The impact of education on work status of persons

Name: Doha Atef Hassan

Major: statistics

Minor: socio-computing

Course: categorical data analysis

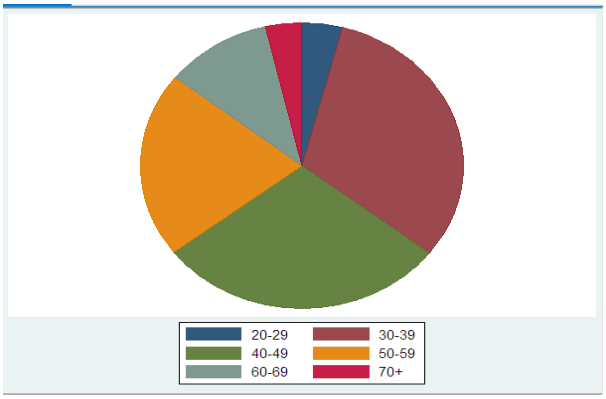
Introduction:

I want to discover the association between education and work status of person by categorical data analysis technique in Kafr Al sheikh governorate. So, I have dataset from 600 observations assuming, multinominal sample. I use 4 variables; the dependent variable is work status of person which containing 5 categories and independent variables are age, area and education. Assuming, alpha=0.05

Descriptive analysis:

First, I must edit data before making some analysis like chi-square test. I transform age variable to 6 categories, this is the frequencies

Pie chart for age grouped




```
. tab gages

  RECODE of
age (Age of
    Person) |      Freq.     Percent        Cum.
------------+-----------------------------------
      20-29 |         24        4.00        4.00
      30-39 |        189       31.50       35.50
      40-49 |        175       29.17       64.67
      50-59 |        126       21.00       85.67
      60-69 |         64       10.67       96.33
        70+ |         22        3.67      100.00
------------+-----------------------------------
      Total |        600      100.00
```

Frequencies of age

I can calculate mode = 189 for (30-39)

In the sample of Kafr El sheikh, the education variable contains 8 variables, but it hasn't below age in this sample, so I divide this variable into 4 categories after removing below age category, and this is frequencies.

1) Illiterate

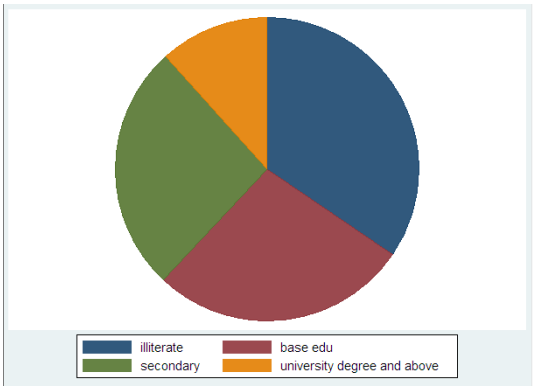
2) Base Edu. (read& write and base education)

3) Secondary (secondary and diploma)

4) University degree and above (university degree and higher than university degree)

The mode (the most common is education) is 207 for illiterate category.

Pie chart for education



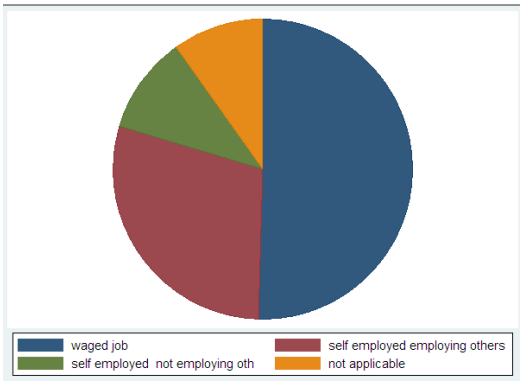
RECODE of educate (Education of Person)	Freq.	Percent	Cum.
illiterate	207	34.50	34.50
base edu	165	27.50	62.00
secondary	158	26.33	88.33
university degree and above	70	11.67	100.00
Total	600	100.00	

Frequencies of education

Work status person variable:

In the sample, it hasn't anyone in non-wage job and the mode is 303 for waged job.

