# PROJECT REPORT GROUP 10

# HOUSEHOLD CLEANER

# PINE SOL ALL PURPOSE

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# OVERVIEW

Household Cleaner Data:

- Household Data: Household data for 6565 panelists with information about the family size, race, age, education, occupation and other such demographics
- Panel data: Information of sales of various brands across different households
- Product Data: Data containing information about different companies and brands along with their sales, volume, units and UPC codes. It also contained data about the product being on display, feature or price reduction.
- Store Data: This file contained data of where the stores were location and linked the products to these stores

Our data was for the year 2001 and contained:

- 50 stores
- 81 companies
- 138 Brands
- 6565 panelists (not all purchased cleaner)

## DATA MANIPULATION & CLEANING

Data had to be aggregated to do some analysis. We have joined the GR and DR data for the products. Several joins were made using PROC SQL to link all the data together. There was no missing data in our columns at store and product level. The Store table did have some duplicate IRI_KEY thus we did not perform analysis at chain level but instead decided to investigate the overall market area.

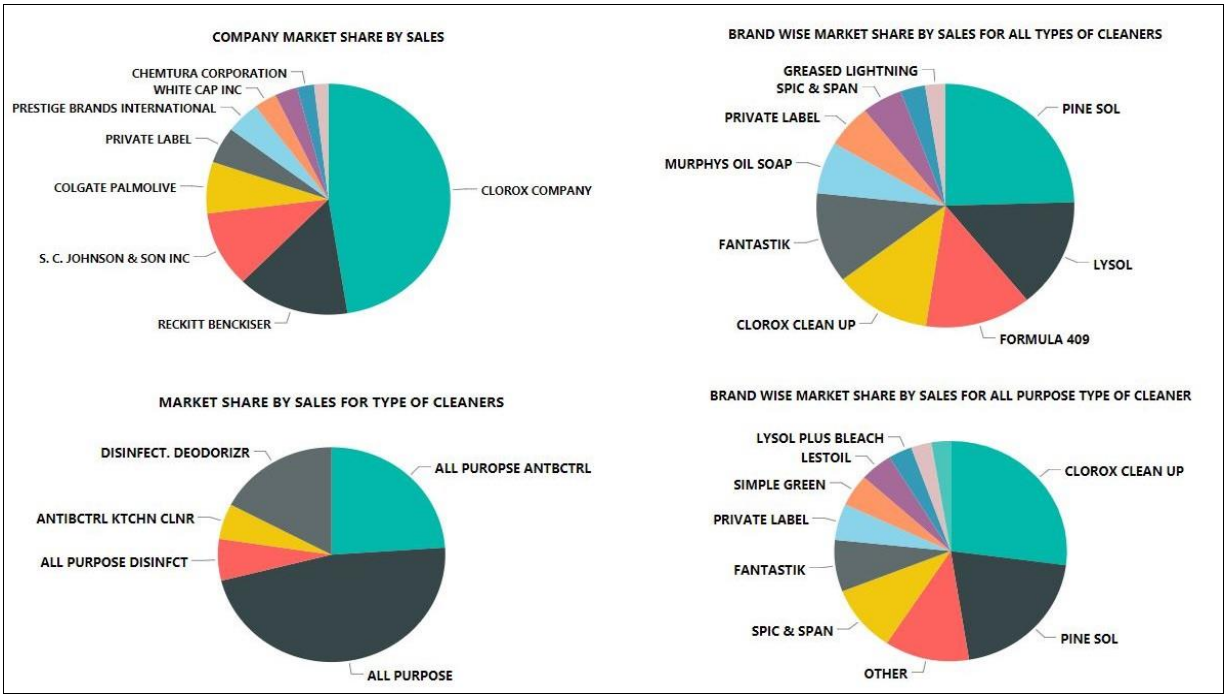
## IMPORTANT CALCULATIONS

- Share weighted price was calculated by taking the dollar amount per unit volume.
- Weekly and Store wise averages for Display, Feature and price reductions were calculated by aggregating the volume sold while a particular product was on display or feature or price reduction respectively. 2 columns were created for display 1 and 2, 4 for feature A, A+, B & C and 1 for price reduction. This converted these categorical variables into continuous variables.
- A column promotion was derived from Displays, Features and Price Reductions which was used to calculate the promoted and non-promoted volumes within our brand. The promoted volume tells us how much volume was sold in the presence of a deal.
- Baseline Volume also known as the estimated weekly volume sales was calculated by taking a weekly average of non-promoted volume of product sold over an year. This is the estimated volume sales per week when there is no promotion.
  Baseline volume = sum(non-promoted volume)/52
- Seasonality Index has been calculated by using the following formulas:
  Expected weekly sales = annual non-promoted volume / 52

Seasonality Index = actual weekly non-promoted volume / expected weekly sales
This gives us a trend of the volume sold over the year.

- Market Share by Sales was calculated on various levels including company, brand, type of cleaner and form of cleaner.

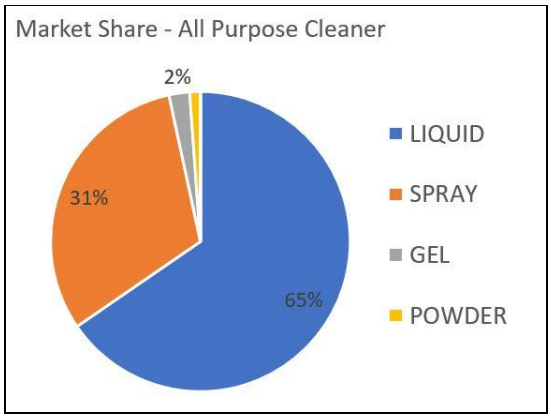
# DESCRIPTIVE STUDY




- The “Company Market Share by Sales” gives us the top 10 companies by market share within our dataset. We can see that Clorox Company has the highest market share for household cleaners followed by Reckitt Benckiser and S. C. Johnson & Son Inc.
- The “Market Share by Sales for Type of Cleaners” shows the top 5 types of cleaners by market share in the dataset. All Purpose covers 37.99% of our market share followed by All Purpose Antbctrl which covers 19.31% and Disinfect. Deodorizr which covers 13.95%.
- Since All Purpose type of cleaner covers most of our market share we have decided to do our analysis on only these types of cleaners.
- **Type of Cleaner Selected: All Purpose**
- The brand wise pie chart tells us that Clorox Clean Up has the maximum market share within All purpose type of cleaner followed by Pine Sol and Spic and Span. Clorox Clean Up and Pine Sol belong to the same company i.e. Clorox Company. Spic and Span belongs to the company Prestige Brands International.
- **Brand Selected: Pine Sol**
- It is surprising that when we consider all the types of cleaners Pine Sol has the highest market share followed by Lysol which belongs to the company Reckitt Benckiser, but Lysol is nowhere to be seen in our selected category of all purpose cleaners.

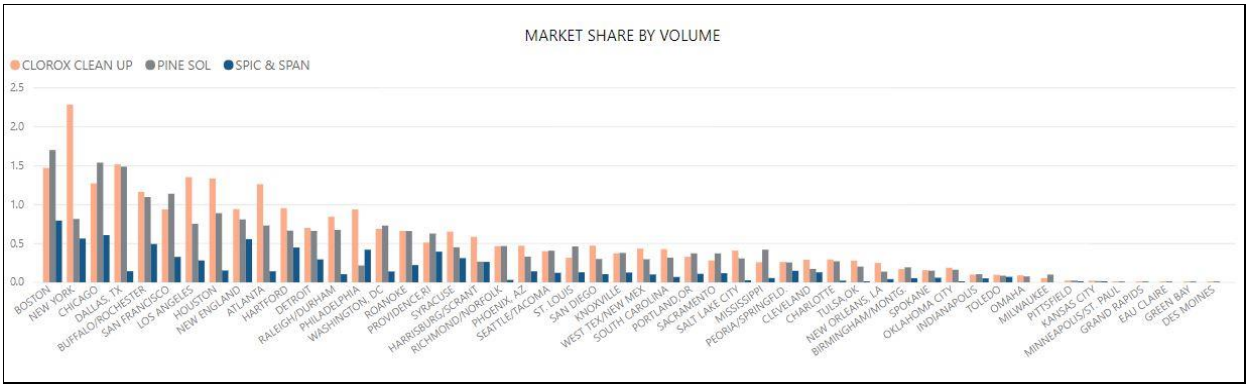
Our brand, Pine Sol had the second highest market share by sales within our selected category but also the highest market share of sales overall.

