



Health Care Access and Social Deprivation

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Summary

- Background information
- Available data
- Data problems
- Multivariate analyses
- Regression modelling
- Concluding remarks



Background information

- Since federation equity major issue
- Need for cross subsidy between city and rural areas
- Health care and access major current problem
- Social deprivation and accessibility to health care resources



Research aim

- To develop a social deprivation measure at the level of the SLA.
- To examine the relationship of this measure, and other explanatory variables in explaining key health outcomes.
- Earlier work in USA on similar data



Available data

- 2006 Australian census
- 1436 Statistical local areas (SLAs)
- These vary considerably in size
- Total population size 19,855,287
- Other data used based on same unit



Statistical Local Areas

- Size ranges from 0 to 133837 (very skew)
- 8 zeroes removed
- 10 SLAs have “totals” but no other data, eight of these are for homeless people
- These were omitted, but the 45000 people involved are very disadvantaged (Half of these in NSW, Qld and NT)



More on SLAs

Catch-all SLAs, usually < 100 residents

SLA	Total
Unincorp. Western	3
Mitchell	3
Unincorp. Islands	6
Parkes	6
Hume	7
Unincorp. Murray Mallee	8
Mount Baw Baw Alpine Resort	9
Unincorp. Lincoln	10
Jerrabomberra	12
Weston Creek-Stromlo - SSD Bal	16
Gungahlin-Hall - SSD Bal	16



More on SLAs

- All SLAs with < 100 inhabitants omitted
- Some percentage variables had missing data (or are they actually zero?)
- Now have 1389 data items (population covered now 19,810,064)



SLA variables

- Percent renter
- Percent indigenous
- Percent aged 65 plus
- Percent language poor
- Percent foreign born
- Percent unemployed
- Percent no car



SLA variables (continued)

- Percent dropout
- Percent lone parent
- Percent poor
- Percent overcrowded

- 11 correlated explanatory variables



Response variables

- avdr100k - avoidable death rate per 100000
- diabrp1k - diabetes rate per 1000
- riskp1k - risk rate per 1000



Other explanatory variables

- ariap-avg - Aust remoteness index (the larger the score the more remote the area)
- pop-medworker - # medical workers
- disascor - disability score (the lower the score the greater the disability)



Other explanatory variables

- The ARIA score and the population of medical worker variables have many zeroes
- Different to other explanatory variables



Other explanatory variables

		Medical workers	
		0	> 0
ARIA score	0	40	429
	>0	262	657



Dimension reduction

- Percentage data are used to overcome the problem of very different SLA sizes
- The problem of different variances still exists – use weighted analysis
- Principal components on weighted correlation matrix

Weighted correlation matrix, all data

%renter_occ	1											
%indig	0.28	1										
%age_65hi	-0.14	-0.16	1									
%language_poor	0.31	0.04	-0.13	1								
%foreign_born	0.34	-0.26	-0.21	0.74	1							
%unemployed	0.26	0.17	0.20	0.40	0.10	1						
%nocar	0.73	0.46	-0.06	0.39	0.35	0.32	1					
%dropout	-0.06	0.39	0.29	0.25	-0.30	0.65	0.11	1				
%loneparent	0.10	0.08	-0.05	0.23	0.01	0.53	-0.09	0.44	1			
%poor	0.10	0.41	0.30	0.32	-0.12	0.78	0.28	0.88	0.46	1		
%overcrowd	0.45	0.63	-0.23	0.66	0.34	0.42	0.70	0.40	0.15	0.50	1	
	1	2	3	4	5	6	7	8	9	10	11	

Principal components – all data

	Comp 1	Comp 2	Comp 3	Comp 4
pct_renter_occ	0.26	-0.33	0.16	0.20
pct_indig	0.27	0.039	0.59	-0.20
pct_age_65hi	0.01	0.32	-0.12	0.76
pct_language_poor	0.32	-0.26	-0.39	-0.05
pct_foreign_born	0.13	-0.46	-0.45	0.07
pct_unemployed	0.38	0.21	-0.24	0.08
pct_nocar	0.33	-0.30	0.27	0.32
pct_dropout	0.33	0.41	0.00	-0.03
pct_singlemother	0.22	0.22	-0.31	-0.46
pct_poor	0.39	0.34	-0.03	0.07
pct_overcrowd	0.42	-0.19	0.17	-0.11
Latent roots	4.092	2.478	1.535	1.07
% variance	37.2	22.71	13.95	9.73

