

Impacts of Individual/Household Socio-Economic Conditions and Area Environment on Health in Australia, Using Five-Wave Panel Data of HILDA Surveys

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Motivation and Purpose (1)

- In addition to human's biological factors, health is a result of interaction of individual's micro-level socio-economic factors and area - environmental factors.
- Most previous research in economics, health care or other social sciences has been the reliance on cross-sectional survey data.
- Cross-sectional data provides point-in-time snapshots but cannot tell us about the change occurring within the same individuals over time.

Motivation and Purpose (2)

- This paper uses 5-year longitudinal data to study impacts of changes in individual's socio-economic condition and the area living environment on personal health status in Australia.
- This study has important policy implication because its findings can help policy makers to decide the priorities in allocating limited public resources between different areas or states.

Data (1)

- Household Income and Labour Dynamics in Australia (HILDA) is
 - Australian's first large-scale
 - nation-wide
 - representative
 - household
 - panel survey
- The first wave of HILD survey started in 2001 and continued each year since then.

Data (2)

- The content of HILDA includes the following household and the individual level information:
 - household composition,
 - dwelling characteristics,
 - child care,
 - housing/household finances,
 - person's country of birth and language,
 - family background,
 - education,
 - employment history and status,

Data (3)

- persons in paid employment and not in paid employment,
- income,
- family formation,
- parenting,
- life situation,
- interview situation,
- general health and well-being,
- lifestyle and living situation,
- personal and household finances,
- attitudes and values about work and gender roles,
- job/workplace

Data (4)

- One of the purposes of this study is to examine the environmental impact of a specific location on individuals' health in Australia, hence, this paper has conducted statistical analysis among individuals who
 - were born in Australia and
 - had not changed their residential places during 2001 to 2005.

Methods (1)

- The outcome (dependent) variables of this study are the self-reported Short Form 36 (SF-36) measurements of health status. There are eight specific dimensions included:
 - physical function,
 - social function,
 - mental health,
 - general health,
 - bodily pain,
 - vitality,
 - role-physical,
 - role-emotional

Methods (2)

- Independent variables indicate personal demographic characteristics, individual or household socio-economic conditions, and the area an individual or household lives
 - 1) *Personal demographic characteristics, including*
 - Age
 - **Gender**: a dummy variable – male (female is the base of comparison)
 - **Ethnicity**: a dummy variable (non-aboriginal Australian is the base of comparison)
 - **Pre-existing health status**: health score of last year (the higher score the healthier)

Methods (3)

- *2) Individual/household socio-economic conditions, including*
 - **Working status:** there are two dummy variables, i.e., ‘being unemployed’ and ‘not in labour force’, and for both dummy variables, ‘being employed’ is the base of comparison
 - **Personal income:** last financial year gross wages and salary
 - **Number of bed rooms:** an indicator of the size of dwelling
 - **Physical condition of dwelling (judged by the interviewer):** being recoded as the higher the score, the better the physical condition of the house
 - **Household weekly grocery expenditures:** an indicator of the level of household living expenses
 - **Household weekly expenditures of meals eating outside:** an indicator of the level of household wealth

Methods (4)

– 3) *Area environment condition, including*

- **State of residency:** seven dummy variables – New South Wales, Queensland, South Australia, West Australia , Tasmania , Northern Territory, Australian Capital Territory (Victoria is the base of comparison).
- **Remoteness in the state:** four level of remoteness defined by the size of population. There are three dummy variables: ‘other-urban’, ‘bounded-locality’, ‘rural-balance’ (major-urban is the base of comparison)

Methods (5)

- Statistical modelling are conducted separately for aboriginal Australians, and non-aboriginal Australians.
- Panel-corrected standard errors are used in analysis by employing STATA econometrics software version 9.
- A 2-stage random-effect model is employed due to the endogeneity problem of health and income

Methods (6)

- The generic model is specified as below:

$$y_{it} = \alpha_{it} + \beta X_{it} + \theta Q_{iT} + \omega_{it}$$

Where

y_{it} is the self reported health score of i^{th} respondent in year (wave) t

α_{it} is the intercept of i^{th} respondent in year (wave) t

β is the coefficient of X_{it}

X_{it} is a vector of independent (explanatory) variables of i^{th} respondent in year (wave) t

θ is the coefficient of Q_{iT}

Q_{iT} is a vector of interaction terms of wave and socio-economic factors or regional factors of i^{th} respondent in year (wave) t

