

**Horizontal equity in the Australian healthcare system:
Exploring the unknowns and updating the knowns**

Mohammad Habibullah Pulok

A thesis submitted in fulfilment of the requirements for the degree of
Doctor of Philosophy in Health Economics

Centre for Health Economics Research and Evaluation (CHERE)

UTS Business School

University of Technology Sydney (UTS)

Submitted March 2019

Certificate of Authorship/Originality

I, Mohammad Habibullah Pulok, declare that this thesis is submitted in fulfilment of the requirements for the award of Doctor of Philosophy in Health Economics in the UTS Business School at the University of Technology Sydney.

This thesis is wholly my own work unless otherwise referenced or acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

This document has not been submitted for qualifications at any other academic institution.

Signature:

Production Note:
Signature removed prior to publication.

Date: 19 March 2019

This PhD is supported by an Australian Government Research Training Program. This research also gratefully acknowledges financial support from the Capital Markets Cooperative Research Centre (CMCRC), and the Australian Institute of Health and Welfare (AIHW).

Ethical approval

Ethics approval has been sought and obtained from the University of Technology Sydney Human Research Ethics Committee (UTS HREC). The ethics application number of this PhD research is UTS HREC ETH17-1317.

Acknowledgements

For me, a PhD is more than a degree. I consider this PhD as the beginning of my research career and it has now become an integral part of my life. My journey towards this PhD has been exciting, enlightening, and a challenging experience. I am very much pleased to have met all the challenges and frustrations to reach this incredibly special moment of my life. I would like to take this opportunity to express my gratitude to many people who have been exceedingly kind and supportive in many ways during my PhD journey.

My heartiest acknowledgement to the members of my supervisory panel, Professor Jane Hall, Associate Professor Kees van Gool and Professor Rosalie Viney. This thesis would not be completed without the invaluable guidance from my principal supervisor Jane Hall. In one word, Jane has been *amazing*. I am deeply grateful for her tremendous support in many ways from the beginning to the end of my PhD. Kees has always been very keen to answer my questions with his prudence. His endurance and eagerness to resolve various issues related to econometrics and data access has paved the way for me to successfully complete this thesis. I am grateful to Kees for his company in various meetings and conferences during my PhD candidature. His meticulous review of various chapters has enormously improved the content of my thesis. I thank Rosalie for her overall support during my PhD.

I will always remember the inspiration and encouragement from all the members of CHERE. I am very much indebted to my PhD colleagues at CHERE for their valuable suggestions over the last three years. Special thanks to Rebecca Addo and Michael Wright. I am thankful to Dr Thomas Longden and Dr Serena Yu for their advice which have advanced my econometric knowledge. Many thanks to the administrative staffs (Gretchen, Lili, Liz, and Vanessa) of CHERE who have made my PhD life easier.

I am grateful to the Australian Institute of Health and Welfare (AIHW) for giving me permission to use the Medicare Benefit Schedule data. My cordial thanks to Bill Watson for his valuable support in my time at the AIHW. I express my acknowledgment to the Australian Bureau of Statistics (ABS) for providing me with the National Health Survey of 2011-12 & 2014-15 and the Australian Aboriginal and Torres Strait Islander Health Survey (AATSIHS) 2012-13 data. I would like to thank Kim McCosker and Barry Tynan from the ABS who patiently validated my STATA programme files to conduct the statistical analysis.

I am very much thankful to Professor Owen O'Donnell and Professor Tom Van Ourti from the Erasmus University Rotterdam for their comments and suggestions to improve the overall quality of my thesis. I would like to thank Professor Stephen Birch from the University of Queensland for his valuable comments to improve the content of the thesis. Special thanks to Dr Sara Allin who has hosted me as a visiting PhD student at the University of Toronto, Canada and guided me in various aspects of the thesis. I thank Dr Kim McGrail from the University of British Columbia who has advised me at various stages of my PhD. I am also grateful to Marion Mapham, Publications Editor (www.uwriteiedit.com), who edited and proofread the thesis, with editorial intervention restricted to Standards D and E of the *Australian Standards for Editing Practice*, as stipulated by the *Guidelines for Editing Research Theses*.

