

The Economics of Population and Individual Ageing with Special Reference to Older Adults in Goa

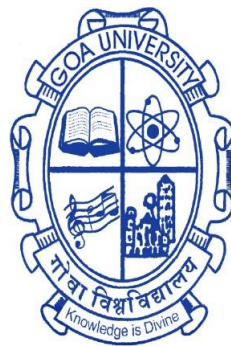
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By

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DECLARATION

I, Charmaine Savia Siqueira Lobo hereby declare that this thesis represents work which has been carried out by me and that it has not been submitted, either in part or full, to any other University or Institution for the award of any research degree.

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Date: 13-06-2024

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CERTIFICATE

I hereby certify that the above Declaration of the candidate, name of the candidate is true and the work was carried out under my supervision.

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To my Parents and Husband

TABLE OF CONTENTS

Declaration.....	i
Certificate.....	i
Acknowledgement	ii
Table of Contents	vii
List of Tables	xiv
List of Figures	xvi
Abbreviations and Acronyms.....	xviii
 CHAPTER 1: INTRODUCTION	 1
1.1 Background of the Study.....	1
1.1.1 The Phenomenon of Population Ageing	1
1.1.2 The Economics of Ageing.....	3
1.1.2.1 The Economics of Population Ageing.....	4
1.1.2.2 The Economics of Individual Ageing	4
1.2 Statement of the Problem	5
1.2.1 Problem Structure: ‘What’, ‘So What’, and ‘Now What’ of the Economics of Ageing	5
1.2.1.1 The ‘What?’ behind the Economics of Ageing	5
1.2.1.2 The ‘So What?’ of the Economics of Ageing	6
1.2.1.2 (i) The ‘So What?’ of the Economics of Population Ageing at the Macro level	6
1.2.1.2 (ii) The ‘So What?’ of the Economics of Individual Ageing at the Micro level	8
1.2.1.3 The ‘Now What?’ of the Economics of Ageing.....	12
1.3 Scope Demarcation: Conceptualising Age and Area.....	12
1.4 Objectives of the Study	14
1.5 Limitations of the Study	15
1.6 Structure of the Thesis.....	16
 CHAPTER 2: REVIEW OF LITERATURE	 18
2.1 Introduction	18
2.2 Causes of Global Population Ageing: Conflicting Views.....	18
2.2.1 Declines in Fertility as the Major Contributor to Population Ageing	19
2.2.2 Declines in Mortality as the Major Contributor to Population Ageing	20
2.2.3 The Importance of Migration in Population Ageing	21
2.2.4 The Stimulation of Research Questions: Present Study v/s Prior Studies.....	23
2.3 Consequences of Population Ageing on Economic Growth: The Debate.....	23
2.3.1 The Negative Impact of Population Ageing on Economic Growth	25
2.3.2 The Positive Impact of Population Ageing on Economic Growth	26
2.3.3 The Possibility of a Non-Monotonic Relationship	27

2.3.4 The Stimulation of Research Questions: Present Study v/s Prior Studies.....	28
2.4 The Financial Condition of Older Adults.....	29
2.4.1 Income.....	30
2.4.2 Expenditure	32
2.4.3 Economic Living Standards	34
2.4.3.1 Economic Living Standards of Older People	34
2.4.3.2 The Capability Approach to Living Standards.....	35
2.4.4 The Stimulation of Research Questions: Present Study v/s Prior Studies.....	36
2.5 Health-related Economic Concerns of Older Adults.....	37
2.5.1 Morbidity.....	37
2.5.2 Health-Related Quality of Life (HRQOL)	38
2.5.3 Health-Related Expenditure	39
2.5.4 The Choice of Healthcare Utilisation (HCU).....	40
2.5.5 The Costs of Caregiving and the Nature of Living Arrangements.....	41
2.5.5.1 Costs of Caregiving.....	42
2.5.5.2 Living Arrangements.....	43
2.5.5.2 (i) Living in Old Aged Homes (OAHs): A Special Case for Analysis.....	44
2.5.6 The Stimulation of Research Questions: Present Study v/s Prior Studies.....	45
2.6 Labour Market Choices, Pensions, and Social Provisions	46
2.6.1 Labour Market Choices: The Changing Role of Retirement.....	46
2.6.1.1 Post-Retirement Work (PRW).....	47
2.6.2 Pensions and Social Provisions	49
2.6.3 The Stimulation of Research Questions: Present Study v/s Prior Studies.....	51
2.7 Summary	52
CHAPTER 3: RESEARCH METHODOLOGY.....	53
3.1 Introduction.....	53
3.2 Panel Data	53
3.3 Cointegration Testing with Panel Data	54
3.3.1 Cross-sectional Dependence (CD)	54
3.3.2 Panel Unit Root Test	54
3.3.3 Panel Cointegration Test	54
3.3.4 Long-Run Cointegrating Regression Estimation - FMOLS and DOLS.....	54
3.4 Panel Data Methods and Appropriate Model Selection Tests.....	55
3.4.1 Pooled Ordinary Least Squares (POLS).....	55
3.4.2 Random Effects Model (REM)	55
3.4.3 Fixed Effects Model (FEM) - Within Estimator	55
3.4.4 Model Selection Tests	56

3.4.4.1 Breusch-Pagan Lagrange Multiplier (LM) Test	56
3.4.4.2 Hausman Test	56
3.4.4.3 Sargan Hansen Test	56
3.5 Design of the Primary Study in Goa	56
3.5.1 Ethical Considerations	59
3.5.2 Instrumentation	59
3.6 Methodology Adopted for Analysing the Primary Data	60
3.6.1 T-Test and Analysis of Variance (ANOVA)	60
3.6.2 Chi-square Test and Fisher's Exact Test (FET)	61
3.6.3 Binary Logistic Regression	61
3.6.4 Confirmatory Factor Analysis (CFA)	61
3.6.5 Structural Equation Modelling (SEM)	61
3.6.5.1 SEM for Mediation Analysis	62
3.7 Sample Profile of the Elderly Living at Home and in OAHs	62
CHAPTER 4: ECONOMIC THEORY AND CROSS-NATIONAL EMPIRICAL ANALYSIS	
UNDERLYING THE MAJOR DRIVERS OF POPULATION AGEING	65
4.1 Introduction	65
4.2 Classification of Nations based on Ageing Transition Stages	66
4.3 Data Procurement	67
4.3.1 Operational Definitions	68
4.4 Justification for Using Life Expectancy as a Proxy for Mortality Rate	69
4.5 Global Trends of the Demographic Indicators	69
4.5.1 Global Trends of Fertility Rate (FERT)	69
4.5.2 Global Trends of Life Expectancy at Birth (LEXP)	70
4.5.3 Global Trends of Net Migration Rate (MIGR)	71
4.6 Economic Theory Underlying Demographic Drivers: A Theoretical Framework	72
4.6.1 Economic Literature Underpinning Fertility	72
4.6.2 Economic Literature Underpinning Life Expectancy (Mortality)	74
4.6.3 Economic Literature Underpinning Migration	76
4.7 The Long-term Relation between Demographic Variables and Population Ageing: A Cross-National Empirical Model	77
4.7.1 Cross-sectional Dependence (CD)	78
4.7.2 Panel Unit Root Test	78
4.7.3 Panel Cointegration Test	79
4.7.4 Long-Run Cointegration Estimation: FMOLS and DOLS	80
4.8 Future Scenario of Demographic Phenomena	84
4.9 Summary	90

CHAPTER 5: IMPLICATIONS OF POPULATION AGEING ON ECONOMIC GROWTH..	92
5.1 Introduction	92
5.2 Historical Linkage between the Young, Old, and Working-age Populace.....	93
5.3 Data and Empirical Specification.....	95
5.4 Analysis Procedure.....	97
5.5 Empirical Results	98
5.5.1 The Evidence of Nonlinearities	98
5.5.2 Population Ageing Deepening and Intensification of the Impact on Growth: Identification of the Threshold Level.....	100
5.5.3 Assessing the Nonlinear Growth Impact among Developed and Developing Nations	106
5.6 Summary	107
CHAPTER 6: DISPARITIES AMONG INDIAN ELDERLY AND ECONOMIC CONCERNS OF GOAN OLDER ADULTS	109
6.1 Introduction	109
Section 6.1: A Situational Analysis of the Elderly in India	109
6.1.1 Introduction	109
6.1.2 The Altering Demographics in India.....	110
6.1.2 (a) Changes in Age-wise Population Ratios.....	110
6.1.2 (b) The Feminisation of the Elderly Population	111
6.1.2 (c) The Ruralisation of the Elderly Population.....	112
6.1.2 (d) Decadal Growth Rate in the General and Elderly Population	112
6.1.3 Situational Analysis of Goa's Elderly in the Context of India: Spatial and Gender Differentials.....	113
6.1.3.1 Economic Dependence of the Indian Elderly	114
6.1.3.1 (i) Fully Economically Dependent Elderly	114
6.1.3.1 (ii) Old Age Dependency Ratios: Gender and Location Based.....	115
6.1.3.1 (iii) Elderly Households belonging to the Poorest Wealth Quintile	116
6.1.3.2 Health Status of the Indian Elderly	117
6.1.3.2 (i) Morbidity and Multimorbidity.....	117
6.1.3.3 The Double Vulnerability Burden: Co-existence of Multimorbidity and Economic Dependency	119
6.1.3.4 Labour Market Decision and Social Security among the Indian Elderly	120
6.1.4 The Need for an In-depth Study on the Elderly in Goa.....	122
6.1.5 Summary	122
Section 6.2: The Inflows, Outflows, and Living Standards Capabilities of the Elderly in Goa .	123
6.2.1 Introduction	123
6.2.2 Household Economic Profile of Older Adults	123
6.2.2.1 Household Member Profile	124

6.2.2.2 Household Income.....	126
6.2.2.3 Household Expenditure	127
6.2.3 Nature and Sources of Income and Expenditure of Older Adults	129
6.2.3.1 Nature of Income and Expenditure of Older Adults	129
6.2.3.2 Sources of Income and Items of Expenditure of the Y-O and O-O	130
6.2.3.3 Debt Repayments and the Elderly	134
6.2.4 Financial Dependence and Reverse Financial Dependence	134
6.2.4.1 Identification of the Predictors of Full Financial Dependence among Older Adults ..	135
6.2.5 Living Standards Capabilities of the Elderly: Complementing the ‘Resource-Based Approach’ with the ‘Capability Approach’	137
6.2.5.1 Adoption of LSCAPE-25 to Assess Living Standards from a Capability Perspective ...	138
6.2.5.2 LSCAPE: The Confirmatory Factor Analytic Approach	140
6.2.5.2 (i) Model Fit	141
6.2.5.2 (ii) Reliability and Validity	142
6.2.5.3 Differences in Living Standards Capabilities among the Elderly in Goa.....	146
6.2.5.4 Summary	147

CHAPTER 7: MORBIDITY, HEALTH-RELATED QUALITY OF LIFE (HRQOL), AND HEALTHCARE COSTS AMONG THE AGED IN GOA149

7.1 Introduction	149
7.2 Morbidity Patterns: The Nature of Chronic Diseases	149
7.2.1 The Prevalence of Multimorbidity	152
7.2.2 Level of Independence in the Activities of Daily Living (ADL)	153
7.3. Health-Related Quality of Life (HRQOL) of the Elderly	154
7.3.1 The Components of the Short Form-36 (SF-36) Health Survey	154
7.3.2 SF-36 Specifically Suited to Measure HRQOL of Older Adults	157
7.3.3 Confirmatory Factor Analysis of SF-36.....	157
7.3.3.1 Model Fit	159
7.3.3.2 Validity and Reliability	159
7.3.4 Differences in Physical and Mental Health.....	162
7.4 Health-related Costs	164
7.4.1 Comparative Perspective of Health Expenditure by Age and Sex	165
7.4.2 Component-wise Health-related Expenditures.....	167
7.4.2.1 The Costs of Caregiving.....	169
7.4.3 The Relation between HRQOL and Health Expenditure	171
7.5 Factors Affecting the Choice of Healthcare Utilisation (HCU)	172
7.6 Summary	176

CHAPTER 8: HEALTHY AGEING TRAJECTORIES, LABOUR MARKET OUTCOMES, AND SOCIAL PROVISIONS AMONG GOAN ELDERLY	178
8.1 Introduction	178
Section 8.1: Healthy Ageing: The Relation between Economic, Health, and Subjective Wellbeing Domains	178
8.1.1 Introduction	178
8.1.2 Dual Variable Models: Providing Direction to our Structural Model	179
8.1.2.1 Living Standards and Life Satisfaction	180
8.1.2.2 Living Standards and HRQOL	180
8.1.2.3 HRQOL and Life Satisfaction	181
8.1.3 Analysis Procedure	182
8.1.4 Structural Equation Modelling	183
8.1.4.1 Evaluation of the Measurement Model	183
8.1.4.2 Structural Model	184
8.1.5 Summary	187
Section 8.2: Labour Market Choices, Pensions, and Social Provisions	188
8.2.1 Introduction	188
8.2.2 Labour Market Dynamics	188
8.2.2.1 Occupation Prior to Retirement Age	188
8.2.2.2 Voluntary Retirement	190
8.2.2.3 Post-Retirement Work (PRW) Status	190
8.2.2.4 The Pull Factors drawing Older Adults into PRW	192
8.2.2.5 Socio-demographic, Economic, and Health Factors Pre-Disposing the Elderly into PRW	193
8.2.3 Pension Provisions	195
8.2.3.1 Retirement Pensions	195
8.2.3.2 Social Pensions	196
8.2.3.2.1 Dayanand Social Security Scheme (DSSS)	196
8.2.3.2.2 Griha Aadhar Scheme	197
8.2.3.2.3 Goa Welfare/Pension Scheme for Seafarers	197
8.2.3.2.4 Reasons for Not Availing Social Pensions	198
8.2.3.3 Other Key Social Welfare Benefits	199
8.2.3.3.1 Deen Dayal Swasthya Seva Yojana (DDSSY)	199
8.2.3.3.2 Maintenance and Welfare of Parents and Senior Citizens Act, 2007	199
8.2.4. Summary	200

CHAPTER 9: FINDINGS, CONCLUSION, AND RECOMMENDATIONS FOCUSING ON THE ‘NOW WHAT’ OF THE ECONOMICS OF AGEING	202
9.1 Summary of Chapters/Findings.....	202
9.2 Conclusion.....	216
9.3 The ‘Now What’ of the Economics of Ageing	219
9.3.1 Promoting Financial Security given the Financial Crunch.....	220
9.3.2 Promoting Improved HRQOL and Healthy Ageing.....	222
9.3.3 Post-Retirement Employment: Promoting Productive Ageing	227
9.3.4 Promoting Safety and Security	230
9.3.5 Research: The Need for Disaggregated Data and Intersectoral Cooperation.....	230
9.3.6 Long-term Residential Care for the Elderly: Where we are and what is lacking?	231
9.3.7 Partnerships for the Goals	232
9.4 Suggestions for Further Research	235
References	237
Appendix I: Questionnaire	270
Appendix II: Contribution of the Thesis.....	277

LIST OF TABLES

Table 3.1: Criteria for Taluka-wise Sample Selection of Towns/Villages	57
Table 3.2: District/Taluka/Locality-wise Distribution of Elderly living at Home.....	57
Table 3.3: Taluka-wise List of OAHs Registered with DoSW, Goa.....	58
Table 3.4: OAHs chosen for the Study	58
Table 3.5: Sample Profile Frequency Distribution of Elderly at Home and in OAHs	63
Table 4.1: Nation Classification based on the Stage of their Ageing Transition.....	67
Table 4.2: Pesaran's Cross-sectional Dependence (CD) Test	78
Table 4.3: Cross-sectionally augmented Im, Pesaran, and Shin (CIPS) Panel Unit Root Test	79
Table 4.4: Heterogenous Pedroni Cointegration Test	80
Table 4.5: Panel FMOLS and Panel DOLS Results (1960-2020)	82
Table 4.6: Panel FMOLS and DOLS Results (2020-2050)	88
Table 5.1: Tests for Appropriate Model Selection.....	98
Table 5.2: Impact of Ageing Population and Working-Age Population on (5-Year Average Non-Overlapping) Economic Growth (1990-2019)	99
Table 5.3: Marginal Effects of Population Ageing on Economic Growth at different levels of the Share of the Elderly in the Population.....	101
Table 5.4: Marginal effects of Old Age Dependency on Economic Growth at different levels of Old Age Dependency Ratio	103
Table 5.5: Impact of Ageing Population on (5-Year Average Non-Overlapping) Economic Growth in Developed and Developing Economies (1990-2019).....	106
Table 6.1: Household Member Profile of Y-O HHs and O-O HHs	126
Table 6.2: Slab-wise Distribution of Total Monthly Household Income of Y-O and O-O HHs.....	127
Table 6.3: Slab-wise Distribution of Total Monthly Household Expenditure	128
Table 6.4: Average Monthly Income and Expenditure exclusively of the Y-O and O-O	130
Table 6.5: Percentage of Older Adults with regard to Repayment of Pending Debts.....	134
Table 6.6: Dependency and Reverse Financial Dependency among the Y-O and O-O	135
Table 6.7: Mode of Operationalisation for Binary Logistic Regression of Financial Dependence ...	136
Table 6.8: Socio-Demographic and Health Factors Determining Financial Dependence	137
Table 6.9: Fit Indices of the LSCAPE Measurement Model	142
Table 6.10: Reliability and Validity of the LSCAPE Model	142
Table 6.11: Fit Indices of the Second-Order LSCAPE CFA Model	143
Table 6.12: Standardised Regression Weights of Second-Order LSCAPE CFA Model.....	143

Table 6.13: Mean Scores of the Subscales of LSCAPE of Older Adults in Goa	145
Table 6.14: Differences in LSCAPE Scores of the Elderly	147
Table 7.1: Morbidity Patterns among the Elderly.....	151
Table 7.2: Comparative Analysis of Morbidity and Monthly Household Income	152
Table 7.3: Presence of Multimorbidity among the Elderly.....	152
Table 7.4: Level of Independence in the Activities of Daily Living (ADL).....	153
Table 7.5: HRQOL Model Re-specifications and the Corresponding Fit Indices.....	159
Table 7.6: Reliability and Validity of the HRQOL Model	159
Table 7.7: Fit Indices of the Second-Order HRQOL CFA Model.....	160
Table 7.8: Standardised Regression Weights of Second-Order HRQOL CFA Model.....	160
Table 7.9: Mean Scores of the Subscales of HRQOL of Older Adults in Goa	162
Table 7.10: Differences in SF-36 Scores among the Elderly	163
Table 7.11: Average and Monthly Medical Expenditure of the Elderly	165
Table 7.12: Average Medical Expenditures of the Elderly as a Share of Household and Personal Expenditure	166
Table 7.13: Component-wise Health-related Expenditure Slabs of the Elderly... ..	169
Table 7.14: The Nature of Caregiving for the Elderly living at Home.....	170
Table 7.15: Slab-wise Monthly Expenditure on Paid-Caregivers.....	171
Table 7.16: Correlation between Health Expenditure and PCS and MCS Scores	171
Table 7.17: Mode of Operationalisation for Binary Logistic Regression for HCU	174
Table 7.18: Factors Affecting Choice of HCU using Binary Logistic Regression.....	175
Table 8.1: Validity and Reliability of the Triple Variable Measurement Model.....	183
Table 8.2: Standardised Path Coefficients and Mediation Summary based on SEM Analysis.....	187
Table 8.3: Occupation for the Major Part of the Life of the Senior Citizen	189
Table 8.4: Post-Retirement Work (PRW) Status	191
Table 8.5: The Pull Factors that drew the Elderly into the Labour Force.....	193
Table 8.6: Mode of Operationalisation for Binary Logistic Regression of the PRW Model.....	194
Table 8.7: Socio-demographic, Economic, and Health Factors Pre-Disposing Older Adults to Work Post-Retirement	195
Table 8.8: Retirement Pension received by the Elderly living at Home.....	196
Table 8.9: Number (Percentage) of Elderly receiving Social Pensions.....	198
Table 8.10: Registrations and Claims made by Elderly Households under DDSSY	199
Table 8.11: Awareness among the Elderly about the Maintenance and Welfare of Parents and Senior Citizens Act, 2007	200

LIST OF FIGURES

Figure 3.1: Total Effect without Mediator	62
Figure 3.2: Direct, Indirect, and Total Effect	62
Figure 4.1: Total Fertility Rate (FERT), 1960-2020	70
Figure 4.2: Life Expectancy at Birth (LEXP), 1960-2020	71
Figure 4.3: Net Migration Rate (MIGR), 1960-2020	72
Figure 4.4: Future Projections of Demographic Phenomena (2020-2050)	86
Figure 4.4.1: Population Ageing (POPAG), Future Projections (2020-2050)	86
Figure 4.4.2: Total Fertility Rate (FERT), Future Projections (2020-2050)	86
Figure 4.4.3: Life Expectancy at Birth (LEXP), Future Projections (2020-2050)	87
Figure 4.4.4: Net Migration Rate (MIGR), Future Projections (2020-2050)	87
Figure 5.1: Trends in Demographic Variables across Ageing Transition Nation Categories	93
Figure 5.1.1: Aged to Super-Aged Nations	93
Figure 5.1.2: Ageing to Aged Nations	93
Figure 5.1.3: Potentially-Ageing to Ageing Nations	93
Figure 5.1.4: Potentially-Ageing Nations	93
Figure 5.2: Historical Nonlinear and Linear Scatterplots between Working-Age Population (WKAGPOP) and Shares of the Old (POPAG) and Young (POPYNG) Global Population	94
Figure 5.2.1: Nonlinear relation between Working-Age share and Old share	94
Figure 5.2.2: Linear relation between Working-Age share and Young share	94
Figure 5.3: Demographic Structure (1950-2021) and Projections (2022-2100) for Developed v/s Developing Economies	95
Figure 5.4: Marginal Effects of Ageing on Economic Growth (1990-2019)	101
Figure 5.4.1: Marginal Effects of Old Share on Economic Growth	101
Figure 5.4.2: Marginal Effects of Old Dependency on Economic Growth	101
Figure 5.5: Scatter plots of Nations from each Ageing Transition highlighting the relation between the Share of the Elderly and the Working-Age Population (1990-2019)	105
Figure 6.1: Share of Population by Broad Age Groups	111
Figure 6.2: Sex Ratio of the General and Elderly Population	111
Figure 6.3: Ruralisation of the Elderly	112
Figure 6.4: Decadal Growth Rate in General and Elderly Population	113
Figure 6.5: State/UT-wise Share of the Elderly in the Population	114
Figure 6.6: State/UT-wise Share of Elderly who are Fully Financially Dependent on others	114
Figure 6.7: Gender-based Old Age Dependency Ratio	115
Figure 6.8: Location-based Old Age Dependency Ratio	116
Figure 6.9: State/UT-wise Elderly Households belonging to the Poorest Wealth Quintile	116

Figure 6.10: Number of Ailments of each Broad Ailment Category reported per 1,00,000 elderly in a 15-day period.....	117
Figure 6.11: State/UT-wise Percentage of the Aged suffering from Multimorbidity	118
Figure 6.12: Double Vulnerability: Multimorbidity and Economic Dependency across States	119
Figure 6.13: Percentage distribution of elderly persons by Usual Status.....	120
Figure 6.14: Beneficiaries of Old Age Social Pension.....	121
Figure 6.15: Comparison of Sources of Income of the Y-O and O-O Respondents	131
Figure 6.16: Comparison of Items of Expenditure of the Y-O and O-O Respondents	133
Figure 6.17: Measurement Model of LSCAPE	141
Figure 6.18: Second-order CFA Model of LSCAPE	144
Figure 7.1: Measurement Model of SF-36 HRQOL	158
Figure 7.2: Second-order CFA Model of SF-36 HRQOL	161
Figure 7.3: Percentage of Elderly reporting various kinds of Health-Related Expenditure.....	167
Figure 7.4: Choice of Healthcare based on various Quality Factors.....	176
Figure 8.1: Measurement Model Interrelating Living Standards Capabilities, HRQOL, and Life Satisfaction.....	184
Figure 8.2: Structural Model depicting the Mediating Role of HRQOL between Living Standards Capabilities and Life Satisfaction	186
Figure 8.3: Reasons for Not Availing Social Pensions among the Elderly	198

ABBREVIATIONS AND ACRONYMS

ADL	Activities of Daily Living
AISCCON	All-India Senior Citizens' Confederation
ANOVA	Analysis of Variance
APKC	Ageing Population Kuznets Curve
ARDL	Autoregressive Distributed Lag
AVE	Average Variance Extracted
BP	Bodily Pain
CBO	Community-Based Organisation
CCRC	Continuing Care Retirement Community
CD	Cross-sectional Dependence
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CHC	Community Health Centre
CHE	Catastrophic Health Expenditure
CIPS	Cross-sectionally augmented Im, Pesaran, and Shin
Con	Contribution
CR	Composite Reliability
CRISIL	Credit Rating Information Services of India Limited
CSR	Corporate Social Responsibility
DDSSY	Deen Dayal Swasthya Seva Yojana
DOLS	Dynamic Ordinary Least Squares
DoSW	Directorate of Social Welfare
DSSS	Dayanand Social Security Scheme
DV	Discriminant Validity
ECD	Elderly Chronic Disease
Enj	Enjoyment
ESHG	Elderly Self-Help Group
EU	European Union
FEM	Fixed Effects Model
FERT	Fertility Rate
FESCOM	Federation of Senior Citizens of Maharashtra
FET	Fisher's Exact Test
FMOLS	Fully Modified Ordinary Least Squares

GCU	Geriatric Care Unit
GDP	Gross Domestic Product
GFI	Goodness of Fit Index
GH	General Health
GMC	Goa Medical College
HBM	Health Behavioural Model
HC	Healthcare
HCU	Healthcare Utilisation
HRQOL	Health-Related Quality of Life
IIPS	International Institute for Population Sciences
ILC-I	International Longevity Centre–India
ILO	International Labour Organization
LASI	Longitudinal Ageing Study in India
LM	(Breusch-Pagan) Lagrange Multiplier
LSCAPE-25	25-Item Living Standards Capabilities of the Elderly
MCS	Mental Component Summary
MH	Mental Health
NGO	Non-Governmental Organisation
NSO	National Statistical Office
NSSO	National Sample Survey Office
OADR	Old Age Dependency Ratio
OAH	Old Aged Home
OECD	Organisation for Economic Co-operation and Development
OLG	Overlapping Generations
OLS	Ordinary Least Squares
O-O	Old-Old
O-O HHs	Old-Old Households
PCS	Physical Component Summary
PF	Physical Functioning
PFRDA	Pension Fund Regulatory Development Authority
PHC	Primary Health Centre
POLS	Pooled Ordinary Least Square
POPAG	Population Ageing
PRB	Population Research Bureau
PRW	Post-Retirement Work

QOL	Quality of Life
Q-S	Questionnaire-Schedule
RE	Role Emotional
REM	Random Effects Model
Res	Restriction
RMSEA	Root Mean Square Error of Approximation
RP	Role Physical
RQ	Research Question
SACRED	Senior Able Citizen for Re-employment in Dignity
SAGE	Senior-Care Ageing Growth Engine
SCW	Senior Citizen Welfare
SD	Standard Deviation
SDG	Sustainable Development Goal
Sec	Security
SEM	Structural Equation Modelling
SF	Social Functioning
SF-36	36-Item Short Form Health Survey
SI	Social Integration
SRMR	Standardised Root Mean Square Residual
SWLS	Satisfaction With Life Scale
TADR	Total Age Dependency Ratio
TLI	Tucker Lewis Index
UN	United Nations
UNDESA	United Nations Department of Economic and Social Affairs
UNFPA	United Nations Population Fund
UT	Union Territory
VRS	Voluntary Retirement Scheme
VT	Vitality
WDI	World Development Indicator
WHO	World Health Organization
YADR	Young Age Dependency Ratio
Y-O	Young-Old
Y-O HHs	Young-Old Households

CHAPTER 1: INTRODUCTION

The prevalent understanding of ageing tends to only take into account a small portion of the complexity that this process entails: Segal (2013, 2).

1.1 Background of the Study

1.1.1 The Phenomenon of Population Ageing

Population Ageing signifies an upsurge in the percentage of older people. It constitutes an unprecedented and unparalleled worldwide demographic upheaval, predicted to accelerate as the twenty-first century advances. It ranks as a prominent concern on the agendas of several nations and global bodies because an ageing populace represents a comprehensive mechanism outlining economic, budgetary, and social transformations that nations are expected to face in the ensuing years (Bogetic et al. 2015, 4).

Towards the beginning of the twenty-first century, the global populace stood at 6.1 billion, while projections by the Population Division of the United Nations Department of Economic and Social Affairs (UNDESA 2022, 28) predict it to reach approximately 9.3 billion by 2050. Considering the worldwide older population aged 65 years and beyond, their share is projected to rise by four times from 595 million to two billion between 2000 and 2050. In 2018, the global share of older adults surpassed that of children under five, marking an unparalleled historical milestone (UNDESA 2019, 16). The reported estimates predict that the senior population's share will rise from 10% in 2000 to 21.1% by 2050. A report by the International Institute for Population Sciences [IIPS] and United Nations Population Fund [UNFPA] (2023, 1) highlights that in more developed regions, the proportion of the elderly will rise from 26% in 2022 to 34% in 2050, while in less developed regions, from 11.5% to 20%.

In 2023, the population billionaire India surpassed China and became our planet's most populated nation. Segmenting the Indian population, the IIPS et al. (2020, 2) highlight that those 60 and over made up 8.6% of the total populace in 2011, which rose to 10.1% by 2021. By 2040, projections indicate that it will reach above 15% and by 2050 to over 20%. Though their proportion appears minor in relative terms, in absolute terms, the total number of elderly in the country is relatively high. In 2011, they accounted for 104 million, while projections anticipate this figure to grow twofold by 2036 to approximately 225 million and fourfold by 2061 to 425 million (*ibid*, 3). Similarly, the *Ageing Index* is predicted to significantly surge from 8.4 elderly for every 100 children in 1950 to 74.5 by

2050, with the *Old Age Dependency Ratio (OADR)* following an analogous trajectory. By 2050, there will be 31.5 elderly per 100 working-age persons, up from 9.5 in 1950 (*ibid*). All ageing markers foretell that India will age quickly in the ensuing decades.

Nevertheless, overarching statistics mask the non-uniform intricacies of the demographic transition in India, which varies among Indian states and is marked by distinct degrees of economic advancement, cultural standards, and political environments. According to the Census of India (2011), while 12.6% of India's older adults reside in Kerala, the state of Goa is home to 11.2%, subsequently followed by Tamil Nadu having 10.4%, and Himachal Pradesh and Punjab comprising 10.3% of the elderly populace respectively. Thus, Goa, the smallest state in India, lying on its west coast, is home to the second-highest share of the Indian senior citizenry.

A report in a local daily (*oHeraldo* 21/10/2022) brought to the fore the present situation of a rising elderly population in Goa, in addition to providing a brief historical context to the same. It pointed out that the demographic surge observed during the 1950s and 1960s gave rise to population control and family planning initiatives. Consequently, Goan households that once had five to six children transformed into ones with no more than three offspring. Subsequently, from the 1970s onwards, the family structure predominantly consisted of around one to two children. Further, the out-migration of Goan youth and young adults in search of better prospects led to a significant outflow of human resources and left a substantial portion of the older generation to fend for themselves. These demographic shifts elevated the number of elderly Goans in the state, while negatively impacting the provision of home-based geriatric care. According to the Census of India (2011), out of the 3.42 lakh households in Goa, 37% have a senior citizen living in them, while about 11,000 elderly live alone. Though this demographic transition marks a triumph owing to improved lifespans and scientific advancement, it poses unforeseen outcomes with substantial implications for healthcare, the economy, and society. The scientific investigation of *Geriatrics* is nevertheless in its embryonic stages in India, with the *Economics of Ageing* being relatively unheard of.

Despite impressive endeavours like the 1982 *First International Assembly on Ageing* held in Austria, the 1991 *Principles for Older Persons* of the United Nations (UN), the 2002 *Madrid Second World Assembly*, whose resolutions were encased in an upbeat vein, commending the invaluable contributions of senior citizens towards their communities, population ageing has been condemned by many. Iparraguirre (2018, 1) claims that out of 262 articles, an ageing populace was depicted as a *Burden* by 168 of

them, based on a survey of items in *The Economist* spanning January 1997 through April 2008. According to a broad spectrum of economic sceptics, population ageing is the genesis of a plethora of issues. In this vein, Fox (2001, 12) describes an ageing population as a *Silver Tsunami*, while Venneberg and Eversole (2010, 42) delineate it as a *Ticking Economic Time Bomb*. Analogous to a *Crisis* (The World Bank 1994, 10), a *Demographic Winter*, and an *Age War* (Thurow 1996, 46), population ageing represents a *Problem to be solved* (Calvo-Sotomayor, Atutxa, and Aguado 2020, 1). Similar parlance ensues in the works of Wallace (1999, 23), depicting an ageing population as an *Age-Quake*, while Little and Triest (2001, 142) epitomise it as a *Shift with Seismic Consequences*. Peterson (1999, 77) construes it to be a *Gray Dawn*, poised to usher in the *Coming Generational Storm* in consonance with the work of Kotlikoff and Burns (2005, 69). Domingo (2008, 725) coined it as a *Demo-dystopia*, i.e., a dystopian future triggered by demographic transitions. Others perceive it as an inducement of negative economic repercussions, causing a potential *Assets Meltdown* in the financial sector (Poterba 2001, 565).

As articulated by Paul Samuelson (2010, 124), the primary economic precept is the realisation that ‘Things are seldom as they appear’. It is pertinent to analyse whether the situation is as apocalyptic as it seems. This perplexing disquisition mirrors a quandary that pervades several policies about ageing economies. While longevity is a triumph meriting being applauded, it would impose an impassable strain on the government’s treasury, exhausting funds which might have been employed otherwise. As ageing is a natural and inevitable phenomenon, only a critical and detailed assessment of the facts and ground realities will ward off misrepresentations and facilitate gearing up policy actions to reap the *Silver Dividend* (Naohiro et al. 2021, 32).

1.1.2 The Economics of Ageing

The Economics of Ageing is a field that still lies in the backwaters of economics, more so in India. However, it is gradually becoming a pre-eminent research area internationally due to the demographic transition that almost every nation is experiencing. A growing number of colleges, universities, and research institutes are offering a course paper at the graduate/postgraduate level, including doctoral fellowships, for instance, the London School of Economics and Political Sciences, Yale University, and Vienna University, among others.¹ In India, however, no institution offers any course exclusively devoted to the Economics of Ageing; nevertheless, a few institutions conduct interdisciplinary research on ageing in India.² As the elderly population augments, socio-economic

inequalities emerge (Heap, Fors, and Lennartsson 2017, 247). The ramifications are complex on people, households, and societies (Walsh et al. 2021, 19). To get a holistic perspective of the phenomenon, the Economics of Ageing encompasses two dimensions: *Population Ageing* (macro perspective) and *Individual Ageing* (micro perspective).

1.1.2.1 The Economics of Population Ageing

Considering Population Ageing as the focal point, the Economics of Ageing seeks to unravel the causes behind global demographic transformations (Poston and Bouvier 2010, 22). Besides, it investigates the speed of ageing across nations via cross-cultural empirical comparisons (Shetty 2012, 1285). It also deals with the ramifications of population ageing on various macroeconomic variables such as economic growth (Maestas, Mullen, and Powell 2023, 306; Pham and Vo 2021, 108), the financial sector and national savings (Pascual-Saez, Cantarero-Prieto, and Pires-Manso 2020, 291), investment (Kopecky 2023, 2), workforce participation rates (Cylus and Al Tayara 2021, 4), fiscal policy (Honda and Miyamoto 2021, 9), public health expenditures (Lopreite and Zhu 2020, 5), current account balances (Chitgupi 2019, 208), expenditures and initiatives concerning governmental pensions and social security provisions (Heer, Polito, and Wickens 2020, 3), inter-generational imbalances (Mason and Lee 2018, 187), and long-term institutional care (Barber, Ong, and Han 2020, 32), to name a few.

1.1.2.2 The Economics of Individual Ageing

Considering Individual Ageing as the focal point, among the many themes analysed include the economic status of older adults, their income variations (Prammer 2019, 5), expenditure and consumption patterns (Wang, Zhao, and Meng 2022, 14), material deprivation (Pereira Gray et al. 2017, 6), their retirement planning and pensions (Foster 2018, 117), post-retirement engagement in work (Xie et al. 2021, 7), retirement savings behaviour, and the impact of having an elderly member on household finances (Yuan, Puah, and Yau 2022, 5). Another crucial area involves analysing older individuals' *Health-Related Quality of Life (HRQOL)*, investigating their physiological and psychological health, and determining their medical expenditures (Krawczyk-Suszek and Kleinrok 2022, 9). The epidemiological transition accompanying the ageing process, the choice of public v/s private treatment (Chatterjee et al. 2019, 37), the role of insurance (Garg, Bebartha, and Tripathi 2022, 7), and the need for institutional care are also some of the critical issues investigated. While it is problematic that *Demography is Destiny*, research through statistical analysis plays a crucial role in understanding the dynamics of this phenomenon.

1.2 Statement of the Problem

As highlighted in the background of the study, population ageing is an accelerating phenomenon that will expand to almost every nation in the following decades (Bloom et al. 2015, 649). These estimations are additionally supported by a recent study from the United States of America (USA), which delineates population ageing to be the single major underlying factor destined to alter the contours of humanity, resulting in significant short-and long-term macroeconomic and microeconomic repercussions, besides impacting the social and political fronts (US National Intelligence Council 2021, 567).

1.2.1 Problem Structure: The ‘What’, ‘So What’, and ‘Now What’ of the Economics of Ageing

1.2.1.1 The ‘What?’ behind the Economics of Ageing

Given that the crux behind ‘What’ the Economics of Ageing encompasses is explicitly outlined in Section 1.1.2 of this chapter, we proceed to the second ‘What’ that is gaining international prominence and is among the highly debated topics in the Economics of Ageing literature, i.e. ‘What’ has been driving global population ageing in terms of being the most prominent driver? We also seek to present an integrated theoretical framework in terms of: ‘What’ is the underlying economic theory behind these drivers?

Economic Demography, a subset of the Economics of Ageing, constitutes a branch of research that scrutinises the factors and outcomes of shifting demographics, encompassing variables comprising gender, age, longevity, fertility, marital status, and spatial factors like urbanisation, relocation, and density of populations. It incorporates principles and practices from both theoretical and applied economics (Kelley and Schmidt 2017, 11). However, there is a dearth of research that presents a comprehensive integration of economic theory underpinning the drivers of population ageing.

Poston and Bouvier (2010, 22) claim that the three major drivers of an ageing populace are Fertility, Mortality, and Migration. Continuing discussions (detailed in the Review of Literature) have arisen over how to measure the contributions of these drivers towards population ageing, primarily concerning which among the three has been most influential for the current pace of the global greying of nations. Some studies strongly contend that declining fertility is the primary cause, chiefly advocated through the prism of *Stable Population Models* (Bengtsson and Scott 2011, 164; Coale, Demeny, and Vaughan 1983, 245; Keyfitz 1975, 267; Lee 2011, 569; Weil 1997, 967). Highlighting

the drawbacks of the aforementioned models led to the emergence of findings suggesting that population ageing is primarily driven by declining mortality (Bourgeois-Pichat 1978, 12-14; Caselli and Vallin 1990, 1-2; Horiuchi 1991, 38; Horiuchi and Wilmoth 1998, 391; Preston, Himes, and Eggers 1989, 691; Preston and Stokes 2012, 231-232), however, often assuming closed economies, besides ignoring or keeping constant key demographic variables, which further received criticism (Lee and Zhou 2017, 288). The role of migration in shaping/combating the ageing of nations has also received inconsistent findings (Alho 2008, 641; Coleman 1995, 155; Paterno 2011, 65; Sharpe and Lotka 1911, 435; UNDESA 2017a, 1-2). This is the first issue we address.

1.2.1.2 The ‘So What?’ of the Economics of Ageing

Subsequent to the causes/driving forces behind the geriatric demographic shift, the second aspect of macroeconomic and microeconomic significance are the ramifications of ageing populations. Global alert signals are being triggered due to population ageing. Certain apprehensions manifest, taking the form of ominous predictions of overwhelming cohorts of abandoned, uncertain, helpless, maltreated, and victimised older individuals, stripped of their rights, languishing anxiously, often with the assistance of mobility aids, while anticipating their demise (Bloom 2019, 15). We begin by analysing the ‘Economic Fall-outs’, ‘Consequences’, or the ‘So What’ of the Economics of Ageing, initially at the macro level, concerning population ageing, with the micro-level analysis following suit.

1.2.1.2 (i) The ‘So What?’ of the Economics of Population Ageing at the Macro level

The financial burden of caring for older adults is detrimental to the fiscal health of economies (Tang and Li 2021, 27). The rapid ageing of humanity has a tremendous influence on public social security, pension, and insurance mechanisms. Mason and Lee (2018, 187) indicated that most systems in the West are affected by massive instability in the system. In most Asian countries and those not belonging to the Organisation for Economic Co-operation and Development (OECD), instability reaches high levels with increased fiscal imbalance. Inter-generational inequality at the macro level is a primary consequence of a population’s shifting demographic composition, tilting towards an older population and resulting in long-term socio-economic repercussions. Governments in fast ageing developing countries face budget constraints and are pressurised to redirect funds in favour of older generations for various purposes (like health, institutionalisation, and retirement savings) while increasing taxation to pay for such initiatives, the burden of which often falls largely on the younger-and-middle aged population.

Population ageing also affects inflation. The life-cycle hypothesis, postulated by Ando and Modigliani (1963, 55), posits that when a population's median age rises, most households finance their expenses via savings rather than actively creating more value. Consequently, the disparity between total demand and economic output widens, surfacing inflationary pressure fuelled by demand. Concurrently, a shrinking labour pool drives up salaries, thus elevating inflation via the cost mechanism. However, Broniatowska (2019, 179) found that a higher OADR is linked to lower inflation, underscoring the deflationary influence of ageing. Anderson, Botman, and Hunt (2014, 2) highlighted that a reason for this deflationary impact stems from diminishing growth in Gross Domestic Product (GDP), accompanied by declining property prices.

Another central area impacted by population ageing is the health sector. With the epidemiological transition accompanying population ageing in the form of new generational diseases, Reid et al. (2022, 7) highlight the substantial catastrophic shocks it poses to economies, characterised by escalating medical and terminal costs. Cristea et al. (2020, 9) also advocate a prime shift in the nature of services demanded, including their accessibility to the aged, creating enormous pressure on society and the government to restructure the public health system, which is costly and time-consuming.

The ageing of the age pyramid also greatly impacts labour force participation and efficiency. In this vein, Harper (2016, 587) pointed out that the balance of the labour force is greatly altered owing to an ageing populace, often contributing to migratory trends resulting in a stream of money transfers to other countries. Dallmeyer, Wicker, and Breuer (2017, 11) portrayed how efficiency and productivity are negatively impacted by a rise in senior workers, which in turn results in negative repercussions on growth.

Economic literature reveals that the growth rate in real GDP frequently serves as an essential indicator for assessing overall economic health (Callen 2022, 14). GDP is significant due to its ability to reveal information about the size and functioning of an economy. Population ageing exerts downward pressure on economic expansion since certain fast-ageing nations, such as Japan, Germany, and the United Kingdom (UK), contribute significantly to global GDP. For instance, via simulated investigations, Onder and Pestieau (2014, 6) demonstrated that sluggish population growth, alongside an upsurge in OADR, will lead to a 1.2 percentage point drop in average annual global GDP growth between 2015 and 2055. In this regard, Lee (2016, 50-52) observed that the composition and efficiency of the workforce, asset investments, turnover on capital, government policy responses, and behavioural changes would eventually influence how the effects of ageing

populations ripple through GDP growth. However, the ramifications of demographic ageing on economic growth remain a highly debated issue. As has been extensively elaborated in the Review of Literature, though population ageing is widely assumed to have detrimental effects on economic growth (Basso and Jimeno 2021, 833; Bloom, Canning, and Fink 2010, 583; Cuaresma, Loichinger, and Vincelette 2016, 4; Eggertsson, Lancastre, and Summers 2019, 325; Ghavidel and Mirghiyasi 2018, 159; Huang, Lin, and Lee 2019, 1; Ismail et al. 2016, 1345; Lee, Shin, and Park 2017, 162; Lindh and Malmberg 2009, 159; Loumrhari 2014, 344; Maestas, Mullen, and Powell 2023, 306; Miri, Maddah, and Raghfhar 2019, 626; Oliver 2015, 841; Park, Lee, and Mason 2012, 2; Uddin, Alam, and Gow 2016, 23; Wongboonsin and Phiromswad 2017, 364), a relatively less number of studies also demonstrate a positive impact (Acemoglu and Restrepo 2017, 174; Bawazir, Aslam, and Osman 2020, 429; Fukuda and Morozumi 2004, 3; Lee et al. 2013, 401; Li and Zhang 2015, 199; Li, Li, and Chan 2012, 5; Mamun, Rahman, and Khanam 2020, 14; Pham and Vo 2021, 108; Prettnner 2013, 811). Notwithstanding the above, though it is commonly assumed that the relation between ageing and economic growth is monotonic (linear), a few relatively recent exceptions argue that the relationship can be non-monotonic (nonlinear), with early ageing stages promoting growth due to higher savings, but later stages causing decline due to lower capital accumulation and labour force participation (An and Jeon 2006, 447; Antonakakis and Workie 2023, 1; Lee and Shin 2019, 1-2; Yang, Zheng, and Zhao 2021, 1). Our study seeks to scrutinise the overall impact of population ageing on economic growth by clarifying these conflicting results.

1.2.1.2 (ii) The ‘So What?’ of the Economics of Individual Ageing at the Micro level

Turning our attention to individual ageing from a microeconomic (individual/household) perspective, research manifests that the financial, health, and familial resources at the disposal of the elderly significantly impact how individuals meet the growing demands of later life (Ghența et al. 2022, 7). The overarching microeconomic framework underlying human behaviour begins with the premise that individuals (and households) strive to achieve their objectives based on their present situation, external restrictions, expertise, and opinions about future uncertainty (Tubaro 2015, 331). Concentrating on such choices assists in the computational modelling of complicated occurrences and identifying legislative levers towards transformation. Thus, from a microeconomic angle, assessment of financial wellbeing, retirement pensions, health, and Quality of Life (QOL) significantly determine if a person flourishes as they age (Mitra, Brucker, and Jajtner 2020, 6).

From the dimension of analysing material resources, in terms of the income and expenditure of older adults, it is found that their insufficient financial capacity is a significant issue (Marson, Kerr, and McLaren 2016, 362). Hills, Cunliffe, and Obolenskaya (2016, 267-268) demonstrated that, on average, the incomes of older individuals are lower than the rest of the population. Poverty and insecurity among older adults are a reality, with inadequate resources and income within the family being evident as the age structure transforms. Kastor and Mohanty (2018, 8) demonstrated that as opposed to non-elderly families, those with older members are more inclined to experience higher out-of-pocket costs and, thus, higher household expenditure. The components of expenditure also differ. For instance, Chung and Magrabi (2007, 245) observed that elderly families spent more on utilities, medical expenses, and housekeeping than younger ones while spending less on apparel, housing, and recreation.

Ageing populations affect welfare distribution at the individual level within families/households. According to Mishra and Rajan (2017, 32), the presence of an older person in the household often breaks down the existing resource-sharing mechanism, reducing overall and individual welfare. Age composition changes can also affect well-being through significant incidences of widowhood and changes in living arrangements (Srivastava et al. 2021, 9). In light of crucial rural-urban inequalities, the desire for co-residence, inadequate savings, pension provisions, and excessive dependence on familial assistance, older adults in rural China continue to be more impoverished, susceptible, impaired, uncertain, and socially estranged compared to urban older people (Fang, Wang, and Ouyang 2019, 324).

More senior women appear materially incompetent than men of similar ages (Torres 2014, 72-73), thus significantly contributing to gender inequality among the aged (Chen et al. 2021, 461). Women are more inclined to outlive their spouses, thus having a greater lifespan since they often marry older men. Regardless of longer lifespans, females are less healthy as they grow older than males (Hossin 2021, 482), making them prone to require care precisely when they are more inclined to become widows. In some instances, older females are less likely to be formally employed, making it harder for them to obtain retirement benefits, often being lower in amount even if they receive a pension. Interestingly, as populations age, a greater need arises for females to engage in caregiving tasks, mainly provided free of charge, restricting women's access to the labour force while increasing their responsibility to carry out unpaid and domestic duties (Mussida and Patimo 2021, 489).

More often than not, older persons are reluctant to disclose financial stress. Nevertheless, their income is often lower, with fewer unmet requirements than younger populations (Groffen et al. 2008, 5). In contrast to younger low-income earners, older individuals are more unlikely to claim they cannot buy goods and are inclined to clarify that the goods are undesirable (Perry 2014, 13). Thus arises the requirement for complementing the assessment of income and expenditure with better-defined metrics, such as the *Living Standards Capabilities* for older adults (Alhambra-Borrás, Doñate-Martínez, and Garcés-Ferrer 2021, 2528), based on Amartya Sen's *Capability Approach* (highlighted in the Review of Literature). It complements the utilitarian/materialist views to evaluate living standards by not depending exclusively on earnings, assets, and ownership (Yeung and Breheny 2016, 293).

A fast-ageing population also poses challenges for individual healthcare-related issues. According to Franceschi et al. (2018, 7), persistent degenerative illnesses, including cancer and cardiovascular disease, constitute the main drivers of fatalities among older adults. Jiang et al. (2018, 18) contend that older people in poor health increasingly rely on household members. On account of the expenses associated with caregiving towards older adults, accompanied by the opportunity costs that follow, it could be difficult for the entire family to cope. Strong associations between chronic morbidities and functional limitations have been found, as serious illness hinders normal routines besides having a detrimental impact on wellbeing (Tey, Lai, and Teh 2016, 39). Arthritis, cardiac problems, diabetes, respiratory ailments, and visual impairments are the most common contributors to functional restrictions among older individuals (Lin, Beck, and Finch 2016, 332). The *Ageing of the Human Immunodeficiency Virus* is yet another phenomenon, entailing the impact of prolonged infection with the virus on individuals as they grow older, owing to advancements in *Anti-Retroviral Therapy*. Approximately 20% of the global older population suffers from psychological problems, specifically anxiety, dementia, substance use, and depression, compounded by physiological and psychosocial multimorbidity (WHO 2017). Biases that negatively influence their care include the triple challenge: *Ageism*, *Mentalism*, and *Ableism* (Rabheru 2021, 989). Hence, assessing their HRQOL is vitally essential to understanding the presence of health inequities among older adults.

Another critical aspect connected to HRQOL and demanding serious attention is the *Healthcare Utilisation (HCU) Choice* of Public v/s Private health services, accompanied by *Catastrophic Health Expenditure (CHE)*. Rahi and Sharma (2022, 1585) contend that privately offered healthcare providers provide 75% of outpatient care and

62% of inpatient treatment in India. According to Rout, Sahu, and Mahapatra (2019, 6), the likely explanation in the Indian context could be associated with the inadequate infrastructure of public health services. As a result of this insufficiency, people are forced to use private healthcare rather than public ones, which results in substantial out-of-pocket costs. This affects the elderly, in particular, who are financially fragile and have significant healthcare demands (Anand 2016, 11). Private healthcare costs in India are approximately fourfold higher than those in public healthcare. Thus, a sizeable section of the elderly (around 38%) often face overwhelming health expenses (Lee, Saran, and Rao 2018, 414).

Another pertinent aspect, given the fast pace at which older adults are growing, leading to declining workforce participation rates, is *Post-Retirement Work (PRW)* among older adults. Retirement was once considered a reasonably anticipated, long-term transition from full-time employment towards full-time recreation. Many people now see retirement as an integration of engaging in financially rewarding employment alongside pursuing recreational endeavours rather than an irreversible departure from the workforce (Moen and Flood 2013, 206). For instance, approximately nine million Americans work after retirement (Maestas 2010, 718). In a similar vein, 47% of older male Canadians aged 60 to 64 who had resigned, rejoined the workforce in less than ten years. While some are pulled out of the labour market prematurely (voluntarily), others are pushed back into the workforce post-retirement owing to various circumstances (Le Blanc et al. 2019, 6).

Another issue demanding attention is the rising number of elderly residing in Old Aged Homes (OAHs). Over the last several decades, households have undergone immense transformations, more so in India, owing to size shrinkage, nuclearisation, and relocation, bearing significant ramifications on the elderly (Chakravorty, Goli, and James 2021, 7), many of whom live alone, or are forced to move to an OAH. Nonetheless, in OAHs, a considerable number of elderly individuals still lack access to adequate care, assistance, and basic requirements for a comfortable and dignified existence, necessitating the enhancement of policies to safeguard OAH residents. For instance, an Indian study observed that the standard of living of the elderly residing within their family environment surpassed that of older adults residing in OAHs (Amonkar et al. 2018, 10). A study undertaken by Chalise (2014, 10) demonstrated that depression is affecting the elderly living in OAHs. Likewise, the prevalence of obesity and malnutrition among older inhabitants of OAHs was also noted by Khole and Soletti (2018, 234). Notwithstanding the limited availability of resources, private OAHs deliver superior care, living conditions, and healthy lifestyle practices compared to government-run OAHs (Chalise 2019, 173).

In fine, as succinctly delineated earlier, the ageing process carries significant economic repercussions on the individual/microeconomic front. As vast literature shows, older adults, particularly older women (and their households), face immense challenges concerning their financial situation, HRQOL, labour market choices, both pre-and post-retirement, and nature of living arrangements (with family v/s in OAHs), all of which have a tremendous bearing on their wellbeing. In light of this, it is imperative to comprehensively understand and record the daily living conditions, on-ground realities, and significant problems that older adults encounter. This knowledge is crucial for addressing and mitigating the economic fallouts of ageing by taking suitable measures and remedies, both in the present and future. In the absence of an exhaustive examination of the factual scenario, it will be difficult to ascertain the extent and kind of relief required, while the specific scope and direction of such actions will not be precisely identifiable.

1.2.1.3 The ‘Now What?’ of the Economics of Ageing

This precise documentation of the ground realities faced by older adults could help older individuals and their households directly. Additionally, understanding the ramifications can assist policymakers in formulating policies and initiatives at the local and macro levels. This is due to the fact that, given the unprecedented and fast-paced nature of this phenomenon, the ageing process, with its consequences on individuals and their households, generates far-reaching ripple effects at the macro, national, and international levels. Though the challenges at hand are indeed daunting, the ensuing chapters suggest that they are not insurmountable. Shifts in demographics inherently possess the capacity to trigger behavioural changes besides stimulating institutional and technical developments and policy reforms. These adjustments may accentuate positive outcomes or help in combatting negative ones. The ageing of the population unquestionably presents a multitude of challenges. A significant contribution of this study involves shedding light on multiple choices that can be adopted to address these problems. We aim at discerning the best-suited options for individual and collective adoption, focused on galvanising governmental, political, and societal determination to take proactive action.

1.3 Scope Demarcation: Conceptualising Age and Area

Given the necessity (as outlined in Section 1.2.1) of assessing the two primary dimensions of the Economics of Ageing, namely, Population Ageing and Individual Ageing, a clear conceptualisation of ‘Ageing’ and a strong justification for using the same is of prime

importance. The yardsticks employed to determine who is or is not old differ from culture to culture. According to *The Encyclopaedia of Population*, the proportion of senior persons of retirement age is a standard indicator of population ageing (Demeny and McNicoll 2003, 201-203). Most old age and ageing descriptions employ a *chronometric framework* derived from Western Gerontology. *Chronological* or *Retrospective Age* is the time from birth expressed in years. Thus, this study considers chronological age as the way of measuring ageing. As Macunovich (2012, 783) noted, the proportion of older individuals in the populace is the most appropriate indicator of population ageing in a nation.

Concerning the first aspect of analysing population ageing at the macro level (which will form the basis for the first two objectives and the subject matter of Chapters 4 and 5), from an international perspective, and to compare countries at various ageing transitions, we adopt the demarcation provided by the UN. According to the UN, a nation is *Super-Aged* when the older adult percentage of individuals aged 65 years and above in the total populace surpasses 20%; *Aged* when this proportion is 14% or greater, and *Ageing* when this proportion is over 7% (World Bank 2021, 2). Thus, the UN places a demarcation at *65 years of age* for cross-cultural comparisons since this is often the retirement age, particularly in industrialised countries. Similarly, the *World Population Data Sheets* published by the Population Research Bureau (PRB) regard the population aged 65 and above as older individuals. Hence, while analysing population ageing from a global perspective for cross-country comparisons, the present study considers the proportion of the elderly aged 65 and beyond to be *older adults*.

The classification of India as an Ageing nation lies imminent, while projections of transitioning into an Aged nation are indicated to occur in a little over two decades. To avoid excluding India (and a few other countries on the same path) from the global macro-analysis, the present study presents a significant contribution by defining a fourth category, the *Potentially-Ageing* nations, whose populace aged 65 years and over is less than 7%.

An assessment of India's preparedness for an ageing population stands pertinent, given projections that it will age rapidly in the coming years.³ A situational analysis of the elderly in India is conducted based on available secondary data from the Census of India (2011), the National Statistical Office [NSO] (2020), and the National Sample Survey Office [NSSO] (2019) to understand the State/Union Territory (UT)-wise disparities prevalent. The position of Goa's elderly relative to those in other States/UTs is highlighted, giving a better context to the remainder of the study, focusing on individual ageing and accentuating the need for an in-depth analysis of older adults in Goa,

performed via intensive primary surveys. The pressing need for the latter is felt since Goa is greying swifter than the remainder of the nation⁴. A few extensive state-specific⁵ and comparative studies⁶ have been conducted on the elderly in India; however, none have featured the State of Goa. Nevertheless, among the handful of studies⁷ conducted on the elderly in Goa, the researcher has not encountered any from the perspective of the Economics of Ageing, which is of prime importance concerning the immense transformations Goan households are facing owing to size shrinkage, nuclearisation, migration, and individualistic outlooks, contributing to the challenges of assisting and sustaining older individuals, traditionally revered in the household.

Thus, the situational analysis of older adults in Goa in relation to other States/UTs in India (based on secondary data) and the economic fallouts of individual ageing from a micro perspective among Goan older adults (via primary survey) forms the subject matter from the third to seventh objectives (Chapters 6 to 8). For the purpose of these objectives that fall under the jurisdiction exclusively of India, we follow the definition promulgated by the 1999 *National Policy on Older Persons*, adopted by the Government of India (GoI). It defines an elderly individual as *60 years or older*. Similarly, 60 years is designated by the Census of India to classify a person as old.

Gerontologist Bernice Neugarten (1974, 191) advocated that a better understanding of older adults' diverse experiences and needs is possible by grouping them into age subsets. She classified older adults into two groups:

- (i) *The Young-Old (Y-O)*: Individuals falling within the age range of 60 to 74 years
- (ii) *The Old-Old (O-O)*: Individuals aged 75 years and beyond.

This classification has been incorporated into the study. Also, the Aged, Elderly, Older Persons/ Older Adults/ Older Individuals, and Senior Citizens are interchangeable terms used throughout the thesis.

1.4 Objectives of the Study

In an endeavour to present an in-depth understanding of the Economics of Population and Individual Ageing, the study's objectives are outlined below:

- 1) To probe into the Long-run relation and Economic Theory underlying the Primary Drivers of Population Ageing.
- 2) To examine the Implications of Population Ageing on Economic Growth.

- 3) To present an Analytical Assessment of the Disparities among the Indian Elderly, comparing those in Goa with their counterparts across India.
 - 4) To assess the Inflows, Outflows, and Living Standards Capabilities of the Goan Elderly.
 - 5) To analyse the Health-Related Quality of Life (HRQOL), Healthcare Costs, and Healthcare Utilisation (HCU) Patterns of Older Adults in Goa.
 - 6) To investigate the relation between Living Standards Capabilities, HRQOL, and Life Satisfaction in the context of Healthy Ageing.
 - 7) To evaluate the Labour Market Choices, Pensions, and Social Provisions of Older Goans.
- From Objectives 4 to 7, wherever possible/deemed necessary, a comparison is made at three tiers: (i) *Age-specific*: Between Y-O and O-O, (ii) *Gender-specific*: Between Males and Females, and (iii) *Living Arrangement-specific*: Among elderly at home and in OAHs.

1.5 Limitations of the Study

- The research topic deals with a sensitive issue wherein individuals have varying perspectives on disclosing information related to their age. Despite care and precautions taken to eliminate inconsistencies (primarily by grouping the elderly into two broad groups: the Y-O and the O-O), respondent bias (especially recall bias among the elderly), and other lacunae, the accuracy of the profile prepared and data analysed from the primary survey depends solely on the information provided by the respondents.
- The survey was conducted following the receding of the COVID-19 pandemic in Goa. Given that the pandemic has impacted every segment of society and the economy, the influence is evident in the finances, health, and labour market realms of the elderly and their households. The findings thus bear the influence of the same.
- The age cutoff for classifying an individual as elderly is just an arbitrary number and varies across nations. Besides, the age for retirement varies based on occupational categories. Nevertheless, the health and finances of a person are often based on previous life circumstances and could be better understood via a life-course perspective.
- Cultural, social, political, environmental, technological, legal, and cohort factors also have an essential function in older individuals' economic, health, and labour market dynamics. We primarily focus on the same from an Economics of Ageing perspective.

1.6 Structure of the Thesis

Nine chapters constitute the current research:

- **Chapter 1** serves as the study's *Introductory Chapter*, providing a broad overview of the research's organisational framework. It sets the background for the study and structures the problem to be studied into three broad components: 'The What?', 'So What?', and 'Now What?' of the Economics of Ageing. It clearly demarcates the scope of the study, outlines the objectives, highlights the limitations, and summarises the chapters that constitute the thesis.
- **Chapter 2** presents a thematic *Review of Literature* on the subtopics underlying every objective. It identifies the research gaps and outlines the research questions.
- **Chapter 3** presents the *Research Methodology* adopted in the study by highlighting the econometric and statistical tests/models employed, owing to the use of both primary and secondary data. It also presents the blueprint behind the primary study in Goa, including questionnaire formulation and sample profile.
- **Chapter 4** focuses on the *Economic Theory and Cross-National Empirical Analysis underlying the Major Drivers of Population Ageing* by presenting a cross-national empirical model based on *Cointegrating Regressions*.
- **Chapter 5** delves into *The Implications of Population Ageing on Economic Growth*, testing for a nonlinear relation using *Fixed Effect Regressions*. It analyses this impact as nations transition across ageing stages, comparing the same across developed and developing economies.
- **Chapter 6**, entitled *Disparities among Indian Elderly and Economic Concerns of Goan Older Adults*, nurtures fertile ground for bridging the gap between the global and local analysis. It does so by first presenting *A Situational Analysis of the Elderly in India (Section 6.1)*, bringing to the fore vast disparities faced by the Indian elderly, comparing Goa's elderly relative to those in other States/UTs, accentuating the need for an in-depth study in Goa. *Section 6.2* assesses the heterogeneous economic condition by analysing the *Inflows, Outflows, and Living Standards Capabilities of the Goan Elderly*.
- **Chapter 7** analyses the *Morbidity Patterns, HRQOL, and Healthcare Costs among the Aged in Goa*. The Costs of Caregiving and HCU are also discussed.
- **Chapter 8** unveils the intricacies from *Wellness to Work* by exploring *Healthy Ageing Trajectories, Labour Market Outcomes, and Social Provisions among Goan Elderly*. It cohesively synthesises the phenomenon of *Healthy Ageing, encompassing the relation*

between the Economic, Health, and Subjective Wellbeing domains (Section 8.1) by employing Structural Equation Modelling (SEM). Section 8.2 explores the Labour Market Choices, Pensions, and Social Provisions among Older Adults in Goa.

- **Chapter 9** presents a *Summary of the Findings, Conclusion, and Recommendations focusing on the ‘Now What?’ of the Economics of Ageing*. Suggestions for future research are also incorporated.

¹ The National Bureau of Economic Research, Cambridge, in USA, offers a research programme on the Economics of Ageing. The University of Melbourne offers the Economics of Ageing as part of their graduate course work, as also does Flinders University in South Australia. The Economics of Ageing is also a prominent subject offered by Yale University in USA. The Research Institute for the Economics of Ageing, part of the Vienna University of Economics and Business Administration, Austria, also extensively engages in research work in this area. The Economics Fraternity of the University of Malta offers the Economics of Ageing Populations as part of their Post Graduate course. The School of Economics of Singapore Management University also offers a similar course. Graduate learners exhibiting a keen interest in this field are also instructed in the Economics of Ageing at the University of Chicago via a Specialized Training Program. Master of Science (MSc.) degree in Ageing and Public Policy is offered at the University of Galway in Ireland by J. E. Cairnes School of Business and Economics. The University of Southampton, UK, also offers an MSc. degree in Global Ageing and Policy. An interesting initiative by the London School of Economics and Political Sciences is the setting up of the Ageing and Health Incentives Lab which specialises in the Economics of Healthy Ageing, Health Behaviour, and Wellbeing in Old Age.

