Groups: 35

Model:

family: zero-inflated negative binomial  
link: log

Fit statistics:

log.Lik	AIC	BIC
-8790.549	17641.1	17687.76

Random effects covariance matrix:

	StdDev	Corr
(Intercept)	0.1858	
zi_(Intercept)	1.4599	-0.5699

Fixed effects:

	Estimate	Std.Err	z-value	p-value
(Intercept)	4.5524	0.1184	38.4376	< 1e-04
grade	-0.0176	0.0143	-1.2314	0.21816612
genderM	-0.1065	0.0312	-3.4151	0.00063767
race_ethnicityWhite	0.0261	0.0499	0.5231	0.60093571
race_ethnicityOther	-0.1201	0.0625	-1.9212	0.05471040
race_ethnicityBlack or African American	-0.0739	0.0710	-1.0417	0.29754777
paid_free_reducedPaid	-0.0487	0.0570	-0.8544	0.39288193
lunch_dur	-0.0060	0.0024	-2.4355	0.01487029
time_to_eat	-0.0066	0.0049	-1.3578	0.17451752
school_typeMiddle School	-0.0155	0.1339	-0.1158	0.90779980
school_typeHigh School	0.0051	0.1557	0.0329	0.97374025
time_to_eat:school_typeMiddle School	-0.0121	0.0087	-1.3994	0.16169434
time_to_eat:school_typeHigh School	-0.0079	0.0077	-1.0213	0.30710384

Zero-part coefficients:

	Estimate	Std.Err	z-value	p-value
(Intercept)	-4.8311	0.8961	-5.3914	< 1e-04
grade	0.0537	0.0879	0.6115	0.5408888
genderM	0.5412	0.1916	2.8249	0.0047295
race_ethnicityWhite	-0.6241	0.3482	-1.7924	0.0730710
race_ethnicityOther	0.8450	0.3003	2.8136	0.0048993
race_ethnicityBlack or African American	0.6577	0.3776	1.7419	0.0815299
paid_free_reducedPaid	0.6481	0.3404	1.9037	0.0569493
lunch_dur	0.0157	0.0162	0.9703	0.3318897
time_to_eat	0.0052	0.0395	0.1306	0.8960904
school_typeMiddle School	0.5169	1.0571	0.4890	0.6248511
school_typeHigh School	0.4180	1.0918	0.3829	0.7018156
time_to_eat:school_typeMiddle School	-0.0486	0.0677	-0.7178	0.4728857
time_to_eat:school_typeHigh School	0.0485	0.0467	1.0370	0.2997172

log(dispersion) parameter:

Estimate	Std.Err
0.9785	0.0357

Integration:

method: adaptive Gauss-Hermite quadrature rule

quadrature points: 11

Optimization:

method: hybrid EM and quasi-Newton

converged: TRUE

## 6.2 Overall

Call:

```
mixed_model(fixed = fv_prop_waste ~ grade + gender + race_ethnicity +  
  paid_free_reduced + lunch_dur + time_to_eat, random = ~1 |  
  school_name, data = salad_bar_dat_use[salad_bar_dat_use$fv_selected ==  
  "Y" & salad_bar_dat_use$fv_prop_waste < 100, ], family = zi.negative.binomial(),
```

```

zi_fixed = ~grade + gender + race_ethnicity + paid_free_reduced +
  lunch_dur + time_to_eat, zi_random = ~1 | school_name)

```

Data Descriptives:

Number of Observations: 1658

Number of Groups: 35

Model:

family: zero-inflated negative binomial

link: log

Fit statistics:

log.Lik	AIC	BIC
-7626.881	15297.76	15331.98

Random effects covariance matrix:

	StdDev	Corr
(Intercept)	0.2066	
zi_(Intercept)	1.4538	-0.6321

Fixed effects:

