

# The Relationship of Deprivation with Health-related Quality of Life

---

TAHMID KASHEM

APERSU SUMMER INTERNSHIP – 2017

## Introduction

---

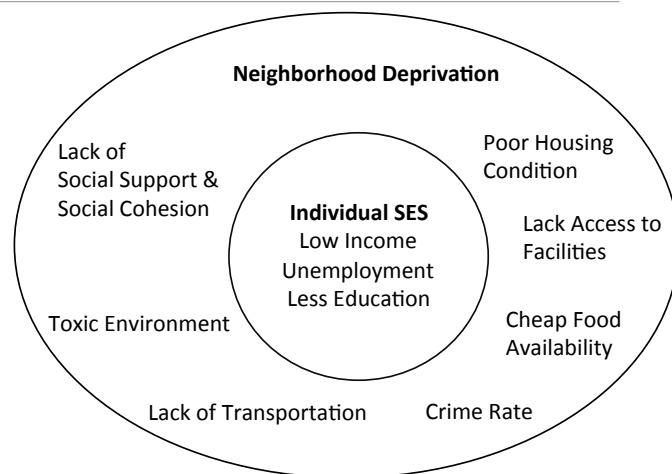
- Deprivation is defined as a state of observable and demonstrable disadvantage relative to the local community or the wider society or nation to which an individual, family or group belongs
- Material deprivation is one component of deprivation that includes goods and conveniences necessary for a modern life, such as adequate housing, shops with affordable healthy food and health care facilities

## Introduction (Cont.)

- A 'deprivation index' is a list of items which has two characteristics, considering the current social and economic conditions in a time and place
  - Firstly, the items on the list are widely seen as necessary for a household to have a standard of living above the poverty level
  - Secondly, the people living in poverty probably find some of the items expensive and so not have all the items.
- Health related quality of life (HRQOL) has been used as a comprehensive health indicator in population health surveys and the EQ-5D-5L is the most commonly used generic preference based patient reported outcome measure of HRQOL around the world

## Introduction (Cont.)

- Literature showed that lower SES and neighborhood deprivation are positively associated with
  - Premature mortality
  - Mental health problems and health service use
  - Chronic conditions (i.e. HTN, Diabetes, Arthritis)
  - Behavior problems in children and adolescents



## Objective

---

- To examine the association between deprivation using the Canadian Deprivation Index (CDI) and Ontario Deprivation Index (ODI), and HRQOL as measured by the EQ-5D-5L dimensions, Index and VAS scores

## Research Design and Methods

---

- Data from Alberta Community Health Survey (ACHS) was used
- Data on socio-demographic characteristics including:
  - Age
  - Gender
  - Education
  - Employment
  - Marital status
  - Body mass index (BMI)

## Research Design and Methods

---

- EQ-5D-5L has two main components:
  - Descriptive system
    - Mobility, Self-Care, Usual Activities, Pain/Discomfort and Anxiety/Depression
    - Each dimension has five levels: from 1 “no problems” to 5 “extreme problems”
    - Describes 3125 distinct health states
  - Visual analogue scale (VAS)
    - The VAS assesses respondent’s self-rated health on a 20-cm vertical scale ranging from 0 (worst imaginable health state) to 100 (best imaginable health state)
- For each health state, index score was generated using the Canadian scoring algorithm.
  - The index score was anchored at 0 (dead) and 1 (full health)
  - Range: -0.148 for worst (55555) to 0.949 for best (11111) health states

## Research Design and Methods (Cont.)

---

- Canadian Deprivation Index (CDI) is a measure of material deprivation consisting of 3 indicators:
  - Household education: The highest level of education in a household (not completed high school, completed high school/certificate, university)
  - Home ownership: Number of participants who owned or rented the dwelling (owned by you or a member of this household or rented)
  - Food security: Whether respondents were worried about running out of food due to lack of money (Often true, sometimes true or never true)
- Based on the 3 indicators, a total score was calculated ranging from 1 to 5, where “1” was considered as “least deprived” and “5” was considered as “most deprived”

