Household Income Case Solution

i. *Analysis of the attributes of the Household Income Case Dataset*

The attribute type and level of measurement help determine the type of statistical method that can be used for analyzing the attribute. The table below contains the type and level of measurement for each attribute of the given data set:

Data Category	Variable Type and Measurement
Subdivision	is a discrete numeric attribute with nominal level of measurement
Occupation	is a discrete numeric attribute with nominal level of measurement
Age	is a numeric attribute with a ratio scale level of measurement
Income	is a numeric attribute with a ratio scaled level of measurement
Q1, Q2, Q3, Q4, Q5	are numeric attributes with an ordinal level of measurement
EvalM	is a numeric attribute with an interval level of measurement

ii. Household Income information about the districts/subdivisions

It is observed that the average household income for the West side district is $4620 more than the East side. Furthermore, the standard deviation of the incomes is greater for the West side district ($7698.82) compared to that of the east side ($6310.63). Thus, in the East side, the incomes are closer to each other with less deviation from the average. Furthermore, the lowest salary ($65,000) falls in the East side district.

The table below summarizes the income information in total for the entire dataset:

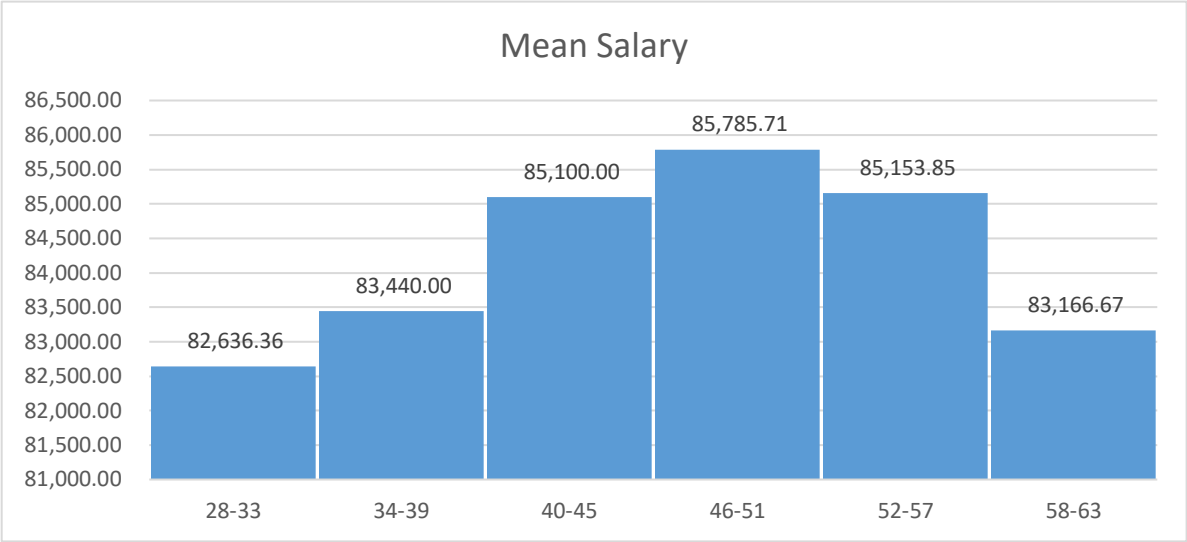
Income Information for all Households	
Mean income of household	$84,130.00
Standard Deviation of income	$7,378.18
Maximum income of household	$98,000.00
Minimum income of household	$65,000.00
Range of income for household	$33,000.00

The household income information about the two districts is described in the table below:

	West Side	East Side
Average income of household	$86440	$81820
Standard Deviation of income	$7698.82	$6310.63
Maximum income of household	$98000	$95000
Minimum income of household	$71000	$65000
Range of income for household	$27000	$30000

iii. Age vs Income Level

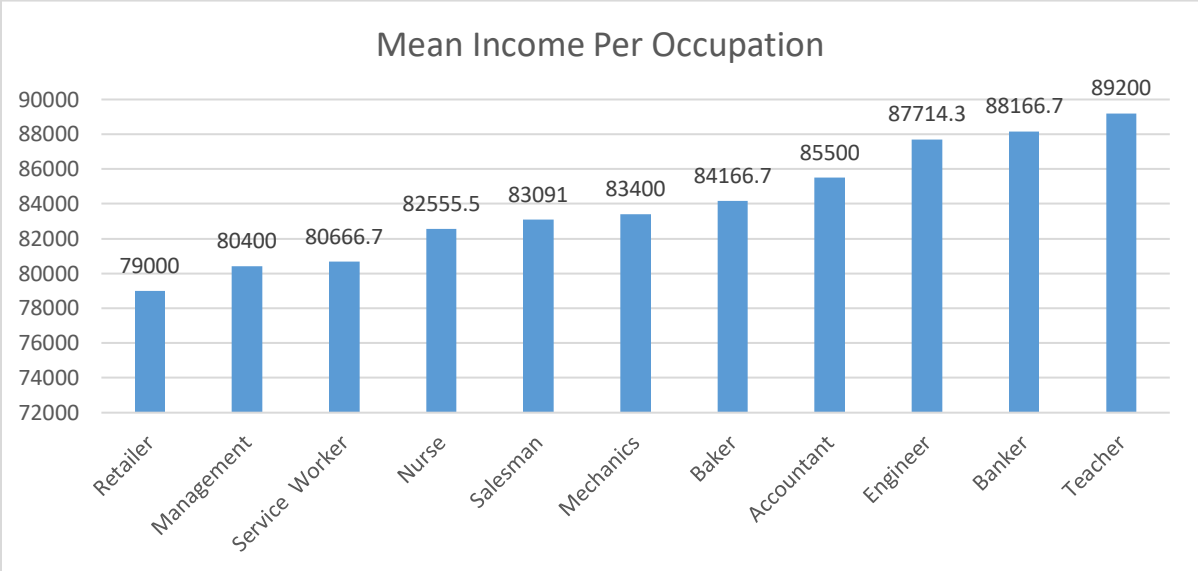
In order to determine the relationship between the age and the income level, a graph representing the average income per age in categories is show below:



The graph shows that the average salaries rise as the age increases up to the age range of 46 to 51, and then decrease. The range of the average salaries is $3149 which indicates that the salaries do not vary much from each other. Also, it can be noted that the maximum household income is found in the age group of 38 and 39 and the minimum income is found in the age group of 37.

iv. Occupation vs Income

In order to analyze the relationship between occupation and income level, a bar chart of the mean income per occupation is shown below:

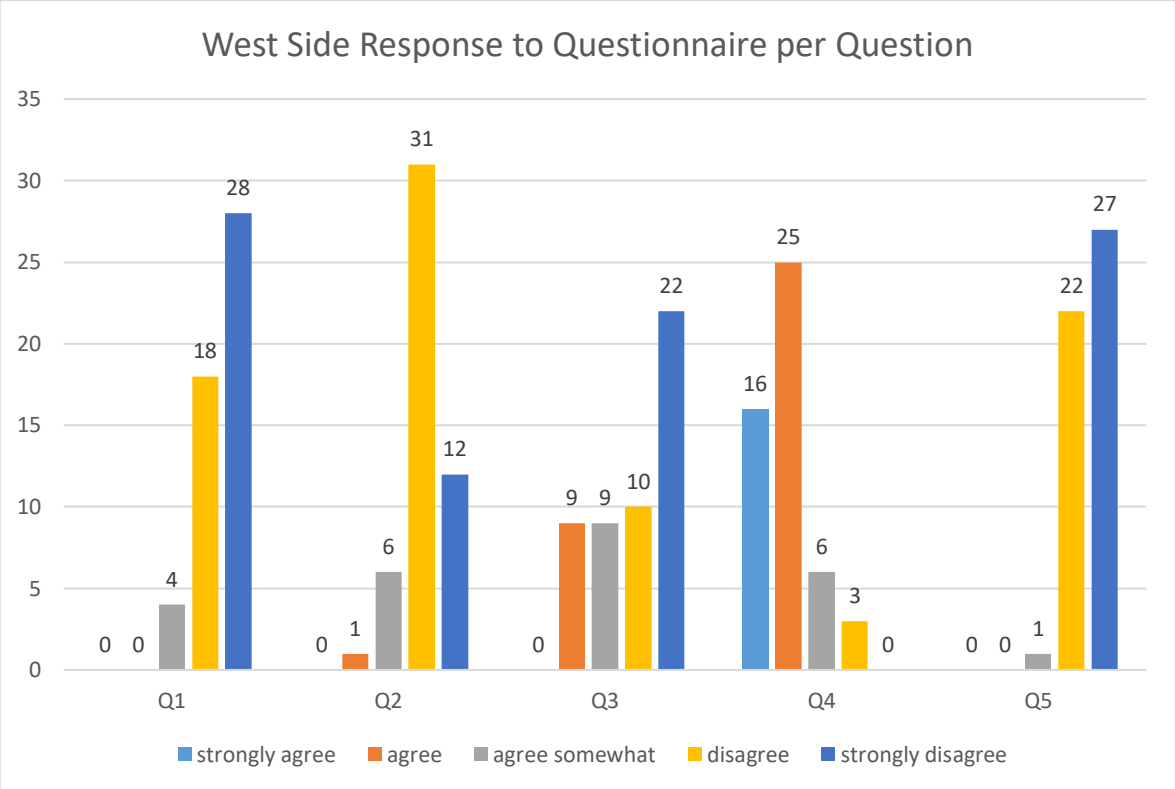


It is noticed that the Teachers have the highest mean household income ($89200) and the retailers have the least mean income ($79000). The range of the mean salary per occupation is $10,200. Also, in the entire household income dataset, the maximum standard deviation (variance) is found to be in the salary of the Engineer ($8110.21). Detail calculations for the construction of the bar chart can be found in the attached Excel sheet.

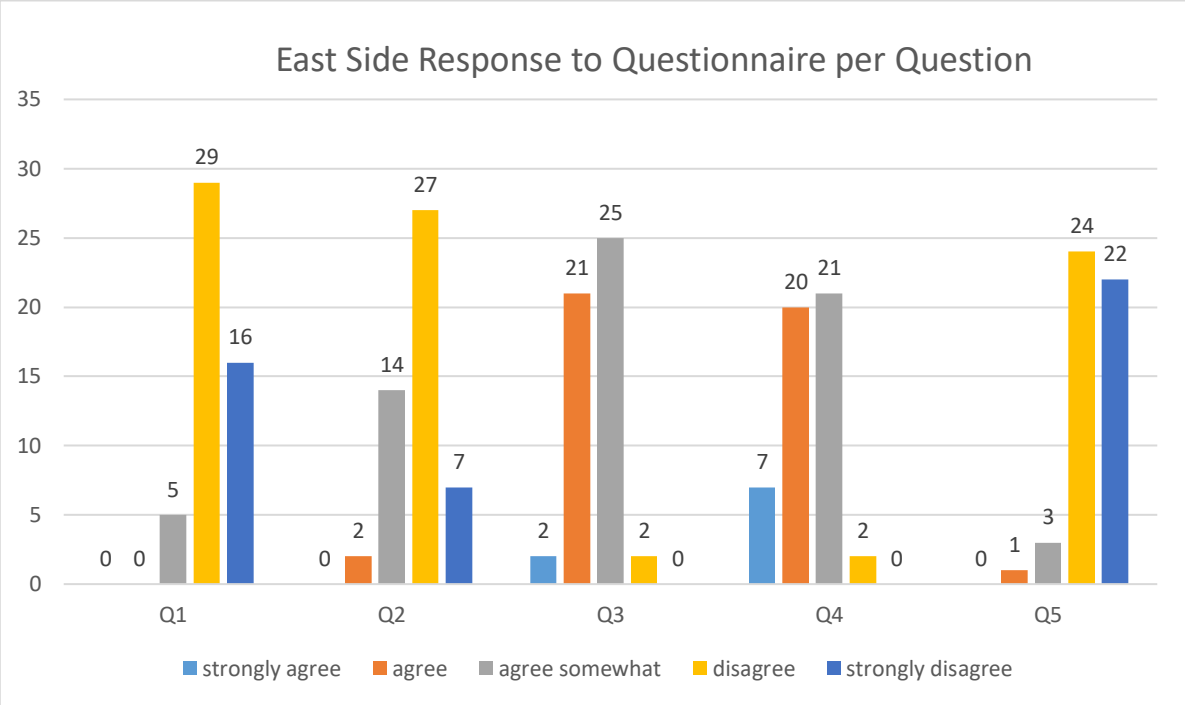
v. District response to the survey

The tables below summarize the responses to each of the questions in the survey based on the West Side and the East Side districts. A bar chart for the data in the table is also shown for noticing the distribution of the responses:

West Side District					
Response	Q1	Q2	Q3	Q4	Q5
strongly agree (1)	0	0	0	16	0
agree (2)	0	1	9	25	0
agree somewhat (3)	4	6	9	6	1
Disagree (4)	18	31	10	3	22
strongly disagree (5)	28	12	22	0	27
Mean rating	4.48	4.08	3.9	1.92	4.52
Mean EvalM	3.78				



East Side District					
Response	Q1	Q2	Q3	Q4	Q5
strongly agree (1)	0	0	2	7	0
agree (2)	0	2	21	20	1
agree somewhat (3)	5	14	25	21	3
Disagree (4)	29	27	2	2	24
strongly disagree (5)	16	7	0	0	22
Mean rating	4.22	3.78	2.54	2.36	4.34
Mean EvalM	3.448				



On the basis of the charts above, it can be concluded that the residents of both the districts have similar responses to the survey questions Q1, Q2, Q4 and Q5 but not for Q3. For Q3, 22 residents of the West side district strongly disagree (mean 3.9) to build the new elementary school and new high school both near the country land near the highway, whereas on the East side only 2 residents disagree (mean 2.54) and the rest agree.

The table below shows the discrepancy of the responses for Q3:

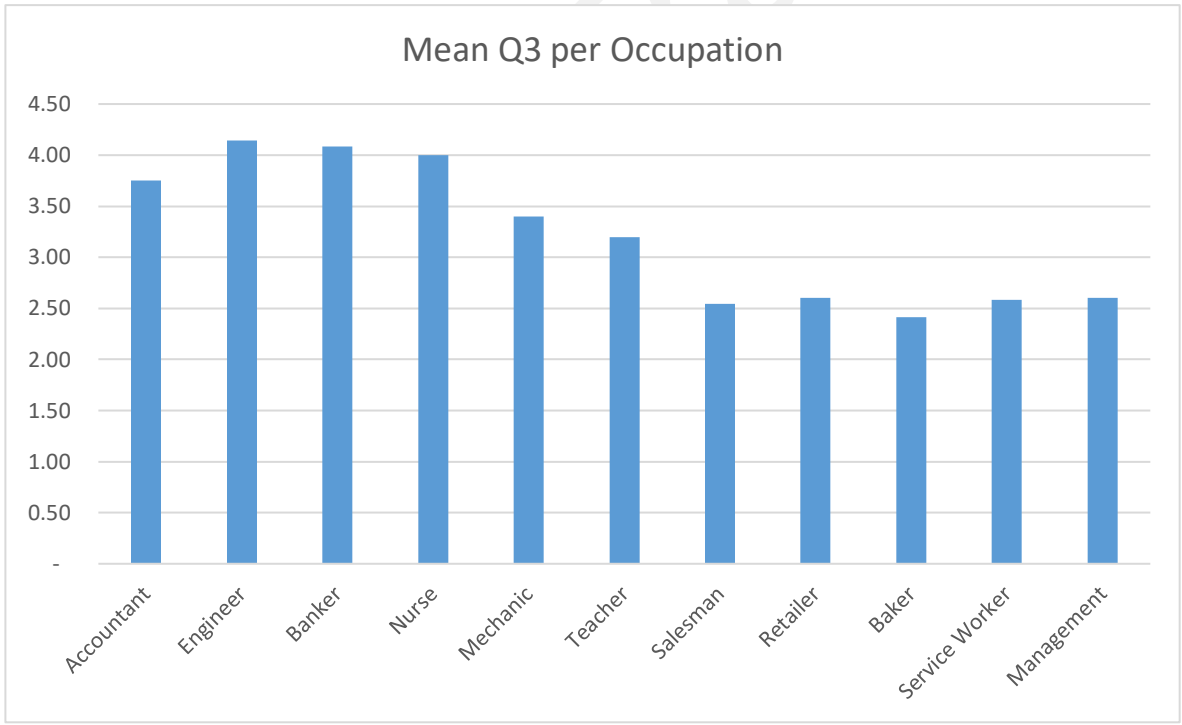
Response	West Side District	East Side District
Strongly agree	0	2
Agree	9	21
Agree somewhat	9	25
Disagree	10	2
Strongly disagree	22	0