ω_{it} is the random error of i^{th} respondent in year (wave) t

Model 1~8 (and Model 9~16): Aboriginal (and Non-Aboriginal) Australian panel estimation (main)

$$\begin{aligned} \text{Derived Health Score}_{ij} = & \alpha_{ij} + \beta_{1ij} \text{Age} + \beta_{2ij} \text{Male} + \\ & \beta_{3ij} \text{Unemployed} + \beta_{4ij} \text{NotInLabourforce} + \\ & \beta_{5ij} \text{annual wages and salary} + \\ & \beta_{6ij} \text{BedRooms} + \beta_{7ij} \text{HouseCondition} + \\ & \beta_{8ij} \text{LastYearHealthScore} + \\ & \beta_{9ij} \text{GroceryExpense} + \beta_{10ij} \text{EatOutExpense} \\ & + \beta_{11ij} \text{NSW} + \beta_{12ij} \text{QLD} + \beta_{13ij} \text{SA} + \\ & \beta_{14ij} \text{WA} + \beta_{15ij} \text{TAS} + \beta_{16ij} \text{NT} + \beta_{17ij} \text{ACT} \\ & + \beta_{18ij} \text{OtherUrban} + \beta_{19ij} \text{BoundLocal} + \\ & \beta_{20ij} \text{RuraBalance} + \varepsilon_{ij} \end{aligned}$$

Model 1~8 (and Model 9~16): Aboriginal
(and Non-Aboriginal) Australian panel
estimation (instrumented)

$$\begin{aligned} \text{Annual wages and salary}_{ij} = & \alpha_{ij} + \beta_{1ij} \text{Age} + \\ & \beta_{2ij} \text{Male} + \beta_{3ij} \text{Unemployed} + \\ & \beta_{4ij} \text{NotInLabourforce} + \\ & \beta_{5ij} \text{Derived Health Score} + \varepsilon_{ij} \end{aligned}$$

Results

Table 1. Impacts of Social-Economic and Environmental Factors on Health of Aboriginal Australian, 2-Stage Random Effect Panel Estimations

HealthScore Independent Variables	1. Physical Function β (p value)	2. Role- Physical β (p value)	3. Bodily Pain	4. General Health β (p value)	5. Mental Health β (p value)	6. Social Function β (p value)	7. Role- Emotional β (p value)	8. Vitality β (p value)	9. Total β (p value)
<i>Male</i>							<i>0.97 (0.01)*</i>		
<i>Unemployed</i>							<i>-19.016 (0.01)*</i>		
<i>Age</i>	<i>-0.20(0.01)*</i>								
Last Year Health Score	0.05 (0.00)**	0.04 (0.03)*	0.06 (0.01)*	0.06 (0.00)**	0.06 (0.00)**	0.08 (0.00)**	0.06 (0.00)**	0.06 (0.00)**	0.51 (0.00)**
NSW									-56.54 (0.04)*
QLD									-76.25 (0.01)*
SA						-16.20(0.02)*			-71.74 (0.02)*
WA				-18.20 (0.02)*		-13.94 (0.04)*	-12.41(0.04)*		-82.11 (0.01)*
ACT					-22.07 (0.02)*	-21.08 (0.05)*			-97.72 (0.04)*
BoundedLocalit y		12.68 (0.04)*							
Overall R- Squared	0.33	0.17	0.17	0.25	0.35	0.25	0.25	0.38	0.46

Note: 1. N=146; 2. Only significant coefficients are presented.; 3. Italic variables and coefficients are also estimated in the second stage estimation; 4. *: p<0.05, **: p<0.01

Table 2. Impacts of Social-Economic and Environmental Factors on Health of Non-Aboriginal Australian, 2-Stage Random Effect Panel Estimations (to be continued on next page)

HealthScore Independent Variables	1. Physical Function β (p value)	2. Role- Physical β (p value)	3. Bodily Pain	4. General Health β (p value)	5. Mental Health β (p value)	6. Social Function β (p value)	7. Role- Emotional β (p value)	8. Vitality β (p value)	9. Total β (p value)
<i>Annual Income</i>	0.00 (0.00)**	0.00 (0.00)**	0.00 (0.00)**		0.00 (0.00)**			-0.00 (0.00)**	
<i>Male</i>				-2.44 (0.00)**	1.18 (0.00)**	0.68 (0.04)*	0.96 (0.02)*	2.84 (0.00)**	
<i>Unemployed</i>								5.39 (0.00)**	
<i>Not in Labour Force</i>	-2.38 (0.00)**	-1.83 (0.00)**						1.10 (0.01)*	
<i>Age</i>	-0.30(0.00)**	-0.14 (0.00)**	-0.15 (0.00)**	-0.05 (0.00)**	0.15 (0.00)**	0.06 (0.00)**	0.03 (0.01)*	0.11(0.00)**	-0.24 (0.00)**
<i>Condition of House</i>			0.45 (0.04)*	0.74 (0.00)**	0.36 (0.02)*	0.42 (0.02)*	0.79 (0.00)**	0.58 (0.00)**	3.55 (0.00)**
<i>Last Year Health Score</i>	0.05 (0.00)**	0.06 (0.00)**	0.07 (0.00)**	0.07 (0.00)**	0.05 (0.00)**	0.06 (0.00)**	0.04 (0.00)**	0.07 (0.00)**	0.55 (0.00)**
<i>Grocery Expenditure</i>								-0.04 (0.05)*	
<i>QLD</i>			-1.77 (0.00)**						
<i>WA</i>			-1.67 (0.03)*						
<i>OtherUrban</i>			-1.27 (0.01)*		0.85 (0.03)*				
<i>Bounded Locality</i>								2.08 (0.04)*	

