

Prescription medicines, over-the-counter medicines and complementary and alternative medicines use in baby boomers and older South Australians and their association with health outcomes (as assessed by health services use and quality of life)

Bee Leng Per

BPharm, MSc

2017

**Faculty of Health Sciences
School of Medicine
Discipline of Medicine
Population Research and Outcome Studies
The University of Adelaide
Australia**

A Thesis submitted for the
degree of Doctor of Philosophy
at the University of Adelaide

Table of Contents

CHAPTER 1: INTRODUCTION	1
CHAPTER 2: LITERATURE REVIEW.....	5
2.1 DEFINITIONS OF AGEING	6
2.1.1 Ageing populations.....	6
2.1.2 Defining ageing.....	7
2.1.3 Defining baby boomers.....	7
2.1.4 Defining older people.....	9
2.2 THE PREVALENCE OF THE USE OF MEDICINES.....	9
2.2.1 Prescription medicines.....	10
2.2.2 Over-the-counter (OTC) medicines	12
2.2.3 Complementary and Alternative Medicines (CAM)	15
2.2.4 Polypharmacy.....	20
2.2.5 Concomitant use of medicines.....	24
2.2.6 Summary of prevalence of the use of medicines	26
2.3 TYPES OF MEDICINES USED.....	27
2.3.1 Main types of medicines used.....	27
2.4 PREDICTORS OF MEDICINES USE	29
2.4.1 Association between sociodemographic characteristics and medicines use	29
2.4.2 Association between health risk factors and medicines use.....	44
2.4.3 Association between chronic conditions and medicines use	57
2.4.4 Medicine use in baby boomers or older people with CVD	68
2.5 ASSOCIATION BETWEEN MEDICINES USE AND HEALTH OUTCOMES.....	69
2.5.1 Association between health services use and medicines use	70
2.5.2 Association between QoL and medicines use	73
2.6 AIMS OF THE STUDY.....	76
2.7 HYPOTHESES.....	76
CHAPTER 3: METHODOLOGY.....	78
3.1 INTRODUCTION.....	79
3.2 ETHICS.....	79
3.3 SOUTH AUSTRALIAN HEALTH OMNIBUS SURVEY (HOS)	79
3.3.1 Sampling procedure.....	80
3.3.2 Questionnaires.....	81
3.3.3 Pilot testing.....	86
3.3.4 Data collection.....	86
3.3.5 Response rate	86
3.3.6 Weighting	87
3.3.7 Validation	88
3.4 THE NORTH WEST ADELAIDE HEALTH STUDY (NWAHS)	88
3.4.1 Sampling procedure.....	88
3.4.2 Questionnaires.....	89
3.4.3 Outcome measures.....	94
3.4.4 Pilot testing.....	95
3.4.5 Data collection.....	95
3.4.6 Response Rate	96
3.4.7 Weighting	96
3.5 ANALYTICAL METHODS	97
3.5.1 Univariable Analysis	97
3.5.2 Multivariable analysis.....	98
3.5.3 Collinearity diagnostics.....	98
3.5.4 Logistic regression	99
3.5.5 Linear regression	99