All Purpose type of cleaners
The major share of all purpose cleaners is covered by the liquid form of cleaner followed by spray. Pine Sol all purpose cleaners are of only made in liquid form.

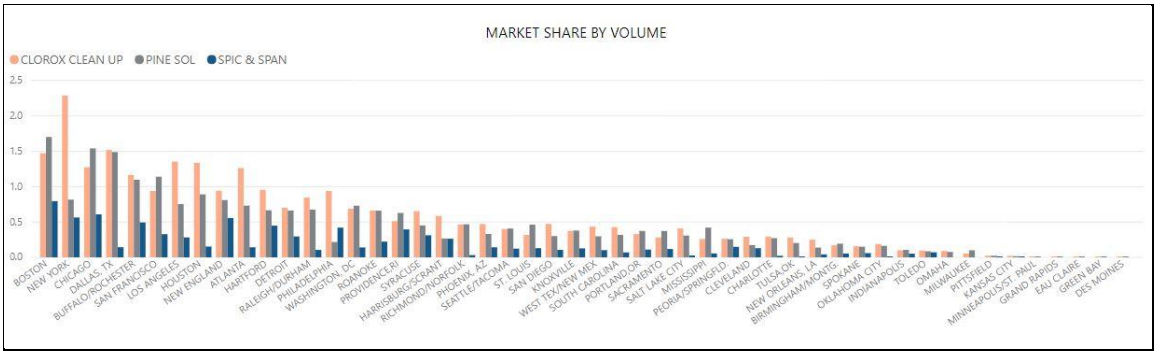



## MARKET LOCATION ANALYSIS

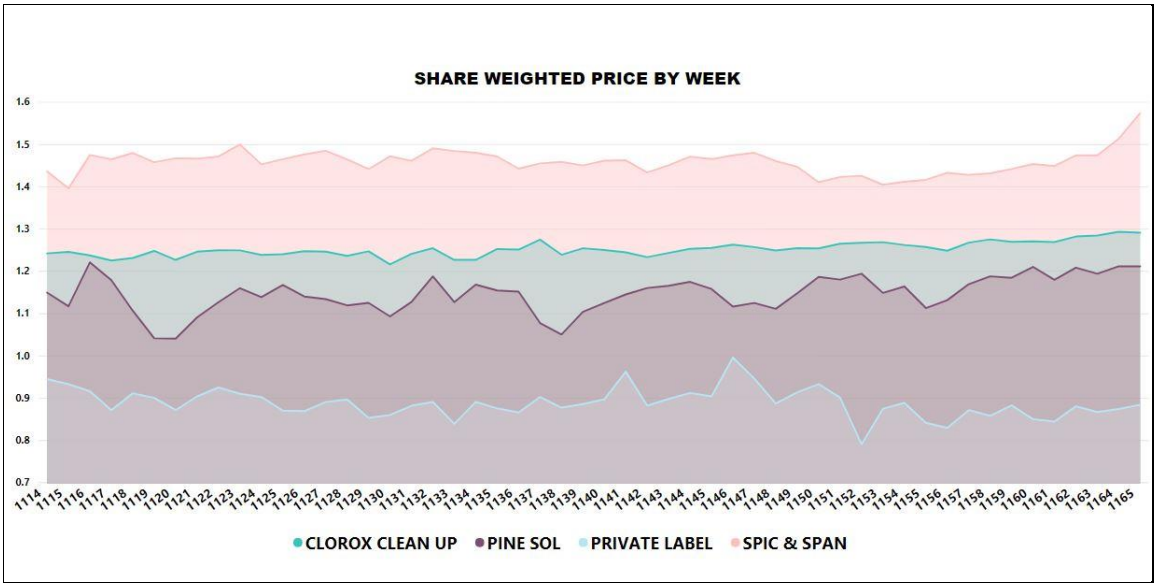
The above graph depicts the market share by sales in each location for the top 3 brands of All Purpose type of cleaners.
Chicago sees a higher share of Pine Sol while for most other locations the market share is higher for Clorox clean.
Philadelphia is one location where we see that spic & Span has a higher market share than Pine Sol.
New York sees an exceptionally high market share of Clorox Clean.



Interestingly, when we calculate the market share by volume the trend seems to be slightly different from what we saw above. In several areas including Boston the market share by volume is higher for Pine Sol as compared to its biggest competitor Clorox Clean.




## SHARE WEIGHTED PRICE

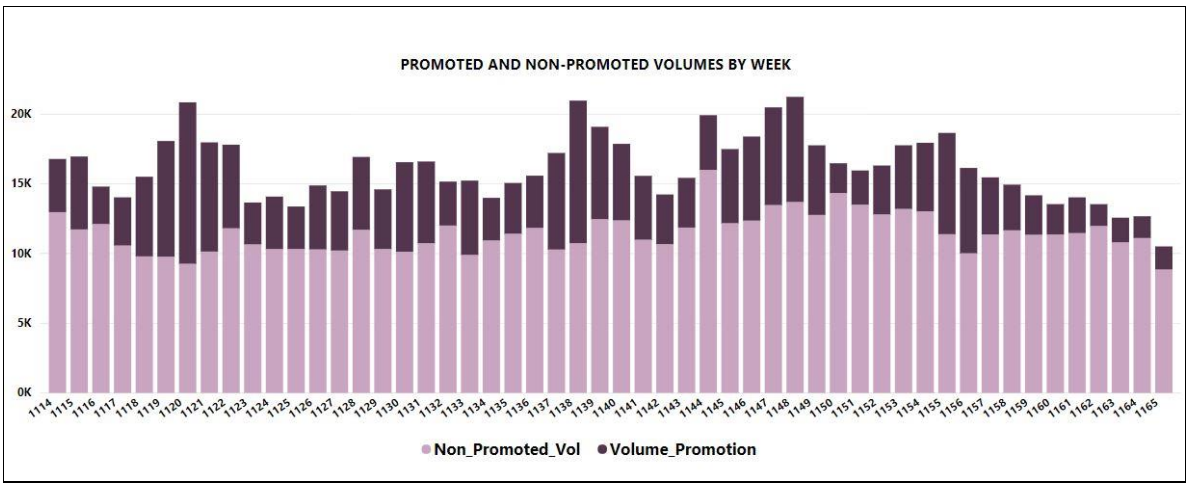



The above graph shows us that the share weighted price is least for Pine Sol thus reasoning our study above which showed that the market share by sales is lower in comparison to the market sales by volume for some locations.
Spic & Span has the highest share weighted price amongst our top brands.
Private brands have the lowest share weighted price and seem to focus on price sensitive customers.

Pine sol has the second lowest market share by sales after private labels.

