

Paper I Title: During the past 12 months, how many times did a person visit an emergency room

By

Indu Prakash Shahi

MS Graduate Student

The Heller School of Social Policy and Management

Brandeis University

Waltham, MA

This paper is Part of MS degree in International Health Policy and Management for Applied Econometrics Modules.

Abstract

What contributes visiting to emergency room is of interest. Some people never visit emergency room because they do not fall sick but some who falls sick also do not visit emergency room because of other reason. Might be they are patient and just visit General Physicians. In such a situation data becomes more skewed to the zeros or more zeros occurs due the above two reasons. In order to answer this question, we have taken data from ICPSR (35013) on: New York City Community Health Survey, 2010. Count Model was used to find the significant variables that determining the number of visits in emergency room in the last 12 months. The models were tested for goodness of fit by using Vuong and robust test and found that restricted model was a good fit.

Background

What contributes visiting to emergency room is of interest. Some people never visit emergency room because they do not fall sick but some who fall sick also do not visit emergency room because of other reason. Might be they are patient and just visit General Physicians. In such a situation data becomes more skewed to the zeros or more zeros occurs due the above two reasons. In order to answer this question, we have taken data from ICPSR (35013) on: New York City Community Health Survey, 2010. Count Model was used to find the significant variables that determining the number of visit in emergency room in the last 12 months. We are considering sex, taking aspiring or not, education, whether insured or not, race whether one does exercise or not and drinker or not (*SEX1*, *ASP1*, *EDU1*, *EDU2*, *EDU3*, *INSURED2*, *NEWRAE1*, *EXERCIZ*, *DRINKER*) as variable to determinant to find the contributing variables. Full model was compared with restricted model and that the latter model with variables (*SEX1*, *ASP1*, *EDU2*, *EDU3*, *NEWRAE1*, *EXERCIZ*,) found robust one. In order for goodness of fit test Vuong and robust test was carried out.

Summary Statistics

Of the 1026 observations, on an average they had single visit to the emergency room ranging from no visit at all to a maximum of 50 visits with a standard deviation of 2.95. There were, 40.59 % of 8618 cases of college graduate, 21.17% had some college or technical school education, 23.03% had high school degree and rest 15.21% had less than high school degree. For insurance, (87.20%) of 8636 respondents were found insured compared to 12.80 % have no insurance arrangement. By race, 42.08% of the 8665 respondents were non-Hispanic White compared to 57.92% others from them. Majority (72.34%) of 8665 respondents were active

apart from job while 27.66% found busy with job. Regarding the drink, 53.02% of 8564 respondents had at least one alcoholic drink in the last 30 days compared to 46.98% who did not.

Bivariate Analysis

There was highly significant mean difference in number of visits in emergency room by male and female ($t=1.85$, $df=1024$, $p\leq .05$). The mean number of visit in emergency room by female was 0.76 which was higher than male by 0.38. Also there was highly significant mean difference in number of visits in emergency room between people who have college degree and the rest had other arrangement ($t=3.11$, $df=1018$, $p\leq .001$). The mean number of visit in emergency room by people having college degree was 0.25 which was less than other by 0.61. Similarly, highly significant mean difference in number of visits in emergency room by white versus others ($t=1.53$, $df=1024$, $p\leq .001$) was found. The mean number of visit in emergency room by white is 0.18 which is less than the visit by other race by 0.70. Further we found highly significant mean difference in number of visits in emergency room by person who was active apart from job and others ($t=2.70$, $df=1024$, $p\leq .001$). The mean number of visit in emergency room by people who were active was 0.49 which was less than the visit by others who were not active apart from job by 0.54. But there was less significant mean difference in number of visits in emergency room by people who had at one alcoholic drink in the last 30 days versus others ($t=1.62$, $df=1024$, $p\leq 0.10$). The mean number of visit in emergency room by drinker was 0.50 which was less than the visit by other by 0.30.