3.6 STUDIES AND ANALYSES.....	100
3.7 SPECIFIC DATA CODING FOR MEDICINES	103
3.7.1 ATC coding for prescription medicines and OTC medicines	103
3.7.2 Coding for CAM.....	105
CHAPTER 4: PREVALENCE OF THE USE OF MEDICINES AMONG SA BABY BOOMERS AND OLDER PEOPLE.....	106
4.1 INTRODUCTION.....	107
4.2 DEMOGRAPHIC CHARACTERISTICS OF THE HOS & NWAHS PARTICIPANTS.....	107
4.2.1 Demographic characteristics of HOS 1	107
4.2.2 Demographic characteristics of HOS 2	108
4.2.3 Comparison of the demographic characteristics, HOS 1 & 2.....	108
4.2.4 Demographic characteristics of NWAHS	108
4.3 PREVALENCE OF THE USE OF PRESCRIPTION MEDICINES, OTC MEDICINES AND CAM OR COMBINATIONS OF THESE (HOS 1 & 2).....	110
4.3.1 Prevalence of the use of prescription medicines, OTC medicines and CAM or a combination of these, HOS 1	110
4.3.2 Prevalence of the use of prescription medicines, OTC medicines and CAM or a combination of these, HOS 2	113
4.3.3 Overall summary of the comparison of prevalence of the use of medicines, HOS 1 & 2	119
4.4 PREVALENCE OF THE USE OF MEDICINES (NWAHS).....	121
4.4.1 Prevalence of prescription medicine use	121
4.4.2 Prevalence of the OTC medicines use	121
4.4.3 Prevalence of CAM use	122
4.4.4 Prevalence of the use of combinations of prescription medicines and CAM	122
4.4.5 Prevalence of the use of combinations of prescription medicines, OTC and CAM.....	122
4.4.6 Prevalence of the use of polypharmacy and major polypharmacy.....	124
4.4.7 Prevalence of combinations of medicines, NWAHS	126
4.4.8 Concomitant use of prescription medicine with OTC medicines and/or CAM, NWAHS.....	127
4.4.9 Overall summary of the comparison of prevalence of the use of prescription medicines, OTC medicines, CAM or combination of these, NWAHS.....	130
4.5 MAIN GROUPS OF THE ANATOMICAL THERAPEUTIC CHEMICAL (ATC) CLASSIFICATION FOR EACH AGE GROUP (HOS 2).....	130
4.6 CONCLUSION	133
CHAPTER 5: THE RELATIONSHIP BETWEEN DEMOGRAPHIC CHARACTERISTICS AND MEDICINES USE FOR SA BABY BOOMERS AND OLDER PEOPLE	134
5.1 INTRODUCTION.....	135
5.2 MEDICINES USE BY DEMOGRAPHIC CHARACTERISTICS, HOS 1 & 2.....	135
5.2.1 Medicines use by demographic characteristics, HOS 1.....	135
5.2.2 Medicines use by demographic characteristics, HOS 2.....	138
5.3 THE RELATIONSHIP BETWEEN THE USE OF MEDICINES AND DEMOGRAPHIC CHARACTERISTICS	141
5.3.1 Univariable logistic regression analysis of demographic characteristics associated with medicines use, HOS 1.....	142
5.3.2 Multivariable logistic regression analysis of demographic characteristics associated with medicines use, HOS 1.....	143
5.3.3 Univariable logistic regression analysis of demographic characteristics associated with medicines use, HOS 2.....	147
5.3.4 Multivariable logistic regression analysis of demographic characteristics associated with medicines use, HOS 2.....	149
5.4 CONCLUSION	154
CHAPTER 6: THE RELATIONSHIP BETWEEN CHRONIC CONDITIONS AND HEALTH RISK FACTORS, AND MEDICINES USE FOR SA BABY BOOMERS AND OLDER PEOPLE.....	156
6.1 INTRODUCTION.....	157
6.2 PREVALENCE OF CHRONIC CONDITIONS FOR EACH AGE GROUP.....	157
6.2.1 The prevalence of the use of medicines for each chronic condition	158