Pie chart for wrkstat




```
. tab wrkstat
```

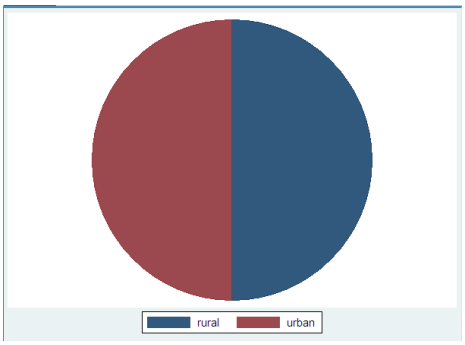
Work Status of Person	Freq.	Percent	Cum.
waged job	303	50.50	50.50
self employed employing others	175	29.17	79.67
self employed not employing others	63	10.50	90.17
not applicable	59	9.83	100.00
Total	600	100.00	

Frequencies for wrkstat

Area variable is the binary variable (urban and rural):

All observations divided equally between two categories

Pie chart for area




```
. tab urbrur
```

Area	Freq.	Percent	Cum.
rural	300	50.00	50.00
urban	300	50.00	100.00
Total	600	100.00	

Frequency for area

Now, we can apply 2-way contingency table between work status and each of the other variables:

second, I test independence between variables

1) Work status of person & Area

I test independence between them

H_0: $\pi_{ij=}\pi_{i+}\pi_{+j}$

H_1: π_{ij} not= $\pi_{i+}\pi_{+j}$

Area	Work Status of Person: waged job	self empl	self empl	not appli	Total
rural	146 151.5	107 87.5	23 31.5	24 29.5	300 300.0
urban	157 151.5	68 87.5	40 31.5	35 29.5	300 300.0
Total	303 303.0	175 175.0	63 63.0	59 59.0	600 600.0

Pearson chi2(3) = 15.7289 Pr = 0.001

2-way contingency table of wrk&Area

and p-value is smaller than alpha so, I reject H_0 at α=0.05 with 95% confidence there is a significant relationship between work status and area.

2) Work status & education

H_0: $\pi_{ij=}\pi_{i+}\pi_{+j}$

H_1: π_{ij} not= $\pi_{i+}\pi_{+j}$

p-value is smaller than alpha so, I reject H0 at α=0.05 with 95% confidence there is a significant relationship between work status and education.

RECODE of educate (Education of Person)	Work Status of Person: waged job	self empl	self empl	not appli	Total
illiterate	45 104.5	115 60.4	16 21.7	31 20.4	207 207.0
base edu	75 83.3	38 48.1	31 17.3	21 16.2	165 165.0
secondary	120 79.8	18 46.1	15 16.6	5 15.5	158 158.0
university degree and	63 35.4	4 20.4	1 7.3	2 6.9	70 70.0
Total	303 303.0	175 175.0	63 63.0	59 59.0	600 600.0

Pearson chi2(9) = 194.0246 Pr = 0.000

2-way contingency table of work&education

3) Work status & age categories

H_0: π_{ij}= $\pi_{i+}\pi_{+j}$

H_1: π_{ij} not= $\pi_{i+}\pi_{+j}$

p-value is smaller than alpha so, I reject H0 at α=0.05 with 95% confidence there is a significant relationship between work status and age.

RECODE of age (Age of Person)	Work Status of Person: waged job	self empl	self empl	not appli	Total
20-29	12 12.1	6 7.0	6 2.5	0 2.4	24 24.0
30-39	116 95.4	47 55.1	26 19.8	0 18.6	189 189.0
40-49	109 88.4	48 51.0	15 18.4	3 17.2	175 175.0
50-59	60 63.6	50 36.8	11 13.2	5 12.4	126 126.0
60-69	6 32.3	22 18.7	4 6.7	32 6.3	64 64.0
70+	0 11.1	2 6.4	1 2.3	19 2.2	22 22.0
Total	303 303.0	175 175.0	63 63.0	59 59.0	600 600.0