Model Design and Interpretation of Result

Since we wanted to know the determinants of numbers of visit in the emergency room, we applied count model. For this we tested whether there were other models we could use as well. When we ran the negative binomial we found that alpha is significant and then applied zero

inflated negative binomial (ZINB) with Vuong test. This was checked by count fit to confirm whether we should stay with ZINB. We then confirmed that the ZINB was correct model for the finding what variables were significant for the model.

After running model for we came to the following results (table1) and they were interpreted as below. From the table 1, we could analyze that *male* (*male* =1) had expected log (count) of 0.83 lower than female (0= other) holding other thing constant. The expected log (count) of emergency room visit by a person using Aspirin (ASP1=1 if use aspirin daily) was increased by 0.58 than those who did not use it, holding other thing constant. But the expected log (count) of the visit to the emergency room decreased by 0.43 for those who had at least some college degree, holding other thing constant. In the same way expected log (count) of visit would decreased by 1.17 for every additional college degree (EDU3 = 1 if at least college degree) achieved by a person compared to other holder rest constant. In other word for each higher level of education than college degree, the number of visits in the emergency room would be decreased by 1.17 holding other factor constant. Similarly, we found that expected log (count) of visit in the emergency room would decrease by 0.93 for being White compared to other holding other thing remains constant. This was also true for active person: log count of visit in the emergency room would decrease by 0.35 for those who did regular activities other than employment compared to other active apart from job holding other thing remains constant

From the table below it is clear that, the log odd of being excessive zeros would be decreased by 3.65 for male compared to female. Similarly log odd of excessive zero would be decreased by 2.24 for USBORN compared to others. But log odd of excessive zero would be increased by 2.83 for every additional person who were insured compared to other, keeping other thing constant.

In a note we had found that variables such as male, education, exercise and unborn people were found to reduction in the number of emergency room visit compared to those who were taking aspirin daily. Those people who were taking aspirin daily were more likely to visit emergency room. For the zero inflation, sex and USBORN reducing excessive zeros in the model while insured and newrace and some other variables are contributing excessive zeros to the model.

After doing analysis and checking goodness of fit and AIC and BIC the restricted model was a good fit for counting how many times did a person make a visit in the emergency room during the last 30 days.

Table 1: Fitting the best count model for number of visit in emergency room

AST16	Model M1		Model M2	
	Coeff.		Coeff.	
SEX1	-0.67	**	-0.83	***
USBORN1	0.48	*		
ASP1	0.55	**	0.58	**
EDU1	-0.23	*		
EDU2	-0.50		-0.43	*
EDU3	-1.16	***	-1.17	***
INSURED2	-0.41			
NEWRACE1	-0.97	***	-0.93	***
EXERCIZ	-0.47	*	-0.35	*
DRINKER1	-0.18			
_cons	0.64		0.56	
inflate				
SEX1	-5.19		-3.65	
USBORN1	-2.67		-2.24	
ASP1	1.69		1.04	
EDU1	1.41		1.05	
EDU2	-0.38		-0.41	
EDU3	-15.80		-1.29	
INSURED2	2.00		2.83	
NEWRACE1	2.19		1.28	

EXERCIZ	-0.04	0.74
DRINKER1	0.56	0.71
_cons	-3.33	-3.61
/lnalpha	1.49	1.39
alpha	4.45	4.02999
LR Chi2(10)	54.48	46.05
Prob>Chi2	***	***
Vuong test P-value	*	**
AIC	1763.33	1761.76
BIC	1876.37	1850.23
Log Likelihood	-858.66	-862.88
Wald Chi2(5)	72.07 ***	59.99 ***

P<=0.05, **=P<=0.01 & ***=P<=0.001

Conclusion

In order to determine the number of visit in emergency room, we need to know how many zeros are coming from two different process which we can detect by using ZINB model. It did separate the variables with excess zeros for the model and separated from the non-inflated part. We came to know that restricted model was a good fit and doing exercise, increasing level of education, being white and US born were less likely to visit the emergency room while use of aspirin increased chance of higher number of visit in the emergency room as shown in the table 1 above.

*****Thank you *****

Paper II Title: What were the determinants of to the choice of being in the Employment status

By

Indu Prakash Shah

MS Graduate Student

The Heller School of Social Policy and Management

Brandeis University

Waltham, MA

This paper was Part of MS degree in International Health Policy and Management for Applied
Econometrics Modules.