6.3	PREVALENCE OF HEALTH RISK FACTORS FOR EACH AGE GROUP	164
6.4	BIOMEDICAL MEASUREMENTS	166
6.5	UNIVARIABLE LOGISTIC REGRESSION ANALYSIS OF DEMOGRAPHIC CHARACTERISTICS, CHRONIC CONDITIONS, HEALTH RISK FACTORS AND THE USE OF MEDICINES	167
6.5.1	<i>Univariable logistic regression analysis of demographic characteristics associated with medicines</i>	167
6.5.2	<i>Univariable logistic regression analysis of chronic conditions associated with medicines use</i>	169
6.5.3	<i>Univariable logistic regression analysis of health risk factors with medicines use</i>	170
6.5.4	<i>Univariable logistic regression analysis of biomedical measurements with medicines use</i>	171
6.6	MULTIVARIABLE LOGISTIC REGRESSION ANALYSIS OF DEMOGRAPHIC, CHRONIC CONDITIONS, HEALTH RISK FACTORS AND BIOMEDICAL MEASUREMENTS VARIABLES ASSOCIATED WITH MEDICINES USE	173
6.6.1	<i>Multivariable logistic regression analysis of demographic and health risk factors and biomedical measurement variables associated with prescription medicines use</i>	173
6.6.2	<i>Multivariable logistic regression analysis of demographic and health risk factors and biomedical measurement variables associated with OTC medicines use</i>	176
6.6.3	<i>Multivariable logistic regression analysis of demographic and health risk factors and biomedical measurement variables associated with CAM use</i>	178
6.6.4	<i>Multivariable logistic regression analysis of demographic and health risk factors and biomedical measurement variables associated with polypharmacy</i>	178
6.7	CONCLUSION	181
CHAPTER 7: THE ASSOCIATION BETWEEN MEDICINES USE AND HEALTH OUTCOMES AS MEASURED BY HEALTH SERVICES USE FOR SA BABY BOOMERS AND OLDER PEOPLE.....		183
7.1	INTRODUCTION.....	184
7.2	THE PREVALENCE OF USING HEALTH SERVICE OR GP VISIT IN LAST MONTH	185
7.2.1	<i>Prevalence of using health service or GP visit in last month, HOS 1</i>	185
7.2.2	<i>Prevalence of using health service or GP visit in last month, HOS 2</i>	185
7.2.3	<i>Proportion of respondents using any health service in the last month or at least one GP visit by age group, HOS 1 & 2</i>	187
7.3	THE PREVALENCE OF USING HEALTH SERVICE USE OR GP VISIT IN LAST MONTH BY DEMOGRAPHIC CHARACTERISTICS	187
7.4	RELATIONSHIP BETWEEN DEMOGRAPHIC CHARACTERISTICS AND HEALTH SERVICE OR GP VISIT	188
7.4.1	<i>Univariable logistic regression analysis of demographic characteristics and medicines use associated with health services use or GP visits, HOS 1</i>	188
7.4.2	<i>Multivariable logistic regression analysis of demographic characteristics and medicines use associated with health services use or GP visits, HOS 1</i>	188
7.4.3	<i>Univariable logistic regression analysis of demographic characteristics and medicines use associated with health services use or GP visits, HOS 2</i>	191
7.4.4	<i>Multivariable logistic regression analysis of demographic characteristics and medicines use associated with health services use or GP visits, HOS 2</i>	192
7.4.5	<i>Summary of the predictors for health services use and GP visits, HOS 1 & 2</i>	196
7.5	THE PREVALENCE OF USING HEALTH SERVICE OR GP VISIT IN THE PAST 12 MONTHS, NWAHS	198
7.5.1	<i>Prevalence of using health service or GP visit in the past 12 months</i>	198
7.5.2	<i>The prevalence of using health service or GP visit in the last 12 months by demographic characteristics, NWAHS</i>	199
7.5.3	<i>The prevalence of using health services or GP visits in the last 12 months by chronic conditions, NWAHS</i>	199
7.5.4	<i>The prevalence of using health services or GP visits in the last 12 months by health risk factors</i>	199
7.5.5	<i>The prevalence of using health services or GP visits in the last 12 months by biomedical measurements</i>	199
7.5.6	<i>The prevalence of using health services or GP visits in the last 12 months by medicines use</i>	200
7.6	RELATIONSHIP BETWEEN MEDICINES USE AND HEALTH SERVICES USE OR GP VISITS, NWAHS	201