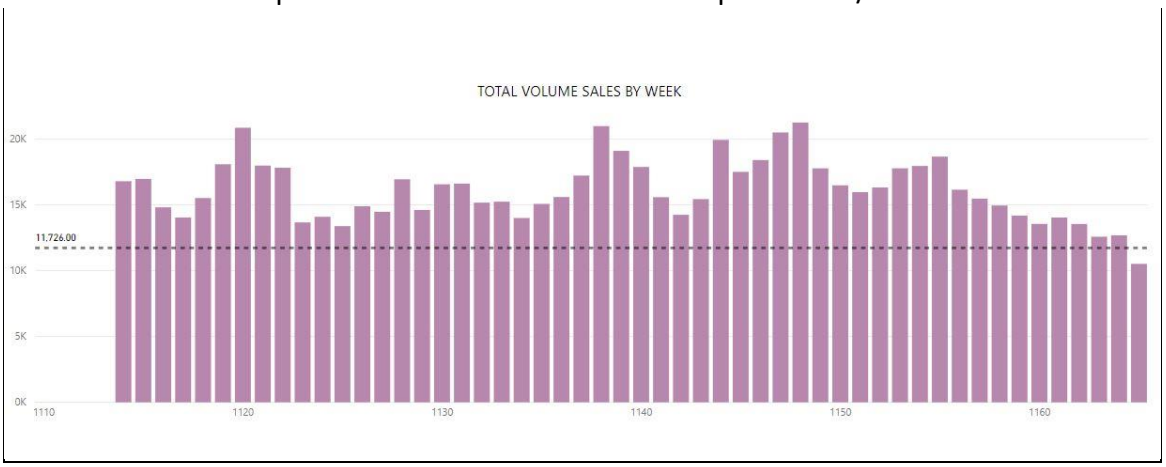
## PROMOTED VS NON-PROMOTED VOLUME

-For Pine Sol All Purpose Cleaner

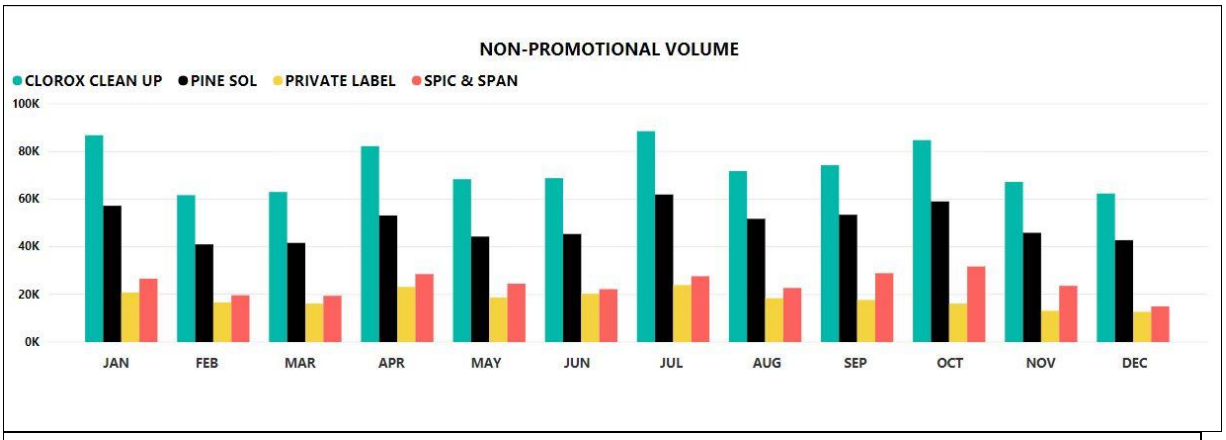


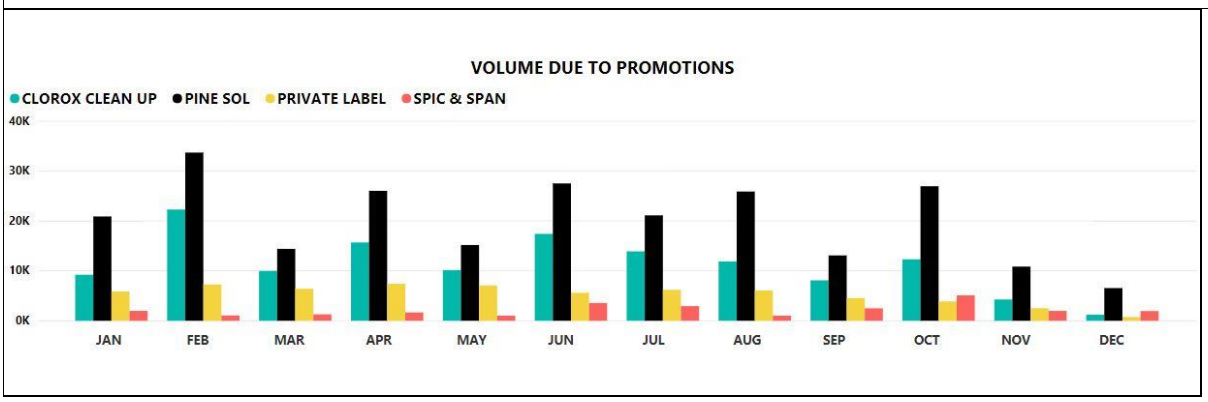

The graph above depicts the total sales as a sum of the volume of the product sold by promotions and non-promotions.
Promotions here refers to a display/feature/price reduction.
The non-promoted volume sales represent the sales that took place without any promotions in the stores while the promoted volume sales are the volume sold due to promotional offers in the stores.

Volume Sales due to promotion = Total Volume due to promotion/ total volume sales = 28.85%



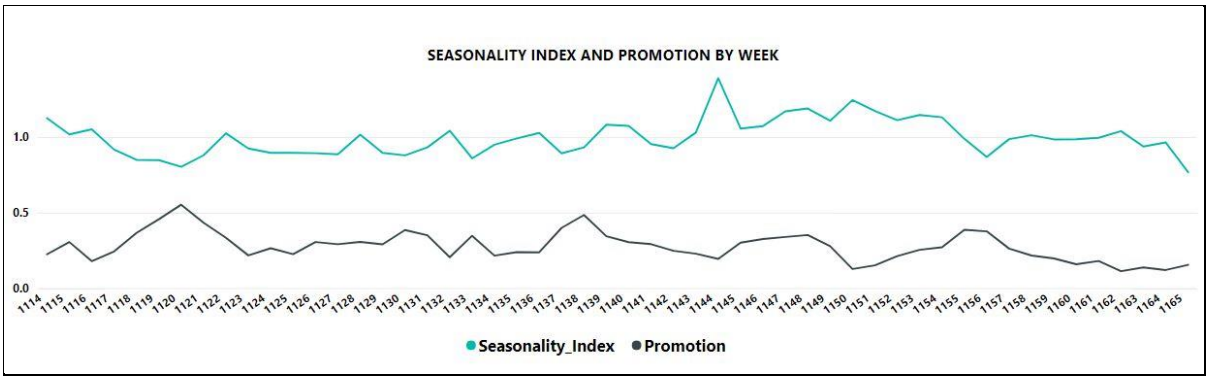

The graph above depicts the total volume sales by week. The baseline volume(11726) has been calculated as the average of non-promoted volume sales.
Baseline volume represents the estimated weekly sales of the product without the presence of any promotion. This value can help the store estimate its inventory.
The sales above this line depicts our incremental sales which is the estimated sales due to promotions.




The figures above depict that sales for Pine Sol are affected by both promotional and non-promotional volumes.
But in the case of it's competitor within the company i.e. Clorox Clean Up, most of its volume is sold without any promotions.
We can say that our brand is being promoted quite well, but we can put in more strategies in place to capture the untapped potential of the brand.

## SEASONALITY INDEX




Seasonality index is defined as the baseline volume sales or non-promoted volume sales divided by the estimated weekly sales.

Promotion again refers to there being a display/feature/price reduction.

The above graph depicts the seasonality index and promotion for each week. During peak seasons we can see that there is not much need for promotions. But for weeks with low seasonality index we can see that the promotions are higher.

The only exception to this trend can be seen in the month of December where we see a drop in seasonality as well as promotions. We would recommend focusing more on promotions during this end of the year in order to increase sales.