Pearson chi2(15) = 334.6056 Pr = 0.000

2-way contingency table of age &work

Then, I should know the strength of the association and direction (for ordinal variables). For 2-way contingency table, I don't study the measures of associations for ordinal variable and nominal variable (two more categories) so, I am ignoring ordinal and applying Cramer's V

Association between work status and age:

Cramer's v= 0.4312

In the sample, there is moderate relationship between work status and age.

```
. tabulate gages wrkstat, V
```

RECODE of age (Age of Person)	Work Status of Person				Total
	waged job	self empl	self empl	not appli	
20-29	12	6	6	0	24
30-39	116	47	26	0	189
40-49	109	48	15	3	175
50-59	60	50	11	5	126
60-69	6	22	4	32	64
70+	0	2	1	19	22
Total	303	175	63	59	600

Cramér's V = 0.4312

Association between work status and area:

Cramer's v = 0.1619

In the sample, there is weak relationship between area and work status of person

```
. tab wrkstat urbrur ,V
```

Work Status of Person	Area		Total
	rural	urban	
waged job	146	157	303
self employed employi	107	68	175
self employed not em	23	40	63
not applicable	24	35	59
Total	300	300	600

Cramér's V = 0.1619

Association between work status and education:

Cramer's v= 0.3283

In the sample, there is weak relationship between education and work status.

```
. tab wrkstat education ,V
```

Work Status of Person	RECODE of educate (Education of Person)				Total
	illiterat	base edu	secondary	universit	
waged job	45	75	120	63	303
self employed employi	115	38	18	4	175
self employed not em	16	31	15	1	63
not applicable	31	21	5	2	59
Total	207	165	158	70	600

Cramér's V = 0.3283

After that I want to take into consideration other variable how effect between work status and educations, control variable is area.

I want to test conditionally independent for each table, if I don't reject H_0, I test joint independent.

If I reject H_0, I test homogeneous between variables.

```
. table education wrkstat ,by(urbrur)
```

Area and RECODE of educate (Education of Person)	Work Status of Person waged job	self employed employ	self employed	not e	not applicable
rural					
illiterate	31	83	6		18
base edu	38	20	10		4
secondary	56	4	6		1
university degree and above	21		1		1
urban					
illiterate	14	32	10		13
base edu	37	18	21		17
secondary	64	14	9		4
university degree and above	42	4			1

1) H_0: $\pi^{xy/z}=\pi_{i+/z}.\pi_{+j/z}$
   H_1: there is no conditional independnet.
   $Chi2(9)_{rural}$= 109.2533
   $Chi(9)_{urban}$=85.5577
   then,
   chi2=109.2533+85.5577= 194.811
   $chi(18)_{tabulated}$=28.9
   so, we reject H_0 at alpha there is not conditional independet.

```
. tab education wrkstat if urbrur == 0,chi2
```

RECODE of educate (Education of Person)	Work Status of Person waged job	self empl	self empl	not appli	Total
illiterate	31	83	6	18	138
base edu	38	20	10	4	72
secondary	56	4	6	1	67
university degree and	21	0	1	1	23
Total	146	107	23	24	300

Pearson chi2(9) = 109.2533 Pr = 0.000

```
. tab education wrkstat if urbrur == 1 ,chi2
```

RECODE of educate (Education of Person)	Work Status of Person waged job	self empl	self empl	not appli	Total
illiterate	14	32	10	13	69
base edu	37	18	21	17	93
secondary	64	14	9	4	91
university degree and	42	4	0	1	47
Total	157	68	40	35	300

Pearson chi2(9) = 85.5577 Pr = 0.000

We also test marginal test by ignoring z(area):

H_0: $\pi_{ij+} = \pi_{i++} \cdot \pi_{+j+}$

H_1: π_{ij+} not= $\pi_{i++} \cdot \pi_{+j+}$

p.value smaller than alpha, there is not marginal independent between eduaction and work status of person

```
. tab education wrkstat ,chi2
```