	Estimate	Std.Err	z-value	p-value
(Intercept)	4.5344	0.1132	40.0551	< 1e-04
grade	-0.0290	0.0101	-2.8587	0.00425423
genderM	-0.1123	0.0331	-3.3913	0.00069556
race_ethnicityWhite	0.0285	0.0532	0.5357	0.59214716
race_ethnicityOther	-0.1963	0.0685	-2.8636	0.00418876
race_ethnicityBlack or African American	-0.1096	0.0766	-1.4308	0.15248563
paid_free_reducedPaid	-0.0532	0.0603	-0.8817	0.37795755
lunch_dur	-0.0081	0.0026	-3.1218	0.00179735
time_to_eat	-0.0088	0.0035	-2.5565	0.01057220

Zero-part coefficients:

	Estimate	Std.Err	z-value	p-value
(Intercept)	-4.9064	0.7539	-6.5078	< 1e-04
grade	0.1218	0.0660	1.8469	0.0647645
genderM	0.5142	0.1933	2.6600	0.0078144
race_ethnicityWhite	-0.6072	0.3492	-1.7387	0.0820817
race_ethnicityOther	0.8619	0.3072	2.8060	0.0050153
race_ethnicityBlack or African American	0.6731	0.3839	1.7532	0.0795755
paid_free_reducedPaid	0.5752	0.3407	1.6883	0.0913540
lunch_dur	0.0159	0.0153	1.0342	0.3010323
time_to_eat	0.0221	0.0188	1.1754	0.2398385

log(dispersion) parameter:

Estimate	Std.Err
0.9814	0.0384

Integration:

method: adaptive Gauss-Hermite quadrature rule

quadrature points: 11

Optimization:  
method: hybrid EM and quasi-Newton  
converged: TRUE

### 6.2.1 Selected and Consumed == 0 removed

[1] 49.44375

[1] 33.10117

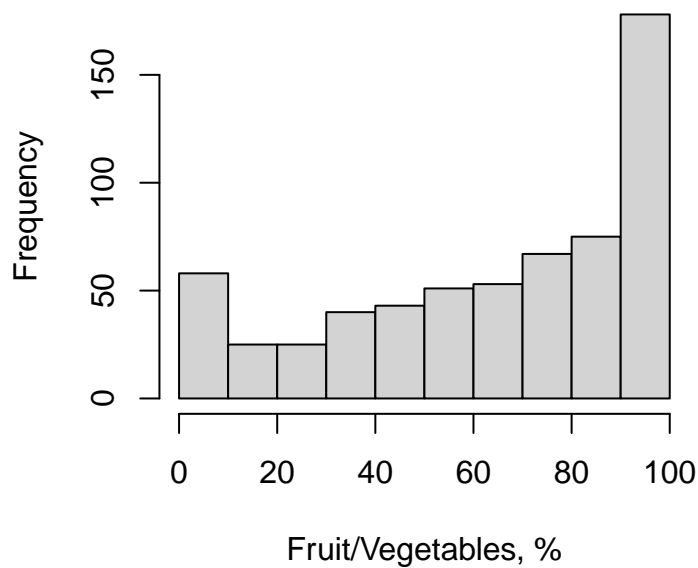
### 6.2.2 Removed 100% waste too

[1] 49.44375

[1] 33.10117

## 6.3 Elementary

### histogram of Percent Fruits/Vegetables Was



Call:

```
mixed_model(fixed = fv_prop_waste ~ grade + gender + race_ethnicity +  
  paid_free_reduced + lunch_dur + time_to_eat, random = ~1 |  
  school_name, data = salad_bar_dat_use[salad_bar_dat_use$school_type ==  
  "Elementary" & salad_bar_dat_use$fv_selected == "Y" & salad_bar_dat_use$fv_prop_waste <  
  100, ], family = zi.negative.binomial(), zi_fixed = ~grade +  
  gender + race_ethnicity + paid_free_reduced + lunch_dur +  
  time_to_eat, zi_random = ~1 | school_name)
```

Data Descriptives:

Number of Observations: 556

Number of Groups: 11

Model:

family: zero-inflated negative binomial  
link: log

Fit statistics:

log.Lik	AIC	BIC
-2633.56	5311.119	5319.873

Random effects covariance matrix:

