

Health Risk Factors between Socioeconomic Groups

Synthia Ekram, Aris Han and Hui Jan Kwan

Year 9
Methodist Ladies' College

Abstract

The mortality from coronary heart disease, cerebrovascular disease, lung cancer and chronic obstructive pulmonary disease is higher among adults in low socioeconomic groups compared to high socioeconomic groups in Australia. This might be due to the difference in the prevalence of risk factors of these diseases in different socioeconomic groups. We aimed to examine if there is a statistically significant difference in health risk factors between all socioeconomic groups, and to explore in particular, the degree of difference between the highest and lowest socioeconomic groups in Australia. Utilising Microsoft excel we analysed our data collected from the National Health Survey of Australia using the Chi Square Test of Independence. There was a significant difference in inactivity in all socioeconomic groups ($p=0.03$). Among the highest and lowest socioeconomic groups, we found a statistically significant difference in inactivity ($p=0.002$), obesity ($p=0.05$) and daily smoking ($p=0.02$). There was no significant difference in high blood pressure and risky drinking between socioeconomic groups or between the highest and lowest socioeconomic groups. Policies should be developed to bridge the gap between these health risk factor inequalities between socioeconomic groups especially between the highest and lowest groups.

Research question

Is there a difference in health risk factors between all socioeconomic groups, and especially what the degree of difference among the highest and lowest socioeconomic groups in Australia?

Background and Significance

Socioeconomic groups are based on the area of residence using the Australian Bureau of Statistics (ABS) Index of Relative Socio-economic Disadvantage¹. These socioeconomic groups are based on higherchical ranking and this hierarchy may result in inequalities in health. In most countries people from high socioeconomic groups lives longer than people from low socioeconomic groups². Similarly, in Australia, men and women in the highest socioeconomic group were found to live 2.6 years longer than men and women in the lowest socioeconomic group³. Mortality from coronary heart disease, cerebrovascular disease, lung cancer and chronic obstructive pulmonary disease is much higher in low socioeconomic groups compared to high socioeconomic groups in Australia¹. The risk factors for these diseases are: physical inactivity, obesity, high blood pressure, risky drinking and daily smoking^{4,5}.

This has not only been in Australia. Studies from around the world have used a similar hypothesis that changes in individual risk factors among socioeconomic groups, such as physical inactivity,

smoking, obesity, and alcohol abuse, are contributing factors for disparities of mortality among these socioeconomic groups². Thus, we were interested in examining these health risk factors because it is important to increase life expectancy, quality of life and plan a way to improve the health system so that it can cater to everyone's individual needs. Consequently, if we want to fulfil the health needs of a specific group of the population, we need to know what the risk factors of diseases are in this group.

As a result, we aimed to examine if there is a difference in health risk factors between different socioeconomic groups, especially if the difference is more prominent between the highest and lowest socioeconomic groups in Australia. This research will help us identify if there is a difference in health risk factors between all socioeconomic groups and if we find a difference, we can offer more targeted management for these risk factors in the appropriate socioeconomic group.

Analysis

We chose the Australian Institute of Health and Welfare (AIHW) data on the "Prevalence of health risk factors, by socioeconomic group" to perform our analysis (Appendix A)¹. This was a large scale survey conducted in all states and territories and across urban, rural and remote areas of Australia (other than very remote areas) from July 2014 to June 2015, and included around 19,000 people in nearly 15,000 private dwellings. Since these were categorical data we performed the Chi-Square Test to check if there is a statistically significant difference in the prevalence of health risk factors by socioeconomic groups. The Chi-Square test is most useful when analysing survey data, and since the AIHW data were collected from the National Health Survey of Australia, we preferred to do the Chi-Square Test. The formula for Chi square test is:

$$\chi^2 = \sum \frac{(O-E)^2}{E}$$

The assumption of Chi-Square test is that the data in the cells should be frequencies, or counts of cases rather than percentages. The categories of the variables are mutually exclusive⁶. Thus we converted the health risk factors data provided in percentages in the AIWH table to frequencies or count of observation in that group.