² The IIPS has a Centre for Ageing Studies in Mumbai. In addition to the UNFPA in New Delhi, the Institute for Social and Economic Change in Bangalore, the Centre for Development Studies in Kerala, the Tata Institute of Social Sciences in Maharashtra, and the Institute of Economic Growth in Delhi also conduct research on ageing in India.

³ An article in *The Economic Times* (16/12/2021), entitled, ‘India will likely get old before it grows rich’, sheds light on India’s fast-ageing future (Sharma, December 16, 2021).

⁴ The smallest Indian state, Goa, situated on the western coastline, is home to the second highest share of older adults (11.2%) in the population, higher than the all-India national average (Census of India, 2011).

⁵ An extensive survey has already been conducted entitled Kerala Ageing Survey, 2005, by the Centre for Development Studies in Kerala, India’s state having the highest share of older adults (Rajan, 2005). A few state-specific studies explicitly focussing on the elderly have also been carried out in Karnataka (Devraj and D’mello, 2019; Shraddha et al., 2012) and Kerala (Rajan et al., 2020) to name a few.

⁶ Alam et al. (2015) focused their analysis on seven states, including Punjab, Kerala, Himachal Pradesh, Tamil Nadu, West Bengal, Maharashtra, and Odisha, presenting a comparative picture.

⁷ In Goa, there are a handful of studies on older adults examining their emotional wellbeing (Cohen et al. 2018), mental diseases and caregiving (Patel and Prince 2001), problems faced by the elderly from a sociological perspective (Rodrigues 2013), preference for/condition of OAHs (Sousa 2010), and diaspora effects on older parents (Moraes 2015).

CHAPTER 2: REVIEW OF LITERATURE

Delving into the perpetually intriguing yet inexplicable realm of ageing and the elderly has become an increasingly demanding pursuit for researchers. A wealth of intellectual endeavour has been invested in crafting comprehensive theories and intricate methodologies and creating extensive databases. With the natural augmentation of the panoply of research tools and diverse perspectives, the shared space for a fruitful idea exchange and open dialogue appears to be contracting. Nonetheless, if we temporarily suspend belief on the credibility and worth of that intricate structure composed of variables, analytical methods, and sets of hypotheses, we may be faced with a somewhat disconcerting revelation: Hazan (1988, 1).

2.1 Introduction

As humanity enters predominantly uncharted waters in conjunction with an ageing populace, investigators instinctively review prior developments to gain insight into the challenges at hand and pave the way for advancing potential research based on a solid foundation. The importance of an ageing population is highlighted in several scholarly articles (Rowland 2009, 37; Schoeni and Ofstedal 2010, 6). The purpose of this section is not merely to deliver an incoherent conglomerate of incompatible evidence but rather to carve out a path to reconsider, question, and explore fresh solutions concerning this ever-evolving issue. This chapter showcases a wealth of scholarship in the guise of research and empirical studies conducted by investigators at the global, national, and local levels on the segments mentioned below. The review has acquired a progressively international flavour due to the dearth of economic research at the latter two tiers. It is organised thematically in sequence to the subject matter addressed in every objective, highlighting conflicting results, methodological issues, and findings exclusive to spatial distributions, thus paving the path for answering several research questions.

2.2 Causes of Global Population Ageing: Conflicting Views

The *Revisionist* school of thought suggests that population ageing began to develop ‘from the top’ (i.e., owing to declining mortality), as opposed to the *Classical* presumption that ageing was caused by decreased fertility. The significance of the role of migration also remains a contentious matter. This section brings out only the conflicting views in the literature concerning the supremacy of the drivers of population ageing. However, the economic theory underpinning each of the drivers is discussed at length in Chapter 4, in answer to Research Question (RQ 1.1) underlying Objective 4.

2.2.1 Declines in Fertility as the Major Contributor to Population Ageing

Over generations, researchers have gained insights into the mechanisms determining age structure, primarily by using *stable population models* (Keyfitz 1975, 267; Lee 2011, 569). These models keep age-specific birth and death rates constant over a sizable amount of time, eventually stabilising the population's age structure. As an illustration, the stable population simulations by Coale, Demeny, and Vaughan (1983, 245) graphically represent the OADR, quantifying the ratio of individuals 65 years and above to those within the working-age bracket (20 to 64 years), utilising isoquants across different levels of fertility and life expectancy. Employing empirical life tables recorded in developed societies over 150 years, corresponding to Northern, Southern, Eastern, and Western Europe, they demonstrated that the effect of a drop in fertility levels on the ageing of the stable population far outweighed the impact of declining mortality.

Bengtsson and Scott (2011, 164) updated the calculations of Coale, Demeny, and Vaughan (1983, 245), utilising one-year age-group data spanning the twentieth century. The outcomes were consistent with the conclusions of Coale, Demeny, and Vaughan (1983, 472). They discovered that with constant fertility, Sweden's percentage of people 65 and older would have been 8% in 2000, mirroring the rate from 1900, signifying minimal alteration over this interval. In both cases mentioned above, the argument proceeds that substantial advancements in mortality have a minor effect on the ageing of the population.

Similarly, Weil (1997, 967) offered insights into four stable populations of the US, keeping 1989 as a point of comparison. The relative importance of changes in births and deaths is evaluated by examining each component separately. Transitioning from the birth rate of the 1930-1934 cohort to the 1986 birth rate leads to an increase of 10.1 percentage points in the share of the population 65 or older when death rates are maintained at their 1980 level and by 13.1 percentage points when death rates are held at their 2030 level. Opposed to this, advancing the death rate from its 1980 level to its 2030 level results in a rise of 2.0 percentage points in the proportion of the aged population when birth rates are held constant at the level of the 1930-1934 birth cohort, or a 4.1 percentage point increase when birth rates are maintained at their 1986 level. They conclude that the fertility shift is responsible for roughly two-thirds of the rise in the share of older adults.

Unfortunately, as Lee and Zhou (2017, 288) pointed out, the drawback of using stable population simulations lies in the fact that such models do not account for the interval between one stable population and another. Given that both the developed and

developing nations are presently in a transitional stage, such stable population models become only marginally relevant. Preston, Heuveline, and Guillot (2000, 153) rightly advocated that the essential condition for stability requires a group of age-specific growth rates to remain uniform over different age categories. However, this condition is fulfilled by a few present-day populations, which prompted Keyfitz (1975, 267) to question the applicability of stable population models in comprehending the dynamics of real-world population ageing.

Lee and Zhou (2017, 285; 290), using *analytical simulations* conducted for India and the more developed countries, assumed that economies are closed by ignoring migration for simplicity's sake and revealed that fertility change has overwhelmingly influenced population ageing in the past century. Furthermore, using UN population projections to analyse the factors driving alterations in population demographics from 2015 to 2100, they emphasised that as the fertility rate stabilises and life expectancy rises in the future, the impact of mortality change will gain greater prominence.

Murphy (2021, 258-260), while critically appraising the work of Lee and Zhou (2017), warned that the results of analytical simulations hinge on the chosen base year and population momentum adopted by the latter. He commented that though the findings remain consistent, specifically that population ageing is primarily driven by declining fertility, he underscored that the role of enhanced survival has become increasingly significant in contemporary times. We thus turn to the literature purporting population ageing to declining mortality, in other words, to rising life expectancy as the key driver.

2.2.2 Declines in Mortality as the Major Contributor to Population Ageing

With enhancements in survival mainly concentrated among the elderly and very old age groups in decades subsequent to World War II, and the emergence of a form of ageing 'at the apex' (Bourgeois-pichat 1978, 12-14) or 'from the top' (Preston, Himes, and Eggers 1989, 691), certain Revisionist scholars have raised objections to the notion that fertility consistently remains the primary driver behind population ageing. A series of scholarly works surfaced (Caselli and Vallin 1990, 1-2; Horiuchi 1991, 38; Horiuchi and Wilmoth 1998, 391; Preston, Himes, and Eggers 1989, 691), and most recently, the one by Preston and Stokes (2012, 231-232), contending that the ongoing process of population ageing in recent times is predominantly attributable to decreasing mortality rates. This line of research has produced sophisticated models for understanding shifts in the mean age of the population aimed at elucidating transitional changes.

Based on information gathered from the UN for the industrialised and developing nations, Preston and Stokes (2012, 231-232) looked at the causes of ageing between 2005 and 2010. Employing an *accounting framework* that presented age-specific growth rates as the aggregate of components signifying births, survival, and migration, they illustrated that the most significant contributor to ageing among industrialised and less developing countries lies in the enormous increases in survivability across generations.

Utilising data from the Human Mortality Database from 1850 onwards, among 11 European nations, Murphy (2017, 257) estimated the effect of fertility, mortality, and migration on population ageing. He *decomposed* ageing into births, mortality, and net migration. Like the ‘tortoise and the hare’, he observed that the gradual rise in mortality ultimately outweighs the erratic fertility element. He pointed out that net migration only negligibly and temporarily impacted ageing populations. The findings supported the hypothesis that mortality supplanted fertility as the primary cause of ageing in wealthy nations and that low-middle-income ones will subsequently pursue this trend.

Extracting data from the Human Mortality Database, encompassing eight populations in Europe, North America, and Oceania, dating even up to 1820 wherever applicable, De Santis and Salinari (2023, 1723) uncovered a *cointegrating relationship* between the reference age structure and the present age structure of the population. They demonstrated that most of the historical shifts observed in the proportions of young, adult, and elderly individuals in these nations can be attributed solely to changes in survival, disregarding fertility and migration.

An argument in favour of mortality being the primary factor driving contemporary population ageing is purported by Horiuchi (1991, 38). He posits that while fertility decline played a crucial role in ageing populations in the past, this effect will be used up, and ongoing ageing will primarily result from declining mortality. This explanation holds merit, as Horiuchi points out that as mortality decreases, its impact becomes more concentrated in older age groups, while the extent of fertility decline is limited.

2.2.3 The Importance of Migration in Population Ageing

While developing stable population models, Sharpe and Lotka (1911, 435) pointed out that in a population that is isolated from migration and subjected to a consistent set of age-specific fertility and mortality rates, there will ultimately be a consistent growth rate, which could be positive, negative, or zero. Additionally, the age distribution within this population will remain stable over time. As noted by Paterno (2011, 80), despite different

chronological and territorial perspectives, the preponderance of studies concerning population ageing and migration assert that the number of immigrants necessary to ‘slow down’ ageing would be so large that it would create problems for the social and/or economic and political systems in the destination regions. In general, the importance of migration in shaping and combating the greying of nations has received mixed findings.

A report published by the UNDESA (2017a, 1-2) found that though immigration significantly rejuvenates the demographics of the recipient nations, it cannot stop or counteract the long-run trend of population ageing. In developed areas, population ageing is anticipated to be slowed through migration. In industrialised regions, the average age in 2050 is expected to be 1.7 years higher under the proposed forecast, with no net migration versus the alternative scenario with migration. The population’s median age in Northern America would become two years older sans net migration, whereas Oceania and Europe would respectively be experiencing an equal increase of 1.6 and 1.1 years. Contrarily, the median age in emerging countries is little impacted by outmigration, predicted to be 0.1 years younger in 2050 compared to a migratory scenario.

While studying the immigration patterns of Commonwealth countries into the UK and Europe, drawing data from the 1989-1991 Labour Force Surveys, Coleman (1995, 155) argued that since the demographic profiles of immigrant and emigrant fluxes were similar and the volume of movement relatively modest, the cumulative impacts of migration on the nation’s age distribution were minimum.

Alho (2008, 641) analysed the *migration-fertility trade-off* by employing a stable open-population model. In this model, cohort net migration was directly proportional to births, and the influence of the age-specific pattern of net migration was encapsulated in a *migration-survivor function* using data from 17 European nations. His findings demonstrated that while certain countries already possess a level of migration that will lead to population stability, for others with declining populations, migration continues to offer prospects for mitigating the overall ageing of the population.

In an attempt to study whether immigration is the solution to population ageing in 103 provinces in Italy between 2001-2002 and 2008-2009 by adopting the *principal components factor analysis* and *regression* techniques, Paterno (2011, 65) suggested that the influence of inflows of foreigners in slowing the rise in the average age is constrained and fails to reach what is achieved through fertility. Internal migration countered the increase in the population’s mean age. Conclusions were drawn that immigration is only ‘one’ solution, which in some cases may be useful but not sufficient.

2.2.4 The Stimulation of Research Questions (RQs): Present Study v/s Prior Studies

The above review of literature pertaining to conflicting views concerning the causes of population ageing stimulates several RQs that will serve as a guiding path in analysing Objective 1.

RQ1.1: What economic theory underpins the three major drivers of population ageing?

RQ1.2: Could there be a statistically significant dynamic long-run relation between the three drivers and population ageing?

RQ1.3: Which of the three has reigned superior in driving the global greying of nations?

RQ1.4: Do variations exist concerning the prominent driving force of population ageing across nation categories transitioning over various ageing stages?

RQ1.5: What will be the driving force channelling global population ageing in future?

The current study improves upon previous research as, firstly, it identifies the lack of an appropriate ‘Economic Theoretical Context’ underlying individual drivers of population ageing that is of utmost necessity before proceeding with further empirical analysis and integrates the same into the study. Secondly, it overcomes the limitations of stable population models as in the works of Bengtsson and Scott (2011), Coale, Demeny, and Vaughan (1983), Keyfitz (1975), Lee (2011), Lee and Zhou (2017), and Weil (1997). Our study brings forth a *dynamic long-run relationship* between the drivers and population ageing using dynamic and robust models of *cointegrating regressions*, tracing similarities to the work of De Santis and Salinari (2023). Our panel includes a combination of developed and developing countries, similar to Preston and Stokes (2012), as opposed to localised studies undertaken by Alho (2008), Murphy (2017), and Paterno (2011). Our panel of nations is subdivided based on different ageing transition stages. We also investigate the most influential driver of future population ageing as undertaken by Lee and Zhou (2017).

2.3 Consequences of Population Ageing on Economic Growth: The Debate

The demographic transformation, in tandem with emerging technological advancements, is projected to ripple through future macroeconomic and labour market circumstances (Basso and Jimeno 2021, 833). Several nations have undergone accelerated alterations in their citizens’ demographic makeup over the past several years, transitioning from the first stage of a substantial youth-age populace towards a significant working-age proportion (second

stage) to finally a large percentage of older adults (third stage). The second stage, comprising a greater share of working adults, is anticipated to have a favourable influence on the economy's growth (Bloom and Williamson 1998, 419-420). On the other hand, the stages marked by increased dependence ratios of the older and younger populations are expected to entail a detrimental effect on the economy.

This impact is ultimately exerted on economic growth and stability through various channels. According to Lee and Mason (2017, 7-8), population demographics exert decisive effects on the availability of factors of production, with older adults being linked with a substantially greater need for capital and a lesser supply of labour. Consequently, they argue that ageing substantially influences production possibilities and factor returns, leading to greater wages and decreased returns on capital, including interest rates. Furthermore, several entitlements to pensions, medical assistance, etc., are linked with age, presenting problems to the sustainability of government budgets in many nations (Tang and Li 2021, 28). The economy's dynamism is also impacted by the citizen's demographic makeup, influencing the pace of technological advancement and economic expansion (Acemoglu and Restrepo 2017, 174).

Additionally, Pascual-Saez, Cantarero-Prieto, and Pires-Manso (2020, 291) advocated that population ageing impacts national savings. Due to a lower consumption rate of older individuals than working-age people, aggregate consumption falls, leading to declining aggregate demand. The elderly frequently possess fewer savings compared to their younger counterparts. Therefore, the decline in savings rate might surpass the decline in investment level. Broniatowska (2019, 179) contends that population ageing exerts a downward pull on inflation if declining aggregate demand cannot be matched entirely by reduced supply. In addition, Ferrero, Gross, and Neri (2019, 262) emphasise the effects on monetary policy: given that decreased inflation usually translates into reduced nominal interest rates, the deflationary factors prompted by shifting demographics suggest a greater likelihood that monetary policy will be limited by its capacity to streamline nominal interest rates over the medium-to long-run.

Some analysts believe the future is grim and will result in an *Age Quake* (Wallace 1999, 23) or a *Silver Tsunami* (Fox 2001, 12). Others, however, are optimistic that legislative adjustments may reduce unfavourable effects. Nonetheless, balancing all those lines of influence remains a vital topic (Holzmann 2013, 107). Given this context, the linkage underlying demographic transformation and economic growth has received extensive investigation; nonetheless, it remains a contentious matter.

2.3.1 The Negative Impact of Population Ageing on Economic Growth

Much research shows that the economic growth implications of population ageing are negative. A few among these examine the impact exclusively on a specific country. In this vein, Ismail et al. (2016, 1345) identified adverse growth repercussions due to an ageing populace from 1980 to 2011 in Malaysia by applying the *Autoregressive Distributed Lag (ARDL)* technique. A significantly negative consequence on per capita GDP on account of the OADR was also confirmed by Uddin, Alam, and Gow (2016, 23) in Australia by deploying the *Dynamic Ordinary Least Squares (DOLS)*, ranging from 1971–2014, with *Granger Causality* tests revealing a one-way short-run causal relationship connecting OADR to GDP per capita. Similarly, employing the ARDL approach, Miri, Maddah, and Raghfar (2019, 626) purported that a rising population aged 64 and older reduced the marginal saving inclination, consequently challenging the process of capital accumulation and harming the Iranian economy from 1987 to 2017.

Several studies examining a group of regions also trace a negative growth impact. In their estimation of the implications of population ageing among a panel of 12 emerging Asian economies between 2011–2020 and 2021–2030, Park, Lee, and Mason (2012, 2), for instance, reported considerable negative growth repercussions across nations with a significantly greater older population. Bloom, Canning, and Fink (2010, 583) also found proof of sluggish economic growth among countries comprising the Organization for Economic Cooperation and Development (OECD), bearing similarities to the findings of Lindh and Malmberg (2009, 159) among a panel of 15 nations belonging to the European Union (EU). Maestas, Mullen, and Powell (2023, 306) uncovered that throughout the USA from 1980 to 2010, when the proportion over 60 years rose by 10%, it slowed per capita GDP growth by 5.5%, analogous to the results of Wongboonsin and Phiromswad (2017, 364) from a sample of 122 nations spanning 1960 to 2010. Eggertsson, Lancastre, and Summers (2019, 325), using a two-generation *Overlapping Generations (OLG) Model*, demonstrated that the association between GDP growth rate and ageing has progressively become negative in recent years (2008-2015) by contrasting it with 1990-2008. Conversely, Lee, Shin, and Park (2017, 162), adopting a panel of 142 nations from 1960 to 2014, noted that population ageing exerts a detrimental short-and long-term growth effect.

Using *panel regression models* for the period 1970–2010 for 23 EU countries, Cuaresma, Lábaj, and Pružinský (2014, 50-52) discovered that the influence of ageing on income dynamics varies among nations, with the adverse consequences of ageing societies being more pronounced in comparatively less affluent nations. Using the *general*

equilibrium model, Basso and Jimeno (2021, 833) explored the primary transmission mechanisms through which demographic factors and technological advancements impact economic growth. Their study revealed that due to a trade-off between innovation and automation, decreased fertility rates and an ageing population result in declines in the proportion of labour income and in per capita GDP growth. Employing time series analysis with *Ordinary Least Squares (OLS)*, Huang, Lin, and Lee (2019, 1) identified the detrimental effects of a rising OADR on Taiwan's economic growth from 1981 to 2017.

2.3.2 The Positive Impact of Population Ageing on Economic Growth

Contrarily, numerous inquiries have revealed that ageing has a favourable influence on economic growth. For instance, Mamun, Rahman, and Khanam (2020, 14) found via *time-series modelling* that the ageing population of Bangladesh contributed positively to long-term economic prosperity from 1972 to 2015. This could happen since increased capital accumulation increases the output of the working-age populace and supplants the aged population's declining economic engagement.

Several studies in China also demonstrated a positive impact. For example, using *dynamic regression analysis* for 2000-2016, Zhao, He, and Yang (2018, 1) revealed that population ageing exerted a positive growth effect. Similarly, Ruidong (2018, 61) and Li and Zhang (2015, 199) exhibited that the OADR bears a long-term beneficial influence on China's GDP. This is anticipated to result from a significantly faster per capita GDP growth rate compared to the older population. Moreover, Bawazir, Aslam, and Osman (2020, 429) utilised *fixed linear panel data models* to analyse data from ten Middle East countries spanning from 1996 to 2016. Their findings revealed that the OADR had a positive impact on economic growth, while the Young Age Dependency Ratio (YADR) exerted a negative effect. This led them to conclude that older individuals do not constitute a substantial demographic force in most Middle Eastern countries. Similarly, using the *partial adjustment framework* in a sample of 80 nations, Lee et al. (2013, 401) demonstrated that over the period 1960-2005, an ageing populace did not hinder economic growth, akin to the results of Pham and Vo (2021, 108), who employed *quantile regression* for a panel of 84 nations from 1971-2015.

Based on a dataset of 22 OECD countries spanning the period 1970-2007, Herzog (2012, 1) found that as nations witness a rise in their OADR, those with lower rates of domestic savings, moderate current account deficits, and a greater degree of openness to international trade, may actually see a rise in GDP growth rates. The argument put forth is

that such countries have enhanced access to global capital markets, enabling them to maintain economic growth even in the face of significant increases in their OADR. These nations, characterised by lower savings rates, can rely on domestic consumption and, notably, foreign investment to counterbalance the decline in worker productivity resulting from the decline of domestic workers. In another cross-country analysis, Fukuda and Morozumi (2004, 3) claim that an increase in OADR would promote economic growth by boosting the savings of the working-age populace, provided the savings are effectively invested for domestic capital accumulation. Employing data from Chinese provinces between 1985 and 2005, Li, Li, and Chan (2012, 5) found that population ageing has a beneficial influence on investment and savings, thus spurring economic growth.

By incorporating *endogenous* and *semi-endogenous growth models* as specific instances, Prettnner (2013, 811) illustrated that population ageing fosters long-term growth within the endogenous framework. However, in the semi-endogenous growth framework, the impact of population ageing is contingent upon the relative changes between fertility and mortality. While examining the impact of population ageing on economic growth across a panel of 169 countries from 1990 to 2015, Acemoglu and Restrepo (2017, 174) identified a positive and statistically significant relation. They propose that the swift implementation of automation technology has contributed to accelerated growth in nations experiencing rapid ageing. They put forward a plausible explanation for this trend, suggesting an endogenous response via technology, specifically, the adoption of technologies capable of performing tasks previously carried out by labour. They note that countries with more rapid population ageing have shown a greater inclination to adopt robotics. However, they advise that this evidence does not establish causation, nor does it conclusively confirm that the adoption of robots is the mechanism offsetting the potential negative impact of population ageing on growth.

2.3.3 The Possibility of a Non-Monotonic Relationship

Zhang, Zhang, and Lee (2003, 83) argue that a non-monotonic (nonlinear) relationship exists between population ageing and economic growth instead of purely a linear one, with early ageing stages promoting growth due to higher savings, but later stages causing decline due to lower accumulation of capital and labour force participation. The empirical evidence on this nonlinear relationship is limited, with a few exceptions. For instance, Lee and Shin (2019, 1) investigated the impact of population ageing on economic growth using panel data spanning 142 countries from 1960 to 2014 utilising *panel fixed effect*

regressions. Their findings indicated that population ageing, proxied by the proportion of the older population, had a negative impact on economic growth, but this effect was observed only when ageing reached a relatively high level. This suggested a nonlinear relationship between population ageing and economic growth. Additionally, they demonstrated that in recent years, population ageing had a more pronounced adverse impact on economic growth, especially among nations with a higher proportion of elderly individuals, which are predominantly developed countries.

Based on a sample of 126 countries from 1970 to 2019, Antonakakis and Workie (2023, 1) revealed the existence of an inverted U-shaped *Ageing Population Kuznets Curve (APKC)*. They also identified the *threshold level* formula for this nonlinear effect. The cross-country regression and *non-parametric kernel estimation* using panel data from OECD countries over the 1960–2000 periods showed the inverted U-shaped relationship between demographic changes and economic growth. Similarly, Liu (2013, 98) studied the influence of population ageing on the economic growth of provinces based on provincial panel data for 1989–2009 in China. Research results suggested that there is an inverted U-shaped relationship between population ageing and economic growth. The elderly share has a decreasing positive effect on the inter-provincial economic growth rate, but after crossing the *inflection point*, its effect changes from positive to negative. Yang, Zheng, and Zhao (2021, 1) used the *Least Square Dummy Variable* and *Two Stages Least Square* methods to carry out an empirical study based on cross-country panel data during the period 2000–2016 and also discovered an inverted U-shaped relationship between population ageing and economic growth.

2.3.4 The Stimulation of Research Questions: Present Study v/s Prior Studies

We find that the literature is replete with studies offering conflicting results, in some cases indicating a positive influence of population ageing on economic growth, and in other cases a negative influence, while a few emerging ones highlighting a non-monotonic relation.

Our study traces similarities and differences to prior research. Firstly, instead of analysing the impact of population ageing on individual macroeconomic variables such as fiscal sustainability (Tang and Li 2021), technological advancement (Acemoglu and Restrepo 2017), national savings (Pascual-Saez, Cantarero-Prieto, and Pires-Manso 2020), inflation (Broniatowska 2019), monetary policy (Ferrero, Gross, and Neri 2019), inter-generational inequality (Mason and Lee 2018), etc., which would constitute an exhaustive task, unessential, as have already been sufficiently analysed by prior researchers; our

analysis is centred on the foremost contentious issue in the literature pertaining to the implications of population ageing on economic growth (proxied by real GDP per capita), which serves as one of the best indicators for assessing the overall economic health of a nation (Callen 2022). Secondly, we identify that a common assumption of most studies [except for a handful including An and Jeon (2006), Antonakakis and Workie (2023), Lee and Shin (2019), Liu (2013), Yang, Zheng, and Zhao (2021), and Zhao, He, and Yang (2018)] involves a monotonic (linear) relationship between demographic changes and economic growth. We trace similarities to these handful of studies by testing for the presence of a nonlinear relationship. Nevertheless, it remains largely unclear as to when the adverse impact of the ageing population on economic growth starts to materialise. We analyse the same using a robust methodology controlling for potential endogeneity issues, besides period and regional fixed effects as well as *business cycle fluctuations*, similar to the one adopted by Lee and Shin (2019) and Antonakakis and Workie (2023). Nevertheless, the incorporation of different categories of nations transitioning over various ageing stages in our panel, unlike prior studies, facilitates identifying the *marginal effects* on economic growth as population ageing deepens. Thus, our study attempts to address the following RQs in answer to Objective 2:

RQ2.1) Could there be a significant global inverted U-shaped (nonlinear) relation between economic growth and population ageing?

RQ2.2) If so, in which ageing-transition category is the threshold level experienced?

RQ2.3) Does the impact on economic growth get stronger as population ageing deepens across nations belonging to different ageing transitions?

RQ2.4) Is this nonlinear relation significant across developed and developing economies?

2.4 The Financial Condition of Older Adults

The literature demonstrates that ageing entails a substantial vulnerability to the prospect of entering and often persisting in poverty. The Joint Centre for Housing Studies, Harvard University (2020, 2) accentuated that the economic status of the elderly is intricately linked to their income, expenses, financial assets, and liabilities. These aspects mirror the diverse life trajectories of older persons, encompassing their earnings, pension contributions, and family conditions (Foster 2018, 117).

2.4.1 Income

Several investigations have been undertaken in the UK assessing the financial condition of older adults. As an example, while analysing the evolving landscape of disparity in the UK in the aftermath of the financial and economic crisis of 2007, Hills, Cunliffe, and Obolenskaya (2016, 267-268) observed that on an average, low or modest incomes among the elderly are not uncommon compared to the rest of the population. Nevertheless, significant shifts in poverty trends have occurred. For instance, during the 1960s and 1970s, poverty rates among the elderly were around six to eight times greater relative to working-age adults having no children. However, subsequent to the late 1980s, the risk of poverty among pensioners substantially decreased (Cribb et al. 2013, 134). Nevertheless, it was quite common for the income of many elderly people to be concentrated close to the poverty threshold. Their results are further substantiated by statistical evidence from Norton and West (2014, 18), which indicates that approximately 1.1 million elderly live with earnings slightly above the poverty line.

In the USA, based on data generated by the US Census Bureau, the Joint Centre for Housing Studies Harvard University (2020, 3-4) demonstrated that although many older individuals are financially secure, significant numbers of low-, moderate-, and middle-income households live in unaffordable housing and lack assets to cover costs. Major sources of income among older individuals primarily include pensions bolstered by interest from savings, social assistance, and other forms of income transfers (Strauss 2014, 522). The emphasis on income is notably pertinent, as noted by Stoller and Stoller (2003, 230) via personal interviews conducted with elderly Finnish and European Americans. They demonstrated that in later life, income typically diminishes due to retirement, while expenses related to health tend to increase. Adopting *multiple regression* tools to assess perceived financial adequacy among retirees, they discovered that notwithstanding the relatively lower income they possess, the elderly assess their financial resources as being adequate. Moreover, rising life expectancy necessitates the maintenance of financial resources over an extended duration.

Concerning household income in China, utilising information extracted from the Chinese Household Finance Survey, 2017, and applying *probit and tobit models*, Kang and Hu (2022, 2889) noted that insufficient finances and assets in the household turn apparent as age composition changes, demonstrating that insecurity and impoverishment among older persons is a fact of life. In contrast, the Japanese government's white paper on an ageing society released in June 2019, which was based on the Cabinet Office's 2016

Economic and Lifestyle Circumstances of the Elderly, notes that around 64.6% of persons 60 years and older had ‘no financial worries’ or ‘relatively few financial worries’, owing to substantially amassed retirement savings. The older the respondents, the more likely they were to fall under the category of not having financial concerns, which included 71.5% of those 80 years or older. They found that heads of households in their sixties or seventies reported greater net savings than other age groups (Cabinet Office Japan 2019, 9). Opposed to this, Oldewage-Theron and Egal (2021, 71) highlighted the prevalence of household food insecurity among elderly individuals in South Africa, predominantly attributed to poverty and solitary living situations, resulting in inadequate dietary intake.

Taking a look at a few studies conducted on the economic status of elderly individuals in India, we find that an overwhelming majority struggle to make ends meet and experience poverty as they grow older since they often belong to impoverished families, as noted by Sebastian and Kumar (2003, 75) based on data from the National Family Health Surveys. Raju (2014, 180) demonstrated that older Indians who have given up their possessions in favour of younger relatives and who no longer exercise authority over income sources feel the loss of capacity for decision-making more profoundly. In his book pertaining to the socio-economic and health dimensions of the elderly in India, Alam (2006, 146-147) portrayed that for elders living with their family, their economic security and well-being largely depend on the economic capacity of the family.

Another very pertinent dimension brought to the fore by Gopal (2006, 4477) is that owing to lower literacy rates, higher life expectancy, and a greater likelihood of widowhood than younger women, elderly Indian females are more dependent on others. Based on data from the National Sample Survey 2004–2005, Srivastava and Mohanty (2012, 493) contend that elderly families face higher poverty rates than non-elderly dwellings. Rajan (2014) highlighted that several older people live in constant suffering in nations like India because there is no adequate social security mechanism. Consequently, several are forced to work for as long as possible to provide for themselves.

In a relatively recent primary study covering a sample of 15,000 older adults across all five regions of Northern, Southern, Western, Eastern, and Central India, between August-September 2016, the AgeWell Research and Advocacy Centre (2017, 14) reported that while the monthly income of 15.63% of the elderly was above ₹ 20,000 per month, 17.6% claimed of having no or negligible monthly income. The monthly income of the rest of the sample ranged from below ₹ 5,000 up to ₹ 20,000. The financial adequacy of the elderly is of prime concern given that over the last several decades, India’s typical

households have undergone immense transformations owing to size shrinkage, nuclearisation, and relocation, bearing significant economic ramifications on the elderly (Chakravorty, Goli, and James 2021, 7), many of whom nowadays depend on a ‘money-order economy’ while intimacy with their children is only from a distance.

2.4.2. Expenditure

An individual’s age is an essential factor in economic behaviour, healthcare needs, food habits, and consumption of goods and services. The existence of a gender disparity in expenditure patterns is a point worth noting. For instance, comparing data of the 55th (1999-2000) and the 64th (2007-2008) rounds of the household consumer expenditure of the NSSO, Maharana and Ladusingh (2014, 1) found wide gender disparity in food and healthcare expenditure among the elderly in India, with that of elderly males being higher than that of their female counterparts; the gap, however, is narrowing with time. They noted that out of the total household food expenditure, less than one-tenth is spent on the elderly. One-fifth of the total household health expenditure was spent on the elderly in 1999-2000. However, from 2007 to 2008, one-third of the total household health expenditure was spent on them. They demonstrated that though health expenses on elderly women increased from the first to the second survey, a vast gender disparity was seen.

Another strand of literature points to the differences in expenditure patterns based on age. For instance, Erlandsen and Nymoen (2008, 505) pointed out that middle-aged individuals exhibit a decreased *average propensity to consume* compared to both younger and older consumers. In contrast, Fareed and Riggs (2005, 152) using *regression analysis* to examine the old-young differences in expenditure patterns computed *consumption functions* for two age groups—those 65 and above and those younger than 65—using data from the 1972–1973 Consumer Expenditure Survey conducted by the Bureau of Labour Statistics, USA, and discovered that the two groups’ average propensities to spend were almost identical. However, they found that the *marginal propensity to consume* for younger consumers was greater for food, clothes, and medical care, while that for the older group was higher for shelter and transportation. Based on data from the U.S Bureau of Labour Statistics, compared to non-aged families, Chen and Chu (1982, 233) discovered that senior households spent less on apparel, home furnishing, automotive purchases, and leisure while spending more on utilities and healthcare. Employing multiple regression estimations using data from the 1986 Consumer Expenditure Survey, Chung and Magrabi (2007, 245) demonstrated that age exerts a notable influence on spending. Elderly families

spent more money on utilities, medical expenses, and housekeeping than younger families while spending less on apparel, services, housing, and recreation. Additionally, Blaylock and Smallwood (1986, 1-2) indicated that age was favourably connected to spending on meals at home but inversely associated with food away from home. The analysis of Chen and Chu (1982, 235) revealed a negative *correlation* between age and expenditure on clothing. While examining home care for the dependent elderly, Soldo (1985, 281) demonstrated that almost all older adults strongly wish to retain autonomous houses. They often see nursing facilities as a last resort, while those having money to pay for home assistance may continue living independently. Similarly, Collard and Hayes (2014, 11) observed that as individuals age in the UK, there is a significant decrease in total household expenditure, accompanied by an increased allocation of funds towards essential necessities. They pointed out that households led by individuals aged 80 and above allocated twice the amount of spending on housing, fuel, and power compared to those headed by individuals in their early fifties (24% compared to 12%, respectively).

In India, Kastor and Mohanty (2018, 1) also demonstrated a similar pattern; in contrast to non-elderly families, those with older members tend to experience higher out-of-pocket costs and, thus, higher household expenditure. Mane (2016, 1-2) contends that malnutrition, costly medications, therapies, untreated chronic ailments, and maltreatment constitute a large proportion of old age expenses in India, wherein over 70% of health spending comprises out-of-pocket costs, putting the aged at risk of impoverishment.

Chakraborty, Chaudhury, and Bandyopadhyay (2019, 7) advocate that destitution and poverty among the elderly are presumed to be a consequence of shifting socio-demographic dynamics. They affirm that the necessity of such studies is crucial, as they play an essential role in tackling the issues of the aged and bridging the gap between their socio-economic needs and the availability of resources. However, measuring the socio-economic status of the elderly poses distinct challenges (Grundy and Holt 2001, 895).

Older people generally live in different economic circumstances from those who are working. As people age, their desires and needs are qualitatively different to those of younger generations (Stephens, Breheny, and Mansvelt 2015, 715). A need thus arises for measures of economic living standards appropriate for the elderly. The current debate revolves around the understanding and assessment of the economic living standards of older individuals (Berthoud, Blekesaune, and Hancock 2009, 1105).

2.4.3 Economic Living Standards

The assessment of economic living standards is used to locate individuals among the spectrum of possibilities for material wellbeing and to understand the relationship of socio-economic status to health or other outcomes (Berthoud and Bryan 2011, 135; Grundy and Holt 2001, 895-896; Renahy et al. 2012, 1-2). Economic living standards are often assessed concerning comparisons of income, wealth, and material resources or assets owned by individuals (Macintyre et al. 2003, 288). Income has been the most popular indicator but has also been found wanting, as income alone does not account for changes across time, nor incorporates varying demands on that income, and is often not reported accurately or willingly by many respondents (Renahy et al. 2012, 1). These issues are especially pertinent to the elderly, whose incomes change as they move into retirement, who may have varying levels of assets, who are less likely to have dependants, and who may be sensitive to reporting their income. In general, measures of income do not adequately capture the range of resources that contribute to living well within a society.

2.4.3.1 Economic Living Standards of Older People

An observed trend indicates that older individuals tend to report higher material living standards as they age and are less inclined to report financial difficulties (Groffen et al. 2008, 1-2), although their income is generally reduced (Norton and West 2014, 18; Berthoud, Blekesaune, and Hancock 2009, 1106). As individuals approach advanced age, they often become acclimated to their circumstances concerning various aspects of life and, consequently, may not perceive the necessity for supplemental income (Bowling 2005, 2-3). Elderly individuals are less prone to stating financial constraints as the reason for being unable to afford certain items; instead, they are more inclined to attribute it to a lack of desire. Additionally, older individuals with restricted financial means often express disinterest in items compared to their younger counterparts with low incomes (Halleröd 2006, 371). Accordingly, differences between wanting, needing, and inability to financially accommodate an item are subject to interpretations related to age and social circumstances. This could be due to cohort effects related to changes across generations in the experiences and expectations of living standards. The pattern of ownership of necessities and luxuries is different for different ages (Berthoud, Blekesaune, and Hancock 2009, 1107) and are related to each cohort's material circumstances. Thus, to address such issues, a better approach involves analysing the living standards of the aged from a *Capability Approach*, which stems from Amartya Sen's (1999) ideology.

2.4.3.2 The Capability Approach to Living Standards

Most resources are not intrinsically valuable; they are instrumental to other objectives. In other words, well-being depends not on the mere existence of resources but on what they enable people to do and be. As Sen (1987, 25) rightly noted, “The value of the living standard lies in the living, and not in the possessing of commodities, which have derivative and varying relevance.” Instead of assessing specific material indicators of living standards, such as the absence of television or meat meals, it is imperative to consider factors such as limited autonomy in consumption choices and restricted social participation, more so among older adults. The capacity of individuals to convert resources into valuable functions varies in meaningful ways. For instance, having an iPad might be a delightful source of recreation, pleasure, and status for an older individual. But if the person is intimidated by electronics, blind, fingerless, or illiterate, its presence in their household would not augment their well-being to the same degree.

Sen's (1999) *Capability Framework* redirects focus from the tangible material aspects of life towards the opportunities for choice and autonomy facilitated by material circumstances and resources. The Capabilities Approach underscores the variability in individuals' freedoms to pursue lives that align with their valued aspirations. Over the past quarter-century, the Capability Approach has significantly advanced the field of welfare economics. Furthermore, it serves as a foundation for global examinations of inequality, exemplified by reports commissioned by organisations such as the Equality and Human Rights Commission in the UK (Burchardt and Vizard 2011, 91). Therefore, it holds particular significance in both comprehending and evaluating living standards.

Unlike other fields, there are few applications of the Capability Approach within ageing research (Gopinath 2018, 261). However, the adoption of this approach to analysing living standards is gaining prominence internationally. It has been adopted in Italy (Chiappero-Martinetti 2000), New Zealand (Breheny et al. 2013; 2016; Stephens 2017; Stephens, Breheny, and Mansvelt 2015; Yeung and Breheny 2016; 2021), the UK (Anand and Van Hees 2006; Gilroy 2006; Grewal et al. 2006), the Netherlands (Zaidi 2017), Europe (Zaidi 2012), Spain (Alhambra-Borrás, Doñate-Martínez, and Garcés-Ferrer 2021), Finland (Mäki-Opas, Pieper, and Vaarama 2022), Switzerland (Ferschl et al. 2022), and Africa (Bérenger and Verdier-Chouchane 2007). Use of it is found in India as well (Majumder 2006; Ray and Sekher 2016; Sengupta 2016).

The Capability Strategy involves an interplay among individual traits, financial resources, and socio-economic and ecological variables (Yeung and Breheny 2016, 292). It

complements the utilitarian/materialist views to evaluate living standards, not depending exclusively on earnings, assets, and ownership. This is relevant for the aged, considering that as individuals grow older, material prosperity leads to smaller disparities (Gwozdz and Sousa-Poza 2010, 397). The Capability Viewpoint is acknowledged as the most accurate gauge of living standards for the elderly (Alhambra-Borrás, Doñate-Martínez, and Garcés-Ferrer 2021, 2527; Breheny et al. 2016, 307).

2.4.4 The Stimulation of Research Questions: Present Study v/s Prior Studies

The literature suggests the existence of vast income and expenditure inequalities among older adults, which, in turn, affect the financial wellbeing of their households. Often, this results in financial dependency of the aged. Besides, in addition to income and expenditure, the literature suggests that to get a wholesome view, analysing the living standards of the elderly from a Capability Standpoint complements our understanding of their financial situation.

Our study traces similarities and differences to prior research. While Srivastava and Mohanty (2012) compared elderly families with non-elderly dwellings in order to assess their income and poverty among them, we compare the nature and sources of income of the Y-Os and O-Os instead. Similarly, Erlandsen and Nymoen (2008) and Fareed and Riggs (2005) analysed the expenditure of younger and older consumers; in contrast, we compare the expenditure patterns of the Y-Os and O-Os instead, in terms of the amount and consumption basket. Tracing similarities to the work of Chakraborty, Chaudhury, and Bandyopadhyay (2019), who advocate that destitution and poverty among older adults are a consequence of shifting socio-demographic dynamics, we attempt to identify the financially dependent elderly based on socio-demographic differentials. As opposed to the work by many researchers merely analysing the economic situation of older individuals regarding income and expenditure, we go a step ahead by complementing our analysis with the living standards capabilities of the elderly, similar to Yeung and Breheny (2016). We attempt to answer the following RQs in response to Objective 4:

RQ4.1) What is the nature of the household economic profile of older adults?

RQ4.2) Are significant differences present in the income and expenses of the elderly?

RQ4.3) Which categories of the aged are fully financially dependent on others?

RQ4.4) Is the Living Standards Capabilities of Elders Scale (LSCAPE) a suitable instrument to evaluate the living standards of the aged via a Capability Perspective?

RQ4.5) Do the living standards capabilities significantly differ among older adults?

2.5 Health-related Economic Concerns of Older Adults

Given that the UN's third Sustainable Development Goal (SDG) aspires to 'Guarantee healthy lifestyles and promote well-being for everyone at all ages', analysing the health status and health-related economic concerns of older adults is of prime importance.

2.5.1 Morbidity

Rabheru (2021, 989) pointed out that the triple jeopardy of Ageism, Mentalism, and Ableism are the implicit and explicit biases that negatively influence the health of individuals. According to the World Health Organization (WHO 2017), approximately 20% of the global older population suffers from mental health conditions such as dementia, depression, anxiety, and substance use, often complicated by physical and psychosocial comorbidities. In a study conducted using data from seven cross-sectional waves of the National Health and Nutrition Examination Survey in the US, Lin, Beck, and Finch (2016, 332) observed that arthritis, cardiovascular disease, lung disorders, vision disabilities, and diabetes, were the common causes of functional limitations in older ages.

When analysing whether older people having elevated incomes exhibit a higher likelihood of developing ailments in comparison to their counterparts with lower income levels, Manderson and Jewett (2023, 5) noted that historically, Non-Communicable Diseases (NCDs) and accompanying impairments have been regarded as ailments of affluence, commonly prevalent among high-income groups. However, using nationally representative data from 7,150 Indian individuals who participated in the WHO study on Global Ageing and Adult Health (2007–2010), by employing *machine-learning algorithms*, Basu and King (2013, 1620) found that the incidence of symptomatic, undiagnosed NCDs was greatest among Indian people in the lowest two income quintiles, defying earlier theories that wealth was associated with an upsurge in NCDs. They noted that the prevalence of undiagnosed NCDs was higher in women and those in rural areas.

The likelihood of the oldest-old having severe health issues necessitating medical services is significant (Lucca et al. 2015, 258). In this vein, Jaul and Barron (2017, 1-2) contend that although hearing, vision loss, and decline in immune function are a part of the normal ageing process, they contend that chronic conditions, including cardiovascular disease, osteoporosis, and dementia, are more common among the oldest-old. Besides, research conducted in Western countries showed that the elderly with a lower socio-economic status had higher rates of depression (Lorant et al. 2003, 98).

While examining the debilitating effects of disease on the capacity to execute *Activities of Daily Living (ADL)*, a study conducted on 2137 elderly using *ordinal logistic regression* showed that neurological disorders had the strongest debilitating effects, followed by musculoskeletal and cardiovascular diseases. The rapid rise in chronic diseases has led to an increased burden of disability among the oldest-old in China. Strong associations between chronic morbidities and functional limitations are found, as severe morbidity disrupts ADL, besides reducing the quality of life (Tey, Lai, and Teh 2016, 39).

As rightly pointed out by the WHO, ‘Health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.’ Thus, besides plainly analysing the burden of diseases with regard to morbidity patterns among older adults, a well-defined instrument that accurately captures a wholesome understanding of their health is of vital significance. HRQOL is regarded as a precious multi-dimensional measure of a person’s general health since it collects physical, psychological, and social health information, highlighting the influence of health status on the quality of life (Revicki, Kleinman, and Cella 2014, 127).

2.5.2 Health-Related Quality of Life (HRQOL)

Quality of Life (QOL) has many sub-divisions, and one aspect of it is HRQOL. It reflects the method of perceiving one’s own health and reacting to the factors related to it (Lin, Lin, and Fan 2013, 8). Besides, according to Krawczyk-Suszek and Kleinrok (2022, 1), HRQOL is an essential indicator of the treatment process, lifestyle, and influence of many other factors, both exogenous and endogenous, on the body. Cleary and Howell (2006, 156) argue that when dealing specifically with the HRQOL of older adults, their physical functioning, independence, and capacity to engage in everyday tasks are of greater relevance. According to Jalenques et al. (2020, 1), measuring HRQOL in older adult groups can be helpful in developing and monitoring health policy and political initiatives such as the ‘Age-friendly Environments in Europe’ project (WHO 2017a).

In an attempt to study the factors that account for variations in HRQOL among Chinese citizens via *multivariate odds ratios* and *binary logistic regression*, Cai, Coyte, and Zhao (2017, 1-2) found that socio-economic status, lifestyle, and psychosocial factors were related with good HRQOL. While about 65% of the respondents reported good self-rated health, it was observed that women, the elderly, married or single respondents and residents of Western China were less likely to report good HRQOL. Respondents who were engaged in work had higher household incomes and reported high social class and

higher socio-economic status compared with peers, who were more likely to report good self-rated health. Normal weight and physically active respondents, along with those reporting a happy life, no depression, and good relationships with families and friends, were related to good self-rated health. Similarly, another study was conducted by Krawczyk-Suszek and Kleinrok (2022, 17-19) among 1038 Polish older adults over 65 years of age, wherein they evaluated HRQOL across 5-year age groups: 66–70, 71–75, 76–80, and >80 years. They demonstrated that while relationship status did not influence the differences in the average level of perceived HRQOL, more than a twofold greater chance of a higher HRQOL was reported by older men under 75 years of age compared to the group of women. The same relationship was noted concerning higher education among respondents up to the age of 80. Significant differences were also observed among older adults residing in rural and urban areas, however, up to those aged 75 years.

2.5.3 Health-Related Expenditure

The relationship between ageing and healthcare expenditure has been a topic of scholarly interest for decades. Studies that evaluate the financial burden experienced by households with and without elderly members reveal that families with older members face greater poverty levels and catastrophic medical expenses compared to those without older members. For instance, in an attempt to measure the financial hardship of *Elderly Chronic Disease (ECD)* in families based on data from the China Health and Retirement Longitudinal Study by comparing the results with a matched control family sample, Xu et al. (2019, 1-2) noted that concerning the effects of ECD on family health service utilisation, ECD-families experienced a greater rate of hospitalisation and outpatient visits than the control group. About 35% to 43% of the expenditure of the average ECD family is spent on out-of-pocket inpatient and outpatient care. Compared with families with lower education status (54%), families with higher education status spent a higher proportion of total expenditures on out-of-pocket medical care (61%). They also found that out-of-pocket costs associated with ECD treatment and any loss of income affect non-medical consumption by ECD families. Besides this, given that more than 90% of China's workers are employed in the informal sector with limited social security benefits, the loss of income from absenteeism by patients and caregivers is likely to rise.

Research findings also indicate that the elderly have higher average costs than non-elderly people. For instance, in the US, Fuchs (1999, 17-19) highlighted that per capita healthcare expenses were threefold greater for those aged 85 years compared to those

between 65-74 years old and twice as high for those 75 to 84 years old. Similarly, according to Mahal and Berman (2002, 1-2), in India, the per capita medical expenses for people 65 and older were about 1.5 times higher than those for people aged 60 to 64. Pandey et al. (2018, 18) also showcased that the incidence of CHE in India was most pronounced in households with elderly members, with female-headed households identified as particularly susceptible to CHE. This underscores gender disparities in healthcare affordability, rendering women relatively more vulnerable to healthcare access.

In their analysis of the repercussions of out-of-pocket health expenditure on households in Vietnam, using data from the Vietnam Living Standard Survey, Van Minh et al. (2013, 258) observed that inadequate financial means and the absence of adequate risk pooling mechanisms to mitigate CHE serve as primary obstacles to accessing vital healthcare services. Likewise, through a thematic review of literature pertaining to health concerns and healthcare expenditure among the elderly in India, Sahoo et al. (2021, 1) concluded that elevated healthcare expenses among older individuals, compounded by the lack of insurance coverage, subject the elderly population, especially those from lower socio-economic backgrounds, to significant financial jeopardy. Additionally, they observed that India's current healthcare expenditure pattern indicates that approximately 71% of healthcare costs are covered by households, 20% by various levels of government (central, state, and local bodies), 6% by businesses, and 2% by external sources. Furthermore, it is projected that by 2030, the older population will bear 45% of India's healthcare burden (Population Reference Bureau 2012, 3-4).

Another interesting aspect that augments the health expenditures is the choice of HCU. For instance, a glimpse at the NSSO (2014) data reveals that in India, the cost of private healthcare is roughly four times higher than that of public healthcare. Consequently, as Lee, Saran, and Rao (2018, 414) pointed out, a plausible share of older adults have to incur CHE owing to choosing private health facilities. This points to another area of investigation: the choice of HCU among older adults.

2.5.4 The Choice of Healthcare Utilisation (HCU)

HCU has been the subject of extensive study on a global scale. Internationally, the utilisation of healthcare services is influenced by numerous factors, among which is the healthcare infrastructure, that is unique to each country and also to the characteristics of individual patients (Caner and Cilasun 2019, 1-2). As pointed out by Amente (2016, 1) in a community-based cross-sectional study carried out on 284 elderly individuals residing in

Bedele, Ethiopia, health-seeking behaviour is influenced by various underlying factors, including the availability, affordability, and accessibility of healthcare services, the level of healthcare awareness among the population, the responsiveness and fee structures of healthcare providers, as well as prolonged waiting times for treatment. Brinda et al. (2016, 32) further noted a decrease in HCU among older individuals in India, as indicated by data gathered through the WHO Study on Global Ageing and Adult Health, attributed to various underlying factors. She contends that due to the absence of dedicated healthcare services for the elderly, a majority of this demographic seek healthcare primarily from private health centres rather than public ones. Moreover, even when services are accessible, the uptake among the elderly remains low due to insufficient awareness, limited health promotion efforts, and inadequate community outreach initiatives. For instance, Goel et al. (2003, 165-166) conducted a survey of 354 elderly residents in rural Meerut, Uttar Pradesh, revealing that merely 53% were cognizant of the geriatric welfare services accessible in their locality, with a mere 4% acknowledging utilisation thereof. Sahoo et al. (2021, 3-4) emphasise that recent trends indicate a notable increase in public HCU among the elderly, with an 8.6% rise observed during hospitalisation and an 18.7% increase in outpatient care from 2004 (60th round of NSSO) to 2017–18 (75th round of NSSO). However, Rahi and Sharma (2022, 1585) suggest that private services dominated, accounting for 75% of outpatient and 62% of inpatient HCU.

Usually, the premise of universal healthcare coverage is embedded in the public healthcare system, but the private healthcare system is increasingly becoming a key source of delivering healthcare services in lower-income countries such as India (Brinda et al. 2016, 33-35). So far, in the Indian context, the possible explanation lies in the role of the inadequate infrastructure of public health services (Rout, Sahu, and Mahapatra 2019, 1-3), which leaves no choice but to seek healthcare in private services rather than public ones, causing financial havoc through a large amount of out-of-pocket expenditure among the most healthcare-demanding vulnerable aged population (Anand 2016, 11).

2.5.5 The Costs of Caregiving and the Nature of Living Arrangements

Frequently, older individuals in many lower- and middle-income countries depend on their family members for support, as formal care systems and social security mechanisms are often lacking. The cost of aged care, particularly long-term care, would vary depending on the kind of care received: formal residential care, formal institutional long-term care at nursing homes and hospices, or informal assistance from family and friends. In numerous

instances, informal caregivers persist in delivering care without receiving any financial or physical aid from governmental sources. However, changes in family structures have weakened the traditional norms of filial piety and intergenerational relationships dramatically (Liang et al. 2023, 1-2). An individual's living arrangement typically denotes their cohabitation situation. For older adults, this may entail living alone, with a spouse, with their children, with both a spouse and children, with other relatives, or in an OAH. Research indicates that if adult children live nearby or share a house with their elderly parents, the need for official institutional care may be postponed or lessened. Similarly, married older people are less inclined than single older people to reside in institutional care. Besides, the extent of a social circle is favourably linked with the availability of informal care and inversely associated with the usage of professional assistance at home (Fernández-Carro and Vlachantoni 2019, 936).

2.5.5.1 Costs of Caregiving

Coe, Skira, and Larson (2018, 2003-2005) noted that approximately 34 million family and friends provided unpaid care to individuals aged 50 and older in 2015. It is difficult to place a value on that time since there is no payment to the caregiver, and multiplying the caregiving hours by a wage does not account for the value of lost leisure, the implications for future employability and salaries, or any intrinsic benefits accrued to the care provider. They note that the primary outcome is the monetised change in well-being due to caregiving, what economists call 'welfare costs'.

In another study conducted in the Kaniyambadi block of Vellore district in Tamil Nadu, Brinda et al. (2014, 1-2) sought to quantify the expenses associated with informal caregiving and to analyse the factors contributing to caregivers' stress. Their study encompassed 1000 individuals aged 65 years and older, along with their respective caregivers. The researchers determined that the average weekly commitment to informal caregiving amounted to 38.6 hours, with an estimated annual cost of informal caregiving, using the *proxy good method*, totalling \$1,19,210 in this rural setting. Additionally, they noted that informal caregiving places significant demands on caregivers' time, productivity, and financial resources. Prolonged periods of caregiving may result in sleep disturbances, depression, and chronic illnesses, thereby compromising caregivers' well-being. Indeed, the study identified a prevalence of depressive symptoms among 10.6% of caregivers, which could potentially lead to inadequate care for dependent elderly individuals. Factors such as cerebrovascular disease, Parkinson's disease, greater

disability, insomnia, and incontinence among the dependent elderly, as well as the amount of time dedicated to assisting with ADL and supervision, were found to significantly exacerbate the caregivers' burden.

Kim and Kim (2021, 1) conducted an analysis of 819 elderly inpatients aged over 65 years, utilising data from the 2017 Korea Health Panel Study and employing logistic regression techniques. Their findings revealed that elderly inpatients living alone were less inclined to utilise caregivers compared to those cohabitating with a spouse. However, the type of household exhibited no statistically significant association with caregiving expenses. Nevertheless, individuals who had received financial assistance or sought treatment at a tertiary hospital were more likely to engage caregivers during hospitalisation. Among these, elderly inpatients receiving financial aid experienced a 64% increase in caregiving costs compared to non-recipients, while those with Medicaid insurance incurred a 54% higher expenditure on caregiving costs.

2.5.5.2 Living Arrangements

Data regarding living preferences indicates a rising trend in the population of older individuals opting to reside alone. Molina-Mula, Gallo-Estrada, and González-Trujillo (2020, 1-3) highlight that across Europe, the percentage of older individuals living alone varies significantly, from 50% in Denmark to less than 20% in countries like Spain, Greece, or Portugal. Importantly, they stress that living alone does not always equate to independence. For instance, in 2019, approximately 6,08,000 older adults aged 65 and above in Spain who lived alone experienced disabilities or difficulties with ADL, necessitating assistance. Hence, it is imperative to understand the needs of older individuals in order to enhance their quality of life. In addition, Bongaarts and Zimmer (2002, 145) bring to the fore that the risk of poverty is elevated among older individuals living alone in Europe compared to those residing with others. Additionally, they observe that in nations characterised by higher levels of social and economic development, there is a reduced prevalence of older adults cohabitating with another person.

In their study, Molina-Mula, Gallo-Estrada, and González-Trujillo (2020, 5-6) highlight that women in developed nations are approximately two and a half times more likely to reside alone, primarily due to their longer life expectancy and the tendency to form relationships with partners older than themselves. In societies where women's social roles are predominantly tied to their roles as daughters, wives, or mothers, living without a

spouse can render them vulnerable, if not marginalised. Additionally, it is revealed that several factors influence the ageing experience of older individuals living alone, including the presence or absence of a social support network, gender dynamics, their living environment, functional capacity, and access to welfare and healthcare resources.

In their investigation into whether living arrangements influence the life satisfaction of older adults, Kandapan, Pradhan, and Pradhan (2023, 1-2) analysed data from the Longitudinal Ageing Study in India (LASI) conducted from 2017 to 2018, involving 30,370 respondents aged 60 and above. Employing *bivariate analysis* and *multinomial logistic regressions*, they determined that the life satisfaction of Indian older adults is notably linked to their living situations. Living alone correlated with lower levels of life satisfaction, while co-residing with a spouse was associated with a higher likelihood of reporting greater life satisfaction. The study also revealed that having both a spouse and children as co-residents increased the likelihood of reporting high levels of life satisfaction. Additionally, individuals with poor self-reported health, limited in more than two ADLs, and having symptoms of depression were significantly more likely to report lower levels of life satisfaction. Characteristics associated with a lower level of life satisfaction among older adults included being male, aged 60-64, having no education, being unmarried, employed, residing in rural areas, living in impoverished households, and belonging to the Scheduled Caste (SC) or Scheduled Tribe (ST) community.

2.5.5.2 (i) *Living in Old Aged Homes (OAHs): A Special Case for Analysis*

Another prominent form of living arrangement gaining the attention of many nowadays is OAHs. Traditionally, OAHs were designed primarily for those older adults who did not have children to take care of them. However, with modernisation, urbanisation, nuclearisation, and migration, the number of older adults moving into OAHs is increasing (Chalise 2019, 173). A plethora of reasons are responsible for this relocation. For instance, in a study carried out on 174 elderly residing in 14 different OAHs of Uttar Pradesh, Akbar et al. (2014, 55) found that misbehaviour of children (29.8%) was the most common reason, followed by no financial support (29.3%), to serve God (9.1%), loneliness (8.0%), adjustment problems at home (5.7%), nuclear family system (5.1%), having no son (5.1%), children settled abroad (2.2%), children not wanting to keep the elderly due to their physical/psychiatric illness (2.2%), life threats from children (1.7%), and better facility in OAHs (1.1%). According to Desai (2019, 3), they are neither neglected nor abandoned but are moving into OAHs in search of safety, independence, and companionship.

Little is known about the QOL of Indian elderly staying in the OAH setup. In an attempt to assess and compare the health status, QOL, and depression in elderly people living in OAHs and within the family using the WHOQOL questionnaire (to assess QOL) and the Geriatric Depression Scale, Amonkar et al. (2018, 10) conducted a cross-sectional study among 60 elderly from OAHs and 120 elderly living within a family setup were selected randomly. Results indicated that the QOL of the elderly in domains of autonomy, past, present, and future activities, social participation, and intimacy was better in the family setup than in OAHs. Statistically significant differences were also observed in the mean geriatric depression scores of both groups.

In contrast, in a similar study undertaken in Ranchi, aimed at comparing the QOL between elderly people living in OAHs and those within the family setup, comprising 80 participants (40 residing in OAHs and 40 living in a family setup), Panday et al. (2015, 1-2) indicated that QOL was better of those elderly people who were living in OAHs in comparison to those residing within their family setup.

In another study aimed at comparing the health status of the elderly in private v/s government-run OAHs, a cross-sectional study was carried out in Kathmandu, Nepal, among seven OAHs with a sample of 188 older adults. Results highlighted that the elderly living in private OAHs have better health status than those in government OAHs, owing to healthy habits and cleaner dwelling surroundings of private OAHs (Chalise 2019, 173).

2.5.6 The Stimulation of Research Questions: Present Study v/s Prior Studies

Literature suggests that a rising senior population is being accompanied by rising health problems, leading to escalating health expenditures. The choice between public v/s private HCUs and the costs of caregiving augment the importance of analysing this topic. Given the serious nature of the impact that this can have on individuals and households, we attempt to answer the following RQs in answer to Objective 5, besides also investigating another area that has received conflicting findings: the health status of the elderly residing in OAHs v/s those in a family set up.

RQ5.1) Is morbidity among the elderly significantly associated with age, gender, living arrangement, and household income?

RQ5.2) Does elderly multimorbidity significantly disrupt ADL?

RQ5.3) Is the 36-Item Short-Form Health Survey (SF-36) suitable for measuring HRQOL among older adults?

RQ5.4) Do physical and mental HRQOL components differ among the elderly?

RQ5.5) What share of the total expenditure does health expenditure on the elderly comprise, and how does it vary among the elderly?

RQ5.6) What are the needs and costs of caregiving for older adults?

RQ5.7) Does a significant relationship exist between HRQOL and health expenses?

RQ5.8) What factors influence the choice of HCU among the elderly?

Our study traces similarities and differences to prior research. Firstly, drawing on contradictory observations (Basu and King 2013; Manderson and Jewett 2023) concerning morbidity and its relation with income, we extend this further to analyse morbidity patterns based on other aspects such as differences in age, gender, etc., similar to Lucca et al. (2015) and Jaul and Barron (2017). Secondly, though HRQOL is widely analysed internationally (Cai, Coyte, and Zhao 2017; Cleary and Howell 2006; Jalenques et al. 2020; Krawczyk-Suszek and Kleinrok 2022), our study is one among a handful in India to study HRQOL, especially of the elderly. Thirdly, while studies have been conducted assessing the economic strain of healthcare expenditures on families with and without older members (Pandey et al. 2018; Xu et al. 2019) and between elderly and non-elderly people (Fuchs 1999; Mahal and Berman 2002), we compare the health expenditure strain among the Y-Os and O-Os. Fourthly, contradictory findings of Amonkar et al. (2018) and Panday et al. (2015) regarding better quality of life among elderly living with family v/s those in OAHs, spurs us along this line to compare the HRQOL, besides other dimensions of elderly living at home and those in OAHs.

2.6 Labour Market Choices, Pensions, and Social Provisions

2.6.1 Labour Market Choices: The Changing Role of Retirement

Retirement, once considered a reasonably anticipated, long-term transition from full-time employment towards full-time recreation, is witnessing a shift in perception. For instance, approximately nine million Americans work post-retirement (Maestas 2010, 718). In a similar vein, 47% of older male Canadians aged 60 to 64 who had resigned rejoined the workforce in less than ten years. Many people now see retirement as an integration of engaging in financially rewarding employment alongside pursuing recreational endeavours rather than an irreversible departure from the workforce (Moen and Flood 2013, 206). Gerber and Radl (2014, 152-160) examined whether older people in post-Soviet Russia were pushed, pulled, or prevented from engaging in the labour market by employing data from 20 surveys conducted between February 1991 and November 2007. According to

logistic regression results, economic hardship and low pension levels drove older people to seek work to supplement their income. They discovered that older Russians with greater levels of education were drawn back into the labour force since they had more employment prospects. They also found that the elderly Russians are not barred from work despite market changes in Russia.

Worthy et al. (2011, 1375) articulately noted, “Elderly people must make several crucial choices about their retirement, how to use their life assets, and how to optimise and enjoy their remaining years.” Two major components of these choices pertaining to the labour market dynamics are Voluntary Retirement (which entails the resignation of employees from their jobs earlier than their retirement date) and Post-Retirement Work (PRW), the latter gaining increasing prominence among older adults.

2.6.1.1 Post-Retirement Work (PRW)

Intellectual attention concerning PRW has surged over recent years, evolving into a progressively prominent topic of discourse (Fasbender et al. 2016, 12). Increasing longevity, prospective constraints on social welfare resources, pension overhauls, and job sector shifts are all sparking curiosity about the likelihood of employability of retired older adults. Labour theorists investigate the nature and dynamics of job prospects among older persons, offering invaluable insight regarding older employees’ aspirations for staying employed post retiring (Hess, Naegele, and Mäcken 2021, 357).