## Research Design and Methods (Cont.)

---

- Ontario Deprivation Index (ODI) is a poverty measure consisting of 10 indicators from 4 deprivation themes:
  - Dietary and health needs: Ability to have fresh fruits and vegetables, meat fish or vegetarian equivalent on alternative days, and dental care
  - Clothing and grooming needs: Appropriate clothes for job interviews
  - Social inclusion: Hobby or leisure activity, ability to buy presents for friends and family once per year, have friends and family over a meal once per month, and being able to get around in your community
  - Housing: Ability to replace or repair broken items, and have a home free of pest
- The total score ranges from 0 to 10 and was categorized into two groups:
  - 0-1 “low” or least deprived
  - 2-10 “high” or most deprived

## Statistical Analysis

---

- Participants with complete EQ-5D-5L data were included in the analysis
- The EQ-5D-5L dimensions were categorized as:
  - level 1 = no problem
  - level 2-3 = mild/moderate problem
  - level 4-5 = severe/extreme problem
- Differences in reporting problems in EQ-5D-5L dimension, index and VAS scores by different levels of deprivation based on the various indices were examined using chi-square test, student’s t-test and ANOVA as appropriate
- Multivariable linear regression models (adjusted for age, sex, marital status and BMI) were conducted to examine the independent association of CDI and ODI with the EQ-5D-5L index and VAS scores, and logistic regression models with each of the EQ-5D-5L dimensions.

## Results

### General characteristics of the participants

Characteristic	Overall (N=6314) N(%) or Mean $\pm$ SD	Characteristic	Overall (N=6314) N(%) or Mean $\pm$ SD
<b>Age (Years)</b>		<b>Employment</b>	
18-44	2444 (38.71)	Employed	3647 (57.76)
45-64	2382 (37.73)	Out of work/Student	703 (11.13)
65-75+	1421 (22.51)	Retired/Unable to work	1455 (23.04)
<b>Gender - female</b>	3809 (60.33)	<b>BMI Value (Weight)</b>	27.52 $\pm$ 5.67
<b>Marital Status</b>		Underweight-BMI < 18.5	109 (1.80)
Married/Common-law	4212 (66.71)	Normal-BMI 18.5-25.0	2013 (33.18)
Widowed/Separated/ Divorced	1057 (16.74)	Overweight-BMI 25.0-30.0	2242 (36.95)
Single, never married	1006 (15.93)	Obese-BMI > 30.0	1702 (28.05)
<b>Education</b>			
High School not completed	553 (8.76)		
High School/Certificate	3931 (62.26)		
University	1782 (28.22)		

## Results

### General characteristics of the participants

Characteristic	Overall (N=6314) N(%) or Mean $\pm$ SD	Characteristic	Overall (N=6314) N(%) or Mean $\pm$ SD
<b>EQ-5D-5L</b>		<b>Pain/Discomfort</b>	
<b>Mobility</b>		No problems	2571 (40.72)
No problems	4800 (76.02)	Slight/Moderate problems	3408 (53.98)
Slight/Moderate problems	1315 (20.83)	Severe/Extreme problems	335 (5.31)
Severe/Extreme problems	199 (3.15)	<b>Anxiety/Depression</b>	
<b>Self-Care</b>		No problems	4073 (64.51)
No problems	5925 (93.84)	Slight/Moderate problems	2089 (33.09)
Slight/Moderate problems	361 (5.72)	Severe/Extreme problems	152 (2.41)
Severe/Extreme problems	28 (0.44)	<b>EQ-5D-5L Index Score</b>	0.85 $\pm$ 0.14
<b>Usual Activities</b>		<b>EQ-5D-5L VAS</b>	79.6 $\pm$ 17.7
No problems	4723 (74.80)		
Slight/Moderate problems	1422 (22.52)		
Severe/Extreme problems	169 (2.68)		

## Results (Contd.)

Fig 1: Distribution of the levels of problems in EQ-5D-5L Mobility dimension across different levels of deprivation indices (Statistically significant at P-value<0.05)