We did these analyses in two stages; first, we examined the difference between all socioeconomic groups and then between the lowest and highest socioeconomic groups. All of our tests are two-tailed and the level of significance was $p \leq 0.05$. This means that if the p-value is more than 0.05, there is no significant difference between the test groups.

Where the Chi-Square test was significant in showing the difference between health risk factors and socioeconomic groups, we performed the Cramer's V or phi (ϕ) test. Cramer's V (or Cramer's Phi) is a measure of the association between nominal variables. The formula for the Cramer's V test is:

$$\text{Cramer's V} = \sqrt{\frac{\chi^2}{n \cdot \min(r-1, c-1)}}$$

The interpretation for Cramer's V is: 0.01 means small difference, 0.30 means medium difference and 0.50 means larger difference since we only have 2 columns.

We performed all these tests using Microsoft Excel.

Results

Table 1a: Chi-Square Test of independence for prevalence of inactivity or insufficient activity by all socioeconomic groups

Category	Inactive	Not inactive	Total
Observed			
Lowest	76.1	23.9	100
2	69.1	30.9	100
3	68.3	31.7	100
4	61.9	38.1	100
Highest	55.8	44.2	100
Total	331.2	168.8	500
Expected			
Lowest	66.24	33.76	
2	66.24	33.76	
3	66.24	33.76	
4	66.24	33.76	
Highest	66.24	33.76	
Test results			
P-value	0.031194747		
Pearson's chi	10.61914738		
Cramer's V	0.145733643 \approx 0.1		

- Socioeconomic groups are based on the area of residence using the Australian Bureau of Statistics (ABS) Index of Relative Socio-economic Disadvantage (where 1 denotes the lowest group and 5 denotes the highest group).
- Inactive or insufficiently active classification is based on self-reported exercise undertaken for fitness, sport or recreation in the last week.

Table 1b: Chi-Square Test of independence of prevalence of inactivity or insufficient activity between the lowest and highest socioeconomic group

Category	Inactive	Not inactive	Total
Observed			
Lowest	76.1	23.9	100
Highest	55.8	44.2	100
Total	131.9	68.1	200
Expected			
Lowest	65.95	34.05	
Highest	65.95	34.05	
Test results			
P-value	0.002452751		
Pearson's Chi	9.175508968		
Cramer's V	0.214190441 \approx 0.2		

- Socioeconomic groups are based on the area of residence using the Australian Bureau of Statistics (ABS) Index of Relative Socio-economic Disadvantage (where 1 denotes the lowest group and 5 denotes the highest group). Analyses were done for lowest vs highest groups.
- Inactive or insufficiently active classification is based on self-reported exercise undertaken for fitness, sport or recreation in the last week.

Table 1 shows the Chi-Square Test of independence of the prevalence of inactivity or insufficient activity by all socioeconomic groups (Table 1a) and the prevalence of inactivity or insufficient activity between lowest and highest socioeconomic group (Table 1b). The level of physical activity was different according to socioeconomic groups. The lowest socioeconomic group had the highest rate of physical inactivity (76.1%) and the highest socioeconomic status group has the lowest rate of physical inactivity (55.8%). When we compared all of the socioeconomic groups, we found the difference for the prevalence of inactivity was statistically significantly different between these groups ($p=0.03$). However, the magnitude of this difference between the groups is small (Cramer's V \approx 0.1). Similarly, the difference between the level of inactivity was different between the lowest and highest socioeconomic groups ($p=0.002$). The magnitude of the difference between these two groups was small (Cramer's V \approx 0.2).

Table 2a: Chi-Square Test of independence of prevalence of obesity in all socioeconomic groups

Category	Obese	Not obese	Total
Observed			
Lowest	33.7	66.3	100
2	30.2	69.8	100
3	29.1	70.9	100
4	25.4	74.6	100
Highest	21.4	78.6	100
Total	139.8	360.2	500
Expected			
Lowest	27.96	72.04	
2	27.96	72.04	
3	27.96	72.04	
4	27.96	72.04	
Highest	27.96	72.04	
Test Results			
P-value	0.353207605	Not significant	

- Socioeconomic groups are based on the area of residence using the Australian Bureau of Statistics (ABS) Index of Relative Socio-economic Disadvantage (where 1 denotes the lowest group and 5 denotes the highest group).
- Obesity classification is based on measured weight and height.