Bridge employment remains a mainstream expression employed in scientific research to classify workforce engagement post-retirement (Cahill, Giandrea, and Quinn 2011, 34). Whatever kind of work an individual of retired status pursues following quitting an existing occupation constitutes bridge employment. It has emerged as a prevalent and well-studied type of PRW. It is defined as continuing to work following retirement with an alternate employer (*ibid*, 35). Notwithstanding the above, most researchers incorporate the term in reference to any job subsequent to retiring, but the critical point is that it occurs before complete discontinuation from the workforce. Modifications of the term could encompass working within the equivalent sector or area, working in another industry, and contractual employment, including working independently. On the other hand, *Unretirement*, frequently referred to as re-entry, entails a comeback to the workforce following an interval of complete retirement. The pathways might range from a year or fewer, even up to an extended duration, between resignation and starting another job (Maestas 2010, 719).

Increased longevity emphasises the importance of ensuring that older individuals maintain a sufficient quality of life following their formal workplace resignation. Often, retirement is followed by a significant decline in the living standards of those who retire, including that of their entire household. In addition, a desire arises among older adults to keep themselves occupied during their free time (Tur-Sinai and Spivak 2022, 71). A few fortunate older individuals can rely upon monetary assets amassed over time to safeguard a satisfactory quality of life during this juncture. Alternatively, older persons facing a dearth of these assets are inclined to endure a significant decrease in their resources and quality of life compared to their pre-retirement condition.

Though the strategy to promote prolonged employment has concentrated chiefly on financial demands and rewards, employees frequently struggle with the *push* and *pull* facets while deciding their retirement time (Le Blanc et al. 2019, 1-2). Higher academic achievement, amalgamated with fairly profitable professions such as professionals, managerial positions, advanced supervisory duties, distinguished job titles, etc., project a greater probability of continuing to work past the retirement age. In contrast, unprofessional blue-collar careers, including basic job positions, indicate a reduced probability of staying employed after retirement (Hokema and Scherger 2016, 91; Oleksiyenko and Życzyńska-Ciołek 2018, 83). Greater physical and mental operation, as well as embracing daily routine elements that boost wellbeing, may mitigate the physiological effects of ageing and keep elderly individuals healthy for work, healthy for life, and healthy for the future. The need to keep oneself mentally active post-retirement predisposes people to stay in the workforce (Winkelmann-Gleed 2011, 80).

The socio-economic level contributes significantly to the justification of people's propensity to work beyond the legal retirement age. Concerning gender and marital status, marriage enhances the chance of complete retirement, especially among older females (Hokema and Scherger 2016, 108; Virtanen et al. 2014, 1-2). Older married females have a lower probability of working post-retirement than single females (Pettersson 2014, 1016). It has also been found that greater levels of educational achievement reflect a greater possibility of unretirement or PRW. Another consideration in PRW is health. Congdon-Hohman (2018, 583) demonstrates that chronic disease, including impairment, is an inducer of disengagement from the workforce.

Economic considerations also constitute one of the essential explanations for individuals working after retirement (Hokema and Scherger 2016, 106). Those requiring an additional source of funds, who have rental or insurance payments, or who need to

repay a loan are prone to unretire (Congdon-Hohman 2018, 606). Irrespective of their initial financial condition, older adults are susceptible to falling into deprivation due to a diminished capability for revenue creation and a rising risk of significant disease (Lloyd-Sherlock 2002, 754). In the context of older adults in India, the widespread perception is that older people strain families and the country since they seldom contribute to national revenue, although that is not always true. Bhagat and Unisa (2006, 201) contend that in India, nearly 40% of those 60 and older are employed. In the context of men, the percentage increases to 61%; contrarily, some individuals aged 15-59 may not have a job and rely on older people.

2.6.2 Pensions and Social Provisions

The Population Institute of Medicine (US), Committee on the Long-Run Macroeconomic Effects of the Ageing U.S. (2012, 122) emphasises that as people age and move into retirement, many begin liquidating their stock of retirement assets to generate income that pays for living expenses, healthcare, and retirement care, among other things. In such a situation, the International Labour Office (ILO 2017, 1) highlighted that the provision of pensions and public social security are essential tools for ensuring income security for women and men as they grow older, necessary for the dignity and wellbeing of older persons, and imperative to realising their rights. Pensions are of two types: *Retirement Pensions* and *Social Pensions*. While retirement pensions are tied to an individual's work history and contributions to a pension fund during their working years, social pensions are more inclusive and designed to provide financial support by the government to specific vulnerable groups, irrespective of their employment background.

Assessing the state of old age pensions worldwide, immense heterogeneity exists in providing and attaining pension benefits. Worldwide, nearly half (48%) of all people over pensionable age who are eligible to receive a pension do not receive it. For those who do, the income provided is often inadequate to keep them from living in or falling into poverty. As a result, most of the world's older women and men must continue working as long as they physically can, often poorly paid and in precarious conditions (*ibid*). Considerable disparities also exist among regions. For instance, while in Europe, the statutory and adequate coverage of public pensions is relatively high, in many middle-and low-income countries, pension coverage is significantly lower. Where sizeable informal sectors exist, the collection of contributions or tax payments to finance public pension systems is complex, resulting in substantially lower coverage of workers in the informal

economy. A gender gap in pension coverage mirrors the inequalities faced by women in the labour market and employment. Women's eligibility and benefits are constrained by their lower labour force participation, lower average earnings, higher incidence of informal employment, and frequently interrupted employment due to an unequal distribution of family care work (*ibid*, 2).

Public social protection expenditure for older persons takes the highest proportion of GDP in Western Europe at 11.1%, followed by 8.3% of GDP in Central and Eastern Europe and 6.6% in North America, yet accounts for only 1.3% of GDP in Africa, where the share of older persons in the total population is significantly lower. In Latin America and the Middle East, 4.6% and 2.0% of GDP, respectively, are allocated to the income security needs of the elderly, while in Asia and the Pacific, where the share of the older population is significantly higher, only 2.0% of GDP is allocated to the same (*ibid*, 3).

Pensions provide a financial security net for older adults, affecting their quality of life and wellbeing (Shao and Li 2023, 1). In an attempt to study the impact of pensions on healthcare-seeking behaviour, using data from the China Health and Retirement Longitudinal Study and adopting a *fuzzy regression discontinuity design*, Chen et al. (2020, 1) undertook a *segmented regression analysis*. Their results revealed that receiving a pension enabled low-income people to use outpatient and inpatient services, besides encouraging low-and high-income people to choose self-treatment, specifically over-the-counter and traditional Chinese medicines and improve their quality of life.

Taking a look at the pension scenario in India, only 12% of Indians are covered by a *formal pension scheme* (those that are supported by employer contributions such as the Provident Fund), according to government figures (Bhardwaj et al. 2019). They emphasise that retirement support through pensions is crucial to any package of elderly support, given that with the rise of the *gig economy* and other unorganised work, a vast majority of Indians hold jobs that offer no social security benefits and pay irregularly. Thus, providing a core basket of social protection benefits to all Indians becomes critical for strengthening growth and inclusion. Pensions form a vital ingredient of this basket, especially since most households find it difficult to save for their future.

Contributory pension programmes, such as the *National Pension Scheme*, the *Atal Pension Yojana*, and the more recently announced *Pradhan Mantri Shram-Yogi Maandhan Yojana*, are the revised mechanisms of pension provision in India. However, these work only for a small number, those who are still young and have the financial wherewithal to save. Although contributory pension schemes have made significant progress recently, and

the number of subscribers for *National Pension Scheme-Lite*, which targets weaker economic segments and unorganised workers, has increased [Credit Rating Information Services of India Limited (CRISIL) and Pension Fund Regulatory Development Authority (PFRDA) 2017, 5]. Bhardwaj et al. (2019) highlighted that across Delhi and Odisha, having low and irregular income, challenges in identifying the target group, low retirement literacy, and insufficient awareness are some of the primary reasons for low uptake and poor persistence of pension schemes. These challenges will plague new ‘mega pension’ schemes too. For citizens with low/irregular incomes and for those already old or nearing retirement, governments often use a second tool: *tax-funded unconditional cash transfers*, also known as *public* or *social pensions*. However, Nag (2017) pointed out that India’s pension system is ranked 28 out of the 30 countries under analysis, highlighting the inadequacy of the nation’s retirement program in one of the world’s rapidly ageing economies, owing to the extensive informal sector. Referring to the World Economic Forum’s report on Global Human Capital, he emphasised that only 7.4% of India’s working-age populace benefits from a pension scheme, contrasting with Germany’s 65% and Brazil’s 31%.

To assess the awareness, utilisation, and barriers faced while utilising social security provisions/schemes by the elderly, Kohli et al. (2017, 10) conducted a cross-sectional study among 360 individuals aged 60 years and above in a rural area in Delhi. Based on the *Chi-square* analysis, they noted that about 79.4% of the elderly were aware of social security schemes, and 45% of the eligible subjects were utilising pension schemes. They pointed out that awareness generation, provision of information on how to approach the concerned authority for utilising the scheme, and ease of administrative procedures should be an integral part of any social security measure. The major barriers reported in using schemes were corruption and tedious administrative procedures.

2.6.3 The Stimulation of Research Questions: Present Study v/s Prior Studies

Given the changing role of retirement and the rise in PRW among older individuals, it is pertinent to study the factors that induce the same. Similarly, the inadequacy of retirement and social pensions often makes it difficult to wade through the golden years; lack of the latter, in many cases, compels many to work post-retirement.

Our study traces similarities and differences to prior researchers. In contrast to researchers such as Congdon-Hohman (2018), Hokema and Scherger (2016), Oleksiyenko and Życzyńska-Ciołek (2018), and Tur-Sinai and Spivak (2022), who solely focus on

analysing the PRW scenario among older adults, we extend the analysis to present a wholesome understanding of labour market dynamics, in terms of what got them into PRW, right from their pre-retirement occupation, including assessment of voluntary retirement. While a handful of studies/reports (Bhardwaj et al. 2019; CRISIL and PFRDA 2017; ILO 2017; Nag 2017) note the inadequacy of pensions, our study seeks to unravel the heterogeneity among the elderly in terms of the number of pensioners and the amount they receive. Tracing similarities to the work of Kohli et al. (2017), we seek to understand the level of utilisation and awareness of social provisions among the elderly in Goa. We seek answers to the following RQs in response to Objective 7:

RQ7.1) What was the nature of pre-retirement work among older adults?

RQ7.2) What are the major reasons for taking voluntary retirement among the elderly?

RQ7.3) What is the nature of PRW among older adults?

RQ7.4) What are the key pull factors that have drawn the elderly into PRW?

RQ7.5) Which categories of older adults are more inclined to work post-retirement?

RQ7.6) Do significant differences exist concerning availing retirement pensions?

RQ7.7) What is the level of awareness and utilisation of social security benefits?

2.7 Summary

This chapter systematically presents a detailed review of literature highlighting pertinent aspects concerning the Economics of Ageing from the point of view of Population Ageing (macro perspective) and Individual Ageing (micro level) that merit further investigation. The literature is broadly organised thematically into five themes: (i) Conflicting Views on the Causes of Global Population Ageing, (ii) The Debate on the Consequences of Global Population Ageing on Macroeconomic Growth, (iii) The Financial Condition of Older Adults, encompassing Income, Expenditure, and Living Standards Capabilities, (iv) Health-related Economic Concerns of Older Adults relating to Morbidity, HRQOL, Health-related Expenditure, Choice of HCU, Costs of Caregiving, and the Nature of Living Arrangements, and (v) Labour Market Choices, Pensions, and Social Provisions. The review of each theme is subsequently followed by identifying the RQs to be addressed by the present study and comparing the similarities and differences between the present research vis-à-vis prior studies.

CHAPTER 3: RESEARCH METHODOLOGY

Learning a subset of the skills, theories, and facts developed by prior generations seems a necessary ingredient to innovative activity: Jones (2010, 2).

3.1 Introduction

This chapter explores the statistical and econometric tests and models pertinent to this research. Appropriate analysis tools have been adopted due to the use of both secondary and primary data. From a global perspective, the first two objectives of this study utilise secondary data of a panel nature¹. Due to the ease of data availability and its relative benefit over cross-sectional and time series data, panel data has recently become increasingly popular (Hsiao 2014, 2). Besides, primary data has been collected via field visits (the design of which has been mentioned in Section 3.5) to analyse the other objectives, accordingly requiring a different set of tests, discussed in later subsections of this chapter. Secondary data has been analysed primarily using software packages like E-Views and STATA, while primary data is analysed using SPSS and AMOS. Definitions and methods of operationalisation are mentioned in relevant portions of the thesis.

3.2 Panel Data

Panel data is widely adopted for cross-national comparisons and has been done so in the present study, owing to several advantages (*ibid*, 3-8). Firstly, it is utilised to simultaneously detect the impact of cross-sectional and time-varying factors. Secondly, panel data models demonstrate a stronger potential for modelling impacts that incorporate the multifaceted nature of human behaviour. Thirdly, using panel data collected over time, investigators can assess the prior and subsequent impacts on entities and nations. Fourthly, panel data offers variation in the data gathered, making parameter estimates more effective and precise. Fifthly, panel data includes more observations compared to cross-sectional data, resulting in lower standard deviations and more accurate estimations. Sixthly, panel data assessments have less constricting assumptions and employ a more complex behavioural model (Baltagi 2021, 1-4). Seventhly, the fixed effect panel approach considers each individual's diversity. Generally, cross-sectional components have specific inherent and immeasurable characteristics that set them apart from other cross-sectional units, particularly nations and states (Kennedy 2003, 301), which mitigates the challenges of mismeasuring or omitting variables that correlate with independent variables.

3.3 Cointegration Testing with Panel Data

Cointegration analysis using panel data constitutes a four-step process, as indicated below.

3.3.1 Cross-sectional Dependence (CD)

The presence of CD^2 between the series provides biased and inconsistent empirical results. Thus, the first step involves examining whether the data has CD or not. We do so by employing the CD test proposed by M. Hashem Pesaran (2021, 13), according to which a test statistic greater than the critical value at a chosen significance level would lead to rejection of the null hypothesis, indicating the presence of CD.

3.3.2 Panel Unit Root Test

Non-stationary data produces erroneous estimates. Hence, it is crucial to look into the order of integration of the variables before checking for cointegration via *Panel Unit Root Tests*³. The conventional unit root tests provide weak findings with low power when the series are cross-sectionally dependent. Therefore, in this study, we apply a second-generation unit root test developed by Pesaran (2007, 265), the *Cross-sectionally augmented Im, Pesaran, and Shin (CIPS) Panel Unit Root Test*⁴. The null hypothesis posits that the data follows a unit root process and does not exhibit stationarity. The alternate suggests that the data is stationary and does not possess a unit root.

3.3.3 Panel Cointegration Test

Following the testing for stationarity, although various alternative panel cointegration tests may be run (depending on the kind of investigation and provided that every variable is integrated of order one), we adopt *Pedroni's Cointegration Test*⁵ (Pedroni 1999; 2004) since it accommodates deterministic trends and is commonly employed for models involving CD, best suited to our study. For verifying the null hypothesis of no cointegration in heterogeneous panels, two categories of tests have been suggested (*ibid*): *Panel Tests*⁶ using the *within-dimension approach* and *Group Tests*⁷ based on the *between-dimension approach*, both of which have been employed.

3.3.4 Long-Run Cointegrating Regression Estimation - FMOLS and DOLS

As a result of the variables' cointegration, the subsequent task is to calculate the long-term equilibrium relation. When used on a cointegrated panel, the OLS estimator turns into a biased and unstable estimator whose distribution relies on *nuisance parameters*. Pedroni (2004, 597) argues that these nuisance parameters can introduce unwanted *endogeneity*

and *serial correlation* into the regression model. Therefore, to address these issues, the *Fully Modified Ordinary Least Square (FMOLS)* (McCoskey and Kao 1998; Phillips and Moon 1999) and the *Dynamic Ordinary Least Square (DOLS)* (McCoskey and Kao 1998; Kao and Chiang 2000) are employed. In the event of variability in the analysed cointegrated vectors, FMOLS and DOLS provide more flexibility (Pedroni 2001, 117). The *FMOLS*⁸ and *DOLS*⁹ estimators incorporate endogeneity and serial correlation adjustments compared to the OLS estimator. However, the DOLS estimator outperforms the OLS and FMOLS estimators regarding sample attributes (Kao and Chiang 2000, 179) as it includes *leads* and *lags* of the differences of the independent variables to overcome endogeneity and serial correlation issues.

3.4 Panel Data Methods and Appropriate Model Selection Tests

Commonly employed panel data methods encompass three main types, as noted below.

3.4.1 Pooled Ordinary Least Squares (POLS)

*POLS*¹⁰ assumes that observations are independent of each other. However, this assumption may be violated when pooling data from different groups or time periods if there is a correlation or dependence within groups or over time. Ignoring this violation can lead to biased and inefficient parameter estimates, necessitating the need for alternatives.

3.4.2 Random Effects Model (REM)

*REM*¹¹ allows for estimating both time-invariant and time-varying effects by treating the individual-specific effects as random variables. The individual-specific effects are modelled as random variables drawn from a population distribution, which captures the overall variation across individuals. In a REM, individual-specific effects are assumed to be uncorrelated with the explanatory variables since the random effects estimator produces inaccurate and misleading results when a relationship persists among the unobserved attributes and independent variables.

3.4.3 Fixed Effects Model (FEM) - Within Estimator

*FEM*¹² is employed to overcome the above-mentioned issue yielding unbiased and reliable results as it allows for the estimation of the effect of time-varying variables on the dependent variable while controlling for unobserved individual-specific factors. The individual-specific effects are modelled as fixed parameters; in other words, they are treated as constants that do not vary across individuals and are assumed to be correlated with the explanatory variables. Estimation is typically done using within-group variations,

where individual-specific effects are differenced out. This implies that only variations in the explanatory variables within each individual over time are considered (Pattanaik and Nayak 2014, 140).

3.4.4 Model Selection Tests

3.4.4.1 Breusch-Pagan Lagrange Multiplier (LM) Test

The *LM* test is employed to choose from REM and POLS regression modelling. The null hypothesis asserts that variation over units is zero and POLS is to be adopted. When the null hypothesis result is significant, the POLS framework is inapplicable, and the REM approach is preferable (Breusch and Pagan 1980, 239).

3.4.4.2 Hausman Test

The *Hausman* technique is utilised to select among the REM and FEM structures (Hausman 1978, 1251). According to the null hypothesis, no link exists between unobserved components and independent variables. The REM estimates will become skewed if the unit-specific impacts are associated with any independent factors¹³. A statistically significant Hausman statistic is taken as reinforcement opposing the adoption of REM and preferring the usage of FEM.

3.4.4.3 Sargan Hansen Test

Pertinent to note is that the Hausman statistic cannot be utilised when the regression employs robust standard errors to control for *heteroskedasticity*, as is the case in the present study. Thus, the *Sargan-Hansen statistic* is used to select between the REM and FEM frameworks. The null hypothesis claims the REM is suitable, while the alternative argues that the FEM framework is appropriate (Schaffer and Stillman 2016).

3.5 Design of the Primary Study in Goa

The study included a sample from Goa, selected using *multistage sampling*. From the two districts of Goa, i.e., North and South Goa, the researcher randomly chose six talukas (i.e., three talukas from each district) out of a total of twelve talukas in Goa, aiming to select a representative, unbiased sample. The chosen talukas included Pernem, Bardez, and Tiswadi from North Goa and Salcete, Mormugao, and Quepem from South Goa. The next step involved a random selection of towns and villages in each taluka to conduct a survey of the elderly living at home. Table 3.1 indicates the criteria used for the same. 20% of the cities and 20% of the villages from each taluka were chosen for the study based on the

Village and Town-wise District Census Handbooks of North and South Goa, prepared by the Director of Census Operations, Goa (2014a and 2014b). Goa has 1,63,357 people aged 60 years and above, according to Census of India (2011). Fulfilling the minimum requirement for a representative sample based on the statistical power analysis of sample size by Krejcie and Morgan (1970, 607), assuming a 95% confidence interval, a sample of 500 elderly respondents was chosen for the study. These included 400 elderly residing at home and 100 residing in OAHs. The 400 older adults residing at home were selected based on the voter's list from the towns and villages listed in Table 3.2

Table 3.1: Criteria for Taluka-wise Sample Selection of Towns/Villages

District	Taluka	Total no. of Towns*	20% of Towns selected	Total no. of Villages*	20% of Villages selected
North Goa	Bardez	16	3	28	6
	Tiswadi	10	2	22	4
	Pernem	5	1	23	5
South Goa	Salcete	13	3	35	7
	Mormugao	4	1	11	2
	Quepem	1	1	37	7

*Source: *Economic Survey of Goa, Directorate of Planning, Statistics & Evaluation (2020-21, 7)*

Table 3.2: District/Taluka/Locality-wise Distribution of Elderly Living at Home

North Goa					South Goa				
Taluka	Towns (Urban)		Villages (Rural)		Taluka	Towns (Urban)		Villages (Rural)	
	Name	Respo-ndents (%)	Name	Respo-ndents (%)		Name	Respo-ndents (%)	Name	Respo-ndents (%)
Bardez	1)Mapusa 2)Socorro 3)Aldona	52 (13%)	1)Tivim 2)Parra 3)Sangolda 4)Nachinola 5)Assagao 6)Ponolem	32 (8%)	Salcete	1)Margao 2)Navelim 3)Nuvem	56 (14%)	1)Assolna 2)Colva 3)Velim 4)Loutolim 5)Betaltatim 6)Cavelossim 7)Rachol	33 (8.2%)
Tiswadi	1)Panaji 2)Chimbel	44 (11%)	1)Ella 2)Chorao 3)Siridao 4)Curca	21 (5.25%)	Mormu-gao	1)Verna	30 (7.5%)	1)Velsao 2)Cansaulim	15 (3.7%)
Pernem	1)Arambol	25 (6.25%)	1)Tiracol 2)Querim 3)Paliem 4)Uguem 5)Tuem	30 (7.5%)	Quepem	1)Xeldem	30 (7.5%)	1)Ambaulim 2)Bali 3)Fatorpa 4)Pirla 5)Sulcorna 6>Maina 7)Cavorem	32 (8%)

Source: *Director of Census Operations (2014a and 2014b) Village and Town-wise District Census Handbooks of North and South Goa.*

The criterion used for selecting OAHs is outlined in the following tables. As per the records of the Directorate of Social Welfare (DoSW), Government of Goa, 2021. Table 3.3 indicates the number of OAHs registered with them. 15% of the total OAHs in North and South Goa were randomly chosen for the study. This procedure and the names of the selected OAHs have been outlined in detail in Table 3.4.

Table 3.3: Taluka-wise List of OAHs Registered with DoSW, Goa

District	Taluka	Number of OAHs	Total
North Goa	Tiswadi	07	27
	Bardez	20	
South Goa	Salcete	10	14
	Ponda	02	
	Mormugao	02	

Source: Directorate of Social Welfare (DoSW), Government of Goa, 2021

Table 3.4: OAHs chosen for the Study

District	No. of Homes chosen	Taluka	City/ Village	Locality	Name of the OAH	Total inmates surveyed	Total inmates in OAH*
North Goa	15% of the 27 = 4.05 = 4	Tiswadi	Chorao	Rural	1) Holy Family Home for the Aged (POAH)	06	09
			Altinho	Urban	2)Recolhimento de Serra (GOAH)	14	24
		Bardez	Calangute	Urban	3) Mother Mary Haven (POAH)	11	21
			Nachinola	Rural	4) Bom Jesus OAH (POAH)	19	24
Total in North Goa						50	78
South Goa	15% of 14 = 2.1 = 2	Salcete	Margao	Urban	1) Asylum of Margao (GOAH)	35	48
		Mormu-gao	Nagao	Rural	2) St. Mary’s Guest House - Cluny Convent (POAH)	15	27
Total in South Goa						50	75
Total in both the districts						100	153

Source: Author calculations based on information provided by DoSW, 2021.

*As reported by the respective in-charge of each home between September-December 2021

POAH: Private-run Old Aged Home; GOAH: Government-run Old Aged Home

3.5.1 Ethical Considerations

Ethical norms were adhered to in a multi-pronged manner, firstly from the Superiors/Managing bodies: The Institute of Public Assistance (Provedoria), Government of Goa, which runs public OAHs, and from the superiors in charge of private OAHs. Secondly, approval was sought at the household level as well. Thirdly, every respondent provided informed consent prior to the survey. The purpose of the research, anonymity of identity, and voluntary nature of participation were also informed to every participant.

3.5.2 Instrumentation

The *Questionnaire-Schedule (Q-S)* for the present study (included in Appendix I) was based on adaptations made from Q-Ss used and pre-tested by previous researchers, including renowned research institutes. One such classic study was conducted in 2005 in India's state, Kerala, which has the highest ageing population, entitled *Kerala Ageing Survey, 2005*, conducted by the Centre for Development Studies, Kerala (Rajan 2005). Besides, the *Questionnaire for the Elderly Survey* developed for Building the Knowledge Base on Ageing in India, a survey carried out in seven Indian states in 2011 by the Institute for Social and Economic Change (Bangalore), the Institute of Economic Growth (New Delhi), the UNFPA (New Delhi) and Tata Institute of Social Sciences (Mumbai), was another highly enriched questionnaire that facilitated in framing one for the present study (UNFPA 2013). The Individual and Household Schedule developed for the *Longitudinal Ageing Study in India (LASI), Wave I, 2017-18*, by the IIPS, Mumbai, that considered a sample of 72,250 adults aged 45 and above, including their spouses less than age 45, to represent pre-ageing and pre-retirement phases (IIPS et al. 2020) also formed the basis of yet another enriched framework, adapted in the present study to Goa.

Finally, to capture the true Goan essence, insights were drawn from questionnaires from two local studies conducted, one from a sociological perspective on the problems of the elderly in Goa (Rodrigues 2013) and another from a health economics perspective on the economic impact of HIV/AIDS on households in Goa (Falleiro 2014).

To improve the scientific rigour of assessing the different facets of the elderly, various scales are used that have been adapted and validated and whose reliability and dimensionality have been evaluated. The *Living Standards Capabilities for Elders scale (LSCAPE)*, developed based on Amartya Sen's Capability Approach, determines living standards capabilities among the elderly (Breheny et al. 2013). It is a 25-item scale comprising Health, Social Integration, Contribution, Enjoyment, Security, and Restriction.

One of the most internationally accepted tools to capture HRQOL is the *Short Form 36 item (SF-36) instrument* assessing Physical Functioning (PF), General Health (GH), Role Limitations due to Physical health (RP), Bodily Pain (BP), Role Limitations due to Emotional problems (RE), Vitality (VT), Mental Health (MH), and Social Functioning (SF) (McHorney, Ware, and Raczek 1993). Conceptually equivalent cultural changes to the questionnaire to be acceptable in the Indian setting were made by Sinha, van den Heuvel, and Arokiasamy (2013, 24). We use this adapted version.

Similarly, Diener et al. (1985) developed the *Satisfaction with Life Scale (SWLS)*, a 5-item globally accepted Subjective Wellbeing scale designed to measure judgments of one's life satisfaction. The same is included in this study. Thus, the Q-S, post-conducting pre-tests for efficacy and improvement was finally adapted into eight sections capturing a holistic perspective, true to the essence of the Economics of Ageing, outlined as follows:

I: Demographics

II: Household Profile

III. Inflows and Outflows of the Senior Citizens

IV. Life Satisfaction and Living Standards Capabilities

V. Health-Related Quality of Life

VI. Health Expenditure and Healthcare Utilisation

VII. Labour Market Choices of the Elderly

VIII. Retirement Pensions and Major Social Provisions

The Q-S was administered through personal home visits from August 2021 to January 2022. Given that the survey took place during the COVID-19 pandemic period (nevertheless when the number of cases had receded), besides following all the due protocols, a few elderly respondents (and their household members) were a bit apprehensive of personal home visits and instead obliged with telephonic surveys. Respecting the relatively higher vulnerability of older adults, telephonic surveys were adopted, though in very few cases only, when insisted upon by the respondents.

3.6 Methodology Adopted for Analysing the Primary Data

3.6.1 T-Test and Analysis of Variance (ANOVA)

*T-tests*¹⁴ and *ANOVA*¹⁵ have been used to analyse differences in means among the elderly concerning their HRQOL and living standard capability scale scores, which are respective dependent variables being *continuous* and *normally distributed* in nature.

3.6.2 Chi-square Test and Fisher's Exact Test (FET)

The *Chi-square test* has been used to determine whether statistically significant differences persist between the predicted and observed frequencies for one or more *categorical* groups. When a '2x2' table provides many cells with an expected count of fewer than five, the Chi-square analysis becomes ineffective (Majumdar 2002, 383). In such situations, *FET* is used (Bordens and Abbott 2009, 413).

3.6.3 Binary Logistic Regression

Binary logistic regression has been adopted to anticipate the presence or absence of a feature or consequence by examining the results of a group of explanatory variables. The outcome variable is dichotomous, possessing two values, 0 or 1 and the *Odds Ratios* for every explanatory variable of the model are estimated using logistic regression coefficients (Hilbe 2015, 3).

3.6.4 Confirmatory Factor Analysis (CFA)

CFA is the crucial initial stage in executing almost all kinds of *SEM* simulations, accomplished by using a *Measurement Model* to validate the measurement quality of every *Latent Construct*¹⁶, which will subsequently be employed as explanatory and outcome variables in the *SEM* (Kline 2005, 117). Developing this *CFA* measurement framework enables assessing the constructs' *Convergent Validity*, evidenced by substantial indicator loadings, demonstrating the significance of conceptual comparability while screening for *Discriminant Validity* and *Reliability*. Subsequently, the *Model Fit* is assessed using *Absolute*, *Parsimonious*, and *Incremental Goodness of Fit Indices* to obtain an *optimal fit*.

3.6.5 Structural Equation Modelling (SEM)

Following the assessment of the *Measurement Model*, the subsequent essential requirement of *SEM* is the characterisation of its path design, which is used to reveal the explicit direction of the multiple relations among the variables (Kline 2005, 118). *SEM* enables representing, estimating, and testing a conceptual path of linear relationships between explanatory and outcome variables (Thakkar 2020, 35) and has been adopted to analyse the relationships in our conceptual model of Healthy Ageing.

3.6.5.1 SEM for Mediation Analysis

A phenomenal contribution of SEM is that it serves as a robust technique for analysing *Mediation* (Tomás et al. 2016, 1377), which is pertinent to our analysis of the Healthy Ageing model. The impact of two constructs could proceed through an indirect path via a third variable known as a *Mediator*. The third variable interacts with the effects of the two constructs in such instances (Hair et al. 2010, 766). Three effects are at work when checking for mediation within a model. Without the presence of a mediator (M), while assessing the relation between a predictor (X) and an outcome variable (Y), 'c' denotes the *Total Effect* of X on Y (Figure 3.1). However, in the presence of a Mediator (M), the direct association between a predictor (X) and an outcome variable (Y) constitutes the *Direct Effect* (c'), indicated in Figure 3.2. The relation which runs from a predictor (X) towards a Mediator (M) and subsequently to the outcome variable (Y) is called the *Indirect Effect* (a*b). In the context of a mediator, the Total Effect is the sum of the Direct Effect among the two constructs plus the Indirect Effect streaming via the Mediator ($c = c' + a*b$).

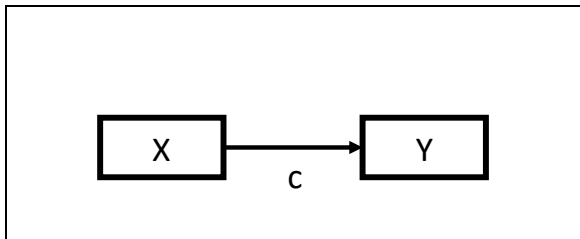


Figure 3.1: Total Effect without Mediator
Source: (Figure 3.1 and 3.2) As in Hair et al. (2010, 766), *Multivariate Data Analysis: A Global Perspective*

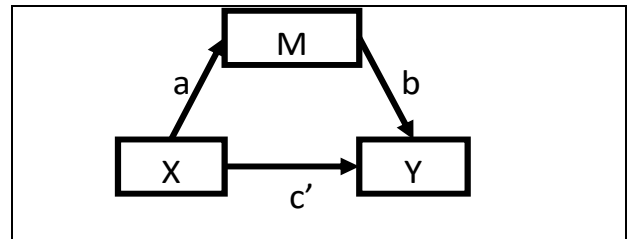


Figure 3.2: Direct, Indirect, and Total Effect

3.7 Sample Profile of the Elderly living at Home and in OAHs

Table 3.5 is a self-explanatory table that provides comparative information about the research samples, i.e., the elderly living at home (N=400) and those in OAHs (N=100). Most of the respondents in both samples were females (55.4%). Similarly, more than half of the respondents resided in urban areas (59.4%). Regarding education, though only 17% of the total sample reported being uneducated, a point to be noted is that almost half the number of elderly living in OAHs (49 out of 100 elderly) had no formal education. Concerning their age profile, the sample comprised a majority of elderly aged between 60 and 69 years (50.4%), followed by the 70-79 years category (32%). Around 80 respondents were surveyed who were between 80-89 years of age, while those 90 and

above were only eight respondents. Regarding their current marital status, while the majority of the elderly living at home were married (295 respondents), more than half of the elderly living in OAHs were widowed (62 out of 100 elderly). Regarding living arrangements, the majority were living with family members (56.6%), around 15% were residing alone, 8.4% were living with a helper, and 20% of the sample comprised the elderly living in OAHs.

Table 3.5: Sample Profile Frequency Distribution of Elderly at Home and in OAHs

	At Home	In OAHs	Total (%)		At Home	In OAHs	Total(%)
<u>Gender</u>				<u>Locality</u>			
Male	194	29	223(44.6)	Rural	163	40	203(40.6)
Female	206	71	277(55.4)	Urban	237	60	297(59.4)
Total	400	100	500(100)	Total	400	100	500(100)
<u>Education</u>				<u>Living Arrangement</u>			
Uneducated	36	49	85(17)	Alone	75	00	75(15)
Upto High school	165	32	197(39.4)	With helper	42	00	42(8.4)
Upto Higher Secondary	43	14	57(11.4)	With family	283	00	283(56.6)
College and above	156	05	161(32.2)	OAH	00	100	100(20)
Total	400	100	500(100)	Total	400	100	500(100)
<u>Age</u>				<u>Current Marital Status</u>			
60-69	200	52	252(50.4)	Unmarried	20	22	42(8.4)
70-79	121	39	160(32.0)	Married	295	14	309(61.8)
80-89	73	07	80(16.0)	Widowed	78	62	140(28.0)
90 and above	06	02	08(1.6)	Divorced/ Separated	07	02	09(1.8)
Total	400	100	500(100)	Total	400	100	500(100)

Source: Primary survey

¹ Wooldridge (2010, 247-251) describes a Panel Dataset as one that is created by repeatedly observing similar cross-sectional units through time. There are two kinds: Balanced Panel and Unbalanced Panel, where each cross-sectional unit is monitored for the same intervals in the former scenario, whereas not all individuals are observed in every period in the case of the latter. According to Hsiao (2003, 3), panel data structure is outlined as:

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 Z_{it} + u_{it} \quad (3.1)$$

where observational units $i=1, \dots, N$ and periods $t=1, \dots, T$.

² CD refers to the presence of interdependence or correlation among observations in the cross-section of a dataset. Testing for CD involves estimating the cross-sectional averages of individual unit variables and then examining the correlation of these averages with individual unit variables. The null hypothesis is that there is no cross-sectional dependence.

³ Panel unit root examinations are used to analyse the stationarity of the series.

⁴ CIPS panel unit root test extends the traditional Im, Pesaran, and Shin (IPS) panel unit root test by incorporating additional information regarding CD.

⁵ The panel cointegration empirical specification is expressed as follows:

$$Y_{i,t} = \alpha_i + \delta_i t + \beta_1 X_{1,i,t} + \beta_2 X_{2,i,t} + \dots + \beta_n X_{n,i,t} + \varepsilon_{i,t} \quad (3.2)$$

where $Y_{i,t}$ is the dependent variable, $X_{n,i,t}$ are independent variables, n is the number of exogenous variables included into the long-run estimation, $\varepsilon_{i,t}$ is the estimated residual representing deviations from the long-run equilibrium relationship, β represents the slope coefficient and the parameters α_{it} and δ_i account for the possibility of country-specific effects and deterministic trend effects respectively.

⁶ Panel tests comprise four statistics: panel v-statistic, panel rho-statistic, panel PP-statistic, and panel ADF-statistic (also known as the panel cointegration statistics). These test the null hypothesis of no cointegration across the entire panel.

⁷ Group Tests contain three statistics: group rho-statistic, group PP-statistic, and group ADF-statistic (i.e., group mean panel cointegration statistics). These test the null hypothesis of no cointegration within each group of the panel. The existence of cointegration in at least one group is assessed based on the significance of the group statistics. The decision rule for each type of statistic is independent. Typically, if any of the group statistics or the panel statistics are statistically significant at a chosen significance level, it suggests evidence of cointegration.

⁸ The FMOLS estimator, $\hat{\beta}_{FM}$ relies on a cointegrated system for a panel of $i=1, \dots, N$ and $t=1, \dots, T$, shown in Eq. 3.2

⁹ The DOLS estimator ($\hat{\beta}_{DOLS}$) is derived from the equation below, where c_{ij} is the estimated value of the lag or lead of the first differenced independent variables. The selection of the number of lags and leads can be automatically done by the software based on various criteria such as Akaike, Schwarz or Hannan-Quinn.

$$y_{it} = \alpha_i + \beta x_{it} + \sum_{j=q_1}^{j=q_2} c_{ij} \Delta x_{i,t-j} + v_{it} \quad (3.3)$$

¹⁰ Econometric models evaluated by employing a POLS estimator are denoted as follows:

$$y_{it} = \beta x_{it} + \alpha z_i + \varepsilon_{it} \quad (3.4)$$

where $i=1, 2, \dots, N$ and $t=1, 2, \dots, T$. Here y_{it} denotes the dependent variable, while x_{it} represents independent variables which do not include a constant term. αz_i captures heterogeneity reflecting the individual impact. z_i includes constant and time-invariant individual/group-specific factors that could either be or not be observable. If z_i includes merely a constant term, this model will provide accurate and reliable estimates of α and β . However, often z_i remains unobservable but could be correlated with x_{it} . This would be ineffective and present erroneous/inaccurate results.

¹¹ Individual-specific impacts are considered to exist randomly in REM framework as follows:

$$Y_{it} = \mu + \beta X_{it} + v_{it} \quad (3.5)$$

$$v_{it} = a_i + u_{it} \quad (3.5a)$$

where a_i denotes the individual-specific time-consistent factor, and u_{it} denotes the impacts of eliminated variables that differ over people and periods. REM is used when the analyst believes that no unobserved impact (a_i) is associated with the independent variables. As a result, the REM predictor is employed to get a reliable estimate (Pattanaik and Nayak 2014, 141).

¹² FEM structure is as follows:

$$y_{it} = \sum_{k=1}^K \beta_k x_{itk} + \alpha_i + u_{it} \quad (3.6)$$

$t=1, 2, \dots, T$, $i=1, 2, \dots, N$ and α_i symbolise individual effects fixed over time; u_{it} are error terms. Since α_i is not observable, it cannot be directly controlled for. The FEM eliminates α_i by de-meaning the variables using the within transformation:

$$y_{it} - \bar{y}_{it} = \sum_{k=1}^K \beta_k (x_{itk} - \bar{x}_{it}) + (u_{it} - \bar{u}_{it}) \quad (3.7)$$

Because the unobserved impact α_i ceases to exist, the findings are impartial and reliable (*ibid*, 42).

¹³ The FEM framework has consistency when unobserved influences are related to explanatory variables, however, the REM model is unreliable.

¹⁴ T-test provides a parametric statistical examination of differences designed for comparing the means of two groups. It frequently gets utilised to assess if a procedure or treatment impacts the population of interest or if the two categories vary (Kullas, Roji, and Smith 2021, 77).

¹⁵ Analysis of variance (ANOVA) may be utilised to determine if there are substantial variations in the means of two or more types (*ibid*, 97).

¹⁶ Latent constructs (commonly called factors or scales) are unmeasurable variables. It is estimated using an array of measurable variables called indicators weighted according to their variance/covariance framework.

CHAPTER 4: ECONOMIC THEORY AND CROSS-NATIONAL EMPIRICAL ANALYSIS UNDERLYING THE MAJOR DRIVERS OF POPULATION AGEING

We are witnessing a tectonic change in the population distribution and eventually in the political power distribution of our planet. It rivals, if it doesn't surpass, the fall of the Roman Empire, the discovery of the Americas, and the Industrial Revolution: Bouvier (2001, 381).

4.1 Introduction

Economics and Demography are not two water-tight compartments. A close interlinkage exists between the two. Economic stimuli drive demographic transformations, while demographic forces, in turn, shape economic occurrences. From one perspective, economic circumstances, especially economic expansion, budgetary decisions, social security, demand and supply, investment expenditures, etc., are impacted by demographic changes, such as a rise in older adults or a fall in the working-age population (Bagautdinova et al. 2014, 50). From the other perspective, the drivers of an ageing population are moulded by the state of the economy, thus shaping the size and distribution of a nation (Roos and Zaun 2016, 1579).

Via the economic lens, this chapter seeks to analyse the relationship between population ageing and demographic drivers/processes, collectively designated by Poston and Bouvier (2010, 228) to comprise fertility, mortality, and net migration. It aims to contribute to the debate in the literature concerning the conflicting views regarding the supremacy of the drivers of population ageing. It does so systematically by first showcasing the trends in the demographic drivers spanning six decades (1960-2020). Secondly, it integrates the economic theoretical framework underlying each demographic variable. Thirdly, it presents an improvement over existing studies by testing the existential significance of a long-term cointegrating relationship linking population ageing and all the three prominent demographic variables, thus suggesting an interplay of the drivers, as opposed to stable population models and closed economies, by using robust and dynamic cointegrating regression analysis, namely FMOLS and DOLS. Fourthly, the interplay of the three major forces in the greying of nations is intensely studied on a global panel of 72 nations, spanning six decades (1960-2020), besides dissecting the global panel into four categories of nations based on different stages of the ageing transition, i.e., (i) Potentially-Ageing nations, (ii) Potentially-Ageing nations to Ageing nations, (iii) Ageing

nations to Aged nations, and (iv) Aged nations to Super-Aged nations. A detailed description of this classification is presented in Section 4.3. Another improvement points to employing life expectancy (a much better indicator outlined in Section 4.5) as a proxy for mortality rates in the analysis. Given the assumption of the existence of differences in data quality, and thus heterogeneity across different countries used in the analysis, especially those at the initial stages of the ageing transition, our study mitigates this phenomenon by employing a suitable methodology that allows for robust heterogeneous dynamics and heterogeneous cointegrating vectors (Pedroni 2001, 93).

4.2 Classification of Nations based on Ageing Transition Stages

The population age profile has garnered great prominence in contemporary research because it precisely conveys the comprehensive effect of changing demographics. The population's share of individuals aged 65 and above is considered the key indicator of population ageing in a nation (Macunovich 2012, 783). A country is termed *Super-Aged* when the proportion aged 65 and older exceeds 20%, *Aged* if this percentage is 14% or over, and *Ageing* if this proportion is above 7%, according to the United Nations (World Bank 2021, 2). This study introduces a fourth category by classifying countries with an older population below 7% as *Potentially-Ageing nations*, as noted in Section 1.1.6 of Chapter 1. Given that population ageing is a phenomenon taking place over a period of time, wherein nations can transition from one ageing category to the other, we take the six-decadal average share of the older adult population from 1960 to 2020 and compare it with their share in the population in the year 2020, to measure the extent of their transition. Based on this range, we categorise nations into four stages, namely: (i) Potentially-Ageing nations, (ii) Potentially-Ageing nations to Ageing nations, (iii) Ageing nations to Aged nations, and (iv) Aged nations to Super-Aged nations. The former two categories are designated as nations in the *Initial stages* of the ageing transition, while the latter two are referred to as nations in the *Advanced stages*.

The number of nations in the advanced ageing transition stages, especially those that have transitioned from Aged to Super-Aged Nations, are relatively fewer compared to the vast majority at the initial transition stages. Hence, the choice of nations has been accordingly made to derive a panel dataset representative of the 'World', comprising a total of 72 nations that are further subdivided into four sub-panels (based on the ageing transition stages), with each sub-panel comprising 18 nations, presented in Table 4.1.

Table 4.1. Nation Classification based on the Stage of their Ageing Transition

<u>Nations in the Advanced Stages of their Ageing Transition</u>					
<u>Aged nations to Super-Aged nations</u>			<u>Ageing nations to Aged nations</u>		
Country	Six-decadal average share (1960-2020)	2020	Country	Six-decadal average share (1960-2020)	2020
Bulgaria	14.3	22.3	Albania	7.6	15.8
Croatia	15.6	21.6	Australia	11.2	16.2
Czechia	14.6	20.2	Barbados	10.3	15.2
Denmark	14.8	20.0	Belarus	11.6	16.6
Estonia	14.0	20.2	Canada	11.3	19.2
Finland	14.7	22.5	Iceland	10.7	18.0
France	15.0	21.0	Korea, Rep.	8.6	14.6
Germany	16.3	22.0	New Zealand	11.0	15.8
Greece	14.9	22.2	North Macedonia	8.4	19.6
Hungary	14.0	20.1	Norway	14.7	15.6
Italy	15.7	23.4	Poland	11.0	14.6
Japan	14.7	29.6	Romania	11.9	17.7
Latvia	14.4	21.4	Russian Fed.	10.7	18.4
Lithuania	14.1	20.4	Switzerland	14.3	18.7
Portugal	14.1	22.3	Ukraine	12.5	15.3
Serbia	14.2	20.7	United Kingdom	15.1	19.7
Slovenia	14.6	20.1	United States	11.9	18.7
Sweden	16.5	20.0	Uruguay	11.7	17.2

<u>Nations in the Initial Stages of their Ageing Transition</u>					
<u>Potentially-Ageing to Ageing nations</u>			<u>Potentially-Ageing nations</u>		
Country	Six-decadal average share (1960-2020)	2020	Country	Six-decadal average share (1960-2020)	2020
Armenia	6.4	12.4	Azerbaijan	5.0	6.5
Bahamas	4.9	8.3	Bahrain	2.3	3.2
Brazil	4.9	9.3	Bangladesh	3.7	5.6
Chile	6.7	12.4	Belize	4.2	4.8
China	6.1	12.6	Bolivia	4.4	5.0
Colombia	4.4	8.5	Botswana	3.3	3.5
Costa Rica	5.4	10.2	Egypt	4.2	4.7
Ecuador	4.7	7.5	Guatemala	3.4	4.9
Israel	6.9	11.8	India	4.4	6.7
Jamaica	6.2	7.3	Indonesia	4.4	6.7
Malaysia	3.9	7.2	Jordan	3.0	3.6
Mauritius	5.7	11.8	Mongolia	4.4	4.3
Mexico	4.6	8.0	Nepal	3.9	6.0
Morocco	3.9	7.2	Nigeria	3.2	3.0
Panama	5.0	8.4	Paraguay	4.4	6.2
Peru	4.9	8.3	Philippines	3.5	5.2
Thailand	5.6	13.9	Qatar	1.5	1.3
Türkiye	5.3	8.2	Uganda	2.3	1.7

Source: Author compilations from UNDESA Population Division, World Population Prospects: 2022

The purpose of undertaking such a detailed methodology in sample selection was to obtain a balanced panel with four sub-groups having an equal number of observations that are balanced in terms of *Temporal* and *Cross-Sectional Balance*. Such a panel dataset with

equal-sized sub-panels offers several advantages for statistical analysis; namely, it facilitates meaningful comparisons across groups since each group is equally represented, yields highly robust and reliable results, prevents biases that arise from uneven sample sizes by ensuring that each group contributes proportionately to the overall analysis, and finally, balancing both time and cross-sectional dimensions augments the inferential power of the dataset by providing informative insights into trends, relationships, and interactions.

An important finding from Table 4.1 is that all the nations that have transitioned from Aged to Super-Aged nations are developed nations. Similarly, out of those that transitioned from being Ageing to Aged nations, the majority of the nations are developed according to the UN's categorisation, except for Uruguay and Barbados, which are still developing nations. On the contrary, among the nations transitioning from Potentially-Ageing to Ageing nations, all nations are developing countries, except for Israel. Similarly, all the countries that are still Potentially-Ageing are developing countries. The underlying essence is that nations in the advanced stages of the ageing transition are developed nations, while those in the initial stages are developing nations. Thus, while developed nations were the first to enter the ageing transition, many developing nations have already entered, with the rest being at different stages as years go by.

4.3. Data Procurement

Data for the share of people 65 and over in the population (POPAG), Total Fertility Rate (FERT), Life Expectancy at birth (LEXP), and Net Migration Rate (MIGR) is procured from the Population Division of the UNDESA (2022), World Bank database.

4.3.1 Operational Definitions

- **POPAG:** The proportion of people 65 years and over in the total population.
- **FERT:** Average number of live births a woman would have at the end of her reproductive years according to the age-specific fertility rates of the given year.
- **LEXP:** The average number of years a newborn would anticipate living subject to the era's prevailing age-specific death rates.
- **MIGR:** Net total of migrants during the period, i.e., the total number of immigrants less the annual number of emigrants, including both citizens and noncitizens.

4.4 Justification for Using Life Expectancy as a Proxy for Mortality Rate

Life expectancy is a measure of mortality rates and, hence, indirectly of the condition of health. Prolonged lifespans result from lower mortality across demographics, including older people living longer and younger people dying less. According to Bayati, Akbarian, and Kavosi (2013, 57), preserving, enhancing, and optimising the health of individuals ranks among the fundamental strategies for sustainable growth. Global publications and academia today often employ life expectancy while examining and assessing mortality rates, given that the crude death rate fails to constitute a reliable instrument for measuring a population's mortality, wellbeing, or quality of life.

According to Rabbi (2013, 479), life expectancy at birth is a commonly adopted composite metric quantifying health and longevity. Klenk et al. (2007, 587) advocate that life expectancy represents an increasingly understandable and practical aggregate measure of mortality compared to fatality levels. Consequently, life expectancy at birth significantly and reliably predicts the community's general health. Sharma (2018, 1-2) advocates that despite being multifaceted, life expectancy represents the most often used measure of assessing citizens' health. It was contended that the definition of optimal health includes several socio-economic prerequisites, including improving living circumstances, eliminating unemployment and instability, and ameliorating educational levels. Additionally, a population's life expectancy at birth encompasses mortality trends spanning every stage of life, prevalent among infants, youth, and grown-ups, including older adults (WHO 2014). According to theoretical and empirical findings, mortality rates have historically been significantly influenced by anticipated adjustments in life expectancy at birth (Miladinov 2020, 1-2).

4.5 Global Trends of the Demographic Indicators

4.5.1 Global Trends of Fertility Rate (FERT)

Figure 4.1 depicts the fertility rate (FERT), averaged across nations belonging to various stages of their ageing transition across six decades, from 1960 to 2020. Globally, fertility rates have fallen roughly from about 4.6 live births per woman in 1960 to approximately 1.87 in 2020. On average, the Aged nations that transitioned to Super-Aged nations had comparatively the lowest fertility rate in 1960 compared to other nation categories, which stood at around 2.5 live births per woman and declined to around 1.57 live births per woman in 2020, witnessing the lowest decline by around 0.93 live births across the six

decades. The Ageing nations that transitioned to Aged nations also had relatively low fertility rates in the 1960s (around 3.44 live births per woman) compared to nations in the initial stages of their ageing transition. On average, the sharpest decline over the six-decade period, by around 4.03 live births, was experienced by nations transitioning from Potentially-Ageing to Ageing from 5.81 live births per woman in 1960, which reduced to 1.78 in 2020, closely followed by a decline of 3.97 live births among the Potentially-Ageing nations from 6.59 live births per woman in 1960 right down to 2.62 in 2020.

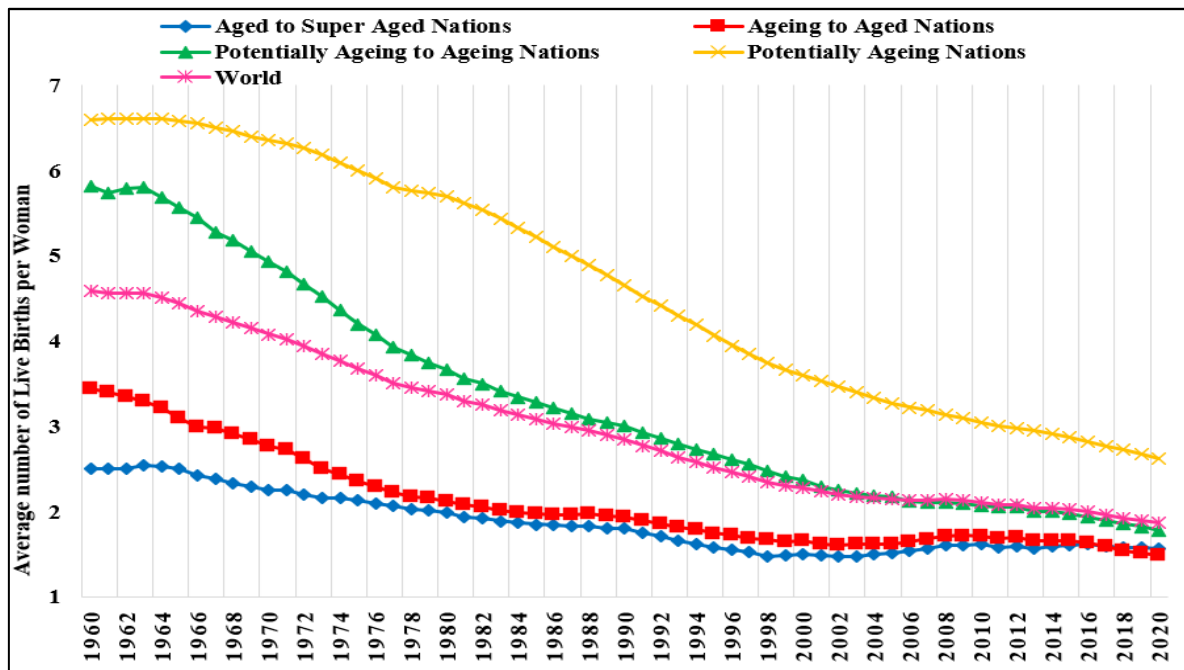


Figure 4.1: Total Fertility Rate (FERT), 1960-2020

Source: Author compilations from UNDESA Population Division, *World Population Prospects: 2022*

4.5.2 Global Trends of Life Expectancy at Birth (LEXP)

The average worldwide life expectancy rose from approximately 60 years in 1960 to about 77 years in 2020, showcased in Figure 4.2. Moreover, looking at each nation category separately, we find a similar trend of rising life expectancy across the six decades. For instance, the average life expectancy trends of nations in the advanced stages of transition almost overlapped across the six decades. It grew from around 67 years in 1960 to around 79 years in 2020 among the Aged to Super-Aged nations, while the same in the Ageing to Aged countries was from 66 years in 1960 to almost 80 years in 2020, roughly around a 12 to 14-year increase. In comparison to these nations, though the Potentially-Ageing to Ageing nations and the Potentially-Ageing nations had relatively lower but rising life expectancy, it was the former category that experienced the sharpest rise in average life

expectancy by around 20 years from around 57 years in 1960, it rose to about 77 years in 2020. On the other hand, the latter nations witnessed an average rise of 11 years across the six decades, from around 49 years in 1960 to around 60 years in 2020. Thus, life expectancy is increasing in advanced and developing nations.

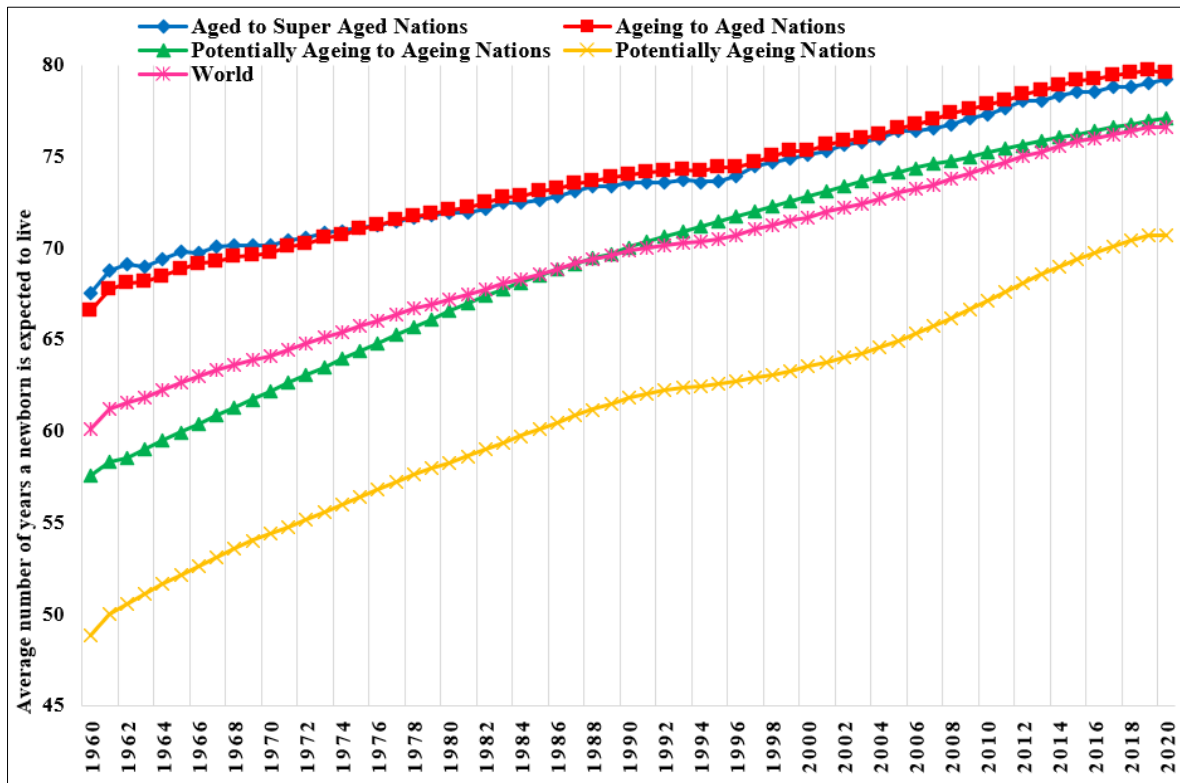


Figure 4.2: Life Expectancy at Birth (LEXP), 1960-2020

Source: Author compilations from UNDESA Population Division, *World Population Prospects: 2022*

4.5.3 Global Trends of Net Migration Rate (MIGR)

Figure 4.3 showcases the fluctuations in the average MIGR experienced across the six-decade period. The Aged to Super-Aged nations have continuously experienced positive and negative phases in their average net migration rate from 1960 to 2020, a positive rate indicating a greater influx of immigrants, while a negative rate highlighting a larger outflow of emigrants from these nations. However, though the Ageing to Aged nations initially witnessed variations in their average net migration rate, post-1999, a continuous positive trend in the same was witnessed. On the other hand, the Potentially-Ageing to Ageing nations demonstrated a continuous negative trend right up to the year 2005, following which their average net migration rate turned positive. Interestingly, the Potentially-Ageing nations witnessed a relatively positive average net migration rate right from 1960 to 2017, except for recent years from 2018 to 2020. Thus, globally, the average net migration rate has been relatively positive spanning the six-decade period.

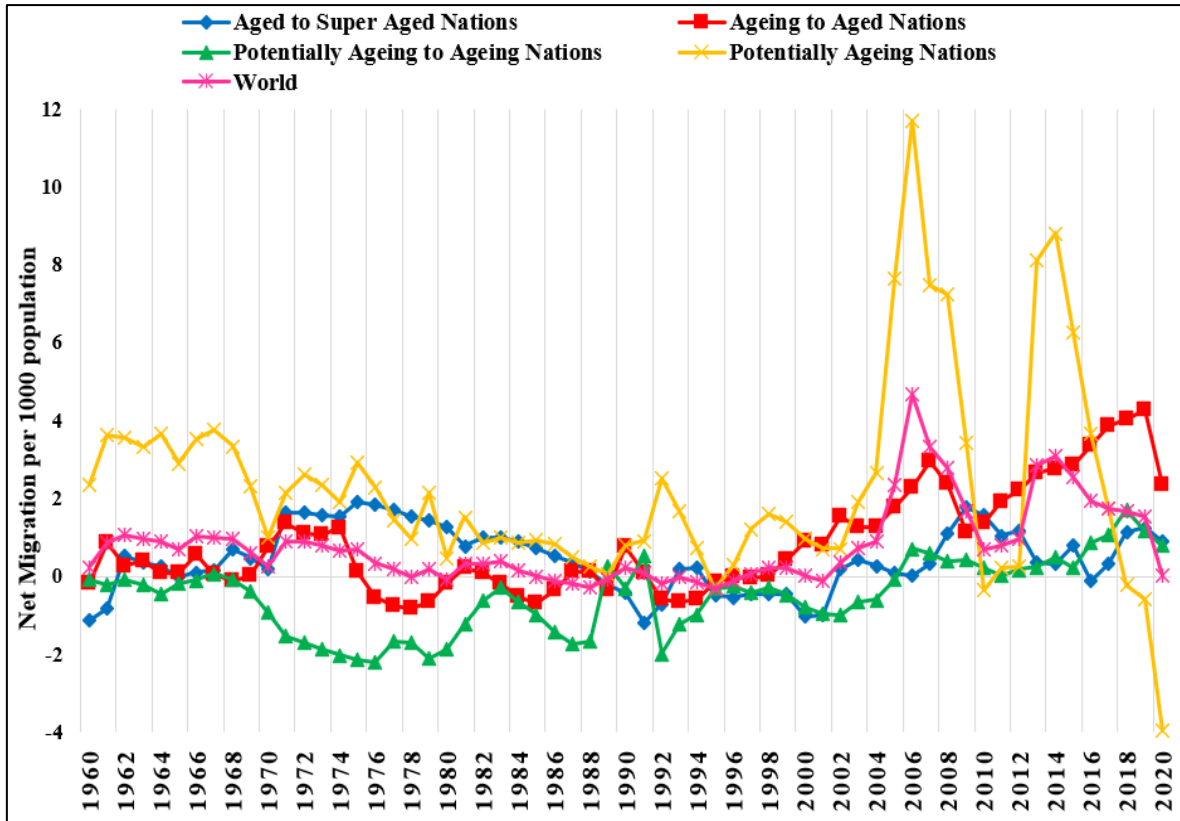


Figure 4.3: Net Migration Rate (MIGR), 1960-2020

Source: Author compilations from UNDESA Population Division, *World Population Prospects: 2022*

Thus, this section presented an overall glimpse into the trends of key demographic variables identified for this study. The next section answers the first research question (RQ1.1) of Objective 1: *What economic theory underpins the three major drivers of population ageing?*

4.6 Economic Theory Underlying Demographic Drivers: A Theoretical Framework

4.6.1 Economic Literature Underpinning Fertility

Among the fertility theories of the Chicago/Columbia School, the *Simple Model* of Gary Becker (1960, 209-210) posits the conventional economic paradigm for comprehending fertility as the Demand for Children. Thus, within a two-good, fundamental neoclassical utility (U) maximising paradigm, the number of offspring is akin to consumer goods. Adults decide how many children (n) and goods (Z) to optimise $U = U(n, Z)$ within the constraints of their finances $\pi_c n + \pi_z Z = I$, wherein the price of children (π_c), is determined by the expenses of child raising and indirect opportunity costs, while π_z represents the per-unit price of goods. The relative cost of π_c/π_z affects the demand for

children. There would be less desire for children with a rise in their relative cost, keeping real earnings unchanged. The desire for children grows with a surge in earnings, but if higher income represents higher salaries, the substitution impact may outweigh the income impact, reducing demand for children.

The *Quality of Children*, portrayed by spending on them, is subsequently incorporated as a supplementary parameter to Becker's original approach. Households endeavour to optimise their utility function comprised of the number of children (n), the quality of children (q), and the total number of goods (Z). In his opinion, a trade-off exists between raising additional children of comparatively poorer quality and lesser children having greater quality.

Becker and Lewis (1973, 279) formalised these concepts and developed a version of the *Shadow Price of Children*, accounting for their quantity and quality. The simulation's key finding demonstrates how the two elements are intertwined since their shadow prices are impacted by each other.

Barro and Becker (1989, 481) further broadened this framework in the 1980s to create a *Dynastic Model with Altruism*, in which parents' choices concerning having offspring consider both the utility of their anticipated progeny and their own utility. Parents are considered 'selfish', implying that their personal consumption increases their utility greater than their children's. Given that such an action reflects an intertemporal choice made by a family, rates of interest are highlighted on the supposition that households favour the present and, consequently, undervalue the expenses and rewards accruing to their offspring in future. Fertility is based on the extra child's net anticipated worth. The total quantity of children is influenced favourably by rates of interest and parental benevolence and adversely by the consumption level of their offspring.

Concerning *Maternal Human Capital*, earnings of men and women and human capital are said to rise whilst nations progress economically, according to Galor and Weil (1996, 374). Rising female salaries boost family income, making the rearing of children cheaper. However, this raises the opportunity cost of parenthood. As a result, there are two effects on fertility: a positive income influence and a negative substitution impact. Because of the dominance of the substitution impact, fertility declines. Decreased birth rates result in a smaller populace, increasing the capital-to-worker ratio and boosting development. Consequently, rising economic activity, increased female earnings, female labour participation, and lower fertility levels create a beneficial feedback chain where these factors multiply and sustain one another.