7.6.1 Univariable logistic regression analysis of demographic characteristics, chronic conditions, health risk factors, biomedical measurements and medicines use associated with health services use	201
7.6.2 Multivariable logistic regression analysis of demographic characteristics, health risk factors, biomedical measurement and medicines use variables associated with health services use	202
7.7 SUMMARY OF THE ASSOCIATION BETWEEN MEDICINES USE INCLUDING PRESCRIPTION MEDICINES, OTC MEDICINES, CAM AND POLYPHARMACY AND HEALTH SERVICES USE AND GP VISITS.....	206
7.8 CONCLUSION	206
CHAPTER 8: THE ASSOCIATION BETWEEN MEDICINES USE AND HEALTH OUTCOMES AS MEASURED BY QUALITY OF LIFE FOR SA BABY BOOMERS AND OLDER PEOPLE.....	207
8.1 INTRODUCTION.....	208
8.2 QUALITY OF LIFE (PCS AND MCS) FOR BABY BOOMERS AND OLDER PEOPLE	208
8.2.1 PCS and MCS for each age group, HOS 1.....	208
8.2.2 PCS and MCS for each age group, HOS 2.....	209
8.2.3 Summary of PCS and MCS for each age group, HOS 1 and HOS 2.....	211
8.3 ASSOCIATION OF MEDICINES USE AND QoL (PCS AND MCS)	211
8.3.1 Association of prescription medicines use with QoL (PCS and MCS), HOS 1.....	211
8.3.2 Association of CAM use with QoL (PCS and MCS), HOS 1	211
8.3.3 Association of prescription medicine use and QoL (PCS and MCS), HOS 2	213
8.3.4 Association of OTC medicines use and QoL (PCS and MCS), HOS 2	213
8.3.5 Association of CAM use and QoL (PCS and MCS), HOS 2	213
8.3.6 Association of combination of medicines use and QoL (PCS and MCS), HOS 2.....	213
8.3.7 Summary.....	215
8.4 ASSOCIATION BETWEEN PRESCRIPTION USE (BY ATC CODE FIRST LEVEL) AND QoL (PCS AND MCS), HOS 2	218
8.5 SUMMARY	221
8.6 CONCLUSION	221
CHAPTER 9: RELATIONSHIP BETWEEN MEDICINES USE AND QUALITY OF LIFE WITH SA BABY BOOMERS AND OLDER PEOPLE WITH SPECIFIC FOCUS ON PEOPLE WITH CVD	222
9.1 INTRODUCTION.....	223
9.2 PREVALENCE OF CVD	223
9.3 DEMOGRAPHIC CHARACTERISTICS OF THOSE WITH CVD, NWAHS	223
9.4 PREVALENCE OF MEDICINES USE FOR PEOPLE WITH CVD, NWAHS	225
9.5 PREVALENCE OF CHRONIC CONDITIONS FOR THOSE WITH CVD, NWAHS.....	226
9.6 HEALTH RISK FACTORS FOR PEOPLE WITH CVD, NWAHS	227
9.7 BIOMEDICAL MEASUREMENTS FOR THOSE WITH CVD, NWAHS	228
9.8 PREDICTORS FOR THE USE OF PRESCRIPTION MEDICINE, OTC, CAM OR POLYPHARMACY FOR THOSE WITH CVD, NWAHS	229
9.8.1 Univariable logistic regression analysis of demographic characteristics, chronic conditions and health risk factors associated with medicines use among people with CVD, NWAHS.....	229
9.8.2 Multivariable logistic regression analysis of demographic and health risk factors and biomedical measurement variables associated with medicines use, NWAHS.....	242
9.9 ASSOCIATION BETWEEN USE OF MEDICINES AND QoL AMONG PEOPLE WITH CVD.	244
9.10 CONCLUSION	246
CHAPTER 10: DISCUSSION	247
10.1 INTRODUCTION	248
10.2 MEDICINES USE	248
10.2.1 Prescription medicine	248
10.2.2 OTC medicines	249
10.2.3 CAM.....	249
10.2.4 Combination of medicines use.....	252
10.2.5 Polypharmacy	253
10.3 DEMOGRAPHICS, RISK FACTORS AND CHRONIC CONDITION PREDICTORS ASSOCIATED WITH USE OF MEDICINES ..	255
10.3.1 Gender	255
10.3.2 Work status	256

10.3.3 Country of birth.....	257
10.3.4 Education level.....	258
10.3.5 Health Risk factors.....	258
10.3.6 Chronic Conditions.....	259
10.4 RELATIONSHIP BETWEEN MEDICINES USE AND HEALTH SERVICES USE OR GP VISITS.....	260
10.5 RELATIONSHIP BETWEEN MEDICINES USE AND QOL.....	260
10.6 RELATIONSHIP BETWEEN CVD AND MEDICINES USE.....	261
10.7 'WHITE COAT' DIFFERENCES.....	262
10.8 METHODOLOGICAL/DEFINITIONAL ISSUES.....	263
10.9 LIMITATIONS.....	264
10.10 STRENGTHS.....	265
10.11 FUTURE RESEARCH.....	266
10.12 CONCLUSION.....	266