## HYPOTHESIS TESTS

- Done on All Purpose Type of Cleaner for all brands

1.)
H0: The amount spent on All Purpose cleaners is same for different family sizes
H1: The amount spent on All Purpose cleaners is different for atleast 2 of the family sizes

The ANOVA Procedure

| Class Level Information | | |
|---|---|---|
| Class | Levels | Values |
| Family_Size | 6 | 1 2 3 4 5 6 |

| | |
|---|---|
| Number of Observations Read | 1368 |
| Number of Observations Used | 1368 |

The ANOVA Procedure

Dependent Variable: Total_Amount_Spent

| Source | DF | Sum of Squares | Mean Square | F Value | Pr > F |
|---|---|---|---|---|---|
| Model | 5 | 162.27512 | 32.45502 | 1.23 | 0.2940 |
| Error | 1362 | 36030.58660 | 26.45418 | | |
| Corrected Total | 1367 | 36192.86172 | | | |

| R-Square | Coeff Var | Root MSE | Total_Amount_Spent Mean |
|---|---|---|---|
| 0.004484 | 104.3082 | 5.143362 | 4.930928 |

| Source | DF | Anova SS | Mean Square | F Value | Pr > F |
|---|---|---|---|---|---|
| Family_Size | 5 | 162.2751230 | 32.4550246 | 1.23 | 0.2940 |

Since p valus is >0.05 we do not reject the null hypothesis. This implies that family size does not impact the spendings of a household on All Purpose cleaners.

2.)
H0: The total amount spent on all purpose cleaners is the same for both the types of residential possession
H1: The total amount spent on all purpose cleaners is different for the two types of residential posession

t Test

The TTEST Procedure

Variable: Total_Amount_Spent

| Type_of_Residential_Possession | N | Mean | Std Dev | Std Err | Minimum | Maximum |
|---|---|---|---|---|---|---|
| 1 | 236 | 4.4440 | 3.4782 | 0.2264 | 0.9900 | 32.4000 |
| 2 | 1130 | 5.0373 | 5.4282 | 0.1615 | 0.9100 | 103.6 |
| Diff (1-2) | | -0.5933 | 5.1452 | 0.3682 | | |

| Type_of_Residential_Possession | Method | Mean | 95% CL Mean | | Std Dev | 95% CL Std Dev | |
|---|---|---|---|---|---|---|---|
| 1 | | 4.4440 | 3.9980 | 4.8901 | 3.4782 | 3.1901 | 3.8239 |
| 2 | | 5.0373 | 4.7205 | 5.3542 | 5.4282 | 5.2133 | 5.6618 |
| Diff (1-2) | Pooled | -0.5933 | -1.3157 | 0.1291 | 5.1452 | 4.9592 | 5.3459 |
| Diff (1-2) | Satterthwaite | -0.5933 | -1.1397 | -0.0469 | | | |

| Method | Variances | DF | t Value | Pr > \|t\| |
|---|---|---|---|---|
| Pooled | Equal | 1364 | -1.61 | 0.1074 |
| Satterthwaite | Unequal | 507.55 | -2.13 | 0.0334 |

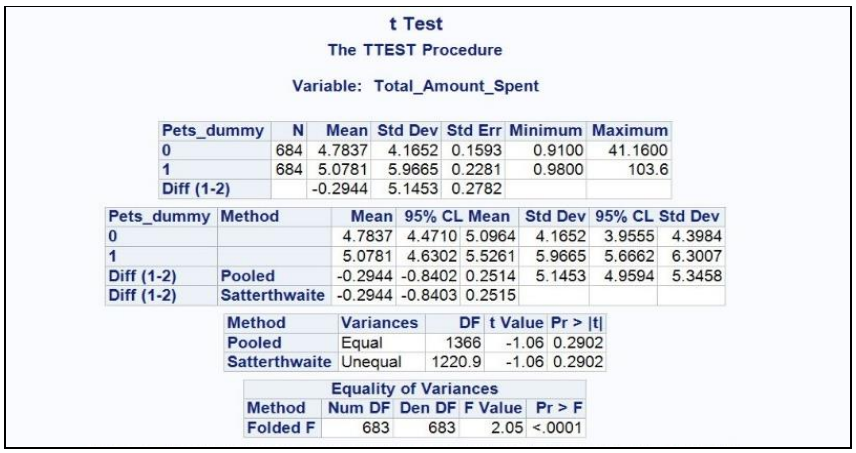
| Equality of Variances | | | | |
|---|---|---|---|---|
| Method | Num DF | Den DF | F Value | Pr > F |
| Folded F | 1129 | 235 | 2.44 | <.0001 |

Since p value for the equality of variances is < 0.05 we reject the null hypothesis of equality. For unequal variances the p value is 0.033 which is less than 0.05 and thus we reject the null hypothesis which implies that the total amount spent on all purpose cleaners is different for the two types of residential possessions.

3. )

H0: The average amount spent on all purpose household cleaners by people with and without pets is the same

H1: The average amount spent on all purpose household cleaners by people with and without pets is not the same



t Test

The TTEST Procedure

Variable: Total_Amount_Spent

| Pets_dummy | N | Mean | Std Dev | Std Err | Minimum | Maximum |
|---|---|---|---|---|---|---|
| 0 | 684 | 4.7837 | 4.1652 | 0.1593 | 0.9100 | 41.1600 |
| 1 | 684 | 5.0781 | 5.9665 | 0.2281 | 0.9800 | 103.6 |
| Diff (1-2) | | -0.2944 | 5.1453 | 0.2782 | | |

| Pets_dummy | Method | Mean | 95% CL Mean | | Std Dev | 95% CL Std Dev | |
|---|---|---|---|---|---|---|---|
| 0 | | 4.7837 | 4.4710 | 5.0964 | 4.1652 | 3.9555 | 4.3984 |
| 1 | | 5.0781 | 4.6302 | 5.5261 | 5.9665 | 5.6662 | 6.3007 |
| Diff (1-2) | Pooled | -0.2944 | -0.8402 | 0.2514 | 5.1453 | 4.9594 | 5.3458 |
| Diff (1-2) | Satterthwaite | -0.2944 | -0.8403 | 0.2515 | | | |

| Method | Variances | DF | t Value | Pr > \|t\| |
|---|---|---|---|---|
| Pooled | Equal | 1366 | -1.06 | 0.2902 |
| Satterthwaite | Unequal | 1220.9 | -1.06 | 0.2902 |

Equality of Variances

| Method | Num DF | Den DF | F Value | Pr > F |
|---|---|---|---|---|
| Folded F | 683 | 683 | 2.05 | <.0001 |

P value is less than 0.05 for equality of variances thus we reject the null hypothesis.
Looking at the p value for unequal variances which is 0.29 we do not reject the null hypothesis which implies that the amount spent on all purpose household cleaners is the same for people with and without pets.

4.)

H0: The average amount spent on all purpose household cleaners by people with and without pets is the same

H1: The average amount spent on all purpose household cleaners by people with and without pets is different for atleast 2 groups

The ANOVA Procedure

| Class Level Information | | |
|---|---|---|
| Class | Levels | Values |
| Children_Group_Code | 8 | 1 2 3 4 5 6 7 8 |

| | |
|---|---|
| Number of Observations Read | 1368 |
| Number of Observations Used | 1368 |

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One-Way Analysis of Variance

Results

The ANOVA Procedure

Dependent Variable: Total_Amount_Spent

| Source | DF | Sum of Squares | Mean Square | F Value | Pr > F |
|---|---|---|---|---|---|
| Model | 7 | 109.62828 | 15.66118 | 0.59 | 0.7643 |
| Error | 1360 | 36083.23344 | 26.53179 | | |
| Corrected Total | 1367 | 36192.86172 | | | |

| R-Square | Coeff Var | Root MSE | Total_Amount_Spent Mean |
|---|---|---|---|
| 0.003029 | 104.4611 | 5.150902 | 4.930928 |

| Source | DF | Anova SS | Mean Square | F Value | Pr > F |
|---|---|---|---|---|---|
| Children_Group_Code | 7 | 109.6282766 | 15.6611824 | 0.59 | 0.7643 |

P value is 0.79643 which is greater than 0.05 which implies that we do not reject the null hypothesis.

