

# Salad Bar Study: Rurality and Fruit and Vegetable Paper (Jepson)

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# 1 Demographic Characteristics

Table 1: Demographic Characteristics

Group	Characteristic	Full Sample		Urban vs Rural			p-value	N
		N	Overall	Rural, N = 740	Suburb, N = 320	Urban, N = 1,647		
	Gender	2,707					0.7	
	F		1,279 (47%)	356 (48%)	145 (45%)	778 (47%)		
	M		1,428 (53%)	384 (52%)	175 (55%)	869 (53%)		
	Grade	2,707	7.0 (3.2)	7.1 (3.4)	6.5 (3.1)	7.1 (3.1)	0.006	
	Age, yr	2,607	12.1 (3.3)	12.3 (3.4)	11.7 (3.1)	12.1 (3.2)	0.010	
	Unknown		100	0	0	100		
	Race/Ethnicity	2,707					<0.001	
	Hispanic or Latino		1,670 (62%)	430 (58%)	137 (43%)	1,103 (67%)		
	White		684 (25%)	201 (27%)	146 (46%)	337 (20%)		
	Other		199 (7.4%)	71 (9.6%)	25 (7.8%)	103 (6.3%)		
	Black or African American		154 (5.7%)	38 (5.1%)	12 (3.8%)	104 (6.3%)		
	Free-Reduced Lunch	2,707					<0.001	
	Free/Reduced		2,191 (81%)	651 (88%)	178 (56%)	1,362 (83%)		
	Paid		516 (19%)	89 (12%)	142 (44%)	285 (17%)		
	F/V Selected	2,707					<0.001	
	N		391 (14%)	73 (9.9%)	108 (34%)	210 (13%)		
	Y		2,316 (86%)	667 (90%)	212 (66%)	1,437 (87%)		
	Rurality	2,707						
	Rural		740 (27%)					
	Suburb		320 (12%)					
	Urban		1,647 (61%)					
	Percent Rural, county	2,707	9.2 (10.4)	21.9 (9.2)	8.9 (12.6)	3.6 (2.5)	<0.001	
	Lunch Period	2,707	28.4 (11.4)	27.8 (13.3)	24.9 (6.5)	29.4 (11.1)	<0.001	
	F/V Self-Served, g	2,316	139.3 (68.4)	141.4 (55.8)	122.2 (64.0)	140.8 (73.9)	<0.001	2,316
	F/V Consumed Any	2,316					0.5	2,316
	N		302 (13%)	95 (14%)	29 (14%)	178 (12%)		
	Y		2,014 (87%)	572 (86%)	183 (86%)	1,259 (88%)		
	Eating Duration	1,903	10.5 (6.8)	10.3 (3.7)	8.8 (16.8)	10.9 (4.5)	0.3	1,903
	Unknown		413	163	11	239		
	F/V Consumed, g	2,316	59.8 (55.5)	66.8 (56.4)	46.6 (49.8)	58.5 (55.4)	<0.001	2,316
	F/V Waste, g	2,316	79.5 (66.6)	74.6 (59.6)	75.7 (58.9)	82.4 (70.5)	0.5	2,316
	F/V Percent Waste (post/pre), %	2,316	55.5 (35.4)	53.3 (35.7)	59.4 (35.3)	55.8 (35.3)	0.15	2,316

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

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

## 1.1 Gender

Pearson's Chi-squared test

```
data: xtabs(~rurality + gender, data = salad_bar_dat_use)
X-squared = 0.70068, df = 2, p-value = 0.7044
```

## 1.2 age

Anova Table (Type III tests)

Response: age

	Sum Sq	Df	F value	Pr(>F)
(Intercept)	112669	1	10659.4123	< 2e-16 ***
rurality	95	2	4.4766	0.01146 *
Residuals	27524	2604		

---

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

\$emmeans

rurality	emmean	SE	df	lower.CL	upper.CL
Rural	12.3	0.1195	2604	12.1	12.6
Suburb	11.7	0.1817	2604	11.3	12.1
Urban	12.1	0.0827	2604	11.9	12.3

Confidence level used: 0.95

\$contrasts

contrast	estimate	SE	df	t.ratio	p.value
Rural - Suburb	0.645	0.218	2604	2.967	0.0085
Rural - Urban	0.245	0.145	2604	1.685	0.2112
Suburb - Urban	-0.401	0.200	2604	-2.007	0.1108

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

## 1.3 grade

Anova Table (Type III tests)

Response: grade

	Sum Sq	Df	F value	Pr(>F)
(Intercept)	36879	1	3595.481	< 2e-16 ***
rurality	103	2	5.021	0.00666 **
Residuals	27735	2704		

---

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

\$emmeans

rurality	emmean	SE	df	lower.CL	upper.CL
Rural	7.06	0.1177	2704	6.83	7.29
Suburb	6.48	0.1790	2704	6.13	6.83
Urban	7.09	0.0789	2704	6.94	7.25

Confidence level used: 0.95

```
$contrasts
  contrast      estimate      SE    df t.ratio p.value
Rural - Suburb    0.581 0.214 2704   2.713  0.0184
Rural - Urban    -0.031 0.142 2704  -0.219  0.9740
Suburb - Urban   -0.612 0.196 2704  -3.130  0.0050
```

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

## 1.4 race/ethnicity

Pearson's Chi-squared test

```
data: xtabs(~rurality + race_ethnicity, data = salad_bar_dat_use)
X-squared = 107.56, df = 6, p-value < 2.2e-16
```

	race_ethnicity			
rurality	Hispanic or Latino	White	Other Black or African American	
Rural	430	201	71	38
Suburb	137	146	25	12
Urban	1103	337	103	104

## 1.5 free-reduced lunch

Pearson's Chi-squared test

```
data: xtabs(~rurality + paid_free_reduced, data = salad_bar_dat_use)
X-squared = 159.94, df = 2, p-value < 2.2e-16
```

	paid_free_reduced	
rurality	Free/Reduced	Paid
Rural	651	89
Suburb	178	142
Urban	1362	285

## 1.6 fruit/veg selected

Pearson's Chi-squared test

```
data: xtabs(~rurality + fv_selected, data = salad_bar_dat_use)
X-squared = 112.89, df = 2, p-value < 2.2e-16
```

## 1.7 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)	94.2531	1	32.001	4.651e-11 ***
rurality	1.0223	2	33.608	0.3707

---

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

\$emmeans

rurality	emmean	SE	df	lower.CL	upper.CL
Rural	141	14.56	32.0	111.7	171
Suburb	112	20.19	35.5	71.4	153
Urban	144	9.38	32.7	124.8	163

Degrees-of-freedom method: kenward-roger

Confidence level used: 0.95

\$contrasts

contrast	estimate	SE	df	t.ratio	p.value
Rural - Suburb	29.04	24.9	34.3	1.167	0.4807
Rural - Urban	-2.53	17.3	32.2	-0.146	0.9884
Suburb - Urban	-31.57	22.3	35.0	-1.418	0.3427

Degrees-of-freedom method: kenward-roger

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

## 1.8 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)	96.9870	1	30.702	5.109e-11 ***
rurality	1.2295	2	33.756	0.3052