Regression analyses – all data

Parameter	ln(avdr100k)		ln(diabr1k)		riskrp1k	
	estimate	s.e.	estimate	s.e.	estimate	s.e.
Constant	7.185	0.216	130.42	8.38	1500.6	80.7
sc[1]	0.805	0.733	98.5	29.9	23	288
sc[2]	-1.048	0.578	-270.5	21.5	-616	206
sc[3]	2.685	0.67	159.1	27.3	-446	263
sc[4]	0.122	0.721	122.9	25.4	897	245
ariap_avg	0.01469	0.00273	0.276	0.126	13.52	1.21
disascor	-0.00204	0.000216	-0.10096	0.00837	-0.9364	0.0806
medworker	-0.00015	0.0000813	-0.00187	0.0028	-0.1253	0.0271

Light orange

Orange

Red

P<0.05

P<0.01

P<0.001



Principal components

- Since large number of zeros for ARIA score and the number of medical workers a single PCP analysis not suitable
- Four sub analyses carried out, first four components extracted



Sub analyses

- Group 1 ARIA = 0, Medworkers = 0
Not remote, poorly serviced
- Group 2 ARIA = 0, Medworkers > 0
Not Remote, “well” serviced
- Group 3 ARIA > 0, Medworkers = 0
Remote, poorly serviced
- Group 4 ARIA > 0, Medworkers > 0
Remote, “well” serviced



PCP results

Medical 0		Medical > 0		Medical 0		Medical >0	
ARIA 0		ARIA 0		ARIA > 0		ARIA > 0	
Latent	% Var	Latent	% Var	Latent	% Var	Latent	% Var
Roots		Roots		Roots		Roots	
7.1	64.5	4.95	44.1	6.62	60.2	4	36.3
1.37	12.5	2.62	23.8	1.32	12	2.65	24.1
1.25	11.3	1.51	13.7	1.05	9.5	1.54	14.4
0.43	4	1.01	9.2	0.8	7.3	1.05	9.6

PCP results – group 4

	Comp 1	Comp 2	Comp 3	Comp 4
pct_renter_occ	0.29	0.19	-0.34	-0.48
pct_indig	0.26	0.06	-0.56	0.30
pct_age_65hi	0.13	-0.47	0.15	-0.09
pct_language_poor	0.21	0.40	0.39	0.24
pct_foreign_born	0.03	0.49	0.37	0
pct_unemployed	0.40	-0.16	0.25	-0.15
pct_nocar	0.40	0.08	-0.29	-0.15
pct_dropout	0.35	-0.31	0.13	0.27
pct_loneparent	0.29	0.13	0.20	-0.54
pct_poor	0.38	-0.31	0.20	0.17
pct_overcrowd	0.34	0.32	-0.10	0.41

Regression analyses – group 4

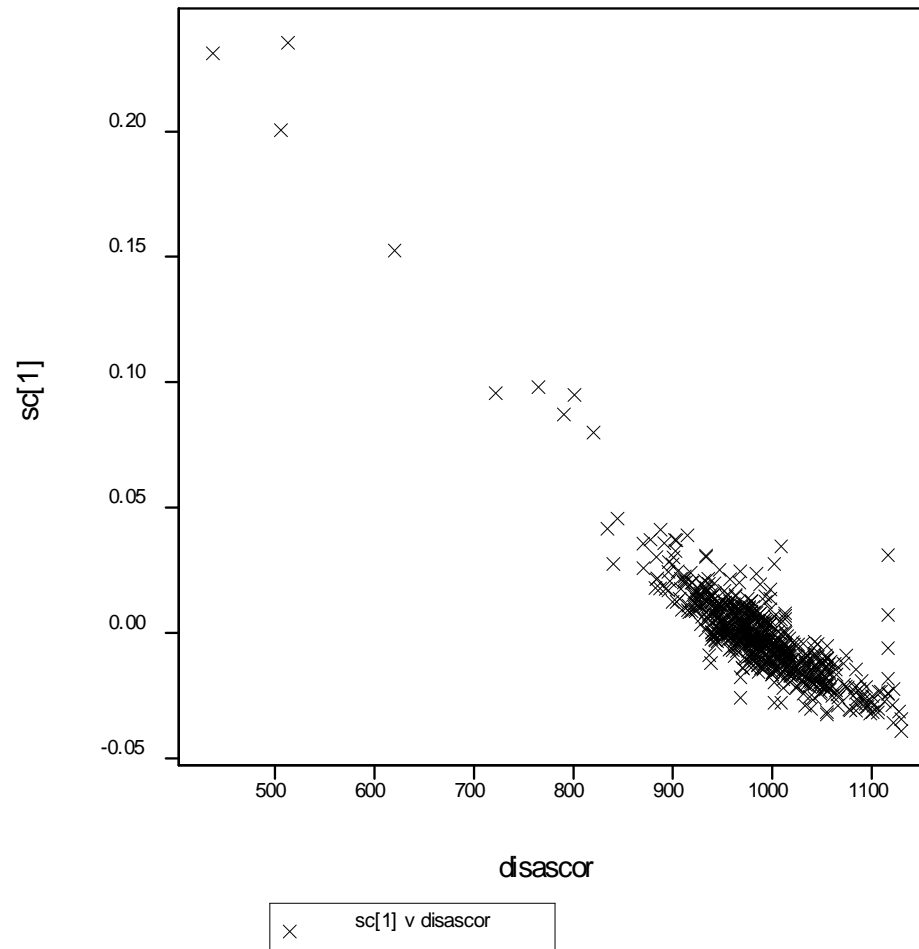
Parameter	ln(avdr100k)		ln(diabr1k)		riskrp1k	
	estimate	s.e.	estimate	s.e.	estimate	s.e.
Constant	6.677	0.357	5.654	0.321	1233	118
sc[1]	3.64	1.07	1.98	1.01	621	372
sc[2]	1.621	0.784	4.547	0.728	233	267
sc[3]	-3.75	0.967	0.762	0.915	-48	336
sc[4]	-4.279	0.789	-0.018	0.945	178	348
ariap_avg	0.02328	0.00371	0.02436	0.00408	12.82	1.5
disascor	-0.00151	0.000359	-0.00239	0.000324	-0.666	0.119
medworker	-0.00036	0.000172	0.000116	0.000151	-0.1045	0.0556