Table 2b: Chi-Square Test of independence of Prevalence of obesity in the lowest and highest socioeconomic group

Category	Obese	Not obese	Total
Observed			
Lowest	33.7	66.3	100
Highest	21.4	78.6	100
Total	55.1	144.9	200
Expected			
Lowest	27.55	72.45	
Highest	27.55	72.45	
Test Results			
P-value	0.05156475		
Pearson's Chi	3.789834406		
Cramer's V	0.137655992		

- Socioeconomic groups are based on the area of residence using the Australian Bureau of Statistics (ABS) Index of Relative Socio-economic Disadvantage (where 1 denotes the lowest group and 5 denotes the highest group). Analyses were done for lowest vs highest groups
- Obesity classification is based on measured weight and height.

Table 2 shows the Chi-Square Test of independence for the prevalence of obesity in all socioeconomic groups (Table 2a) and the prevalence of obesity between the lowest and highest socioeconomic group (Table 2b). The level of obesity was different according to socioeconomic groups. The lowest socioeconomic group had the highest obesity rate (33.7%) and the highest socioeconomic status group has the lowest obesity rate (21.4%). When we compared all of the socioeconomic groups in regards to obesity prevalence, we found the difference for the prevalence

of obesity was not statistically significant between these groups ($p=0.35$). The difference for prevalence of obesity in the lowest and highest socioeconomic group was statistically significantly different ($p=0.05$). The Cramer's V showed that this difference was low (Cramer's $V \approx 0.1$).

Table 3a: Chi-Square Test of independence of Prevalence of High blood pressure in all socioeconomic groups

Category	HBP	Not HBP	Total
Observed			
Lowest	25.5	74.5	100
2	25	75	100
3	21.1	78.9	100
4	23.1	76.9	100
Highest	20.8	79.2	100
Total	115.5	384.5	500
Expected			
Lowest	23.1	76.9	
2	23.1	76.9	
3	23.1	76.9	
4	23.1	76.9	
Highest	23.1	76.9	
Test Results			
P-value	0.902052822	Not significant	

- Socioeconomic groups are based on the area of residence using the Australian Bureau of Statistics (ABS) Index of Relative Socio-economic Disadvantage (where 1 denotes the lowest group and 5 denotes the highest group).
- High blood pressure classification is based on measured blood pressure. For the 24% of respondents aged 18 years and over who did not have their blood pressure measured, imputation was used to obtain blood pressure.

Table 3b: Chi-Square Test of independence of Prevalence of high blood pressure in the lowest and highest socioeconomic group

Category	HBP	Not HBP	Total
Observed			
Lowest	25.5	74.5	100
Highest	20.8	79.2	100
Total	46.3	153.7	200
Expected			
Lowest	23.15	76.85	
Highest	23.15	76.85	
Test Results			
P-value	0.430739997	Not significant	

- Socioeconomic groups are based on the area of residence using the Australian Bureau of Statistics (ABS) Index of Relative Socio-economic Disadvantage (where 1 denotes the lowest group and 5 denotes the highest group). Analyses were done for lowest vs highest group
- High blood pressure classification is based on measured blood pressure. For the 24% of respondents aged 18 years and over who did not have their blood pressure measured, imputation was used to obtain blood pressure.

Table 3 shows the Chi-Square Test of independence of the prevalence of high blood pressure in all socioeconomic groups (Table 3a) and the prevalence of high blood pressure between the lowest and highest socioeconomic groups (Table 3b). The prevalence of high blood pressure was different according to socioeconomic groups. The lowest socioeconomic group had the highest number of people with high blood pressure (25.5%) and the highest socioeconomic status group has the lowest prevalence of high blood pressure (20.8%). When we compared all of the socioeconomic groups, we found the difference for the prevalence of high blood pressure was not statistically significant ($p=0.9$). Similarly, the difference we observed for the prevalence of high blood pressure in the lowest and highest socioeconomic group was not statistically significant ($p=0.43$).