RECODE of educate (Education of Person)	Work Status of Person				
	waged job	self empl	self empl	not appli	Total
illiterate	45	115	16	31	207
base edu	75	38	31	21	165
secondary	120	18	15	5	158
university degree and	63	4	1	2	70
Total	303	175	63	59	600

Pearson chi2(9) = 194.0246 Pr = 0.000

Instead finding independnce and association between 3 variables by using 3-way contingency table becouse I have a lot of categories for 3 variables so, I will model it by using log linear model (poisson regression model), the response variable is counts (n_{ij}) of this table.

```
. poisson _freq i.wrkstat i.urbrur i.education i.wrkstat#i.education i.wrkstat#i.urbrur i.education#i.urbrur

Iteration 0:   log likelihood = -76.062511
Iteration 1:   log likelihood = -69.145027
Iteration 2:   log likelihood = -69.094113
Iteration 3:   log likelihood =  -69.09391
Iteration 4:   log likelihood =  -69.09391

Poisson regression                              Number of obs     =         30
                                                LR chi2(22)       =     517.62
                                                Prob > chi2       =     0.0000
Log likelihood =  -69.09391                     Pseudo R2         =     0.7893
```

_freq	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
wrkstat						
self employed employing others	.9133084	.1883381	4.85	0.000	.5441725	1.282444
self employed not employing others	-1.34061	.3211345	-4.17	0.000	-1.970022	-.711198
not applicable	-.7011652	.2711062	-2.59	0.010	-1.232524	-.1698069
urbrur						
urban	-.952046	.2249426	-4.23	0.000	-1.392926	-.5111666
education						
base edu	.1531311	.2094153	0.73	0.465	-.2573154	.5635776
secondary	.5096002	.2021829	2.52	0.012	.113329	.9058713
university degree and above	-.4056607	.2673829	-1.52	0.129	-.9297216	.1184001
wrkstat#education						
self employed employing others#base edu	-1.637197	.2709629	-6.04	0.000	-2.168275	-1.10612
self employed employing others#secondary	-2.859108	.3151607	-9.07	0.000	-3.476811	-2.241404
self employed employing others#university degree and above	-3.336169	.5774065	-5.78	0.000	-4.467865	-2.204473
self employed not employing others#base edu	-.0364891	.3701855	-0.10	0.921	-.7620393	.6890612
self employed not employing others#secondary	-1.274128	.4127268	-3.09	0.002	-2.083058	-.4651988
self employed not employing others #						
university degree and above	-1.734006	1.071741	-1.62	0.106	-3.834579	.3665683
not applicable#base edu	-1.097627	.3518792	-3.12	0.002	-1.787298	-.4079565
not applicable#base edu	-1.097627	.3518792	-3.12	0.002	-1.787298	-.4079565
not applicable#secondary	-3.046441	.5249981	-5.80	0.000	-4.075419	-2.017464
not applicable#university degree and above	-3.399445	.7686486	-4.42	0.000	-4.905969	-1.892921
wrkstat#urbrur						
self employed employing others#urban	.0868783	.2369744	0.37	0.714	-.3775829	.5513396
self employed not employing others#urban	.8277359	.3090691	2.68	0.007	.2219716	1.4335
not applicable#urban	.8739808	.3212707	2.72	0.007	.2443019	1.50366
education#urbrur						
base edu#urban	.9338302	.2311194	4.04	0.000	.4808444	1.386816
secondary#urban	1.151094	.2545047	4.52	0.000	.6522735	1.649914
university degree and above#urban	1.599707	.3437481	4.65	0.000	.925973	2.273441
_cons	3.480276	.1616974	21.52	0.000	3.163355	3.797197

After testing H_0: homogenous model fits the data well

H_1: it doesn't fit data well

By using likelihood ratio test(deviance) between homogeneous model(max log likelihood = -69.09391) and saturated model (max log likelihood = -64.070253)

RLH= 2[-64.070253-(-69.09391)] = 8.73722

Chi2(7,0.015)=14.067

So. I don't reject H_0 at alpha = 0.05 , there is a strong evidence that model (WE&WA&EA) fits data well.

