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Analysis of relation between number of members in a family and number of vehicles per family

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ABSTRACT

We investigate whether there is a direct correlation between the number of members living in one family and number of vehicles per family (both 2 and 4 wheelers included). The analysis involves correlation regression and descriptive statistics of both the variables. The research paper also involves a graph which depicts average number of vehicles given the number of members a family has. The analysis has been done by taking a sample of 545 families that will help us determine our objectives.

Keywords— *Vehicles, Family members, Analysis*

1. OBJECTIVES

- To determine the correlation between the two variables.
- To find the regression analysis.
- To summarise the data in the form of statistics.
- To interpret the results received.
- To interpret the data with the help of graphs.

2. INTRODUCTION

The following data collected is primary in nature. It is a two-variable data with the independent variable being number of members in the family and the dependent variable being number of vehicles per family. The number of members in a family range from 1 to 13 while the number of vehicles per family range from 0 to 7. This data will help us get the desired relation and achieve our objectives.

3. DATA

Table 1: Data

Sr no	No of members in a family	No of vehicles in the family
1	7	3
2	8	3
3	11	3
4	7	2
5	12	4
6	8	3
7	10	5
8	11	4
9	5	2
10	2	1
11	6	3
12	3	2
13	11	5
14	2	1
15	3	1
16	4	2

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17	10	4
18	11	6
19	2	1
20	4	1
21	9	3
22	11	3
23	9	3
24	8	2
25	8	3
26	6	3
27	5	2
28	4	2
29	11	5
30	7	3
31	3	1
32	6	2
33	8	3
34	3	2
35	6	3
36	5	3
37	4	2
38	3	2
39	9	4
40	2	2
41	10	6
42	12	7
43	5	3
44	11	4
45	12	4
46	5	2
47	5	2
48	11	3
49	5	3
50	9	3
51	7	3
52	4	2
53	10	4
54	9	4
55	7	3
56	4	2
57	9	4
58	6	2
59	8	4
60	2	1
61	10	4
62	3	1
63	12	4
64	2	1
65	6	2
66	6	3
67	5	3
68	4	2
69	9	3
70	12	4
71	9	3
72	12	4
73	6	3
74	3	2
75	5	2
76	6	2
77	12	4
78	5	2
79	4	2
80	9	3

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81	11	4
82	6	2
83	3	1
84	10	3
85	7	3
86	2	1
87	8	3
88	3	2
89	4	3
90	3	2
91	5	3
92	3	1
93	12	7
94	5	2
95	5	3
96	8	3
97	2	1
98	11	5
99	7	3
100	4	1
101	9	3
102	7	2
103	10	4
104	7	3
105	9	3
106	4	2
107	9	3
108	6	3
109	8	3
110	11	4
111	5	2
112	8	3
113	11	3
114	8	4
115	9	4
116	6	2
117	6	4
118	7	2
119	2	2
120	9	3
121	4	3
122	11	4
123	2	1
124	5	2
125	5	3
126	5	1
127	4	1
128	12	4
129	7	3
130	10	3
131	8	2
132	2	2
133	3	2
134	11	6
135	5	3
136	2	1
137	5	1
138	7	2
139	7	3
140	10	3
141	9	5
142	3	2
143	11	3
144	3	1

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145	10	3
146	6	2
147	10	3
148	3	1
149	2	0
150	5	2
151	3	1
152	2	1
153	8	2
154	7	4
155	6	3
156	7	4
157	6	2
158	3	2
159	5	2
160	6	2
161	5	1
162	8	3
163	3	2
164	10	3
165	11	4
166	5	3
167	12	4
168	5	2
169	4	1
170	9	3
171	12	3
172	6	4
173	7	2
174	5	2
175	2	1
176	6	3
177	4	2
178	5	2
179	4	1
180	2	2
181	8	4
182	7	2
183	5	2
184	7	3
185	9	4
186	10	4
187	2	1
188	5	1
189	6	2
190	2	0
191	10	3
192	3	1
193	4	2
194	2	1
195	12	7
196	2	1
197	11	5
198	7	2
199	9	4
200	6	3
201	10	3
202	9	2
203	7	2
204	9	4
205	10	5
206	9	4
207	9	3
208	7	2