I would like to acknowledge the financial support that I have received from the Research Training Programme Scholarship (UTS International Research Scholarship) for my PhD research. My sincere acknowledgement to the Capital Markets Cooperative Research Centre (CMCRC) for providing me with the generous PhD stipend. I take this opportunity to thank Dr Federico Girosi for inspiring me to apply for this scholarship. I am thankful to the Centre for Health Economics Research and Evaluation (CHERE) and the UTS Business School for the additional financial support which enabled me to attend several conferences in Australia and abroad during my candidature.

Finally, it would not be possible to have reached this stage of my life without the unconditional care and love from my beloved parents, and I would like to express my deep respect and love for them. I am thankful to all my family members and friends who have supported me throughout my life. My lovely wife, Farhana has shown the highest level of patience to support me in completing this thesis. Her understanding of this intellectual journey has been priceless and will be inspirational for my future career.

Table of Contents

Certificate of Authorship/Originality.....	i
Ethical approval	ii
Acknowledgements.....	iii
Table of Contents.....	v
List of Tables	viii
List of Figures	ix
List of Abbreviations	x
Abstract.....	xii
Chapter 1: Introduction.....	1
1.1 Background.....	1
1.2 Australian healthcare system	2
1.3 Conceptual framework: Equity in healthcare as a performance indicator	3
1.4 Research motivation and objectives.....	6
1.5 Thesis outline	8
Chapter 2: Equity in healthcare: A conceptual review.....	11
2.1 Introduction.....	11
2.2 Equity in health: The definition	11
2.3 Distinction between inequity and inequality.....	13
2.4 Equity in healthcare	14
2.5 Horizontal versus vertical equity in healthcare.....	15
2.6 Access to healthcare: Utilisation or use as a measure of access	16
2.7 Conclusion	17
Chapter 3: Measuring inequity in healthcare: A review of methodological development.....	18
3.1 Introduction.....	18
3.2 Measurement of health and healthcare inequality.....	19
3.2.1 <i>The Gini health index and related health Lorenz curve</i>	20
3.2.2 <i>The concentration index and related concentration curve</i>	22
3.3 Measuring and explaining horizontal inequity in healthcare use.....	25
3.3.1 <i>Identifying inequity: The regression approach</i>	26
3.3.2 <i>Measuring inequity: The concentration index approach</i>	27
3.3.3 <i>Explaining horizontal inequity: The decomposition approach</i>	31
3.4 Debates and developments.....	33
3.4.1 <i>Measurement scale and bounds of healthcare variables</i>	33
3.4.2 <i>Evaluation of the decomposition approach</i>	35
3.4.3 <i>Measuring socioeconomic status</i>	36
3.4.4 <i>Longitudinal perspective</i>	37
3.4.5 <i>Application of administrative data</i>	38
3.5 Conclusion	40

Chapter 4: Inequity in healthcare use: An empirical review	41
4.1 Introduction	41
4.2 Empirical evidence from the OECD countries.....	42
4.3 Empirical evidence from Australia	48
4.4 Empirical evidence: Application of administrative data	51
4.5 Conclusion	53
Chapter 5: Horizontal inequity of healthcare: Updated and extended evidence from Australia.	56
5.1 Introduction.....	57
5.2 Empirical strategy	58
5.3 Data and variable	63
5.3.1 <i>Data source and access</i>	63
5.3.2 <i>Analytic sample</i>	64
5.3.3 <i>Measure of healthcare utilisation</i>	64
5.3.4 <i>Independent variables</i>	65
5.4 Results.....	68
5.4.1 <i>Descriptive statistics</i>	68
5.4.2 <i>Determinants of healthcare use</i>	69
5.4.3 <i>Horizontal inequity in healthcare use</i>	73
5.4.4 <i>Regional variation in horizontal inequity of healthcare use</i>	74
5.4.5 <i>Robustness results</i>	78
5.5 Discussion.....	80
5.6 Conclusion	84
Chapter 6: Horizontal inequity in doctor visits in Australia	85
6.1 Introduction.....	86
6.2 Physician service provision, OOP cost and equity in Australia.....	88
6.3 Empirical method.....	90
6.3.1 <i>Measuring and explaining inequity</i>	90
6.3.2 <i>Econometric issues</i>	92
6.4 Description of data and variables.....	93
6.4.1 <i>Data source and sample</i>	93
6.4.2 <i>Dependant variables</i>	94
6.4.3 <i>Explanatory variables</i>	94
6.5 Results.....	96
6.5.1 <i>Summary statistics</i>	96
6.5.2 <i>Regression results</i>	99
6.5.3 <i>Concentration and horizontal indices</i>	106
6.5.4 <i>Decomposition analysis</i>	107
6.6 Conclusion	114