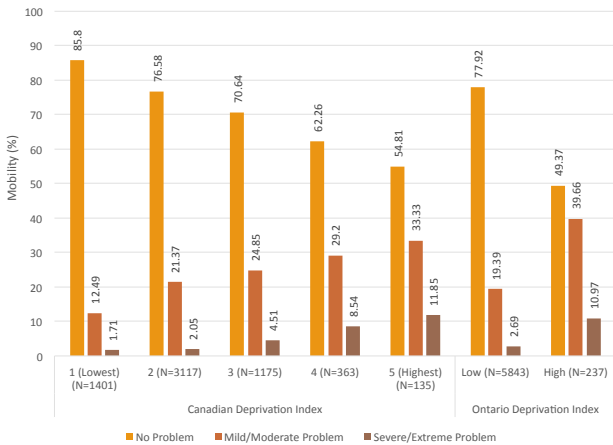
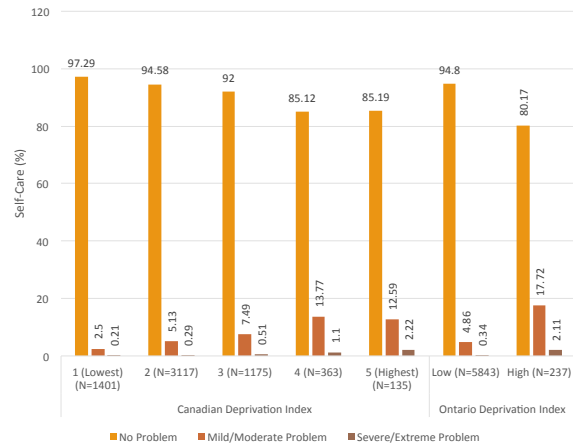


Fig 2: Distribution of the levels of problems in EQ-5D-5L Self-Care dimension across different levels of deprivation indices (Statistically significant at P-value<0.05)



## Results (Contd.)

Fig 3: Distribution of the levels of problems in EQ-5D-5L Usual Activities dimension across different levels of deprivation indices (Statistically significant at P-value<0.05)

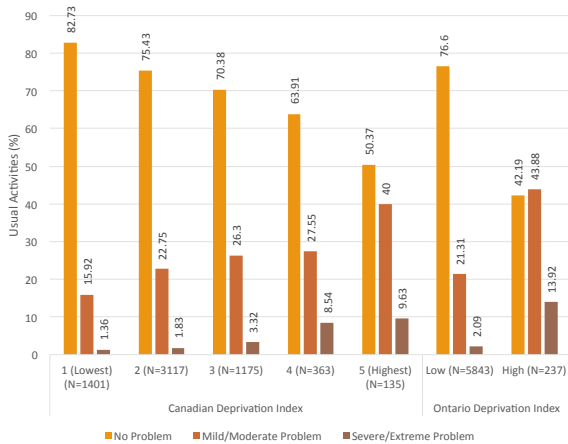
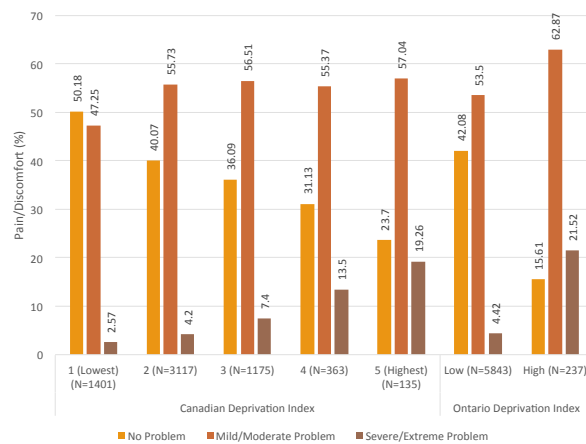
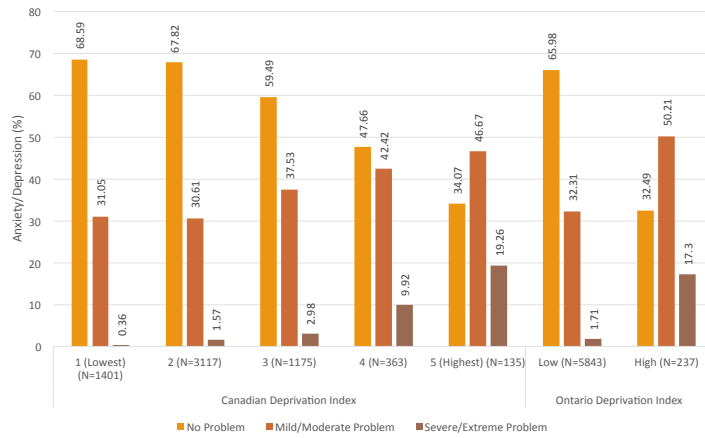