Light orange P<0.05

Red P<0.001



Group 4 – SC(1) versus disascor



Regression analyses – group 3

Parameter	ln(avdr100k)		ln(diabr1k)		riskrp1k	
	estimate	s.e.	estimate	s.e.	estimate	s.e.
Constant	6.311	0.436	5.893	0.335	1097	180
sc[1]	4.3	1.18	0.38	1.28	222	677
sc[2]	1.609	0.929	1.83	0.743	68	399
sc[3]	0.32	1.18	-1.188	0.84	-453	428
sc[4]	-0.85	1.08	-2.76	0.896	-198	459
ariap_avg	0.01508	0.0075	0.02862	0.00628	13.47	3.34
disascor	-0.00101	0.000464	-0.00262	0.000365	-0.53	0.196

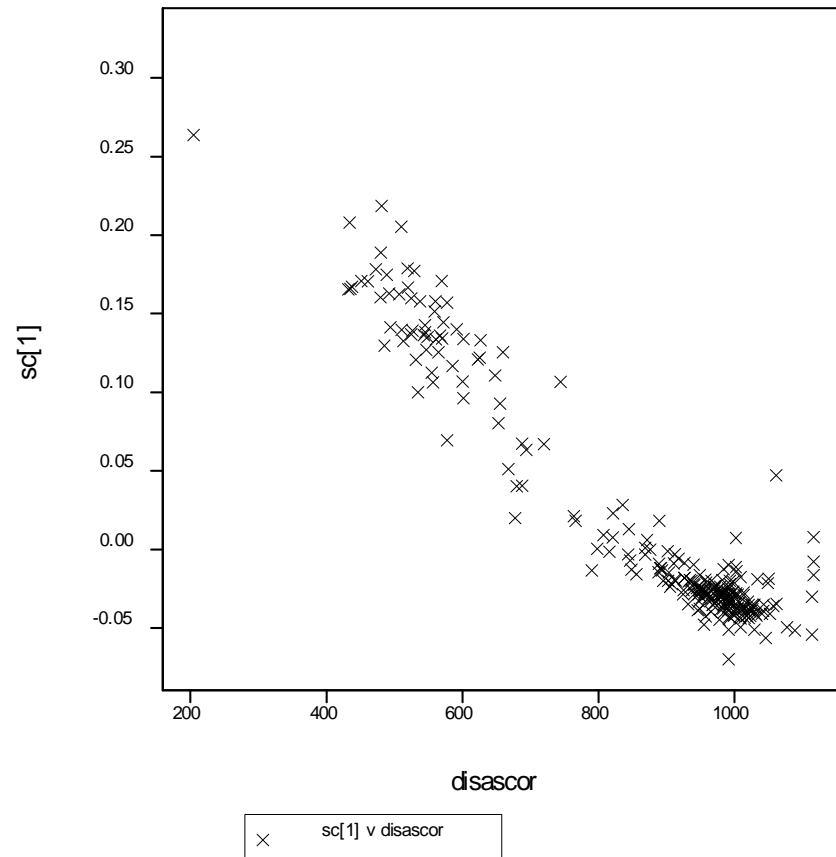
Light orange P<0.05

Dark orange P<0.01

Red P<0.001



Group 3, SC(1) versus disascor





Concluding remarks

- Results so far look very promising
- Confirm that relationships are linear
- Several outlier observations – maybe important SLAs health-wise
- 2011 census



References

- Wang F, Luo W, (2005) Assessing spatial and nonspatial factors for healthcare access: towards an integrated approach to defining health professional shortage areas. *Health and Place* 131-146.
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