Table 4a: Chi-Square Test of independence of Prevalence of risky drinking in all socioeconomic groups

Category	Drinking	Not drinking	Total
Observed			
Lowest	15.8	84.2	100
2	16.8	83.2	100
3	17.3	82.7	100
4	17.9	82.1	100
Highest	17.6	82.4	100
Total	85.4	414.6	500
Expected			
Lowest	17.08	82.92	
2	17.08	82.92	
3	17.08	82.92	
4	17.08	82.92	
Highest	17.08	82.92	
Test Results			
P-value	0.995711121	Not significant	

- Socioeconomic groups are based on the area of residence using the Australian Bureau of Statistics (ABS) Index of Relative Socio-economic Disadvantage (where 1 denotes the lowest group and 5 denotes the highest group).
- Lifetime risky drinking classification is based on self-reported alcohol use.

Table 4b: Chi-Square Test of independence of Prevalence of risky drinking in the lowest and highest socioeconomic group

Category	Drinking	Not drinking	Total
Observed			
Lowest	15.8	84.2	100
Highest	17.6	82.4	100
Total	33.4	166.6	200
Expected			
Lowest	16.7	83.3	
Highest	16.7	83.3	
Test Results			
P-value	0.732912954	Not significant	

- Socioeconomic groups are based on the area of residence using the Australian Bureau of Statistics (ABS) Index of Relative Socio-economic Disadvantage (where 1 denotes the lowest group and 5 denotes the highest group). Analyses were done for lowest vs highest groups
- Lifetime risky drinking classification is based on self-reported alcohol use.

Table 4 shows the Chi-Squared Test of the prevalence of risky drinking in all socioeconomic groups (Table 4a) and the prevalence of risky drinking between the lowest and highest socioeconomic group (Table 4b). The level of risky drinking was different according to socioeconomic groups. The lowest socioeconomic group had the lowest rate of risky drinking (15.8%) and the highest socioeconomic status group has the highest rate of risky drinking (17.6%). When we compared all of the socioeconomic groups, we found the difference for the prevalence of high blood pressure was not statistically significant ($p=0.996$). Similarly, the difference for the prevalence of risky drinking in the lowest and highest socioeconomic group was not statistically significant ($p=0.73$).

Table 5a: Chi-Squared Test of Prevalence of daily smoking in all socioeconomic groups

Category	Smoking	Not smoking	Total
Observed			
Lowest	17.7	82.3	100
2	14.6	85.4	100
3	12	88	100
4	10.1	89.9	100
Highest	6.5	93.5	100
Total	60.9	439.1	500
Expected			
Lowest	12.18	87.82	
2	12.18	87.82	
3	12.18	87.82	
4	12.18	87.82	
Highest	12.18	87.82	
Test Results			
P-value	0.14572205	Not significant	

- Socioeconomic groups are based on the area of residence using the Australian Bureau of Statistics (ABS) Index of Relative Socio-economic Disadvantage (where 1 denotes the lowest group and 5 denotes the highest group).

- Daily smoking classification is based on self-reported tobacco use.

Table 5b: Chi-Square Test of independence of Prevalence of daily smoking in the lowest and highest socioeconomic group

Category	Smoking	Not smoking	Total
Observed			
Lowest	17.7	82.3	100
Highest	6.5	93.5	100
Total	24.2	175.8	200
Expected			
Lowest	12.1	87.9	
Highest	12.1	87.9	
Test results			
P-value	0.015166617		
Pearson's Chi	5.897009186		
Cramer's V	0.171712102 \approx 0.2		

- Socioeconomic groups are based on the area of residence using the Australian Bureau of Statistics (ABS) Index of Relative Socio-economic Disadvantage (where 1 denotes the lowest group and 5 denotes the highest group). Analyses were done for lowest vs highest groups
- Daily smoking classification is based on self-reported tobacco use.