Fig 4: Distribution of the levels of problems in EQ-5D-5L Pain/Discomfort dimension across different levels of deprivation indices (Statistically significant at P-value<0.05)



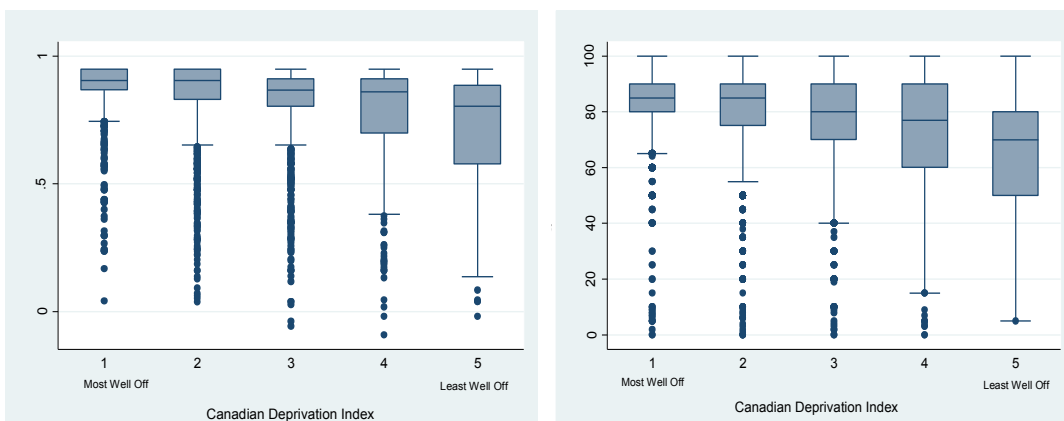
## Results (Contd.)

Fig 5: Distribution of the levels of problems in EQ-5D-5L Anxiety/Depression dimension across different levels of deprivation indices (Statistically significant at P-value<0.05)



## Results (Contd.)

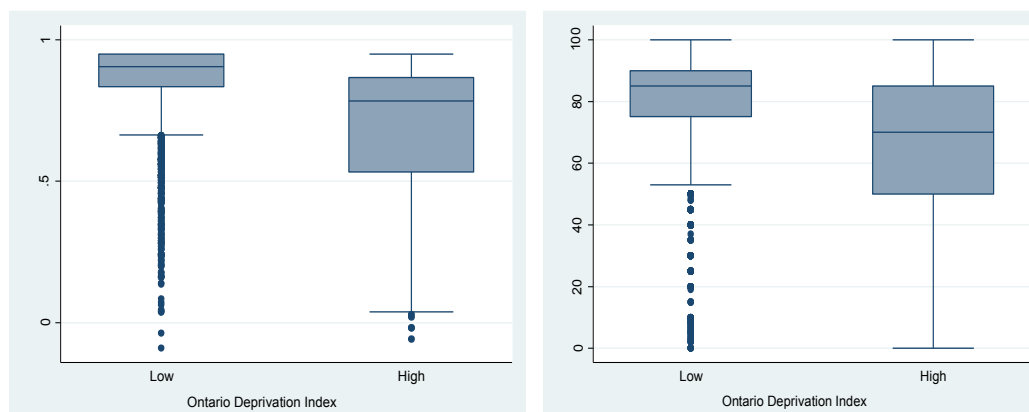
Fig 6: EQ-5D-5L Index and Visual Analogue Scale Scores by Canadian Deprivation Index Score (Statistically significant at P-value<0.05)





## Results (Contd.)

Fig 7: EQ-5D-5L Index and Visual Analogue Scale Score by Ontario Deprivation Index Score (Statistically significant at P-value<0.05)



## Results (Contd.)

- Results from multivariable logistic regression analysis of the association of CDI and ODI with EQ-5D-5L 5 dimensions, adjusted for age, sex, marital status and BMI