## PRICE ELASTICITY

- The value of overall elasticity for Pine Sol – All purpose is 2.74 which tells us that our product is quiet elastic and a 10% increase in price will lead to a decrease in demand of 27.4%
- The below table consists of price elasticities across different cities. Our product is least elastic in San Francisco is most elastic in cities like Cleveland and Indianapolis.
- We can use these elasticities to identify areas that will react the most to the promotions and we can strategize accordingly.

| PINE SOL - ALL PURPOSE | |
|---|---|
| **CITY** | **ELASTICITY** |
| SAN FRANCISCO | 1.20 |
| NEW YORK | 1.77 |
| DALLAS | 1.83 |
| BOSTON | 1.95 |
| HOUSTON | 2.86 |
| LOS ANGELS | 2.98 |
| CHICAGO | 3.17 |
| BUFFALO/ROCHESTER | 3.30 |
| NEW ENGLAND | 3.63 |
| ATLANTA | 3.63 |
| OKLAHOMA | 3.63 |
| SACRAMENTO | 3.85 |
| CHARLOTTE | 4.02 |
| CLEVELAND | 4.23 |
| INDIANAPOLIS | 4.38 |

**SAS Output**

**Log-Log Model to find out the elasticity of Pine Sol- All Purpose**

| | |
|---|---|
| Number of Observations Read | 38175 |
| Number of Observations Used | 38175 |

**Analysis of Variance**

| Source | DF | Sum of Squares | Mean Square | F Value | Pr > F |
|---|---|---|---|---|---|
| Model | 1 | 7959.63646 | 7959.63646 | 10850.4 | <.0001 |
| Error | 38173 | 28003 | 0.73358 | | |
| Corrected Total | 38174 | 35962 | | | |

| | | | |
|---|---|---|---|
| Root MSE | 0.85649 | R-Square | 0.2213 |
| Dependent Mean | 2.66721 | Adj R-Sq | 0.2213 |
| Coeff Var | 32.11184 | | |

**Parameter Estimates**

| Variable | DF | Parameter Estimate | Standard Error | t Value | Pr > \|t\| |
|---|---|---|---|---|---|
| Intercept | 1 | 3.17735 | 0.00657 | 483.42 | <.0001 |
| ln_wt_price | 1 | -2.74276 | 0.02633 | -104.17 | <.0001 |

# PANEL REGRESSION

We have performed a panel regression to check the effects of price and promotions on the volume sales for Pine Sol.

Our data had hetroskedasticity which we resolved in proc panel by using the HAC option.

Below are the results of the regression:

Fixed Two Effects model:

Dependent Variable: Total_volume

| Model Description | |
|---|---|
| Estimation Method | FixTwo |
| Number of Cross Sections | 904 |
| Time Series Length | 52 |
| HAC Kernel | Quadratic |
| HAC Bandwidth | Andrews(91) |

| Fit Statistics | | | |
|---|---|---|---|
| SSE | 7324716.480 | DFE | 37208 |
| MSE | 196.8586 | Root MSE | 14.0306 |
| R-Square | 0.6654 | | |

| F Test for No Fixed Effects | | | |
|---|---|---|---|
| Num DF | Den DF | F Value | Pr > F |
| 954 | 37208 | 58.92 | <.0001 |

**Parameter Estimates**

| Variable | DF | Estimate | Standard Error | t Value | Pr > \|t\| | Label |
|---|---|---|---|---|---|---|
| share_wt_price | 1 | -16.2232 | 1.0234 | -15.85 | <.0001 | |
| Display_1 | 1 | 8.19001 | 1.0148 | 8.07 | <.0001 | |
| Display_2 | 1 | 16.83064 | 1.2716 | 13.24 | <.0001 | |
| PriceReduction | 1 | 5.435948 | 0.4471 | 12.16 | <.0001 | |
| Feature_A | 1 | 10.76601 | 1.0777 | 9.99 | <.0001 | |
| Feature_Aplus | 1 | 12.29492 | 5.1590 | 2.38 | 0.0172 | |
| FA_D1 | 1 | 12.14401 | 5.2265 | 2.32 | 0.0202 | |
| FB_D1 | 1 | 27.05059 | 6.7837 | 3.99 | <.0001 | |
| FB_D2 | 1 | 19.23175 | 7.7277 | 2.49 | 0.0128 | |
| FC_D1 | 1 | 76.04954 | 38.5270 | 1.97 | 0.0484 | |
| Feature_B | 1 | 9.280645 | 0.8127 | 11.42 | <.0001 | |
| Feature_C | 1 | 24.20118 | 2.6285 | 9.21 | <.0001 | |

Since we do not have standardized betas we have calculated the product of means and betas.

| | Mean*Bet |
|---|---|
| share_wt_price | -19.8093 |
| PriceReduction | 0.92269 |
| Display 2 & Feature B | 0.781764 |
| Display 1 & Feature B | 0.524787 |
| Display 1 & Feature A | 0.502611 |
| Display_2 | 0.404324 |
| Feature_A | 0.336353 |
| Feature_B | 0.335463 |
| Display 1 & Feature C | 0.241513 |
| Display_1 | 0.147888 |
| Feature_C | 0.09217 |
| FB_D2 | 0.041977 |
| FB_D1 | 0.041436 |
| Feature_Aplus | 0.039323 |
| FA_D1 | 0.01837 |
| FC_D1 | 0.001455 |

**Interpretation**

- For a 1 unit increase in share weighted price keeping everything else constatnt the volume will decrease by 16.22 units.
- If the fraction of units that are on minor display increases by 10%, keeping everything else constant, then the volume increases by 0.8 units.
- If the fraction of units that are on major display increases by 10%, keeping everything else constant, then the volume increases by 1.68 units.
- If the fraction of units that are marketed usnig large size ad increases by 10%, keeping everything else constant, then the volume increases by 1 unit.
- If the fraction of units that are marketed usnig a medium size ad increases by 10%, keeping everything else constant, then the volume increases by 0.93 units.
- If the fraction of units that are marketed usnig a small ad increases by 10%, keeping everything else constant, then the volume increases by 2.4 units.
- If the fraction of units that are marketed usnig retailer coupon or rebate increases by 10%, keeping everything else constant, then the volume increases by 1.3 units.
- If we increase the fraction of units which were promoted through price reduction by 10%, keeping everything else constant, the volume increases by 0.54 units.

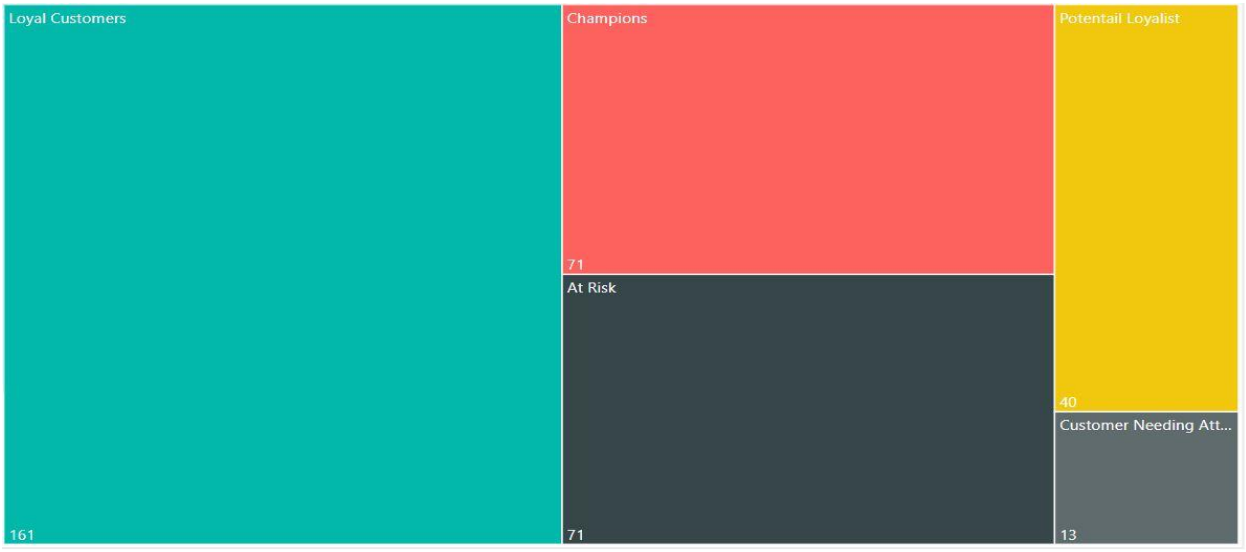
SYNERGISTIC EFFECTS (Interpretation of interaction terms):-