Leibenstein (1974, 458) postulates that individuals belonging to various social strata showcase distinct preferences, such as an inclination for procreation, primarily via comparison and imitation of the purchasing habits and lifestyles of reference categories, what Duesenberry (1949, 28) referred to as *Conspicuous Consumption*, motivated by an analogous need to distinguish oneself from lower social classes.

Easterlin (1966, 131) proposed the *Relative Income Hypothesis*, wherein a family would prefer bearing offspring if materialistic ambitions were modest compared to predicted income. Nevertheless, households find it challenging to nurture children if materialistic desires surpass family means. According to this hypothesis, the number of offspring rises as the relationship between money and material ambitions increases.

Hoffman (1975, 430) proposed the *Value of Children (VOC) Theory*, which views children as intermediate goods. Children could serve as a valuable source of labour, insurance utility, emotional utility, social approval, and esteem. It also suggests that childrearing and childbearing are inextricably linked. It is essential to consider succession, reciprocal contributions, and cohesion among parents and offspring.

The *Wealth Flows Hypothesis* by Caldwell (2005, 721), based on anticipated flows of net wealth over generations, purports that fertility choices are rational. Inter-generational transfers of assets vary across primitive and modern cultures. Unlike industrialised societies where wealth flows from the elderly to future generations, primitive societies favour younger generations over older ones, incentivising parents to raise as many offspring as possible.

Kohler, Billari, and Ortega (2002, 641) coined the *Postponement Transition Theory* to describe the fast rise in average birth rates in European nations from the mid-1990s. The rising average age of motherhood is linked to low fertility because birthing later reduces fertility significantly as the postponement trend expedites. Goldstein, Sobotka, and Jasilioniene (2009, 663) opined that overall fertility reduces by 25% relative to its level before delay if postponement rises by three months each year.

4.6.2 Economic Literature Underpinning Life Expectancy (Mortality)

Contrasted with literature encompassing the Economics of Fertility, the Economics of Mortality cannot claim a comparable degree of intellectual advancement. The Economics of Mortality does not consider how or when individuals choose to die, given that the majority refrain from doing so, excluding those who choose suicide or euthanasia. This branch of Economics determines whether potential economic factors influence alterations

in the share of persons dying at certain ages and evaluates any economic ramifications caused by such mortality variations. A decrease in fatality indicates a drop in age-specific incidences of death and, thus, a concurrent rise in the proportion of persons surviving to later ages. Thus, the economic appraisal of mortality and life expectancy are interrelated.

According to Barro and Sala-I-Martin (2003), there is a link connecting *economic activity and death*, wherein greater per capita GDP levels are linked to reduced mortality and enhanced life expectancy. In his *Preston Curve*, Preston (1975, 231) explored the statistically significant connection involving *per capita national income and life expectancy at birth* spanning numerous nations and during three distinct periods. The curve generally illustrates that as per capita income increases, so does life expectancy. In the initial stages of economic development, when income is relatively low, countries may face challenges in providing adequate healthcare, sanitation facilities, and nutrition. As a result, life expectancy tends to be shorter. However, as a nation progresses economically, it can allocate resources to enhance healthcare infrastructure, education, and public health programs, increasing life expectancy. Amartya Sen (1998, 8) examined mortality rates spanning 1901 to 1960 in the UK and opined that GDP growth did not cause a rise in life expectancy over the era. Instead, he thought it was more logical to attribute the increase in life expectancy to improvements in public funding for social services and the growth and spread of societal views that support '*sharing*'.

Several empirical and analytical works have examined the *impact of declining death rates (or rising life expectancy) on economic growth and human capital investments*. According to Kuznets (1973, 247), a drop in mortality is necessary for current economic progress. Ben-Porath (1967, 352) provided a significant breakthrough by presenting an analogy in which improvements in human capital were essential for economic gain. He noted that extended lifespans render education investments more lucrative as a function of life expectancy. Thus, lower death rates could stimulate economic development.

Concerning *Economic Inequality and Mortality*, Wilkinson and Pickett (2008, 699) suggested that inequality in earnings affects fatality and life expectancy. They discovered that income inequality corresponds to reduced life expectancy and greater mortality rates regardless of degrees of economic activity. Besides, economists have proposed various theories to clarify historical patterns and variations in mortality. The *Epidemiologic Transition* is one of these hypotheses that has gained the greatest traction (Omran 2005, 731). He differentiated between three distinct phases: a time characterised by elevated mortality, featuring a typical lifespan between 20 to 40 years (the era of starvation and

pestilence), followed by the age of falling mortality, coupled with an estimated life expectancy of 50 years (the era of waning pandemics), and a third phase wherein mortality increases, however, at a slower pace till it ultimately plateaus and advances in life expectancy stagnate (the era of man-made diseases). Olshansky and Ault (1986, 355) add phase four (the era of retracted degenerative illnesses) marked by advancing longevity, declining mortality, and rising personal accountability for healthy living.

4.6.3 Economic Literature Underpinning Migration

A widespread perception prevails that a significant immigrant inflow renders the host nation's populace much younger since the demographic makeup of immigrants tends to be younger relative to the native citizens. Therefore, it is generally accepted that a lenient immigration regime could rapidly boost the share of the working-age populace and significantly lower the expenditures associated with caring for older adults.

Iparraguirre (2018, 184-185) argues that *migration is crucial to the inquiry of ageing and economics*. Firstly, migration has the potential to reshape the demographics of the source and host nation. Regional ageing patterns could get strengthened or altered in conjunction with these influxes. Secondly, the demographic makeup of immigrants also impacts the regional economy and the demand for goods and utilities in the host location. For instance, migrant workers with young households might have distinct requirements compared to migrant retirees. Thirdly, contingent on the migrants' socio-economic makeup, migration exhibits various economic effects concerning employment opportunities and productivity, strain on services, financial flows, wage effects, etc.

Literature concerning the *Economics of Working-age-Population-Migration* is best defined by the notable *Dual Labour Market theory* of William Wilson and Michael Piore, explaining the disparities and segmentation within the labour market, emphasising different employment structures and conditions (Piore 1979, 86). As Constant and Zimmermann (2011, 13) noted, microeconomic migration models often presume that enterprises in recipient nations desire to maximise their perks. At the same time, immigrants aim to maximise their welfare, which is usually approximated by earnings or consumption. Aspiring migrants evaluate the disparity between the income earned (or anticipated to be earned) in their country of origin and a couple of countries, considering the expense of relocating and allied expenditures. These approaches concentrate on economic migrants, i.e., people who forsake their homeland and family to relocate for employment and economic possibilities to improve their lives and that of their offspring.

On the other hand, *Migration Economics for people-at-Pensionable-age* concerns the different motives that older people have to migrate compared to younger people. In this vein, De Jong et al. (1985, 41) characterised preserving economic and social connections and adhering to lifestyle objectives as two primary migratory reasons for older individuals related to established social ideas of successful ageing. According to Oehmke, Tsukamoto, and Post (2007, 95), health and recreational facilities are important considerations when deciding where to live. Marjavaara and Lundholm (2016, 228) noted that the desire to move and the destination choice is also influenced by acquaintance with the recipient location, especially in the second-home possession, while Fournier, Rasmussen, and Serow (1988, 245) demonstrated that variations in costs of housing and living standards between the source and destination nations can also have an impact. According to research on fiscal concerns, Duncombe, Robbins, and Wolf (2001, 281) observed that reduced duties on estates, inheritance, earnings, and property entice older migrants. Benson (2009, 121) discovered that certain retirees go to lesser frequented areas in their quest for distinctiveness. The likelihood of residential mobility amongst older persons in Germany is also significantly influenced by life events such as divorce, widowhood, and declining health, as was brought to the fore by Milewski and Loth (2015, 225).

4.7 The Long-term Relation between Demographic Variables and Population Ageing: A Cross-National Empirical Model

In this section, we seek to answer *RQ1.2: Could a statistically significant dynamic long-run relationship exist between the three drivers and population ageing?* We do so by testing for cointegration. Equation (Eq.) 4.1 specifies the relationship between population ageing and its drivers based on theory and previous empirical studies:

$$POPAG_{i,t} = f(FERT_{i,t}, LEXP_{i,t}, MIGR_{i,t}) \quad (4.1)$$

Eq. 4.1 is extended to Eq. 4.2, creating a model that will act as the empirical foundation for the models employed in this section using panel cointegration and dynamic panel data procedures.

$$POPAG_{i,t} = \beta_0 + \beta_1 FERT_{i,t} + \beta_2 LEXP_{i,t} + \beta_3 MIGR_{i,t} + \varepsilon_{i,t} \quad (4.2)$$

4.7.1 Cross-sectional Dependence (CD)

An important issue to address before applying unit root tests is to examine whether the sample data has cross-sectional dependence or independence. For this purpose, we employ the CD test proposed by Pesaran (2021, 13). The CD test results are presented in Table 4.2. Findings show that the null hypothesis of cross-sectional independence is strongly rejected at the 1% significance level for all of the variables (POPAG, FERT, LEXP, and MIGR) and among the global (world) sample, as well as among individual categories of nations at different stages of their ageing transition. We establish that all of our variables have CD.

Table 4.2: Pesaran's Cross-sectional Dependence (CD) test

	POPAG	FERT	LEXP	MIGR
World	251.08***	317.17***	306.57***	14.70***
Aged to Super-Aged nations	91.82***	66.26***	78.00***	11.92***
Ageing to Aged nations	89.41***	76.40***	70.23***	8.57***
Potentially-Ageing to Ageing nations	82.30***	92.36***	88.51***	7.32***
Potentially-Ageing nations	12.46***	88.39***	68.48***	7.13***

*** $p < 0.001$

4.7.2 Panel Unit Root Tests

Analysing the order of integration of variables is crucial prior to doing a cointegration test. However, the conventional unit root tests assume cross-sectional independence and provide weak findings with low power when the series has CD. Therefore, in this study, we apply a second-generation panel unit root test with CD, developed by Pesaran (2007, 265): the Cross-sectionally augmented Im, Pesaran, and Shin (CIPS) panel unit root test, based on the null hypothesis of non-stationarity, i.e. the presence of a unit root.

The results of the Pesaran CIPS unit root test are presented in Table 4.3. The findings on level data indicate that the null hypothesis of non-stationary cannot be rejected even at the 5% significance level for all variables. However, at the first difference, the null hypothesis of non-stationary can be strongly rejected at the 1% significance level for all variables. The CIPS tests are estimated with constant and trend terms with two lags. These findings, therefore, confirm that all of the variables have a unit root at levels and are stationary at their first differences. In other words, all variables are integrated of order I(1). These findings suggest that there may be a cointegration relationship between POPAG, FERT, LEXP, and MIGR.

Table 4.3: Cross-sectionally augmented Im, Pesaran, and Shin (CIPS) Panel Unit Root test

	Variables at Level			
	<u>POPAG</u>	<u>FERT</u>	<u>LEXP</u>	<u>MIGR</u>
World	-2.048	-2.50	-2.392	-2.202
Aged to Super-Aged nations	-2.337	-2.528	-2.513	-2.481
Ageing to Aged nations	-2.232	-2.601	-2.263	-2.271
Potentially-Ageing to Ageing nations	-1.336	-2.570	-2.507	-2.437
Potentially-Ageing nations	-2.090	-2.275	-2.462	-2.774
	Variables at First Difference			
	<u>ΔPOPAG</u>	<u>ΔFERT</u>	<u>ΔLEXP</u>	<u>ΔMIGR</u>
World	-2.665***	-3.927***	-4.438***	-3.202***
Aged to Super-Aged nations	-2.871***	-4.383***	-3.813***	-4.450***
Ageing to Aged nations	-2.897***	-4.769***	-5.845***	-4.303***
Potentially-Ageing to Ageing nations	-2.977***	-4.138***	-4.505***	-4.700***
Potentially-Ageing nations	-2.925***	-3.561***	-3.907***	-4.655***

*** $p < 0.001$

The critical values (constant and trend) of the CIPS (Pesaran 2007) test, based on two lags for the World sample of 72 nations at 1% and 5%, are -2.65 and -2.57, while that for the individual nation categories comprising 18 nations each at 1% and 5% are -2.85 and -2.7

4.7.3 Panel Cointegration Test

The Pedroni test is used to confirm the third estimating phase, which tests for the presence of a cointegrating connection between population ageing and demographic variables. The aforementioned test accommodates deterministic trends and individual effects concerning cross-sectional dependency and heterogeneous panels. Pedroni (1999, 653) suggested panel and group tests for verifying the null hypothesis of no cointegration. The panel tests comprise four statistics, along with their weighted statistics, summing up to eight, while the group tests include three.

Table 4.4 displays the statistical findings of the panel cointegration test. Separate tests have been conducted for all the countries comprising the World and among each category of nations belonging to their respective ageing transition. Out of the eleven statistics, a total of six statistics are highly significant at the 1% level in the cases of the World, Ageing to Aged nations, and Potentially-Ageing nation categories, sufficient to indicate the existence of cointegration, causing us to disprove the null hypothesis that cointegration does not exist, as documented in the work of De Santis and Salinari (2023, 1723) and Siqueira Lobo and Falleiro (2024a)¹. Besides, among the Aged to Super-Aged and Potentially-Ageing to Ageing nations, eight test statistics were very significant at the 1% level, indicating the existence of a strong statistically significant cointegrating relation between the three drivers and population ageing.

Answering RQ1.3 regarding *which of the three drivers has reigned superior in driving the global greying of nations* demands an estimation of the equilibrium relation over the long term. However, when used on a cointegrated panel, the OLS estimator turns biased and unstable. Hence, FMOLS and DOLS were employed.

Table 4.4: Heterogenous Pedroni Cointegration test

Test Statistic	World	Aged to Super-Aged nations	Ageing to Aged nations	Potentially- Ageing to Ageing nations	Potentially- Ageing nations
Panel v-Statistic	-0.676 (0.751)	-0.337 (0.632)	-0.456 (0.676)	-0.389 (0.642)	-2.081 (0.981)
Panel rho-Statistic	-9.699 (0.000)	-8.765 (0.000)	-4.584 (0.000)	-6.221 (0.000)	-5.598 (0.000)
Panel PP-Statistic	-13.632 (0.000)	-10.995 (0.000)	-7.301 (0.000)	-8.843 (0.000)	-7.873 (0.000)
Panel ADF-Statistic	1.278 (0.899)	-2.952 (0.002)	3.808 (0.999)	-3.783 (0.000)	2.369 (0.991)
Panel v-Weighted Statistic	-0.873 (0.809)	-0.287 (0.613)	0.215 (0.415)	0.210 (0.412)	-2.723 (0.997)
Panel rho- Weighted Statistic	-3.874 (0.000)	-9.116 (0.000)	-3.988 (0.000)	-4.675 (0.000)	-5.407 (0.000)
Panel PP-Weighted Statistic	-6.660 (0.000)	-11.435 (0.000)	-5.758 (0.000)	-6.243 (0.000)	-8.409 (0.000)
Panel ADF-Weighted Statistic	3.302 (0.999)	-3.851 (0.000)	2.733 (0.997)	-3.962 (0.000)	3.239 (0.999)
Group rho-Statistic	-1.718 (0.043)	-7.999 (0.000)	-3.328 (0.000)	-4.631 (0.000)	-4.973 (0.000)
Group PP-Statistic	-2.102 (0.018)	-10.367 (0.000)	-3.884 (0.000)	-4.734 (0.000)	-7.165 (0.000)
Group ADF-Statistic	10.501 (1.000)	-0.649 (0.258)	7.049 (1.000)	6.129 (1.000)	4.958 (1.000)

Optimal lag length based on the Schwarz Information Criterion; p-value indicated in brackets

4.7.4 Long-Run Cointegration Estimation: FMOLS and DOLS

Table 4.5 presents the FMOLS and DOLS results from 1960 to 2020. Results of both the FMOLS and DOLS tests indicate the existence of robust and substantially significant long-run relations running from all three independent variables - fertility, life expectancy, and net migration - to population ageing. The Adjusted R-squared values are also relatively good in all models. In most cases, the coefficient signs and statistical significance reported by the Panel DOLS tests align with those noted in the Panel FMOLS tests. However, the magnitude of the coefficients of the independent variables are slightly different among the models, resulting in higher adjusted R-squared values in the case of DOLS estimates.

We first analyse the results at the Global (World) level, comprising 72 nations. With regard to the first driver, the fertility rate (and given our prior six-decadal trend analysis of declining fertility in Figure 4.1), the estimation results in Table 4.5 imply that a unit reduction in global fertility rates raises the global proportion of older adults in the total population by around 1.36% (1.05%) based on the FMOLS (DOLS) estimations, thus being the primary driver contributing very significantly to global population greying at the 1% level. Life expectancy at birth is found to be the second highly significant driver influencing global population ageing at the 1% level, with a unit increase in life expectancy leading to around a 0.19% (0.18%) increase in population ageing based on FMOLS (DOLS) estimates. Lastly, though the magnitude of the impact of net migration is found to be relatively low compared to the other two drivers, nevertheless, a rise in global net migration leads to a significant decline in population ageing by 0.03% in the case of FMOLS and DOLS estimations respectively at the 1% and 5% level of significance.

We also investigate *whether variations exist concerning the prominent driving force of population ageing across nation categories transitioning over various ageing stages (RQ1.4)*. Table 4.5 points out that in comparison to the magnitude of the coefficients of life expectancy and net migration, those of fertility are found to exert significantly the strongest influence in driving population ageing across the six decades from 1960-2020, concerning both the FMOLS (DOLS) estimations for the Aged to Super-Aged nations [-5.133 (-4.989)], Ageing to Aged nations [(-1.919 (-1.991))], Potentially-Ageing to Ageing nations [-0.534 (-0.362)], and Potentially-Ageing nations [-0.080 (-0.097)] in most cases at the 1% level of significance. The strongest impact of this force driving population ageing is witnessed among Aged to Super-Aged nations, followed by the Potentially-Ageing to Ageing nations, while fertility declines exerted the lowest impact among Potentially-Ageing nations. Thus, declining fertility rate is the key driver of population ageing, in tune with the findings of Bengtsson and Scott (2011, 164); Coale, Demeny, and Vaughan (1983, 245); Keyfitz (1975, 267); Lee (2011, 569); Lee and Zhou (2017, 285) and Weil (1997, 967). Societal trends such as delayed childbearing contribute to declining fertility rates, exacerbating the effects on population ageing. A decline in fertility contributes to a demographic imbalance characterised by a shrinking proportion of younger individuals relative to older age groups. As birth rates decrease, fewer young people enter the population to replace ageing cohorts, leading to an ageing population. Urbanisation, economic development, and educational attainment correlate with declining fertility due to changes in lifestyles, healthcare, and family structures (Nargund 2009).

Table 4.5: Panel FMOLS and Panel DOLS Results (1960-2020)

Table 4.5: Panel FMOLS and Panel DOLS Results (1980-2020)									
Panel FMOLS Results					Panel DOLS Results*				
Variable	Coefficient	Std. Error	t-Statistic	Prob.	Variable	Coefficient	Std. Error	t-Statistic	Prob.
World									
FERT	-1.355	0.054	-24.971	0.000	FERT	-1.045	0.062	-16.832	0.000
LEXP	0.193	0.003	73.569	0.000	LEXP	0.183	0.003	72.780	0.000
MIGR	-0.027	0.010	-2.598	0.009	MIGR	-0.029	0.014	-2.008	0.045
<i>Adjusted R-Squared: 0.47</i>					<i>Adjusted R-Squared: 0.68</i>				
Aged to Super-Aged nations									
FERT	-5.133	0.267	-19.191	0.000	FERT	-4.989	0.324	-15.422	0.000
LEXP	0.312	0.007	46.410	0.000	LEXP	0.318	0.008	40.463	0.000
MIGR	0.498	0.082	6.0352	0.000	MIGR	0.080	0.041	-1.936	0.053
<i>Adjusted R-Squared: 0.36</i>					<i>Adjusted R-Squared: 0.69</i>				
Ageing to Aged nations									
FERT	-1.919	0.151	-12.684	0.000	FERT	-1.991	0.154	-12.957	0.000
LEXP	0.210	0.005	45.289	0.000	LEXP	0.217	0.004	52.114	0.000
MIGR	0.110	0.024	4.555	0.000	MIGR	0.171	0.021	8.069	0.000
<i>Adjusted R-Squared: 0.57</i>					<i>Adjusted R-Squared: 0.75</i>				
Potentially-Ageing to Ageing nations									
FERT	-0.534	0.051	-10.412	0.000	FERT	-0.362	0.065	-5.553	0.000
LEXP	0.109	0.003	40.063	0.000	LEXP	0.107	0.003	41.018	0.000
MIGR	-0.019	0.016	-1.205	0.228	MIGR	-0.012	0.017	-0.732	0.465
<i>Adjusted R-Squared: 0.49</i>					<i>Adjusted R-Squared: 0.62</i>				
Potentially-Ageing nations									
FERT	-0.080	0.037	-2.153	0.031	FERT	-0.097	0.037	-2.610	0.009
LEXP	0.017	0.008	2.084	0.037	LEXP	0.025	0.009	2.594	0.009
MIGR	0.004	0.003	1.370	0.171	MIGR	0.006	0.000	-1.973	0.048
<i>Adjusted R-Squared: 0.69</i>					<i>Adjusted R-Squared: 0.83</i>				

*The Schwarz Information Criterion determines the number of lags and leads in the case of DOLS.

The second most influential driver of population ageing by order of magnitude of the impact is rising life expectancy owing to highly significant positive estimated FMOLS (DOLS) coefficients, in most cases at the 1% level for the Aged to Super-Aged [0.312 (0.318)], Ageing to Aged [(0.210 (0.217)], Potentially-Ageing to Ageing [0.109 (0.107)], and Potentially-Ageing nations [0.017 (0.025)]. The strongest impact exerted by rising life expectancy in driving population ageing is witnessed once again among the Aged to Super-Aged nations. A rise in life expectancy alters the shape of the population pyramid, typically transforming it from a pyramid with a broad base (indicating high birth rates and high mortality rates at younger ages) to a more rectangular or even an inverted pyramid (indicating lower birth rates and longer lifespans). This shift reflects a larger proportion of older individuals relative to younger ones, thereby contributing to population ageing (Chen 2023, 1).

An interesting finding about net migration is that while analysing its influence across nations at various stages of their ageing transition, a mixed impact was witnessed owing to fluctuations in migratory trends; nevertheless, net migration had the lowest influence among all four sub-samples at different transition stages based on the FMOLS/DOLS coefficients, though at varying significance levels. As in the case of a global negative impact, a similar impact is found among the Potentially-Ageing to Ageing nations [-0.019 (-0.012)]; however, being statistically insignificant. Contrarily, among Potentially-Ageing nations, while net migration exerted an insignificant positive impact on population ageing based on FMOLS estimations (0.004), the results were significant based on the DOLS estimations (0.006) at the 5% level. Opposed to this, a rise in net migration exerts a significantly positive impact on population ageing among the Aged to Super-Aged [0.498 (0.080)] and Ageing to Aged nations [0.110 (0.171)], respectively.

Though uniformity is noticed concerning the signs of the estimated coefficients of fertility (having a negative sign) and life expectancy (having a positive sign) across the global sample as well as the sub-samples of nations at different ageing transition stages, the intriguing feature noticed concerning changes in the signs of net migration across the sub-panels deserve further elucidation, with the positive coefficient sign of net migration questioning the ‘Rejuvenating Role of Migration’ (Harper 2016, 185-187). Given that the net migration rate denotes the total number of immigrants minus the total number of emigrants, the net migration rate turns positive when the number of immigrants is higher and negative when the number of emigrants is higher. We draw evidence from a report published by the Global Commission on International Migration (GCIM 2005, 83) in Geneva, entitled *Migration in an Interconnected World: New Directions for Action*, which highlighted that in 2005, there were nearly 200 million migrants internationally, around 60% of whom were residing in developed countries, while the other 40% in developing countries. The report also acknowledged that almost one in every 10 persons living in developed countries is a migrant. Analysing these findings in the context of our study, which revealed that developed regions are primarily those in the advanced stages of the ageing transition, clarifies the reason for the change in coefficient signs of net migration. Given that developed nations have a higher share of elderly in the total population accompanied by a relatively higher net migration rate, points to the positive direction of the relation, resulting in a significantly positive sign for the net migration coefficients in Aged to Super-Aged nations and Ageing to Aged nations in case of both FMOLS/DOLS estimations.

In contrast, nations at the initial stages of the ageing transition, typically identified to be developing economies, more often than not witness a higher emigration of their population, accompanied by an increasing share of their elderly over the six decades, though at a slower pace. This justifies the negative sign observed among Potentially-Ageing to Ageing nations. Nevertheless, this finding is not significant, highlighting the fact that the net migration rate is dependent on the stringency of immigration/emigration policies of the nations under study. As indicated in the above-mentioned report, developing countries also serve as destination countries for 40% of international migrants. Many Potentially-Ageing nations in our study do not have very stringent immigration policies and are recipients of immigrants, thus resulting in positive net migration rates. At the same time, they have been experiencing a rise in their elderly population over six decades, leading to a positive relation between the two variables, and thus a positive sign, the significance of which has been adequately captured by the robust DOLS regression estimation, owing to the use of leads and lags, as opposed to the FMOLS estimation. Thus, the relatively higher rates of population ageing and net migration have resulted in a stronger influence experienced by the developed nations at the advanced stages of the ageing transition compared to their counterparts at the initial stages, in tune with discussions on variations in the moderating and converging factor in the ageing of nations (Backman and Karlsson 2023, 922).

4.8 Future Scenario of Demographic Phenomena

Based on the projections of the UNDESA (2022), Figure 4.4 depicts global forecasts of the aforementioned demographic phenomena averaged across nations belonging to various stages of their ageing transition across the ensuing three decades, from 2020 to 2050.

Figure 4.4.1 depicts a sharply rising global phenomenon of population ageing from 13% of the elderly in the total populace in 2020, rising to 16.21% by 2030, right up to 22.43% by 2050. Projections indicate that this surging phenomenon will be experienced by all nation categories belonging to different stages of their ageing transition. By 2050, this share will continue to remain the highest among the nations that transitioned from Aged to Super-Aged, reaching up to 30.25% on average, subsequently followed by the nations that transitioned from being Ageing to Aged, which are projected to further transition to Super-Aged nations approximately by the year 2029, with slight variations across nations, with their share of older adults on an average reaching 26.90% by 2050. The nations that transitioned from Potentially-Ageing to Ageing nations are further projected to transition

to Aged nations by 2032, having an elderly population share on an average of around 14.26% and to Super-Aged nations with an average population of around 20.33% by 2048. The Potentially-Ageing nations are projected to transition to Ageing nations on an average by the year 2033.

According to Figure 4.4.2, globally, average fertility rates are expected to fall from around 1.88 live births per woman in 2020 to 1.79 in 2030 and approximately 1.72 by 2050. This global trend of declining average fertility rates corresponds to the nations that are currently in their transition from being Potentially-Ageing to Ageing, including the Potentially-Ageing nations, which are also projected to face fertility rate declines on an average from 1.80 live births per woman in 2020 to 1.67 by 2050 in the case of the former, and from 2.66 live births per woman in 2020 to 1.99 by 2050 in the case of the latter. However, the Aged to Super-Aged nations are projected to start witnessing a rise in their average fertility rates from 1.53 live births in 2020 to 1.57 by 2030, further rising up to 1.60 by 2050. A similar phenomenon holds true in the case of Ageing to Aged nations, where average fertility rates are projected to rise from 1.47 live births in 2020 to 1.53 by 2030, further up to 1.59 by 2050.

Life expectancy at birth (Figure 4.4.3) is projected to rise gradually from 2020 to 2050, both globally and across ageing transition stages, with the highest average life expectancy projected for the nations that are currently at their Aged to Super-Aged transition phase. For instance, the average years a newborn is anticipated to live in nations currently at their Aged to Super-Aged transition will be about 84.48 years by the year 2050, followed by those transitioning from Ageing to Aged (84.02 years), Potentially-Ageing to Ageing (82.05 years), and the Potentially-Ageing nations (76.71 years).

Figure 4.4.4 projects that most of the Aged to Super-Aged nations and the Ageing to Aged nations (earlier highlighted as developed nations) will witness an influx of immigrants, leading to projections of a positive net migration rate for most of the period from 2020 to 2050. By contrast, nations currently transitioning from Potentially-Ageing to Ageing and the Potentially-Ageing nations are projected to witness a negative net migration rate owing to a larger outflow of emigrants from these nations.

Figure 4.4: Future Projections of Demographic Phenomena (2020-2050)

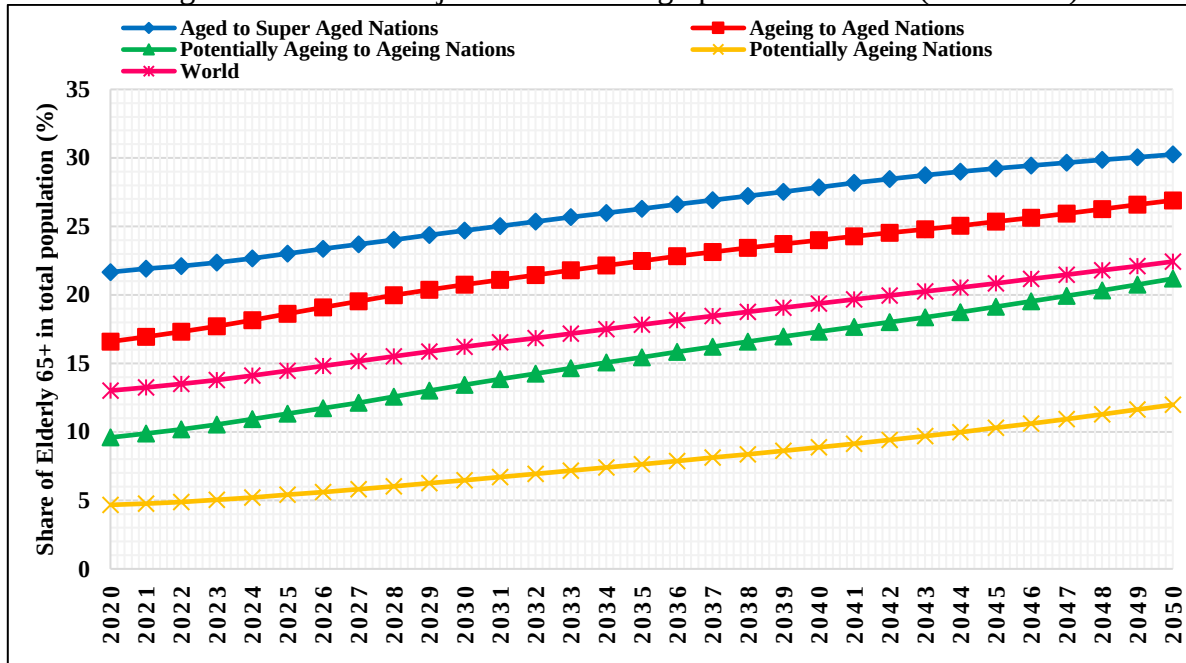


Figure 4.4.1: Population Ageing (POPAG), Future Projections (2020-2050)

Source: Author compilations from UNDESA Population Division, World Population Prospects: 2022

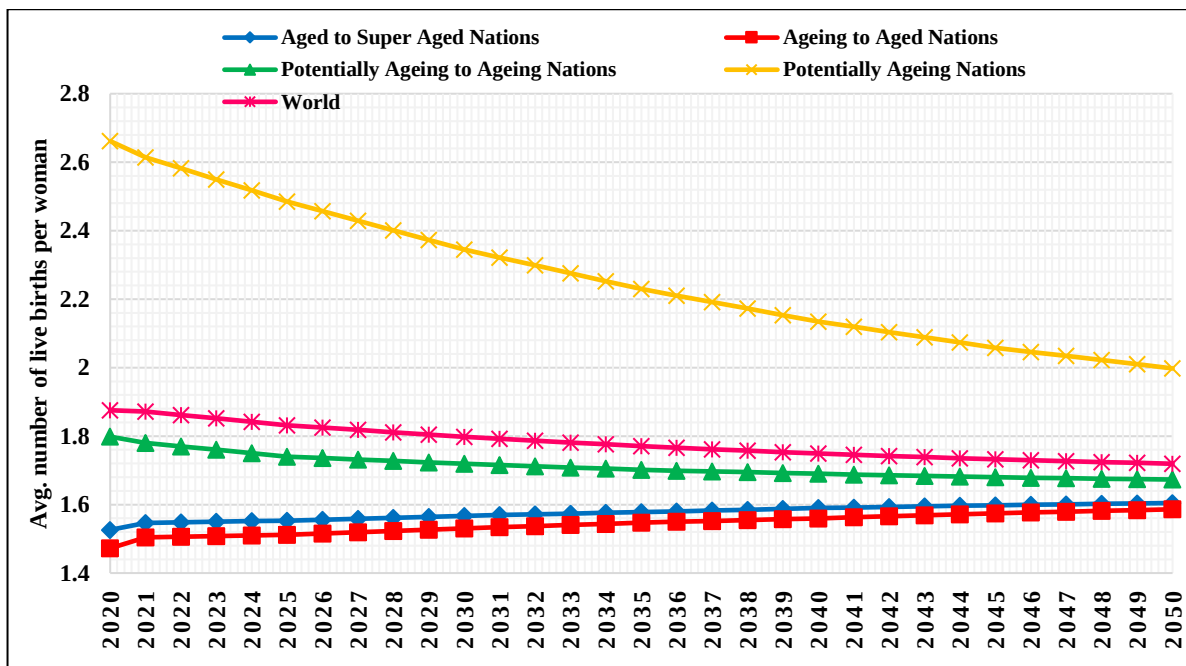


Figure 4.4.2: Total Fertility Rate (FERT), Future Projections (2020-2050)

Source: Author compilations from UNDESA Population Division, World Population Prospects, 2022

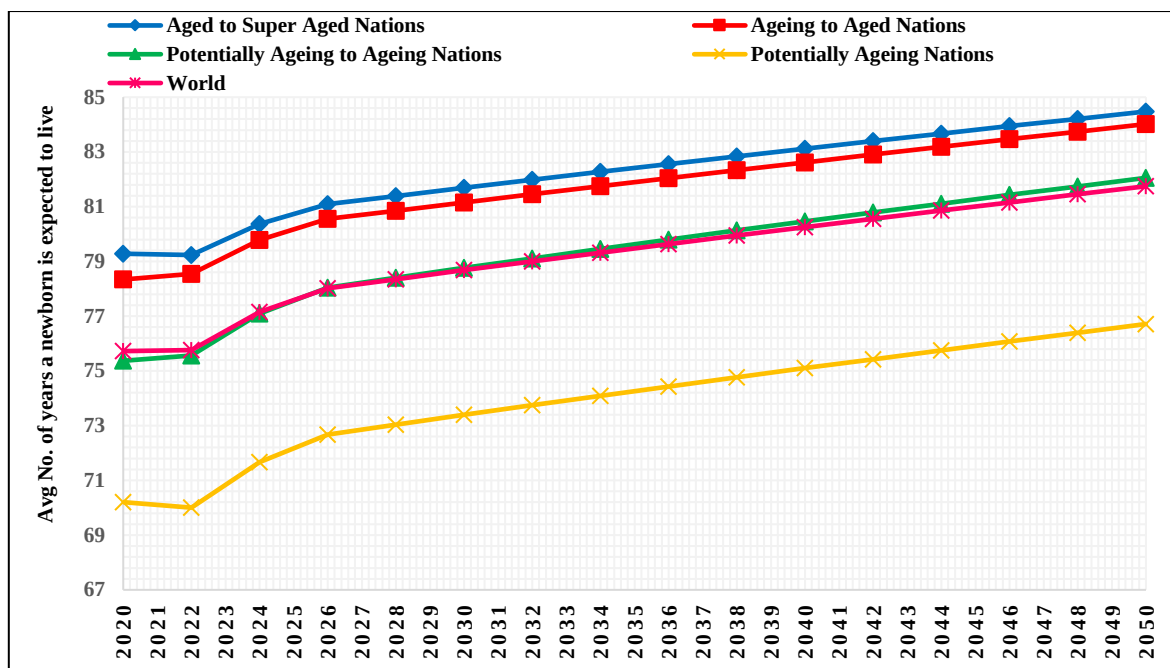


Figure 4.4.3: Life Expectancy at Birth (LEXP), Future Projections (2020-2050)

Source: Author compilations from UNDESA Population Division, World Population Prospects, 2022

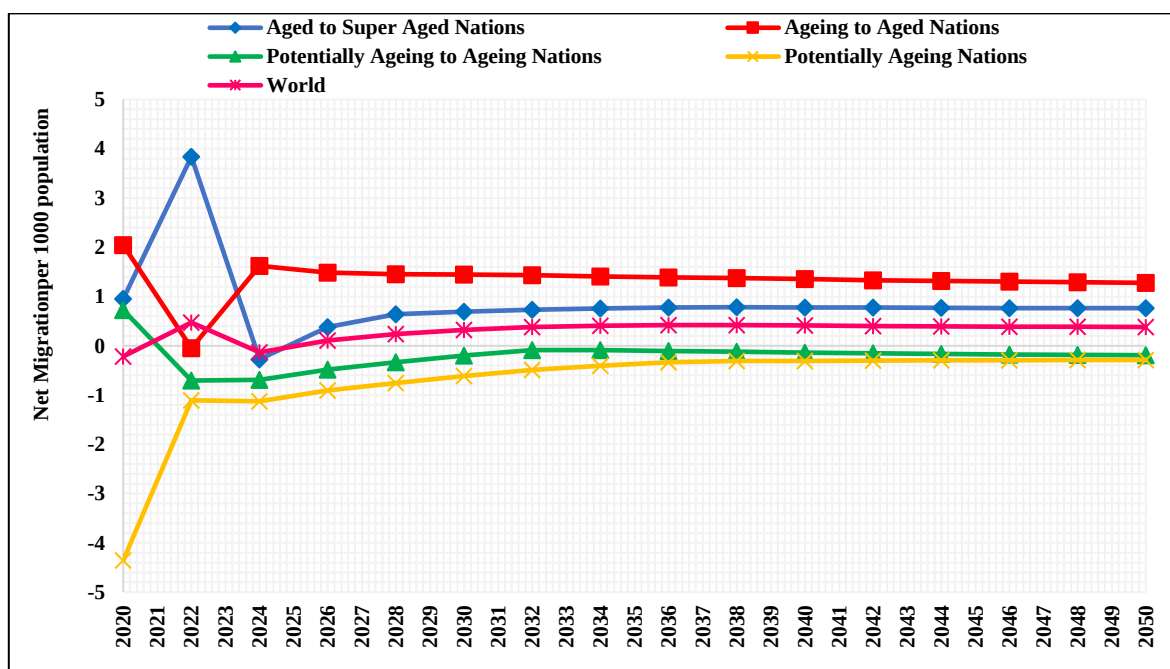


Figure 4.4.4: Net Migration Rate (MIGR) Future Projections (2020-2050)

Source: Author compilations from UNDESA Population Division, World Population Prospects, 2022

Given the projections of continued population ageing in the future, we attempt to investigate RQ1.5: What will be the driving force channelling global population ageing in the future? Table 4.6 provides an overview of the FMOLS and DOLS findings for the entire sample of 72 nations taken together over the period 2020-2050, aimed at examining which demographic driver will primarily be driving future population ageing. The number

of lags and leads for DOLS estimations have been determined by the Schwarz Information Criterion. The coefficients of fertility rate are significantly negative according to the FMOLS (DOLS) estimates [-0.739 (-0.856)] at the 1% and 5% significance level, respectively, implying that a reduction in fertility raises the proportion of older adults, thus being a significant contributor in driving future population ageing. However, taking a look at the estimated coefficients of life expectancy reveals that rising life expectancy at birth surpasses fertility rates to become the primary driver of global future population ageing according to the FMOLS (DOLS) estimates [1.960 (2.079)], thus very significantly increasing population ageing at the 1% level, owing to significant advancements in healthcare, nutrition, sanitation, and lifestyle factors. Finally, an increase in net migration rate is also found to have a highly significant and positive influence on population ageing in the future [0.269 (1.159)], higher in magnitude compared to the impact it exerted over the prior six decades. This presents a pivotal contribution to the economic analysis of demographic drivers, as rising life expectancy (declining mortality rates) will outweigh reductions in fertility rate, thus becoming the leading driver responsible for the greying of nations in the coming decades. Hence, a need arises for nations to focus on ensuring the ‘*Healthy*’ Life Expectancy (*HLE*) of their population, i.e., the average number of years an individual can live in good health, devoid of significant illness/disability.

Table 4.6 Panel FMOLS and DOLS Results (2020-2050)

Panel FMOLS Results					Panel DOLS Results*				
Variable	Coefficient	Std. Error	t-Statistic	Prob.	Variable	Coefficient	Std. Error	t-Statistic	Prob
World (2020-2050)									
FERT	-0.739	0.207	-3.573	0.000	FERT	-0.856	0.406	-2.109	0.035
LEXP	1.960	0.038	52.114	0.000	LEXP	2.079	0.054	38.343	0.000
MIGR	0.269	0.035	7.711	0.000	MIGR	1.159	0.091	12.648	0.000
<i>Adjusted R-Squared:0.62</i>					<i>Adjusted R-Squared:0.88</i>				

*The Schwarz Information Criterion determines the number of lags and leads in the case of DOLS.

Analysis of the signs of the estimated coefficients of the drivers of future population ageing (being as expected and in line with prior findings for fertility and life expectancy) once again draws our attention towards the positive coefficient of net migration as opposed to the negative coefficient found for the global (world) sample for the period 1960-2020 in Table 5, reaffirming our argument, questioning the rejuvenating role of migration and pointing towards an emerging phenomenon of ‘Elderly Migration’. Discussions surrounding migration have been marred by *Ageism*, characterised by a predominant focus

on pervasive presumptions that migrants are predominantly youthful adults. However, elderly individuals, hitherto neglected, are also engaged in migration and developmental processes across various geographical settings (Bastia et al. 2022, 1009).

Our findings are in consonance with the outstanding contributions of a handful of exceptional studies. For instance, Zaiceva (2014, 4) demonstrates that following a decline at the age of 30, there is a subsequent peak of migration among older individuals, particularly upon retirement, indicative of *Return Migration*. She convincingly asserts that population ageing, advancements in healthcare facilities, and retirement provisions are precipitating an uptick in elderly migration, including return retirement migration, along with the mobility of specialised workers such as healthcare and long-term care providers. Notably, she observes that the demographic of elderly individuals (aged over 65) among international migrants constitutes a significant proportion, totalling approximately 26 million or 11.1%. This demographic is more pronounced in developed regions (13%) compared to developing regions (8%), with Europe and Oceania registering the highest percentages. While the majority of international migrants relocate from less to more developed nations, there exists a notable presence of elderly migrants, with Canada, Australia, and New Zealand already exhibiting proportions nearing those of working-age migrants. These countries, alongside Switzerland, encompass regions with the highest proportions of migrants aged over 65 within the overall population, reflecting historical migration trends, prior influxes, and lower proportions of native elderly populations.

In another compelling article demystifying three economic myths surrounding ageing, Murray and van Onselen (2019, 12) assert that the notion of high immigration as a panacea for population ageing is fallacious. They argue that while low immigration can help stabilise the age structure and mitigate population decline, high immigration offers minimal long-term benefits beyond increasing the overall population size. This approach poses significant challenges for the future, particularly as ageing results from extended lifespans and immigrants themselves age at the same rate as the native population. Furthermore, Bermingham's (2001, 355) seminal research suggests that while immigration may address population decline, it is not a solution for population ageing. In tune with the assertions of Murray and van Onselen (2019, 12), he also contends that immigrants, like all mortals, undergo ageing processes. The sheer magnitude of immigrants required to counterbalance declines in the ratio of working-age populations to the elderly is prohibitively high, rendering annual figures untenably excessive for serious consideration.

4.9 Summary

This chapter discerned the relative significance of three pivotal drivers of contemporary and future population ageing: fertility rates, life expectancy, and net migration. As societies transition demographically, the dynamics among these ageing determinants undergo a transformative shift. Traditional paradigms, including the stable population model, experience varying degrees of diminishment in their explanatory and prognostic efficacy. Consequently, there arises a requisite for novel methodologies capable of elucidating the intrinsic interconnections and the stability of these associations via robust and dynamic estimations. In light of the fact that the ageing stages, Super-Aged, Aged, and Ageing, are not water-tight compartments but rather represent phases of transition, across which nations evolve from one to another over decades, the present study incorporates this aspect by classifying nations into ageing transition stages. It goes a step ahead to define a fourth category, the Potentially-Ageing nations, to include several nations at the initial stages of the transition that have been excluded from analysis in prior studies.

This chapter unravelled that while global fertility rates have fallen since 1960, longevity rates have been soaring. Nations in advanced ageing transitions, which primarily encompass developed nations, witnessed comparatively lower fertility and higher life expectancy than their counterparts in the early stages. At the same time, fluctuations in net migration were observed. Reasons underpinning the trends behind the three major drivers of population ageing were identified through the prism of an economic theoretical framework. A highly statistically significant long-run dynamic cointegrating relationship between the three major demographic variables and cross-national population ageing was identified in the global panel and in each of the four transition categories. Declining fertility was found to have reigned superior in very significantly driving population ageing over the six decades (1960-2020) in the global panel, followed by life expectancy and, lastly, net migration. Across the four categories of nations at different ageing transitions, the order of influence of the drivers was found to be the same, with declining fertility being the predominant driver.

Projections up to the year 2050 indicate the sharply rising global phenomenon of population ageing will continue to be a reality in ensuing decades as nations progress further towards advanced stages of ageing transition. Nevertheless, though global fertility rates will continue to fall in future, nations in the advanced ageing stages will start experiencing a rise in fertility along with an influx of immigrants, leading to a positive net

migration rate. However, life expectancy will continue to rise among all nations, and estimates indicate that the latter will surpass fertility rates to become the primary driver of global population ageing in future. Our findings are in tune with the predictive arguments set out by Horiuchi (1991, 38), who stated that as life expectancies continue to rise globally, owing to declining mortality, its effects get increasingly concentrated at older ages, while fertility decline becomes limited in extent, indicating that the effect of earlier fertility decline gets wholly played out.

The contradiction in the impact of net migration on contemporary and future population ageing questions the rejuvenating role of migration and spurs the need for investigation into the rising phenomenon of Elderly Migration.

¹ The findings of Siqueira Lobo and Falleiro (2024a) are incorporated into a research paper entitled “Cross-National Empirical Analysis of the Contribution of Fertility, Life Expectancy and Net Migration in Driving Contemporary and Future Population Ageing”, that has been accepted for publication in *Population and Economics*, a SCOPUS indexed journal, on 5th March 2024.

CHAPTER 5: IMPLICATIONS OF POPULATION AGEING ON ECONOMIC GROWTH

The roster of significant global threats in the next century has become extensive and recognisable. It encompasses the spread of nuclear, biological, and chemical weapons, as well as various forms of high-tech terrorism, lethal super viruses, drastic climate change, the economic and political ramifications of globalisation, and the potential for violent ethnic conflicts in today's fragile new democracies. However, there is a less-appreciated challenge—the ageing of the developed world's population—that could potentially have a greater impact on shaping our shared future than any of the aforementioned risks: Peterson (1999, 42).

5.1 Introduction

As noted by Goodhart and Pradhan (2020, 41), the presently compelling challenges of a global ageing population have sparked controversy regarding its macroeconomic ramifications. The economic literature has significantly contributed to unravelling the intricate relationship between ageing and economic growth (Bloom, Canning, and Fink 2010, 583). Despite the plethora of literature examining this timely topic, results remain either inconclusive or controversial, with some indicating that the ageing population has a negative impact on economic growth, while others find that the ageing population has a positive impact, yet others demonstrating differing short and long-run effects, with a few recent exceptions highlighting a non-monotonic relationship. Given that linearity in the relation between population ageing and economic growth is a forerunner, with just a handful of recent studies revealing nonlinearity, it remains largely unclear as to when the adverse impact of an ageing population on economic growth starts to materialise.

By first tracing the historical linkage between the young, old, and working-age populations across nations at different ageing transitions spanning three decades (1990-2019), this chapter lays the crucial foundation for understanding the mechanism underlying the relation between population ageing and economic growth, revealed via Panel Fixed Effect Regressions, incorporating regional and period dummies, and controlling for heteroscedasticity using robust standard errors. Robustness is ensured in our analysis by proxying the OADR for old age share to compare the findings in the two cases. Besides the identification of a nonlinear relation and the threshold level below (above) which the ageing population promotes (hampers) economic growth, this chapter sheds light on the intensification of the negative impact as population ageing deepens via Marginal Effects while finally comparing the impact among developed and developing nations.

5.2 Historical Link between the Young, Old, and Working-age Populace

To best understand this transformation, Figure 5.1 depicts the trends in demographic dynamics encompassing population ageing among the same sample of 72 nations transitioning from Aged to Super-Aged (Figure 5.1.1), from Ageing to Aged (Figure 5.1.2), from Potentially-Ageing to Ageing (Figure 5.1.3), and the Potentially-Ageing nations (Figure 5.1.4). Data is extracted from the World Bank's WDI database from 1990 to 2019. Figures are averaged among nations in each category.

Figure 5.1: Trends in Demographic Variables across Ageing Transition Nation Categories

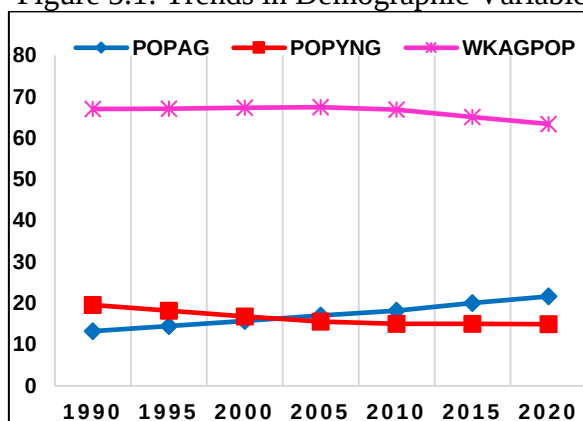


Figure 5.1.1: Aged to Super-Aged Nations

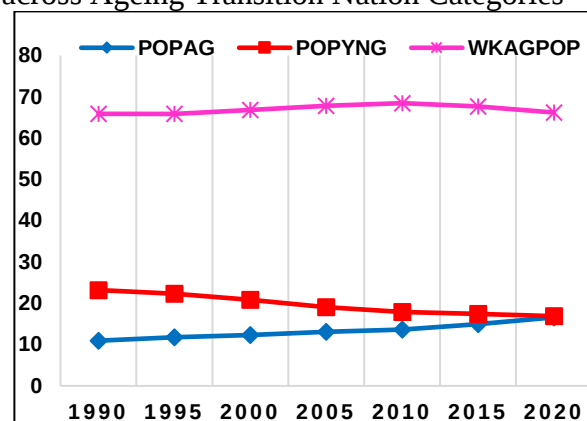


Figure 5.1.2: Ageing to Aged Nations

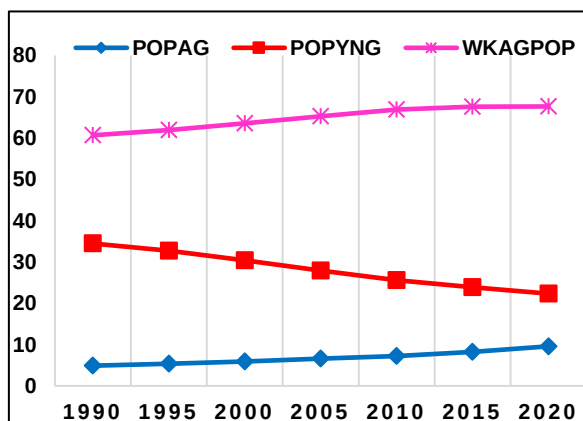


Figure 5.1.3: Potentially-Ageing to Ageing

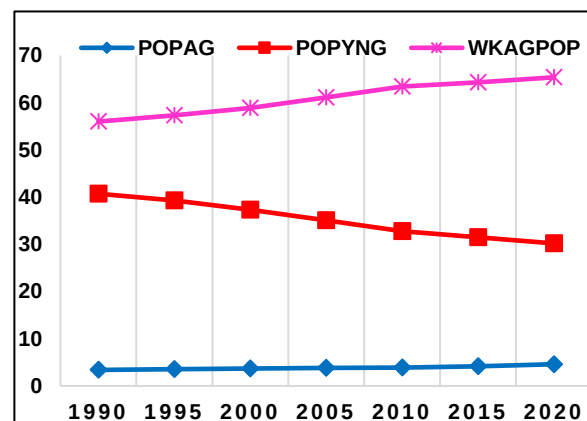


Figure 5.1.4: Potentially-Ageing Nations

Source: Author compilations from UNDESA Population Division, World Population Prospects, 2022

It is assumed that a surge in the percentage of older adults aged 65 and above in the total population (POPAG) will be accompanied by a reduction in the working-age proportion aged 15-59 years (WKAGPOP), adversely affecting economic growth. However, what needs to be borne in mind is that given the expansion of the proportion of older adults, a problem arises only when the combined aggregate percentage of the working-age and young population below 15 years (POPYNG) simultaneously start shrinking. Figure 5.1 showcases that this phenomenon has occurred only among nations at advanced stages of

their ageing transition (and in recent decades). Figure 5.1 exhibits that a rising proportion of older adults among the latter nations was accompanied by a declining young population along with an initially constant (up to the year 2005) and subsequently declining working-age population among nations transitioning from Aged to Super-Aged, with the nations transitioning from Ageing to Aged closely following suite.

Conversely, nations at the initial ageing transition stages face the phenomenon of a growing fraction of older adults, however, paralleled by a rising proportion of working-age people, despite being coupled with a relatively fast-paced declining young population demonstrated in Figure 5.1. Thus, the core issue remains that a larger proportion of the elderly does not consistently equate with a reduced fraction of the working-age populace. Progress towards it is gradual. Figures 5.2.1 and 5.2.2 support this view.

Figure 5.2.1 demonstrates the nonlinear association between the share of older adults (POPAG) and the share of the working-age population (WKAGPOP). A rising percentage of working-age citizens accompanies nations with a lower share of older populations. Nevertheless, as the share of older adults rises beyond a threshold level, the working-age populace starts facing a decline. In contrast, Figure 5.2.2 reveals the linear relation between the share of the working-age (WKAGPOP) and young population (POPYNG). Economies having higher proportions of a young populace have lower shares of working-age individuals.

Figure 5.2: Historical Nonlinear and Linear Scatterplots between Working-Age Population (WKAGPOP) and Shares of the Old (POPAG) and Young (POPYNG) Global Population

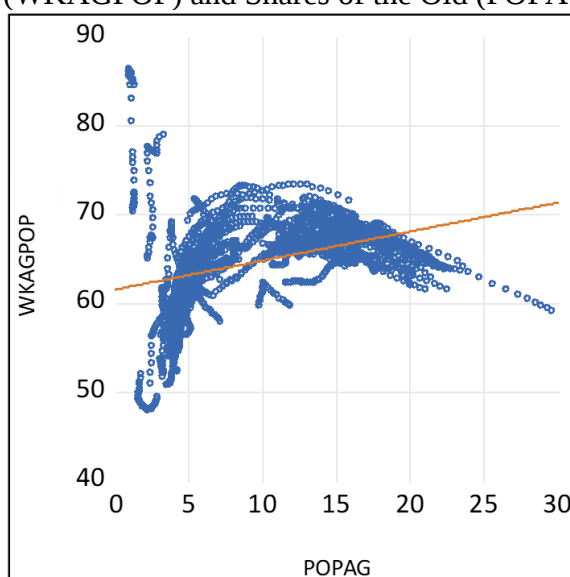


Figure 5.2.1: Nonlinear relation between Working-Age share and Old share

Source: Author compilations, UNDESA Population Division, *World Population Prospects*, 2022

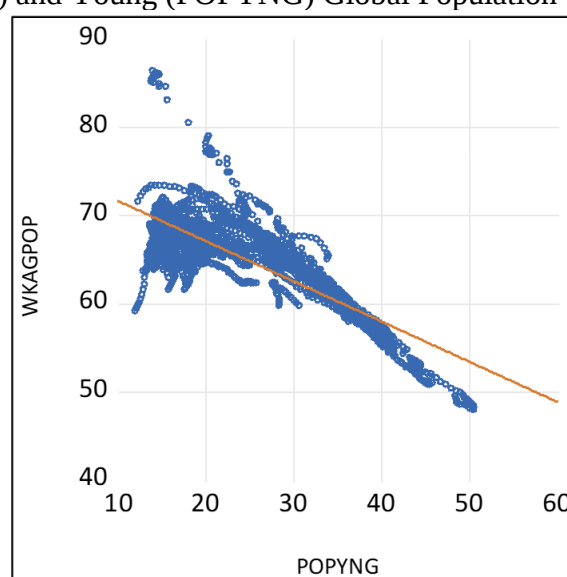


Figure 5.2.2: Linear relation between Working-Age share and Young share

Considering this same sample of nations from another perspective, classifying them based on developed and developing economies reveals that concern is more pronounced in developed economies at present compared to developing ones. However, projections by the UNDESA (2022) suggest that ageing will continue to be a major policy challenge in both categories (see Figure 5.3).

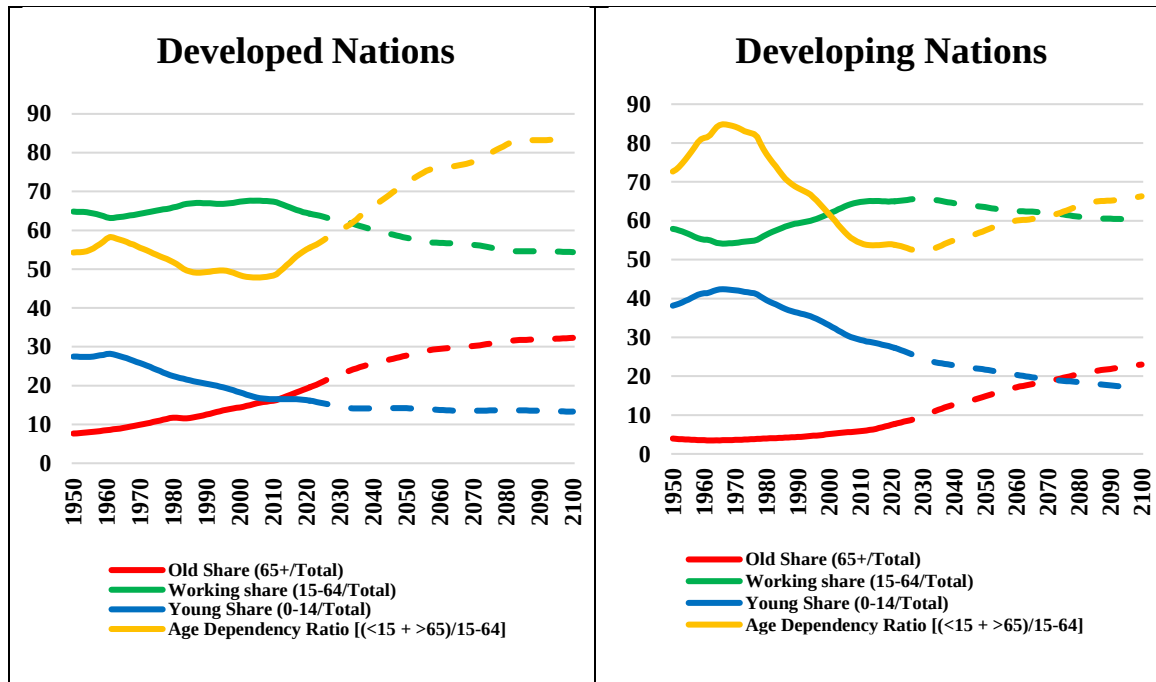


Figure 5.3: Demographic Structure (1950-2021) and Projections (2022-2100) for Developed v/s Developing Economies

Source: Author compilations from UNDESA Population Division, *World Population Prospects*, 2022

5.3 Data and Empirical Specification

To examine the impact of population ageing on economic growth, a dataset has been constructed comprising the same panel of 72 countries (specified in Section 4.2), however spanning three decades (1990 to 2019), owing to data limitations extracted from the Penn World Tables (PWT 10.1), UN Statistics and World Bank's WDI database. In further regressions, these nations have been split into developed and developing nations based on the UN categorisation. As mentioned in Chapter 4, all nations in the advanced stages of the ageing transition are developed nations, except for Barbados and Uruguay, giving us a sample of 35 developed nations, while all nations in the initial stages of the transition are developing economies, except for Israel, giving us 37 developing nations.

Following the augmented-Solow growth framework (Mankiw, Romer, and Weil 1992, 407; Solow 1956, 65), we estimate the following Ageing Population Kuznet's Curve (APKC) model as proposed by Antonakakis and Workie (2023, 3):

$$\begin{aligned}\Delta \ln Y_{it} = & \alpha_0 + \beta_1 \ln Y_{it-1} + \beta_2 \ln K_{it-1} + \beta_3 \ln H_{it-1} + \beta_4 \ln Pop_{it-1} + \gamma_1 POPAG_{it-1} \\ & + \gamma_2 POPAG^2_{it-1} + \gamma_3 \Delta POPAG_{it} + \delta R_i + \zeta_t + \varepsilon_{it} \quad \dots 5.1\end{aligned}$$

where $\Delta \ln Y_{it}$ is the 5-year non-overlapping and consecutive average growth rate of the log of real GDP per capita (PPP) in constant 2017 international dollars (World Bank's National Accounts data) in country i (where $i = 1, 2, \dots, 72$), and time t (where $t = 1990-94, 1995-99, \dots, 2015-19$, i.e. six 5-year non-overlapping sub-periods). For each sub-period, the gap between the initial value and its terminal value represents the growth in each subperiod and is divided by five to get an annual average. Using 5-year non-overlapping average growth rates, we minimise the influence of business cycle fluctuations, which is a common practice adopted in the literature. Previous empirical population ageing-economic growth models have also used per capita GDP growth rate as a proxy for economic growth (Antonakakis and Workie 2023; Bayar and Karamikli 2021; Kiziltan 2021; Lee and Shin 2019; Oliver 2015; Papapetrou and Tsalaporta 2020).

α_0 is a constant. The lag of $\ln Y_{it}$ is included to account for conditional convergence and avoid potential endogeneity. All independent variables (apart from those in first differences) are included in their first lag to capture the effects of initial values and avoid potential endogeneity (Antonakakis and Workie 2023, 3; Lee and Shin 2019, 7). Turning to our main variables of interest, $POPAG_{it-1}$ and $POPAG^2_{it-1}$ denote our ageing population measure, the former capturing the long-run relation at level, while the latter is incorporated to capture the nonlinear relation via the quadratic term. Population ageing is proxied by (a) The share of older adults in the population ($POPAG_{it-1}$): the percentage of population aged 65 and over in the total population (as in Eq. 5.1), and (b) Old age dependency ratio ($OADR_{it-1}$): i.e., the percentage of older adults aged 65 and over to the working-age population aged 15-64 and its square term ($OADR^2_{it-1}$), respectively (Eq. 5.2). $\Delta POPAG_{it}$ denotes the first difference of our ageing proxy capturing any potential short-run effects of an ageing population on economic growth. Both $POPAG_{it-1}$ and $OADR_{it-1}$ have been extracted from the UN database. We have also presented the impact of the share of the working-age population (WKAGPOP) on economic growth in terms of the linear/nonlinear relationship to provide a comparative analysis (Eq. 5.3).

$$\begin{aligned}\Delta \ln Y_{it} = & \alpha_0 + \beta_1 \ln Y_{it-1} + \beta_2 \ln K_{it-1} + \beta_3 \ln H_{it-1} + \beta_4 \ln Pop_{it-1} + \gamma_1 OADR_{it-1} \\ & + \gamma_2 OADR^2_{it-1} + \gamma_3 \Delta OADR_{it} + \delta R_i + \zeta_t + \varepsilon_{it} \quad \dots 5.2\end{aligned}$$

$$\begin{aligned}\Delta \ln Y_{it} = & \alpha_0 + \beta_1 \ln Y_{it-1} + \beta_2 \ln K_{it-1} + \beta_3 \ln H_{it-1} + \beta_4 \ln Pop_{it-1} + \gamma_1 WKAGPOP_{it-1} \\ & + \gamma_2 WKAGPOP^2_{it-1} + \gamma_3 \Delta WKAGPOP_{it} + \delta R_i + \zeta_t + \varepsilon_{it} \quad \dots 5.3\end{aligned}$$

$\ln K_{it}$ denotes the log of capital stock at constant 2017 prices in US\$ millions, $\ln H_{it}$ is the log of human capital index based on years of schooling and returns to education while $\ln Pop_{it}$ is the log of total population in millions, all retrieved from Penn World tables v.10.1. R_i is a vector of regional dummy variables based on Penn World tables regional classification comprising Europe, North America, South America, Asia, Africa, and Oceania. Following the works of Eggertsson, Lancastre, and Summers (2019) and Acemoglu and Restrepo (2017), we control for regional dummies as opposed to country fixed-effects due to (a) widespread regional heterogeneity in demographic structure and (b) critiques related to the use of country fixed-effects in cross-country growth regressions (Barro 2015, 911). ζ_t are time-fixed-effects, controlling for time-varying differences in the dependent variable common to countries. ε_{it} is the error term.