Note: after testing all RLH between all possible models, I decided the simplify model is homogenous model.

And saturated model & conditinal models at appendix

Finally, I apply modeling by using multinominal regression model because response nominal variable has more than 2 categories.

```
. mlogit wrkstat age i.urbrur i.education ,rrr

Iteration 0:   log likelihood = -701.46701
Iteration 1:   log likelihood = -536.09164
Iteration 2:   log likelihood = -503.02696
Iteration 3:   log likelihood = -498.39196
Iteration 4:   log likelihood = -498.23217
Iteration 5:   log likelihood = -498.23208
Iteration 6:   log likelihood = -498.23208

Multinomial logistic regression                 Number of obs     =        600
                                                LR chi2(15)       =     406.47
                                                Prob > chi2       =     0.0000
Log likelihood = -498.23208                     Pseudo R2         =     0.2897
```

wrkstat	RRR	Std. Err.	z	P>|z|	[95% Conf.	Interval]
waged_job	(base outcome)					
self_employed_employing_others						
age	1.003083	.0120609	0.26	0.798	.9797204	1.027003
urbrur						
urban	1.144916	.2683494	0.58	0.564	.7232123	1.812513
education						
base edu	.193767	.0529796	-6.00	0.000	.1133822	.3311424
secondary	.0582189	.0196046	-8.44	0.000	.0300907	.112641
university degree and above	.0240368	.0134739	-6.65	0.000	.0080119	.0721143
_cons	2.119631	1.277528	1.25	0.213	.6504747	6.907012
self_employed__not_employing_oth						
age	.9642252	.0155376	-2.26	0.024	.9342478	.9951644
urbrur						
urban	2.293066	.7059979	2.70	0.007	1.254138	4.192641
education						
base edu	.8673615	.3265137	-0.38	0.705	.4147341	1.813972
secondary	.2046056	.0895298	-3.63	0.000	.0867871	.4823697
university degree and above	.0259728	.0276423	-3.43	0.001	.0032256	.2091385
_cons	1.434494	1.137718	0.45	0.649	.3031088	6.788891
not_applicable						
age	1.322476	.0458657	8.06	0.000	1.235568	1.415496
urbrur						
urban	2.16831	.9501557	1.77	0.077	.9185946	5.118218
education						
base edu	.3824752	.1864108	-1.97	0.049	.1471447	.9941729
secondary	.8215679	.6043566	-0.27	0.789	.1943068	3.473753
university degree and above	.7813805	.7534913	-0.26	0.798	.1180436	5.172289
_cons	4.05e-08	8.84e-08	-7.79	0.000	5.60e-10	2.93e-06

Base category for work status is waged job because it is most common category, and base category for education is illiterate.

First table (self-employed employing others): age and area are insignificant so, there is no evidence relationship between them and self-employed employing others.

For education: e^{β} (base edu) =0.193767 (it is significant and the estimated relative risk of self-employed employing others between base education compared to

illiterate is 80.6% lower than corresponding relative risk of waged job, holding other variables constant)

$e^{\beta}_{(\text{secondary})}$=0.0582189 (it is significant and the estimated relative risk of self-employed employing others between secondary compared to illiterate 94.17% lower than corresponding relative risk of waged job, holding other variables constant)

Second table (self-employed not employing others): $e^{\beta}_{(\text{area})}$=2.293066 (it is significant and the estimated relative risk of self-employed not employing others between urban compared to rural is 129% more than the corresponding relative risk of waged job, holding other variables constant.

$e^{\beta}_{(\text{Base Edu})}$ is insignificant and $e^{\beta}_{(\text{secondary})}$=0.2046056 (it is significant and the estimated relative risk of self-employed not employing others between secondary compared to illiterate 79.53% lower than corresponding relative risk of waged job, holding other variables constant)

Third table (not applicable): all categories of education are insignificant

$e^{\beta}_{(\text{age})}$=1.322476 (it is significant and with each one year increase the estimated relative risk of not applicable is 32.2476% more than the corresponding the relative risk of waged job, holding other variables constant.