List of Tables

Table 2.1: Literature related to prevalence of the use of prescription medicines in baby boomers or older people	11
Table 2.2: Literature related to prevalence of the OTC medicines use in baby boomers and older people	14
Table 2.3: Five domains of CAM categorized by NICM	16
Table 2.4: Literature related to prevalence of the use of CAM in baby boomers and older people	18
Table 2.5: Literature related to prevalence of the use of polypharmacy in baby boomers and older people	22
Table 2.6: Literature regarding concomitant use of medicines in baby boomers and older people.....	25
Table 2.7:Literature regarding main type of medicines use in baby boomers and older people.....	28
Table 2.8: Summary of the association between age and medicines use.....	31
Table 2.9: Summary of the association between gender and medicines use	32
Table 2.10: Summary of association between country of birth and medicines use	35
Table 2.11: Summary of the association between area of residence and medicines use	36
Table 2.12: Summary of the association between marital status and medicines use	38
Table 2.13: Summary of the association between education and medicines use	39
Table 2.14: Summary of the association between work status and medicines use	42
Table 2.15: Summary of the association between income and medicines use.....	43
Table 2.16: Summary of the association between HBP and medicines use.....	45
Table 2.17: Summary of the association between physical activity and medicines use	47
Table 2.18: Summary of the association between alcohol consumption and medicines use	49
Table 2.19: Summary of the association between smoking status and medicines use.....	50
Table 2.20: Summary of the association between BMI and medicines use.....	52
Table 2.21: Summary of the association between high cholesterol level and medicines use	54
Table 2.22: Summary of the association between high blood glucose level and medicines use	56
Table 2.23: Summary of the association between arthritis and medicines use	58
Table 2.24: Summary of the association between asthma and medicines use	60
Table 2.25: Summary of the association between diabetes and medicines use	61
Table 2.26: Summary of the association between CVD and medicines use.....	63
Table 2.27: Summary of the association between mental health conditions and medicines use	66
Table 2.28: Summary of the association between health services use and medicines use.....	71
Table 2.29: Summary of the association between GP visits and medicines use.....	72
Table 2.30: Summary of the relationship between QoL and medicines use.....	75
Table 3.1: Age of young baby boomers and older people, HOS 1 & 2	82
Table 3.2: Eight dimensions of SF-36	84
Table 3.3: Health Omnibus Surveys' Response Rates	87
Table 3.4: Participation and response rate, NWAHS	96
Table 4.1: Prevalence of medicines use, HOS 1	112
Table 4.2: Prevalence of medicines use, HOS 2.....	116
Table 4.3: Prevalence of combinations of medicines, HOS 2	117
Table 4.4: Prevalence of medicines use, NWAHS	123
Table 4.5: Prevalence of the use of polypharmacy, NWAHS	125
Table 4.6: Prevalence of combinations use of medicines, NWAHS	126
Table 4.7: Prevalence of the use of OTC medicines within prescription medicines users, NWAHS ...	128
Table 4.8: Prevalence of the use of CAM within prescription medicines users, NWAHS	129
Table 4.9: Prevalence of the use of CAM within OTC medicines users, NWAHS	129
Table 4.10: Main groups of medicines are divided according to ATC	130
Table 4.11: Main groups of the ATC classification, HOS 2.....	131
Table 5.1: Multivariable analysis of demographic characteristics associated with taking prescription medicine, HOS 1	145
Table 5.2: Multivariable analysis of demographic characteristics associated with taking CAM, HOS 1	145