Deprivation index	Mobility	Self-Care	Usual Activities	Pain/Discomfort	Anxiety / Depression
	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)
CDI (1 Most well off) - reference					
2	1.61 (1.34, 1.95)	1.80 (1.25, 2.60)	1.40 (1.18, 1.66)	1.37 (1.19, 1.16)	1.01 (0.88, 1.17)
3	2.31 (1.86, 2.88)	2.62 (1.75, 3.9)	1.87 (1.53, 2.29)	1.77 (1.49, 2.10)	1.33 (1.12, 1.58)
4	4.30 (3.20, 5.80)	6.2 (3.92, 9.81)	2.93 (2.21, 3.89)	2.63 (2.01, 3.45)	2.14 (1.67, 2.74)
5 (Least well off)	6.90 (4.53, 10.52)	6.88 (3.77, 12.57)	5.90 (3.95, 8.81)	3.92 (2.53, 6.08)	3.32 (2.25, 4.90)
ODI (Score 0-1) - reference					
Score 2-10	4.17 (3.10, 5.62)	4.47 (3.10, 6.44)	5.21 (3.90, 6.97)	4.35 (2.97, 6.38)	3.61 (2.69, 4.83)

CDI: Canadian Deprivation Index

ODI: Ontario Deprivation Index

Note: All associations were statistically significant at p-value < 0.05

## Results (Contd.)

- Results from multivariable linear regression analysis of the association of CDI and ODI with EQ-5D-5L Index and VAS scores, adjusted for age, sex, marital status and BMI

Deprivation index	Index Score		VAS Score	
	$\beta$ (SE)	P Value	$\beta$ (SE)	P Value
CDI (1 Most well off) – reference				
2	-0.02 (0.004)	<0.01	-1.6 (0.56)	<0.01
3	-0.05 (0.006)	<0.01	-5.1 (0.69)	<0.01
4	-0.12 (0.008)	<0.01	-11.4 (1.04)	<0.01
5 (Least well off)	-0.18 (0.01)	<0.01	-17.3 (1.57)	<0.01
ODI (Score 0-1) - reference				
Score 2-10	-0.17 (0.01)	<0.01	-13.3 (1.15)	<0.01

CDI: Canadian Deprivation Index  
ODI: Ontario Deprivation Index

## Discussion

- Our study found that, people with high scores on both deprivation indexes were more likely to report problems in all dimensions of the EQ-5D-5L and have lower EQ-5D-5L index and VAS scores
- Possible explanations:
- Unhealthy lifestyle including smoking, alcohol consumption, drug use, less physical exercise and lack of healthy foods
  - Material deprivation including housing problems and lack of resources in the community
  - Deprivation at the neighborhood level could also impact the association between individual deprivation and HRQOL

## Discussion

---

- Limitations of the study
  - Cross-sectional nature of the data
  - Representativeness of the study sample
  - Residual confounding
  - Lack of assessment of neighbourhood deprivation
  
- Future research should investigate and identify which physical, social, economic, psychological and behavioral factors mediate the association between individual deprivation and HRQOL

## Discussion (Contd.)

---

- Overall, poverty impacts the society, from greater demands on the health care and criminal justice system, to diminished workplace and economic productivity
  
- To eradicate poverty at the root level, the poverty reduction strategies or interventions should focus on deprivation at both individual and community level
  
- The findings in our study would aid policy makers in making informed decisions regarding:
  - Measurement and monitoring socioeconomic inequalities impacting HRQOL
  - Resource allocation on primary care teams, social care and community care programs
  - Housing policies
  - Urban planning