Conclusion:

At the end, I found association between work status person and education but there is low relationship and found moderate relation between work status and age. After that I took in consideration other variable called control variable and check conditional independence by using 3-way contingency and log linear model. Both ways had rejected conditional independence and the simplified model is homogeneous model. The homogenous association means that the partial association of X and Y is the same at all levels of z. Then I tested multinomial regression model.

Appendix:

Saturated model

```
. poisson _freq i.wrkstat i.urbrur i.education i.wrkstat#i.education i.wrkstat#i.urbrur i.education#i.urbrur i.education#i.wrkst
> #i.urbrur
note: 4.education#2.wrkstat#0.urbrur identifies no observations in the sample
note: 4.education#2.wrkstat#1.urbrur omitted because of collinearity
note: 4.education#3.wrkstat#1.urbrur identifies no observations in the sample

Iteration 0:   log likelihood = -85.428426
Iteration 1:   log likelihood = -64.129451
Iteration 2:   log likelihood = -64.070277
Iteration 3:   log likelihood = -64.070253
Iteration 4:   log likelihood = -64.070253

Poisson regression                              Number of obs     =         30
                                                LR chi2(29)       =     527.67
                                                Prob > chi2       =     0.0000
Log likelihood = -64.070253                     Pseudo R2         =     0.8046
```

_freq	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
wrkstat						
self employed employing others	.9848534	.2104905	4.68	0.000	.5722996	1.397407
self employed not employing others	-1.642228	.4460098	-3.68	0.000	-2.516391	-.7680646
not applicable	-.5436154	.2963336	-1.83	0.067	-1.124419	.0371878
urbrur						
urban	-.7949299	.3220041	-2.47	0.014	-1.426046	-.1638134
education						
base edu	.203599	.2420204	0.84	0.400	-.2707522	.6779501
secondary	.5913645	.2238643	2.64	0.008	.1525986	1.03013
university degree and above	-.3894648	.2826254	-1.38	0.168	-.9434004	.1644708
wrkstat#education						
self employed employing others#base edu	-1.626707	.3473068	-4.68	0.000	-2.307416	-.9459984
self employed employing others#secondary	-3.623911	.5587158	-6.49	0.000	-4.718974	-2.528848
self employed employing others#university degree and above	-3.178054	.6135863	-5.18	0.000	-4.380661	-1.975447
self employed not employing others#base edu	.3072267	.5702986	0.54	0.590	-.8105381	1.424991
self employed not employing others#secondary	-.5913645	.6192322	-0.95	0.340	-1.805037	.6223084
self employed not employing others#university degree and above	-1.402295	1.116487	-1.26	0.209	-3.59057	.7859801
not applicable#base edu	-1.707676	.6034314	-2.83	0.005	-2.89038	-.5249726
not applicable#secondary	-3.481736	1.051509	-3.31	0.001	-5.542656	-1.420817
not applicable#university degree and above	-2.500907	1.065567	-2.35	0.019	-4.58938	-.4124344
wrkstat#urbrur						
self employed employing others#urban	-.1581748	.383386	-0.41	0.680	-.9095976	.5932479
self employed not employing others#urban	1.305755	.6085666	2.15	0.032	.1129869	2.498524
not applicable#urban	.4695075	.4859684	0.97	0.334	-.4829731	1.421988
education#urbrur						
base edu#urban	.7682616	.3962694	1.94	0.053	-.0084122	1.544935
secondary#urban	.9284613	.370363	2.51	0.012	.2025631	1.654359
university degree and above#urban	1.488077	.4184677	3.56	0.000	.6678955	2.308259
education#wrkstat#urbrur						
base edu#self employed employing others#urban	.0794826	.5530671	0.14	0.886	-1.004509	1.163474
base edu#self employed not employing others#urban	-.5371499	.7558539	-0.71	0.477	-2.018596	.9442966
base edu#not applicable#urban	1.00408	.773519	1.30	0.194	-.5119896	2.520149
secondary#self employed employing others#urban	1.277406	.7084459	1.80	0.071	-.111122	2.665935
secondary#self employed not employing others#urban	-1.033822	.8255987	-1.25	0.210	-2.651966	.5843219
secondary#not applicable#urban	.7832555	1.23274	0.64	0.525	-1.63287	3.199381
university degree and above # self employed employing others # rural	0	(empty)				
university degree and above # self employed employing others # urban	0	(omitted)				
university degree and above # self employed not employing others # urban	0	(empty)				
university degree and above#not applicable#urban	-1.162655	1.519077	-0.77	0.444	-4.13999	1.814681
cons	3.433987	.1796053	19.12	0.000	3.081967	3.786007