Table 2. Impacts of Social-Economic and Environmental Factors on Health of Non-Aboriginal Australian, 2-Stage Random Effect Panel Estimations (continued)

HealthScore Independent Variables	1. Physical Function β (p value)	2. Role-Physical β (p value)	3. Bodily Pain	4. General Health β (p value)	5. Mental Health β (p value)	6. Social Function β (p value)	7. Role-Emotional β (p value)	8. Vitality β (p value)	9. Total β (p value)
Rural Balance			-1.34 (0.02)*				-1.09 (0.05)*		
Overall R-Squared	0.28	0.15	0.22	0.32	0.24	0.19	0.09	0.30	0.44

Note: 1. N=9985; 2. Only significant coefficients are presented.; 3. Italic variables and coefficients are also estimated in the second stage estimation; 4. *: p<0.05, **: p<0.01

Table 3 Summary of directions of significant explanatory variables of each health dimension for aboriginal and non-aboriginal Australian

	Physical Function		Role physical		Bodily pain		General health		Mental health		Social function		Role emotion		Vitality		
	A	NonA	A	NonA	A	NonA	A	NonA	A	NonA	A	NonA	A	NonA	A	NonA	
Income				+/0		+/0											+/0
Age	-	-		-		-		-		+		+		+			+
Male								-		+		+		+			+
Unemployed														-			+
Not in labour		-		-													+
Condition of dwelling						+		+		+		+		+			+
Last year health	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
QLD						-											
SA												-					
WA						-		-				-					
ACT										-		-					
Other-urban						-					+						
Bounded locality				+													+
Rural balance						-								-		-	

Note: A: aboriginal Australian; NonA: non-aboriginal Australian

Conclusions and Discussions (1)

- Firstly, last year's health condition is highly associated with this year's health condition. Incorporating this 'obvious' variable in all of my models is for the sake of 'control', i.e., when the impact of last year's health condition is controlled, the impacts of other independent variables can be specified.
- However, last year's health is a very good predictor of current or future health and is useful in health planning and policy making

Conclusions and Discussions (2)

- Secondly, aging produces a negative impact on physical health for both aboriginal and non-aboriginal Australians, but it produces a positive impact on mental health for non-aboriginal Australians.
- It implies that older people who may be less healthy in a physical sense for any human being, but have a better emotional being due to getting wiser or at a later life stage where having less stress due to employment or raising children etc.

Conclusions and Discussions (3)

- But aging doesn't significantly impact on aboriginals' mental well being. It may imply that the support from kinship and wider community structure could make a difference for people who are at the age (or life stage) of raising child or employment.
- Thus, for health planning and policy making, these findings can provide insights for dealing with different needs of aboriginal and non-aboriginal Australians.

Conclusions and Discussions (4)

- Thirdly, personal annual income usually is found to be positively associated with individual's health in cross-sectional studies, but it is insignificant in this panel analysis, after the correction of endogeneity problem between health and income (by the 2-stage panel estimation process)

Conclusions and Discussions (5)

- The first explanation is that the changes in income and health status of a particular individual may be too small during the five-year time, thus the relationship between income and health cannot be shown. This explanation can be verified when more waves of panel data across longer period of time are available in the future.

Conclusions and Discussions (6)

- The second explanation is that perhaps the overall level of a household's wealth is more important than personal income in predicting individual health. This is supported by the finding of this study in terms of the physical condition of dwelling (rather than personal income) is significantly related to personal health. The physical condition of dwelling is actually an aggregate indicator of the wealth of the household and the quality of a most intimate and daily living environment of the person.

Conclusions and Discussions (7)

- The fourth major finding is regarding a unique health pattern among aboriginal Australians. For most of the dimensions of personal health, most of the individual-level demographic or socio-economic variables (such as age, gender, income, working status and dwelling condition) don't have a significant impact on the health of aboriginal Australians.

Conclusions and Discussions (8)

- A significant factor to aboriginal Australians' health is actually at the level of state, i.e., aboriginal Australians living in Victoria reported having better health than aboriginal Australians living in most of other states.
- Such inequality of health between states does not exist among non-aboriginal Australians.

Conclusions and Discussions (9)

- Finally, the cases living in Northern Territory was automatically dropped from the multi-variate longitudinal analysis due to the total number of good-quality aboriginal cases in Northern Territory being too small.
- Thus, it is necessary to draw an over representative sample for aboriginal Australians, especially for aboriginal Australians living in Northern Territory in future HILDA surveys so that further meaningful analysis regarding aboriginals' health can be conducted.

**Welcome and thank you
for questions and
comments**