- If the fraction of products that are on minor display increases by 10% accompanied by a 10% increase in marketing the products through a large size add, keeping everything else constant, the volume increases by 3.10 units.

- If the fraction of products that are on minor display increases by 10% accompanied by a 10% increase in marketing the products through a medium size add, keeping everything else constant, the volume increases by 4.45 units.
- If the fraction of products that are on major display increases by 10% accompanied by a 10% increase in marketing the products through a medium size add, keeping everything else constant, the volume increases by 4.53 units.
- If the fraction of products that are on minor display increases by 10% accompanied by a 10% increase in marketing the products through a small size add, keeping everything else constant, the volume increases by 10.84 units.

# RFM ANALYSIS

**Pine Sol All Purpose Customers**




**Champions:** *"Bought recently, buy often and spend the most!"*

- Around 20% of the customers comes under this category. These customers can be given referral coupons as they can advocate and promote our products.
- They can be targeted to sell new products as they can be early adopters of the brand.

**Loyal Customers:** *"Spend good money with us often"*

- Around 45% of the customers are loyal customers, in which case we can target this segment to upsell higher value products and keep them engaged

**At Risk:** *"Spent big money and purchased often. But long time ago"*

- At risk customer segment accounts for 20% of all customers. Basically, these are the customers we have already lost.
- We can bring them back by sending personalized emails and offering discounts on next purchase

**Potential Loyalist:** *"Recent customers but spent a good amount"*

- These segment accounts for 11% of our customers and show trends of becoming our loyal customers.
- They can be targeted by providing the options of other variants of our products and we can offer them loyalty programs.

**Customer Needing Attention:** *"Average recency, frequency and monetary values"*

- This segment accounts for 4% of the total Pine Sol all-purpose customers. They have above average frequency and monetary value but may not have bought very recently though.
- These customer segment can be reactivated by making limited time offers.

**Demographic Characteristics of the Customers Segment**

**Common Characteristics of our Customers**

The common household characteristics of our customers are white, married, having no children, home owners, Non-Hispanic and has full time working females. The median Household age of our customers is between 45 to 64 years and has median household income between $20,000 to $55,000. Almost 65% of our customers household have full-time working male.

**Difference Between Customer Segments**

**"Loyal/Champion vs at risk/needs attention"** All our loyal/champion customers have pets, whereas the customers in segment "at risk/needs attention" do not have pets. Furthermore, our loyal/champion customers are comparatively less educated as compared to the customers who are "at risk/needs attention"

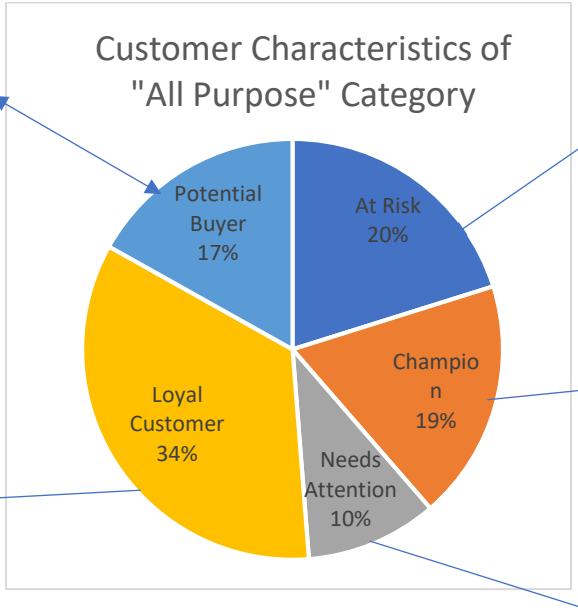
"**Loyal Customers vs at risk Customers**"- Most of our loyal customers have less median household age as compared to customers who are at risk.

"**Champion customers vs At Risk Customers**" – Our champion customers have comparatively less household income and are retired as compared to the customers in segment "At risk" whose occupation type is professional or technical.

| "At Risk" & "Needs Attention" | "Champion" & "Loyal" |
|---|---|
| Households have no Pets | Households have Pets |
| Higher household Income | Lower Household income |
| More educated males in households | Less Educated Males in Households |
| Occupation Type = Professional or Technical | Occupation Type = Retired |
| COMMON CHARACTERISTICS<br><br>White \| Married \| No children \| Home owners \| Non-Hispanic \| Full time working females \| The median Household age is 45 - 64 years \| Median household income $20k - $55k \| Full-time working male in 65% of households \| | |

**Pine Sol versus Other Brands (All Purpose cleaners only)**

Median HH Income: $35k-$45K
**Median HH Age: 45-54**
Mode HH Occupation: 'Professional/Technical'
Females working Full time