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209	4	1
210	2	2
211	2	1
212	7	3
213	5	2
214	11	3
215	10	4
216	6	3
217	5	1
218	3	1
219	7	3
220	8	5
221	8	3
222	9	3
223	7	2
224	5	3
225	2	1
226	5	2
227	3	0
228	9	3
229	7	2
230	6	3
231	6	3
232	12	3
233	9	4
234	3	2
235	10	4
236	11	4
237	5	3
238	5	2
239	12	3
240	8	2
241	3	1
242	2	1
243	10	4
244	6	1
245	4	0
246	9	2
247	2	1
248	4	2
249	5	3
250	9	3
251	8	3
252	5	2
253	4	2
254	10	3
255	6	2
256	3	1
257	10	3
258	4	2
259	11	6
260	5	2
261	11	3
262	7	3
263	10	3
264	8	3
265	9	3
266	6	2
267	2	1
268	9	3
269	9	2
270	3	2
271	9	3
272	8	3

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273	6	3
274	10	5
275	10	3
276	9	4
277	6	4
278	6	2
279	3	2
280	6	3
281	5	2
282	9	3
283	2	0
284	9	2
285	10	3
286	7	1
287	8	4
288	12	3
289	12	3
290	2	2
291	3	1
292	10	5
293	4	0
294	9	4
295	3	2
296	10	4
297	8	4
298	9	3
299	3	2
300	11	4
301	4	1
302	2	2
303	8	3
304	7	3
305	9	3
306	7	3
307	3	1
308	7	2
309	2	0
310	5	2
311	6	2
312	5	2
313	12	3
314	5	2
315	4	2
316	8	3
317	11	4
318	12	3
319	6	3
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321	10	5
322	6	2
323	10	3
324	10	4
325	6	2
326	10	2
327	9	3
328	7	3
329	4	1
330	5	2
331	6	1
332	10	3
333	4	2
334	6	2
335	9	3
336	10	4

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337	9	4
338	5	1
339	11	5
340	11	6
341	7	3
342	8	3
343	3	2
344	5	3
345	8	2
346	7	3
347	10	4
348	4	2
349	7	2
350	2	0
351	8	3
352	5	1
353	9	3
354	3	2
355	5	2
356	2	1
357	6	4
358	9	4
359	12	4
360	8	2
361	9	3
362	7	4
363	10	3
364	5	2
365	2	1
366	6	3
367	13	7
368	5	2
369	10	3
370	9	3
371	4	1
372	11	4
373	4	1
374	13	3
375	9	3
376	7	3
377	7	2
378	8	3
379	9	3
380	10	2
381	11	3
382	4	2
383	8	3
384	6	3
385	5	2
386	12	5
387	6	3
388	7	2
389	6	3
390	2	1
391	5	1
392	7	3
393	12	3
394	9	3
395	3	2
396	12	4
397	7	4
398	13	6
399	4	2
400	7	3

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401	10	3
402	8	3
403	9	3
404	4	2
405	8	2
406	5	3
407	11	3
408	2	1
409	10	5
410	5	2
411	5	2
412	3	1
413	5	2
414	4	1
415	7	3
416	8	3
417	10	5
418	4	2
419	6	3
420	10	4
421	6	3
422	12	4
423	10	5
424	9	3
425	4	1
426	10	4
427	7	2
428	8	3
429	2	0
430	4	0
431	9	3
432	12	4
433	7	2
434	10	3
435	3	1
436	11	3
437	12	3
438	8	2
439	11	4
440	5	2
441	4	1
442	6	3
443	10	3
444	3	0
445	12	5
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447	9	4
448	10	3
449	5	2
450	2	1
451	10	4
452	4	1
453	2	1
454	11	5
455	7	4
456	10	4
457	9	4
458	5	2
459	10	4
460	4	1
461	12	4
462	5	2
463	3	2
464	7	3

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465	5	2
466	2	1
467	9	3
468	11	3
469	9	3
470	5	2
471	2	0
472	11	5
473	13	6
474	4	2
475	5	2
476	4	1
477	10	3
478	8	3
479	4	2
480	4	2
481	2	1
482	7	2
483	3	0
484	12	5
485	3	1
486	11	3
487	12	3
488	5	1
489	9	3
490	11	4
491	9	4
492	7	4
493	2	2
494	11	3
495	7	4
496	6	3
497	7	3
498	4	2
499	5	2
500	9	3
501	7	3
502	4	2
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504	6	3
505	10	4
506	9	3
507	9	5
508	10	4
509	5	2
510	4	1
511	9	3
512	7	3
513	7	3
514	10	4
515	7	3
516	8	4
517	8	2
518	7	3
519	8	3
520	9	3
521	4	1
522	6	2
523	2	0
524	5	2
525	10	4
526	3	1
527	5	2
528	11	3

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529	8	2
530	5	2
531	9	3
532	3	1
533	3	1
534	9	4
535	1	1
536	5	2
537	5	2
538	9	3
539	5	3
540	2	2
541	8	3
542	8	4
543	10	3
544	12	4
545	5	2

4. CORRELATION

	No of members in a family	**No of vehicles in the family**
No of members in a family	1	
No of vehicles in the family	0.78998	1

Interpretation: A weak positive correlation ranges from 0.1 to 0.3 while a moderate positive correlation ranges from 0.3 to 0.5 and a high positive correlation ranges from 0.5 to 1. The above data has a strong positive correlation with the correlation being 0.78998. This means that more the numbers of members in family the number of vehicles per family are likely to rise.