Chapter 7: Inequality in specialist care: Evidence from Australian Medicare data	118
7.1 Introduction.....	119
7.2 Materials and Method	121
7.3 Results.....	125
7.4 Discussion.....	138
7.5 Conclusion	140
Chapter 8: Inequity in healthcare use within Indigenous Australians.....	142
8.1 Introduction.....	143
8.2 Methodology	145
8.3 Data and variables.....	149
8.4 Results.....	151
8.5 Discussion.....	162
8.6 Conclusion	164
Chapter 9: Conclusion.....	165
9.1 Introduction.....	165
9.2 Thesis summary and major findings	166
9.3 Policy implications.....	169
9.4 Thesis contributions	171
9.5 Thesis limitations	172
9.6 Avenues for future research	173
Appendix: 5.....	175
Appendix: 6.....	189
Appendix: 7.....	197
Appendix: 8.....	201
References.....	202

List of Tables

Table 5.1: Description of independent variables	67
Table 5.2: Summary statistics of healthcare utilisation in Australia.....	68
Table 5.3: Logistic regression models for any visit and GP, specialist, and dentist visit	71
Table 5.4: Logistic regression models for utilisation of hospital-related care	72
Table 5.5: Erreygers's inequality and horizontal inequity indices of healthcare use.....	74
Table 5.6: Robustness of inequity estimates (EHI) using different ranking variables.....	79
Table 5.7: Summary of inequality and inequity in healthcare use	81
Table 6.1: Summary statistics of GP and specialist visit.....	97
Table 6.2: Regression models for GP visit	101
Table 6.3: Regression models for specialist visit.....	103
Table 6.4: Inequality and inequity in GP and specialist visit.....	107
Table 6.5: Decomposition results for GP visits	109
Table 6.6: Decomposition results for specialist visits.....	111
Table 7.1: Summary statistics of the number of specialist visits by independent variables.....	126
Table 7.2: Count Data regression of specialist visit (All).....	130
Table 7.3: Count Data regression of specialist visit (Non-bulk-billed)	132
Table 7.4: Count data regression of specialist visit (Bulk-billed).....	134
Table 7.5: Relative inequality in specialist visit (standard concentration index).....	136
Table 8.1: Descriptive statistics of the independent variables.....	152
Table 8.2: Health service utilisation (proportion) by the independent variables	154
Table 8.3: Logistic regression results of the probability four types of healthcare use.....	156
Table 8.4: Erreygers's decomposition for the probability specialist visit.....	161