Table 5.3: Multivariable analysis of demographic characteristics associated with taking prescription medicine and/or CAM, HOS 1	146
Table 5.4: Multivariable analysis of demographic characteristics associated with taking prescription medicine, HOS 2	150
Table 5.5: Multivariable analysis of demographic characteristics associated with taking OTC medicine, HOS 2	150
Table 5.6: Multivariable analysis of demographic characteristics associated with taking CAM, HOS 2	151
Table 5.7: Multivariable analysis of demographic characteristics associated with taking prescription medicine and/or CAM, HOS 2	152
Table 5.8: Multivariable analysis of demographic characteristics associated with polypharmacy, HOS 2	153
Table 5.9: Summary of the predictors for taking prescription medicine, HOS 1 & 2	154
Table 5.10: Summary of the predictors for taking OTC medicines, HOS 2	154
Table 5.11: Summary of the predictors for taking CAM for each age group, HOS 1 & 2	155
Table 6.1: Prevalence of chronic conditions for each age group, NWAHS	159
Table 6.2: Prevalence of prescription medicine use by chronic conditions, NWAHS	161
Table 6.3: Prevalence of OTC medicines use by chronic conditions, NWAHS	162
Table 6.4: Prevalence of CAM use by chronic conditions, NWAHS	163
Table 6.5: Prevalence of health risk factors for each age group, NWAHS	165
Table 6.6: Reference ranges for lipid profile and fasting glucose level.....	166
Table 6.7: Target lipid level for people taking anti-lipid agent	166
Table 6.8: Prevalence of biomedical measurements for each age group, NWAHS.....	167
Table 6.9: Multivariable analysis of factors associated with taking prescription medicine, NWAHS ..	175
Table 6.10: Multivariable analysis of factors associated with taking OTC medicine, NWAHS	177
Table 6.11: Multivariable analysis of factors associated with taking CAM, NWAHS	179
Table 6.12: Multivariable analysis of factors associated with polypharmacy (including OTC medicines and CAM), NWAHS	180
Table 7.1: Using health service or GP visit in last month for each age group, HOS 1	186
Table 7.2: Using health service or GP visit in last month for each age group, HOS 2	186
Table 7.3: Multivariable analysis of demographic characteristics and medicines use associated with health services use for each age group, HOS 1	190
Table 7.4: Multivariable analysis of demographic characteristics and medicines use associated with GP visits, HOS 1	191
Table 7.5: Multivariable analysis of demographic characteristics and medicines use associated with health services use for each age group, HOS 2	194
Table 7.6: Multivariable analysis of demographic characteristics and medicines use associated with GP visit, HOS 2	195
Table 7.7: Summary of factors associated with more likely to use health services use in last month, HOS 1 & 2	196
Table 7.8: Summary of factors associated with more likely to visit GP, HOS 1 & 2	197
Table 7.9: Using health service or GP visit in the last 12 months for each age group, NWAHS	198
Table 7.10: Health service use in the last 12 months by medicines use, NWAHS	200
Table 7.11: GP visit in the last 12 months by medicines use, NWAHS	201
Table 7.12: Multivariable analysis of medicines use associated with health services use within each age group, NWAHS	203
Table 7.13: Multivariable analysis of medicines use associated with GP visits within each age group, NWAHS	205
Table 8.1: PCS and MCS for each age group, HOS 1	209
Table 8.2: PCS and MCS for each age group, HOS 2	210
Table 8.3: The use of medicines associated with QoL, HOS 1	212
Table 8.4: The use of medicines associated with QoL (PCS and MCS) for each age group, HOS 2 ...	214
Table 8.5: Combination of medicines use associated with QoL (PCS and MCS) for each age group, HOS 2	215
Table 8.6: Factors associated with QoL (PCS, MCS) for each age group, HOS 2	217
Table 8.7: Prescription medicine use (by ATC code first level) associated with QoL (PCS and MCS), HOS 2	220

Table 9.1: Prevalence of CVD for each age group, NWAHS.....	223
Table 9.2: Demographic characteristics of people with CVD, NWAHS.....	224
Table 9.3: Prevalence of medicines use for people with CVD and without CVD, NWAHS	226
Table 9.4: Chronic conditions for people with CVD, NWAHS	227
Table 9.5: Health risk factors for people with CVD, NWAHS	228
Table 9.6: Biomedical measurement for people with CVD, NWAHS	229
Table 9.7: Univariable analysis of demographic characteristics associated with taking prescription medicine among people with CVD, NWAHS	230
Table 9.8: Univariable analysis of chronic conditions associated with taking prescription medicines among people with CVD, NWAHS	231
Table 9.9: Univariable analysis of health risk factors associated with taking prescription medicine among people with CVD, NWAHS	231
Table 9.10: Univariable analysis of biomedical measurements associated with taking prescription medicine among people with CVD, NWAHS	232
Table 9.11: Univariable analysis of demographic characteristics associated with taking OTC medicines among people with CVD, NWAHS	233
Table 9.12: Univariable analysis of chronic conditions associated with taking OTC medicines among people with CVD, NWAHS	234
Table 9.13: Univariable analysis of health risk factors associated with taking OTC medicines among people with CVD, NWAHS	235
Table 9.14: Univariable analysis of biomedical measurements associated with taking OTC medicines among people with CVD, NWAHS	236
Table 9.15: Univariable analysis of demographic characteristics associated with taking CAM among people with CVD, NWAHS	237
Table 9.16: Univariable analysis of chronic conditions associated with taking CAM among people with CVD, NWAHS	238
Table 9.17: Univariable analysis of health risk factors associated with taking CAM among people with CVD, NWAHS	238
Table 9.18: Univariable analysis of biomedical measurements associated with taking CAM among people with CVD, NWAHS	239
Table 9.19: Univariable analysis of demographic characteristics associated with polypharmacy among people with CVD, NWAHS	240
Table 9.20: Univariable analysis of chronic conditions associated with polypharmacy among people with CVD, NWAHS	241
Table 9.21: Univariable analysis of health risk factors associated with taking polypharmacy among people with CVD, NWAHS	241
Table 9.22: Univariable analysis of biomedical measurements associated with polypharmacy among people with CVD, NWAHS	242
Table 9.23: Multivariable analysis of factors associated with taking prescription medicine among baby boomers with CVD, NWAHS	243
Table 9.24: Multivariable analysis of factors associated with taking CAM for people with CVD, NWAHS	243
Table 9.25: Multivariable analysis of factors associated with polypharmacy for people with CVD, NWAHS	244
Table 9.26: PCS and MCS for those with CVD and without CVD, NWAHS	245
Table 9.27: Association between medicines use and PCS & MCS for people with and without CVD, NWAHS	246