---

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

\$emmeans

rurality	emmean	SE	df	lower.CL	upper.CL
Rural	66.2	6.72	30.7	52.5	79.9
Suburb	47.6	9.86	37.7	27.6	67.5
Urban	61.3	4.38	32.0	52.4	70.2

Degrees-of-freedom method: kenward-roger

Confidence level used: 0.95

\$contrasts

contrast	estimate	SE	df	t.ratio	p.value
Rural - Suburb	18.62	11.93	35.2	1.561	0.2757

Rural - Urban	4.85	8.02	31.1	0.605	0.8184
Suburb - Urban	-13.77	10.79	36.7	-1.277	0.4172

Degrees-of-freedom method: kenward-roger

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

## 1.9 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)	30.3639	1	31.884	4.551e-06 ***
rurality	0.2758	2	33.651	0.7607

---

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

\$emmeans

rurality	emmean	SE	df	lower.CL	upper.CL
Rural	75.3	13.67	31.9	47.5	103
Suburb	66.0	19.03	35.8	27.4	105
Urban	81.0	8.81	32.7	63.1	99

Degrees-of-freedom method: kenward-roger

Confidence level used: 0.95

\$contrasts

contrast	estimate	SE	df	t.ratio	p.value
Rural - Suburb	9.35	23.4	34.4	0.399	0.9162
Rural - Urban	-5.70	16.3	32.1	-0.350	0.9347
Suburb - Urban	-15.05	21.0	35.2	-0.717	0.7549

Degrees-of-freedom method: kenward-roger

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

## 1.10 fruit/veg waste proportion

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

Response: fv\_prop\_waste

	F	Df	Df.res	Pr(>F)
(Intercept)	95.7315	1	31.242	4.959e-11 ***
rurality	0.0263	2	33.772	0.974

---

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

\$emmeans

rurality	emmean	SE	df	lower.CL	upper.CL
Rural	53.6	5.48	31.2	42.5	64.8
Suburb	55.7	7.84	37.0	39.9	71.6
Urban	54.0	3.56	32.3	46.7	61.2

Degrees-of-freedom method: kenward-roger  
Confidence level used: 0.95

\$contrasts

contrast	estimate	SE	df	t.ratio	p.value
Rural - Suburb	-2.111	9.57	34.9	-0.221	0.9735
Rural - Urban	-0.331	6.53	31.6	-0.051	0.9986
Suburb - Urban	1.779	8.61	36.1	0.207	0.9767

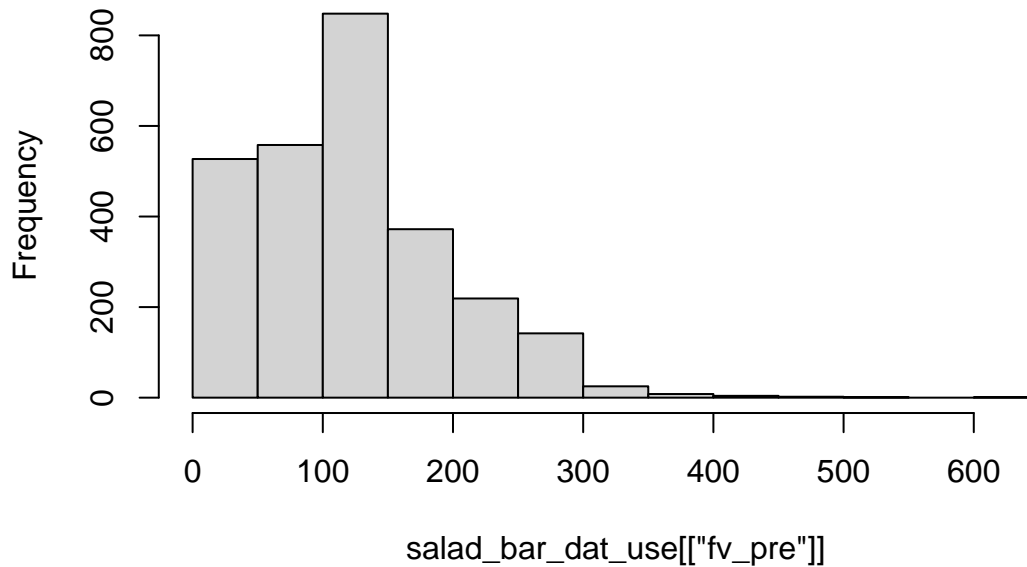
Degrees-of-freedom method: kenward-roger

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

## 2 Rurality Models

### 2.1 Fruit/Vegetable Self-Served

**Histogram of salad\_bar\_dat\_use[["fv\_pre"]]**



-mean and sd for participants that selected F/V

```
[1] 139.266
```

```
[1] 68.44484
```

#### 2.1.1 Interaction model

Call:

```
mixed_model(fixed = fv_pre ~ grade + gender + race_ethnicity +  
  paid_free_reduced + lunch_dur + school_type * rurality, random = ~1 |  
  school_name, data = salad_bar_dat_use, family = zi.negative.binomial(),  
  zi_fixed = ~grade + gender + race_ethnicity + paid_free_reduced +  
    lunch_dur + school_type * rurality, zi_random = ~1 |  
    school_name, iter_EM = 0)
```

Data Descriptives:

Number of Observations: 2707

Number of Groups: 36

Model:

family: zero-inflated negative binomial

link: log

Fit statistics:

log.Lik	AIC	BIC
---------	-----	-----



-13121.35 26314.69 26371.7

Random effects covariance matrix:

	StdDev	Corr
(Intercept)	0.2784	
zi_(Intercept)	1.8981	-0.0947

Fixed effects:

	Estimate	Std.Err	z-value	p-value
(Intercept)	4.9180	0.1688	29.1395	< 1e-04
grade	0.0074	0.0074	0.9992	0.317719
genderM	-0.0290	0.0168	-1.7265	0.084265
race_ethnicityWhite	0.0266	0.0268	0.9924	0.321026
race_ethnicityOther	0.0530	0.0340	1.5597	0.118840
race_ethnicityBlack or African American	-0.0358	0.0374	-0.9574	0.338361
paid_free_reducedPaid	-0.0532	0.0314	-1.6928	0.090501
lunch_dur	0.0001	0.0020	0.0581	0.953635
school_typeMiddle School	-0.0135	0.2377	-0.0566	0.954857
school_typeHigh School	-0.0526	0.2397	-0.2193	0.826429
ruralitySuburb	-0.0515	0.2580	-0.1997	0.841753
ruralityUrban	-0.1450	0.1957	-0.7409	0.458769
school_typeMiddle School:ruralitySuburb	-0.3403	0.3773	-0.9021	0.366989
school_typeHigh School:ruralitySuburb	-0.1595	0.4242	-0.3760	0.706894
school_typeMiddle School:ruralityUrban	0.2207	0.2819	0.7829	0.433709
school_typeHigh School:ruralityUrban	0.1151	0.2751	0.4183	0.675738

Zero-part coefficients:

	Estimate	Std.Err	z-value	p-value
(Intercept)	-5.6437	1.4711	-3.8364	0.00012486
grade	-0.0696	0.0724	-0.9611	0.33650728
genderM	0.2554	0.1416	1.8043	0.07119207
race_ethnicityWhite	0.4532	0.1860	2.4366	0.01482803
race_ethnicityOther	-0.0594	0.2893	-0.2051	0.83745557
race_ethnicityBlack or African American	0.3781	0.3358	1.1260	0.26017212
paid_free_reducedPaid	0.3789	0.2096	1.8078	0.07064378
lunch_dur	0.0123	0.0113	1.0807	0.27981917
school_typeMiddle School	2.8592	1.8506	1.5450	0.12234819
school_typeHigh School	3.5125	1.9979	1.7581	0.07872895
ruralitySuburb	-0.1667	2.3303	-0.0715	0.94297192
ruralityUrban	-1.4441	1.8757	-0.7699	0.44137455
school_typeMiddle School:ruralitySuburb	1.5710	2.9438	0.5337	0.59356981
school_typeHigh School:ruralitySuburb	2.0301	3.3019	0.6148	0.53866924
school_typeMiddle School:ruralityUrban	0.5980	2.3758	0.2517	0.80128651
school_typeHigh School:ruralityUrban	1.7065	2.3348	0.7309	0.46485283

log(dispersion) parameter:

Estimate	Std.Err
1.8989	0.031

Integration:

method: adaptive Gauss-Hermite quadrature rule

quadrature points: 11

Optimization:  
method: quasi-Newton  
converged: TRUE

#### 2.1.1.1 IRR

	[,1]
(Intercept)	136.7235973
grade	1.0074667
genderM	0.9713719
race_ethnicityWhite	1.0269076
race_ethnicityOther	1.0543854
race_ethnicityBlack or African American	0.9648161
paid_free_reducedPaid	0.9482314
lunch_dur	1.0001145
school_typeMiddle School	0.9866356
school_typeHigh School	0.9487876
ruralitySuburb	0.9497876
ruralityUrban	0.8650503
school_typeMiddle School:ruralitySuburb	0.7115232
school_typeHigh School:ruralitySuburb	0.8525548
school_typeMiddle School:ruralityUrban	1.2469666
school_typeHigh School:ruralityUrban	1.1219639

#### 2.1.1.2 OR

	[,1]
(Intercept)	0.003539768
grade	0.932747776
genderM	1.290980251
race_ethnicityWhite	1.573380506
race_ethnicityOther	0.942376014
race_ethnicityBlack or African American	1.459445267
paid_free_reducedPaid	1.460694302
lunch_dur	1.012330314
school_typeMiddle School	17.446782374
school_typeHigh School	33.533304870
ruralitySuburb	0.846457858
ruralityUrban	0.235969367
school_typeMiddle School:ruralitySuburb	4.811560497
school_typeHigh School:ruralitySuburb	7.614913395
school_typeMiddle School:ruralityUrban	1.818403875
school_typeHigh School:ruralityUrban	5.509389090

#### 2.1.2 Overall model

Call:  
mixed\_model(fixed = fv\_pre ~ grade + gender + race\_ethnicity +  
paid\_free\_reduced + lunch\_dur + rurality, random = ~1 | school\_name,

```
data = salad_bar_dat_use, family = zi.negative.binomial(),
zi_fixed = ~grade + gender + race_ethnicity + paid_free_reduced +
  lunch_dur + rurality, zi_random = ~1 | school_name)
```

#### Data Descriptives:

Number of Observations: 2707

Number of Groups: 36

#### Model:

family: zero-inflated negative binomial

link: log

#### Fit statistics:

log.Lik	AIC	BIC
-13132.58	26313.15	26351.16

#### Random effects covariance matrix:

	StdDev	Corr
(Intercept)	0.3065	
zi_(Intercept)	2.7526	-0.1773

#### Fixed effects:

	Estimate	Std.Err	z-value	p-value
(Intercept)	4.8977	0.1256	38.9790	< 1e-04
grade	0.0083	0.0070	1.1818	0.237304
genderM	-0.0292	0.0168	-1.7350	0.082740
race_ethnicityWhite	0.0277	0.0267	1.0339	0.301181
race_ethnicityOther	0.0534	0.0339	1.5723	0.115884
race_ethnicityBlack or African American	-0.0352	0.0374	-0.9428	0.345775
paid_free_reducedPaid	-0.0549	0.0313	-1.7522	0.079733
lunch_dur	0.0002	0.0019	0.0817	0.934898
ruralitySuburb	-0.2344	0.1776	-1.3199	0.186873
ruralityUrban	-0.0444	0.1230	-0.3606	0.718412

#### Zero-part coefficients:

	Estimate	Std.Err	z-value	p-value
(Intercept)	-4.5820	1.1021	-4.1577	< 1e-04
grade	0.0400	0.0704	0.5686	0.569601
genderM	0.2301	0.1416	1.6253	0.104109
race_ethnicityWhite	0.3738	0.1857	2.0125	0.044164
race_ethnicityOther	-0.0823	0.2879	-0.2858	0.775035
race_ethnicityBlack or African American	0.3448	0.3364	1.0250	0.305354
paid_free_reducedPaid	0.3708	0.2083	1.7803	0.075035
lunch_dur	0.0150	0.0115	1.3085	0.190708
ruralitySuburb	1.7774	1.6082	1.1053	0.269048
ruralityUrban	-0.3895	1.1562	-0.3369	0.736203

#### log(dispersion) parameter:

Estimate	Std.Err
1.9	0.031

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

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

#### 2.1.2.1 IRR

	[,1]
(Intercept)	133.9750810
grade	1.0083653
genderM	0.9712491
race_ethnicityWhite	1.0280385
race_ethnicityOther	1.0548163
race_ethnicityBlack or African American	0.9653690
paid_free_reducedPaid	0.9465630
lunch_dur	1.0001593
ruralitySuburb	0.7910597
ruralityUrban	0.9566104

#### 2.1.2.2 OR

	[,1]
(Intercept)	0.01023414
grade	1.04085488
genderM	1.25878441
race_ethnicityWhite	1.45323088
race_ethnicityOther	0.92101566
race_ethnicityBlack or African American	1.41167551
paid_free_reducedPaid	1.44888516
lunch_dur	1.01516138
ruralitySuburb	5.91473985
ruralityUrban	0.67739084

### 2.1.3 Rurality x Gender

Call:

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

Data Descriptives:

Number of Observations: 2707

Number of Groups: 36

Model:

family: zero-inflated negative binomial

link: log

Fit statistics:

log.Lik	AIC	BIC
-13127.11	26310.21	26354.55

Random effects covariance matrix:

	StdDev	Corr
(Intercept)	0.3016	
zi_(Intercept)	2.5020	-0.2199

Fixed effects:

	Estimate	Std.Err	z-value	p-value
(Intercept)	4.8696	0.1254	38.8461	< 1e-04
grade	0.0080	0.0071	1.1305	0.258275
race_ethnicityWhite	0.0302	0.0267	1.1278	0.259423
race_ethnicityOther	0.0539	0.0339	1.5894	0.111967
race_ethnicityBlack or African American	-0.0332	0.0374	-0.8881	0.374486
paid_free_reducedPaid	-0.0577	0.0313	-1.8422	0.065444
lunch_dur	0.0001	0.0019	0.0461	0.963238
genderM	-0.0015	0.0310	-0.0472	0.962355
ruralitySuburb	-0.1378	0.1775	-0.7762	0.437656
ruralityUrban	-0.0152	0.1229	-0.1234	0.901762
genderM:ruralitySuburb	-0.1449	0.0637	-2.2740	0.022964
genderM:ruralityUrban	-0.0231	0.0376	-0.6148	0.538715

Zero-part coefficients:

	Estimate	Std.Err	z-value	p-value
(Intercept)	-4.1699	1.0447	-3.9913	< 1e-04
grade	0.0420	0.0702	0.5978	0.549970
race_ethnicityWhite	0.3956	0.1859	2.1279	0.033345
race_ethnicityOther	-0.0512	0.2875	-0.1781	0.858616
race_ethnicityBlack or African American	0.3617	0.3346	1.0807	0.279821
paid_free_reducedPaid	0.3897	0.2090	1.8650	0.062188
lunch_dur	0.0149	0.0115	1.2948	0.195373
genderM	-0.3785	0.2742	-1.3803	0.167496

ruralitySuburb	1.3004	1.5017	0.8660	0.386518
ruralityUrban	-0.6803	1.0886	-0.6250	0.531996
genderM:ruralitySuburb	0.9519	0.4102	2.3203	0.020323
genderM:ruralityUrban	0.7461	0.3360	2.2205	0.026387

log(dispersion) parameter:

Estimate	Std.Err
1.9012	0.031

Integration:

method: adaptive Gauss-Hermite quadrature rule

quadrature points: 11

Optimization:

method: hybrid EM and quasi-Newton

converged: TRUE

Count Model: there is a significant interaction between Rural and Suburban schools and gender for amount of F/V selected among those who selected F/V. There is no significant effect of gender on selection for rural schools and no difference in the effect of gender on selection between rural and urban schools. However, males at suburban schools will select an average of 13% fewer g of F/V compared to females. This equates to males in suburban schools selecting 15 g fewer F/V than females compared to only 2 grams fewer in rural schools and 1 fewer g at urban schools (estimated from adjusted marginal means - see below).

Zero Model: there is a significant interaction between rurality of school and gender for selection 0 g of F/V. While there is no gender difference in the odds of selecting 0 g of F/V at rural schools, males at suburban and urban schools are 80% and 55% more likely to select 0 g of F/V, respectively, than females.

### 2.1.3.1 Count Model Marginal Means

rurality = Rural:

gender	prob	SE	df	asympt.LCL	asympt.UCL
F	136	14.17	Inf	110.8	167
M	136	14.08	Inf	110.7	166

rurality = Suburb:

gender	prob	SE	df	asympt.LCL	asympt.UCL
F	118	17.16	Inf	89.1	157
M	102	14.93	Inf	76.8	136

rurality = Urban:

gender	prob	SE	df	asympt.LCL	asympt.UCL
F	134	9.18	Inf	117.0	153
M	131	8.93	Inf	114.2	149

Results are averaged over the levels of: race\_ethnicity, paid\_free\_reduced

Confidence level used: 0.95

Intervals are back-transformed from the log scale

### 2.1.3.2 IRR

[,1]

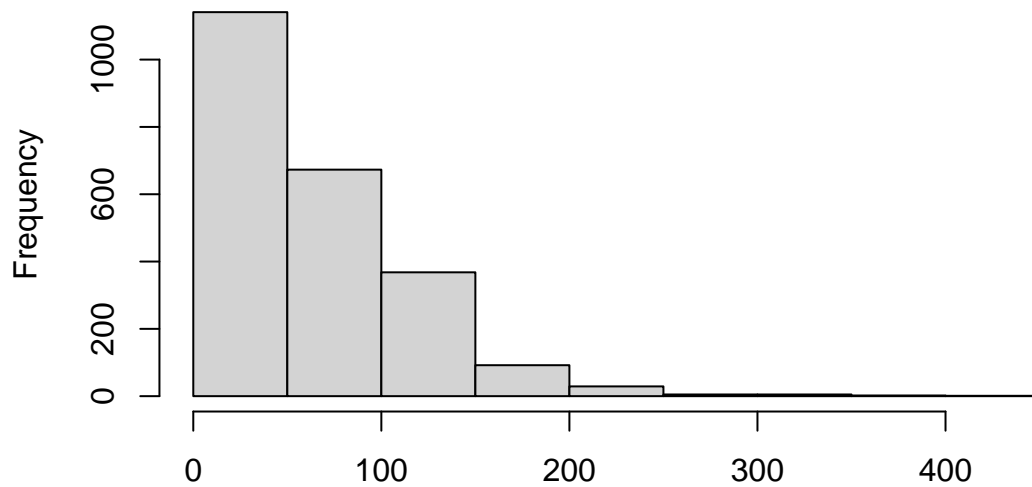
(Intercept)	130.2714852
grade	1.0080093
race_ethnicityWhite	1.0306270
race_ethnicityOther	1.0553929
race_ethnicityBlack or African American	0.9673136
paid_free_reducedPaid	0.9438942
lunch_dur	1.0000896
genderM	0.9985364
ruralitySuburb	0.8713078
ruralityUrban	0.9849404
genderM:ruralitySuburb	0.8651282
genderM:ruralityUrban	0.9771206

### 2.1.3.3 OR

	[,1]
(Intercept)	0.0154538
grade	1.0428870
race_ethnicityWhite	1.4852649
race_ethnicityOther	0.9500802
race_ethnicityBlack or African American	1.4356976
paid_free_reducedPaid	1.4765148
lunch_dur	1.0149943
genderM	0.6848926
ruralitySuburb	3.6706809
ruralityUrban	0.5064517
genderM:ruralitySuburb	2.5905311
genderM:ruralityUrban	2.1086876

## 2.2 Fruit/Vegetable Consumed

```
if salad_bar_dat_use[salad_bar_dat_use[["fv_selected"]] == "Y",
```



```
salad_bar_dat_use[salad_bar_dat_use[["fv_selected"]] == "Y", "fv_consumed"
```

-mean and sd for participants that selected F/V and consumed > 0 g F/V

```
[1] 68.72344 [1] 54.03744
```

### 2.2.1 Interaction Model

Call:

```
mixed_model(fixed = fv_consumed ~ grade + gender + race_ethnicity +  
  paid_free_reduced + lunch_dur + school_type * rurality, random = ~1 |  
  school_name, data = salad_bar_dat_use, family = zi.negative.binomial(),  
  zi_fixed = ~grade + gender + race_ethnicity + paid_free_reduced +  
    lunch_dur + school_type * rurality, zi_random = ~1 |  
    school_name, iter_EM = 0)
```

Data Descriptives:

Number of Observations: 2707

Number of Groups: 36

Model:

family: zero-inflated negative binomial  
link: log

Fit statistics:

log.Lik	AIC	BIC
-11694.08	23460.15	23517.16

Random effects covariance matrix:



	StdDev	Corr
(Intercept)	0.2603	
zi_(Intercept)	0.8628	0.2007

Fixed effects:

	Estimate	Std.Err	z-value	p-value
(Intercept)	4.0201	0.1909	21.0546	< 1e-04
grade	0.0347	0.0184	1.8856	0.0593530
genderM	0.0707	0.0412	1.7145	0.0864359
race_ethnicityWhite	0.0533	0.0652	0.8182	0.4132488
race_ethnicityOther	0.2414	0.0837	2.8842	0.0039239
race_ethnicityBlack or African American	0.0979	0.0919	1.0654	0.2866885
paid_free_reducedPaid	-0.0181	0.0747	-0.2419	0.8088416
lunch_dur	0.0039	0.0038	1.0238	0.3059075
school_typeMiddle School	-0.1976	0.2565	-0.7703	0.4411368
school_typeHigh School	-0.1600	0.2785	-0.5745	0.5656624
ruralitySuburb	-0.5035	0.2627	-1.9170	0.0552370
ruralityUrban	-0.4286	0.2000	-2.1435	0.0320723
school_typeMiddle School:ruralitySuburb	0.3754	0.4150	0.9045	0.3657059
school_typeHigh School:ruralitySuburb	0.3659	0.4500	0.8130	0.4161956
school_typeMiddle School:ruralityUrban	0.5068	0.2910	1.7416	0.0815720
school_typeHigh School:ruralityUrban	0.3676	0.2781	1.3218	0.1862481

Zero-part coefficients:

	Estimate	Std.Err	z-value	p-value
(Intercept)	-2.1725	0.5789	-3.7530	0.00017473
grade	-0.0232	0.0490	-0.4741	0.63545064
genderM	0.1929	0.1050	1.8368	0.06624249
race_ethnicityWhite	0.3060	0.1455	2.1032	0.03544862
race_ethnicityOther	0.1276	0.2087	0.6117	0.54070504
race_ethnicityBlack or African American	0.4934	0.2319	2.1278	0.03335237
paid_free_reducedPaid	0.3578	0.1692	2.1153	0.03440752
lunch_dur	0.0070	0.0088	0.7888	0.43025067
school_typeMiddle School	0.3871	0.7898	0.4901	0.62408418
school_typeHigh School	0.9599	0.8498	1.1296	0.25866139
ruralitySuburb	-0.1539	0.8631	-0.1783	0.85850112
ruralityUrban	-0.7614	0.6563	-1.1602	0.24597485
school_typeMiddle School:ruralitySuburb	1.5208	1.2417	1.2248	0.22065479
school_typeHigh School:ruralitySuburb	1.5340	1.3664	1.1227	0.26158267
school_typeMiddle School:ruralityUrban	0.6597	0.9276	0.7112	0.47694191
school_typeHigh School:ruralityUrban	1.0121	0.9074	1.1154	0.26467805

log(dispersion) parameter:

Estimate	Std.Err
0.2265	0.0338

Integration:

method: adaptive Gauss-Hermite quadrature rule

quadrature points: 11

Optimization:

```
method: quasi-Newton
converged: TRUE
```

### 2.2.1.1 IRR

```
                                [,1]
(Intercept)                    55.7051604
grade                          1.0353580
genderM                        1.0732457
race_ethnicityWhite            1.0547768
race_ethnicityOther            1.2730850
race_ethnicityBlack or African American 1.1029029
paid_free_reducedPaid          0.9820845
lunch_dur                      1.0039247
school_typeMiddle School       0.8206971
school_typeHigh School         0.8521675
ruralitySuburb                 0.6043954
ruralityUrban                  0.6514158
school_typeMiddle School:ruralitySuburb 1.4555452
school_typeHigh School:ruralitySuburb 1.4417443
school_typeMiddle School:ruralityUrban 1.6598888
school_typeHigh School:ruralityUrban 1.4442904
```

### 2.2.1.2 OR

```
                                [,1]
(Intercept)                    0.1138942
grade                          0.9770337
genderM                        1.2127833
race_ethnicityWhite            1.3580148
race_ethnicityOther            1.1361533
race_ethnicityBlack or African American 1.6378676
paid_free_reducedPaid          1.4302081
lunch_dur                      1.0069800
school_typeMiddle School       1.4726533
school_typeHigh School         2.6113754
ruralitySuburb                 0.8573724
ruralityUrban                  0.4669907
school_typeMiddle School:ruralitySuburb 4.5758909
school_typeHigh School:ruralitySuburb 4.6368579
school_typeMiddle School:ruralityUrban 1.9342823
school_typeHigh School:ruralityUrban 2.7512948
```

### 2.2.2 Overall Model

```
Call:
mixed_model(fixed = fv_consumed ~ grade + gender + race_ethnicity +
  paid_free_reduced + lunch_dur + rurality, 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 +
```

```
rurality, zi_random = ~1 | school_name)
```

Data Descriptives:

Number of Observations: 2316

Number of Groups: 36

Model:

family: zero-inflated negative binomial

link: log

Fit statistics:

log.Lik	AIC	BIC
-11284.98	22617.96	22655.97

Random effects covariance matrix:

	StdDev	Corr
(Intercept)	0.2696	
zi_(Intercept)	0.5647	0.0398

Fixed effects:

	Estimate	Std.Err	z-value	p-value
(Intercept)	3.8635	0.1556	24.8275	< 1e-04
grade	0.0427	0.0127	3.3633	0.0007703
genderM	0.0698	0.0410	1.7034	0.0884971
race_ethnicityWhite	0.0601	0.0645	0.9315	0.3515794
race_ethnicityOther	0.2412	0.0831	2.9029	0.0036971
race_ethnicityBlack or African American	0.1052	0.0915	1.1491	0.2505057
paid_free_reducedPaid	-0.0221	0.0734	-0.3013	0.7632108
lunch_dur	0.0030	0.0036	0.8297	0.4066826
ruralitySuburb	-0.2639	0.1788	-1.4755	0.1400652
ruralityUrban	-0.1311	0.1170	-1.1202	0.2626475

Zero-part coefficients:

	Estimate	Std.Err	z-value	p-value
(Intercept)	-2.1519	0.3858	-5.5774	< 1e-04
grade	0.0400	0.0357	1.1193	0.26302
genderM	0.1245	0.1350	0.9226	0.35620
race_ethnicityWhite	0.0768	0.1961	0.3916	0.69538
race_ethnicityOther	0.2161	0.2536	0.8520	0.39424
race_ethnicityBlack or African American	0.4278	0.2741	1.5604	0.11867
paid_free_reducedPaid	0.1132	0.2260	0.5008	0.61653
lunch_dur	-0.0082	0.0096	-0.8593	0.39020
ruralitySuburb	0.0607	0.4236	0.1432	0.88610
ruralityUrban	-0.1662	0.2752	-0.6041	0.54579

log(dispersion) parameter:

Estimate	Std.Err
0.2372	0.0335

Integration:

method: adaptive Gauss-Hermite quadrature rule

quadrature points: 11

Optimization:

method: hybrid EM and quasi-Newton

converged: TRUE

#### 2.2.2.1 IRR

	[,1]
(Intercept)	47.6308784
grade	1.0436059
genderM	1.0723201
race_ethnicityWhite	1.0619653
race_ethnicityOther	1.2728151
race_ethnicityBlack or African American	1.1109025
paid_free_reducedPaid	0.9781317
lunch_dur	1.0029838
ruralitySuburb	0.7680662
ruralityUrban	0.8771603

#### 2.2.2.2 OR

	[,1]
(Intercept)	0.1162671
grade	1.0408090
genderM	1.1326308
race_ethnicityWhite	1.0798051
race_ethnicityOther	1.2411797
race_ethnicityBlack or African American	1.5338279
paid_free_reducedPaid	1.1198264
lunch_dur	0.9918239
ruralitySuburb	1.0625621
ruralityUrban	0.8468433

### 2.2.3 Rurality x Gender

Call:

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

Data Descriptives:

Number of Observations: 2316

Number of Groups: 36

Model:

family: zero-inflated negative binomial

link: log

Fit statistics:

log.Lik	AIC	BIC
-11284.12	22624.24	22668.58

Random effects covariance matrix:

	StdDev	Corr
(Intercept)	0.2689	
zi_(Intercept)	0.5637	0.0406

Fixed effects:

	Estimate	Std.Err	z-value	p-value
(Intercept)	3.8570	0.1583	24.3685	< 1e-04
grade	0.0419	0.0127	3.2953	0.00098305
race_ethnicityWhite	0.0607	0.0645	0.9410	0.34670318
race_ethnicityOther	0.2414	0.0831	2.9057	0.00366403
race_ethnicityBlack or African American	0.1074	0.0917	1.1705	0.24179119
paid_free_reducedPaid	-0.0237	0.0734	-0.3229	0.74679792
lunch_dur	0.0029	0.0036	0.8068	0.41977451
genderM	0.0943	0.0757	1.2461	0.21272407
ruralitySuburb	-0.1991	0.1942	-1.0253	0.30524148
ruralityUrban	-0.1202	0.1264	-0.9506	0.34182182
genderM:ruralitySuburb	-0.1374	0.1577	-0.8709	0.38383090
genderM:ruralityUrban	-0.0197	0.0919	-0.2141	0.83049712

Zero-part coefficients:

	Estimate	Std.Err	z-value	p-value
(Intercept)	-2.0568	0.3963	-5.1902	< 1e-04
grade	0.0401	0.0358	1.1205	0.26248
race_ethnicityWhite	0.0757	0.1963	0.3858	0.69964
race_ethnicityOther	0.2125	0.2537	0.8376	0.40227
race_ethnicityBlack or African American	0.4353	0.2743	1.5871	0.11249
paid_free_reducedPaid	0.1194	0.2261	0.5280	0.59747
lunch_dur	-0.0081	0.0096	-0.8468	0.39710

genderM	-0.0632	0.2364	-0.2675	0.78912
ruralitySuburb	-0.0922	0.4986	-0.1849	0.85332
ruralityUrban	-0.3140	0.3162	-0.9929	0.32074
genderM:ruralitySuburb	0.2879	0.4971	0.5790	0.56257
genderM:ruralityUrban	0.2752	0.2952	0.9323	0.35121

log(dispersion) parameter:

Estimate	Std.Err
0.2375	0.0335

Integration:

method: adaptive Gauss-Hermite quadrature rule

quadrature points: 11

Optimization:

method: EM

converged: TRUE

### 2.2.3.1 IRR

	[,1]
(Intercept)	47.3249461
grade	1.0427845
race_ethnicityWhite	1.0626051
race_ethnicityOther	1.2730429
race_ethnicityBlack or African American	1.1133686
paid_free_reducedPaid	0.9765772
lunch_dur	1.0028984
genderM	1.0989273
ruralitySuburb	0.8194917
ruralityUrban	0.8867641
genderM:ruralitySuburb	0.8716510
genderM:ruralityUrban	0.9805294

### 2.2.3.2 OR

	[,1]
(Intercept)	0.1278625
grade	1.0409032
race_ethnicityWhite	1.0786604
race_ethnicityOther	1.2367505
race_ethnicityBlack or African American	1.5454968
paid_free_reducedPaid	1.1267846
lunch_dur	0.9919447
genderM	0.9387293
ruralitySuburb	0.9119441
ruralityUrban	0.7305335
genderM:ruralitySuburb	1.3335608
genderM:ruralityUrban	1.3167467

## 2.3 Fruit/Vegetable Proportion Waste

### Histogram of Percent Fruits/Vegetables Waste, %



-mean and sd for participants that selected F/V and consumed > 0 g F/V

```
[1] 53.35328
```

```
[1] 30.97268
```

#### 2.3.1 Interaction Model

Call:

```
mixed_model(fixed = fv_prop_waste ~ grade + gender + race_ethnicity +  
  paid_free_reduced + lunch_dur + school_type * rurality, random = ~1 |  
  school_name, data = salad_bar_dat_use, family = zi.negative.binomial(),  
  zi_fixed = ~grade + gender + race_ethnicity + paid_free_reduced +  
  lunch_dur + school_type * rurality, zi_random = ~1 |  
  school_name, iter_EM = 0)
```

Data Descriptives:

Number of Observations: 2316

Number of Groups: 36

Model:

family: zero-inflated negative binomial

link: log

Fit statistics:

log.Lik	AIC	BIC
-11078.37	22228.73	22285.74

Random effects covariance matrix:

	StdDev	Corr
(Intercept)	0.1895	
zi_(Intercept)	1.3101	-0.7346

Fixed effects:

	Estimate	Std.Err	z-value	p-value
(Intercept)	4.2836	0.1344	31.8772	< 1e-04
grade	-0.0142	0.0128	-1.1084	0.267677
genderM	-0.0468	0.0291	-1.6078	0.107874
race_ethnicityWhite	-0.0120	0.0445	-0.2702	0.787024
race_ethnicityOther	-0.0913	0.0607	-1.5043	0.132514
race_ethnicityBlack or African American	-0.0352	0.0652	-0.5398	0.589343
paid_free_reducedPaid	-0.0090	0.0531	-0.1695	0.865369
lunch_dur	-0.0063	0.0025	-2.4947	0.012607
school_typeMiddle School	0.0274	0.1821	0.1504	0.880485
school_typeHigh School	0.0740	0.1959	0.3776	0.705697
ruralitySuburb	0.2011	0.1889	1.0650	0.286877
ruralityUrban	0.1229	0.1438	0.8549	0.392629
school_typeMiddle School:ruralitySuburb	-0.0083	0.2922	-0.0285	0.977294
school_typeHigh School:ruralitySuburb	-0.3647	0.3263	-1.1175	0.263779
school_typeMiddle School:ruralityUrban	-0.1176	0.2097	-0.5610	0.574804
school_typeHigh School:ruralityUrban	-0.1543	0.2008	-0.7685	0.442200