	StdDev	Corr
(Intercept)	0.1229	
zi_(Intercept)	1.4319	-0.5992

Fixed effects:

	Estimate	Std.Err	z-value	p-value
(Intercept)	4.1215	0.1650	24.9747	< 1e-04
grade	-0.0074	0.0179	-0.4157	0.677616
genderM	-0.0930	0.0458	-2.0329	0.042067
race_ethnicityWhite	0.0399	0.0740	0.5393	0.589675
race_ethnicityOther	-0.0687	0.0829	-0.8288	0.407208
race_ethnicityBlack or African American	0.0025	0.0934	0.0269	0.978546
paid_free_reducedPaid	-0.0624	0.0711	-0.8779	0.379983
lunch_dur	0.0058	0.0048	1.2129	0.225154
time_to_eat	-0.0031	0.0043	-0.7201	0.471438

Zero-part coefficients:

	Estimate	Std.Err	z-value	p-value
(Intercept)	-4.0142	1.8584	-2.1600	0.030776
grade	0.1423	0.1463	0.9728	0.330638
genderM	0.6139	0.4129	1.4866	0.137123
race_ethnicityWhite	-0.0352	0.6910	-0.0509	0.959373
race_ethnicityOther	0.0399	0.5857	0.0680	0.945749
race_ethnicityBlack or African American	1.1296	0.5663	1.9947	0.046078
paid_free_reducedPaid	-0.0699	0.8031	-0.0870	0.930633
lunch_dur	-0.0223	0.0602	-0.3696	0.711683
time_to_eat	-0.0051	0.0464	-0.1089	0.913260

log(dispersion) parameter:

Estimate	Std.Err
1.3784	0.0668

Integration:

method: adaptive Gauss-Hermite quadrature rule  
quadrature points: 11

Optimization:

method: hybrid EM and quasi-Newton  
converged: TRUE



### 6.3.1 Selected and Consumed == 0 removed

```
[1] 60.59751
```

```
[1] 30.96679
```

### 6.3.2 Removed 100% waste too

```
[1] 60.59751
```

```
[1] 30.96679
```

## 6.4 Middle School

### Histogram of Percent Fruits/Vegetables Was



Call:

```
mixed_model(fixed = fv_prop_waste ~ grade + gender + race_ethnicity +  
  paid_free_reduced + lunch_dur + time_to_eat, random = ~1 |  
  school_name, data = salad_bar_dat_use[salad_bar_dat_use$school_type ==  
  "Middle School" & salad_bar_dat_use$fv_selected == "Y" &  
  salad_bar_dat_use$fv_prop_waste < 100, ], family = zi.negative.binomial(),  
  zi_fixed = ~grade + gender + race_ethnicity + paid_free_reduced +  
  lunch_dur + time_to_eat, zi_random = ~1 | school_name)
```

Data Descriptives:

Number of Observations: 547

Number of Groups: 12

Model:

family: zero-inflated negative binomial

link: log

Fit statistics:

log.Lik	AIC	BIC
-2527.89	5099.78	5110.448

Random effects covariance matrix:

	StdDev	Corr
(Intercept)	0.2050	
zi_(Intercept)	1.9272	-0.4046

Fixed effects:

	Estimate	Std.Err	z-value	p-value
(Intercept)	4.6230	0.3448	13.4072	< 1e-04
grade	-0.0300	0.0421	-0.7137	0.475386
genderM	-0.1552	0.0664	-2.3382	0.019377
race_ethnicityWhite	0.0434	0.1046	0.4151	0.678073
race_ethnicityOther	-0.3340	0.1318	-2.5334	0.011297
race_ethnicityBlack or African American	-0.2908	0.1407	-2.0672	0.038719
paid_free_reducedPaid	-0.0418	0.1181	-0.3537	0.723537
lunch_dur	-0.0100	0.0044	-2.2798	0.022621
time_to_eat	-0.0141	0.0085	-1.6565	0.097631

Zero-part coefficients:

	Estimate	Std.Err	z-value	p-value
(Intercept)	-1.8052	2.3038	-0.7835	0.4333045
grade	-0.2220	0.2729	-0.8134	0.4159892
genderM	0.0375	0.3797	0.0989	0.9212327
race_ethnicityWhite	-1.1294	0.7553	-1.4952	0.1348581
race_ethnicityOther	1.6127	0.5642	2.8581	0.0042615
race_ethnicityBlack or African American	-1.3679	1.4209	-0.9627	0.3356951
paid_free_reducedPaid	0.4574	0.7008	0.6527	0.5139795
lunch_dur	0.0172	0.0225	0.7663	0.4435016
time_to_eat	-0.0794	0.0674	-1.1784	0.2386528

log(dispersion) parameter:

Estimate	Std.Err
0.7333	0.066

Integration:

method: adaptive Gauss-Hermite quadrature rule

quadrature points: 11

Optimization:

method: hybrid EM and quasi-Newton

converged: TRUE

#### 6.4.1 Selected and Consumed == 0 removed

[1] 46.87765

[1] 33.6009

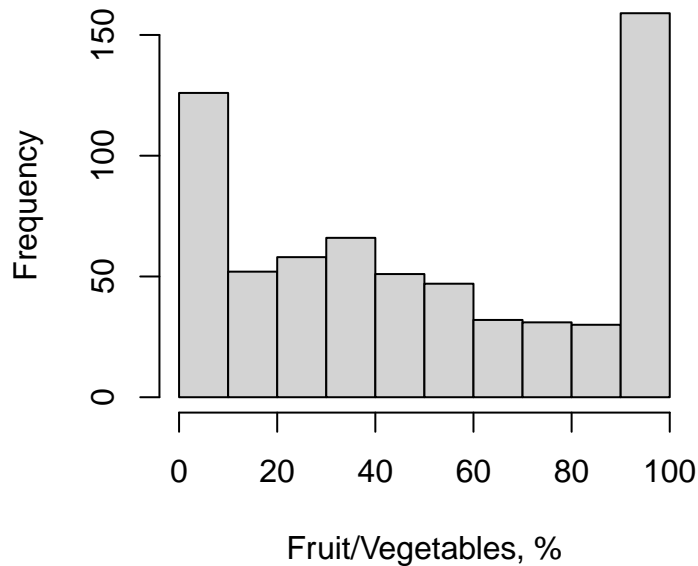
#### 6.4.2 Removed 100% waste too

```
[1] 46.87765
```

```
[1] 33.6009
```

### 6.5 High School

#### Histogram of Percent Fruits/Vegetables Was



Call:

```
mixed_model(fixed = fv_prop_waste ~ grade + gender + race_ethnicity +  
  paid_free_reduced + lunch_dur + time_to_eat, random = ~1 |  
  school_name, data = salad_bar_dat_use[salad_bar_dat_use$school_type ==  
  "High School" & salad_bar_dat_use$fv_selected == "Y" & salad_bar_dat_use$fv_prop_waste <  
  100, ], family = zi.negative.binomial(), zi_fixed = ~grade +  
  gender + race_ethnicity + paid_free_reduced + lunch_dur +  
  time_to_eat, zi_random = ~1 | school_name)
```

Data Descriptives:

Number of Observations: 555

Number of Groups: 12

Model:

family: zero-inflated negative binomial

link: log

Fit statistics:

log.Lik	AIC	BIC
-2415.491	4874.983	4885.651

Random effects covariance matrix:

	StdDev	Corr
(Intercept)	0.2027	
zi_(Intercept)	1.1651	-0.9727

Fixed effects:

	Estimate	Std.Err	z-value	p-value
(Intercept)	4.5180	0.3272	13.8095	< 1e-04
grade	-0.0178	0.0286	-0.6241	0.532553
genderM	-0.0920	0.0610	-1.5072	0.131771
race_ethnicityWhite	0.0453	0.1015	0.4463	0.655388
race_ethnicityOther	-0.2301	0.1713	-1.3437	0.179036
race_ethnicityBlack or African American	0.0313	0.2071	0.1511	0.879885
paid_free_reducedPaid	0.0612	0.1509	0.4060	0.684746
lunch_dur	-0.0111	0.0059	-1.8810	0.059974
time_to_eat	-0.0124	0.0067	-1.8368	0.066242