Conditinal (WE & WA)

```
. poisson _freq i.wrkstat i.urbrur i.education i.wrkstat#i.education i.wrkstat#i.urbrur

Iteration 0:   log likelihood = -89.266693
Iteration 1:   log likelihood =  -85.10893
Iteration 2:   log likelihood = -85.065516
Iteration 3:   log likelihood = -85.065353
Iteration 4:   log likelihood = -85.065353

Poisson regression                              Number of obs     =         30
                                                LR chi2(19)       =     485.68
                                                Prob > chi2       =     0.0000
Log likelihood = -85.065353                     Pseudo R2         =     0.7406
```

_freq	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
wrkstat						
self employed employing others	1.199561	.1948453	6.16	0.000	.8176713	1.581451
self employed not employing others	-1.34004	.3429238	-3.91	0.000	-2.012158	-.6679213
not applicable	-.5420327	.2876574	-1.88	0.060	-1.105831	.0217654
urbrur						
urban	.0726392	.1149728	0.63	0.528	-.1527033	.2979817
education						
base edu	.5108256	.1885618	2.71	0.007	.1412513	.8804
secondary	.9808293	.1748015	5.61	0.000	.6382247	1.323434
university degree and above	.3364722	.19518	1.72	0.085	-.0460736	.719018
wrkstat#education						
self employed employing others#base edu	-1.618172	.2656445	-6.09	0.000	-2.138825	-1.097518
self employed employing others#secondary	-2.83539	.3079071	-9.21	0.000	-3.438876	-2.231903
self employed employing others#university degree and above	-2.71233	.5536858	-4.90	0.000	-3.797534	-1.627125
self employed not employing others#base edu	.1505729	.3609898	0.42	0.677	-.5569541	.8580998
self employed not employing others#secondary	-1.045368	.3996526	-2.62	0.009	-1.828673	-.262063
self employed not employing others # university degree and above	-2.072969	1.062977	-1.95	0.051	-4.156366	.0104282
not applicable#base edu	-.9002904	.3397538	-2.65	0.008	-1.566196	-.2343851
not applicable#secondary	-2.805379	.5126535	-5.47	0.000	-3.810161	-1.800596
not applicable#university degree and above	-3.077312	.7552174	-4.07	0.000	-4.557511	-1.597113
wrkstat#urbrur						
self employed employing others#urban	-.5865849	.1954214	-3.00	0.003	-.9696039	-.203566
self employed not employing others#urban	.5251978	.2892634	1.82	0.069	-.0417479	1.092144
not applicable#urban	.304655	.288889	1.05	0.292	-.2615569	.870867
_cons	3.076536	.1605341	19.16	0.000	2.761895	3.391177

Conditional (WE&EA)

```
. poisson _freq i.wrkstat i.urbrur i.education i.wrkstat#i.education i.education#i.urbrur

Iteration 0:   log likelihood = -79.859898
Iteration 1:   log likelihood =  -76.10927
Iteration 2:   log likelihood = -76.065664
Iteration 3:   log likelihood = -76.065501
Iteration 4:   log likelihood = -76.065501

Poisson regression                              Number of obs     =         30
                                                LR chi2(19)       =     503.68
                                                Prob > chi2       =     0.0000
Log likelihood = -76.065501                     Pseudo R2         =     0.7680
```