Abstract

What were the determinants to be in employments status was of key interest to the researcher? In order to answer this question, we had taken data from ICSPR (36176) on Privately Insured in America: Opinion on Health Care Cost and Coverage, 2014. Multinomial Logit Model was used to find the determinants to the employment. Marriage, gender, being a parents, education status, race and living pace pays key role whether or not a person was in the full time employment compared to part time or not employed compared to part time. Full model was better than some of the other restricted model.

Background

People take higher education for employment. Many people remain employed and some working part time and some not employed. What causes them being or not being in the employment. Or what were the determinant factors to be or not to be in the employment. This paper tried to find out the determinants whether an individual was employed full time or part-time or unemployed on the basis of the following variables gender, RACE, marital status, living place, PARENT and education level. In order to answer this question, we had taken data from ICSPR (36176) on Privately Insured in America: Opinion on Health Care Cost and Coverage, 2014. Multinomial Logit Model was used to find the determinants to the employment. Marriage, gender, being a parents, education status, race and living place plays key role whether or not a person was in the full time employment

Summary Statistics

Of the 997 respondents, around 65% found married compared to 19% never married and rest 16% consists of separated, widowed or divorced. More than half (54%) of the 1003 observation did not had a sort of parent ship compared to 46% were parents. Almost two third (62 %) of the 1002 observation were found to have at least of College graduate compared to 38% had other lower than college graduate degree. Similarly, of the 991 respondents, 21 % were found living in the urban while less people (29%) only lived in the rural and more than half (51%) were found living in the suburban area. By race bulk (76%) of the 971 observation were non-Hispanic White compared to rest 24% other. The composition of the male and female was remained as 49% and 51% respectively.

Statistical Analysis

There was highly significant difference between the expected and observed frequencies of being currently married against other status ($\chi^2 = 10.48, p \leq 0.001$). The highest contributing chi-square value among the cells was 2.6. There was higher chi-square contribution because of the lower expected value than the observed. Similar sort of significant difference was found between the expected and observed frequencies of being never married against other marriage status ($\chi^2 = 6.50, p \leq 0.05$). The highest contributing chi-square value among the cells was 4.6. There was higher chi-square contribution because of the lower expected value than the observed. Also the significant difference was found between the expected and observed frequencies of being married, divorced and separated against other situation ($\chi^2 = 8.90, p \leq 0.05$). The highest contributing chi-square value among the cells was 5.0. There was higher chi-square contribution because of the lower expected value than the observed.

We observed relation among the parents and found that highly significant difference between the expected and observed frequencies of being currently being parents against non-parents ($\chi^2 = 17.76, p \leq 0.001$). The highest contributing chi-square value among the cells was 3.8. There was higher chi-square contribution because of the lower expected value than the observed. The highly significant difference was found between the expected and observed frequencies of being higher education (at least college graduate) and against other lower level education ($\chi^2 = 21.87, p \leq 0.001$). The highest contributing chi-square value among the cells was 7.1. There was higher chi-square contribution because of the lower expected value than the observed. For any relation between rural versus, we found that there was highly significant difference between the expected and observed frequencies of being in the rural area against of at least suburban ($\chi^2 = 14.14, p \leq 0.001$). The highest contributing chi-square value among the

cell was 7.1. There was higher chi-square contribution because of the lower expected value than the observed. There was highly significant difference between the expected and observed frequencies of being in the sub-Saharan area against other area ($\chi^2 = 11.83$, $p \leq 0.01$). The highest contributing chi-square value among the cells was 2.6. There was higher chi-square contribution because of the lower expected value than the observed. Among male and female, we found that there was highly significant difference between the expected and observed frequencies of being male against female ($\chi^2 = 47.16$, $p \leq 0.001$). The highest contributing chi-square value among the cells was 8.5. There was higher chi-square contribution because of the lower expected value than the observed.