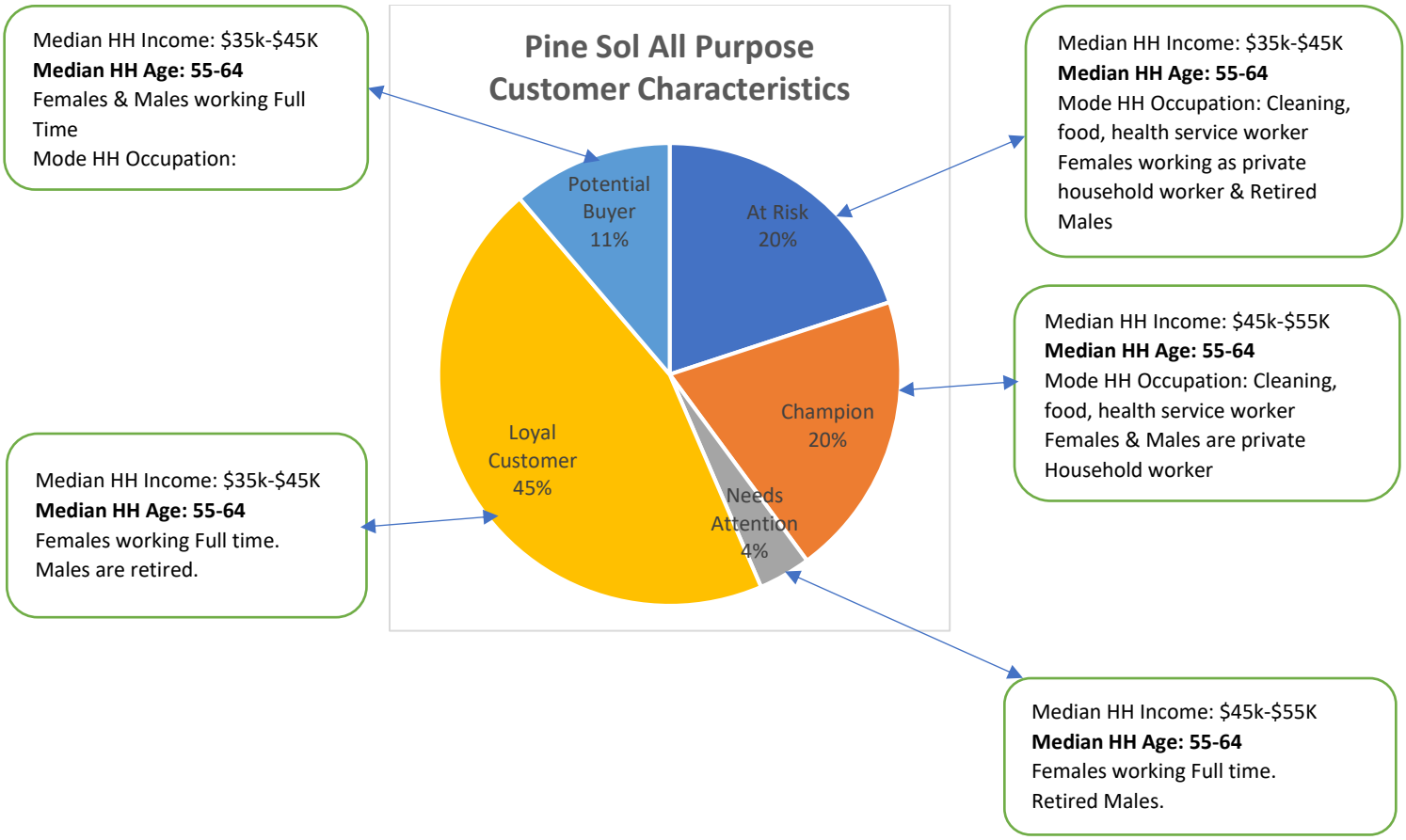



Median HH Income: $45k-$55K
**Median HH Age: 55-64**
Mode HH Occupation: Retired
Women Occupation: Professional/technical
Women Working hours: Full-time
Females Less Educated than men

HH Income: $45k-$55K
**HH Age: 45-54**
**HH Occupation: 'Professional/Technical'**
Females working Full time

Median HH Income: $25k-$35K
**Median HH Age: 55-64**
Mode HH Occupation: 'Retired'
Females working Full time

Median HH Income: $20k-$25K
**Median HH Age: 45-54**
Mode HH Occupation: 'Cleaning, food, health service worker'
Females Less Educated than men




**Category Analysis:**

- Pine Sol has relatively more loyal customers as compared to other brands in the All-Purpose Category.
- To retain their champion and loyal category customers, Pine Sol can provide offers on pet supplies as the above mentioned segments have pets.
- Pine Sol should try to expand its market to younger people as currently most of the buyers of Pine Sol All Purpose cleaners are people between 55-65 years of age.

# LOGISTIC REGRESSION

- On Household data

**Type 3 Analysis of Effects**

| Effect | DF | Wald Chi-Square | Pr > ChiSq |
|---|---|---|---|
| Combined_Pre_Tax_Inc | 12 | 40.7132 | <.0001 |
| HH_AGE | 6 | 15.5925 | 0.0161 |
| HH_EDU | 8 | 17.9277 | 0.0218 |
| HH_OCC | 11 | 38.7554 | <.0001 |
| Number_of_Dogs | 5 | 24.0662 | 0.0002 |
| Number_of_Cats | 5 | 25.2948 | 0.0001 |
| Children_Group_Code | 7 | 17.6642 | 0.0136 |

**Analysis of Maximum Likelihood Estimates**

| Parameter | | DF | Estimate | Standard Error | Wald Chi-Square | Pr > ChiSq |
|---|---|---|---|---|---|---|
| Intercept | | 1 | -1.2897 | 1.3636 | 0.8945 | 0.3443 |
| Combined_Pre_Tax_Inc | 0 | 1 | 0.2274 | 0.9105 | 0.0624 | 0.8028 |
| Combined_Pre_Tax_Inc | 1 | 1 | 0.3538 | 0.3022 | 1.3706 | 0.2417 |
| Combined_Pre_Tax_Inc | 2 | 1 | -1.2046 | 0.4020 | 8.9804 | 0.0027 |
| Combined_Pre_Tax_Inc | 3 | 1 | 0.1831 | 0.2738 | 0.4474 | 0.5036 |
| Combined_Pre_Tax_Inc | 4 | 1 | -0.6999 | 0.3441 | 4.1376 | 0.0419 |
| Combined_Pre_Tax_Inc | 5 | 1 | -0.4593 | 0.2807 | 2.6781 | 0.1017 |
| Combined_Pre_Tax_Inc | 6 | 1 | 0.1171 | 0.2253 | 0.2702 | 0.6032 |
| Combined_Pre_Tax_Inc | 7 | 1 | -0.2254 | 0.2319 | 0.9446 | 0.3311 |
| Combined_Pre_Tax_Inc | 8 | 1 | -0.5543 | 0.2404 | 5.3158 | 0.0211 |
| Combined_Pre_Tax_Inc | 9 | 1 | 0.1051 | 0.2285 | 0.2113 | 0.6457 |
| Combined_Pre_Tax_Inc | 10 | 1 | -0.1253 | 0.2398 | 0.2731 | 0.6012 |
| Combined_Pre_Tax_Inc | 11 | 1 | -0.2911 | 0.2333 | 1.5568 | 0.2121 |
| HH_AGE | 0 | 1 | -2.7726 | 0.9763 | 8.0655 | 0.0045 |
| HH_AGE | 1 | 1 | -10.6926 | 712.0 | 0.0002 | 0.9880 |
| HH_AGE | 2 | 1 | 0.1018 | 0.3785 | 0.0723 | 0.7880 |
| HH_AGE | 3 | 1 | 0.4658 | 0.2097 | 4.9366 | 0.0263 |
| HH_AGE | 4 | 1 | 0.1687 | 0.1845 | 0.8366 | 0.3604 |
| HH_AGE | 5 | 1 | 0.2278 | 0.1627 | 1.9600 | 0.1615 |
| HH_EDU | 0 | 1 | 2.4315 | 0.9859 | 6.0831 | 0.0136 |
| HH_EDU | 1 | 1 | -12.0006 | 503.4 | 0.0006 | 0.9810 |
| HH_EDU | 2 | 1 | -0.6069 | 0.6508 | 0.8696 | 0.3511 |
| HH_EDU | 3 | 1 | 0.5760 | 0.3003 | 3.6793 | 0.0551 |
| HH_EDU | 4 | 1 | -0.0744 | 0.2251 | 0.1091 | 0.7412 |
| HH_EDU | 5 | 1 | 0.0779 | 0.2300 | 0.1147 | 0.7349 |
| HH_EDU | 6 | 1 | 0.2433 | 0.2277 | 1.1416 | 0.2853 |
| HH_EDU | 7 | 1 | 0.0763 | 0.2303 | 0.1098 | 0.7403 |
| HH_OCC | 0 | 1 | 1.1482 | 0.6005 | 3.6558 | 0.0559 |
| HH_OCC | 1 | 1 | -0.1993 | 0.1743 | 1.3079 | 0.2528 |
| HH_OCC | 2 | 1 | -0.2140 | 0.2320 | 0.8510 | 0.3563 |
| HH_OCC | 3 | 1 | -0.7556 | 0.3130 | 5.8263 | 0.0158 |
| HH_OCC | 4 | 1 | -0.3457 | 0.2076 | 2.7720 | 0.0959 |
| HH_OCC | 5 | 1 | -0.1019 | 0.6547 | 0.0242 | 0.8764 |
| HH_OCC | 6 | 1 | 0.7953 | 0.3311 | 5.7693 | 0.0163 |