vi. Household by Occupation response to survey

The table below shows the mean scores of the survey by occupation:

Occupation	Q1	Q2	Q3	Q4	Q5	EvalM
Accountant	4.75	4.00	3.75	2.00	4.50	3.80
Engineer	2.00	4.43	4.14	2.07	4.64	3.83
Banker	4.42	4.25	4.08	1.83	4.58	3.83
Nurse	4.30	4.30	4.00	2.00	4.40	3.80
Mechanic	4.80	4.00	3.40	1.40	4.60	3.64
Teacher	4.60	4.00	3.20	2.00	2.00	3.60
Salesman	4.36	3.55	2.55	2.18	4.45	3.42
Retailer	4.40	4.00	2.60	1.80	4.40	3.44
Baker	4.25	4.00	2.42	2.75	4.17	3.52
Service Worker	4.17	3.75	2.58	2.25	4.50	3.45
Management	4.00	3.70	2.60	2.50	4.20	3.40

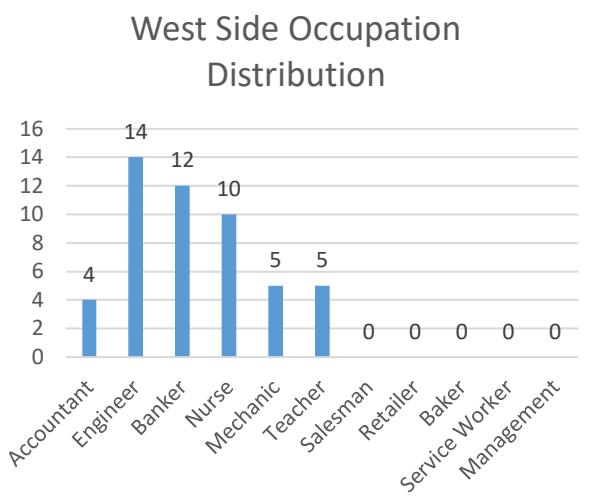
All the occupations have consistent ratings/responses for Q1, Q2, Q4 and Q5. However, for Q3, the results are different. The bar chart below shows the average rating of the Q3 per occupation:

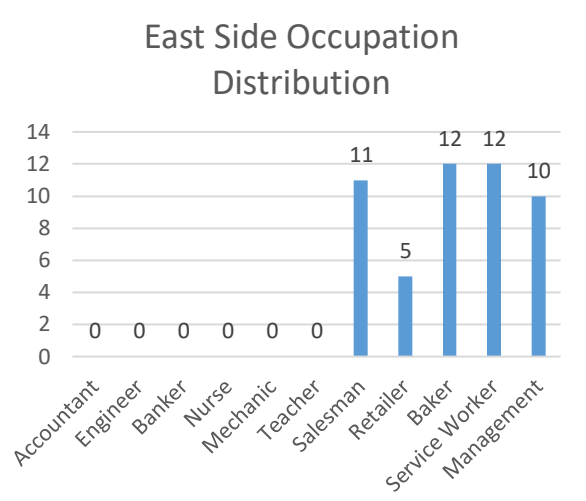


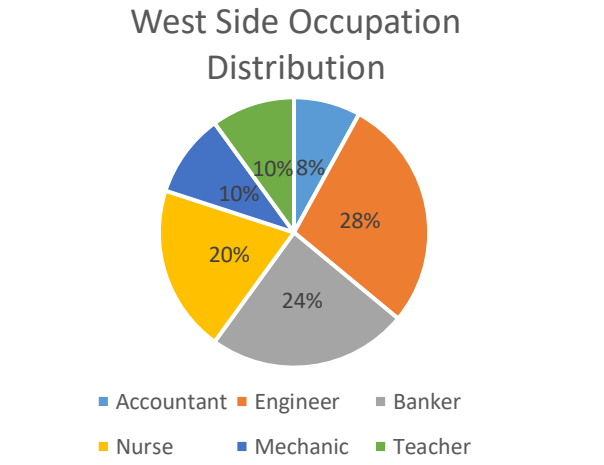
From the information above, it can be seen that the Accountants, Engineers, Bankers, Nurses, Teachers and Mechanics (mean Q3 > 2.5) disagree as a response to Q3 whereas Salesmen, Retailers, Bakers, Service Workers and Management (Q3 < 2.5) agree with Q3.

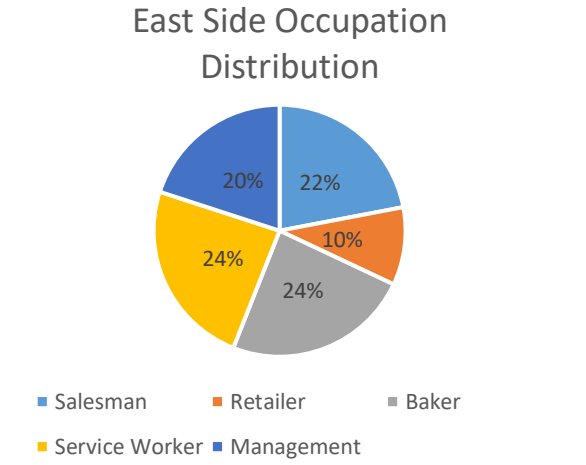
vii. Differences in response between district and occupation

The bar charts and the pie charts below show the distribution of the occupation per district:









Since the occupations Accountant, Engineer, Banker, Nurse, Mechanic and Teacher live in the West Side district and the Salesman, Retailer, Baker, Service Worker and Management live in the East side of the district, both the districts have different responses to Q3. The pie charts above show that none of the occupations overlap within the district.

viii. Relationship between household income and responses to the questionnaire

71% of the incomes in the dataset are significant Disposable Incomes (incomes > $ 80,000). Since the county manager is interested in these incomes, a table below shows the mean rating for incomes greater than and less than the significant disposable income:

Income	Q1	Q2	Q3	Q4	Q5	EvalM
Non-Significant (<$80000)	4.14	3.83	2.93	2.31	4.14	3.47
Significant (>$80000)	4.44	3.97	3.34	2.07	4.55	3.67

Furthermore, in order to get more insights on the responses to the questions, the table below shows the mean ratings for each question per quartile of the income range:

Income	Q1	Q2	Q3	Q4	Q5	EvalM
Quartile1 ($80000)	4.12	3.76	3.00	2.24	4.16	3.46
Quartile2 ($85000)	4.52	3.84	3.12	2.12	4.40	3.60
Quartile3 ($89000)	4.40	4.04	3.48	2.00	4.52	3.69
Quartile4 ($98000)	4.36	4.08	3.28	2.20	4.64	3.71

Both tables show that there does not seem to be a significant difference for the question answers by the residents in the different income groups. The income is not a major factor for the response to the questions. Also, all the income groups like the idea to build a new elementary school and a new high school both in the park (Q4).

ix. Conclusion

The information above shows the household income about the West side and East side district in total and separate. The West side district has higher income on average compared to the East side. Furthermore, as the age of the residents increase, their salaries increase till the age of 51 and then decrease.

With regards to the response to the questionnaire, the residents in the West side district disagree to the response for Q3 whereas the residents in the East side district agree. Furthermore, the West side district has residents with the occupations - Accounts, Engineer, Banker, Nurse, Mechanic and Teacher, whereas the East side district residents have occupations - Salesman, retailer, baker, service worker and management. Most of the residents for both the districts and all occupations have similar responses for Q1, Q2, Q4, Q5 questions in the questionnaire and both the districts favor Q4 the most. Also, for the response to the questionnaire, the significant disposable income does not seem to be a factor.

**** The Household Income Calculation.xlsx contains the detailed calculations for the above report.**