5. REGRESSION

SUMMARY OUTPUT	
Regression Statistics	
Multiple R	0.78997974
R Square	0.62406799
Adjusted R Square	0.62337567
Standard Error	1.83218882
Observations	545

ANOVA

	df	**SS**	**MS**	**F**	**Significance F**
Regression	1	3025.957988	3025.958	901.4101	1.9E-117
Residual	543	1822.805315	3.356916		
Total	544	4848.763303			

	Coefficients	**Standard Error**	**t Stat**	**P-value**	**Lower 95%**	**Upper 95%**	**Lower 95.0%**	**Upper 95.0%**
Intercept	1.77235732	0.187263329	9.464519	8.91E-20	1.404508	2.140207	1.404508	2.140207
X Variable 1	1.92397321	0.064082257	30.02349	1.9E-117	1.798094	2.049853	1.798094	2.049853

Interpretation:
Y= A + BX
A= 1.77235732
B= 1.92397321
Y=1.77235732 + 1.92397321

This means that when there is an increase in the number of family members by 1.92397321, the number of vehicles per family will increase by 1 vehicle.

Graph: The following graph shows the linear regression line where the X axis depicts the number of members in a family while Y axis depicts average vehicles per family.

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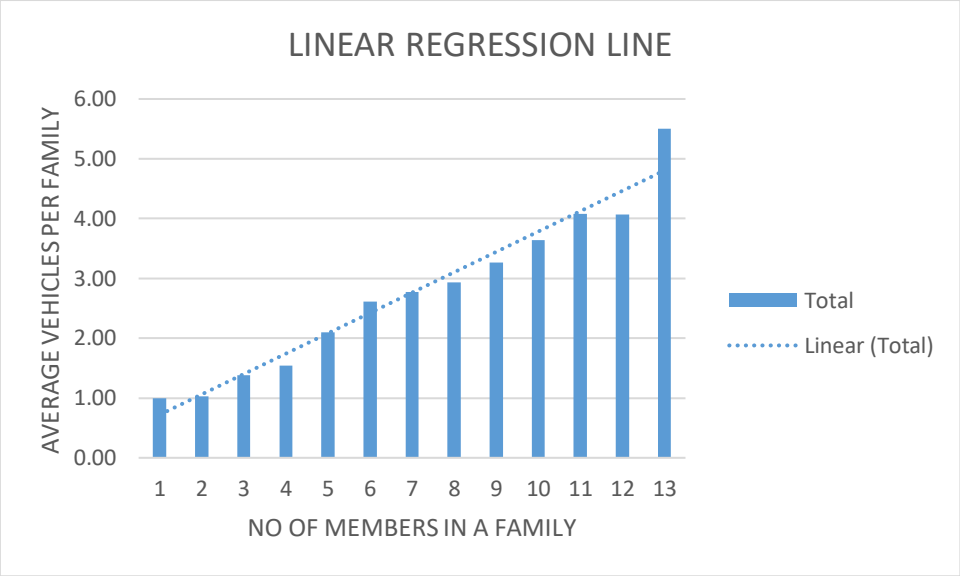

Descriptive statistics

No of members in a family		No of vehicles in the family	
Mean	6.87706422	Mean	2.653211
Standard Error	0.12788447	Standard Error	0.052509
Median	7	Median	3
Mode	5	Mode	3
Standard Deviation	2.9854929	Standard Deviation	1.225838
Sample Variance	8.91316784	Sample Variance	1.502678
Kurtosis	-1.0660826	Kurtosis	0.703688
Skewness	0.03496347	Skewness	0.414852
Range	12	Range	7
Minimum	1	Minimum	0
Maximum	13	Maximum	7
Sum	3748	Sum	1446
Count	545	Count	545

6. CONCLUSION

The number of vehicles on roads are increasing day by day leading to increased congestion. The above analysis showed that higher the number of members in a family higher the number of vehicles being used per family. This supports the generic statement made about increase in vehicles. Moreover, the regression analysis helps to predict the number of cars a family may have approximately given the number of members in a family.

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