Zero-part coefficients:

	Estimate	Std.Err	z-value	p-value
(Intercept)	-4.1502	1.8783	-2.2096	0.0271342
grade	0.0366	0.1332	0.2746	0.7836131
genderM	0.7394	0.2834	2.6090	0.0090812
race_ethnicityWhite	-0.4008	0.4930	-0.8129	0.4162797
race_ethnicityOther	1.1418	0.5267	2.1678	0.0301773
race_ethnicityBlack or African American	1.3260	0.7876	1.6837	0.0922331
paid_free_reducedPaid	0.7767	0.5053	1.5371	0.1242745
lunch_dur	0.0125	0.0394	0.3160	0.7519723
time_to_eat	0.0556	0.0257	2.1631	0.0305309

log(dispersion) parameter:

Estimate	Std.Err
0.9215	0.0682

Integration:

method: adaptive Gauss-Hermite quadrature rule  
quadrature points: 11

Optimization:

method: hybrid EM and quasi-Newton  
converged: TRUE

### 6.5.1 Selected and Consumed == 0 removed

[1] 40.79901

[1] 31.58416

### 6.5.2 Removed 100% waste too

[1] 40.79901

[1] 31.58416

## 7 Supplemental Information – Complete vs Missing Time to Eat

### 7.1 Demographic Characteristics

Table 2: Demographic Characteristics and Variables of Interest

Group	Characteristic	Full Sample		Time to Eat Data			p-value
		N	Overall	N	Complete	Missing	
	Gender	2,216		2,874			0.14
	F		1,036 (47%)		1,120 (46%)	230 (50%)	
	M		1,180 (53%)		1,295 (54%)	229 (50%)	
	Unknown				7	0	
	Grade	2,216	7.4 (3.1)	2,881	7.1 (3.1)	5.7 (3.5)	<0.001
	Age, yr	2,121	12.4 (3.1)	2,777	12.2 (3.2)	10.9 (3.5)	<0.001
	Unknown		95		99	5	
	Race/Ethnicity	2,216		2,804			<0.001
	Hispanic or Latino		1,400 (63%)		1,490 (63%)	248 (55%)	
	White		524 (24%)		552 (23%)	149 (33%)	
	Other		168 (7.6%)		176 (7.5%)	28 (6.2%)	
	Black or African American		124 (5.6%)		132 (5.6%)	29 (6.4%)	
	Unknown				72	5	
	Free-Reduced Lunch	2,216		2,875			<0.001
	Free/Reduced		1,768 (80%)		1,881 (78%)	395 (86%)	
	Paid		448 (20%)		536 (22%)	63 (14%)	
	Unknown				5	1	
	F/V Selected	2,216		2,881			0.006
	N		354 (16%)		379 (16%)	49 (11%)	
	Y		1,862 (84%)		2,043 (84%)	410 (89%)	
	F/V Self-Served, g	1,862	141.3 (70.3)	2,453	136.1 (70.6)	132.7 (58.8)	>0.9
	Lunch Period	1,862	28.4 (12.4)	2,329	28.4 (12.3)	24.8 (7.2)	<0.001
	Unknown				118	6	
	Eating Duration	1,862	10.9 (4.8)				
	F/V Consumed Any	1,862					
	N		204 (11%)				
	Y		1,658 (89%)				
	F/V Consumed, g	1,862	60.7 (55.9)	2,453	58.3 (54.9)	62.4 (52.7)	0.072
	F/V Waste, g	1,862	80.7 (67.5)	2,453	77.8 (66.0)	70.3 (60.5)	0.070
	F/V Percent Waste (post/pre), %	1,862	55.0 (35.0)	2,453	55.4 (34.9)	52.7 (36.1)	0.3

<sup>1</sup> n (%); Mean (SD)

<sup>2</sup> Pearson's Chi-squared test; Wilcoxon rank sum test