5.4 Analysis Procedure

Table 5.1 presents the analysis procedure adopted for appropriate model selection. The LM test has been adopted to assess the suitability of using a REM in comparison to the POLS for each of the three equations (Eq. 5.1: Model 1 with POPAG, Eq. 5.2: Model 2 with OADR and Eq. 5.3: Model 3 with WKAGPOP). In each case, the LM test very significantly rejected the null hypothesis of no random effect (at the 1% significance level), demonstrating that a REM is preferable to a pooled regression.

The Modified Wald test was used to examine group-wise heteroscedasticity, which was found to be very significantly present at the 1% level, the presence of which was controlled for by adopting robust standard errors. Next, to check the appropriateness of the FEM v/s the REM, the Hausman test for post-estimation had to be employed. However, given the use of robust standard errors, the Sargan-Hansen test had to be adopted instead. The findings of the post-estimation test strongly refuted the null hypothesis of the suitability of utilising REM at the 1% level of significance and showed that FEM is preferable over REM.

Table 5.1: Tests for Appropriate Model Selection

	Based on Model (1) with POPAG (Eq. 5.1)	Based on Model (2) with OADR (Eq. 5.2)	Based on Model (3) with WKAGPOP (Eq. 5.3)
Breusch-Pagan LM test	12.06*** (0.0003)	20.63*** (0.0000)	80.32*** (0.0000)
Modified Wald test	1776.88*** (0.0000)	8078.95*** (0.0000)	3172.45*** (0.0000)
Sargan-Hansen statistic	66.05*** (0.0000)	59.67*** (0.0000)	5.17*** (0.0115)

5.5 Empirical Results

5.5.1 The Evidence of Nonlinearities

In an attempt at analysing our second objective, pertaining to the impact of population ageing on economic growth, we seek to answer *RQ2.1: Could there be a significant global inverted U-shaped (nonlinear) relation between economic growth and population ageing?* Results of the FEM estimations on the total sample of 72 countries as outlined in Eqs. 5.1, 5.2, and 5.3 are displayed in Table 5.2. In accordance with the literature, the initial per capita GDP coefficient [-0.043 (Model 1) and -0.040 (Models 2 and 3 respectively)] is negative and highly significant at the 1% level, demonstrating that prosperous nations grow gradually compared to countries with lower incomes. Findings pertaining to the coefficients of the stock of physical capital (0.012, 0.010, and 0.011 in the respective models) are significantly positive, highlighting their positive impact on economic growth in line with the literature. Nations with greater physical capital accumulation have a greater economic growth velocity. In contrast, though the signs of the coefficients of human capital and population are in accordance with prior researchers, they remain insignificant in the present study.

Moving on to our main variables of interest, the findings of Model 1 indicate that the coefficient of the difference term of the share of older adults (0.0259) highlights that in the short-run, a rising elderly population exerts a very significant positive impact on economic growth at the 1% level. However, in the long-run, though the baseline coefficient of old share (0.0033) is positive and significant at the 10% level, its quadratic coefficient (-0.00012) is negative and significant at the 5% level. This suggests that there is a nonlinear relation with a threshold effect: as the share of the elderly in the total population increases, economic growth also increases initially. However, once the elderly population share reaches a maximum limit, it starts having adverse effects on economic growth, suggesting the presence of a non-monotonic relation in the long-run.

Table 5.2: Impact of Ageing Population and Working-Age Population on (5-Year Average Non-Overlapping) Economic Growth (1990-2019)

Variables	(1) GDPpcgr	(2) GDPpcgr	(3) GDPpcgr
Log real GDP per worker	-0.04290*** (0.00757)	-0.04021*** (0.00901)	-0.04022*** (0.00779)
Log Physical Capital	0.012464* (0.00670)	0.01099*** (0.00588)	0.01107** (0.00545)
Log Human Capital	0.011880 (0.01208)	0.01251 (0.01212)	0.01237 (0.01076)
Log Population	-0.018748 (0.01388)	-0.02074 (0.01389)	-0.01034 (0.01332)
Old Share	0.00332* (0.00177)		
Old Share ²	-0.00012** (0.00006)		
Δ Old Share	.025993*** (0.00932)		
Old Dependency		0.00161* (0.00086)	
Old Dependency ²		-0.00004** (0.000019)	
Δ Old Dependency		0.01455*** (0.00489)	
Working Share			0.00540** (0.00267)
Working Share ²			-0.00004 (0.00003)
Δ Working Share			0.00718* (0.00423)
Constant	0.34031*** (0.07463)	0.33136*** (0.07740)	0.12481** (0.17225)
Obs	350	350	350
Number of Countries	72	72	72
Regional Dummies	YES	YES	YES
Time FE	YES	YES	YES
R-squared	0.552	0.555	0.540
Adjusted R-squared	0.412	0.416	0.397
F test	F(12, 266)=4.68	F(12,266)=4.65	F(12,266)=5.26
Prob > F	0.0000	0.0000	

*** $p < .01$, ** $p < .05$, * $p < .1$ Parentheses indicate Robust Standard errors to control for heteroskedasticity

Our findings of this non-monotonic relationship remain robust as we proxy old age dependency for the share of the elderly in Model 2. As old age dependency increases, economic growth also increases significantly initially. However, a significantly negative quadratic coefficient (-0.00004) suggests that once old age dependency reaches a maximum limit, it starts having adverse effects on growth, leading to a decline in growth. On the other hand, in Model 3, a positive linear relation was found between working-age

population share and economic growth, both in the short-run (0.0072) and long-run (0.0054), with the quadratic term being insignificant even at the 10% significance level. Consequently, population ageing adversely impacts economic growth once it surpasses a particular threshold, thus indicating that there is an inverted U-shaped (nonlinear) relation between global population ageing and economic growth.

These findings of a nonlinear relation between population ageing and economic growth trace associations with the historical nonlinear association demonstrated between the share of the elderly and the working-age population in the scatter plot in Fig 5.2.1. When paired alongside the linear relation between the working-age proportion and economic growth, found in Model 3, this historical nonlinear association results in a nonlinear relation between the share of older adults and economic growth.

5.5.2 Population Ageing Deepening and Intensification of the Impact on Growth: Identification of the Threshold Level

Given the presence of a nonlinear relation between population ageing and economic growth, and thus, the existence of a threshold level, RQ2.2 aims to analyse *in which the ageing-transition category is the threshold experienced*. It also seeks to find out *whether the adverse impact on economic growth gets stronger as population ageing deepens across nations belonging to different ageing transitions (RQ2.3)*.

Based on the coefficients $\hat{\gamma}_1$ and $\hat{\gamma}_2$ estimated from Eq. 5.1, Antonakakis and Workie (2023, 4) adopted a method to calculate the threshold level below (above), which ageing populations could promote (adversely affect) economic growth as follows:

$$Threshold = \frac{\hat{\gamma}_1}{-2\hat{\gamma}_2} \quad (5.4)$$

Based on Eq. 5.4, the threshold levels are calculated to be 13.83% and 20.13% for the old age share and dependency proxies of ageing populations, respectively. To offer additional insights into the nonlinear relationship, we present the marginal effects of an ageing population and old age dependency on economic growth, respectively, in Figure 5.4. The specific range of the marginal effects above and below which a rising old age share and old age dependency ratio affect economic growth positively and negatively, along with the significance levels, is presented in Tables 5.3 and 5.4. According to Figure 5.4.1 and the corresponding Table 5.3, at around 7% of population ageing (a nation transitioning from being Potentially-Ageing to Ageing), a one percentage point increase in ageing leads to a significant increase in the 5-year GDP per capita growth by 0.029 percentage points.

Figure 5.4: Marginal Effects of Ageing on Economic Growth (1990-2019)

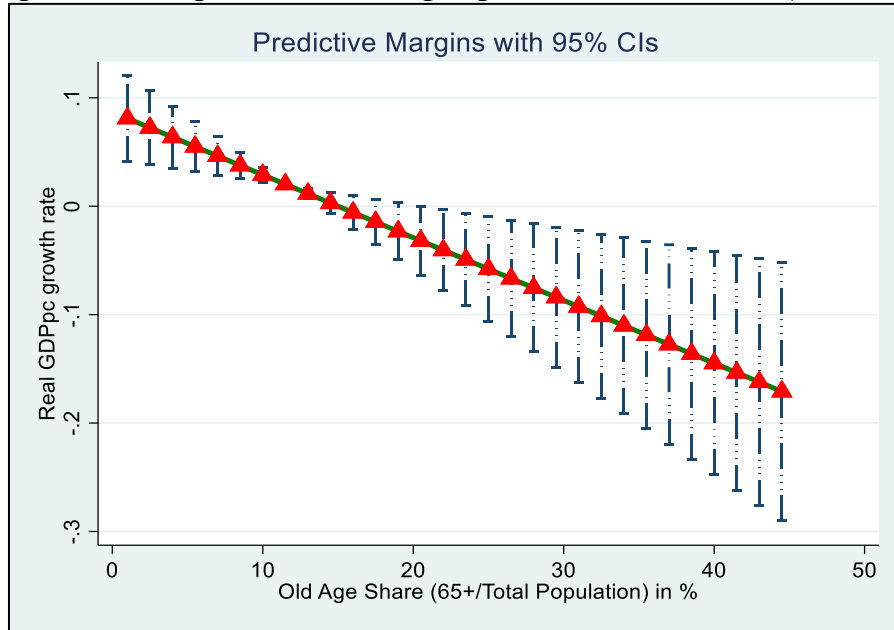


Figure 5.4.1: Marginal Effects of Old Share on Economic Growth
Source: EViews output based on results in Table 5.3

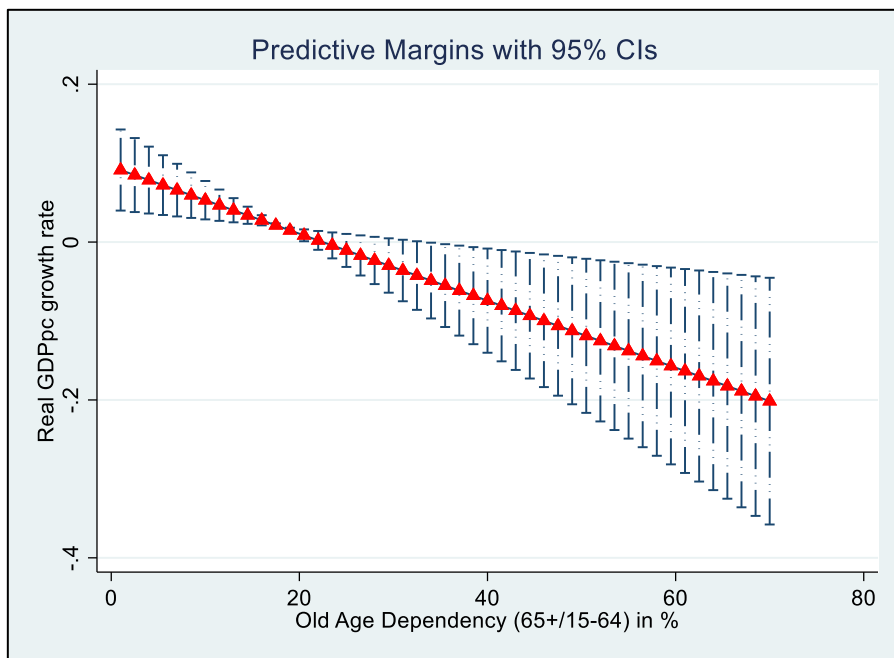


Figure 5.4.2: Marginal Effects of Old Dependency on Economic Growth
Source: EViews output based on results in Table 5.4

As the share of the elderly population continues to rise and touches around 11% of the population, positive effects turn negative, nevertheless remaining insignificant, until the share reaches around 13%, which represents the threshold level, wherein a percentage point increase in population ageing leads to a statistically significant decline in economic growth by 0.0232 percentage points. This is the turning point from which an Ageing nation transitions to an Aged nation. As the share of the elderly continues to rise, and the nation

further transitions into a Super-Aged nation, having an elderly population share of more than 20%, the negative impact of an ageing population on economic growth continues to grow in magnitude while remaining statistically significant. In a nutshell, our findings, documented in detail in Siqueira Lobo and Falleiro (2024b)¹ suggest that the impact of an ageing population on economic growth is conditional on the level of the ageing population.

Table 5.3: Marginal Effects of Population Ageing on Economic Growth at different levels of the Share of the Elderly in the Population

		Delta-method				
		Margin	Std. Err.	z	P> z	[95% Conf. Interval]
Old	Share_at					
1		.0811046	.0201478	4.03	0.000	.0416156 .1205935
2		.0724166	.0173579	4.17	0.000	.0383958 .1064374
3		.0637286	.0145691	4.37	0.000	.0351736 .0922837
4		.0550407	.0117824	4.67	0.000	.0319476 .0781338
5		.0463527	.0089996	5.15	0.000	.0287139 .0639916
6		.0376648	.0062258	6.05	0.000	.0254625 .049867
7		.0289768	.0034827	8.32	0.000	.0221508 .0358028
8		.0202888	.0010487	19.35	0.000	.0182334 .0223443
9		.0116009	.0023815	4.87	0.000	.0069333 .0162685
10		.0029129	.0050837	0.57	0.567	-.007051 .0128768
11		-.005775	.0078497	-0.74	0.462	-.0211602 .0096102
12		-.014463	.0106299	-1.36	0.174	-.0352971 .0063711
13		-.023151	.0134153	-1.73	0.084	-.0494445 .0031426
14		-.0318389	.0162033	-1.96	0.049	-.0635969 -.000081
15		-.0405269	.0189928	-2.13	0.033	-.0777521 -.0033016
16		-.0492148	.0217832	-2.26	0.024	-.0919091 -.0065206
17		-.0579028	.0245742	-2.36	0.018	-.1060673 -.0097383
18		-.0665908	.0273655	-2.43	0.015	-.1202262 -.0129553
19		-.0752787	.0301572	-2.50	0.013	-.1343857 -.0161717
20		-.0839667	.0329491	-2.55	0.011	-.1485457 -.0193877
21		-.0926546	.0357411	-2.59	0.010	-.1627059 -.0226033
22		-.1013426	.0385333	-2.63	0.009	-.1768665 -.0258187
23		-.1100306	.0413256	-2.66	0.008	-.1910272 -.0290339
24		-.1187185	.044118	-2.69	0.007	-.2051881 -.0322489
25		-.1274065	.0469104	-2.72	0.007	-.2193492 -.0354638
26		-.1360944	.0497029	-2.74	0.006	-.2335103 -.0386785
27		-.1447824	.0524955	-2.76	0.006	-.2476716 -.0418932
28		-.1534704	.055288	-2.78	0.006	-.2618329 -.0451078
29		-.1621583	.0580807	-2.79	0.005	-.2759943 -.0483223
30		-.1708463	.0608733	-2.81	0.005	-.2901558 -.0515368

Table 5.4: Marginal effects of Old Age Dependency on Economic Growth at different levels of Old Age Dependency Ratio

	Delta-method		z	P> z	[95% Conf. Interval]	
	Margin	Std. Err.				
Old dependency_at						
1	.091237	.0260404	3.50	0.001	.0398607	.1426132
2	.0848729	.0237546	3.57	0.000	.0380064	.1317394
3	.0785088	.0214691	3.66	0.000	.0361515	.1208661
4	.0721448	.019184	3.76	0.000	.0342958	.1099937
5	.0657807	.0168995	3.89	0.000	.0324391	.0991223
6	.0594166	.0146158	4.07	0.000	.0305806	.0882526
7	.0530526	.0123333	4.30	0.000	.0287196	.0773855
8	.0466885	.0100531	4.64	0.000	.0268544	.0665226
9	.0403244	.0077769	5.19	0.000	.024981	.0556678
10	.0339604	.0055099	6.16	0.000	.0230897	.044831
11	.0275963	.003271	8.44	0.000	.0211427	.0340499
12	.0212322	.0012261	17.32	0.000	.0188132	.0236512
13	.0148682	.0016641	8.93	0.000	.0115849	.0181514
14	.0085041	.0038076	2.23	0.027	.0009919	.0160163
15	.00214	.0060572	0.35	0.724	-.0098104	.0140904
16	-.004224	.0083272	-0.51	0.613	-.0206532	.0122051
17	-.0105881	.0106047	-1.00	0.319	-.0315105	.0103343
18	-.0169522	.0128856	-1.32	0.190	-.0423747	.0084703
19	-.0233162	.0151684	-1.54	0.126	-.0532425	.00661
20	-.0296803	.0174523	-1.70	0.091	-.0641127	.0047521
21	-.0360444	.019737	-1.83	0.069	-.0749843	.0028956
22	-.0424084	.0220222	-1.93	0.056	-.085857	.0010401
23	-.0487725	.0243078	-2.01	0.046	-.0967304	-.0008146
24	-.0551366	.0265937	-2.07	0.040	-.1076044	-.0026688
25	-.0615006	.0288798	-2.13	0.035	-.1184787	-.0045226
26	-.0678647	.031166	-2.18	0.031	-.1293534	-.006376
27	-.0742288	.0334524	-2.22	0.028	-.1402284	-.0082292
28	-.0805929	.0357389	-2.26	0.025	-.1511035	-.0100822
29	-.0869569	.0380254	-2.29	0.023	-.1619788	-.011935
30	-.093321	.0403121	-2.31	0.022	-.1728543	-.0137877
31	-.0996851	.0425988	-2.34	0.020	-.1837299	-.0156402
32	-.1060491	.0448855	-2.36	0.019	-.1946056	-.0174927
33	-.1124132	.0471723	-2.38	0.018	-.2054813	-.019345
34	-.1187773	.0494591	-2.40	0.017	-.2163572	-.0211973
35	-.1251413	.051746	-2.42	0.017	-.2272331	-.0230495
36	-.1315054	.0540329	-2.43	0.016	-.2381091	-.0249017
37	-.1378695	.0563198	-2.45	0.015	-.2489851	-.0267538
38	-.1442335	.0586067	-2.46	0.015	-.2598611	-.0286059
39	-.1505976	.0608937	-2.47	0.014	-.2707372	-.0304579
40	-.1569617	.0631807	-2.48	0.014	-.2816134	-.0323099
41	-.1633257	.0654677	-2.49	0.013	-.2924895	-.0341619
42	-.1696898	.0677547	-2.50	0.013	-.3033657	-.0360139
43	-.1760539	.0700417	-2.51	0.013	-.3142419	-.0378658
44	-.1824179	.0723287	-2.52	0.013	-.3251182	-.0397177
45	-.188782	.0746158	-2.53	0.012	-.3359944	-.0415695
46	-.1951461	.0769028	-2.54	0.012	-.3468707	-.0434214
47	-.2015101	.0791899	-2.54	0.012	-.357747	-.0452732

Similar conclusions can be derived from the marginal effects presented in Figure 5.4.1 and the corresponding Table 5.4. Up to the point where the old age dependence ratio is below 14%, an increase in the old age dependency results in a significantly positive influence on economic growth. With a further increase in the dependence ratio, the marginal effects turn negative, though insignificant. However, when old age dependency reaches about 20%, a percentage point increase in the same leads to a statistically significant decrease in 5-year economic growth by 0.0297 percentage points. As the dependence ratio continues to rise, the adverse impact on economic growth grows in magnitude.

This highlights that as population ageing deepens beyond a certain level, the negative impact of population ageing gradually intensifies. Among the primary explanations for the intensifying influence on growth rate as a result of deepening population ageing lies the phenomenon demonstrated in Figure 5.1, that the expansion of the proportion of older adults in nations at advanced stages of their ageing transition is combined with a simultaneous decline in the aggregate percentage of the working-age and young population, resulting in adverse consequences on economic growth. On the other hand, nations at the initial stages of their ageing transition, though facing the phenomenon of a growing fraction of older adults, coupled with a relatively fast-paced declining young population, are simultaneously paralleled by a rising proportion of working-age people, thus not experiencing any significant negative growth repercussions.

The same can be more specifically understood by looking at individual examples of countries from each nation category. The relation between the share of the elderly population and the working-age population is illustrated with the help of scatter diagrams below. Figure 5.5 illustrates that in the case of Japan, a country transitioning from an Aged to a Super-Aged society, from 1990 until the old age population share reached 15.5% in 1996, the annual increases in the old age population share were accompanied by a relatively constant share of the working-age population, hovering around 69%. Subsequently, however, the working-age population share has declined, while the old population share has continued to rise. In the case of Norway, a nation transitioning from Ageing to Aged, the increasing old age share was initially accompanied by a rising working-age population. Between 1995 and 2010, though the old age share increased, the working-age population hovered between 68.2% and 69.1% and thereafter faced a declining trend, accompanied by a rising elderly population share. Next is the case of Chile, a nation transitioning from Potentially-Ageing to Ageing. As is clearly visible, Chile has faced a rising elderly population along with an increase in its working-age

population. However, a declining trend in its working-age population has started to surface in recent years amidst a rising elderly population. Finally, the case of India, which is a Potentially-ageing nation, is presented. All across the three decades, India has faced a rising share of the elderly population, accompanied by a rise in its working-age population.

So long as the *Demographic Pressure* from a growing share of older people is less than (or comparable to) the *Demographic Gain* from a rising percentage of working-age individuals, the *Total Population Ageing Effect* on the growth of the economy is unlikely to be substantially adverse.

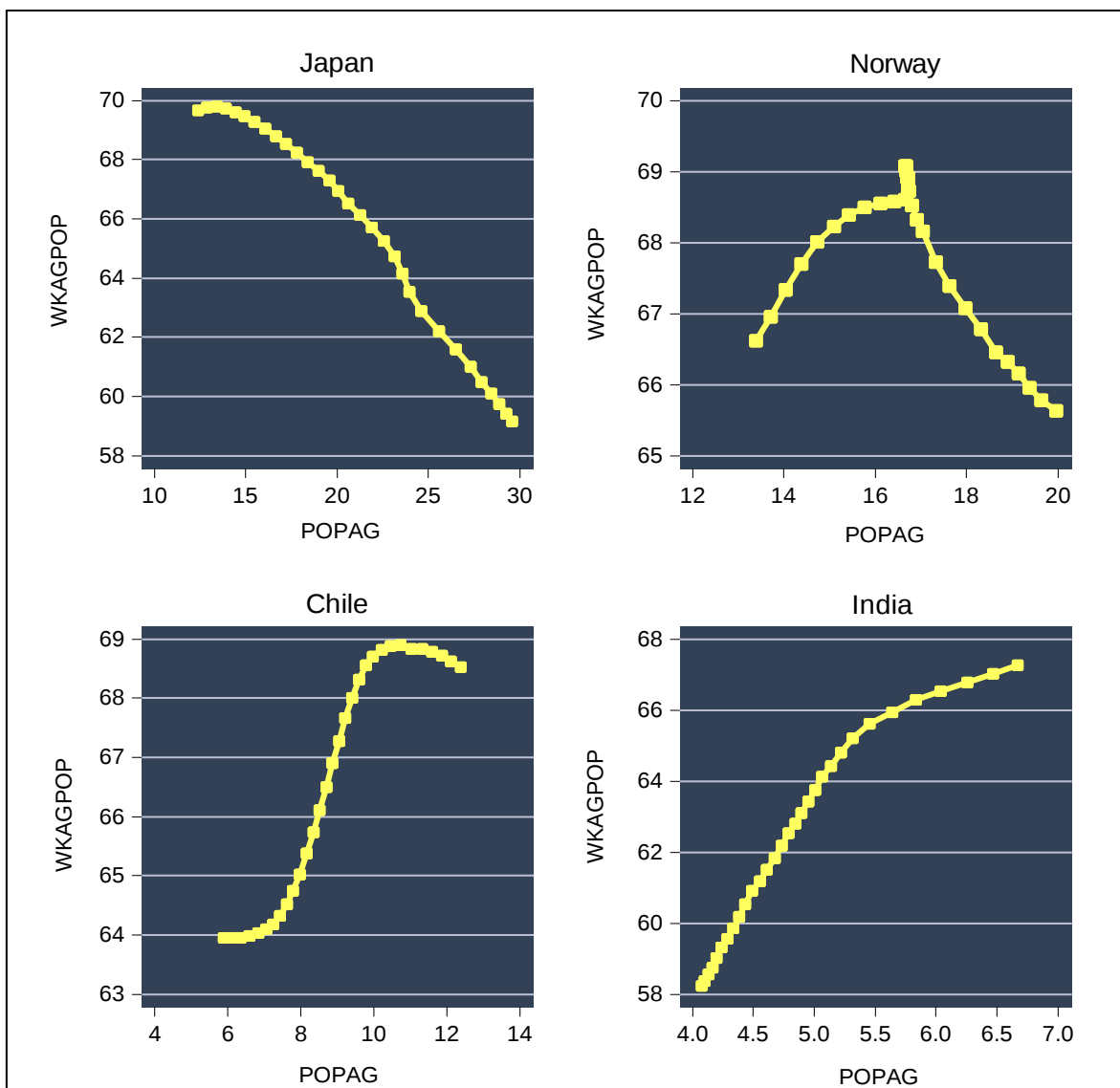


Figure 5.5 Scatter plots of Nations from each Ageing Transition highlighting the relation between the Share of the Elderly and Working-Age Population (1990-2019)

Source: Author compilations from UNDESA Population Division, *World Population Prospects*, 2022

5.5.3 Assessing the Nonlinear Impact among Developed and Developing Nations

Finally, our last research question in this chapter (RQ2.4) investigates *whether this nonlinear relation is significantly consistent across developed and developing economies*. Splitting the sample between (35) developed and (37) developing economies, the results are presented in Table 5.5.

Table 5.5: Impact of Ageing Population on (5-Year Average Non-Overlapping) Economic Growth in Developed and Developing Economies (1990-2019)

Variables	Developed Nations		Developing Nations	
	(1) GDPpcgr	(2) GDPpcgr	(3) GDPpcgr	(4) GDPpcgr
Log real GDP per capita	-0.060098*** (0.016617)	-0.05645*** (0.01256)	-0.03894*** (0.01137)	-0.03764*** (0.01125)
Log Physical Capital	0.00423** (0.01509)	0.00013** (0.00006)	0.01187 (0.00965)	0.01232 (0.00943)
Log Human Capital	0.01066 (0.03811)	0.02094 (0.03876)	0.02482** (0.01215)	0.02599** (0.01220)
Log Population	-0.06425* (0.03861)	-0.05378* (0.03068)	-0.03501** (0.01446)	-0.03772** (0.01533)
Old Share	0.00601** (0.00257)		0.00523 (0.00338)	
Old Share ²	-0.00021*** (0.00007)		0.00032 (0.00021)	
Δ Old Share	0.00722 (0.01129)		0.03462* (0.02061)	
Old Dependency		0.00383** (0.00177)		0.00267 (0.00197)
Old Dependency ²		-0.00007** (0.00003)		0.00012 (0.00008)
Δ Old Dependency		0.00655 (0.00698)		0.02290** (0.01145)
Constant	0.86727 (0.27181)	0.73990 (0.27498)	0.35692*** (0.08043)	0.33930*** (0.08591)
Obs	167	167	183	183
Number of Countries	35	35	37	37
Regional Dummies	YES	YES	YES	YES
Time FE	YES	YES	YES	YES
R-squared	0.617	0.606	0.6237	0.6316
Adjusted R-squared	0.4743	0.460	0.4888	0.4996
F test	F(11, 121)=7.60	F(11,121)=6.54	F(12,134)=4.19	F(12,134)=3.86
Prob > F	0.0000	0.0000	0.0000	0.0000

*** $p < .01$, ** $p < .05$, * $p < .1$ Parentheses indicate Robust Standard errors to control for heteroskedasticity

Table 5.5 suggests that a highly significant nonlinear relationship exists between economic growth and population ageing in the cases of the coefficients of the quadratic terms of both the proxies: old share (-0.00021) and old age dependency (-0.00007) respectively, in developed economies (at the 1% and 5% level respectively), which comprise nations transitioning from Ageing to Aged and those from Aged to Super-Aged, since improving longevity and declining birth rates arose foremost among the developed nations. However, in the developing economies, which mainly include Potentially-Ageing nations and those transitioning from Ageing to Potentially-Ageing, i.e., nations in the initial stages of their ageing transition, only a significant positive short-run effect is observed in the case of both old share (0.03462) and old dependency ratios (0.02290) respectively, with no evidence of a long-run nonlinear relation.

Our results are consistent with those of Lee and Shin (2019, 14-15), who discovered that population ageing had a detrimental influence on economic growth among 29 OECD countries compared to developing countries. Additionally, they performed regressions independently across groups of more-aged versus less-aged nations, wherein population ageing proved to expend substantial adverse growth implications merely among older nations in the short- and long-run. We also draw similarities with the findings of Antonakakis and Workie (2023) and Park, Lee, and Mason (2012).

The transitional buffer period afforded to nations during the nascent phases of their demographic ageing process, prior to attaining the critical threshold, presents decision-makers with a strategic window to prepare adequately for this transition. Conversely, nations in more advanced stages of demographic ageing must implement effective measures to mitigate and manage the ensuing challenges. As elucidated by Harper (2023, 2-4), the primary obstacle lies not in the demographic shift itself but in the underlying structures and policies that influence its aftermath.

5.6 Summary

This chapter sheds light on the implications of population ageing on economic growth, given inconsistent findings in the literature. A notable global nonlinear relationship between economic growth and an ageing population is observed, stemming from the historical nonlinear relation between the proportions of working-age and older adults. In the initial stages of ageing, both the shares of older and working-age populations increase simultaneously. However, it is only in the later stages of ageing that the rise in the share of

the elderly population begins to coincide with a decline in the share of the working-age population. These results explain why ageing has a negative relationship with economic growth only when the share of the old age population is sufficiently high. Apart from the identification of the threshold level below (above), which population ageing promotes (hampers) economic growth, the study has demonstrated that this negative impact intensifies as population ageing deepens, especially among nations at the advanced stages of their ageing transition. A significant nonlinear relation between economic growth and population ageing was also noted among the developed economies. However, only a significant positive short-run effect was observed among developing nations. A need arises for suitable measures to reduce the negative impact on growth and reap the Silver Demographic Dividend instead.

¹ The findings of Siqueira Lobo and Falleiro (2024b) are incorporated into a research paper entitled “The Implications of Population Ageing on Economic Growth: Evidence of Nonlinearity”, that has been accepted for publication in *Asian Economic and Financial Review*, a SCOPUS indexed journal, on 24th February 2024.

CHAPTER 6: DISPARITIES AMONG INDIAN ELDERLY AND ECONOMIC CONCERNS OF GOAN OLDER ADULTS

6.1 Introduction

This chapter bridges the gap between the global and local analysis. It does so by first presenting *A Situational Analysis of the Elderly in India* (Section 6.1), bringing to the fore vast State/UT-wise disparities faced by the Indian elderly across dimensions pertinent to the analysis in ensuing chapters via *data visualisation*, employing data from secondary sources such as Census of India (2011), NSO (2020), and the (NSSO 2019). The position of Goa's elderly relative to those in other States/UTs is highlighted, accentuating the need for an in-depth study of older adults in Goa.

Section 6.2 assesses the *Inflows, Outflows, and Living Standards Capabilities of the Elderly in Goa*. The primary survey findings bring to the fore the household economic profile, differences in income and expenditure, financial dependency, and reverse financial dependency among the elderly, besides complementing the Resource-based Approach with the Capability Approach by analysing their living standards capabilities.

SECTION 6.1: A SITUATIONAL ANALYSIS OF THE ELDERLY IN INDIA

We must be aware that the developed countries became rich before they became old; the developing countries will become old before they become rich: Brundtland (2002) as in Adioetomo and Mujahid (2014, xvi).

6.1.1 Introduction

India, the world's largest demographic billionaire, is facing a proliferating aged populace. With the bulk of its population aged under 30, India has not yet paid sufficient attention to the challenges and concerns of its greying citizens, with only a few research efforts being conducted on them. The demographic dividend is being reaped primarily through focusing on children and youth and addressing their developmental needs. It has become common parlance to think of India as a 'young country' while it is often forgotten that India will soon have one of the biggest populations of old people, projected to rise twofold to 225

million by 2036 and by fourfold to 425 million by 2061 [IIPS et al. (2020, 3)]. This demographic transition presents wide-ranging and complex economic, health, and social challenges that will intensify in the future.

This section presents an answer to Objective 3 of the thesis by presenting an analytical assessment of the Indian elderly, comparing those in Goa with their counterparts across other States/UTs by extracting data from the National Sample Surveys and the decadal census. This offers a more comprehensive and enriched appreciation of the demographic reality evolving in India, manifesting a truly Indian experience having its own share of implications for countries in the developing regions of the world as well. Though developed nations have been confronted with the issue of population ageing, their governmental strategies and policies have been keeping up with the slow and gradual ageing pace. Nevertheless, a similar process is relatively rapid in developing countries like India, which lack adequate recognition and preparedness in terms of policies and programmes (Rajan and Mishra 2020, 2). This section provides insight into this phenomenon (often described as alarming without taking into consideration the inevitable reality with optimism) besides setting the context for the analysis of the ensuing chapters.

6.1.2 The Altering Demographics in India

6.1.2 (a) Changes in Age-wise Population Ratios

A nation's progress is greatly influenced by its demographic makeup. The proportion of elderly individuals in India has experienced rapid growth in recent years, and this trend is expected to continue in the forthcoming decades. Projections indicate that the percentage of the population aged over 60 years will rise from 10.1% in 2021 to 21.3% by 2051 (Figure 6.1). By the end of the century, the elderly are anticipated to constitute more than 36% of the total population. The significant surge in the elderly population has been evident since 2010, accompanied by a decline in the population aged below 15 years, indicating the accelerated pace of ageing in India. By 2046, the number of elderly individuals in India is predicted to surpass that of children aged 0–14 years (Figure 6.1). Additionally, the proportion of individuals aged 15–59 years is also expected to decrease by that time. Thus, India, which is relatively youthful today, is poised to transition into a rapidly ageing society in the near future.

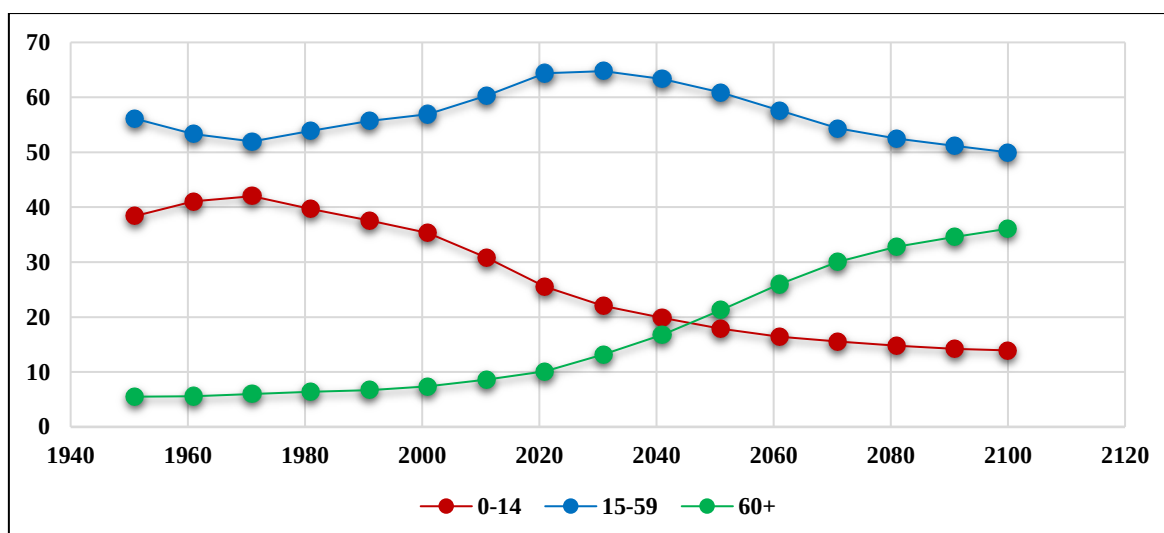


Figure 6.1: Share of Population by Broad Age Groups

Source: Author compilations from UNDESA Population Division, *World Population Prospects, 2022*

6.1.2.(b) The Feminisation of the Elderly Population

The process of population ageing in India is not gender-neutral. Gender disparities persist across all age groups. As women age, the repercussions become more pronounced. Poverty exhibits a gendered dimension in old age, with older women facing a higher likelihood of widowhood, solitary living, lack of income, fewer personal assets, and full dependence on family for support. Since 1991, the sex ratio (females per 1,000 males) among the elderly has consistently risen, whereas the sex ratio of the overall population remains unchanged. A sex ratio exceeding 1,000 indicates a larger population of elderly women than men, a phenomenon not observed in the general population (Figure 6.2).

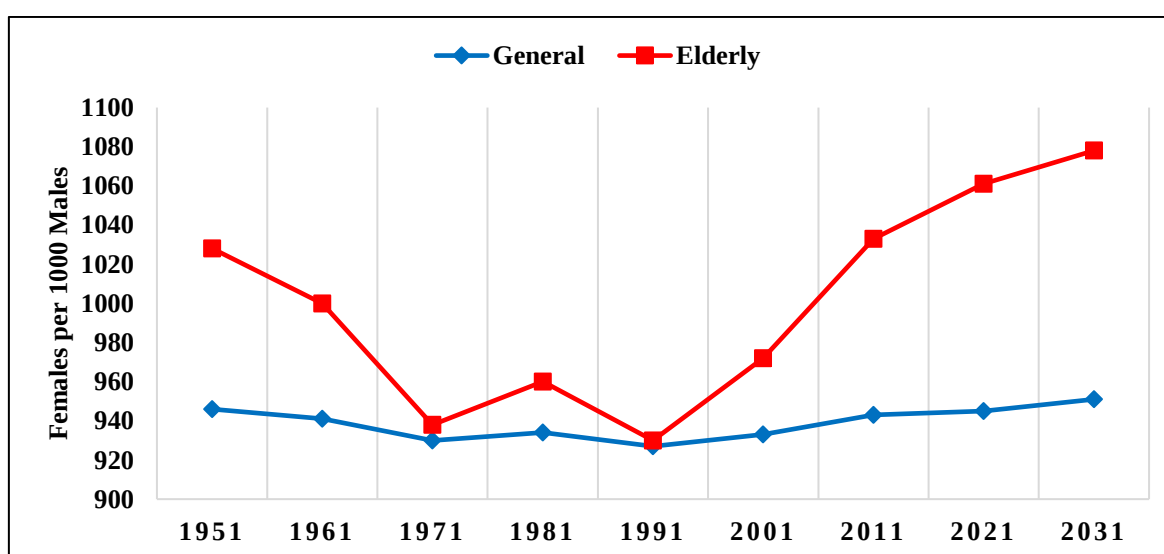


Figure 6.2: Sex Ratio of the General and Elderly Population

Source: Author compilations from UNDESA Population Division, *World Population Prospects, 2022*

6.1.2.(c) Ruralisation of the Elderly Population

Figure 6.3 identifies a distinct occurrence. The majority of the elderly in India live in rural regions. In 1961, just 3.7 million older adults lived in cities compared to 21 million in rural areas. In 2011, the same trend persisted, with a vast majority of senior people (73.3 million) continuing to live in rural areas as opposed to metropolitan ones (30.6 million). However, sharp differences persist across states. For example, Rajan and Mishra (2020, 55) highlight that in Goa, Tamil Nadu, and Mizoram, more than 40% of the aged currently live in urban areas. On the other hand, in states such as Arunachal Pradesh, Himachal Pradesh, and Bihar, there is a preponderance of the aged in the rural areas.

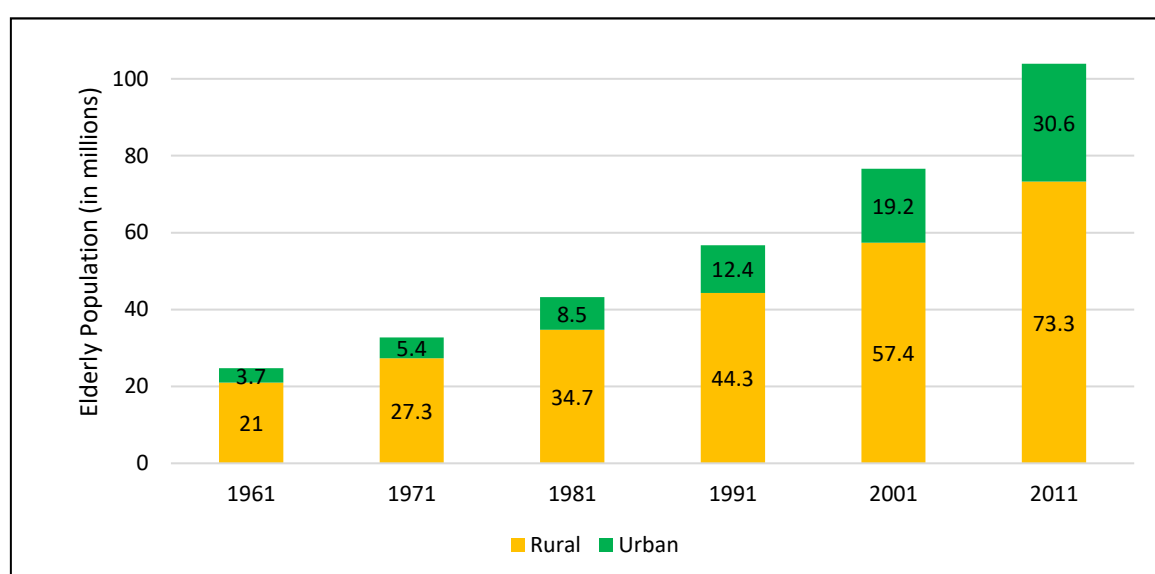


Figure 6.3: Ruralisation of the Elderly

Source: NSO (2021), based on data from Census of India, 1961-2011

6.1.2.(d) Decadal Growth Rate in General and Elderly Population

The decadal growth rate of the aged population dramatically outpaces that of the overall population, as seen in Figure 6.4. An intriguing phenomenon is that the overall population's decadal growth rate only increased from 1951-1971, and then it saw a steady fall for the next decades. The same is anticipated to happen in the future. Contrarily, India has experienced a moderate-to-high decadal growth rate in its elderly population since 1961. Notably, the growth rate was slower before 2001, but it is anticipated to accelerate significantly in the forthcoming decades. Though the elderly population's decadal growth rate increased during the same decades as the general population, it declined from 1961-1971 to 1991-2001. However, growth picked pace from 1991 to 2001 (25.2%) and is projected to shoot to 41% by 2031.

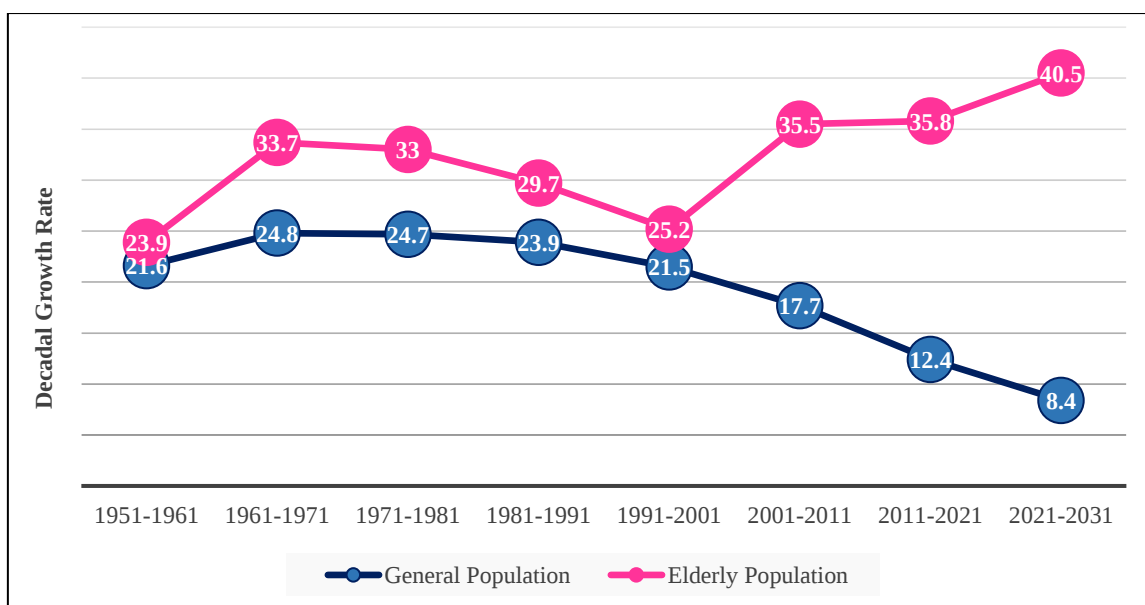


Figure 6.4: Decadal Growth Rate in General and Elderly Population

Source: NSO (2021) based on data from Census of India (1951-2011); Projections by the National Commission on Population, 2020

6.1.3 Situational Analysis of Goa's Elderly in the Context of India: Spatial and Gender Differentials

An identifiable aspect of India's ageing phenomenon is the north-south divide, characterised by the rising absolute numbers and proportional growth of the elderly, influenced by the diverse stages and rates of the demographic transition among states, reflecting variations in the ageing experience. The proportional representation of the elderly is deemed a more effective metric, as it underscores the concentration of elderly individuals within a specific region. According to Census 2011, Figure 6.5 illustrates that Kerala has the highest percentage of senior persons (12.6%), just next to Goa (11.2%) and Tamil Nadu (10.4%). Dadra and Nagar Haveli have the lowest percentage (4.0%), followed by Arunachal Pradesh (4.6%), Daman and Diu (4.7%), and Meghalaya (4.7%). The senior population in twelve states is higher than the national average (8.6%). The aged population has grown by an average of 1% across states during the 2001 and 2011 Censuses, while Goa has seen the highest rise of 3%. Rajan and Mishra (2020, 26) project that during 2011–2051, the states of Tamil Nadu, Tripura, and Goa could witness sharper surges in the elderly share relative to the other states. In contrast, Bihar, Madhya Pradesh, and Uttar Pradesh may see a relatively slower pace of increase. Thus, the majority of the states in South India and select states in the North currently lie at the forefront of a gradually greying India, with projections revealing that one in five individuals will be elderly in the southern states by 2036.

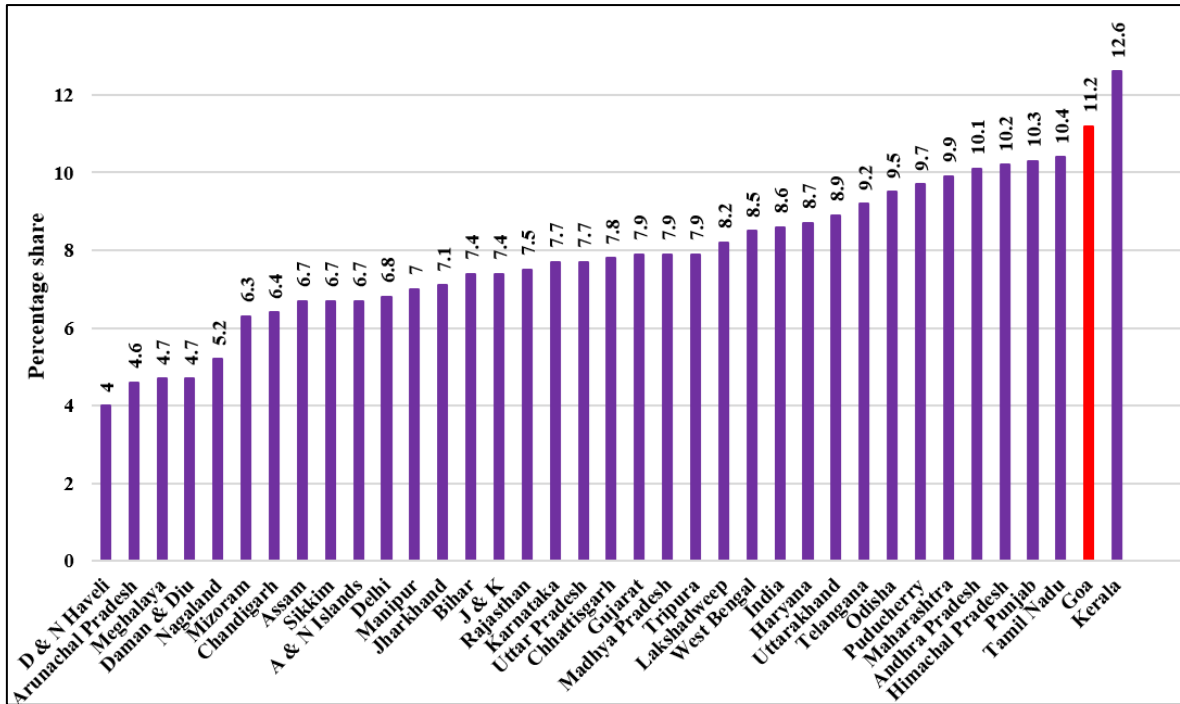


Figure 6.5: State/U.T.-wise Share of the Elderly in the Population

Source: Census of India, 2011

6.1.3.1 Economic Dependence of the Indian Elderly

6.1.3.1 (i) Fully Economically Dependent Elderly

A person is considered fully economically dependent if he or she requires complete financial help from others to live a normal life. Rajan and Mishra (2020, 122) advocate that the economic dependency of old people in the country deserves due consideration in the absence of adequate social security measures.

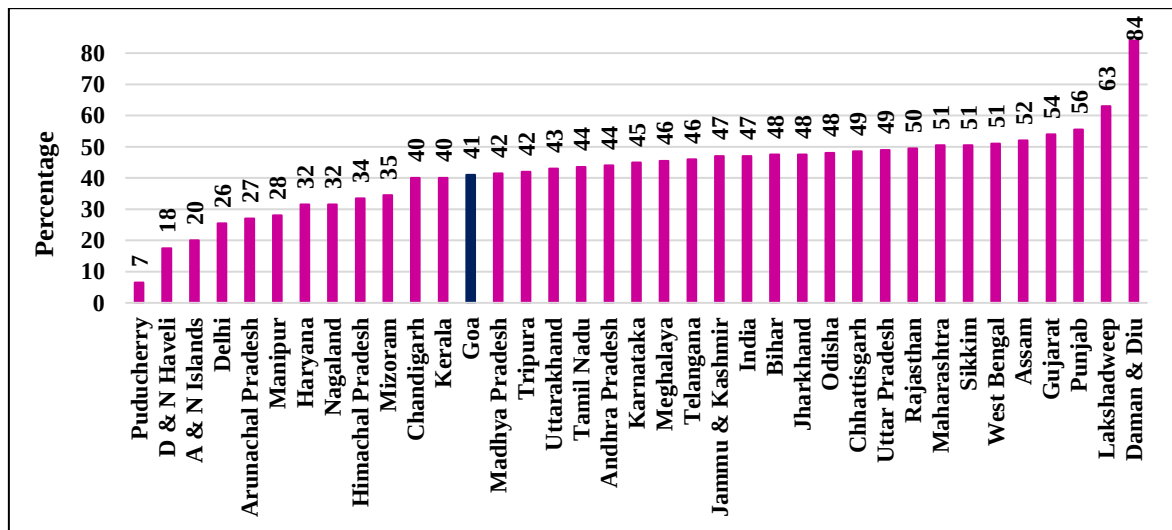


Figure 6.6: State/UT-wise Share of Elderly who are Fully Financially Dependent on others

Source: NSSO 75th Round (July 2017 - June 2018) - Social Consumption in India: Health

The elderly who are financially dependent on others in old age are highly vulnerable, with the all-India average figure standing at 47%, illustrated in Figure 6.6. Among the UTs, while Puducherry (7%) had the lowest share of older adults who were fully economically dependent, it was found that almost 84% of the elderly population in Daman and Diu reported complete financial dependency. Considering the states, 18 states lie below the national average in terms of full financial dependency, with Goa having 41% elderly who are fully financially dependent.

6.1.3.1 (ii) Old Age Dependency Ratios: Gender and Location Based

The old age dependence ratio provides data on the share of people 60 and older per 100 in the working-age range (15 to 59 years). A higher old age dependence ratio signifies an increased demand for support from the subsequent generation in terms of caregiving and social and financial assistance. Figure 6.7 illustrates an escalating dependency ratio for both genders. However, the percentage of women relying on assistance as they age surpasses that of men and is projected to continue exceeding it in the foreseeable future. This gender discrepancy can be attributed to the longer life expectancy of women and their increased likelihood of widowhood when they reach this stage of life, all the more increasing their vulnerability and dependence on others, often pushing them into poverty (Rajan and Mishra 2020, 73).

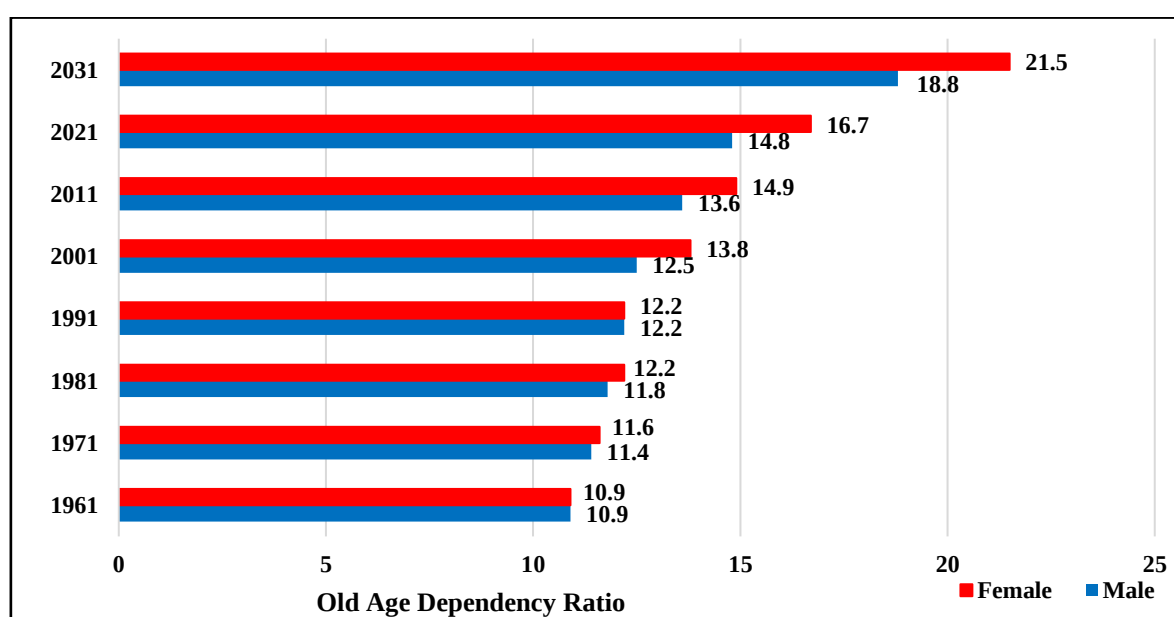


Figure 6.7: Gender-based Old Age Dependency Ratio

Source: NSO (2021) based on data from Census of India (1951-2011); Projections by the National Commission on Population, 2020

In a similar vein, based on the 1961 to 2011 Census reports, Figure 6.8 shows that the old age dependence ratio in rural regions has remained more significant than in urban areas. This dependence owes to the fact that a considerable section of older persons work in the informal sector in India without retirement and are primarily underpaid.

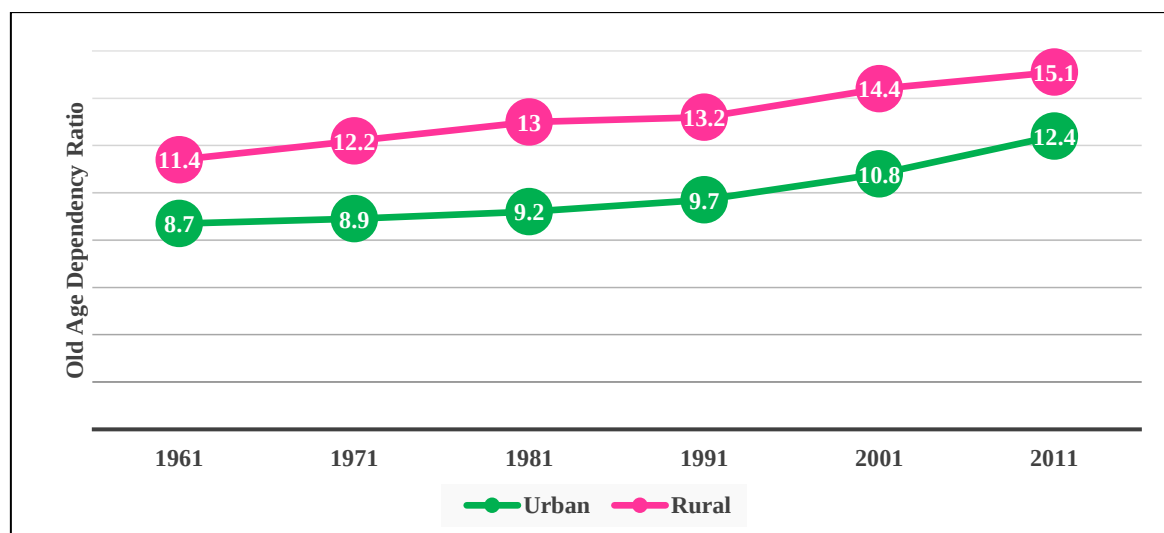


Figure 6.8: Location-based Old Age Dependency Ratio
Source: NSO (2021) based on data from the Census of India (1961-2011)

6.1.3.1(iii) Elderly Households belonging to the Poorest Wealth Quintile

On average, 21.7% of the elderly in India reside in households belonging to the poorest wealth quintile—from 4.2% in Jammu and Kashmir to 47% in Chhattisgarh (Figure 6.9). As Goa is one of the highest per capita income states (India Ministry of Finance 2022), only 6.1% of the elderly live in households belonging to the poorest wealth quintile.

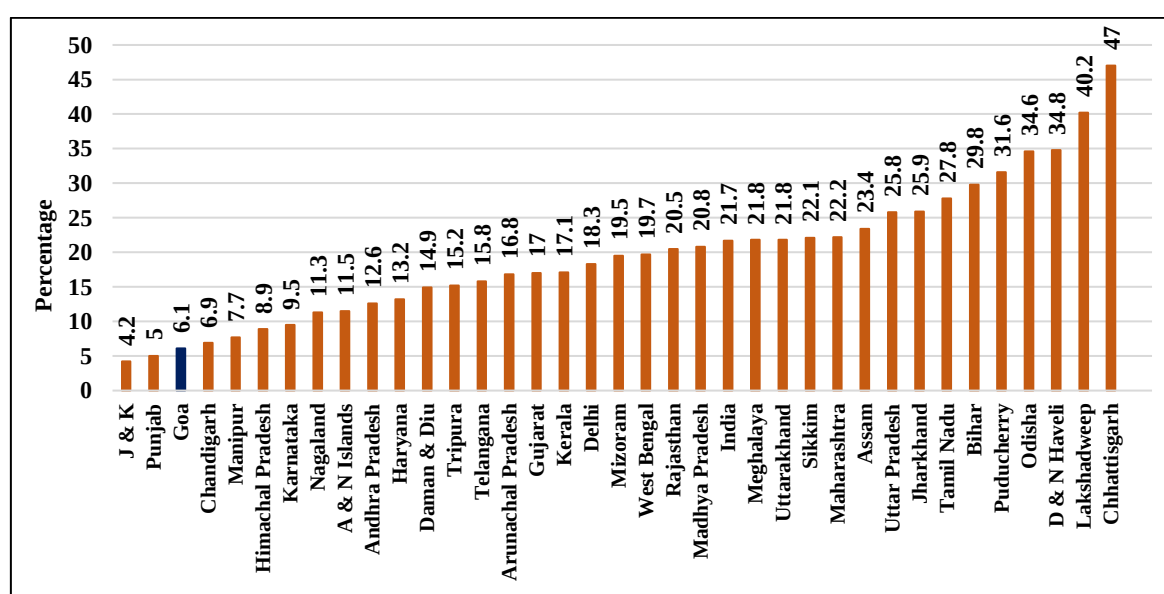


Figure 6.9: State/UT-wise Elderly Households belonging to the Poorest Wealth Quintile
Source: IIPS et al. (2020)

6.1.3.2 Health Status of the Indian Elderly

6.1.3.2 (i) Morbidity and Multimorbidity

Morbidity is higher among the elderly when compared with those in other stages of life, such as childhood, adolescence, and adulthood, with most elderly suffering from multiple diseases (Joshi, Kumar, and Avasthi 2003, 173). Rajan and Mishra (2020, 179) demonstrated that senior persons living in South India report the highest level of morbidity in the nation, with around 47% of the elderly reporting an ailment. The second highest level was around 30%, reported from East India, followed by 22.8% in the Western region. The relative morbidity position of males and females in the different regions is not alike; this divergence clearly shows the gender dimensions in the health status of the elderly (*ibid*). In parts of South and Central India, the morbidity levels are relatively higher among males than among females. In all other regions, women have relatively higher levels of morbidity than men, being higher in urban areas. They also note that the outpatient care rate shows that morbidity is highest among the richest in society, and the untreated morbidity rate is higher among the poorest people. Figure 6.10 illustrates the major categories of ailments reported by the Indian elderly.

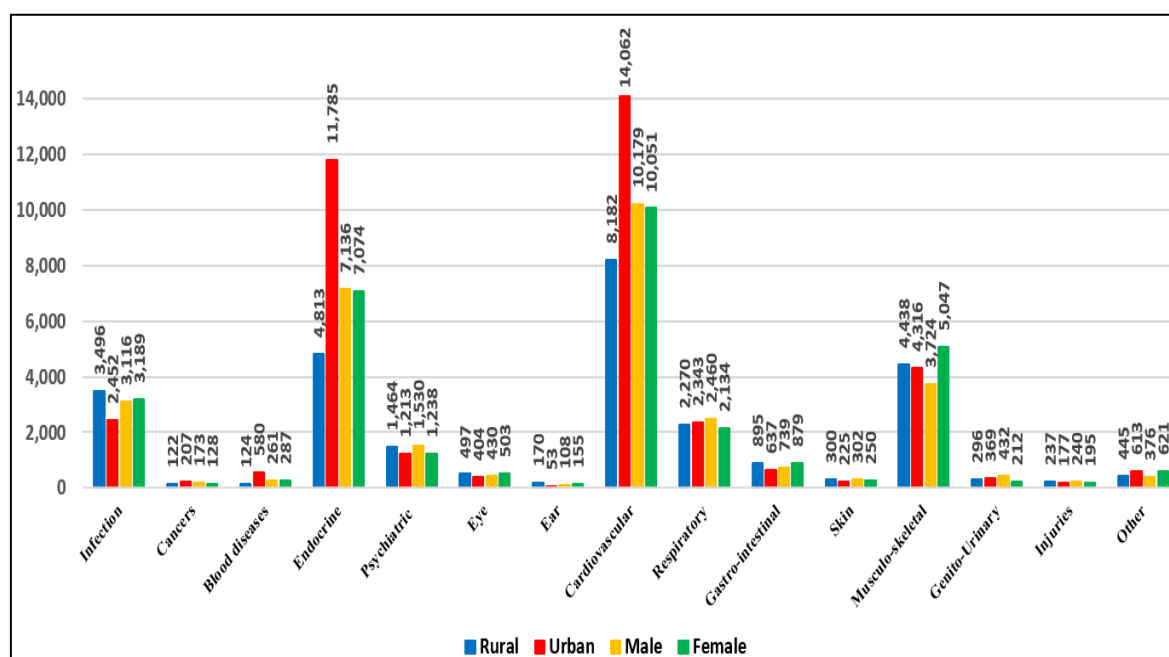


Figure 6.10: Number of Ailments of each Broad Ailment Category reported per 1,00,000 elderly in a 15-day period

Source: NSSO 75th Round (July 2017 - June 2018) - Social Consumption in India: Health

Cardiovascular and endocrine-related ailments are the two major categories of ailments reported by the Indian elderly, followed by musculoskeletal ailments and infections (Figure 6.10). A higher number of elderly males and those living in urban areas report having cancers, endocrine-related diseases, cardiovascular problems, respiratory, and genito-urinary ailments in comparison to their rural and female counterparts. Elderly females and those residing in rural areas reported a higher rate of infections, eye and ear-related problems, and gastrointestinal and musculoskeletal ailments. In comparison, elderly males living in rural areas had more ailments related to psychiatric and skin issues and injuries.

Figure 6.11 presents a state/UT-wise comparison of the percentage of the aged suffering from multimorbidity. It is observed that, on average, 23.3% of the elderly suffer from multiple morbid conditions in India. The share of the aged with multimorbidity is as high as 52.2% in Kerala to as low as 7.3% in Nagaland. However, 13 states and five UTs have a higher share of the aged suffering from multimorbidity compared to the national average. Goa ranks as the second highest state (barring the UTs) after Kerala, with 38.8% suffering from multimorbidity. It is essential to bear in mind that Goa is the second highest after Kerala in terms of the share of older adults in the total population as well.