Zero-part coefficients:

	Estimate	Std.Err	z-value	p-value
(Intercept)	-5.8495	1.1136	-5.2527	< 1e-04
grade	0.1022	0.0806	1.2682	0.2047282
genderM	0.4726	0.1789	2.6414	0.0082563
race_ethnicityWhite	-0.3798	0.3076	-1.2345	0.2170137
race_ethnicityOther	0.9172	0.2920	3.1411	0.0016831
race_ethnicityBlack or African American	0.7564	0.3553	2.1289	0.0332602
paid_free_reducedPaid	0.4495	0.3222	1.3951	0.1629912
lunch_dur	0.0219	0.0156	1.4057	0.1597989
school_typeMiddle School	0.2248	1.4197	0.1583	0.8741935
school_typeHigh School	1.4723	1.4663	1.0041	0.3153190
ruralitySuburb	1.9604	1.4380	1.3633	0.1727753
ruralityUrban	0.7539	1.1820	0.6378	0.5236043
school_typeMiddle School:ruralitySuburb	0.1366	2.0071	0.0681	0.9457353
school_typeHigh School:ruralitySuburb	-1.7279	2.1964	-0.7867	0.4314474
school_typeMiddle School:ruralityUrban	-0.5489	1.6112	-0.3407	0.7333359
school_typeHigh School:ruralityUrban	-0.8387	1.5216	-0.5512	0.5814698

log(dispersion) parameter:

Estimate	Std.Err
0.8671	0.0316

Integration:

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



Optimization:  
method: quasi-Newton  
converged: TRUE

### 2.3.1.1 IRR

	[,1]
(Intercept)	72.5027377
grade	0.9859009
genderM	0.9542672
race_ethnicityWhite	0.9880400
race_ethnicityOther	0.9127712
race_ethnicityBlack or African American	0.9654033
paid_free_reducedPaid	0.9910346
lunch_dur	0.9936916
school_typeMiddle School	1.0277566
school_typeHigh School	1.0767984
ruralitySuburb	1.2228012
ruralityUrban	1.1308213
school_typeMiddle School:ruralitySuburb	0.9917172
school_typeHigh School:ruralitySuburb	0.6944319
school_typeMiddle School:ruralityUrban	0.8890150
school_typeHigh School:ruralityUrban	0.8569809

### 2.3.1.2 OR

	[,1]
(Intercept)	0.002881365
grade	1.107659451
genderM	1.604081525
race_ethnicityWhite	0.684022006
race_ethnicityOther	2.502378886
race_ethnicityBlack or African American	2.130533499
paid_free_reducedPaid	1.567581738
lunch_dur	1.022120102
school_typeMiddle School	1.252061609
school_typeHigh School	4.359265599
ruralitySuburb	7.102438512
ruralityUrban	2.125250714
school_typeMiddle School:ruralitySuburb	1.146382217
school_typeHigh School:ruralitySuburb	0.177650697
school_typeMiddle School:ruralityUrban	0.577563039
school_typeHigh School:ruralityUrban	0.432252900

### 2.3.2 Overall Model

Call:  
mixed\_model(fixed = fv\_prop\_waste ~ grade + gender + race\_ethnicity +  
paid\_free\_reduced + lunch\_dur + rurality, 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 + rurality, zi_random = ~1 | school_name)

```

Data Descriptives:

Number of Observations: 2014

Number of Groups: 36

Model:

family: zero-inflated negative binomial

link: log

Fit statistics:

log.Lik	AIC	BIC
-9332.207	18712.41	18750.42

Random effects covariance matrix:

	StdDev	Corr
(Intercept)	0.2358	
zi_(Intercept)	1.3342	-0.7020

Fixed effects:

	Estimate	Std.Err	z-value	p-value
(Intercept)	4.3112	0.1261	34.1933	< 1e-04
grade	-0.0236	0.0097	-2.4261	0.0152617
genderM	-0.0764	0.0314	-2.4353	0.0148792
race_ethnicityWhite	-0.0109	0.0484	-0.2259	0.8212593
race_ethnicityOther	-0.1800	0.0668	-2.6940	0.0070594
race_ethnicityBlack or African American	-0.1032	0.0719	-1.4352	0.1512403
paid_free_reducedPaid	-0.0427	0.0575	-0.7427	0.4576682
lunch_dur	-0.0081	0.0027	-2.9350	0.0033357
ruralitySuburb	0.0815	0.1538	0.5298	0.5962270
ruralityUrban	0.0415	0.1006	0.4121	0.6802779

Zero-part coefficients:

	Estimate	Std.Err	z-value	p-value
(Intercept)	-5.2017	0.7746	-6.7157	< 1e-04
grade	0.1522	0.0583	2.6122	0.0089951
genderM	0.4839	0.1819	2.6601	0.0078111
race_ethnicityWhite	-0.4897	0.3081	-1.5893	0.1120018
race_ethnicityOther	0.9073	0.2968	3.0573	0.0022335
race_ethnicityBlack or African American	0.7368	0.3647	2.0204	0.0433421
paid_free_reducedPaid	0.4145	0.3195	1.2972	0.1945688
lunch_dur	0.0204	0.0146	1.3965	0.1625507
ruralitySuburb	1.5480	0.8549	1.8108	0.0701718
ruralityUrban	0.0771	0.6051	0.1274	0.8986243

log(dispersion) parameter:

Estimate	Std.Err
0.8781	0.0345

Integration:

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

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

#### 2.3.2.1 IRR

	[,1]
(Intercept)	74.5269159
grade	0.9766978
genderM	0.9264900
race_ethnicityWhite	0.9891352
race_ethnicityOther	0.8352537
race_ethnicityBlack or African American	0.9019293
paid_free_reducedPaid	0.9582023
lunch_dur	0.9919622
ruralitySuburb	1.0849281
ruralityUrban	1.0423371

#### 2.3.2.2 OR

	[,1]
(Intercept)	0.005507466
grade	1.164437313
genderM	1.622331231
race_ethnicityWhite	0.612830701
race_ethnicityOther	2.477746684
race_ethnicityBlack or African American	2.089263387
paid_free_reducedPaid	1.513615839
lunch_dur	1.020587732
ruralitySuburb	4.702252170
ruralityUrban	1.080144348

### 2.3.3 Rurality x Gender

Call:

```
mixed_model(fixed = fv_prop_waste ~ grade + race_ethnicity +
  paid_free_reduced + lunch_dur + gender * rurality, 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 + race_ethnicity + paid_free_reduced +
  lunch_dur + gender * rurality, zi_random = ~1 | school_name)
```

Data Descriptives:

Number of Observations: 2014

Number of Groups: 36

Model:

family: zero-inflated negative binomial

link: log

Fit statistics:

log.Lik	AIC	BIC
-9329.901	18715.8	18760.14

Random effects covariance matrix:

	StdDev	Corr
(Intercept)	0.2364	
zi_(Intercept)	1.3337	-0.7014

Fixed effects:

	Estimate	Std.Err	z-value	p-value
(Intercept)	4.3603	0.1287	33.8844	< 1e-04
grade	-0.0236	0.0097	-2.4239	0.0153542
race_ethnicityWhite	-0.0154	0.0484	-0.3177	0.7506843
race_ethnicityOther	-0.1850	0.0668	-2.7694	0.0056164
race_ethnicityBlack or African American	-0.0986	0.0719	-1.3713	0.1702790
paid_free_reducedPaid	-0.0391	0.0575	-0.6794	0.4969026
lunch_dur	-0.0079	0.0028	-2.8757	0.0040316
genderM	-0.1803	0.0578	-3.1185	0.0018175
ruralitySuburb	0.0003	0.1647	0.0018	0.9985527
ruralityUrban	-0.0317	0.1071	-0.2965	0.7668640
genderM:ruralitySuburb	0.1640	0.1200	1.3668	0.1716841
genderM:ruralityUrban	0.1441	0.0700	2.0590	0.0394897

Zero-part coefficients:

	Estimate	Std.Err	z-value	p-value
(Intercept)	-5.1853	0.8002	-6.4800	< 1e-04
grade	0.1535	0.0583	2.6318	0.0084944
race_ethnicityWhite	-0.4921	0.3086	-1.5946	0.1108034
race_ethnicityOther	0.9058	0.2970	3.0504	0.0022857
race_ethnicityBlack or African American	0.7350	0.3649	2.0141	0.0439983
paid_free_reducedPaid	0.4174	0.3199	1.3046	0.1920394
lunch_dur	0.0203	0.0146	1.3882	0.1650732

genderM	0.4594	0.3746	1.2264	0.2200474
ruralitySuburb	1.4821	0.9248	1.6027	0.1089965
ruralityUrban	0.0663	0.6643	0.0998	0.9205074
genderM:ruralitySuburb	0.1105	0.6046	0.1827	0.8550236
genderM:ruralityUrban	0.0131	0.4395	0.0299	0.9761521

log(dispersion) parameter:

Estimate	Std.Err
0.8807	0.0345

Integration:

method: adaptive Gauss-Hermite quadrature rule

quadrature points: 11

Optimization:

method: hybrid EM and quasi-Newton

converged: TRUE

### 2.3.3.1 IRR

	[,1]
(Intercept)	78.2785434
grade	0.9766859
race_ethnicityWhite	0.9847248
race_ethnicityOther	0.8311229
race_ethnicityBlack or African American	0.9061368
paid_free_reducedPaid	0.9616790
lunch_dur	0.9921076
genderM	0.8350143
ruralitySuburb	1.0002987
ruralityUrban	0.9687539
genderM:ruralitySuburb	1.1782562
genderM:ruralityUrban	1.1549516

### 2.3.3.2 OR

	[,1]
(Intercept)	0.005598504
grade	1.165854402
race_ethnicityWhite	0.611345181
race_ethnicityOther	2.473956361
race_ethnicityBlack or African American	2.085392877
paid_free_reducedPaid	1.518003400
lunch_dur	1.020462416
genderM	1.583162503
ruralitySuburb	4.402354021
ruralityUrban	1.068536032
genderM:ruralitySuburb	1.116802812
genderM:ruralityUrban	1.013224460

### 2.3.4 Rurality x Grade

Call:

```
mixed_model(fixed = fv_prop_waste ~ gender + race_ethnicity +
  paid_free_reduced + lunch_dur + grade * rurality, 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 = ~gender + race_ethnicity + paid_free_reduced +
  lunch_dur + grade * rurality, zi_random = ~1 | school_name)
```

Data Descriptives:

Number of Observations: 2014

Number of Groups: 36

Model:

family: zero-inflated negative binomial

link: log

Fit statistics:

log.Lik	AIC	BIC
-9328.961	18713.92	18758.26

Random effects covariance matrix:

	StdDev	Corr
(Intercept)	0.2319	
zi_(Intercept)	1.3366	-0.7483

Fixed effects:

	Estimate	Std.Err	z-value	p-value
(Intercept)	4.0975	0.1625	25.2206	< 1e-04
genderM	-0.0785	0.0314	-2.5024	0.0123356
race_ethnicityWhite	-0.0041	0.0483	-0.0856	0.9318081
race_ethnicityOther	-0.1740	0.0668	-2.6057	0.0091677
race_ethnicityBlack or African American	-0.1082	0.0719	-1.5049	0.1323414
paid_free_reducedPaid	-0.0309	0.0578	-0.5347	0.5928869
lunch_dur	-0.0077	0.0027	-2.8430	0.0044692
grade	0.0060	0.0178	0.3356	0.7371998
ruralitySuburb	0.4488	0.2518	1.7827	0.0746294
ruralityUrban	0.3046	0.1766	1.7246	0.0846067
grade:ruralitySuburb	-0.0590	0.0330	-1.7872	0.0739127
grade:ruralityUrban	-0.0387	0.0215	-1.7994	0.0719580

Zero-part coefficients:

	Estimate	Std.Err	z-value	p-value
(Intercept)	-5.7237	1.1152	-5.1324	< 1e-04
genderM	0.4769	0.1820	2.6200	0.0087930
race_ethnicityWhite	-0.4554	0.3093	-1.4725	0.1408845
race_ethnicityOther	0.9257	0.2972	3.1152	0.0018383
race_ethnicityBlack or African American	0.7476	0.3651	2.0475	0.0406113
paid_free_reducedPaid	0.4643	0.3228	1.4387	0.1502391
lunch_dur	0.0207	0.0146	1.4176	0.1563183

grade	0.2096	0.1190	1.7620	0.0780707
ruralitySuburb	2.4270	1.5522	1.5636	0.1179204
ruralityUrban	0.6647	1.2129	0.5480	0.5836894
grade:ruralitySuburb	-0.1181	0.1921	-0.6145	0.5388544
grade:ruralityUrban	-0.0690	0.1392	-0.4953	0.6204173

log(dispersion) parameter:

Estimate	Std.Err
0.8795	0.0345

Integration:

method: adaptive Gauss-Hermite quadrature rule

quadrature points: 11

Optimization:

method: hybrid EM and quasi-Newton

converged: TRUE

#### 2.3.4.1 IRR

	[,1]
(Intercept)	60.1878488
genderM	0.9245263
race_ethnicityWhite	0.9958745
race_ethnicityOther	0.8403159
race_ethnicityBlack or African American	0.8974502
paid_free_reducedPaid	0.9695778
lunch_dur	0.9923205
grade	1.0060000
ruralitySuburb	1.5664665
ruralityUrban	1.3560272
grade:ruralitySuburb	0.9426722
grade:ruralityUrban	0.9620139

#### 2.3.4.2 OR

	[,1]
(Intercept)	0.003267753
genderM	1.611091698
race_ethnicityWhite	0.634206552
race_ethnicityOther	2.523690136
race_ethnicityBlack or African American	2.111829873
paid_free_reducedPaid	1.590978008
lunch_dur	1.020918511
grade	1.233246016
ruralitySuburb	11.324385884
ruralityUrban	1.943876472
grade:ruralitySuburb	0.888639504
grade:ruralityUrban	0.933363714