Model Selection

In order to find employment status of an individual, we had applied Multinomial Logit model for the above selected variables. Goodness of fit were selected by applying AIC and BIC. The table 1 below showed that males were more likely to be in full time employment than part time compared to female. Similarly, being a parent it was more likely to be in full time employment than to be in part time compared to other unmarried, divorce or separated. Those who had at least college degree education there was more chance of being in full time employment than part time compared to other types of education. In other words one-unit increase in the variable gender1 (switching from female to male) was associated with a 1.14 increase in the log odds of being in the full time employment versus part time employment. Similarly, one-unit increase in the variable parents1 (switching into married compared to other) was associated with a 0.52 increase in the log odds of being in the full time employment versus part time employment. One-unit increase in the variable parents1 (switching into married compared to other) was associated with a 0.52 increase in the log odds of being in the full time employment versus part time

employment. One-unit increase in the variable EDU1 (switching into at least college degree compared to other) was associated with a 0.47 increase in the log odds of being in the full time employment versus part time employment. Again, one-unit increase in the variable EDU1 (switching into at least college degree compared to other) was associated with a 0.04 decrease in the log odds of being in the not employed versus part time employment. Similarly, one-unit increase in the variable married1 (getting married compared to other) was associated with a 0.22 decrease in the log odds of being in the not employed versus part time employment. For the region, one-unit increase in the variable livepl2 (switching into rural to other) was associated with a 0.72 increase in the log odds of being in the not employed versus part time employment. For the same one-unit increases in variable livepl2, the association just 0.20 increases in the log odds of being in the full time employed versus part time employment

For the ratio of probability of choosing one category over the probability of choosing other category, we applied relative risk ratio in the multinomial logit model. The ratio was explained in the fourth column of table 1. The relative risk ratio of one-unit increase in the variable gender1 was 3.13 for being in the full time employment versus part time. The relative risk ratio of one-unit increase in the variable gender1 was 1.30 for being not employed versus part time. The relative risk ratio of one-unit increase in the variable RACE1 was 1.32 for being in the full time employment versus part time. The relative risk ratio of one-unit increase in the variable RACE1 was 1.51 for being not employed versus part time. The relative risk ratio of one-unit increase in the variable PARENTS1 was 1.69 for being in the full time employment versus part time. The relative risk ratio of one-unit increase in the variable PARENTS1 was 1.05 for being not employed versus part time. The relative risk ratio of one-unit increase in the variable

EDU1 was 1.60 for being in the full time employment versus part time. The relative risk ratio of one-unit increase in the variable EDU1 was 0.96 for being not employed versus part time.

Table 1: Multinomial logit model comparison for being in types of employment

Full Time Variable Name	Full Model Coeff	Restricted Model Coeff	Marginal Effect on Full Model
gender1	1.14 ***	1.12 ***	3.13
RACE1	0.27		1.32
livepl1	0.1		1.11
livepl2	0.2		1.22
PARENT1	0.52 *	0.52 *	1.69
EDU1	0.47 *	0.49 *	1.60
married1	0.23		1.26
Nmarried0	-0.18	-0.48	0.84
_cons	0.22		1.25
<hr/>			
_2__Part_time (base outcome)			
_3__Not_employed			
gender1	0.26		1.30
RACE1	0.41		1.51
livepl1	0.31		1.37
livepl2	0.72		2.05
PARENT1	0.05		1.05
EDU1	-0.04		0.96
married1	-0.22		0.81
Nmarried0	-0.62		0.54
_cons	0.48	0.71	1.61
AIC	1678.64	1753.87	
BIC	1766.01	1802.89	
LR Chi2(18)	104.91	91.78	
Prob>Chi2	0.000	0.000	

*=P<=0.05, **=P<=0.01 and ***=P<=0.001

Conclusion

After running the multinomial logit model, variables gender, race, education, parents and living place seems to had got influential role in the model. Gender played vital role for a person being in the full time employment or not. Other variable to be determinants to the model were living place, education, being parents and married or not. Full model seems more robust rather than the restricted one, despite the higher significant level of some restricted variable. Lower AIC and BIC proves that full model was dominant in for the chosen variable to be in the full time employment versus part time employment.

***** Thank You *****