List of Figures

Figure 3.1: Example of health Lorenz curve.....	21
Figure 3.2: Example of the concentration curve of healthcare service use.....	23
Figure 3.3: The concentration curves for medical care and need.....	28
Figure 5.1: Regional variation of horizontal inequity in any visit.....	75
Figure 5.2: Regional variation of horizontal inequity in GP visit.....	76
Figure 5.3: Regional variation of horizontal inequity in specialist visit.....	76
Figure 5.4: Regional variation of horizontal inequity in dentist visit.....	76
Figure 5.5: Regional variation of horizontal inequity in inpatient admission.....	77
Figure 5.6: Regional variation of horizontal inequity in outpatient visit.....	77
Figure 5.7: Regional variation of horizontal inequity in emergency visit.....	77
Figure 5.8: Regional variation of horizontal inequity in day clinic visit.....	78
Figure 6.1: Distribution of visit to GP and specialist by income and SEIFA quintiles.....	98
Figure 6.2: Distribution of GP and specialist visits in last 12 months.....	105
Figure 6.3: Components of horizontal inequity in GP visits.....	113
Figure 6.4: Components of horizontal inequity in specialist visits.....	114
Figure 7.1: State and territory variation of inequality in all specialist visit.....	137
Figure 7.2: State and territory variation of inequality in non-bulk-billed specialist visit.....	137
Figure 7.3: State and territory variation of inequality in bulk-billed specialist visit.....	137
Figure 8.1: Health insurance and concession card by income quintile and SAH.....	153
Figure 8.2: Distribution of specialist visit by quintiles and deciles of income.....	157
Figure 8.3: Concentration curves of specialist visit.....	158
Figure 8.4: Income-related inequality and horizontal inequity in specialist visit.....	159
Figure 8.5: Summary of the decomposition results for specialist visits.....	161

List of Abbreviations

AATISH	Australian Aboriginal and Torres Strait Islander Health Survey
ABS	Australian Bureau of Statistics
AIHW	Australian Institute of Health and Welfare
BTOS	Broad type of services
BTOS	Broad type of services
CC	Concentration curve
CI	Concentration index
EI	Erreygers's index
FFS	Fee-for-service
GCI	Generalised concentration index
GDP	Gross domestic product
GP	General practitioner
HI	Horizontal Inequity
HILDA	Household, Income and Labour Dynamics in Australia
LTC	Long-term conditions
MBS	Medicare Benefit Schedule
NB	Negative binomial
NHS	National Health Survey
OECD	Organisation for Economic Cooperation and Development
OLS	Ordinary least square
OOP	Out-of-pocket
OR	Odds ratio
PBS	Pharmaceutical Benefits Scheme
PHI	Private health insurance
PHN	Primary health network
SAH	Self-assessed health
SDG	Sustainable development goal
SE	Standard error
SES	Socioeconomic status
UHC	Universal health coverage

UK	United Kingdom
USA	United States of America
WHO	World Health Organisation
WI	Wagstaff index

Abstract

Australia has a tax-funded universal health insurance system known as Medicare, which aims to ensure universal and equitable use of healthcare services. This thesis assesses the fairness of the Australian healthcare system in delivering healthcare services during the period of encouraging greater private healthcare financing. This thesis first measures the degree of horizontal inequity (unequal care for equal need) in eight indicators of healthcare use between 2011-12 and 2014-15. Secondly, it examines inequity in GP and specialist visit by making a distinction between the probability of visit and the conditional visit. Thirdly, this thesis investigates how co-payment is related to area-level socioeconomic inequality in Medicare-funded specialist care by using national administrative data. Finally, it measures and explains inequity in use of healthcare services within the non-remote Indigenous Australians.

The overall finding is that there was pro-rich inequity in use of out-of-hospital services while the utilisation of hospital-related services was almost equitable. There was a small degree of pro-rich inequity in the probability of GP visits, but significant pro-poor inequity in conditional visits to GP. On the contrary, there was considerable inequity in the probability of visiting a specialist favouring richer people. The distribution of conditional visits for this care was almost equitable, but it appears to be pro-rich when higher users were excluded from the analysis. Income, private health insurance, and education significantly accounted for pro-rich inequity while the contribution of concession card to inequity was pro-poor. The analysis of Medicare Benefit Schedule (MBS) data shows that inequality in specialist services was favourable to the individuals living in socioeconomically advantaged areas. Most importantly, this inequality was higher for visits with co-payment while there was almost no inequality in visits without co-payment. Finally, there was no evidence of inequity in the utilisation of GP services and inpatient admission within the Indigenous Australians. However, wealthier Indigenous Australians were higher users of specialist services than their poorer counterparts despite having similar levels of need. Pro-rich inequity in specialist services suggests the need for policy discussions to reform Medicare safety net arrangements so that poorer people have a chance to access larger benefits. Policy reforms should ensure that Medicare serves financially vulnerable and sicker people equitably.