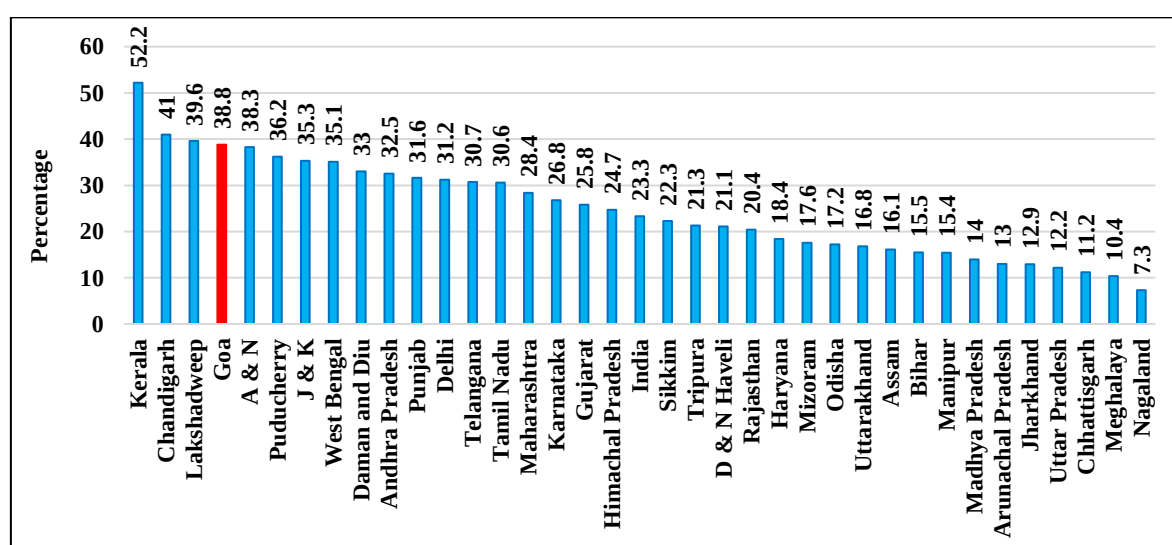


Figure 6.11: State/UT-wise Percentage of the Aged suffering from Multimorbidity
Source: NSSO 75th Round (July 2017 - June 2018) - Social Consumption in India: Health

Rajan (2005) contends that the elderly are most vulnerable to disability and its daily life repercussions, often resulting from multimorbidity. As per the Census of India (2011), the disabled population (defined as those facing restrictions or an inability to perform an activity in the manner of or within the range regarded as normal for human beings) among those aged 60 years and above in India was around 53 million. Of this segment, 27 million

were elderly males, and the remaining 26 million were elderly females. The disability rate of the elderly (number of disabled elderly persons per 100 elderly) stood at 5.18% according to Census 2011. In other words, for every 100 old persons, five are disabled. Among the various kinds of disabilities, issues related to sight, hearing, and movement are relatively predominant among old people. Generally, the proportion of the elderly with such infirmities increases with age, irrespective of the place of residence, gender or state.

6.1.3.3 The Double Vulnerability Burden: Co-existence of Multimorbidity and Economic Dependency

Research indicates that Multimorbidity and Economic Dependency are highly associated as one would lead to the other, thereby making the person more vulnerable to poverty and disease (Rajan and Mishra 2020, 148). In old age, people suffering from multiple ailments are more likely to rely on others for financial aid, enhancing vulnerability. On the other hand, those elderly who are financially dependent on others are less likely to seek healthcare and consequently become prone to illness and life-threatening conditions. Figure 6.12 shows the association between multimorbidity and economic dependency of the elderly at the state level. Elevated levels of economic dependency and multimorbidity among the elderly make for a less elderly well-being state. An upward-rising correlation is observed among the states, indicating a close relationship between multimorbidity and financial dependency, highlighting the double burden that many states have to deal with.

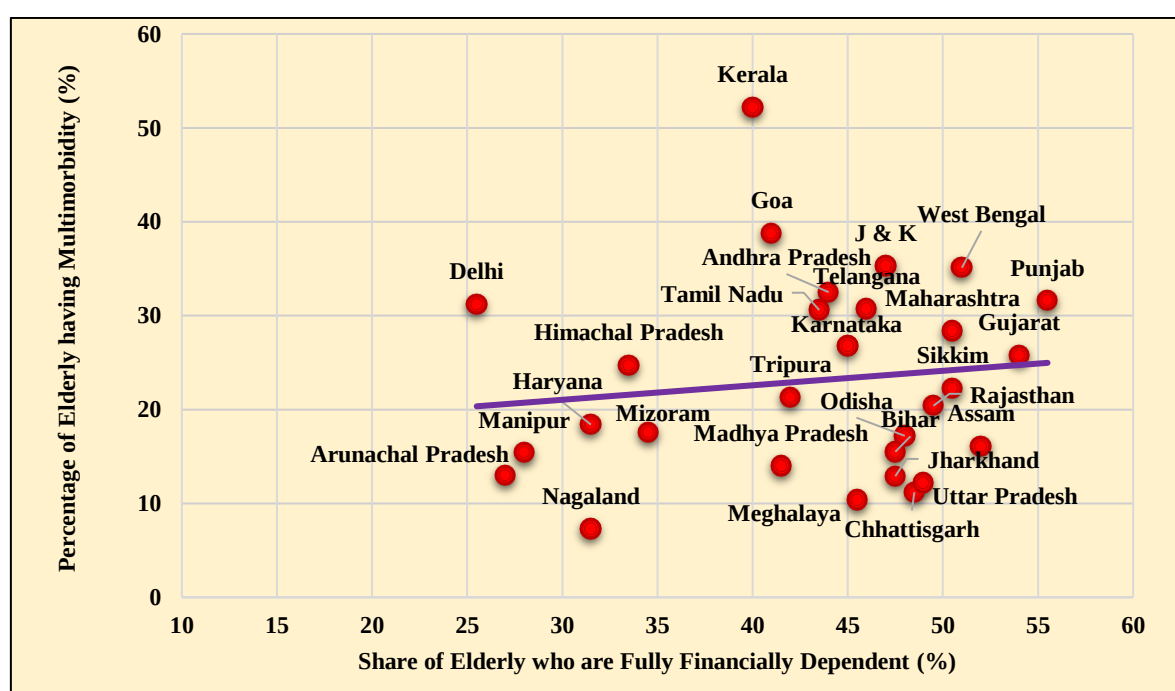


Figure 6.12: Double Vulnerability: Multimorbidity and Economic Dependency across States
Source: Author calculations based on NSSO 75th Round, Social Consumption in India: Health

6.1.3.4 Labour Market Decision and Social Security among the Indian Elderly

Figures 6.13(a) and 6.13(b) compare the labour market decision post becoming a senior citizen among two age categories: 60-64 years and 65 years and above. Overall, a large majority of the elderly, be it age-wise (60-64 years or 65 and above), locality-wise (rural or urban) or sex-wise (male or female), are no longer in the labour force. However, some interesting observations do emerge. It is observed that among the 60-64 years category, a higher number of elderly who live in rural areas (45.6%) continue to be considered employed as per the *Usual Status* definition adopted by the Periodic Labour Force Survey (PLFS), 2018-19, in comparison to their urban counterparts (30%). A similar trend holds for the elderly aged 65 and above, though by a lesser proportion: 24.4% in rural areas and 14.4% in urban areas. Regarding the gender-wise split, quite a large percentage of males aged 60-64 (65.5%), as well as those aged 65 and over (33.2%), continue to be employed compared to their female counterparts.

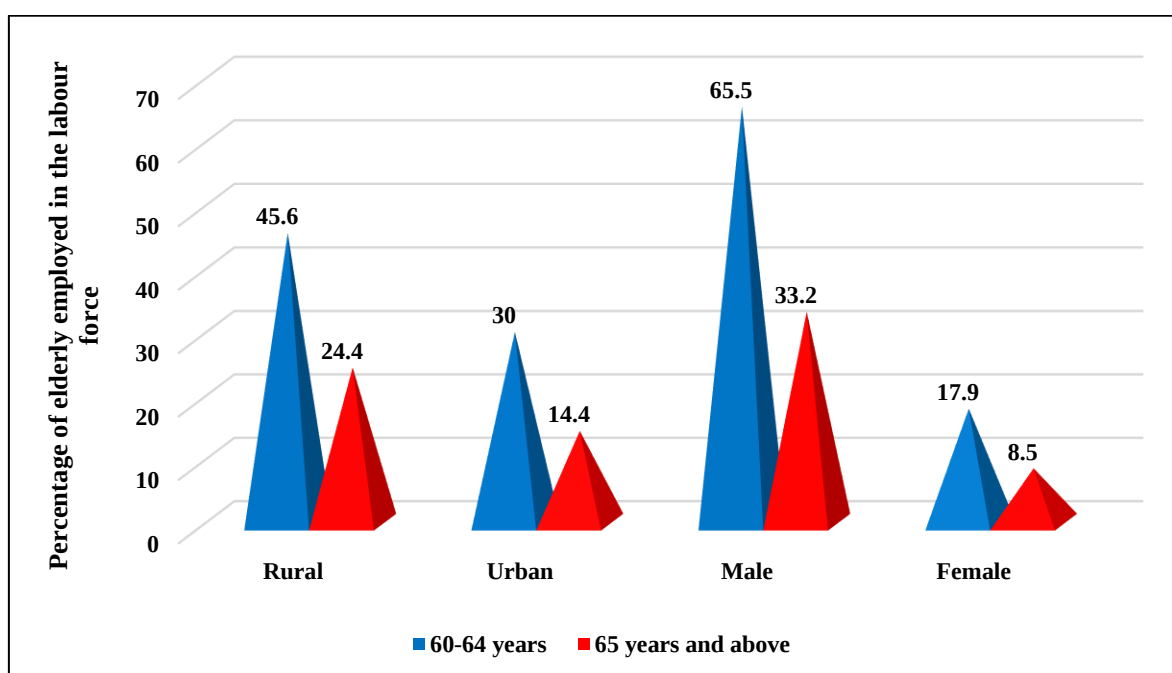


Figure 6.13: Percentage distribution of elderly persons by Usual Status
Source: NSO (2020), Periodic Labour Force Survey: 2018-19

The well-being of older people has been mandated in the *Constitution of India*. Article 41 of the *Directive Principles of State Policy* speaks about providing social security to the aged, according to which the State shall, within the limits of its economic capacity and development, ensure adequate provision for assisting individuals in situations of old age, illness, disability, and other instances of unmet needs. Social security was made the

concurrent responsibility of the Central and State governments. *Item No. 09* of the *State List* and *Item Nos. 20, 23 and 24* of the *Concurrent List* speak of social security, old age pension, social insurance, social and economic planning, and assistance to the disabled (Reddy, Devi, and Harinath 2010, 150-154). In addition, *Articles 42 and 47* deal with social security issues for the elderly, while other sections of the Constitution focus on labour welfare, including conditions of work, provident funds, liability for worker's compensation, invalidity, and old age pensions.

Despite several social security schemes and social protection floors at different levels, most elderly people, particularly older people above 80, are not able to avail of the benefits that they often deserve due to many hindrances. For instance, Figure 6.14 highlights the percentage of beneficiaries of old age social pensions among different states and UTs in India. Vast differences are noticed, with almost half the percentage of elderly receiving pension benefits in Haryana and Puducherry, while only 2.97% and 3.51% receiving the benefits in Gujarat and Nagaland, respectively. In Goa, 8.74% of the elderly receive the same.

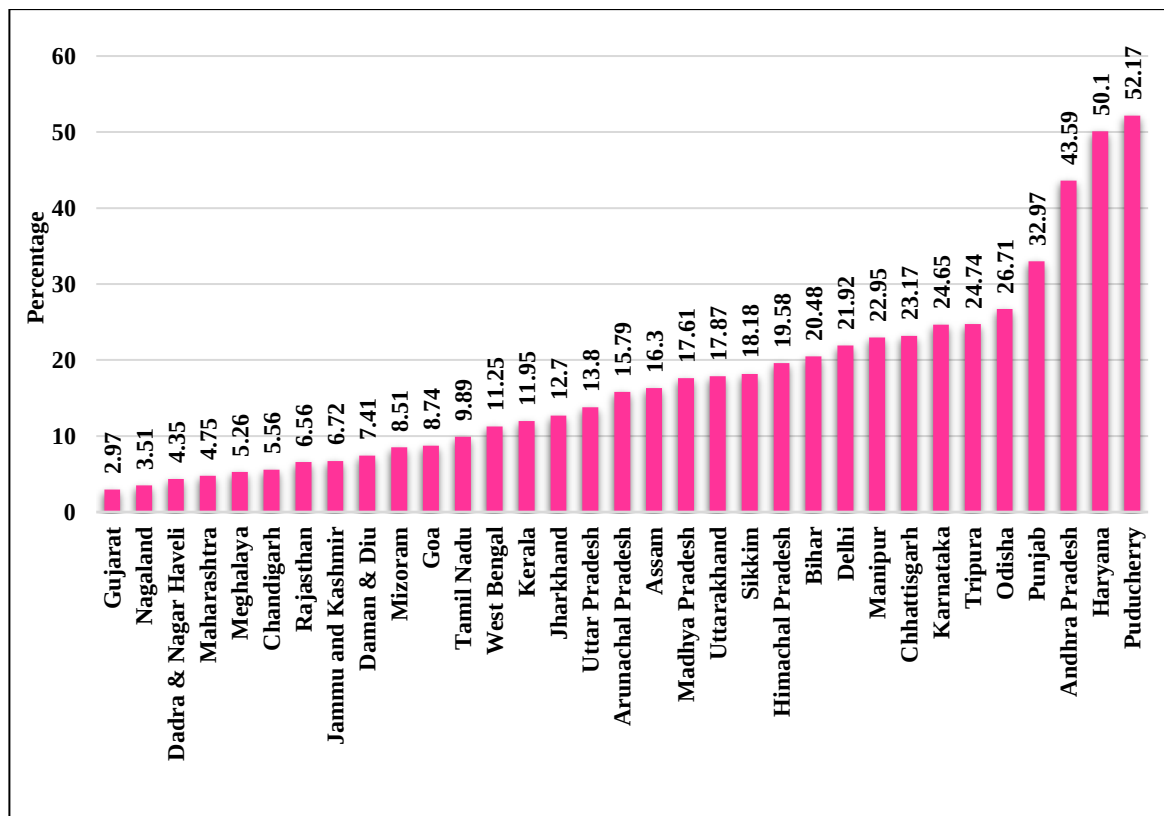


Figure 6.14: Beneficiaries of Old Age Social Pension

Source: Estimated from the India Human Development Survey (2011–12) by Goli et al. (2019)

6.1.4. The Need for an In-depth Study on the Elderly in Goa

Based on available secondary data from the Census of India (2011), the National Statistical Office [NSO] (2020), and the National Sample Survey Office [NSSO] (2019), only a situational analysis of the elderly in India has been conducted to understand the state/UT-wise disparities prevalent and to highlight the position of the elderly in Goa in relation to the rest of the country. Thus, to analyse the impact of individual ageing at the micro level from the lens of the Economics of Ageing (which forms the subject matter for Objectives 4 to 7), a need arises to assess the ground realities endured by older adults via field surveys at the grassroots, given the non-existence of the nature of a similar intensive study, the rising importance of this topic given the fast-changing demographics and the immense policy implications it will have. This study also seeks to incorporate added dimensions using validated scales that complement our understanding of older adults, fundamental to the Economics of Ageing, on which data from secondary sources in India is yet unavailable, such as Living Standards Capabilities, HRQOL, Subjective Well-being, etc. Yet another area of focus of our study, on which secondary data sources are unavailable, involves incorporating specific dimensions of older adults residing in OAHs, wherever possible and appropriate, for comparison purposes with their counterparts not residing in OAHs.

6.1.5 Summary

In answer to Objective 3, in this section, an attempt has been made to present a situational analysis of older adults in India, thematically focused on (i) Altering Demographics, (ii) Financial, (iii) Health and (iv) PRW and Social Pensions; besides highlighting major comparisons between the elderly in Goa, in relation to those in other States/UTs in India, to provide the much-needed context and to highlight the need for the ensuing chapters. It is observed that India has a long way to go in preparing for an ageing future.

SECTION 6.2: THE INFLOWS, OUTFLOWS, AND LIVING STANDARDS CAPABILITIES OF THE ELDERLY IN GOA

While money might not be everything, it's a way ahead of what is in second place: Herrmann (2017).

6.2.1 Introduction

The financial situation of older adults is closely related to their level of financial independence. This section attempts to unravel the inflows, outflows, and living standards capabilities of the elderly in Goa, along with analysing their heterogeneity.

Based on physical interactions with older adults living in OAHs, it was brought to light that all the 49 elderly respondents living in government-run OAHs have no income source and are being cared for at the government's expense. However, among the 51 elderly living in non-government-run OAHs, 47 reported that their children/family members pay the monthly fee and necessary expenditures of the OAH (mandatory to be paid to meet the needs of the elderly inmate). Only four of them had savings in banks. They had authorised the superior/in-charge of the OAH to withdraw the necessary monthly amount from their account on their behalf, being unable to do so by themselves. Given this scenario, it is amply clear that out of 100 elderly respondents residing in OAHs, only four had the income to pay for their expenditures, presenting a more or less homogenous pattern across the OAHs.

Thus, while assessing the inflows and outflows of the elderly, we do so by focusing on older adults residing at home (N=400). To evaluate the heterogeneity in this population category, the elderly are further classified as Young-Old (Y-O), i.e., those 60-74 years and the Old-Old (O-O), i.e., those 75 years and above (Lachman 2001, 135). However, the entire sample will be analysed for their living standards capabilities.

6.2.2 Household Economic Profile of Older Adults

In this section, we attempt to answer the first research question in response to Objective 4 (RQ4.1): *What is the nature of the household economic profile of older adults?* This question is pertinent given the fact that an overwhelming number of older individuals in India struggle to make ends meet and experience poverty as they grow older since they are often part of impoverished families (Sebastian and Kumar 2003, 75). Thus, the economic profile of the family plays a major role in impacting the economic life of the older

members. We analyse the household economic profile from three aspects: household member profile, household income, and household expenditure. While studying the household details, a household is considered a residential premise, abode, or dwelling, where family members live, eat, and stay together. Thus, details of all family members residing in the household of the elderly respondent were considered. The household economic profile exclusively of older adults residing at home is analysed in this section. Reasons for not including those living in OAHs are many: (i) The majority of them have not interacted with their family members for years together, (ii) Most of those who have interacted with household members are unaware of their current household economic status, and (iii) Many do not have a family anymore.

6.2.2.1 Household Member Profile

Over the last several decades, India's households have undergone immense transformations owing to size shrinkage, nuclearisation, and relocation, bearing significant economic ramifications on the elderly (Chakravorty, Goli, and James 2021, 7). In this vein, we analyse differences in household size and number of age-dependents among Young-Old Households (Y-O HHs) and Old-Old Households (O-O HHs) in Goa. According to Table 6.1, out of the sample of 400 elderly respondents residing at home, 200 were aged 60-74; hence, their household has been called Y-O HH. The remaining 200 were 75 years and above, categorising their household as an O-O HH. In the case of a household where two or more elderly respondents resided, for example, one being in the Y-O age group and the other being in the O-O age group, the household was categorised as O-O HH and the O-O senior citizen was surveyed to capture the true impact of ageing. Thus, per household, only one elderly respondent was chosen for the study.

Table 6.1 reveals that O-O HHs comparatively have 1.07 times a greater number of total household members as compared to their Y-O counterparts, with the average household size being 3.38 in Y-O HHs compared to 3.61 in O-O HHs.

It is interesting to note that while the number of working-age members between 15-59 years were relatively higher by 1.03 times among the Y-O HHs, the O-O HHs had a higher number of young members (below 15 years) as well as elderly members (aged 60 years and above) by 1.01 times and 1.05 times respectively.

In terms of the household shares of the members, elderly members make up the highest share in O-O HHs (45.84%), followed by working-age members (39.61%). In contrast, among Y-O HHs, the share of the working-age and elderly members is quite

close, with the former (43.64%) being marginally higher by just 1.04% compared to the latter (42.60%). The young members comprise the smallest share of members in the household composition, with the share being marginally higher among O-O HHs (14.54%) compared to Y-O HHs (13.76%).

In terms of age-dependency ratios, the YADR, i.e., (Population aged 0-14 years / Population aged 15-59 years) was 1.16 times higher in the case of O-O HHs compared to the Y-O HHs. Similarly, the OADR, i.e. (Population aged 60 years and above / Population aged 15-59 years), was 1.18 times higher among the O-O HHs. This leads to a rise in the Total Age Dependency Ratio (TADR), i.e., [(Population aged 0-14 years + Population aged 60 years and above) / Population aged 15-59 years], which is a summation of YADR and OADR, once again being higher by 1.18 times among the O-O HHs, owing to a relatively higher OADR.

In many O-O HHs, it was found that the elderly often reside with one of their children to facilitate the need for caregiving: in some cases, the elderly member has to be cared for owing to poor health, while in other instances, the elderly member cares for their grandchildren, while their children go to work. The latter reason explains why O-O HHs have a higher YADR compared to Y-O HHs, which in turn contributes to their relatively larger household size. In contrast, in many of the Y-O HHs, the children of the elderly (who fall in the working-age category) are often still pursuing their higher education (specialisations) while others are employed in India/abroad, and hence, quite often not residing with their elderly parents. Besides, the spouse of the elderly respondent in a Y-O HH often does not yet fall in the senior citizen bracket, resulting in a marginally higher number of working-age members in Y-O HHs.

Thus, given the burden of a relatively larger household size, higher TADR, accompanied by relatively fewer members of working-age, the middle-aged adults referred to as the 'Sandwich Generation' [the term coined by Dorothy Miller (1981, 419)] find themselves *sandwiched* between the responsibilities of simultaneously providing and caring for their ageing parents and supporting their children, more common in O-O HHs, creating unique challenges and demands on their time and resources.

Hadley et al. (2011, 643) pointed out that the age structure ultimately determines household dependency ratios, which are likely critical determinants of multiple facets of the household ecology. High age dependency ratios within households mean that labour is in high demand, as a few work to produce and meet the needs of many. However, Bhagat and Unisa (2006, 201) rightly argue that the tacit assumptions that underlie these measures

are that old persons are generally economically inactive, whereas working-age adults are mostly economically active. However, this may not be true in reality if a significant number of old persons are also economically active or if a large number of working-age adults are not able to get jobs. Hence, this needs a more profound understanding than what just lies at the surface in terms of the extent to which the elderly can support themselves and contribute to the household budget, their sources of income and expenditure, and which categories of older adults are more inclined towards being fully financially dependent on others, pursued in later sections.

Table 6.1: Household Member Profile of Y-O HHs and O-O HHs

Household Member Classification	Y-O HHs	O-O HHs
Total number of households	200	200
Total household members	676 (Mean:3.38; SD:1.34)	722 (Mean:3.61; SD:1.31)
Total household members aged 0-14 years	93 (Mean:0.46; SD:0.23)	105 (Mean:0.53; SD:0.18)
Total household members aged 15-59 years	295 (Mean:1.48; SD:0.88)	286 (Mean:1.43; SD:0.92)
Total household members aged 60 and over	288 (Mean:1.44; SD:0.72)	331 (Mean:1.66; SD:0.97)
Household share of members aged 0-14 years	13.76%	14.54%
Household share of members aged 15-59 years	43.64%	39.61%
Household share of members 60 years and over	42.60%	45.84%

Source: Primary survey

6.2.2.2 Household Income

Concerning the second aspect, household income, Kang and Hu (2022, 2889) noted that insufficient finances and assets within the household turn apparent as the age composition changes, demonstrating that insecurity and impoverishment among older households is a fact of life. In this context, Table 6.2 indicates that the size of the Y-O HH's total monthly household income is 1.12 times higher than that of the O-O HHs, with t-tests confirming the presence of highly significant differences in the means of the two samples at the 0.01 level ($t=3.827$, $df=398$, $p=.000$). The prevalence of inequalities in total monthly household income is widespread with the minimum amount ranging from as low as ₹ 1,500 to the maximum amount even going up to around ₹ 4,50,000 in a few cases.

To highlight the widespread heterogeneity in monthly household income of the Y-O and O-O HHs, their incomes have been grouped slab-wise. The majority of elderly households in Goa earn a total monthly household income in the range of ₹ 45,000 - ₹ 65,000, both in the case of the Y-O HHs [55 HHs (27.5%)] and O-O HHs [52 HHs (26%)]. A total of one-eighth of the elderly HHs in Goa claimed that their total monthly HH income is less than ₹ 5,000, with a higher number of O-O HHs (14.5%) reporting the same. Group-wise monthly household income slab classification brings to the fore that a

relatively higher number of O-O HHs are observed towards the lower rungs of the income slabs. For instance, while 54 Y-O HHs had a monthly household income below ₹ 25,000, a higher number (64) of O-O HHs faced the same situation. However, as we move higher up the income categories, it is observed that the number of Y-O HHs relatively surpasses their counterparts, thus all the more bringing to light the inequality present in total monthly household incomes among the two categories of households.

The average monthly income per O-O HH member (per capita income) is lower at ₹ 16,013.39 compared to ₹ 19,226.98 in the case of Y-O HH members, with an average difference of ₹ 3,213.43. Again, the t-test confirms significant differences in monthly per capita household incomes of the two samples at the 5% level ($t=2.556$, $df=398$, $p=.011$), with average monthly income per Y-O HH member being 1.20 times higher than that of the O-O HH member.

Table 6.2: Slab-wise Distribution of Total Monthly HH Income of Y-O and O-O HHs

Total Monthly Household Income (MHI)	Y-O HHs [No. (%)]	O-O HHs [No. (%)]
Below ₹ 5,000	21 (10.5)	29 (14.5)
₹ 5,000 - ₹ 25,000	33 (16.5)	35 (18.5)
₹ 25,000 - ₹ 45,000	35 (17.5)	40 (21)
₹ 45,000 - ₹ 65,000	55 (27.5)	52 (26)
₹ 65,000 - ₹ 85,000	25 (12.5)	17 (8.5)
₹ 85,000 - ₹ 1,00,000	18 (9.0)	12 (6)
₹ 1,00,000 and above	13 (6.5)	11 (5.5)
Total	200 (100)	200 (100)
Mean (SD) of total MHI of Y-O HHs	₹ 64,987.21 (SD: 5455.31)	
Mean (SD) of total MHI of O-O HHs	₹ 57,808.32 (SD: 2604.82)	
Mean (SD) of per capita MHI of Y-O HHs	₹ 19,226.98 (SD: 3220.76)	
Mean (SD) of per capita MHI of O-O HHs	₹ 16,013.39 (SD: 1874.63)	

Source: Primary survey

6.2.2.3 Household Expenditure

As in the case of household incomes, the prevalence of vast heterogeneity in total monthly household expenditure is widespread, with the minimum amounts ranging from as low as ₹ 700 to the maximum amount even going up to ₹ 3,00,000¹. We find that though the total monthly household income of the Y-O HHs was significantly higher than that of the O-O HHs, just the reverse happens in the case of total monthly household expenditure, with the size of the O-O HH's total monthly household expenditure (₹ 32,999.91) being 1.11 times higher than that of the Y-O HHs (₹ 29,890.67). T-test confirms the existence of a very significant difference in the means of the two samples at the 0.01 level ($t=3.996$, $df=398$, $p=.000$), indicating the higher burden of O-O HHs.

A slab-wise classification of monthly household expenditure is helpful in highlighting the widespread heterogeneity among Y-O and O-O HHs. The majority of elderly households in Goa have a total monthly household expenditure in the range between ₹ 25,000 - ₹ 35,000. Around 26 of the total elderly households reported that their household expenditure was less than ₹ 1,000 per month, with a marginally higher number of O-O HHs reporting the same (14 O-O HHs) compared to their counterparts (12 Y-O HHs). A deeper analysis revealed a very interesting pattern in household expenditure: a larger number of O-O HHs were observed towards the lower rungs of the expenditure slabs. For instance, while 69 OO HHs had monthly household expenditures below ₹ 15,000, the same was true for only 49 Y-O HHs. Moving up the expenditure ladder, a shift was observed with a higher number of Y-O HHs (122) surpassing their counterparts (92 O-O HHs), incurring monthly household expenditures between ₹ 15,000 - ₹ 45,000. Finally, towards the highest slabs, a greater number of O-O HHs (39) were observed incurring monthly household expenditures of ₹ 45,000 and beyond compared to their counterparts (29 Y-O HHs), as documented in the work of Siqueira Lobo and Falleiro (2024c)².

The average monthly expenditure per Y-O HH member (per capita expenditure) is lower at ₹ 8,843.39 compared to ₹ 9,141.25 in the case of O-O HH members, with an average difference of ₹ 297.86. Again, the t-test confirmed the existence of very significant differences in the monthly per capita household expenditure of the two samples at the 0.01 level ($t=5.038$, $df=398$, $p=.000$), with the same being significantly higher among O-O HH members.

Table 6.3 Slab-wise Distribution of Total Monthly Household Expenditure

Total Monthly Household Expenditure (MHE)	Y-O HHs [No. (%)]	O-O HHs [No. (%)]
Below ₹ 1,000	12 (6)	14 (7)
₹ 1,000 - ₹ 5,000	14 (7)	20 (10)
₹ 5,000 - ₹ 15,000	23 (11.5)	35 (17.5)
₹ 15,000 - ₹ 25,000	27 (13.5)	21 (10.5)
₹ 25,000 - ₹ 35,000	68 (34)	46 (23)
₹ 35,000 - ₹ 45,000	27 (13.5)	25 (12.5)
₹ 45,000 - ₹ 55,000	25 (12.5)	32 (16)
₹ 55,000 and above	4 (2)	7 (3.5)
Total	200 (100)	200 (100)
Mean (SD) of total MHE of Y-O HHs	₹ 29,890.67 (SD: 1874.63)	
Mean (SD) of total MHE of O-O HHs	₹ 32,999.91 (SD: 3052.46)	
Mean (SD) of per capita MHE of Y-O HHs	₹ 8,843.39 (SD: 1085.07)	
Mean (SD) of per capita MHE of O-O HHs	₹ 9,141.25 (SD: 611.71)	

Source: Primary survey

6.2.3 Nature and Sources of Income and Expenditure of Older Adults

After analysing the household income and expenditure, this section is devoted to the income and expenditure exclusively of older adults. As age reduces one's ability to labour and earn, irrespective of one's initial financial condition, older adults are susceptible to falling into deprivation due to a diminished capability for revenue creation and a rising risk of significant disease (Lloyd-Sherlock 2002, 754). This section attempts to answer the second research question for this chapter (*RQ6.2*): *Are significant differences present in the income and expenditure patterns exclusively of the elderly?*

6.2.3.1 Nature of Income and Expenditure of Older Adults

Table 6.4 shows that the average monthly income, exclusively of the Y-O (₹ 21,662.33), differs from that of the O-O (₹ 16,443.27) senior citizen by about ₹ 5,219.06. The t-test confirms the highly significant difference in the average monthly income exclusively of the elderly respondents of the two samples based on age (Y-O and O-O) at the 0.01 level ($t=3.971$, $df=398$, $p=.000$) to the disadvantage of the O-O respondents. Interestingly, both the Y-O and O-O represent very heterogeneous groups. On the one hand, a total of 124 older adults [71 O-O (35.5%) and 53 Y-O (26.5%)] reported that they had no source of income of their own nor were getting any support from the government and were at the mercy of their household members who often ill-treated and abused them. On the other side, the maximum monthly income reported by the richest category of the Y-O and O-O ranged even up to ₹ 89,000 and ₹ 72,000 respectively.

Analysing differences in monthly income exclusively of the Y-O and O-O respondents from a gender perspective, we find that while the mean monthly income solely of the Y-O males and females was ₹ 22,482.18 and ₹ 18,743.21, respectively, the corresponding figures were lower at ₹ 17,595.12 and ₹ 13,283.52, respectively in case of O-O males and females. The t-test confirmed the existence of a significant difference at the 0.05 level in average monthly income based on the gender of the senior citizens ($t=2.485$, $df=398$, $p=.013$) to the disadvantage of female senior citizens.

In terms of expenditure, Table 6.4 shows that the difference between the average monthly expenditures of the Y-O (₹ 10,978.43) and O-O (₹ 8,563.30) senior citizen is an amount of about ₹ 2,415, being higher in the case of the Y-O respondents. The t-test highlighted a very significant difference in the average monthly expenditure of the two samples at the 0.01 level ($t=3.602$, $df=398$, $p=.000$).

Analysing differences in monthly expenditure exclusively of the Y-O and O-O from a gender perspective, the mean monthly expenditure exclusively of Y-O males and females was ₹ 11,642.31 and ₹ 7,942.89, respectively. The corresponding figures were lower at ₹ 9,420.16 and ₹ 5,196.32, respectively, in the case of O-O males and females. T-test shows that differences in mean monthly expenditure are highly significant across gender ($t=2.598$, $df=398$, $p=.009$).

Table 6.4: Average Monthly Income and Expenditure exclusively of the Y-O and O-O

		Y-O Respondents (N=200)			O-O Respondents (N=200)		
		Male	Female	All Y-Os	Male	Female	All O-Os
Income	Mean (₹)	22,482.18	18,743.21	21,662.33	17,595.12	13,283.52	16,443.27
	(SD)	(3970.02)	(2412.68)	(2856.34)	(2100.22)	(1999.46)	(2023.12)
Expenditure	Mean (₹)	11,642.31	7,942.89	10,978.43	9,420.16	5,196.32	8,563.30
	(SD)	(1444.07)	(1279.83)	(1563.98)	(1162.22)	(977.64)	(1229.49)

Source: Primary survey

An important observation made while comparing monthly per capita household income and expenditure with the average income and expenditure exclusively of the elderly respondents is that per capita household figures mask the actual financial scenario of the elderly as household size enters the picture. For instance, we found that the monthly per capita household expenditure was significantly higher among the O-O HHs compared to the Y-O HHs. Contrarily, when we compared the average monthly expenditure patterns exclusively of the elderly, it was found that the Y-O had significantly higher expenditure than the O-O. Elderly consumers are very often an overlooked consumer category. However, age-related changes drive their specific choices of products and services, which tend to be different from younger adults and, therefore, have major significance in consumer behaviour, spending patterns (expenditure), and marketing (Alhammedi, Santos-Roldán, and Cabeza-Ramírez 2021, 1). Thus, there is a need to study the consumption basket of older consumers. In this vein, we begin by analysing their income sources.

6.2.3.2 Sources of Income and Items of Expenditure of the Y-O and O-O

In an attempt to study the different components of income and expenditure of older adults, we also attempt to test whether specific sources of income and items of expenditure are significantly associated with a higher number of Y-Os than O-Os. Figure 6.15 indicates that the elderly receive monthly income from multiple sources.

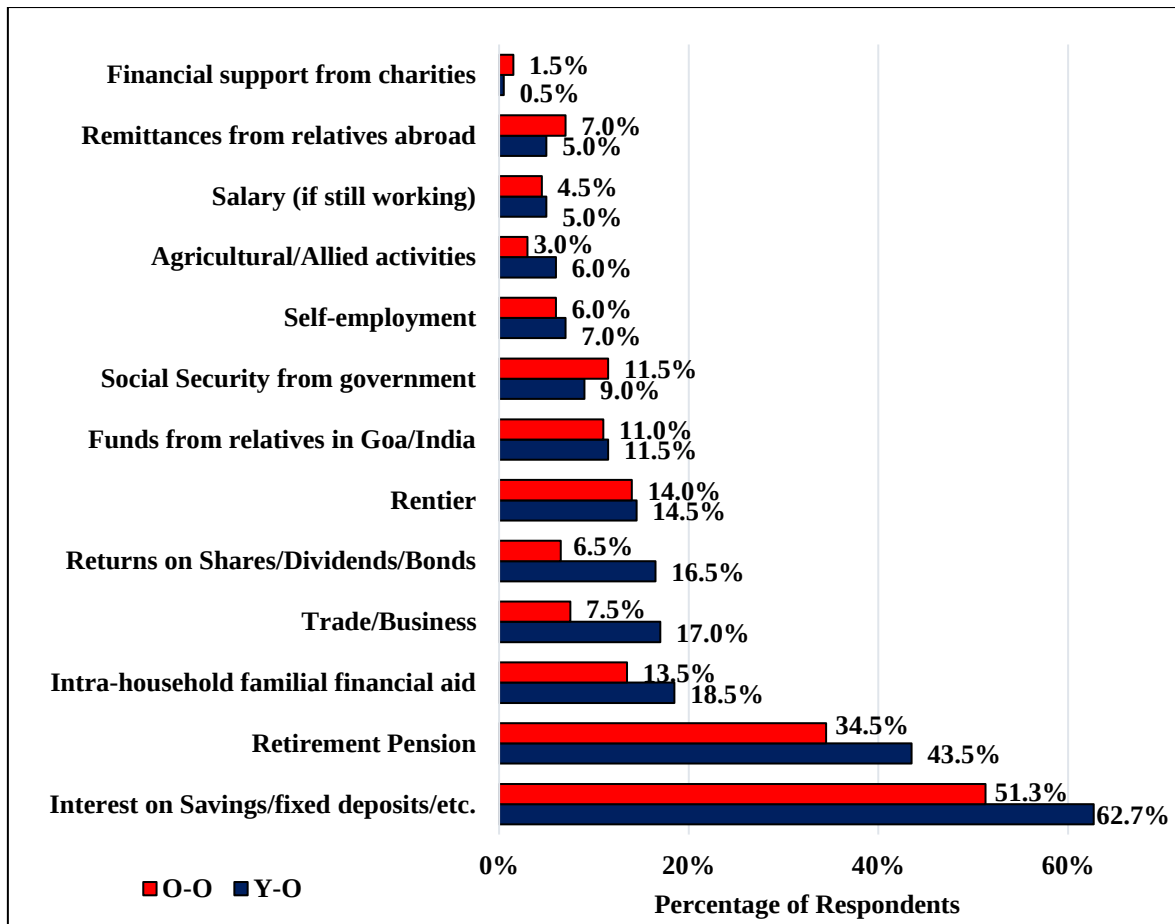


Figure 6.15: Comparison of Sources of Income of the Y-O and O-O Respondents
Source: Primary survey

The primary source of income is interest on savings/fixed deposits for both the Y-O (62.7%) and the O-O (51.3%), followed by retirement pensions [87 Y-O respondents (43.5%) and 69 O-O respondents (34.5%) respectively]. Intra-household financial aid is a source of income for 18.5% of the Y-Os and 13.5% of the O-Os. While income from trade/business continues to be a source for around 17% of the Y-O, only 7.5% of the O-O reported this source. Returns on shares/dividends/bonds yield income to 16.5% of the Y-O, with the corresponding figure being only 6.5% in the case of O-Os. A similar proportion of Y-Os and O-Os are rentiers (around 14%), while 11% receive money from children/relatives living in Goa/India. Income via social security schemes from the government is a source for relatively more O-Os (11.5%) than Y-Os (9%). While 7% of the O-Os receive remittances from relatives living abroad, 5% of the Y-Os receive the same. The proportion of Y-Os and O-Os receiving income from salaries (4% to 5%) and self-employment (6% to 7%) is similar. 6% of the Y-Os reported receiving income from agriculture and allied activities, double the share of the O-O respondents. Finally, 1.5% of the O-Os and 0.5% of the Y-Os received financial help from charitable organisations.

Significant associations were found only in the case of five components and at varying significance levels. A highly significant association at the 1% significance level was found between the number of Y-Os and O-Os having trade/business as a source of income ($\chi^2=8.396$, $df=1$, $p=.004$) and getting returns on shares/dividends/bonds ($\chi^2=9.826$, $df=1$, $p=.002$) in favour of the Y-Os. Besides, a significant association at the 5% level of significance was found regarding availing income via social security benefits ($\chi^2=4.404$, $df=1$, $p=.034$), but this time, to the advantage of the O-O. Lastly, significant associations were found between the number of Y-O and O-O, in favour of Y-Os earning income from interest on savings/fixed deposits ($\chi^2=3.424$, $df=1$, $p=.064$) and retirement pension ($\chi^2=3.405$, $df=1$, $p=.065$) at the 1% level.

Concerning monthly expenditures, once again, Figure 6.16 reveals that the elderly spend money on multiple items. The primary expenditure category among the Y-O (83%) and O-O (77%) is on food items. The only item of expenditure on which a slightly higher percentage of O-Os (74%) reported spending more was medical expenses than the Y-Os (68%), being the next component subsequent to food expenditures, on which a large number of elderly spent money.

Quite a high proportion of older adults reported spending money on utilities, ranging from 60% to 67% of the Y-Os and 49% to 59.5% of the O-Os. These include expenditure on payment of water/electricity bills, on transport, be it on spending for fuel for their vehicle or paying the fare of buses/hired vehicles, telephone/mobile phone related charges, and cooking fuel. Compared to the items mentioned in the above paragraph, a lesser percentage of older respondents (around 32% to 34% Y-Os and between 25% to 28.5% O-Os) spent money on the purchase of clothing/footwear, consumer services such as payment of salary of the domestic servant, tailoring charges, laundry, as well as personal care items and toiletries. While 26% of Y-O respondents reported spending money on alcohol/cigarettes/tobacco products, the same was true for only 8% of O-O respondents. Lastly, very few older adults, around 13.5% to 21% of the Y-O respondents and 7% to 9% of the O-O respondents reported paying for the repair and maintenance of their house and household goods, spending on the education of children/grandchildren, and expenditure on entertainment/outings, besides social/religious events.

A significantly higher number of Y-Os spend money on certain components of expenditure as compared to their O-O counterparts. Highly significant associations were found between the number of Y-Os and O-Os spending money on food ($\chi^2=17.864$, $df=1$, $p=.001$), cooking fuel ($\chi^2=13.149$, $df=1$, $p=.000$), water/electricity bills ($\chi^2=15.930$, $df=1$,

p=.000), transportation ($\chi^2=17.160$, df=1, p=.000), entertainment/outings ($\chi^2=11.294$, df=1, p=.001), education of children/grandchildren ($\chi^2=7.177$, df=1, p=.007), and alcohol/cigarettes/tobacco ($\chi^2=22.962$, df=1, p=.000), all significant at the 1% level, highlighting the fact that a significantly more number of Y-Os were spending money on these items as compared to the O-Os. Finally, a significantly higher number of Y-Os spent money on consumer services ($\chi^2=5.627$, df=1, p=.018), social/religious events ($\chi^2=4.593$, df=1, p=.032), and donations/charity ($\chi^2=4.00$, df=1, p=.046), significant at the 5% level. Important to note is that though the only component on which a relatively higher number of O-Os spent money compared to the Y-Os, no statistically significant association was found, indicating that health-related expenditures are being incurred on more or less a similar basis by both categories of elderly respondents.

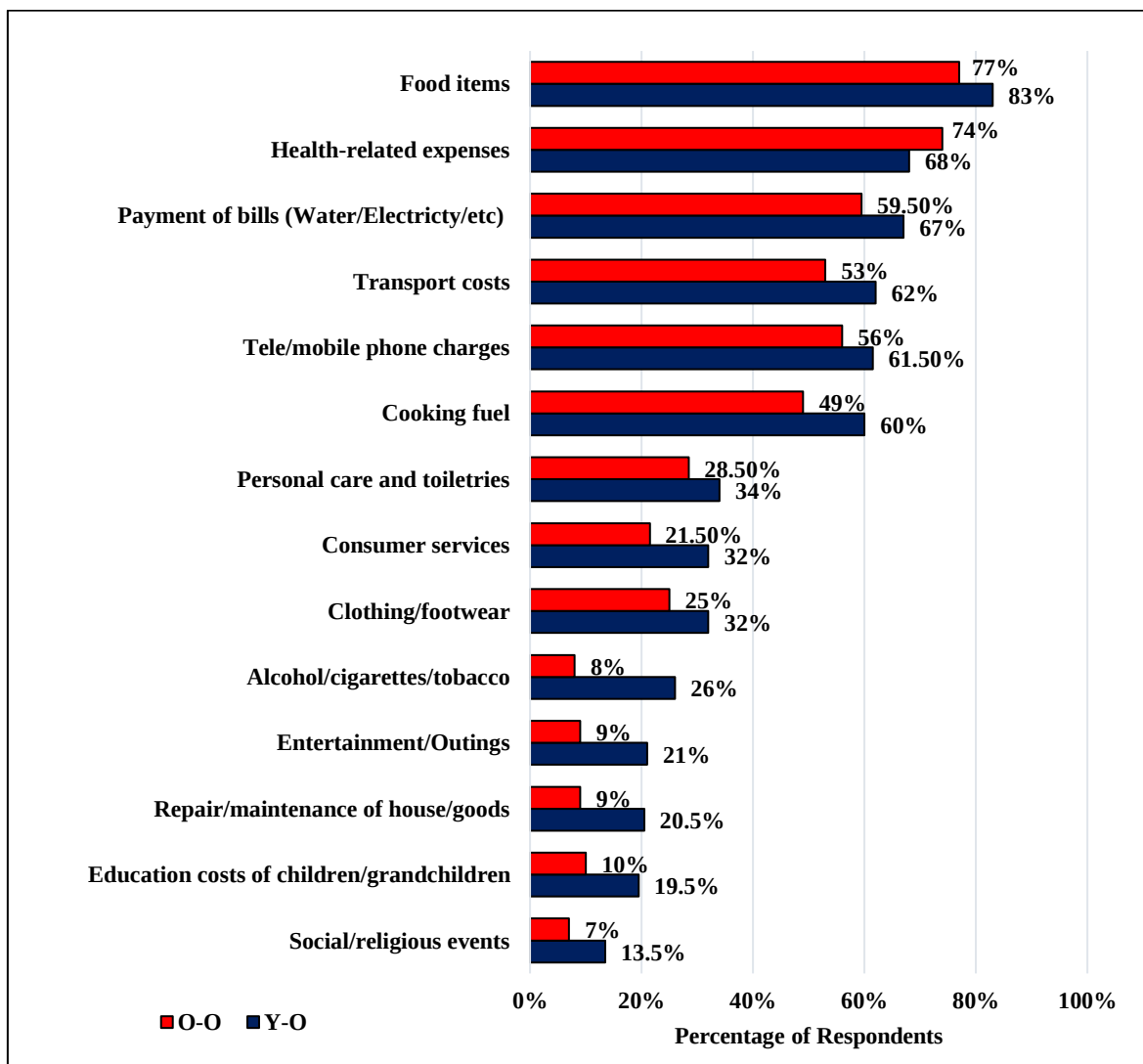


Figure 6.16: Comparison of Items of Expenditure of the Y-O and O-O Respondents
Source: Primary survey

6.2.3.3 Debt Repayments and the Elderly

Concerning debt repayments, Table 6.5 highlights that a large majority of the elderly do not have any debts yet to be repaid³. However, looking at it from a gender perspective, a highly significant gender association was found to the disadvantage of Y-O males ($\chi^2=8.064$, $df=1$, $p=.005$) as opposed to no significant gender association among the O-O category ($\chi^2=2.130$, $df=1$, $p=.144$).

Table 6.5: Percentage of Older Adults with regard to Repayment of Pending Debts

	Y-Os [No. (%)]			O-Os [No. (%)]		
	Male	Female	Total	Male	Female	Total
Pending Debt to be Repaid	19 (9.5)	5 (2.5)	24 (12)	10 (20)	13 (6.5)	33(16.5)
No debt repayments	85(42.5)	91(45.5)	176 (88)	39 (78)	89(44.5)	167(83.5)

Source: Primary survey

6.2.4 Financial Dependence and Reverse Financial Dependence

Destitution and impoverishment among older adults are presumed to be a consequence of shifting socio-demographic dynamics. In light of the fact that such analysis plays an essential role in tackling the issues of older individuals, bridging the gap between socio-economic needs and the availability of resources (Chakraborty, Chaudhury, and Bandyopadhyay 2019, 7), we try to identify *which categories of older adults are fully financially dependent on others? (RQ6.3)*

Table 6.6 reveals the extent of financial dependency among older adults in Goa. Out of the total older adults living at home, a little less than one-third of them (31%) are fully financially dependent on others. A higher percentage of the O-O (35.5%) are fully financially dependent compared to their counterparts (26.5%). Nevertheless, many older individuals have their own sources of income; however, these are insufficient for them. Hence, they remain partially dependent on others for their finances. Once again, a higher percentage of O-Os (31%) were partially dependent on others compared to the Y-Os (23.5%). Concerning financial independence, while 50% of the Y-Os were financially independent, only 33.5% of the O-Os were financially independent. The Chi-square test indicates that a very significant association exists at the 1% level among the Y-O and O-O in terms of the status of their financial dependence on others to meet their needs ($\chi^2=16.069$, $df=2$, $p=.003$), with the O-Os being 1.34 times more likely to be fully financially dependent compared to their Y-O counterparts.

In certain cases, instances of *Reverse Financial Dependency* also exist, wherein other family members are fully dependent on the elderly household members to meet their needs. Though the majority of the Y-O (57.5%), as well as the O-O (73%), reported that they do not have to fully financially support their household members (though many of them contribute to the household budget expenditure), it is essential to note that 42.5% of the Y-Os still have to fully financially support their household members, while the same is in the case of 27% of the O-Os, thus indicating that a little over one-third of the sample have to fully financially support their household members. The Chi-square test suggests that a higher number of Y-Os are engaged in reverse financial dependency compared to their counterparts at the 10% significance level ($\chi^2=2.981$, $df=1$, $p=.084$), the former being 1.6 times more likely than the latter.

Table 6.6: Dependency and Reverse Financial Dependency among the Y-O and O-O

	Y-O [n (%)]	O-O [n (%)]
<u>Financial Dependency</u>		
Fully dependent	53 (26.5)	71 (35.5)
Partially dependent	47 (23.5)	62 (31.0)
Not dependent	100 (50.0)	67 (33.5)
Total	200 (100)	200 (100)
<u>Reverse Financial Dependency</u>		
Percentage of older adults who financially support their household members	85 (42.5)	54 (27)

Source: Primary survey

6.2.4.1 Identification of the Predictors of Full Financial Dependence among Older Adults

The binary logistic regression method is used to understand the determinants of financial dependency among the elderly to identify the categories of older adults who are fully financially dependent on others to meet their daily needs. Full financial dependence is the dependent variable wherein the options considered are ‘Fully financially dependent’ and ‘Not fully financially dependent’.

Based on prior studies that dealt with the determinants of financial dependence, we select a set of independent variables comprising socio-demographic (Vlachantoni 2012, 104) and health-related aspects (Mane 2016, 1-2). Our independent variables include gender, age, marital status, educational qualification, and locality. Two health-related independent variables (analysed in further detail in Chapter 7) were also included, comprising older adult’s perception of their health status based on the statement,

‘Compared to one year ago, how would you rate your health in general now?’ which they rated on a five-point Likert scale, from much better now than a year ago, to much worse now than a year ago. The monthly health expenditure of the older adult was assessed as the second health variable. The method of operationalisation is given in Table 6.7.

Table 6.7: Mode of Operationalisation for Binary Logistic Regression of Financial Dependence

Variable considered	Mode of Operationalisation	Variable type
Financial Dependence	FINDEP: 1=Fully Financially dependent, 0=otherwise	Categorical
Gender	SEX: 1=Male, 0=otherwise	Categorical
Age	AGE: 1=Young-Old, 0=otherwise	Categorical
Current Marital Status	MARRIED: 1=Currently married, 0=otherwise	Categorical
Educational Qualification	EDU: 1=Formally educated, 0=otherwise	Categorical
Locality	LOC: 1=Urban, 0=otherwise	Categorical
Health Status Perception	HEALTH	Likert scale
Log of Health Expenditure	lnHEXP	Continuous

The following logistic regression model is tested:

$$\begin{aligned}
 FINDEP_i &= \log \left(\frac{\text{Fully Financially Dependent}}{\text{Not Fully Financially Dependent}} \right)_i \\
 &= \alpha + \beta_1.SEX_i + \beta_2.AGE_i + \beta_3.MARRIED_i + \beta_4.EDU_i + \beta_5.LOC_i \\
 &\quad + \beta_6.HEALTH_i + \beta_7.lnHEXP + \epsilon_i
 \end{aligned}$$

The *Omnibus Tests of Model Coefficients* used to assess the model fit indicate that the model is highly significant ($\chi^2=85.625$, $p=.000$). The *Hosmer and Lemeshow statistic* indicates a poor fit if the significance value is less than 0.05. In our case, we find that the model adequately fits the data (since $p=0.172$). The *Pseudo R-squared* presented by *Nagelkerke's R-squared* specifies that the independent variables account for a 27% change in the outcome variable. The model correctly classified 70% of cases (*Percentage Accuracy in Classification*), indicating good model accuracy.

The results in Table 6.8 reveal that the log odds of being fully financially dependent in old age is very significantly lower by 0.53 times among elderly males in comparison to their female counterparts (reference category) at the 1% level of significance, similar to the findings of Vlachantoni (2012, 104). We also find that the log odds of being fully financially dependent are significantly lower at the 5% level by 0.48 times among the Y-O compared to the O-O. Though the tendency to be fully financially dependent is lower for married and educated older adults, the results are not statistically

significant. However, the log odds of being fully financially dependent are very significantly lower by 0.39 times among the elderly living in rural areas. Regarding health variables, we find that an improved health status perception very significantly lowers the log odds of being fully financially dependent at the 1% significance level by 1.33 times. We also find that for every one-unit increase in health expenditure, the log odds of being economically dependent significantly increased by one time, resembling the findings of Mane (2016, 1-2). Primarily, elderly females, the O-O, those residing in urban areas, and those with a poorer health status perception and high health expenditures are more inclined to be fully financially dependent on others.

Table 6.8: Socio-Demographic and Health Factors Determining Financial Dependence

Factors	B	S.E.	Wald	df	Sig.	Exp(β)	95% C.I. for Exp(β)	
							Lower	Upper
Gender	-.628	.236	7.105	1	.008***	.534	.336	.847
Age	-.725	.281	6.632	1	.010**	.484	.279	.841
Marital status	-.055	.250	.048	1	.826	.947	.580	1.545
Education	-.753	.468	2.587	1	.108	2.124	.848	5.319
Locality	-.944	.241	15.320	1	.000***	.389	.243	.624
Health Status	-.284	.151	3.510	1	.061*	1.328	.987	1.787
Health expenditure	.000	.000	4.015	1	.045**	1.000	1.000	1.000
Constant	1.839	.987	3.472	1	.062*	6.292		

*** $p < .01$, ** $p < .05$, * $p < .1$

6.2.5 Living Standards Capabilities of the Elderly: Complementing the ‘Resource-Based Approach’ with the ‘Capability Approach’

So far, we have conducted a detailed analysis of the household and personal income and expenditure of older adults. However, this determines only one aspect of their standard of living from a ‘Resource-based approach’. Sengupta (2016, 43) rightly pointed out that although essential, these material resources (for example, income and consumption expenditure) are not enough for people’s overall well-being, especially the elderly, particularly in the less developed world. In this vein, Amartya Sen purported the *Capability Approach* that forms the basis of evaluating the Living Standards Capabilities according to which, “The value of the living standard lies in the living, and not in the possessing of commodities, which has derivative and varying relevance.” The Capability Approach highlights the variation in individuals’ freedoms to live a life they find meaningful and valuable (Sen 1987, 25). Given that the Capability Approach is now widely acknowledged to be the most accurate gauge of living standards appropriate for the

elderly (Alhambra-Borrás, Doñate-Martínez, and Garcés-Ferrer 2021, 2527; Breheny et al. 2016, 307), for reasons as already outlined in the review of literature (Section 2.4.3), we analyse the nature of the living standards capabilities of the elderly by assessing *whether the Living Standards Capabilities of Elders Scale (LSCAPE) is a suitable instrument to evaluate the living standards of older adults in Goa from a Capability Perspective (RQ4.4)*.

6.2.5.1 Adoption of LSCAPE-25 to Assess Living Standards from a Capability Perspective

Recognising the significant impact of living standards on older individuals' capacity to age well and engage in community life, six domains of living standards have been defined based on Sen's Capability Framework. These domains assess the degree to which older adults have the freedom to pursue various aspects of life, resulting in a comprehensive measure of living standards tailored specifically to the needs of the elderly, in the form of the 25-item Living Standards Capabilities of Elders Scale (LSCAPE-25). Through this framework, living standards are perceived as ranging from constraints to freedoms. This perspective enables an assessment of the liberties that individuals experience and allows for examining disparities in these freedoms across different strata (Breheny et al. 2013, 1035). The six spheres delineated by the living standard capabilities are mentioned below.

6.2.5.1(a) The Capability to Live in Physical Comfort: Health

The realm of physical comfort emphasises considerations related to health, well-being, and access to healthcare services. Optimal health represents a significant capability, influenced partly by the availability and efficiency of healthcare access. Exploring preventable morbidity offers insight into variations in living standards. Diminished living standards correlate with adverse mental and physical health outcomes (Stephens et al. 2011, 73). Living standards exert an impact on health and well-being, even among individuals who are not economically disadvantaged. While those with the least resources in society typically experience the most adverse outcomes, individuals with relatively comfortable means still exhibit inferior health and higher mortality rates compared to those in higher socio-economic positions (Marmot, Allen, and Goldblatt 2010, 1254). These health inequalities, spanning a continuum from the lowest socio-economic status to the highest, have been demonstrated to endure and intensify among older individuals following retirement from the workforce (Stephens et al. 2011, 74).

6.2.5.1(b) *The Capability to be Connected to Others: Social Integration*

Living standards encompass elements such as engagement in traditional social activities. (Saunders, Naidoo, and Bedford 2008, 175). Reduced living standards correlate with limited opportunities for social support (Stephens et al. 2011, 83). Additionally, lower living standards contribute to decreased social participation, hindering the ability to host guests or attend social gatherings. These limitations are often utilised as indicators of material deprivation (Renahy et al. 2012, 1).

6.2.5.1(c) *The Capability to Contribute to the Lives of Others: Contribution*

Martela (2023, 811) contends that positively impacting others by contributing in some way to their lives is a central dimension of the Capability Perspective. The active participation of older persons in society is based on providing older persons with the opportunity to continue contributing to society. The United Nations Economic Commission for Europe (UNECE 2020, 13) rightly notes that the contributions of older persons reach beyond their economic activities, extending into their roles in the family and the community. Often, these contributions cannot be measured economically, such as care for family members and voluntary activities in the community.

6.2.5.1(d) *The Capability to Experience Enjoyment: Enjoyment*

Capabilities include the freedom a person has to ‘enjoy’ valuable functions. As Jarosz (2022, 1242) rightly advocates, it is not solely the engagement in particular activities but rather the enjoyment of the opportunities in individuals’ lives and the level of pleasure they derive from them that fosters their well-being in older age. The elderly are aware of the activities that hold meaning for them, and they perceive participation in these activities as a vital component for successful ageing (Reichstadt et al. 2010, 567). Participation in social, economic, cultural, sporting, and recreational activities that older adults enjoy contributes to the growth and maintenance of their well-being (UNECE 2020, 21).

6.2.5.1(e) *The Capability to Feel Secure: Security*

Elderly individuals with a fixed income must balance their present material circumstances with the need for future security amidst uncertainty regarding their longevity and the sufficiency of resources to address evolving health and social care requirements (Breheny et al. 2013, 1035). Metrics evaluating access to a stable future possess the capability to measure a facet of living standards that fluctuates significantly across the spectrum from the most deprived to the most advantaged. Older individuals are primarily seeking not

merely the purchasing power of economic resources but rather the ability to navigate the uncertainties associated with later life (Mansvelt, Breheny, and Stephens 2014, 1666). Limited living standards hinder the ability to effectively respond to unforeseen circumstances, and a metric that acknowledges this has the potential to capture both the psychological and material challenges influenced by inadequate economic resources.

6.2.5.1(f) *The Capability to Make Choices: Restriction*

This area evaluates autonomy by examining access to various options (Breheny et al. 2013, 1045). This entails conceptualising living standards as a constraint on the ability to select living conditions and the incapacity to engage in activities that contribute to one's sense of identity. Marmot et al. (2010, 1254) contend that this domain focuses on "the capability/difficulty of getting through the day."

Thus, LSCAPE-25 comprises 25 statements consisting of six first-order factors: Healthcare (HC), Contribution (Con), Social Integration (SI), Enjoyment (Enj), Restriction (Res), and Security (Sec). Responses from the entire sample of 500 respondents were sought to capture their ability to live a life they have reason to value. The respondent rated each statement on a five-point Likert Scale, ranging from 1: Strongly disagree to 5: Strongly agree. Only in the case of the last construct having negative wording, responses were reverse coded, giving higher weight to those who did not face restrictions.

6.2.5.2 LSCAPE: The Confirmatory Factor Analytic Approach

A common strategy that views LSCAPE as an underlying entity that can be quantified is the factor analytic approach. Using the CFA approach, this study examines the living standards capabilities of the aged population in Goa using the LSCAPE items. It determines whether the data fits the model well. It displays linkages among observed variables, highlighting the inherent latent factors in living standards capabilities. It also aids in deriving the second-order component, namely the overall LSCAPE summary score, using the *Maximum Likelihood* method. The Measurement Model of LSCAPE used to test the model fit, validity, and reliability is presented in Figure 6.17. Besides, the figure also highlights excerpts of the 25 items (detailed in the questionnaire in Appendix I). Every oval corresponds to a latent element: HC, SI, Con, Enj, Sec, and Res. Thus, the CFA model was run using AMOS to test the feasibility of using LSCAPE to measure the living standards capabilities of older Goans.

6.2.5.2 (i) Model Fit

In the realm of CFA, various model fit indices are employed to assess the adequacy of the proposed model in explaining the observed data. These fit indices serve as quantitative measures to determine how well the model aligns with the empirical data⁴. No single fit index should be considered in isolation. Researchers assess multiple indices collectively to gain a more comprehensive understanding of how well the model fits the data. The choice of fit indices depends on the specific context and the characteristics of the dataset being analysed in CFA. Results of the fit indices of our Measurement Model (Figure 6.17) have been presented in Table 6.9. The initial model gave a perfect fit to the data, fulfilling all the cut-off values. Hence, there was no need for model re-specification.

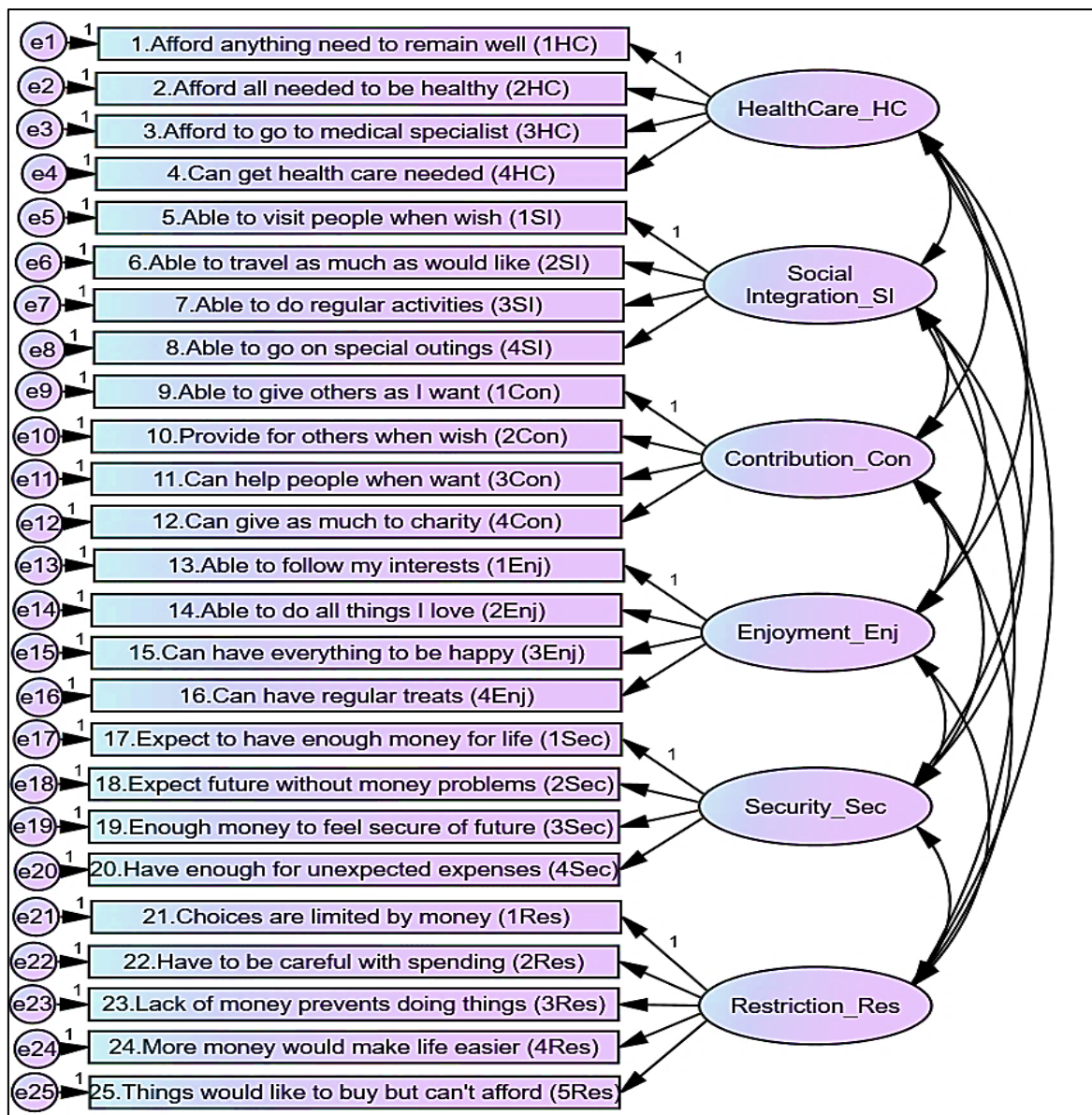


Figure 6.17: Measurement Model of LSCAPE

Source: Primary survey

Table 6.9: Fit Indices of the LSCAPE Measurement Model

Model	GFI	CFI	TLI	RMSEA	SRMR	CMIN/df
Cut-off value	>=0.90	>=0.90	>0.90	=/<0.08	=/<0.08	<3.0
Measurement Model	0.901	0.953	0.946	0.061	0.050	2.848

GFI=Goodness of fit index, RMSEA=Root Mean Square Error of Approximation, TLI=Tucker-Lewis Index, SRMR= Standardized Root Mean Square Residual, CFI=Comparative Fit Index, CMIN/df=Chi-square value/degrees of freedom

6.2.5.2 (ii) Reliability and Validity

The next step is to check for the reliability and validity of the model⁵. Reliability examines the internal consistency of a measure, with *Cronbach's alpha*⁶ (α) and *Composite Reliability*⁷ (CR) being its two main measures (Hair et al. 2010, 737). Validity is about the accuracy of a measure, primarily assessed via Convergent Validity⁸ [for which *Average Variance Extracted*⁹ (AVE) is utilised] and *Discriminant Validity*¹⁰ (DV) (Henseler et al. 2015, 115; Fornell and Larcker 1981, 39).