# Thank You

## Acknowledgements:

Dr. Fatima Al Sayah

Dr. Arto Ohinmaa

Dr. Jeff Johnson



APERSU Summer Internship

# References

1. Pampalon R, Hamel D, Gamache P, Raymond G. A deprivation index for health planning in Canada. *Chronic Dis Can.* 2009 Jan 1;29(4):178-91.
2. Mackenbach JP, Howden-Chapman P. New perspectives on socioeconomic inequalities in health. *Perspectives in biology and medicine.* 2003;46(3):428-44.
3. Matern R, Oliphant M, Mendelson M. Developing a deprivation index: The research process. *Caledon Institute of Social Policy;* 2009 Dec 2.
4. Guyatt GH, Feeny DH, & Patrick DL. Measuring health-related quality of life. *Annals of Internal Medicine.* 1993;118(8):622-629.
5. Gusi N, Olivares PR, Rajendram R. The EQ-5D health-related quality of life questionnaire. In: *Handbook of disease burdens and quality of life measures 2010* (pp. 87-99). Springer New York.
6. Bosma H, Dike van de Mheen H, Borsboom GJ, Mackenbach JP. Neighborhood socioeconomic status and all-cause mortality. *American Journal of Epidemiology.* 2001 Feb 15;153(4):363-71.
7. Van Os J, Driessens GE, Gunther N, Delespaul P. Neighbourhood variation in incidence of schizophrenia. *The British Journal of Psychiatry.* 2000 Mar 1;176(3):243-8.
8. Croudace TJ, Kayne R, Jones PB, Harrison GL. Non-linear relationship between an index of social deprivation, psychiatric admission prevalence and the incidence of psychosis. *Psychological medicine.* 2000 Jan;30(1):177-85.
9. Diez-Roux AV, Nieto FJ, Muntaner C, Tyroler HA, Comstock GW, Shahar E, Cooper LS, Watson RL, Szklo M. Neighborhood environments and coronary heart disease: a multilevel analysis. *American journal of epidemiology.* 1997 Jul 1;146(1):48-63.
10. Roux AV, Merkin SS, Arnett D, Chambless L, Massing M, Nieto FJ, Sorlie P, Szklo M, Tyroler HA, Watson RL. Neighborhood of residence and incidence of coronary heart disease. *New England Journal of Medicine.* 2001 Jul 12;345(2):99-106.
11. Kalff AC, Kroes M, Vles JS, Hendriksen JG, Feron FJ, Steyaert J, Van Zeben TM, Jolles J, van Os J. Neighbourhood level and individual level SES effects on child problem behaviour: a multilevel analysis. *Journal of Epidemiology & Community Health.* 2001 Apr 1;55(4):246-50.
12. Brooks-Gunn J, Duncan GJ, Klebanov PK, Sealander N. Do neighborhoods influence child and adolescent development?. *American journal of sociology.* 1993 Sep 1;99(2):353-95.
13. Stafford M, Marmot M. Neighbourhood deprivation and health: does it affect us all equally?. *International journal of epidemiology.* 2003 Jun 1;32(3):357-66.
14. Reijneveld SA. Neighbourhood socioeconomic context and self reported health and smoking: a secondary analysis of data on seven cities. *Journal of Epidemiology & Community Health.* 2002 Dec 1;56(12):935-42.
15. Pearce J, Witten K, Bartie P. Neighbourhoods and health: a GIS approach to measuring community resource accessibility. *Journal of Epidemiology & Community Health.* 2006 May 1;60(5):389-95.
16. Mejeed A, Bardsley M, Morgan D, O'sullivan C, Bindman AB. Cross sectional study of primary care groups in London: association of measures of socioeconomic and health status with hospital admission rates. *Bmj.* 2000 Oct 28;321(7268):1057-60.
17. Hamel D, Pampalon R. Trauma and deprivation in Québec. *Institut national de santé publique du Québec;* 2002.
18. Martinez J, Pampalon R, Hamel D. Deprivation and stroke mortality in Quebec. *Chronic Diseases and Injuries in Canada.* 2003 Apr 1;24(2/3):57.
19. Philibert MD, Pampalon R, Hamel D, Thoeuz JP, Loiselle CG. Material and social deprivation and health and social services utilisation in Quebec: a local-scale evaluation system. *Social science & medicine.* 2007 Apr 30;64(8):1651-64.
20. Xie F, Pullenayegum E, Gaebel K, Bansback N, Bryan S, Ohinmaa A, Poissant L, Johnson JA. A time trade-off-derived value set of the EQ-5D-5L for Canada. *Medical care.* 2016 Jan;54(1):98.
21. Alberta Government. Canadian Deprivation Index. [2015] Available From: <https://open.alberta.ca/opendata/canadian-deprivation-index-cdi-alberta#summary> [Accessed 19th July 2017]
22. Mackenbach JP. Socioeconomic inequalities in health in the Netherlands: impact of a five year research programme. *Bmj.* 1994 Dec 3;309(6967):1487-91.
23. Eachus J, Williams M, Chan P, Smith GD, Grainge M, Donovan J, Frankel S. Deprivation and cause specific morbidity: evidence from the Somerset and Avon survey of health. *Bmj.* 1996 Feb 3;312(7026):287-92.