Table 5 shows the Chi-Square Test of independence of the prevalence of daily smoking in all socioeconomic groups (Table 5a) and the prevalence of daily smoking between the lowest and highest socioeconomic group (Table 5b). The level of daily smoking was different according to socioeconomic groups. The lowest socioeconomic group had the highest rate of smoking (17.7%) and the highest socioeconomic group has the lowest smoking rate (6.5%). When we compared all of the socioeconomic groups, we found the difference for the prevalence of smoking was not statistically significant ($p=0.15$). However, the difference for prevalence of smoking in the lowest and highest socioeconomic group was statistically significant ($p=0.02$). The Cramer's V showed that this difference was low (Cramer's V \approx 0.2).

Discussion

We found that there was a significant difference in inactivity in all socioeconomic groups but no significant difference in the prevalence of obesity, high blood pressure, risky drinking and daily smoking were found. When we compared the highest and lowest socioeconomic groups, we found a significant difference in inactivity, obesity and daily smoking, but no significant difference in high blood pressure and risky drinking.

Our results are supported by other studies. For example, all over the world obesity, high blood pressure, risky drinking and smoking are highly prevalent in low socioeconomic group than high socioeconomic groups⁷.

In previous research, it has been shown that countries that provide universal health coverage, i.e. Canada, people from low socioeconomic groups use less health care than their health care needs⁸. Since Australia has the similar health care system to that of Canada's, it might be that Australians from low socioeconomic group use the health care system less and have poor control on disease risk factors. Thus, closing the gaps between the highest and lowest socioeconomic groups in health behaviours especially for obesity and daily smoking should be a priority in Australia. Furthermore, irrespective of socioeconomic groups, the government needs to make policies to encourage all Australians to participate more in physical activities. Even in the highest socioeconomic group, the highest prevalence of inactivity is almost 60%, a percentage which was increased further with each socioeconomic group and was highest in the lowest socioeconomic group (76%). Additionally, more research should be done to understand more about why these gaps exist between the socioeconomic groups.

Conclusion

The health risk factors of Australian people differ according to socioeconomic groups. The difference is most prominent between the highest and lowest socioeconomic groups. Policies should be developed to bridge the gap between these health risk factors, especially for inactivity, obesity and smoking.

References

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Appendix A

Health risk factor	Year		Socioeconomic group					Australia	Rate ratio: lowest/highest socioeconomic group
			Lowest	2	3	4	Highest		
Inactive or insufficiently active	2014–15	% aged 18+ [95% CI]	76.1 [74.0–78.2]	69.1 [66.6–71.6]	68.3 [64.8–71.8]	61.9 [59.1–64.7]	55.8 [53.2–58.4]	65.0 [63.6–66.4]	1.4
Obese	2014–15	% aged 18+ [95% CI]	33.7 [31.1–36.2]	30.2 [27.9–32.4]	29.1 [27.0–31.3]	25.4 [23.3–27.4]	21.4 [19.0–23.8]	27.9 [26.9–28.8]	1.6
High blood pressure	2014–15	% aged 18+ [95% CI]	25.5 [23.7–27.3]	25.0 [22.7–27.3]	21.1 [19.7–22.5]	23.1 [20.7–25.5]	20.8 [18.5–23.1]	22.9 [21.9–23.9]	1.2
Lifetime risky drinking	2016	% aged 14+ [95% CI]	15.8 [14.5–17.1]	16.8 [15.4–18.2]	17.3 [15.8–18.8]	17.9 [16.4–19.4]	17.6 [16.1–19.1]	17.1 [16.5–17.7]	0.9
Daily smoking	2016	% aged 14+ [95% CI]	17.7 [16.3–19.1]	14.6 [13.2–16.0]	12.0 [10.8–13.2]	10.1 [9.0–11.2]	6.5 [5.7–7.3]	12.2 [11.6–12.8]	2.7