Table 6.10 indicates that all six constructs of LSCAPE had very good internal consistency owing to a high Cronbach's value above 0.7. Similarly, values for CR are all higher than 0.70, establishing CR. Concerning validity, AVE is more than 0.5 in all cases, suggesting Convergent Validity for the Model. Similarly, the square root of the AVE of each construct is much larger than the correlation of the specific construct with any of the other constructs, establishing DV in the model. Evaluation of the Measurement Model paves the way for analysing the second-order factor structure of LSCAPE.

Table 6.10: Reliability and Validity of the LSCAPE Model

Factors	Cronbach α	AVE	CR	DV					
				HC	SI	Con	Enj	Sec	Res
HC	.886	0.664	0.887	0.815					
SI	.851	0.594	0.852	0.763	0.771				
Con	.935	0.784	0.935	0.771	0.720	0.885			
Enj	.889	0.673	0.891	0.804	0.753	0.815	0.820		
Sec	.906	0.712	0.908	0.730	0.718	0.745	0.813	0.844	
Res	.910	0.671	0.910	0.184	0.104	0.214	0.202	0.178	0.819

The Second-Order CFA is a statistical method employed to confirm that the theorised construct in a study loads onto a certain number of underlying sub-constructs or components. For example, the theory posits that the LSCAPE (second-order) construct

consists of six underlying first-order sub-constructs. First of all, we observe that, as in the case of the Measurement Model, all fit indices in the second-order CFA model display the required level (Table 6.11). High factor loadings cause the convergence of observed variables on the same construct. All factor loadings should be greater than or equal to 0.5 (Malhotra and Birks 2007, 291). A loading greater than 0.70 is preferable; however, a loading even of 0.5 or 0.6 may be appropriate. Figure 6.18 shows a high degree of convergence of observed variables on their first-order constructs ($p < 0.001$ in each case).

Table 6.11: Fit Indices of the Second-Order LSCAPE CFA Model

	GFI	CFI	TLI	RMSEA	SRMR	CMIN/df
Cut-off value	≥ 0.90	≥ 0.90	> 0.90	≤ 0.08	≤ 0.08	< 3.0
	0.90	0.952	0.946	0.060	0.054	2.822

GFI=Goodness of fit index, RMSEA=Root Mean Square Error of Approximation, TLI=Tucker-Lewis Index, SRMR= Standardised Root Mean Square Residual, CFI=Comparative Fit Index, CMIN/df=Chi-square value/degrees of freedom

Similarly, Table 6.12 highlights the *Standardised Regression* estimates of the first-order factors loading onto the second-order factors, indicating convergence onto the second-order construct. Furthermore, Table 6.12 also indicates that the R^2 for all sub-constructs are high. Thus, the theory that Living Standards Capabilities of the Elderly (LSCAPE) consists of six sub-constructs is well supported. Given that the model fit was good and the validity and reliability of the model have been achieved, we can conclude that LSCAPE is a suitable instrument for measuring the living standards capabilities of older adults. We can thus proceed to evaluate the LSCAPE scores of the elderly.

Table 6.12: Standardised Regression Weights of Second-Order LSCAPE CFA

	Construct	Estimate	P	R^2
HC	→ LSCAPE	.853	Reference point	.73
SI	→ LSCAPE	.885	***	.78
Con	→ LSCAPE	.891	***	.79
Enj	→ LSCAPE	.954	***	.91
Sec	→ LSCAPE	.883	***	.78
Res	→ LSCAPE	.807	***	.65

*** $p < 0.001$

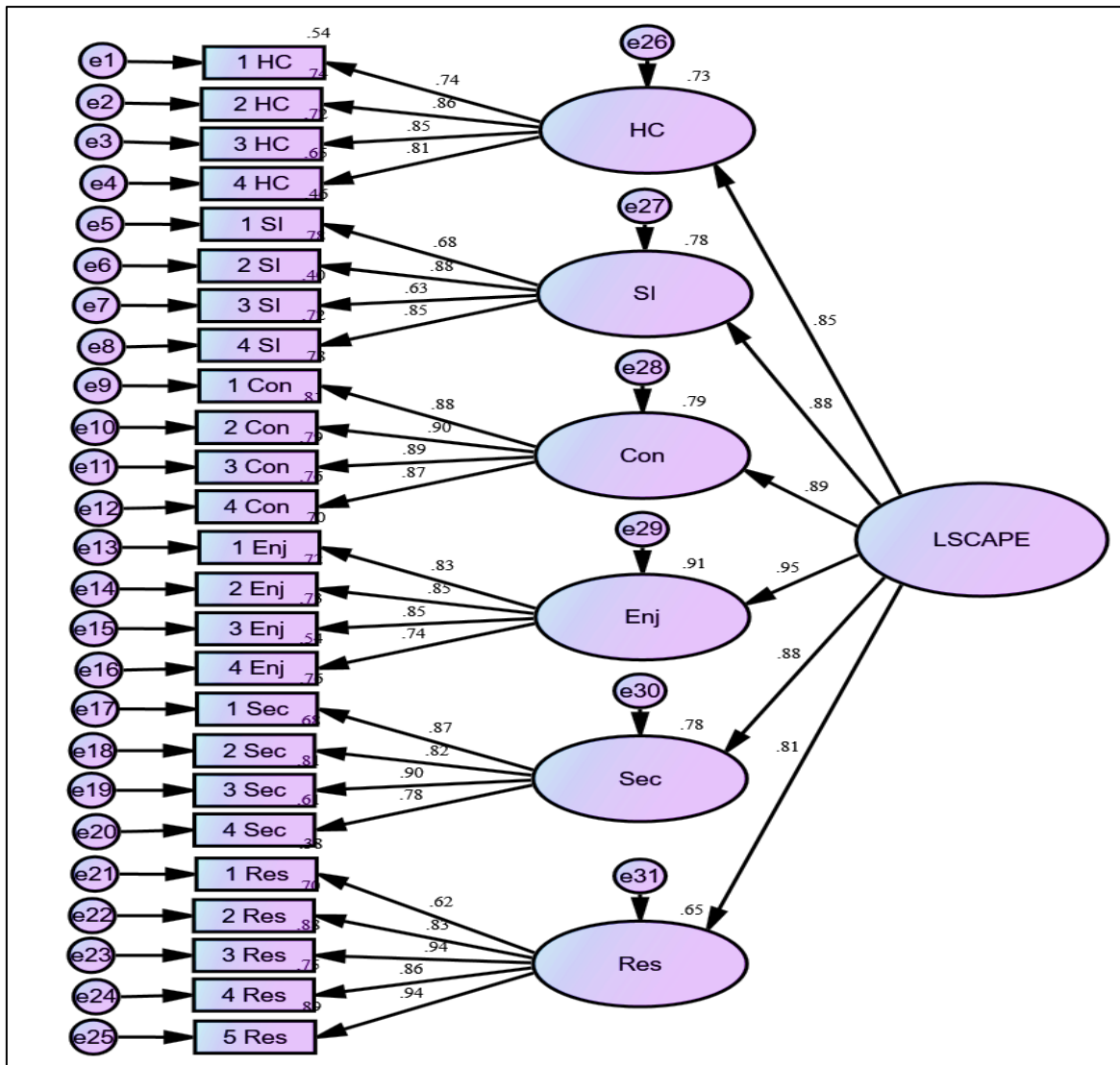


Figure 6.18: Second-order CFA Model of LSCAPE
Source: Primary survey

The summation of the average construct scores gives us the final average LSCAPE score of the total sample. An individual's LSCAPE score can range between 25 and 125, with a higher value signifying a higher living standard capability, with the median LSCAPE score being fixed at 75. Overall, LSCAPE scores ranging from 25-58 indicate a *lower* living standard capability, those between 59-92 indicate a *moderate* level, and those between 93-125 indicate a *high* living standard capability. Table 6.13 represents the mean and standard deviation of the subscale indicators of LSCAPE. In Goa, the average LSCAPE score of the Goan elderly is 60.01 (SD:29.24), which is lower than the median value, indicating a moderate living standard capability of older Goans. Comparing this to the findings of a study of older New Zealanders (Breheny et al. 2016, 329), it was found that their average LSCAPE score was higher at 85.5 (SD: 22.7).

Table 6.13: Mean Scores of the Subscales of LSCAPE of Older Adults in Goa

Constructs	Mean	Standard deviation
HC	11.43	4.872
SI	10.42	4.568
Con	9.62	5.081
Enj	10.03	4.823
Sec	9.14	4.891
Res	9.37	5.009
LSCAPE	60.01	29.244

Source: Primary survey

While analysing the sub-domains, it was observed that the capability to live in physical comfort measured via the Healthcare (HC) factor had the highest mean score at 11.43 (SD: 4.87), which is essential given that access to good healthcare is one of the basic needs being emphasised by the SDGs. However, compared to older Goans, the mean score of older New Zealanders was found to be higher at 15.30 (SD: 4.15) (*ibid*, 330). The next highest domain score was related to the capability to be connected to others via Social Integration (SC) at 10.42 (SD: 4.57), once again lower in comparison to older New Zealanders at 14.17 (SD: 4.11). Given that the survey was conducted during the COVID-19 pandemic period in India (Goa), this capability was assessed based on older adults' social integration just before the pandemic, owing to mobility restrictions and social distancing. The capability to experience Enjoyment and to do things that bring older adults happiness (Enj) received a mean score of 10.03 (SD: 4.82), while that in the case of the capability to Contribute to the lives of others (Con) was 9.62 (SD: 5.08), both lower than the findings of older New Zealanders which were 14.70 (SD: 3.96) and 12.36 (SD: 4.40) respectively. In the case of the capability to make Choices (Res), older New Zealanders scored the highest in this domain [15.96 (SD: 5.07)] while the mean score of older Goans was 9.37 (SD: 5.0), signifying a lower autonomy level of the latter. Finally, the lowest mean score was found in the case of the capability to feel Secure about the future (Sec) with a mean score of 9.14 (SD: 4.89), presenting an uncertain future in terms of financial security of elderly Goans, opposed to a higher score among older New Zealanders [12.81 (SD: 4.61)]; signifying that when measured from a Capability Perspective, the average living standards of the elderly in Goa are moderate. Thus, often, only measuring living standards from the materialistic point of view may not yield a holistic perspective, as adequate resources are not the only factor, but the capability to function effectively is essential as well. We test *whether significant heterogeneity exists across older adults concerning their living standards capabilities* by answering RQ4.5.

6.2.5.3 Differences in Living Standards Capabilities among the Elderly in Goa

Given that the data followed a *normal distribution* (Kim 2013, 52), ANOVA and t-tests were adopted, the results of which are presented in Table 6.14, indicating significant differences in living standards capabilities of the elderly based on gender, age, living arrangements, and current work status. With regard to gender, elderly males had a significantly higher mean LSCAPE score (70.09) compared to elderly females (61.44). Significant differences were also noticed concerning each sub-factor, with elderly males having relatively higher mean scores. As regards age groupings, the elderly aged between 60 and 69 years had the highest significant average LSCAPE score (71.54), as well as the highest score on each individual construct. They were followed by the elderly aged between 70 and 79 and those aged 80 to 89. The elderly aged 90 years and above had the lowest living standards capabilities.

With regard to living arrangements, once again, significant differences were found. It was the elderly living with family who had the highest average LSCAPE score (72.57), followed by those living alone (69.19). It was found that those living in OAHs had the lowest living standard capability. Among the individual construct scores, these differences were significant only in a few cases (Enj, Sec, and Res). Concerning educational qualifications, significant differences were observed in the LSCAPE score and in another three sub-domains (HC, Enj, and Res), with the elderly who completed their college and/or pursued further education having the highest score in all cases. Finally, with regard to the current work status (which is elaborated in greater detail in Section 2 of Chapter 8), a significant difference was found at the 10% level of significance, with those who never worked having the lowest average score (59.82), while those who worked till retirement (66.46) and those working post-retirement age (66.09) having more or less similar scores. Significant differences concerning individual constructs were found only in two cases (Con and Res).

It is interesting to note that no significant differences were found with regard to marital status and the overall LSCAPE score, except for one factor (Res), wherein the elderly who were divorced/separated had the highest score, followed by those who were married as well as the unmarried. The widowed had the lowest score. Similarly, though the overall LSCAPE score was not significant, whether the elderly resided in a rural or urban area, only in the case of the last component (Res) was a significant difference found at the 10% level to the advantage of urbanites.

Table 6.14: Differences in LSCAPE Scores of the Elderly

Variable	LSCAPE Scores [Mean (Standard Deviation)]						LSCAPE
	HC	SI	Con	Enj	Sec	Res	
<u>Gender</u>							
Male	12.04(5.02)	11.22(4.8)	10.57(5.11)	10.82(4.7)	10.1(5.10)	15.34(6.0)	70.09(22.37)
Female	10.94(4.70)	9.78(4.24)	8.86(4.92)	9.4(4.798)	8.37(4.58)	14.08(6.5)	61.44(22.93)
p-value	0.012**	0.000***	0.000***	0.001***	0.000***	0.028**	0.000***
<u>Age Groups</u>							
60-69	12.46(4.81)	11.58(4.6)	11.06(5.01)	11.18(4.6)	10.18(4.9)	15.08(5.9)	71.54(22.36)
70-79	10.77(4.89)	9.78(4.57)	8.98(5.01)	9.69(4.96)	8.81(4.92)	14.87(6.7)	62.89(23.81)
80-89	9.8(4.485)	8.24(3.07)	6.8(3.912)	7.49(4.15)	6.86(3.95)	13.16(6.66)	52.35(16.68)
90-99	8.38(1.408)	8.63(0.74)	5.63(1.59)	6.38(1.50)	5.88(1.45)	11.25(7.12)	46.13(10.50)
p-value	0.000***	0.000***	0.000***	0.000***	0.000***	0.093*	0.000***
<u>Marital status</u>							
Unmarried	11.36(5.51)	9.43(4.61)	9.6(5.38)	10.62(5.1)	9.24(5.08)	15.93(6.94)	66.17(23.54)
Married	11.66(5.24)	10.77(4.8)	10.26(5.2)	10.24(4.8)	9.39(5.12)	16.04(6.31)	68.36(22.75)
Widowed	11.28(4.59)	10.37(4.3)	9.32(4.93)	9.81(4.77)	8.95(4.72)	13.74(6.18)	63.46(22.79)
Separated/ Divorced	13.56(5.10)	11.67(5.8)	10.44(6.44)	11.67(5.2)	11.33(5.9)	17.78(5.74)	76.44(30.27)
p-value	0.56	0.404	0.366	0.53	0.58	0.003***	0.154
<u>Educational Qualifications</u>							
Uneducated	11.25(5.12)	10.25(5.0)	9.02(5.53)	9.23(5.16)	9.09(5.12)	13.54(6.83)	62.37(26.21)
Class X	11.38(4.21)	10.73(3.7)	9.45(4.676)	9.8(4.35)	8.92(4.64)	12.52(5.62)	62.8(21.394)
Class XII	10.99(5.00)	10.15(4.7)	9.45(5.15)	9.96(5.03)	8.92(4.86)	15.48(6.34)	64.95(22.58)
College and abv.	12.67(5.39)	10.61(5.1)	10.76(5.26)	11.18(4.8)	10.12(5.2)	17.46(6.04)	72.8(23.816)
p-value	0.078*	0.613	0.155	0.086*	0.269	0.000***	0.012**
<u>Living arrangements</u>							
Alone	12.08(4.68)	10.69(4.5)	9.92(5.179)	10.89(4.5)	10.17(4.8)	15.44(5.66)	69.19(20.67)
With family	12.19(5.81)	10.71(5.4)	10.51(5.61)	10.92(5.1)	10.2(5.22)	18.04(5.88)	72.57(24.44)
OAH	11.16(4.58)	10.32(4.3)	9.35(4.899)	9.71(4.72)	8.75(4.75)	13.63(6.24)	62.91(22.48)
p-value	0.173	0.741	0.167	0.057*	0.021**	0.000***	0.001***
<u>Locality</u>							
Urban	11.46(4.97)	10.24(4.6)	9.88(5.076)	10.37(4.7)	9.14(4.76)	15.3(6.37)	66.38(22.38)
Rural	11.4(4.80)	10.53(4.5)	9.43(5.07)	9.79(4.83)	9.12(4.97)	14.22(6.34)	64.48(23.52)
p-value	0.896	0.48	0.328	0.189	0.969	0.063*	0.368
<u>Current Work Status</u>							
Never worked	10.65(4.22)	9.97(3.73)	8.37(4.511)	9.54(4.40)	8.59(4.73)	12.7(6.006)	59.82(20.55)
Worked till retirement	11.48(5.28)	10.58(4.9)	9.77(5.175)	10.08(5.2)	9.26(5.28)	15.3(6.614)	66.46(24.21)
PRW	11.59(4.83)	10.47(4.5)	9.86(5.139)	10.13(4.7)	9.22(4.76)	14.82(6.28)	66.09(23.02)
p-value	0.255	0.564	0.048**	0.595	0.577	0.013**	0.062*

Source: Primary survey

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

6.2.5.4 Summary

This section analysed the heterogeneous financial situation of the elderly and their households in Goa. Among the elderly living in OAHs, those not having any income were cared for in government-run OAHs, while the fees of most of those in private OAHs were paid by their relatives. While O-O HHs bear the burden of relatively higher dependency ratios and household size accompanied by relatively higher monthly household (and per capita) expenditure, their monthly household (and per capita) income is lower compared to Y-O HHs. Highly significant differences in income and expenditure patterns exclusively of

the elderly are also evident, with their major sources of income being interest on deposits and retirement pension, while their major items of expenditure being on food and healthcare. A large majority do not have any debt repayments. Around one-third of the elderly live at home, primarily comprising elderly females, the O-O, those residing in urban areas, those having a poor perception of their health status, and those having high health expenses reported not having any source of income (nor getting any social support from the government), and were thus fully financially dependent on others. Nevertheless, instances of Reverse Financial Dependency were also noted, with a significantly higher number of Y-Os still having to fully financially support their household members. LSCAPE-25 proved to be a suitable instrument for measuring living standards capabilities, indicating a moderate living standard capability of older Goans. The capability to live in physical comfort had the highest mean score, followed by the capability to be connected to others, while the capability to make choices and to feel secure about the future had the lowest scores, with significant differences observed across socio-demographic groups. The vast heterogeneity observed among the elderly necessitates the need for assistance, primarily to vulnerable sections.

¹ Owing to very high costs of treatment especially for chronic kidney disease.

² The findings of Siqueira Lobo and Falleiro (2024c) are documented in a research paper entitled “The Economic Condition of Older Adults in Goa”, that is currently under the second stage of revisions in *Arthshastra Indian Journal of Economics & Research*, a UGC Care-listed journal.

³ No significant associations were found between the Y-O and O-O ($\chi^2=1.657$, $df=1$, $p=.198$).

⁴ Goodness-of-Fit Index (GFI) assesses the proportion of variance in the observed data accounted for by the model. Comparative Fit Index (CFI) measures how well the hypothesized model fits in comparison to a null model. Tucker-Lewis Index (TLI) compares the fit of the hypothesized model to a null model. Root Mean Square Error of Approximation (RMSEA) estimates the discrepancy between the model-implied covariance matrix and the observed data. Standardized Root Mean Square Residual (SRMR) measures the average standardized discrepancy between the observed and predicted correlations. The Chi-square test (χ^2) assesses the difference between the hypothesized model and the observed data in terms of the Chi-square value divided by the degrees of freedom (CMIN/df).

⁵ These evaluate the quality of research and indicate how well a technique/test measures something.

⁶ Cronbach’s alpha measures the degree to which items within a scale or test are interrelated, with a higher Cronbach’s alpha indicating greater internal consistency.

⁷ CR quantifies how well the indicator items within a latent construct reliably measures that underlying construct, with a CR of 0.7 or above generally considered good (Hair et al. 2010, 737).

⁸ Convergent Validity assesses the degree to which a measurement instrument correlates with other measures that theoretically should be related to the same construct.

⁹ AVE is the sum of squared standard loadings divided by the combined total of the squared standard loadings and the sum of the indicator error of measurement. AVE should exceed 0.5 to achieve convergent validity (Fornell and Larcker 1981, 339).

¹⁰ DV is a pre-requisite for analysing relationships between unobserved variables (Henseler et al., 2015, 115). DV specifically tests that two constructs are distinct and not measuring the same thing. The constructs pass the DV test between the groups where the correlation between them is low, which signifies that each construct though conceptually similar is different and distinct from the other constructs (Hair et al. 2010, 708). The diagonally presented values represent the square root of the AVE, which measures the variances between the indicator variables and their construct, while other items represent squared correlations between the model constructs.

CHAPTER 7: MORBIDITY, HEALTH-RELATED QUALITY OF LIFE (HRQOL), AND HEALTHCARE COSTS AMONG THE AGED IN GOA

Age is a predisposing determinant that is not directly responsible for healthcare utilisation. Instead, it is the relationship between age and need determinants such as health and disability that explain the age pattern of health expenditures: de Meijer et al. (2013, 359).

7.1 Introduction

This chapter seeks to study the triple jeopardy of ageism, mentalism, and ableism by investigating heterogeneity in the nature of morbidity and HRQOL among the elderly in Goa, including those living at home and in OAHs. It also seeks to unravel health-related costs borne by the elderly, including the factors affecting the choice of HCU between public and private health services, besides looking at the costs of caregiving for the elderly. When analysing these latter aspects, the focus is laid only on older adults residing at home. The reason for this is that, in government-run OAHs, the health costs of the elderly are borne by the government whenever required, while in non-government-run OAHs, the family members of the elderly pay whatever extra medical expenditure is required for the elderly inmate besides the fees, the amount of which is intimated to them by the in-charge of the OAH, while the inmates were themselves unaware about the same.

7.2 Morbidity Patterns: The Nature of Chronic Diseases

Morbidity refers to the condition of suffering from a chronic disease or medical condition. According to the WHO, chronic diseases tend to last for a long duration and are the result of a combination of genetic, physiological, environmental, and behavioural factors. Besides, there is a move to include chronic conditions that are not indicators of disease but long-standing functional disabilities, including developmental disorders and visual impairment (Bernell and Howard 2016, 1-2). This section attempts to analyse the heterogeneous nature of morbidity among older adults by answering the first research question of this chapter (RQ5.1): *Is morbidity among the elderly significantly associated with age, gender, living arrangement, and household income?*

Table 7.1 indicates the nature of morbidity concerning major medical conditions faced by the entire elderly sample. The top five highly reported chronic physical diseases among the elderly include Diabetes (285 respondents), Hypertension (182), Cardiovascular disease (147), Rheumatoid-/Osteo-arthritis (135), and Cancer (123). Besides, while around

80 to 90 elderly reported suffering from Chronic bodily pain and Chronic Respiratory Disease, between 40 to 60 of them reported severe Hearing loss and Prostrate/Hernia-related problems. Among the other physical ailments reported included Irritable Bowel Syndrome, Cirrhosis, Accidental injury, Chronic Kidney Disease, Paralysis, Parkinson's disease, and Vision loss.

Among the major mental diseases, Depression ranked as the most prominent, with around 104 elderly suffering from the same. Anxiety disorders and Dementia were reported by around 51 and 40 respondents, respectively, while 13 elderly were suffering from Alzheimer's disease. Out of the entire sample of 500 respondents, only 18 reported not suffering from any sort of physical or mental disease.

Although morbidity is part of the normal ageing process, it is observed that chronic conditions are found to be more common among the oldest-old (Jaul and Barron 2017, 1; Lucca et al. 2015, 258). An interesting observation was made while examining differences in the nature of diseases among the Y-O and O-O that a relatively higher number of Y-Os reported suffering from major chronic physical diseases such as Diabetes, Hypertension, Cardiovascular disease, Rheumatoid-/Osteo-arthritis, and Cancer, as well as major mental illnesses. However, upon performing Chi-square tests, none of these associations were significant, even at the 10% significance level. This highlights the fact that morbidity is plaguing the Y-O and O-O alike, resulting in no significant associations between them with regard to any of the diseases.

From a gender perspective, Alharbi et al. (2020, 1684) contend that elderly females are more likely to suffer from chronic diseases than elderly males. In this vein, a segregation of the nature of diseases based on gender in our study revealed that a significantly higher number of females suffer from both physical and mental health-related problems. Rheumatoid-/Osteo-Arthritis ($\chi^2=15.252$, $df=1$, $p=.000$), Cancer ($\chi^2=2.923$, $df=1$, $p=.087$), Diabetes ($\chi^2=4.889$, $df=1$, $p=.027$), Hypertension ($\chi^2=5.180$, $df=1$, $p=.023$), Anxiety disorders ($\chi^2=4.520$, $df=1$, $p=.034$), Depression ($\chi^2=4.456$, $df=1$, $p=.035$), and Chronic Respiratory Disease ($\chi^2=6.545$, $df=1$, $p=.011$), are significantly more prevalent among elderly females; while Cardiovascular disease ($\chi^2=5.195$, $df=1$, $p=.023$), Cirrhosis ($\chi^2=3.509$, $df=1$, $p=.061$), and Hernia/Prostrate problems ($\chi^2=30.871$, $df=1$, $p=.000$) are more prevalent among elderly males.

From a living arrangement perspective, Akbar et al. (2018, 193) indicate that the prevalence of mental health problems among the elderly living in OAHs is higher compared to those living at home. Our findings suggest that even though the number of

elderly living at home (n=400) is four times greater than those living in OAHs (n=100), a higher number of elderly living in OAHs reported to be suffering from mental health problems. However, the findings were significant only in two cases: Alzheimer's disease and Dementia. For instance, while nine elderly living in OAHs suffered from Alzheimer's disease, four elderly living at home suffered from the same ($\chi^2=4.160$, $df=1$, $p=.041$, $FET=.047$). Similarly, a significantly higher number suffered from Dementia in OAHs (31 respondents) compared to only six elderly living at home ($\chi^2=6.511$, $df=1$, $p=.011$).

Table 7.1: Morbidity Patterns among the Elderly

Medical condition	Sum of elderly reporting each condition
Rheumatoid-/Osteo-Arthritis	135
Cardiovascular disease	147
Diabetes	285
Hypertension	182
Chronic Respiratory Disease	79
Cancer	123
Cirrhosis	31
Chronic Kidney Disease	22
Irritable Bowel Syndrome	34
Paralysis	14
Parkinson's disease	12
Alzheimer's disease	13
Depression	104
Dementia	40
Anxiety disorders	51
Accidental injury	31
Hearing loss	59
Vision loss	10
Chronic bodily pain	89
Prostrate/Hernia problems	40

Source: Primary survey

While some researchers note that historically morbidity patterns and diseases were associated with the affluent/higher income groups (Manderson and Jewett 2023, 5), others find it more prominent among the lower income groups (Basu and King 2013, 1620). Given that we are looking at household income, we consider only the elderly residing at home in this case. By grouping the total number of elderly suffering from at least one chronic condition, corresponding to different monthly household income slabs, in Table 7.2, we find that though almost 50% of the elderly reporting at least one morbid/chronic condition belonged to the lowest three monthly household income slabs (i.e. below ₹ 45,000), no statistically significant association was found between monthly household income and the presence of at least one chronic disease among the elderly ($\chi^2=4.111$, $df=1$, $p=.342$).

Table 7.2: Comparative Analysis of Morbidity and Monthly Household Income

Total Monthly Household Income	Number of elderly having at least one Morbidity
Below ₹ 5,000	49
₹ 5,000 - ₹ 25,000	69
₹ 25,000 - ₹ 45,000	76
₹ 45,000 - ₹ 65,000	93
₹ 65,000 - ₹ 85,000	42
₹ 85,000 - ₹ 1,00,000	30
₹ 1,00,000 and above	24

Source: Primary survey

7.2.1 The Prevalence of Multimorbidity

The prevalence of multimorbidity was also noticed among the elderly. Table 7.3 indicates that initially, at lower levels, such as having only one morbid or a co-morbid condition (2 illnesses together), the total number of Y-Os outnumbered the O-Os. However, as the number of multi-morbid conditions rose from three to ten, the total number of O-Os started outnumbering the Y-Os. With regard to gender and the prevalence of multimorbidity, at lower levels of multimorbidity, the number of males having these issues exceeded the number of females, up to the prevalence of three multi-morbid conditions. A higher number of elderly females had four to five multimorbidities as opposed to their male counterparts. Gradually, as the prevalence of a higher number of multimorbidities progressed, once again, a higher number of elderly males suffered from the same.

In the case of elderly living in OAHs, a similar trend was observed as in the case of elderly residing at home—a higher number suffered from lower levels of multimorbidity. As the number of multimorbidities rose, fewer elderly reported the same. The maximum number of multi-morbid conditions reported by older adults living in OAHs was six, as opposed to a maximum of 10 reported by the elderly living at home.

Table 7.3: Presence of Multimorbidity among the Elderly

No. of morbidities	Elderly living at Home			Elderly living in an OAH	Total sample	
	Y-O	O-O	Total	Total	Males	Females
0	8	9	17	1	10	8
1	81	78	159	53	123	89
2	65	51	116	31	79	68
3	24	27	51	6	30	27
4	11	13	24	4	10	18
5	6	8	14	3	6	11
6	2	6	8	2	7	3
7	3	4	7	0	4	3
8	0	3	3	0	2	1
10	0	1	1	0	1	0

Source: Primary survey

7.2.2 Level of Independence in the Activities of Daily Living (ADL)

RQ5.2 attempts to determine *whether elderly multimorbidity significantly disrupts ADL*. Table 7.4 indicates that most elderly do not require any assistance in performing their ADLs. Relatively few older adults require full assistance, especially in bathing (68 respondents), as compared to dressing (85), toilet use (76), and feeding (57), while 123 of them reported requiring full assistance in moving (primarily comprising the O-Os, mainly elderly females and those residing in OAHs in the majority of the ADLs, respectively). Instead of full assistance, a comparatively higher number of elderly require partial assistance in performing their ADLs.

Table 7.4 demonstrates that a higher number of elderly suffering from multimorbidity require assistance in performing ADL compared to those who are independent in performing ADL. The Chi-square test emphasises that these findings are significant in each of the ADLs. For instance, a significantly higher number of elderly suffering from multimorbidity required assistance in bathing (178), while 92, though suffering from multimorbidity, did not require any assistance. In contrast, 22 elderly, though not reporting any multimorbidities, claimed that they needed assistance with bathing. Nevertheless, the majority of the elderly who did not suffer from multimorbidity reported independence in their ADL. Thus, a significant association exists between the presence of multimorbidity and the need for assistance in ADL, with the findings being highly significant at the 1% level ($\chi^2=11.698$, $df=1$, $p=.003$). Similar significant associations were also found between the presence of multimorbidity and the need for assistance in other ADLs including dressing ($\chi^2=17.945$, $df=1$, $p=.000$), toilet use ($\chi^2=9.133$, $df=2$, $p=0.010$), mobility ($\chi^2=18.465$, $df=1$, $p=.002$) and feeding ($\chi^2=15.236$, $df=1$, $p=.007$).

Table 7.4: Level of Independence in the Activities of Daily Living (ADL)

		Number of Elderly *									
		Bathing		Dressing		Toilet use		Mobility		Feeding	
Independent in ADL	Do not require assistance/	300 (92)		263 (81)		326 (101)		215 (69)		351 (131)	
Require assistance in ADL.	Require Partial assistance	200	132	237	152	174	98	285	162	149	92
	Require full assistance	(178)	68	(189)	85	(169)	76	(201)	123	(139)	57

*Figures in brackets indicate the number of elderly suffering from multimorbidity

Source: Primary survey

Given that a far superior and wholesome way of analysing the health of individuals is to assess their HRQOL since it collects physical and mental health information, highlighting the influence of health status on QOL (Revicki, Kleinman, and Cella 2014, 127), we proceed to answer RQ5.3 in the next section: *Is the internationally accepted, 36-Item Short-Form Health Survey (SF-36) a suitable instrument for measuring HRQOL among older adults in Goa?*

7.3. Health-Related Quality of Life (HRQOL) of the Elderly

7.3.1 The Components of the Short Form-36 (SF-36) Health Survey

SF-36 is a valuable tool that comprehensively assesses an individual's HRQOL from a health economics perspective. It is widely used in health economics research and policy development to assess the impact of health and healthcare interventions on an individual's life, including work, social interactions, and well-being.

Being a survey instrument of international repute, SF-36 has been utilised globally in assessing HRQOL. Most specifically, it has been adopted in the USA, Canada, UK, Australia, Germany, Netherlands, Sweden, Japan, South Korea, China, Brazil, India, Saudi Arabia, South Africa, Spain, France, Italy, New Zealand, Mexico, and Argentina. It measures the following components, each of which has great significance with repercussions from a health economics perspective.

7.3.1(i) Physical Functioning (PF)

This component assesses an individual's ability to perform physical activities. Poor physical functioning often necessitates medical consultations, hospitalisations, rehabilitation, and assistance, driving up health costs. The economic burden of impaired physical functioning in the elderly extends beyond healthcare costs. It includes informal caregiving, transportation costs for medical appointments, and the opportunity cost of lost productivity (Anderson and Durstine 2019, 3).

7.3.1(ii) Role Limitations due to Physical health (RP)

This component focuses on limitations in performing work or other activities due to physical health problems. Often, especially among the aged, there is a need for long-term care, like nursing homes or home healthcare, which are quite expensive. Besides, when individuals are unable to fulfil their responsibilities due to physical health limitations, it can result in reduced productivity and increased health expenses (Lee et al. 2021, 1).

7.3.1(iii) Bodily Pain (BP)

BP measures the extent of bodily pain and discomfort experienced by an individual. It is essential to understand the pain and suffering related to health conditions which can impact HCU, including doctor visits, diagnostic tests, medication use, and surgeries. This, in turn, results in higher healthcare costs (Wei et al. 2019, 957). Pain can limit an older adult's ability to work or may force early retirement. This can result in reduced workforce participation, which, in turn, has implications for individual income, pensions, and government social welfare programs.

7.3.1(iv) General Health (GH)

This component assesses an individual's perception of their overall health. It provides insights into how individuals perceive their well-being, which can influence healthcare-seeking behaviours. Those who perceive themselves as having poorer health may be more likely to seek medical care, leading to increased healthcare costs (National Academies of Sciences, Engineering, and Medicine 2018, 30-32). Older adults with a positive general health perception are more inclined to adopt a healthy lifestyle and engage in health-promoting activities, besides being able to continue PRW, positively impacting income.

7.3.1(v) Vitality (VT)

VT measures an individual's energy level and fatigue. This is relevant for understanding the impact of health conditions on an individual's vitality and productivity. From a health economics perspective, vitality is crucial because fatigue can result in decreased productivity, increased absenteeism, and even presenteeism (working while unwell). Individuals with high vitality levels may require fewer healthcare services and have lower medical expenditures (Duijvestijn et al. 2023, 1), besides being more likely to remain in the labour force or engage in productive activities, such as part-time work or volunteering.

7.3.1(vi) Social Functioning (SF)

SF assesses the ability to engage in social activities and relationships. From a health economics perspective, impaired social functioning and lack of social networks can result in increased HCU due to the impact of social isolation on mental health (Hajek, Kretzler, and König 2021), and it can lead to higher healthcare costs. Poor social functioning is linked to the need for informal caregiving among the elderly. Those with lower social functioning may require more assistance with ADLs, leading to increased informal caregiving by family members.

7.3.1(vii) Role Limitations due to Emotional Health (RE)

This component measures the limitations in an individual's daily activities due to emotional problems. Emotional health limitations often necessitate medical and therapeutic interventions (Singh, Kumar, and Gupta 2022, 1). These include costs associated with therapy, medications, hospitalisation, and long-term care in severe cases. As a result, health insurance, government-funded healthcare, and disability programs bear a significant financial burden. Emotional health limitations can lead to early retirement or withdrawal from the workforce, reducing the economic contributions of older adults and accompanying physical health conditions, which necessitate additional healthcare resources and expenses, reducing overall QOL.

7.3.1(viii) Mental Health (MH)

MH assesses psychological well-being and distress. Older adults with mental health issues may be more vulnerable to abuse or neglect, which can result in the need for legal interventions and protective services, incurring additional costs (Cooper and Livingston 2014, 839). Mental health issues among older adults have profound economic implications, affecting healthcare costs, caregiver expenses, and productivity. Recognising the economic impact of mental health is vital for policymakers, healthcare providers, and economists as they work to address the challenges faced by ageing populations. Efforts to promote mental health and provide mental healthcare can lead to cost savings and better overall well-being for older adults.

7.3.1(ix) Scoring

A description regarding the conceptual foundation of the SF-36, its development, testing, rating, and interpretation can be found in Hays, Sherbourne, and Mazel (1993, 22-25) and McHorney, Ware, and Raczek (1993, 250-255). The scoring procedure is a two-step process. First, pre-coded numeric values are recoded as per the scoring key given in Hays, Sherbourne, and Mazel (1993, 22-25). The scores range from 0 (representing the poorest health state, comparable to death) to 100 (showing the highest health status), with larger values signifying improved HRQOL. In the second step, items on the same scale are averaged to create the eight scale scores. HRQOL comprises two components: Physical and Mental Health. The two summary scores, the Physical Component Summary (PCS) and the Mental Component Summary (MCS) are derived by averaging their respective individual scale scores.

7.3.2 SF-36 Specifically Suited to Measure HRQOL of Older Adults

In the context of older adults, SF-36 is noted to be the best instrument for assessing their HRQOL for various reasons. Firstly, it serves as a *comprehensive tool* that assesses multiple dimensions of HRQOL, including physical, mental, and social aspects (Cech and Martin 2012, 101). In older adults, a holistic assessment is vital because ageing often brings multifaceted health challenges beyond physical health. This instrument captures various health-related issues that older adults may face, such as pain, vitality, and emotional well-being. Secondly, it focuses on the patient's perspective, yielding *patient-reported* and *patient-centred outcomes*. In the case of older adults, their experiences and perceptions of health are particularly valuable. By using the SF-36, healthcare professionals can gain insights into how older adults view their own well-being, which can help tailor healthcare interventions to meet their specific needs and preferences.

Thirdly, as older adults often have complex health conditions and may undergo treatment and interventions over extended periods, the SF-36 allows for *longitudinal assessment*. This means that changes in HRQOL can be tracked over time, providing a dynamic view of how health conditions and interventions affect older adults' quality of life. Fourthly, *benchmarking* and *comparative analyses* are easily possible with this instrument, given its widespread usage, and can inform healthcare policies and interventions to improve the QOL for older adults. Fifthly, from a healthcare policy and resource allocation perspective, the SF-36 data can be used to *prioritise interventions and allocate resources effectively*, thus providing *tailored interventions*. By understanding which aspects of HRQOL are most affected in older adults, policymakers and healthcare providers can focus on interventions with the greatest potential for improving their lives.

7.3.3 Confirmatory Factor Analysis of SF-36

A holistic way of health status assessment commences with a health model that determines the substance of a questionnaire and serves as a 'blueprint' for rating multi-item scales and summary measures. This blueprint includes a confirmatory technique for assessing the instrument's construct validity. According to Harichandrakumar and Kumaran (2018, 252), a critical problem in modelling HRQOL is the collinearity and complexity of the connections among variables, which are difficult to decipher by standard statistical analysis. Yin et al. (2016, 3) purport that the factor analytical technique is a popular approach that considers HRQOL a latent or hidden construct capable of quantification. It represents a crucial stage in validating health status questionnaires before their usage.

The Measurement Model of SF-36 used to test the model fit, validity, and reliability is presented in Figure 7.1. Every oval corresponds to a latent element, namely PF, GH, RP, BP, SF, MH, VT, and RE, representing eight first-order health components, with the former four loading onto the second-order factor PCS, while the latter four loading onto the next second-order factor MCS.

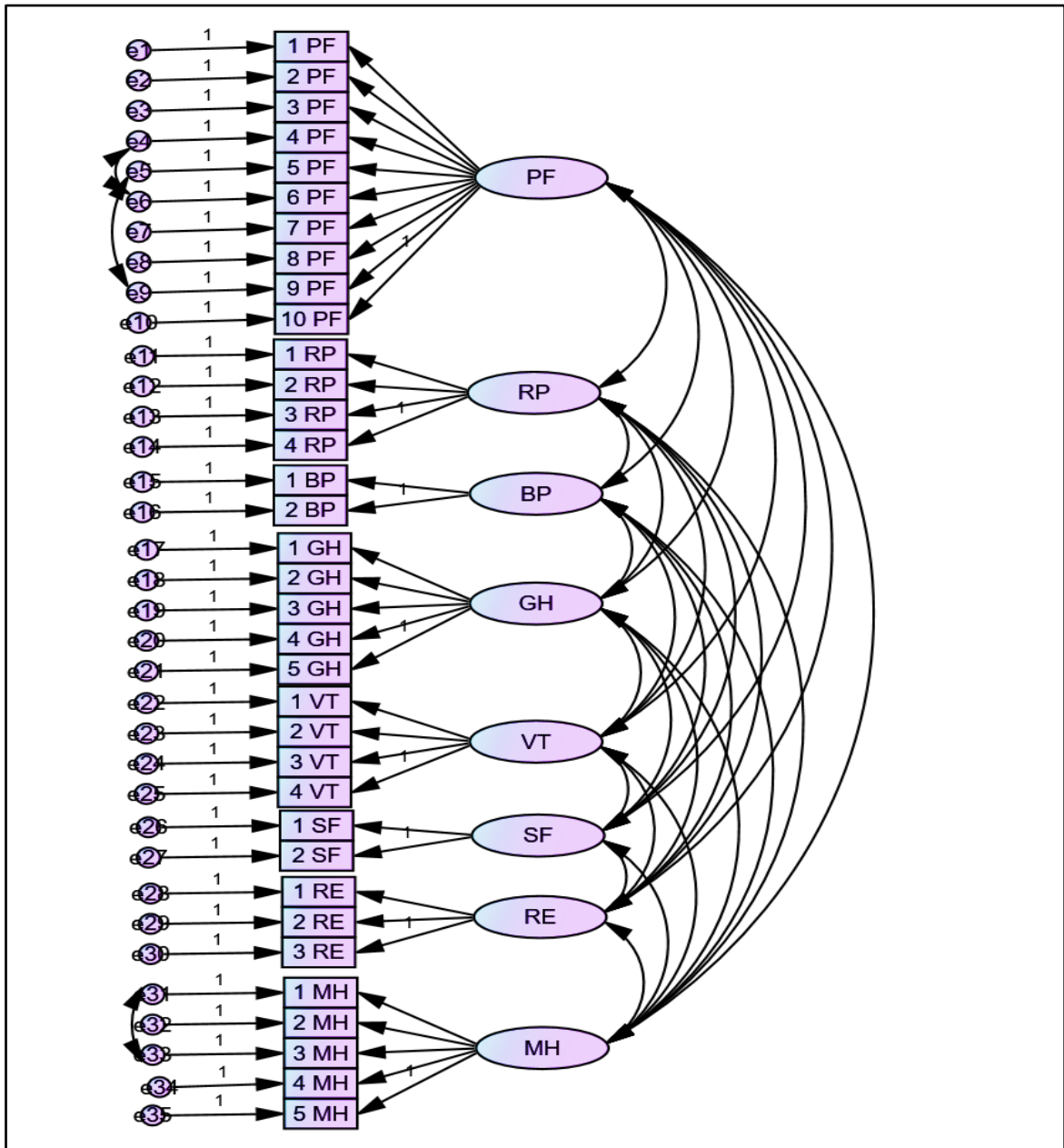


Figure 7.1: Measurement Model of SF-36 HRQOL
Source: Primary survey

7.3.3.1 Model Fit

To test the feasibility of using SF-36 for measuring the HRQOL of older Goans, the CFA model was run using the Maximum Likelihood Method to estimate the model. The initial model did not fit the data perfectly, as indicated in Table 7.5, owing to the non-attainment of cut-off values. Hence, modification indices were adopted by drawing covariances between error terms (e4 and e6, e5 and e9, and e31 and e33), resulting in excellent model fit values, similar to the work of Harichandrakumar and Kumaran (2018). Fit indices prior (Model 1) and post (Model 2) and the use of modification indices are presented in Table 7.5. The Measurement Model was then checked for its validity and reliability.

Table 7.5: HRQOL Model Re-specifications and the Corresponding Fit Indices

Model	GFI	CFI	TLI	RMSEA	SRMR	CMIN/df
Cut-off value	≥ 0.90	≥ 0.90	> 0.90	≤ 0.08	≤ 0.08	< 3.0
Model 1	0.851	0.861	0.844	0.072	0.067	3.609
Model 2	0.90	0.90	0.91	0.060	0.067	2.814

GFI=Goodness of fit index, RMSEA=Root Mean Square Error of Approximation, TLI=Tucker-Lewis Index, SRMR=Standardised Root Mean Square Residual, CFI=Comparative Fit Index, CMIN/df=Chi-square value/degrees of freedom

7.3.3.2 Validity and Reliability

Table 7.6 indicates that all eight constructs of the SF-36 HRQOL scale had very good internal consistency owing to a high Cronbach's value above 0.7. Also, the AVE in all cases is more than 0.5, suggesting Convergent Validity for the Model. CR was also established as all the values obtained exceeded 0.70. Besides, the constructs also passed the DV test, signifying that each construct, though conceptually similar, is different and distinct from the other constructs. The evaluation of the Measurement Model paves the way for analysing the second-order factor structure of HRQOL.

Table 7.6: Reliability and Validity of the HRQOL Model

Factors	Cronbach α	AVE	CR	DV							
				PF	RP	BP	GH	SF	RE	VT	MH
PF	0.925	0.546	0.922	0.739							
RP	0.844	0.586	0.848	0.361	0.765						
BP	0.856	0.751	0.858	0.640	0.396	0.867					
GH	0.749	0.524	0.761	0.404	0.246	0.565	0.724				
SF	0.773	0.668	0.800	0.548	0.395	0.652	0.341	0.818			
RE	0.816	0.600	0.818	0.331	0.654	0.393	0.161	0.432	0.775		
VT	0.899	0.696	0.901	0.012	0.045	0.018	0.042	0.022	0.071	0.834	
MH	0.813	0.516	0.794	0.525	0.287	0.681	0.473	0.511	0.333	0.018	0.718

The second-order SF-36 CFA model is presented in Figure 7.2, indicating a high degree of convergence of observed variables on their first-order constructs owing to high factor loadings ($p < 0.001$ in each case). Besides, the first-order factors PF, RP, BP, and GH highly significantly ($p < 0.001$) load on to PCS (second-order factor), while VT, RE, SF, and MH very significantly load on to MCS (second-order factor), tracing similarities to the original framework of the SF-36 model (Ware and Sherbourne 1992) concerning first-order factors converging onto the second-order. Drawing a covariance path between the two second-order factors (PCS and MCS) makes the second-order CFA model fit the data in a better manner (indicated in Table 7.7), similar to the works of Buchcik et al. (2017, 4) and Harichandrakumar and Kumaran (2018, 253), being highly significant at the 1% level (Estimate: 1.010, SE: 0.031, CR: 33.025, $p < 0.001$), demonstrating that Physical and Mental Health are robustly related to each other.

Table 7.8 highlights the Standardised Regression estimates of first-order factors loading onto second-order factors, indicating convergence onto the second-order construct. Table 7.8 also indicates that most of the R^2 values of the sub-constructs are sufficiently high. We can thus conclude that SF-36 is a suitable instrument to measure the HRQOL of the elderly in Goa.

Table 7.7: Fit Indices of the Second-Order HRQOL CFA Model

	GFI	CFI	TLI	RMSEA	SRMR	CMIN/df
Cut-off value	≥ 0.90	≥ 0.90	> 0.90	≤ 0.08	≤ 0.08	< 3.0
Second Order CFA	0.901	0.931	0.924	0.051	0.063	2.280

GFI=Goodness of fit index, RMSEA=Root Mean Square Error of Approximation, TLI=Tucker-Lewis Index, SRMR= Standardised Root Mean Square Residual, CFI=Comparative Fit Index, CMIN/df=Chi-square value/degrees of freedom

Table 7.8: Standardised Regression Weights of Second-Order HRQOL CFA Model

	Path direction		Estimate	P	R^2
PF	→	PCS	.717	Reference point	.51
RP	→	PCS	.500	***	.25
BP	→	PCS	.894	***	.80
GH	→	PCS	.575	***	.33
VT	→	MCS	.762	Reference point	.58
SF	→	MCS	.731	***	.53
RE	→	MCS	.501	***	.25
MH	→	MCS	.731	***	.54

Note. *** $p < 0.001$

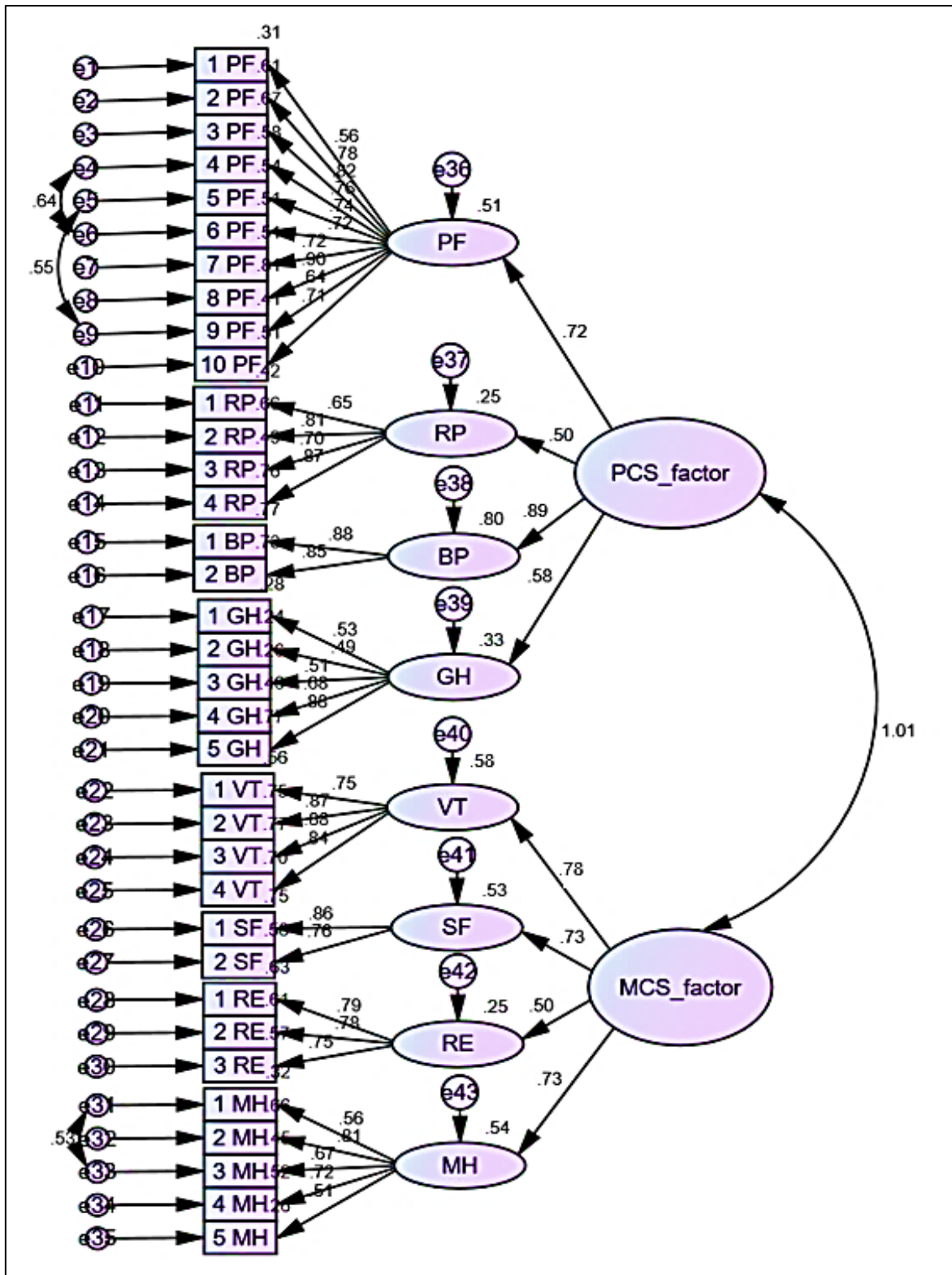


Figure 7.2: Second Order CFA Model of SF-36 HRQOL
Source: Primary survey

7.3.4 Differences in Physical and Mental Health

We analyse RQ5.4: *Do the Physical and Mental components of HRQOL significantly differ among the elderly?* Table 7.9 represents the mean (standard deviation) scores of the subscale indicators of HRQOL. PCS was 57.12 (21.01), while MCS was 60.94 (18.22), signifying better mental health of older adults in Goa, with an absolute difference of about 3.82 units between the two components. A similar study conducted in Tehran (Tajvar, Arab, and Montazeri 2008, 1471) that analysed the determinants of HRQOL among older adults also found that their MCS score (MCS=63.86) was higher than their PCS score (PCS=55.01) by around 8.85 units. Concerning individual subscales, among the domains measuring mental health, the older adults in Goa reported the lowest mean score on VT (47.01), followed by SF (55.90). The COVID-19 pandemic further aggravated the social functioning situation of the elderly (although they were told to rate their situation just prior to the onslaught of the pandemic, given the social distancing protocols). Among PCS domains, PF (48.61) and GH (53.94) had relatively lower scores, followed by BP (55.59).

Table 7.9: Mean Scores of the Subscales of HRQOL of Older Adults in Goa

Subscales	Mean	Standard deviation
Physical functioning (PF)	48.61	28.14
Role physical (RP)	70.10	37.80
Bodily pain (BP)	55.59	28.72
General health (GH)	53.94	18.37
Vitality (VT)	47.01	28.87
Social functioning (SF)	55.90	30.04
Role emotional (RE)	77.13	35.86
Mental health (MH)	63.65	22.30
Physical Component Scale (PCS)	57.12	21.01
Mental Component Scale (MCS)	60.94	18.2

Source: Primary survey

The literature reveals that HRQOL is not homogenous across the elderly (Lobo and Falleiro 2022, 44). Given that the data followed a normal distribution (Kim 2013, 52), ANOVA and t-tests were adopted, and the results are presented in Table 7.10. With regard to gender, elderly males reported higher mean scores on almost all the Physical and Mental components. Thus, older females have worse health status than males, consistent with the results of Sarker (2021, 1). However, these differences were significant for the PCS scale, BP, GH, PF, and MH. There were also substantial variations in HRQOL across the lifespan. The mean value for RP, VT, and RE was statistically greater for those aged 60 to 69. As age progressed, the HRQOL reduced significantly.

Table 7.10: Differences in SF-36 Scores among the Elderly

Variable	SF-36 HRQOL Scores [Mean (standard deviation)]									
	PF	RP	BP	GH	VT	SF	RE	MH	PCS	MCS
<u>Gender</u>										
Male	53.8 (28.2)	71.5 (38.7)	61.4 (30.0)	58.7 (17.0)	46.3 (29.3)	57.2 (31.3)	78.5 (36.1)	68.8 (20.8)	61.4 (21.0)	62.7 (19.0)
Female	44.4 (27.4)	69.0 (37.1)	50.9 (26.9)	50.1 (18.6)	47.6 (28.5)	54.8 (29.0)	76.1 (35.7)	59.5 (22.6)	53.7 (20.4)	59.5 (17.4)
p-value	<0.001 ***	0.450	<0.001 ***	<0.001 ***	0.639	0.379	0.453	<0.001 ***	<0.001 ***	0.051 *
<u>Age Groups</u>										
60-69	53.4 (28.2)	71.8 (38.3)	61.4 (29.4)	59.1 (16.3)	47.2 (29.4)	57.6 (31.5)	78.3 (37.1)	68.0 (21.9)	61.5 (21.2)	62.8 (19.0)
70-79	48.4 (28.1)	72.5 (36.7)	54.1 (28.1)	52.3 (18.6)	47.2 (28.8)	57.7 (29.0)	76.9 (35.0)	62.6 (21.9)	56.9 (20.6)	61.1 (18.3)
80-89	35.6 (24.4)	60.6 (38.1)	42.5 (22.7)	41.8 (17.2)	46.8 (27.6)	47.8 (27.0)	75.8 (33.1)	53.5 (20.7)	45.2 (17.0)	56.0 (15.0)
90-99	33.1 (14.9)	62.5 (32.7)	34.4 (15.2)	45.0 (23.5)	38.8 (27.4)	46.8 (19.7)	58.3 (38.8)	51.0 (20.3)	43.8 (10.3)	48.8 (8.9)
p-value	<0.001 ***	0.118	<0.001 ***	<0.001 ***	0.867	0.034 **	0.545	<0.001 ***	<0.001 ***	<0.001 ***
<u>Marital status</u>										
Unmarried	41.1 (23.5)	62.0 (39.5)	51.1 (25.5)	46.7 (18.3)	42.0 (29.5)	50.6 (26.5)	71.4 (35.0)	52.5 (25.8)	50.2 (17.7)	54.1 (17.0)
Married	52.2 (28.2)	74.3 (36.3)	60.0 (29.6)	57.3 (17.4)	47.4 (29.0)	59.0 (31.0)	80.2 (34.4)	67.3 (22.2)	61.0 (20.8)	63.5 (18.5)
Widowed	43.3 (28.3)	64.8 (39.1)	47.3 (25.8)	48.4 (18.7)	48.6 (28.3)	51.5 (28.2)	71.7 (38.8)	59.3 (20.0)	51.0 (20.7)	57.8 (17.1)
Separated/ Divorced	42.8 (28.1)	47.2 (42.3)	55.6 (27.8)	57.2 (18.2)	32.8 (26.7)	43.1 (30.0)	85.2 (33.8)	59.1 (18.0)	50.7 (19.6)	55.1 (16.5)
p-value	0.008 ***	0.025 **	0.001 ***	<0.001 ***	0.262	0.039 **	0.110	0.001 ***	<0.001 ***	0.002 ***
<u>Educational Qualifications</u>										
Not- educated	36.3 (22.8)	67.1 (32.3)	37.1 (17.5)	37.9 (14.4)	44.9 (30.4)	47.9 (22.9)	73.7 (31.3)	50.2 (18.9)	44.7 (13.8)	54.2 (13.1)
Class X	42.9 (26.0)	64.5 (39.7)	48.3 (25.4)	51.2 (17.1)	46.0 (30.0)	47.1 (28.2)	72.4 (38.3)	59.8 (22.1)	51.8 (19.6)	56.3 (17.7)
Class XII	50.6 (28.9)	69.3 (39.9)	64.1 (28.8)	59.1 (19.7)	50.7 (28.0)	59.2 (30.8)	73.1 (40.1)	68.7 (21.9)	60.8 (20.6)	62.4 (20.1)
College and above	61.4 (28.1)	78.9 (36.2)	71.3 (28.5)	64.0 (13.9)	48.1 (27.1)	69.6 (30.1)	86.1 (32.0)	73.7 (19.3)	57.1 (21.0)	69.4 (17.2)
p-value	<0.001 ***	0.003 ***	<0.001 ***	<0.001 ***	0.598	<0.001 ***	0.001 ***	<0.001 ***	<0.001 ***	<0.001 ***
<u>Living arrangements</u>										
Alone	49.7 (28.1)	56.9 (46.1)	60.1 (28.0)	57.2 (17.9)	51.3 (25.0)	54.2 (31.2)	73.2 (42.0)	69.0 (17.2)	50.0 (22.4)	61.9 (18.0)
With family	53.5 (29.1)	72.4 (38.8)	61.7 (18.8)	58.9 (16.4)	47.1 (28.4)	58.7 (31.6)	78.3 (37.9)	69.4 (20.4)	61.7 (21.1)	63.4 (19.0)
OAH	30.4 (13.4)	66.5 (28.7)	31.8 (11.6)	34.8 (12.0)	45.1 (31.7)	46.4 (20.5)	74.3 (24.1)	41.0 (15.1)	41.0 (8.6)	51.8 (11.4)
p-value	<0.001 ***	0.064 *	<0.001 ***	<0.001 ***	0.500	<0.001 ***	0.402 ***	<0.001 ***	<0.001 ***	<0.001 ***
<u>Locality</u>										
Rural	44.5 (27.5)	67.0 (38.2)	49.0 (28.0)	50.2 (17.9)	45.5 (30.3)	50.6 (29.3)	74.8 (36.7)	60.2 (22.6)	52.7 (20.9)	57.8 (17.7)
Urban	51.4 (28.3)	72.2 (37.6)	59.9 (28.3)	56.4 (18.3)	48.1 (27.9)	59.5 (30.1)	78.7 (35.3)	65.9 (21.9)	60.1 (20.6)	63.1 (18.3)
p-value	0.007 ***	0.127	<0.001 ***	<0.001 ***	0.325	0.001 ***	0.231 ***	0.005 ***	<0.001 ***	0.001 ***

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: Primary survey

Concerning marital status, older adults who were married and whose spouse was alive reported a higher HRQOL, which was statistically significant except for VT and RE domains, than the unmarried, widowed, separated, or divorced respondents. Additional research has shown that residing with one's spouse improves one's health, bodily function, and societal involvement (Zhou et al. 2014, 1). Investigations trace a link between loneliness and unfavourable psychological and physical health in divorced/widowed elderly, leading to depression (Rahman, Rahman, and Rahman 2019, 57).

Findings indicated noteworthy variations in HRQOL relating to educational attainment. Higher educational qualifications were connected with improved HRQOL. Prior research highlights that the degree of education was substantially positively associated with self-reported HRQOL as older persons with greater levels of education often had more money, leisure activities, and societal assistance (Zhou et al. 2014, 8-9).

Living arrangements also had a role to play. Older adults residing with family members reported a better mean score than those residing alone or in an OAH. The results were significant for all the domains except for RP, VT, and RE.

Another interesting finding was that differences were found with regard to the locality in which the elderly respondent resided. For instance, those residing in cities and towns had better HRQOL compared to those in villages, with statistically significant differences in most scores. However, Sarker (2021, 1) discovered that respondents aged 60 years and above in country-side locations reported improved HRQOL compared to city-dwellers. Though country-side residents engage in a considerable amount of strenuous work, poor access to medical services, dysfunctional conveyance amenities, and financial difficulties aggravate health problems. This causes loneliness in times of illness. On the contrary, older city dwellers seem to have a higher HRQOL than those in villages (Usha and Lalitha 2016, 1), consistent with the current study's results.

7.4 Health-related Costs

We attempt to carry forward this analysis by incorporating the health expenditure dimension. While some studies find that better HRQOL of older adults is correlated with lower health expenditure, others advocate that improved HRQOL is a function of higher health spending to take the necessary timely precautions, thus resulting in a positive correlation. As noted in Section 7.1, the health-related costs only of older adults living at home are being considered, as those living in OAHs are financed by the government (in

case of government-run OAHs) or their family member pays the required amount along with the monthly fee to the in-charge of the non-government-run OAH. Before we proceed to analyse the relation between HRQOL and health expenditures, we first analyse the nature and components of health spending by attempting to answer RQ5.5, i.e. *What share of the average monthly expenditure does health expenditure on the elderly comprise and how does it vary among the elderly?*

7.4.1 Comparative Perspective of Health Expenditure by Age and Sex

Table 7.11 presents a comparative analysis of the annual and monthly medical expenditure among the Y-O and O-O, as well as differences based on gender. Taking a look first from the age perspective, the average annual health expenditure of the O-O is relatively higher at ₹ 55,236.92 compared to ₹ 44,971.2 in the case of the Y-O, with an average difference of ₹ 10,265.72. The t-test confirms the highly significant difference in the average annual health expenditure of the two samples based on age (Y-O and O-O) at the 0.01 level ($t=5.573$, $df=398$, $p=.000$), with the average health expenditure of the O-O being 1.23 times that of the Y-O. From a monthly perspective, the average monthly health expenditure of the O-O is around ₹ 4,603.08 as compared to ₹ 3,747.6 among the Y-O.