_freq	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
wrkstat						
self employed employing others	.9382696	.1758348	5.34	0.000	.5936398	1.282899
self employed not employing others	-1.034074	.2910708	-3.55	0.000	-1.604562	-.4635854
not applicable	-.3726753	.2334101	-1.60	0.110	-.8301507	.0848002
urbrur						
urban	-.6931472	.147442	-4.70	0.000	-.9821281	-.4041663
education						
base edu	.0870114	.2140077	0.41	0.684	-.332436	.5064588
secondary	.5283919	.2038805	2.59	0.010	.1287934	.9279905
university degree and above	-.3414075	.2656701	-1.29	0.199	-.8621114	.1792964
wrkstat#education						
self employed employing others#base edu	-1.618172	.2656445	-6.09	0.000	-2.138825	-1.097518
self employed employing others#secondary	-2.83539	.3079071	-9.21	0.000	-3.438876	-2.231903
self employed employing others#university degree and above	-3.281923	.551962	-5.95	0.000	-4.363749	-2.200097
self employed not employing others#base edu	.1505729	.3609898	0.42	0.677	-.5569541	.8580998
self employed not employing others#secondary	-1.045368	.3996526	-2.62	0.009	-1.828673	-.262063
self employed not employing others # university degree and above	-2.025716	1.063327	-1.91	0.057	-4.1098	.0583673
not applicable#base edu	-.9002904	.3397538	-2.65	0.008	-1.566196	-.2343851
not applicable#secondary	-2.805379	.5126535	-5.47	0.000	-3.810161	-1.800596
not applicable#university degree and above	-3.077312	.7552174	-4.07	0.000	-4.557511	-1.597113
education#urbrur						
base edu#urban	.9490806	.2153618	4.41	0.000	.5269792	1.371182
secondary#urban	.9993141	.2182968	4.58	0.000	.5714601	1.427168
university degree and above#urban	1.363305	.3007482	4.53	0.000	.7738492	1.952761
_cons	3.401197	.1569639	21.67	0.000	3.093554	3.708841

Conditional (WA&EA)

```
. poisson _freq i.wrkstat i.urbrur i.education i.wrkstat#i.urbrur i.education#i.urbrur

Iteration 0:   log likelihood = -154.14913
Iteration 1:   log likelihood =  -153.9984
Iteration 2:   log likelihood = -153.99831
Iteration 3:   log likelihood = -153.99831

Poisson regression                              Number of obs     =         30
                                                LR chi2(13)       =     347.81
                                                Prob > chi2       =     0.0000
Log likelihood = -153.99831                     Pseudo R2         =     0.5304
```

_freq	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
wrkstat						
self employed employing others	-.183886	.1299851	-1.41	0.157	-.4386521	.07088
self employed not employing others	-1.848112	.2243381	-8.24	0.000	-2.287807	-1.408418
not applicable	-1.805553	.2202634	-8.20	0.000	-2.237261	-1.373844
urbrur						
urban	-.6023777	.170132	-3.54	0.000	-.9358302	-.2689252
education						
base edu	-.6505876	.1453797	-4.48	0.000	-.9355266	-.3656485
secondary	-.7225611	.1489018	-4.85	0.000	-1.014403	-.4307189
university degree and above	-1.30354	.2302105	-5.66	0.000	-1.754745	-.8523361
wrkstat#urbrur						
self employed employing others#urban	-.6528521	.1948626	-3.35	0.001	-1.034776	-.2709284
self employed not employing others#urban	.6801355	.2873076	2.37	0.018	.1170229	1.243248
not applicable#urban	.304655	.288889	1.05	0.292	-.2615569	.870867
education#urbrur						
base edu#urban	.9490806	.2153618	4.41	0.000	.5269792	1.371182
secondary#urban	.9993141	.2182968	4.58	0.000	.5714601	1.427168
university degree and above#urban	1.091679	.2991797	3.65	0.000	.5052974	1.67806

Summary for age variable (continuous) before turning it to categories

```
. summarize age
```

Variable	Obs	Mean	Std. Dev.	Min	Max
age	600	45.73667	11.53136	23	90