List of Figures

Figure 3.1: NWAHS sample in stage 1	90
Figure 4.1: Comparison of demographic characteristics for each age group, HOS 1 & HOS 2.....	109
Figure 4.2: Prevalence of medicines use, HOS 1	112
Figure 4.3: Prevalence of medicines use, HOS 2	118
Figure 4.4: Comparison of medicines use for each age group, HOS 1 & HOS 2.....	120
Figure 4.5: Prevalence of medicines use, NWAHS.....	123
Figure 4.6: Prevalence of the use of polypharmacy, NWAHS	125
Figure 4.7: The use (%) of main groups of the ATC classification, HOS 2	132
Figure 7.1: Comparison of the proportion of respondents using any health service in the last month and at least one GP visit, HOS 1 and 2	187
Figure 8.1: Mean (95%CI) of PCS and MCS, HOS 1	209
Figure 8.2: Means (95%CI) of PCS and MCS, HOS 2.....	210

Appendix

Appendix 4.1 Demographic characteristics of SA baby boomers and older people.....	282
Appendix 5.1 Medicines use by demographic characteristics	287
Appendix 6.1 Distribution of the medicines use for each chronic condition.....	304
Appendix 6.2 Demographic characteristics, chronic conditions, health risk factors and medicines use, NWAHS	308
Appendix 7.1 Health services use and GP visits by demographic characteristics	323
Appendix 7.2 Demographic characteristics, medicines use and health services use, GP visits, HOS 1 & 2.....	328
Appendix 7.3 Demographic characteristics, chronic conditions, health risk factors, medicines use and health services use, GP visits, NWAHS	335
Appendix 8.1 Linear regression model of demographic characteristics and medicines use with PCS and MCS	351

Abstract

There is growing evidence of the increasing use of medicines in older generations; however, research undertaken to critically examine specific differences in use among baby boomers and older people is limited. Understanding the complex factors that influence medicine use by baby boomers and older people is vital due to the particular risks associated with medicines use in older generations. In addition, exploring the differences in medicines usage between these generations will help to inform research and health policy to better meet the health care needs of the ageing population.

This thesis, utilising South Australian (SA) population data, examines the difference in prevalence of use of medicines and the influence of social, demographic, chronic conditions and health related factors on the likelihood of being a user of prescription medicines, over-the-counter medicines (OTC) or complementary and alternative medicines (CAM). The thesis also examines the links between medicines use and health outcomes with the evaluation of their beneficial or adverse effects assessed through comparison with quality of life (QoL), health services use and biochemical markers.

Population data from the SA Health Omnibus Survey, an annual face-to-face survey of randomly selected respondents, and the North West Adelaide Health Study (NWAHS) were used. Univariable and multivariable logistic regression analyses were performed in order to investigate the relationships between medicines use and demographic characteristics (including gender, household size, income, education, area of residence, work status, marital status and country of birth). Linear regression analyses were used to determine the relationship between QoL and the independent variables.

The results of the analysis show that the majority of SA baby boomers and older people take a combination of prescription medicines and CAM and a large proportion of older people take a combination of prescription medicines, OTC medicines and CAM. Unemployment was shown to be a key factor for the use of prescription medicines and polypharmacy (five or more medicines), while gender and education were important factors for the use of CAM. The use of CAM and OTC medicines could potentially increase the rate of adverse effects or drug interactions. Therefore, it is important for prescribers to take a detailed medicines history prior to prescribing medicine.

QoL was shown to be lower with increased use of prescription medicines and OTC medicines. However only a weak association was found between the use of CAM and QoL. The specific type of prescription medicines found to be associated with QoL were those prescribed for blood and blood forming organs, musculoskeletal system and nervous system. Cardiovascular disease (CVD) was used as an example of a chronic condition. People with CVD and without CVD had a similar QoL but the increase use of prescription medicines, OTC medicines was associated with lower QoL. Further investigation for association of the use of medicines and QoL is warranted.