| | | | | | | |
|---|---|---|---|---|---|---|
| HH_OCC | 7 | 1 | 0.1345 | 0.3143 | 0.1830 | 0.6688 |
| HH_OCC | 8 | 1 | 0.4307 | 0.2169 | 3.9426 | 0.0471 |
| HH_OCC | 9 | 1 | -1.0452 | 0.4099 | 6.5026 | 0.0108 |
| HH_OCC | 10 | 1 | -0.0148 | 0.1830 | 0.0066 | 0.9355 |
| Number_of_Dogs | 0 | 1 | -2.1214 | 0.8126 | 6.8149 | 0.0090 |
| Number_of_Dogs | 1 | 1 | -1.8878 | 0.8168 | 5.3416 | 0.0208 |
| Number_of_Dogs | 2 | 1 | -2.7230 | 0.8330 | 10.6854 | 0.0011 |
| Number_of_Dogs | 3 | 1 | -1.6986 | 0.8750 | 3.7685 | 0.0522 |
| Number_of_Dogs | 4 | 1 | -2.9528 | 1.3211 | 4.9962 | 0.0254 |
| Number_of_Cats | 0 | 1 | 1.4604 | 1.0492 | 1.9374 | 0.1640 |
| Number_of_Cats | 1 | 1 | 1.2316 | 1.0572 | 1.3572 | 0.2440 |
| Number_of_Cats | 2 | 1 | 2.0580 | 1.0612 | 3.7605 | 0.0525 |
| Number_of_Cats | 3 | 1 | 2.1401 | 1.0781 | 3.9410 | 0.0471 |
| Number_of_Cats | 4 | 1 | 1.6983 | 1.1477 | 2.1897 | 0.1389 |
| Children_Group_Code | 1 | 1 | 0.0341 | 0.3992 | 0.0073 | 0.9319 |
| Children_Group_Code | 2 | 1 | 0.0837 | 0.2674 | 0.0980 | 0.7542 |
| Children_Group_Code | 3 | 1 | -0.3472 | 0.1753 | 3.9247 | 0.0476 |
| Children_Group_Code | 4 | 1 | 1.0266 | 0.3891 | 6.9601 | 0.0083 |
| Children_Group_Code | 5 | 1 | -0.1183 | 1.2145 | 0.0095 | 0.9224 |
| Children_Group_Code | 6 | 1 | -0.6693 | 0.3107 | 4.6403 | 0.0312 |
| Children_Group_Code | 7 | 1 | -0.1106 | 0.6596 | 0.0281 | 0.8668 |

| Odds Ratio Estimates | | | |
|---|---|---|---|
| Effect | Point Estimate | 95% Wald Confidence Limits | |
| Combined_Pre_Tax_Inc 0 vs 12 | 1.255 | 0.211 | 7.477 |
| Combined_Pre_Tax_Inc 1 vs 12 | 1.424 | 0.788 | 2.576 |
| Combined_Pre_Tax_Inc 2 vs 12 | 0.300 | 0.136 | 0.659 |
| Combined_Pre_Tax_Inc 3 vs 12 | 1.201 | 0.702 | 2.054 |
| Combined_Pre_Tax_Inc 4 vs 12 | 0.497 | 0.253 | 0.975 |
| Combined_Pre_Tax_Inc 5 vs 12 | 0.632 | 0.364 | 1.095 |
| Combined_Pre_Tax_Inc 6 vs 12 | 1.124 | 0.723 | 1.749 |
| Combined_Pre_Tax_Inc 7 vs 12 | 0.798 | 0.507 | 1.258 |
| Combined_Pre_Tax_Inc 8 vs 12 | 0.574 | 0.359 | 0.920 |
| Combined_Pre_Tax_Inc 9 vs 12 | 1.111 | 0.710 | 1.738 |
| Combined_Pre_Tax_Inc 10 vs 12 | 0.882 | 0.551 | 1.412 |
| Combined_Pre_Tax_Inc 11 vs 12 | 0.747 | 0.473 | 1.181 |
| HH_AGE 0 vs 6 | 0.062 | 0.009 | 0.424 |
| HH_AGE 1 vs 6 | <0.001 | <0.001 | >999.999 |
| HH_AGE 2 vs 6 | 1.107 | 0.527 | 2.325 |
| HH_AGE 3 vs 6 | 1.593 | 1.056 | 2.403 |
| HH_AGE 4 vs 6 | 1.184 | 0.825 | 1.699 |
| HH_AGE 5 vs 6 | 1.256 | 0.913 | 1.727 |
| HH_EDU 0 vs 8 | 11.376 | 1.648 | 78.557 |
| HH_EDU 1 vs 8 | <0.001 | <0.001 | >999.999 |
| HH_EDU 2 vs 8 | 0.545 | 0.152 | 1.952 |

| | | | |
|---|---|---|---|
| Number_of_Dogs 2 vs 5 | 0.066 | 0.013 | 0.336 |
| Number_of_Dogs 3 vs 5 | 0.183 | 0.033 | 1.016 |
| Number_of_Dogs 4 vs 5 | 0.052 | 0.004 | 0.695 |
| Number_of_Cats 0 vs 5 | 4.308 | 0.551 | 33.679 |
| Number_of_Cats 1 vs 5 | 3.427 | 0.432 | 27.215 |
| Number_of_Cats 2 vs 5 | 7.830 | 0.978 | 62.676 |
| Number_of_Cats 3 vs 5 | 8.501 | 1.028 | 70.323 |
| Number_of_Cats 4 vs 5 | 5.465 | 0.576 | 51.819 |
| Children_Group_Code 1 vs 8 | 1.035 | 0.473 | 2.263 |
| Children_Group_Code 2 vs 8 | 1.087 | 0.644 | 1.836 |
| Children_Group_Code 3 vs 8 | 0.707 | 0.501 | 0.996 |
| Children_Group_Code 4 vs 8 | 2.792 | 1.302 | 5.985 |
| Children_Group_Code 5 vs 8 | 0.888 | 0.082 | 9.604 |
| Children_Group_Code 6 vs 8 | 0.512 | 0.278 | 0.941 |
| Children_Group_Code 7 vs 8 | 0.895 | 0.246 | 3.261 |

| Association of Predicted Probabilities and Observed Responses | | | |
|---|---|---|---|
| Percent Concordant | 66.0 | Somers' D | 0.321 |
| Percent Discordant | 33.8 | Gamma | 0.322 |
| Percent Tied | 0.2 | Tau-a | 0.072 |
| Pairs | 2071104 | c | 0.661 |

- The odds of buying Pine Sol All purpose cleaner decreases by 70% for households that have a combined pre tax imcome in the range of $10,000 to $11,999 as compared to households with a combined pre tax income greater than $100,000.
- The odds of buying Pine Sol All purpose cleaner decreases by 50% for households that have a combined pre tax imcome in the range of $15,000 to $19,999 as compared to household with a combined pre tax income greater than $100,000.
- The odds of buying Pine Sol All purpose cleaner increases by 60% for households with an age group of 35-44 as compared to an age group of 65+.
- The odds of buying Pine Sol All purpose cleaner increases by 78% for households with some high school education as compared households with post graduate work.
- The odds of buying Pine Sol All purpose cleaner decreases by 53% for households with sales occupation as compared to non employed households.
- The odds of buying Pine Sol All purpose cleaner increases by 28% for households with an operative occupation as compared to non employed households.
- The odds of buying Pine Sol All purpose cleaner increases by 54% for households with cleaning or health service worker occupation as compared to non employed households.
- The odds of buying Pine Sol All purpose cleaner decreases by around 85% for households with 0 or 1 dog as compared to households with 5 dogs and a similar trend can be seen for households with 2 or 3 households.
- The odds of buying Pine Sol All purpose cleaner decreases by 30% for households with children in 12-17 age group as compared to households with no children.
- The odds of buying Pine Sol All purpose cleaner increases by 179% for households with children in 0-5 & 6-11 age groups as compared to households with no children.
- The odds of buying Pine Sol All purpose cleaner decreases by 50% for households with children in 6-11 & 12-17 age groups as compared to households with no children.