## References

24. Brown AF, Ang A, Pebley AR. The relationship between neighborhood characteristics and self-rated health for adults with chronic conditions. *American Journal of Public Health*. 2007 May; 97(5):926-32.
25. McLean G, Gunn J, Wyke S, Guthrie B, Watt GC, Blane DN, Mercer SW. The influence of socioeconomic deprivation on multimorbidity at different ages: a cross-sectional study. *Br J Gen Pract*. 2014 Jul 1;64(624):e440-7.
26. Lee RE, Cubbin C. Neighborhood context and youth cardiovascular health behaviors. *American Journal of Public Health*. 2002 Mar;92(3):428-36.
27. Reijneveld SA. Neighbourhood socioeconomic context and self reported health and smoking: a secondary analysis of data on seven cities. *Journal of Epidemiology & Community Health*. 2002 Dec 1;56(12):935-42.
28. Peat JK, Dickerson J, Li J. Effects of damp and mould in the home on respiratory health: a review of the literature. *Allergy*. 1998 Feb 1;53(2):120-8.
29. Khaw KT. Temperature and cardiovascular mortality. *The Lancet*. 1995 Feb 11;345(8946):337-8.
30. Hopton JL, Hunt SM. Housing conditions and mental health in a disadvantaged area in Scotland. *Journal of Epidemiology & Community Health*. 1996 Feb 1;50(1):56-61.
31. Bobak M, Pikhart H, Rose R, Hertzman C, Marmot M. Socioeconomic factors, material inequalities, and perceived control in self-rated health: cross-sectional data from seven post-communist countries. *Social science & medicine*. 2000 Nov 1;51(9):1343-50.
32. Drukker M, van Os J. Mediators of neighbourhood socioeconomic deprivation and quality of life. *Social psychiatry and psychiatric epidemiology*. 2003 Dec 1;38(12):698-706.
33. Poortinga W, Dunstan FD, Fone DL. Neighbourhood deprivation and self-rated health: the role of perceptions of the neighbourhood and of housing problems. *Health & place*. 2008 Sep 30;14(3):562-75.
34. Eric Notebook. Cross-sectional Studies. [Second Edition] Available From: [https://sph.unc.edu/files/2015/07/nciph\\_ERIC8.pdf](https://sph.unc.edu/files/2015/07/nciph_ERIC8.pdf). [Accessed 29<sup>th</sup> July 2017]
35. Statistics Canada. Residential Telephone Service Survey. [2013] Available From: <http://www.statcan.gc.ca/daily-quotidien/140623/dq140623a-eng.htm>. [Accessed 29<sup>th</sup> July 2017]
36. Henkel D, Zengin U. Social inequality and substance use and problematic gambling among adolescents and young adults: a review of epidemiological surveys in Germany. *Current drug abuse reviews*. 2016 Apr 1;9(1):26-48.
37. Bonevski B, Regan T, Paul C, Baker AL, Bisquera A. Associations between alcohol, smoking, socioeconomic status and comorbidities: evidence from the 45 and Up Study. *Drug and alcohol review*. 2014 Mar 1;33(2):169-76.
38. Kino S, Bernabé E, Sabbah W. Socioeconomic inequality in clusters of health-related behaviours in Europe: latent class analysis of a cross-sectional European survey. *BMC public health*. 2017 May 23;17(1):497.
39. Together We Raise Tomorrow. Alberta's Poverty Reduction Strategy. Discussion Paper [2013] Available From: <https://open.alberta.ca/dataset/11df4303-b795-4c7d-a2bf-5dc1c70fd24/resource/28faa2ba-8242-4f10-af69-94e8be659a73/download/6881615-2013-Together-We-Raise-Tomorrow-Albertas-Poverty-Reduction-Strategy-2013-06.pdf>. [Accessed 30<sup>th</sup> July 2017]
40. Together We Raise Tomorrow. Alberta's Poverty Reduction Strategy. Summing Up. [2013] Available From: <http://www.humaneservices.alberta.ca/documents/spf-summing-up-poverty-reduction.pdf>. [Accessed 5<sup>th</sup> August 2017]