Declaration

I certify that this work contains no material which has been accepted for the award of any other degree or diploma in my name in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission in my name for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint award of this degree.

I give consent to this copy of my thesis, when deposited in the University Library, being made available for loan and photocopying, subject to the provisions of the Copyright Act 1968.

I also give permission for the digital version of my thesis to be made available on the web, via the University's digital research repository, the Library Search and also through web search engines, unless permission has been granted by the University to restrict access for a period of time.

I acknowledge the support I have received for my research through the provision of an Australian Government Research Training Program Scholarship.

I acknowledge Dr. Graham Lyons edited the thesis.

Signed: (Bee Leng Per)

Date: 14th September 2017

Acknowledgement

My first and sincere thanks is dedicated to my principal supervisor, Professor Anne Taylor, as without her encouragement, I would not be able to finish this thesis. With her tireless effort of proofreading throughout all stages of the thesis, support and also being able to edit the thesis everywhere including on the airplane, hospital, shack or office is astonishing! This has made me move forward and complete the thesis despite the complexity of the study and the length of time it has taken.

Dr. Tiffany Gill, my supervisor, can be straightforward but without her statistical skills and skills in cleaning the data, this thesis would not have been possible and presented. Thank you Tiffany.

Many thanks to all of my colleagues in Population Research and Outcome Studies, for providing me with friendship, editing and encouragement, especially Alicia who helped with the complexity of merging data and writing complicated syntax for the study. Thanks for Lora and Constance for editing the thesis. I also express my gratitude to the people of South Australia who participate in health surveys.

Writing the last chapter was the most challenging task in completing this thesis. I thank Professor Elizabeth Roughead for her valuable time and willingness to discuss the results with me and providing insight. I admire her comprehensive knowledge on pharmacoepidemiology. I also thank Dr. Nicole Pratt, who helped me reanalyse one of the studies.

Finally, I thank my parents. Without them I would not exist in this world and my housemate Hui-Fen who was always encouraging me to complete the task. My Master Hsing Yun always said “Where there is Dharma, there is a Way”.

Conference presentations arising from this thesis

1. Per, B.L., Taylor, A., Gill, T. Trends in use of medicines in baby boomers and older people in South Australia. Poster presentation: Faculty of Health Sciences Postgraduate Research Conference 2013, Adelaide.

2. Per, B.L., Taylor, A., Gill, T. Comparison of the use of prescription and non-prescription medicines between baby boomers and older adults. Oral presentation: National Medicines Symposium 2016, Canberra.

3. Per, B.L., Taylor, A., Gill, T. Association between Quality of life and medicines use for baby boomers and older people, by cardiovascular disease status. Poster presentation: 32nd International Conference on Pharmacoepidemiology & Therapeutic Risk Management 2016, Ireland.

Abbreviation

List of acronyms and abbreviations used in the text

ABS	Australian Bureau of Statistics
AIHW	Australian Institute of Health and Welfare
AMH	Australian Medicines Handbook
ANOVA	Analysis of variance
ATC	Anatomical Therapeutic Chemical
BMI	Body Mass Index
CAM	Complementary and alternative medicines
CATI	Computer-assisted telephone interviewing
95% CI	95% confidence interval
CVD	Cardiovascular disease
ERP	Estimated resident population
EWP	Electronic White Pages
GDP	Gross Domestic Product
GP	General practitioner
HBP	High blood pressure
HDL	High density lipoprotein
IADL	Instrumental activities of daily living
LDL	Low density lipoprotein
MANOVA	Multivariate analysis of variance
MCS	Mental component summary scores
NCCAM	National Center for Complementary and Alternative Medicine
NCD	Non-communicable disease
NICM	The National Institute of Complementary Medicine
NHMRC	National Health and Medical Research Council
NIH	National Institutes of Health
OR	Odds ratio
OTC	Over the counter medicine
PADL	Physical Activities of Daily Living
PCS	Physical component summary scores
PROS	Population Research & Outcome Studies
QOL	Quality of life
QPL	Questionnaire Programming Language
SA	South Australia
SD	Standard deviation
SLAs	Statistical Local Areas
SF36	The Short Form (36) Health Survey
SPSS	Statistical Package for the Social Science
TCM	Traditional Chinese Medicine
TC	Total cholesterol
TG	Triglyceride
TGA	Therapeutic Goods Administration
UK	United Kingdom
UN	United Nations
USA	United States of America
VIF	Variance inflation factor
WHO	World Health Organisation