Widespread heterogeneity is observed concerning medical expenditures among the elderly, with the minimum annual amount being as low as ₹ 3,747.6 (monthly: ₹ 312.3), while the maximum amount rising even up to ₹ 11,76,980.7¹ (monthly: ₹ 98,081.7).

Table 7.11: Average and Monthly Medical Expenditure of the Elderly

Elderly subgroups	Annual Medical Expenditure		Monthly Medical Expenditure	
	Mean	Standard Deviation	Mean	Standard Deviation
Y-O	₹ 44,971.23	4827.48	₹ 3,747.61	402.25
O-O	₹ 55,236.92	8393.68	₹ 4,603.08	699.47
Y-O Males	₹ 39,286.54	3267.79	₹ 3,273.88	272.32
Y-O Females	₹ 46,231.99	4911.95	₹ 3,852.67	409.33
O-O Males	₹ 53,198.47	4799.10	₹ 4,433.21	399.93
O-O Females	₹ 53,420.28	8513.24	₹ 4,451.69	709.44

Source: Primary survey

Gender differences are also noticeable, with the average annual health expenditure of Y-O elderly females amounting to ₹ 46,231.99 (monthly: ₹ 3,852.67) being higher by 1.18 times than that of Y-O elderly males (annual: ₹ 39,286.54, monthly: ₹ 3,273.88). In a similar vein, the average annual health expenditure of O-O elderly females at around ₹

53,420.28 (monthly: ₹ 4,451.69) was 1.08 times that of O-O elderly males (annual: ₹ 53,198.4, monthly: ₹ 4,433.21). The t-test reported that these gender differences in health expenditures were highly significant among the elderly ($t=3.504$, $df=398$, $p=.000$).

In an attempt to analyse what share of the average monthly expenditure does average monthly health expenditure of the elderly comprises, Table 7.12 reveals that medical expenses of the O-O constitute 13.95% of the average monthly household expenditure in O-O HHs, while that of the Y-O constitutes 12.5% of their household budget, the former being 1.17 times higher than the latter. While the proportion of expenditure is higher by 1.94 times for elderly females compared to elderly males in Y-O HHs, not much of a gender difference is observed in O-O HHs, being marginally higher by 0.06% among O-O females.

Carrying forward the above analysis from the perspective of analysing the proportion of medical expenses out of the total expenditure incurred exclusively by the senior citizen himself/herself, we find that the burden of medical expenditures constitutes quite a high proportion of their out-of-pocket expenditure, especially in the case of elderly females, more so in O-O HHs, owing to relatively lower personal sources of income than their counterparts, as discussed in Section 6.2.3.1. For instance, while the average monthly medical expenditure of Y-Os is 34.1% of their total expenditure, the same is 1.58 times higher in the case of the O-Os (53.75%).

Analysing the gender differences, the burden is much higher in the case of elderly females, both Y-O females (amounting to 48.5% of their personal expenditure) and O-O females (amounting to 85.67% of the same). In contrast, the proportion of average medical expenses of elderly males is comparatively lower than their female counterparts, amounting to 28.12% among Y-O males and 47.06% in the case of O-O males.

Table 7.12: Average Medical Expenditures of the Elderly as a Share of Household and Personal Expenditure

Percentage Share of Medical Expenses	Y-Os			O-Os		
	Y-O Males	Y-O Females	All Y-Os	O-O Males	O-O Females	All O-Os
Share of Average Monthly Household Expenditure	10.95%	12.89%	12.5%	13.43%	13.49%	13.95%
Share of Average Monthly Expenditure only of Senior Citizens	28.12%	48.50%	34.1%	47.06%	85.67%	53.75%

Source: Primary survey

7.4.2 Component-wise Health-related Expenditures

Figure 7.3 indicates that the highest percentage (82.75%) of the elderly incurred expenditure on medicines and health-related transportation costs (to/from the clinic/hospital), respectively, over the year prior to the survey. A considerable percentage of senior citizens also incurred expenditure on clinical/diagnostic tests (74.25%), doctor consultation charges (63%), and expenses on special diet/supplements (62.5%). Expenditure on health insurance premiums and hospitalisation expenses were incurred by slightly over half the elderly living at home (57% and 52.25% of the elderly, respectively). Finally, less than half the elderly reported incurring expenditure on therapy (49.25%).

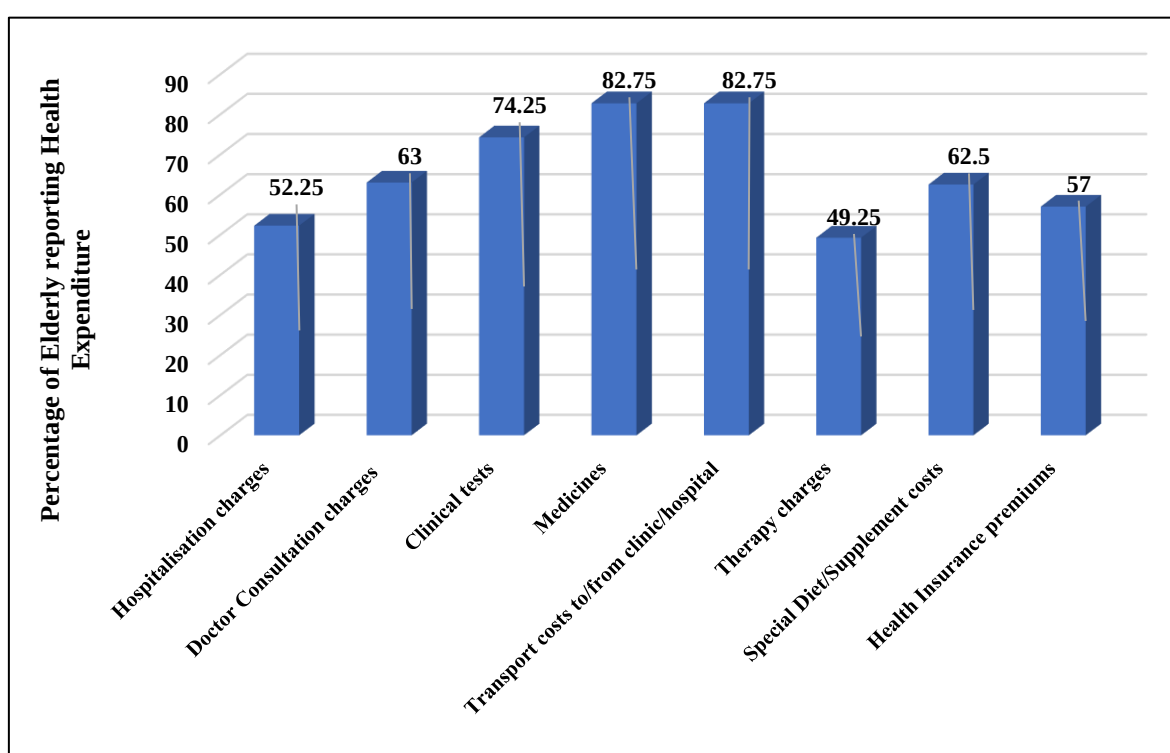


Figure 7.3: Percentage of Elderly reporting various kinds of Health-Related Expenditure

Source: Primary survey

Nevertheless, an in-depth analysis of the slab-wise distribution of expenditure on each component of medical expenditure reveals vast variations in the amount of expenditure incurred on each item. Though expenditure on medicines/prescription drugs was reported to be incurred by the highest number of elderly living at home, around 17.25% reported that they did not spend money on the same, as they availed the same free of cost at the Goa Medical College (GMC). Nevertheless, the slab-wise distribution of the 82.75% who incurred expenditure on this component reveals that the majority of them (43.25%) spent over ₹ 9,000 annually, with around 25.25% spending between ₹ 9,000 - ₹ 12,000, while

18% spending over ₹ 12,000 on medicines. In contrast, though an equally high percentage of elderly incurred health-related transportation expenditure (82.75%) as in the case of medicines, the slab-wise expenditure distribution reveals that most of them (44.75%) spent a relatively lesser amount, somewhere below ₹ 1,000, while around 25.5% spent between ₹ 1,000 - ₹ 3,000. Around 17.5% reported no expenditure on health-related transportation owing to their proximity to the clinic/hospital (being within walking distance).

Expenditure on clinical/diagnostic tests was the next highly reported medical expenditure component. However, slab-wise expenditure distribution reveals that while 25.75% of the elderly availed of these tests free of cost at government hospitals, a major chunk of them (62.5%) spent up to ₹ 6,000 on such tests in the last year. A similar scenario is observed in the case of payment of doctor's consultation fees and expenses on special diets/supplements, wherein around 37%, respectively, reported no such expenditure, and the majority spent up to ₹ 3,000 annually in each case.

The other components of expenditure included payment of health insurance premiums. While 43% reported not paying any health insurance premiums, the majority (49.5%) reported paying below ₹ 1,000 annually (in most cases for the *Deen Dayal Swasthya Seva Yojana* health insurance scheme of the Government of Goa, discussed in the next chapter). Nevertheless, around 7.5% pay above ₹ 9,000 annually.

With regard to hospitalisation charges, 191 respondents (47.75%) reported nil expenses on this item, owing to no hospitalisation over the last year, in the case of 113 respondents, while the remaining 78 respondents reported having received the same at no cost at government health facilities. In contrast, among those being hospitalised at private hospitals in the last year, around 10.75% spent between ₹ 1,000 - ₹ 3,000, 22.75% spent between ₹ 3,000 - ₹ 12,000 while 18.75% spent above ₹ 12,000. A significant association was found at the 5% significance level between the presence of multimorbidity and the need for hospitalisation ($\chi^2=6.511$, $df=1$, $p=.011$).

Concerning therapy costs, primarily psychotherapy, physiotherapy, chemotherapy, and radiation therapy, while around half the sample reported no expenditure on this component, the slab-wise expenditure distribution reveals that among those incurring expenditure on this item, the percentage of elderly rose towards the higher expenditure slabs. For instance, while 9.75% of the elderly spent between ₹ 1,000 - ₹ 9,000 on therapy, 13% spent between ₹ 9,000 - ₹ 12,000, while 26.5% spent above ₹ 12,000.

7.13: Component-wise Health-related Expenditure Slabs of the Elderly [Frequency (%)]

	Hospital- isation charges	Doctor fees	Clinical tests	Medicines	Transport costs (to/from health facility)	Therapy charges	Special Diet/ Supplements	Health Insurance premiums
Nil	191 (47.75)	148 (37)	103 (25.75)	69 (17.25)	69 (17.25)	203 (50.75)	150 (37.5)	172 (43)
Below ₹ 1000	-	88 (22)	64 (16)	53 (13.25)	179 (44.75)	-	116 (29)	198 (49.5)
₹ 1000 - ₹ 3000	43 (10.75)	106 (26.5)	76 (19)	42 (10.5)	102 (25.5)	3 (0.75)	97 (24.25)	-
₹ 3000 - ₹ 6000	11 (2.75)	22 (5.5)	110 (27.5)	43 (10.75)	21 (5.25)	15 (3.75)	29 (7.25)	-
₹ 6000 - ₹ 9000	18 (4.5)	15 (3.75)	24 (6)	20 (5)	15 (3.75)	21 (5.25)	4 (1)	-
₹ 9000 - ₹ 12000	62 (15.5)	11 (2.75)	12 (3)	101 (25.25)	10 (2.5)	52 (13)	3 (0.75)	13 (3.25)
Above ₹ 12000	75 (18.75)	10 (2.5)	11 (2.75)	72 (18)	4 (1)	106 (26.5)	1 (0.25)	17 (4.25)

Source: Primary survey

The Chi-square test and FET failed to reveal significant associations (except for one component, therapy charges) between the Y-O and O-O concerning the slab-wise distribution of each item of health expenditure. For instance, no significant associations were found concerning hospitalisation charges ($\chi^2=1.778$, $df=6$, $p=.939$, $FET=.942$), fees for doctors visits ($\chi^2=5.953$, $df=6$, $p=.429$, $FET=.428$), clinical tests ($\chi^2=9.804$, $df=6$, $p=.133$, $FET=.132$), expenditure on medicines ($\chi^2=8.153$, $df=6$, $p=.227$), transportation costs to/from clinic ($\chi^2=8.300$, $df=6$, $p=.217$, $FET=.207$), diet costs/supplements ($\chi^2=1.138$, $df=6$, $p=.980$, $FET=.981$), and health insurance premiums ($\chi^2=7.746$, $df=6$, $p=.257$, $FET=.259$), thus highlighting that both the Y-O and O-O alike incur expenditure on each of the components in a similar manner. Only in the case of therapy expenses a significant association was found ($\chi^2=11.437$, $df=6$, $p=.076$, $FET=.066$), with a higher number of O-Os incurring expenses on the same; however, only at the 10% significance level.

7.4.2.1 The Costs of Caregiving

According to Jiang et al. (2018, 1), older people in poor health become increasingly reliant on household members. Due to the expenses associated with assisting older adults and the opportunity costs that follow, it could be difficult for the whole family to cope. We attempt to analyse: *What are the needs and costs of caregiving among older adults?* (RQ5.7). Table 7.14 indicates that out of the 400 elderly living at home, 239 (59.75%) did not

require any caregiver and were independent enough to care for themselves. Among these comprised a higher number of Y-Os [135 (33.75% of the overall sample)] compared to the O-Os [104 (26% of the overall sample)]. Nevertheless, 40.25% of the elderly living at home needed the assistance of caregivers to help them with their ADLs. In some cases, these caregivers are family members (among 20% of the elderly respondents), while in other cases, they are paid personnel (among 20.25%). Concerning family members as caregivers, the spouse was the primary caregiver among the Y-O, followed by children. The reverse was the case among the O-O, where children were primary caregivers. Other relatives were caregivers to only five elderly².

On the other hand, paid personnel were hired to care for the elderly, wherein a total of 65 elderly (25 Y-Os, 40 O-Os) were cared for by caretakers (devoted exclusively to the service of the elderly member). At the same time, 16 were looked after by their domestic helper (who, besides taking care of the elderly member, also performed other household chores). In both cases where caregiving was provided (by family and paid personnel), the same was higher among the O-Os compared to Y-Os. The Chi-square test indicated that this association was significant at the 5% level ($\chi^2=11.723$, $df=2$, $p=0.01$).

7.14: The Nature of Caregiving for the Elderly Living at Home

Nature of caregiver	Y-Os (Freq)	O-Os (Freq)	Total (Freq)	Grouping based on Nature of Caregiver	Y-Os Freq (%)	O-Os Freq (%)	Total Freq (%)
Independent/ No need for caregiver	135	104	239	Self	135 (33.75%)	104 (26%)	239 (59.75%)
Spouse	23	10	33	Family members	36 (9%)	44 (11%)	80 (20%)
Children	11	31	42				
Other relatives	2	3	5				
Caretaker	25	40	65	Paid personnel	29 (7.25%)	52 (13%)	81 (20.25%)
Domestic helper	4	12	16				

Source: Primary survey

Table 7.15 indicates that among the 81 elderly respondents who have paid personnel as their caregivers, 61.73% of the elderly respondents reported that their caregivers were paid between ₹ 15,000 - ₹ 25,000 on a monthly basis, with a higher number of O-O reporting the same (31 respondents) compared to the Y-O (19 respondents). It was observed that relatively higher remuneration has to be paid to specialised/trained caregivers, compared to domestic helpers who take care of the aged, wherein, in most cases (14.81% of the respondents), the latter are paid in the range of ₹ 10,000 - ₹ 15,000, and sometimes even

below ₹ 10,000 monthly. Based on the health and physical activity of the elderly, the caregivers' charges vary, with the demand for higher charges as the condition of the elderly deteriorates. For instance, 23.46% of the elderly respondents reported paying above ₹ 25,000 a month, higher among the O-O (17.29%) than the Y-O (6.17%). These amounts are often expensive for the elderly to finance and are paid for by family members. Our finding that the O-Os face a higher burden of caregiving costs is supported by the Chi-square test, indicating a significant association among Y-Os and O-Os concerning slab-wise caregiving expenses, to the disadvantage of the O-Os ($\chi^2=18.723$, $df=3$, $p=0.01$).

Table 7.15: Slab-wise Monthly Expenditure on Paid-Caregivers

Monthly expenditure on caregiver	No. of elderly		
	Y-O	O-O	Total
Less than ₹ 10,000	2 (2.47)	3 (3.70)	5 (6.17)
₹ 10,000 - ₹ 15,000	3 (3.70)	4 (4.94)	7 (8.64)
₹ 15,000 - ₹ 20,000	7 (8.64)	11 (13.58)	18 (22.22)
₹ 20,000 - ₹ 25,000	12 (14.81)	20 (24.69)	32 (39.51)
₹ 25,000 - ₹ 30,000	3 (3.70)	10 (12.35)	13 (16.05)
₹ 30,000 and above	2 (2.47)	4 (4.94)	6 (7.41)
Total	29 (35.80)	52 (64.20)	81 (100)

Source: Primary survey

7.4.3 The Relation between HRQOL and Health Expenditure

Seeking to determine *whether there is a significant positive or negative relation between HRQOL and health expenditure (RQ5.7)*, Table 7.16 highlights a highly significant negative correlation between HRQOL and total health expenditure. In each case (PCS and MCS), there is an inverse relationship, indicating that better (i.e. higher scores) physical health results in significantly lower health expense and vice versa, with a *Pearson's Correlation Coefficient* of -0.565. Similarly, older adults with poorer mental health have to spend more to finance their medical expenses; for example, Kale and Carroll (2016, 283) found that older cancer patients with economic problems reported lower HRQOL.

Table 7.16: Correlation between Health Expenditure and PCS and MCS Scores

	Total Health Expenditure		
	PCS	MCS	
Total Health Expenditure	Pearson Correlation	1	-.565***
	Sig. (2-tailed)	.000	.000
	N	500	500

*** Correlation is significant at 0.01 level (2-tailed)

As observed in Section 7.4.2, a few older adults reported no expenditures on specific components of health expenditure, given that they went to government health facilities. However, the majority reported incurring expenditure on each component of healthcare, while in some cases, considerably high expenditure patterns were observed. Thus, we proceed with this analysis further by seeking to understand the HCU patterns of the elderly in terms of *what determines their choice of public v/s private health facilities or a combination of the same (RQ5.8)*.

7.5. Factors Affecting the Choice of Healthcare Utilisation (HCU)

Goa has an elaborate public health infrastructure right from the Primary Health Centres (PHC) at the village level, the Community Health Centres (CHC) at the Block level, the two District Hospitals in North and South Goa districts respectively, and the tertiary hospital – the GMC – at the State level, under the purview of the government, through the Department of Health Services. Added to this is the new Super Speciality block at GMC. Besides, there are several private hospitals across the State. In our study, the majority of the elderly living at home [213 respondents (53.25%)] opted for Private health facilities, in comparison to 151 respondents (37.75%) who chose Public health facilities. In contrast, 9% chose a combination of Public and Private health facilities.

Historically, various theoretical frameworks have emerged to explore the determinants influencing individuals' choices in HCU. These include the *Stages of Illness and Medical Care* (Suchman 1965), the *Health Belief Model* (Rosenstock, Strecher, and Becker 1994), and the *Choice Making Model* (Young 1980). However, the most prevalent framework utilised in understanding HCU is Andersen's (1995) *Health Behavioural Model (HBM)*. The rationale behind the widespread adoption of HBM lies in its comprehensive multidimensional approach, which incorporates both individual factors (such as age, gender, and education) and contextual variables (for example, geographical location and health insurance) that impact individuals' choices to access healthcare (Babitsch, Gohl, and von Lengerke 2012, 1). Unlike other models that primarily focus on behavioural and cultural dimensions, HBM recognises that health-seeking behaviour is influenced by a multitude of factors, spanning from sociodemographic characteristics to healthcare needs, in contrast to other frameworks that solely concentrate on behavioural and cultural elements. Andersen's model organises these factors into three main categories: *Predisposing, Enabling, and Need factors*.

- Predisposing factors encompass socio-demographic characteristics.
- Enabling factors comprise family/community resources that enable HCU.
- Need factors arise from an individual's requirement for utilising healthcare services. Perceived and assessed health status are typically regarded as components of need factors (Andersen 1995, 2-7).

The current study endeavours to investigate the factors influencing the selection of healthcare providers—private versus public sector—among elderly individuals in Goa, employing Binary Logistic Regression to analyse these three factors identified within the HBM. The selection of the healthcare facility is considered the outcome variable. Given that a small minority (9%) opted for a combination of both healthcare facilities, the analysis focuses solely on the two primary categories: Private and Public healthcare facilities. All explanatory variables influencing HCU were selected based on Andersen's behavioural framework. The predisposing independent variables comprised gender, age, educational qualification, marital status, and locality.

Among the enabling factors included the natural logs of monthly per capita household income and monthly income exclusively of the elderly. The third enabling factor was whether the respondent had a health insurance policy. The extent of financial dependency was also assessed on a three-point Likert scale ranging from being fully financially dependent to partial dependency right up to being financially independent.

Finally, three need factors were assessed, including (i) the number of morbidities the person was suffering from over the last year prior to the survey, (ii) whether there was a need for hospitalisation during this period, and (iii) their health status perception was assessed by the statement 'Compared to one year ago, how would you rate your health in general now?', which they rated on a five-point Likert scale from much better now than a year ago, to much worse now than a year ago. Only the responses of the elderly living at home were considered, as the same in OAHs is prior decided by the management/doctor of the OAH, and the elderly inmates have no say in the same. The method of operationalisation is given in Table 7.17.

Table 7.17: Mode of Operationalisation for Binary Logistic Regression for HCU

	Variable considered	Mode of Operationalisation	Variable type
Dependent Variable	Healthcare Utilisation Choice	HCU = 1: Private health facility, 0: otherwise	Categorical
<u>Independent Variables</u>			
Predisposing factors	Gender	SEX = 1: male, 0: otherwise	Categorical
	Age	AGE = 1: Young-Old (Y-O), 0: otherwise	Categorical
	Current Marital Status	MARRIED = 1: Currently married, 0: otherwise	Categorical
	Educational Qualification	EDU = 1: Has formal education, 0: otherwise	Categorical
	Locality	LOC = 1: Urban, 0: otherwise	Categorical
Enabling factors	Monthly per capita HH Income	lnMPCI(HH)	Continuous
	Monthly income of the elderly	lnINCOME	Continuous
	Has Health Insurance	INSURANCE = 1: Yes, 0: otherwise	Categorical
	Financial Dependence	FINDEP	Likert scale
Need factors	Number of Morbidities	MORBID	Ordinal
	Need for hospitalisation	HOSP = 1: Yes, 0: otherwise	Ordinal
	Perception of Health Status	HSTATUS	Likert scale

The following logistic regression model is tested:

$$\begin{aligned}
 HCU_i = \log \left(\frac{\text{private}}{\text{public}} \right)_i \\
 = \alpha + \beta_1 \cdot SEX_i + \beta_2 \cdot AGE_i + \beta_3 \cdot MARRIED_i + \beta_4 \cdot EDU_i + \beta_5 \cdot LOC_i \\
 + \beta_6 \cdot \ln MPCI(HH)_i + \beta_7 \cdot \ln INCOME_i + \beta_8 \cdot INSURANCE_i + \beta_9 \cdot FINDEP_i \\
 + \beta_{10} \cdot MORBID_i + \beta_{11} \cdot HOSP_i + \beta_{12} \cdot HSTATUS_i + \epsilon_i
 \end{aligned}$$

The Omnibus Test of Model Coefficients used to test the model fit indicated that the model is significant ($\chi^2=20.536$, $df=12$, $p=.058$), indicating good fit as compared to the baseline null model without any independent variables used, thus having a good fit. The Hosmer and Lemeshow test also proves that the model adequately fits the data (since $p=0.823$), indicating no difference between the observed and predicted model. The Pseudo R-squared presented by *Nagelkerke's R²* (0.41) suggests that a 41% change in the criterion variable can be accounted for the predictor variables in the model. The Percentage Accuracy in the Classification model was 77.7%.

The results in Table 7.18 revealed that among the pre-disposing factors, only educational qualification is a significant factor in determining the choice of a private hospital over a public hospital. A formal education (EDU) increases the odds of preferring a private hospital compared to a public hospital by 2.129 times and is significant at the 10% significance level. An interesting finding is that neither the enabling nor the need factors significantly influenced the choice of HCU. This highlights that regardless of these factors, the elderly Goans prefer to go to private hospitals for treatment. Given this finding, we proceed to analyse some quality factors that influence this choice.

Table 7.18: Factors Affecting Choice of HCU using Binary Logistic Regression

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
SEX	-.139	.257	.293	1	.588	.870	.526	1.439
AGE	-.135	.265	.260	1	.610	.874	.520	1.469
MARRIED	-.262	.282	.868	1	.352	.769	.443	1.336
EDU	.756	.431	3.073	1	.080	2.129	.915	4.956
LOC	.341	.255	1.781	1	.182	1.406	.852	2.318
lnMPCI(HH)	.071	.128	.305	1	.581	1.073	.835	1.379
lnINCOME	.064	.053	1.465	1	.226	1.066	.961	1.181
INSURANCE	.411	.258	2.542	1	.111	1.509	.910	2.502
FINDEP	.127	.102	1.550	1	.213	1.136	.929	1.388
MORBID	.051	.084	.365	1	.546	1.052	.892	1.242
HOSP	.030	.117	.067	1	.796	1.031	.819	1.297
HSTATUS	.144	.163	.782	1	.377	1.155	.839	1.589
Constant	-1.834	1.263	2.109	1	.146	.160		

The quality factors considered were the cost factor, proximity, well-qualified medical personnel, efficiency, clean environment, privacy, fewer waiting hours/ timely treatment, and patient safety. Figure 7.4 indicates the choice of healthcare pattern based on the quality factors mentioned. It is observed that the choice of a public healthcare facility is primarily driven by the low-cost factor (77%), where medical treatment is relatively free of cost while, in some cases, available at subsidised rates. The following most important reason for opting for public hospitals is the availability of well-qualified medical practitioners (35.5%), especially in the super speciality sections such as Cardiovascular disease, Cancer, etc., at GMC. Nevertheless, the percentage was comparatively lower than that in private hospitals (43%). While proximity is opted for as the third most important reason by 32.5% of the respondents, the other quality factors were opted for by relatively fewer respondents.

In contrast, the choice of a private health facility was influenced primarily by fewer waiting hours and the availability of timely treatment (59.5%), closely followed by the safety of the patient (57.5%) and efficiency of service (55.5%). The privacy of the patient (47%), the clean and sanitised environment (44.5%), and the availability of well-qualified medical personnel (43%) are also prominent factors that influence the choice of a private health facility. Finally, among the respondents opting for a combination of public and private health facilities, those who sought a combination of quality factors (proximity, timely treatment, efficiency, clean environment, privacy, patient safety) opted in a proportion ranging from 29.5% to 37.5% of the respondents.

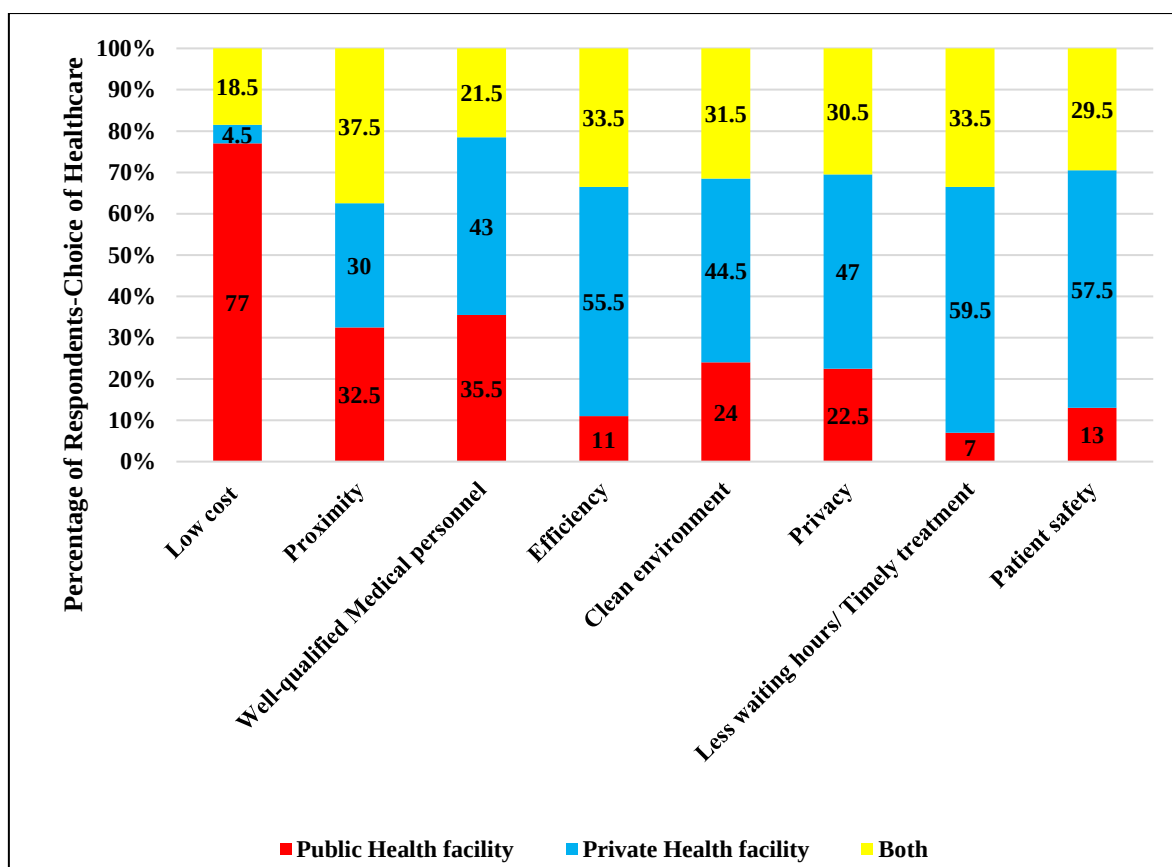


Figure 7.4: Choice of Healthcare based on various Quality Factors

Source: Primary survey

7.6 Summary

This chapter analysed the nature of morbidity that is plaguing the Y-O and O-O alike, being significantly higher among elderly females. Mental health problems are higher among the elderly living in OAHs. Multimorbidity is very common, with a significantly higher number of elderly suffering from multimorbidity requiring assistance in performing their ADLs. SF-36 was found to be a suitable instrument to assess the HRQOL of the elderly. HRQOL was evaluated from two aspects: physical and mental, with their mental health being better than their physical health. Older adults scored lowest on the subdomains of physical functioning, general health, and bodily pain, while among the domains measuring mental health, the lowest mean score was on vitality, followed by social functioning. Nevertheless, significant differences were found among elderly females, those aged 90 years and above, the unmarried, uneducated, those residing in OAHs, those living alone, and those living in rural areas having the lowest HRQOL scores. Concerning health expenditure, in government-run OAHs, the health costs are borne by the government, while in non-government-run OAHs, the family members of the elderly pay the fee amount and

whatever extra medical expenditure is required. Differences in healthcare expenditure were also observed, being higher among the O-O and elderly females, and forming a sizeable portion of the expenditure budget of the household and individual. The top five highly reported items of health expenditure include medicines, health-related transportation costs, clinical/diagnostic tests, doctor consultation charges, and special diet/supplement expenses. However, the slab-wise distribution of expenditure on each component reveals vast variations in the amount incurred on each item.

A significantly high number of O-Os need the assistance of caregivers, who often are family members but, in other cases, are paid personnel, including trained caretakers and domestic helpers, resulting in relatively high costs of caregiving. Better HRQOL was very significantly correlated with lower health expenditure. Elderly residing in OAHs do not make their own HCU choice as government-run OAHs take the sick, elderly inmates to public hospitals/health centres. However, most of the non-government-run OAHs have a private doctor-on-call, and based on the doctor's recommendation, the choice of hospital is made. Among the elderly living at home, a little over half the sample opted for private health facilities. Nevertheless, none of Andersen's HBM variables, except for the pre-disposing factor of education, significantly influenced this choice. Nonetheless, among quality factors, the choice of a public healthcare facility is primarily driven by the low/no cost factor, availability of well-qualified medical practitioners and proximity to the health facility. In contrast, the choice of a private health facility was influenced primarily by fewer waiting hours, availability of timely treatment, patient safety, and service efficiency. Besides, the patient's privacy, a clean and sanitised environment, and the availability of well-qualified medical personnel are also prominent reasons.

¹ Extremely high expenditure reported by an elderly respondent who was suffering from cancer and chronic kidney disease.

² In many cases where family members served as caregivers of the elderly, interactions with them revealed that this caregiving task was getting overwhelming for some, given the sleepless nights in some cases which often led them to leave their job, thus resulting in a loss of income.

CHAPTER 8: HEALTHY AGEING TRAJECTORIES, LABOUR MARKET OUTCOMES, AND SOCIAL PROVISIONS AMONG GOAN ELDERLY

8.1 Introduction

This chapter unveils the intricacies from *Wellness to Work* by cohesively synthesising the phenomenon of *Healthy Ageing*, encompassing *the relation between Economic, Health, and Subjective Wellbeing domains* in Section 8.1 by employing the SEM technique. The Mediating Role of HRQOL (health) is tested between living standards capabilities (economic) and life satisfaction (subjective wellbeing) based on the Direct, Indirect, and Total Effects. Section 8.2 explores the *Labour Market Choices, Pensions, and Social Provisions among Older Adults in Goa*. Labour market choices are analysed in terms of *Pre-, Voluntary-, and Post-Retirement Work*. Reasons for taking voluntary retirement and the key pull factors that have drawn older adults back to the labour market post-retirement age are analysed, besides identifying the categories of the elderly that are more inclined to such work. The prevalence of significant differences concerning retirement pensions among the elderly and the level of awareness and utilisation of social security benefits is also assessed.

SECTION 8.1: HEALTHY AGEING - THE RELATION BETWEEN ECONOMIC, HEALTH, AND SUBJECTIVE WELLBEING DOMAINS

We added years to life; now it's time to add life to those years: J. F. Kennedy (1963, 189).

8.1.1 Introduction

As the world has embarked on the *Healthy Ageing Decade* (2021-2030), scrutiny of the (extended) meaning of healthy ageing helps us appreciate the underlying relationship between living standards capabilities, life satisfaction, and HRQOL, which the WHO (2020) seeks to emphasise. This relationship forms the foundation for the present section, an association not yet studied by prior researchers among older adults, more so from the Capability Perspective, however, bearing impactful policy implications.

According to the WHO, “Healthy ageing involves acquiring and preserving *functional abilities* to foster *wellbeing* through later life” (*ibid*, v). Concerning ‘wellbeing’, Veenhoven (2012, 63) contends the integral role of life satisfaction in subjective wellbeing. Following its introduction in the mid-1980s, subjective wellbeing is used as a proxy for overall life satisfaction, wellbeing, and contentment, especially among older adults. Concerning the second aspect, ‘functional ability’, the WHO clarifies that “functional ability depends on developing capabilities that allow individuals to fulfil elementary requirements, make choices, adapt, create, and sustain relationships, and bring societal value.” Functional ability is predicated on the ‘capabilities’ of the individual. It stems from the Capability Approach of Amartya Sen (1987), which contemplates the things that individuals can accomplish with the liberties they enjoy.

In continuance with its comprehensive definition, the WHO stressed that “Wellbeing and functional ability influence and are, in turn, affected by the prevalence and intensity of illness or injury and age-specific physiological impairments that influence an individual’s innate ability” (WHO 2020, 9), highlighting the third aspect of individuals’ HRQOL and its relation with living standards capabilities and life satisfaction.

Healthy ageing thus reinforces the prerequisite for action spanning various realms that empower older adults to thrive as valuable resources within their households, neighbourhood, and society (Wilmoth et al. 2023, 113). This phase, mainly encompassing a third of the lifespan, ought to offer an unparalleled chance to continually grow oneself physiologically, socially, and emotionally (Gladman 2019, 8-9). Appropriate policy resolutions in this regard fulfil one of the core objectives of the healthy ageing decade: guaranteeing that older individuals embrace prolonged periods of wellbeing and good health through accessible amenities and conducive surroundings (Wilmoth et al. 2023, 3). Part of the rationale for improving the living standards capabilities, HRQOL, and life satisfaction stems from the fact that a happier and healthier populace necessitates fewer amenities (Sirgy 2012, 17).

8.1.2 Dual Variable Models: Providing Direction to our Structural Model

There has been slow yet stalling progress in ‘dual variable model’ investigations, where the attention is predominantly on two major variables. We rely on the findings of these studies to provide direction for the path analysis adopted in our structural model.

8.1.2.1 Living Standards and Life Satisfaction

The relation between living standards (proxied by material resources like income) and life satisfaction has been extensively studied. Horstmann et al. (2012, 391) highlighted a positive link between the economic situation and life satisfaction among older women. Yu et al. (2020, 2851) and Diener, Tay, and Oishi (2013, 267) found that household income positively influences subjective wellbeing. Similarly, Ungerer and Strasheim (2011, 25) revealed that those with higher living standards are more satisfied with their lives. Blanchflower and Oswald (2004, 1359) demonstrated that material fulfilment does, in reality, purchase the quality of life, including the ability to safeguard for ‘rainy days’, contributing to improved life satisfaction, aligning with the findings of other researchers (Diener et al. 2010, 52). Kollamparambil (2020, 201) and Eam et al. (2020, 391) confirm that income has a favourable impact on subjective wellbeing in Western cultures, as well as in South Asia, South Africa, and East Asia.

On the contrary, few studies specify that increased income (better living standard) fails to improve life satisfaction. *Ideal Aspirants* contend that desires grow in tandem with income (Graham and Pettinato 2006, 128), leading to the assessment of living standards based on ideal expectations and not minimal needs. *Adaptation Advocates* believe that rises in wealth trigger an upsurge in material possessions and consumption, but individuals promptly adjust to this higher level, reducing marginal utility and life satisfaction (Easterlin et al. 2010, 22463). These conflicting results are due to disagreements over how older people’s living standards are defined and judged. Older persons are reluctant to disclose financial stress. Nevertheless, their income is often lower, with fewer unmet requirements than younger populations (Groffen et al. 2008, 1). Thus, we adopt the Living Standards Capabilities Approach, a better-defined metric, which is a crucial component of healthy ageing (Alhambra-Borrás, Doñate-Martínez, and Garcés-Ferrer 2021, 2527). Most capabilities are found to exhibit a significant association with life satisfaction, according to the studies by Anand, Hunter, and Smith (2005, 9) and Anand and Van Hees (2006, 268) that have looked into the association between life satisfaction and capabilities.

8.1.2.2 Living Standards and HRQOL

We review both mental and physical health in HRQOL as the living standards of older persons impact the two (Goli et al. 2014, 353). Older adults are frailer and less resilient to disease, so their living standard may dramatically influence their health more than young individuals. Those in deplorable circumstances are more susceptible to becoming unwell

(Wilkinson et al. 2004, 1). The recursive assumption is that health may impact one's living standards; however, this impact is less significant (Ramsey et al. 2013, 1143). Studies on the first segment of HRQOL, namely mental health, have discovered a substantial association with the standard of living (Bellani and D'Ambrosio 2011, 67; Foulds, Wells, and Mulder 2014, 766). One of the primary justifications for this is that an inadequate living standard may be quite alienating, decreasing social interaction and increasing the risk of a mental disorder (Bellani and D'Ambrosio 2011, 68-69). Alternate avenues, from inadequate living standards to poor emotional wellness for the aged, include the inability to give back to the community and comparisons with others, resulting in unfavourable self-assessments (Murali and Oyeboode 2004, 216). Studies have linked a diminished living standard to lower physical health (Patel et al. 2010, 115; Dulin et al. 2011, 1406; Perry 2014, 2). Persons with poor living standards suffer from coronary heart disease, diabetes, arthritis, and obesity. At the same time, those from disadvantaged backgrounds had unfulfilled requirements of consulting a doctor (Ministry of Health New Zealand 2010) demonstrating that living standards are an essential gauge of good health (Perry 2014, 20).

8.1.2.3 HRQOL and Life Satisfaction

Jafari et al. (2010, 1362), Horstmann et al. (2012, 391), and Papi and Cheraghi (2021, 65) discovered a strong link between health status and life satisfaction. According to Ferrans et al. (2005, 336), HRQOL was developed to examine the impact of health, sickness, physical performance, and mental and social adaptation on wellbeing. Fagerström et al. (2007, 33) found that life satisfaction is associated with self-assessments of health. Both physical and cognitive health have an enormous impact on older individuals' wellbeing (Low and Molzahn 2007, 141). According to Meijer et al. (2009, 361), mental HRQOL is a better marker of total life satisfaction than physical HRQOL. As cognitive abilities deteriorate, older adults become less willing to carry out daily tasks independently and become increasingly reliant on others, lowering their life satisfaction and causing depression, anxiety, and diminished self-esteem. Ferguson (2014, 328) also contends that the reduction of functionality intensifies with age, compromising older individuals' mental health and life satisfaction. Besides, prior habits, such as eating right, exercising, cigarette usage, and alcohol consumption, may influence the current level of life satisfaction. Physical health also influences older people's well-being. For instance, Gwozdz and Sousa-Poza (2010, 397) discovered a link between the deterioration in the wellbeing of respondents above 75 years alongside a sharp drop in mental and physical health.

Based on the predominant paths among the dual variable models, living standards are found to impact life satisfaction positively in most cases. Living standards are also found to affect HRQOL, and HRQOL, in turn, is demonstrated to impact life satisfaction. Given these path directions and the fact that mental and physical health are the most potent estimators of subjective wellbeing (Webb et al. 2011, 542), we analyse whether HRQOL mediates the influence of living standards capabilities on life satisfaction.

8.1.3 Analysis Procedure

The latent variable SEM is adopted, given its capacity to take into account mediation effects and latent variables while investigating multiple interactions. (Tomás et al. 2016, 1377). A strategy of partially disaggregating the indicators, known as *Parcelling*, is deployed to minimise the overall number of variables during the evaluation while preserving autonomy (Gupta and Singh 2015, 22-23). This is done by taking a mean of the items and gauging each construct to generate a scale rating for every participant on each multi-item scale. This method rectifies random error in measurement and yields parameter values equal to those from a latent variable assessment (Williams and O’Boyle 2008, 233).

The first step in SEM is to develop a theoretically grounded Measurement Model, which might require modification indices to become more adaptive and acceptable (Kline 2005, 117). The model fit, validity, and reliability are then assessed. Mediation analysis using SEM necessitates complex approaches centred around conceptual comprehension, empirical evidence, and advanced statistical procedures most suited to the present study.

The suitability of using the LSCAPE-25 scale to assess the Living Standards Capabilities of Elders and SF-36 to quantify their HRQOL was evaluated in Chapters 6 and 7, respectively, indicating excellent consistency and convergence of first-order factors onto second-order factors. The Satisfaction with Life Scale (SWLS), a five-item globally recognised scale to evaluate perceptions of a person’s life satisfaction on a seven-point Likert scale, was established by Diener et al. (1985). The five statements include: ‘In most ways, my life is close to my ideal’: L1; ‘The conditions of my life are excellent’: L2; ‘I am satisfied with my life’: L3; ‘So far I have gotten the important things I want in life’: L4; ‘If I could live my life over, I would change almost nothing’: L5. Participants mark how strongly they concur or disagree with each item. A series of research work indicates that the SWLS has excellent internal consistency and reliability. Higher ratings indicate better life satisfaction. Since SWLS comprises just one factor, it has been directly incorporated into the model. Responses from the entire sample are evaluated.

8.1.4 Structural Equation Modelling

8.1.4.1 Evaluation of the Measurement Model

Figure 8.1 presents the CFA Measurement Framework employed for assessing the model's fit, credibility, and reliability, while its outcomes are presented in Table 8.1. Three different constructs comprise the model, namely LSCAPE (representing living standards capabilities of elders), HRQOL (representing health-related quality of life), and LifeSatisf (representing life satisfaction). LSCAPE and HRQOL have been included in the model based on the *parcelling* technique. The initial CFA Measurement Model failed to meet the required fit indices. By modifying indices, the model was re-specified and re-run by drawing covariances among the error terms of LifeSatisf variables (L3 and L4). The re-specified model obtained a better and acceptable fit (CMIN/df=2.7, CFI=0.97, RMSEA=0.06, TLI=0.97, SRMR=0.05, and GFI=0.95).

Table 8.1 shows that the factor loadings of each construct and the AVE are more than 0.5, suggesting convergent validity for the Measurement Model according to Fornell and Larcker's (1981, 39) criterion. Similarly, CR is also achieved with values over 0.70, and so is DV, fulfilling Hair et al.'s (2010, 737) criterion. Thus, the fulfilment of all the necessary criteria in the Measurement Model paves the way for the Structural Model.

Table 8.1: Validity and Reliability of the Triple Variable Measurement Model

Factors	Factor Loading	Latent Factors	AVE	CR	DV		
					LSCAPE	HRQOL	LifeSatisf
Healthcare (HC)	.813	LSCAPE	.693	.931	.832		
Social Integration(SI)	.825						
Contribution (Con)	.874						
Enjoyment (Enj)	.920						
Security (Sec)	.799						
Restriction (Res)	.753						
Physical component summary (PCS)	.773	HRQOL	.687	.814	.054	.829	
Mental component summary (MCS)	.880						
L1	.757	LifeSatisf	.628	.893	.374	.365	.792
L2	.955						
L3	.671						
L4	.791						
L5	.757						

Note. AVE=Average Variance Extracted; CR=Composite Reliability; DV=Discriminant Validity.

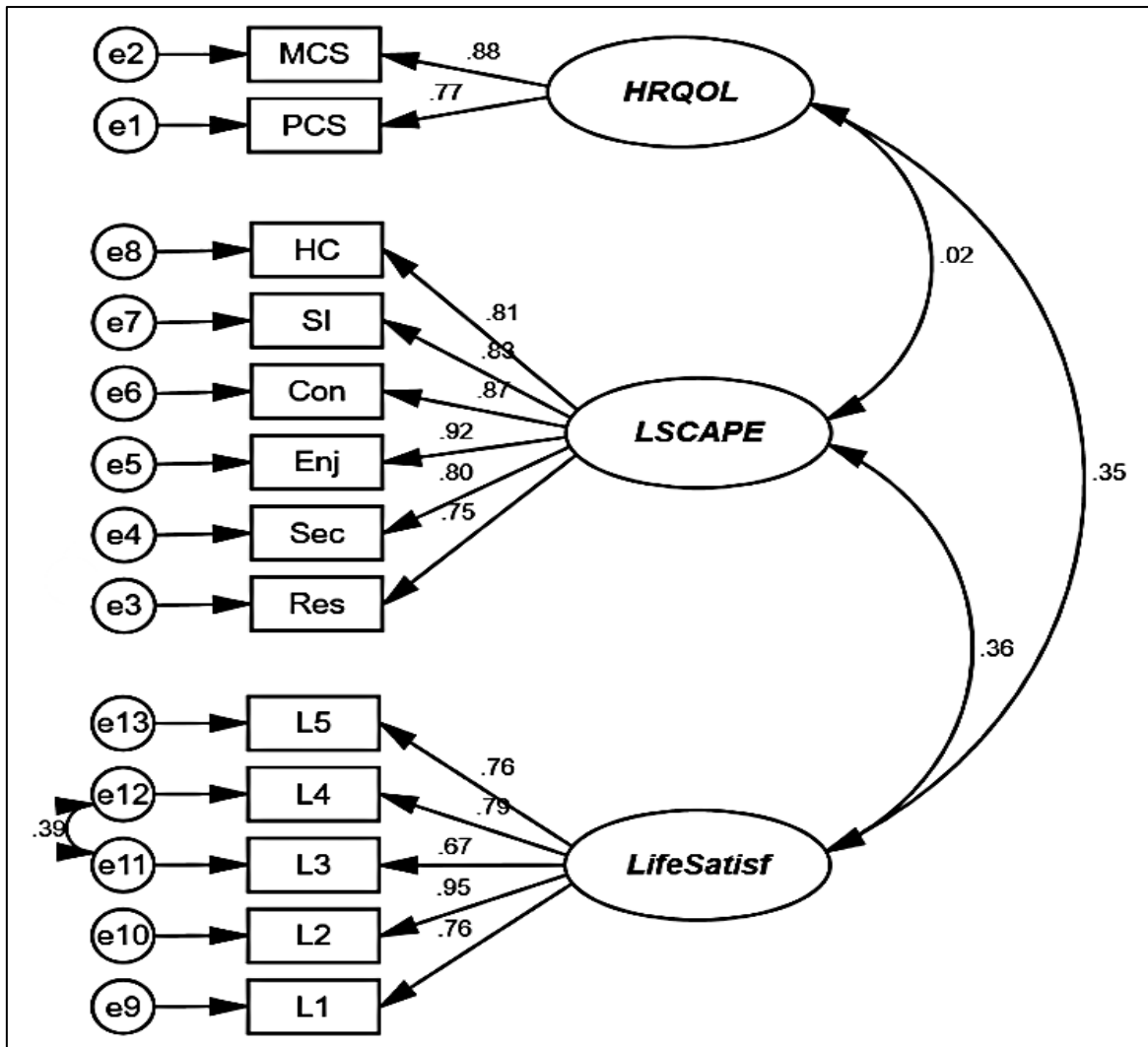


Figure 8.1: Measurement Model Interrelating Living Standards Capabilities, HRQOL, and Life Satisfaction

Source: Primary survey

8.1.4.2 Structural Model

The Structural Equation Model tests for the existence of a significant relationship between living standards capabilities, HRQOL, and life satisfaction ($LSCAPE \rightarrow HRQOL \rightarrow LifeSatisf$), with HRQOL mediating the influence between living standards capabilities and life satisfaction. While testing this central relationship, the statistical significance of the sub-relationships has also been evaluated, considering that living standards are being studied from a Capability Perspective, unlike prior research. These include testing the existence of a statistically significant relationship between living standards capabilities and life satisfaction ($LSCAPE \rightarrow LifeSatisf$), living standards capabilities and HRQOL ($LSCAPE \rightarrow HRQOL$), and HRQOL and life satisfaction ($HRQOL \rightarrow LifeSatisf$).

The results of the SEM analysis are presented in Figure 8.2. The widely acknowledged strategy to gauge the significance of mediation assessment involves employing a *bootstrap procedure* using the *bias-corrected percentile approach*. The bootstrap methodology creates lower and upper limit approximations based on a confidence interval of 95%. HRQOL's mediating role is assessed through the lens of the direct, indirect, and total effects. Table 8.2 demonstrates highly significant mediation effects, corroborated by the two-tailed significance values generated by the bias-corrected percentile method. The direct effect of LSCAPE on LifeSatisf in the absence of HRQOL is positive and statistically very significant at the 1% level ($\beta=0.338$, $p=0.001$), similar to Diener et al. (2010, 52), Diener, Tay, and Oishi (2013, 267), Eam et al. (2020, 391), Horstmann et al. (2012, 391), Kollamparambil (2020, 201) and Yu et al. (2020, 2851).

LSCAPE's indirect impact on LifeSatisf in the presence of HRQOL is also positive and highly significant ($\beta=0.083$, $p=0.001$) and can be obtained by multiplying path estimates from LSCAPE to HRQOL ($\beta=0.24$) with that from HRQOL to LifeSatisf ($\beta=0.35$). These very significant results indicate that HRQOL acts as a mediator between LSCAPE and LifeSatisf. The total effect ($\beta=0.42$, $p=0.001$) of LSCAPE on LifeSatisf is a summation of the direct and indirect effect in the presence of the mediator, which is also highly significant ($p=0.001$).

Partial-Complementary mediation is found to be occurring, wherein the direct effect between LSCAPE and LifeSatisf is statistically significant, as is the indirect effect through the mediator, HRQOL, proving that partial mediation is occurring. Besides, the direct and indirect effects exhibit analogous impacts regarding orientation., i.e., both are positive, indicating a case of complementary mediation.

The other sub-paths are also highly significant. For instance, LSCAPE positively and significantly influences HRQOL (LSCAPE $\rightarrow$ HRQOL) of older adults ($\beta=0.24$, $p<0.001$) by impacting both the dimensions of HRQOL: PCS and MCS, in tune with the findings of Dulin et al. (2011, 1406), Patel et al. (2010, 115), Perry (2014, 2), and Wilkinson et al. (2004, 1). However, the influence is higher on their mental health. This finding is consistent with those of Bellani and D'Ambrosio (2011, 68-69), Foulds, Wells, and Mulder (2014, 766), and Meijer et al. (2009, 361), who also found that mental health has higher significance in HRQOL. This is relevant in Goa, given that Patel and Prince (2001, 29) demonstrated the prevalence of despondency and dementia amongst Goa's older adults attributable to abuse and neglect. This finding was supported by Cohen et al. (2018, 168), that also reported accounts of neglect and abuse among older adults in Goa.

HRQOL, in turn, is a positive and highly significant antecedent of LifeSatisf (HRQOL→LifeSatisf) in older people ($\beta=0.35$, $p<0.001$) in accordance with the findings of Cho and Cheon (2023, 1), Cho, Post, and Kim (2018, 380), Horstmann et al. (2012, 391), Jafari et al. (2010, 1362), and Papi and Cheraghi (2021, 65).

These findings highlight that having good living standards capabilities is not the only criterion for improving older adults' life satisfaction. Their HRQOL (both physical and mental) also significantly influences their wellbeing. This influence is more substantial (by a unit) compared to the direct influence that LSCAPE has on LifeSatisf ($\beta=0.34$). In other words, HRQOL acts as a mediator between the relation of LSCAPE on LifeSatisf. Our findings agree with the observations of Yeung and Breheny (2016, 296), who claimed that ageing healthily is characterised not solely by the physical process, medical state, and functioning but more so by older persons' capability to lead lives effectively in years to come. As Wilmoth et al. (2023, 6) noted, an improved living standard may assist individuals in avoiding factors leading to impaired psychological and physical functioning, including loneliness, thus lowering the likelihood of poor wellbeing.

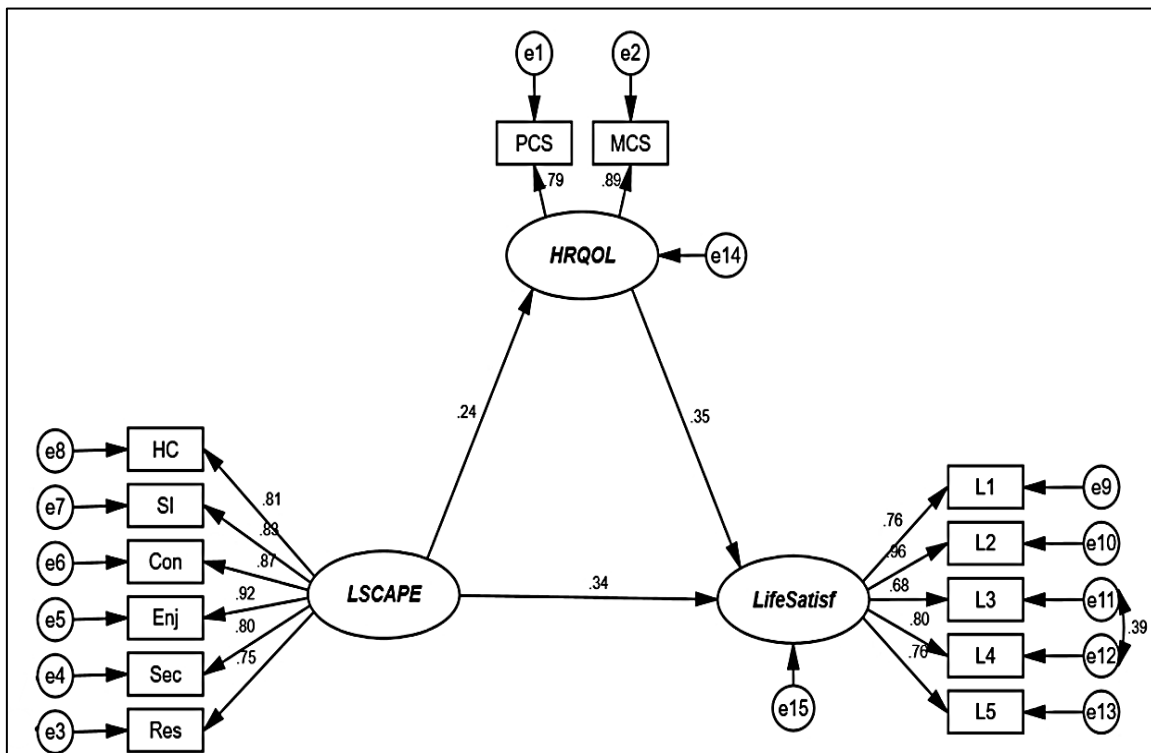


Figure 8.2: Structural Model depicting the Mediating Role of HRQOL between Living Standards Capabilities and Life Satisfaction

Source: Primary survey

Table 8.2: Standardised Path Coefficients and Mediation Summary based on SEM Analysis

Path directions	β	p-value
LSCAPE $\rightarrow$ HRQOL $\rightarrow$ LifeSatisf		
Standardised Direct Effect	.34	.001(LB=0.269; UB=0.402)
Standardised Indirect Effect	.08	.001 (LB=0.066; UB=0.100)
Standardised Total Effect	.42	.001 (LB=0.351; UB=0.482)
LSCAPE $\rightarrow$ LifeSatisf	.34	.001
LSCAPE $\rightarrow$ HRQOL	.24	.000
HRQOL $\rightarrow$ LifeSatisf	.35	.000

UB and LB denote the confidence interval's upper and lower bounds; β =Standardised path coefficient.

8.1.5 Summary

This section conceptualised the Healthy Ageing definition purported by the WHO into a structural model that tested the relation between the three fundamental components: living standards capabilities, HRQOL, and life satisfaction of older adults in Goa. SEM demonstrated that HRQOL very significantly mediates the relationship between living standards capabilities and life satisfaction.

SECTION 8.2: LABOUR MARKET CHOICES, PENSIONS, AND SOCIAL PROVISIONS

Ageing has economic effects whenever some economic interaction (the sale of a good or service, the provision of a government benefit, and so on) brings together people whose participation is a function of their age ... Old age pensions, child-rearing, and the combining of old people's capital with young people's labour are all cases where a change in the relative numbers on either side of the equation will have important effects: Weil (2008, 499).

8.2.1 Introduction

Labour market dynamics are undergoing changes. Retirement was considered a reasonably anticipated, long-term transition from full-time employment towards full-time recreation. However, this perception has since shifted. Intellectual attention concerning PRW has surged over recent years, evolving into a progressively prominent topic of discourse (Fasbender et al. 2016, 12). According to Kuitto, Kuivalainen, and Möhring (2021, 403), many with low or even average incomes are not able to make private pension savings that would accumulate adequate income in old age. Simultaneous cuts in the level of public pensions tend to harm low-to-middle-income pensioners the most, increasing inequalities in old age income and well-being (Social Protection Department 2018, 25-26).

This section unravels the labour market dynamics among older adults in Goa concerning Pre-Retirement, Voluntary Retirement, and PRW patterns (Siqueira Lobo and Falleiro 2023, 68). A glimpse into the Pension scenario: both Retirement and Social Pensions is also presented, along with an analysis of a few prominent Social Welfare Initiatives by the government to assist the elderly. The analysis is predominantly in terms of a comparison between the Y-O and O-O residing at home (except for pre-and voluntary retirement patterns), given that the elderly in OAHs are not permitted to engage in remunerative work outside the OAH, nor were they the recipients of any pension benefits.

8.2.2 Labour Market Dynamics

8.2.2.1 Occupation Prior to Retirement Age

Concerning analysing labour market decisions of older adults, the argument of Worthy et al. (2011, 1375) that the possibilities for future employment opportunities or retirement savings hinge on one's past choices highlight that analysis of the nature of post-retirement employment among older adults necessitates pondering their pre-retirement job patterns. Thus, Table 8.3 presents an answer to the first research question of this section, namely:

What was the nature of pre-retirement work among older adults (RQ7.1), by showcasing a comparative analysis of the nature of older adults' occupations prior to retirement age among older adults living at home and in OAHs. Among the elderly living at home (who are further classified as Y-O and O-O), many of the respondents reported to be government employees (43 respondents among the Y-O and 33 among the O-O) and private sector employees (32 respondents: Y-O and 31 respondents: O-O). In comparison, 69 were homemakers (28 respondents: Y-O and 41 respondents: O-O). Besides, the next highly reported occupational categories included running a business (39 respondents), being an agriculturist (37 respondents), an educationist (36 respondents), and a professional (26 respondents). Professionals primarily comprised doctors, engineers, lawyers, and seafarers.

However, the Chi-square test and FET results revealed no significant association between the Y-O and O-O in terms of the nature of the occupational category prior to retirement ($\chi^2=13.114$; $df=10$; $p=.217$; $FET=.218$). In contrast, the majority of the elderly living in OAHs reported that they were either homemakers (31 respondents), engaged in farming (14 respondents), were domestic helpers or were unemployed for the major part of their lives (12 respondents respectively). We find a highly significant association between the nature of occupational category and nature of residence, i.e., the elderly living at home and in OAHs ($\chi^2= 69.669$; $df=10$; $p=.000$; $FET=.000$).

Table 8.3: Occupation for the Major Part of the Life of the Senior Citizen (Frequency)

	<u>Elderly living at home</u>			<u>Elderly living in OAHs</u>
	Y-O	O-O	Total	Total
Agriculturist	16	21	37	14
Business	18	21	39	6
Professional	18	8	26	0
Educationist	22	14	36	2
Government Employee	43	33	76	4
Private sector Employee	32	31	63	9
Skilled Worker (Carpenter/Mason/Driver)	9	8	17	10
Domestic helper	4	8	12	12
Rentier	4	8	12	0
Homemaker	28	41	69	31
Unemployed	6	7	13	12
Total	200	200	400	100

Source: Primary survey

8.2.2.2 Voluntary Retirement

Another concern involves voluntary retirement and the various reasons inducing individuals in Goa to retire prematurely, prompting an investigation into: *What are the major reasons for taking voluntary retirement among the Goan elderly? (RQ7.2)*. Out of the entire sample of the elderly who were engaged in the labour market for a remuneration, a total of 83 respondents reported that they had taken voluntary retirement. The most commonly cited reason (by 34 respondents) was due to their own 'Health problems' and redundancy. Out of the many cases, to mention just a few, two respondents reported that they went into depression, while one started turning blind. Hence, they had to resign from their jobs voluntarily. These findings resonate with those of Cahill, Giandrea, and Quinn (2011, 40), Congdon-Hohman (2018, 583), Hokema and Scherger (2016, 91), and Virtanen et al. (2014, 1), who also demonstrated that ill health is a crucial factor contributing to premature retirement.

Another primary reason many (25 respondents) reported was 'Due to Family Reasons'. For instance, the transfer of the husband of a respondent to Kolkata compelled her to leave her job prematurely. This corresponds to the observations of Winkelmann-Gleed (2011, 80), who noted that one's obligations to the family predispose individuals to early retirement. Another five respondents reported that they decided to retire prematurely because their organisation offered a good retirement package, and the *Voluntary Retirement Scheme (VRS)* presented attractive benefits. Six respondents experienced many problems at work, creating much stress for them; for example, a respondent narrated a case of being compelled to engage in corrupt practices. All this prompted them to resign prematurely from their job. This result coincides with a similar finding by Virtanen et al. (2014, 7), who noted that a stressful work environment is closely connected to leaving the workforce untimely. Five respondents gave up their jobs early to relax and enjoy their free time, pursue their hobbies, and travel, in other words, for leisure purposes, as contented by Winkelmann-Gleed (2011, 83-84). A few others stated that they resigned voluntarily as they felt obliged to take up community service.

8.2.2.3 Post-Retirement Work (PRW) Status

Given that a large number of older adults are engaging in PRW, some in the form of Bridge employment, others via Unretirement (Cahill, Giandrea, and Quinn 2011, 34; Donner, Sze, and Bluth 2015, 235; Maestas 2010, 718; Moen and Flood 2013, 206), it directs the present study to seek answers to: *What is the nature of PRW among older*

adults? (RQ7.3). According to the terms and conditions of the OAHs surveyed in the present study, the elderly living in OAHs are not permitted to engage in any remunerative work outside the OAH. Hence, we analyse the PRW status of the elderly living at home by comparing the Y-O and O-O. As observed in Table 8.4, taking together the Y-O and O-O though most of the older adults are permanently out of the labour force (79.5%), 20.5% are currently engaged in PRW for which they receive a monetary remuneration. Out of this, a higher number of the Y-O (52 respondents) are engaged in PRW than the O-O (30 respondents). The Chi-square test reveals the existence of a very significant association between the PRW status among the Y-Os and O-Os ($\chi^2=7.424$, $df=1$, $p=.006$), indicating a higher number of Y-Os being currently engaged in PRW.

Table 8.4: Post-retirement Work (PRW) Status

Post-retirement work status	Y-O	O-O	Total (%)
Yes	52	30	82 (20.5)
No	148	170	318 (79.5)
Total	200	200	400 (100)

Source: Primary survey

Focusing exclusively on the Y-Os, results demonstrated that a total of 52 Y-O respondents engaged in PRW in Goa (Table 8.4). Eleven Y-O respondents were engaged in their own business related to food catering orders that kept them occupied for about four to six hours a day. Another four were engaged in agriculture and the sale of its produce, while another four reported taking tuition for school students for around four hours a day. While two senior citizens are engaged in the real estate business, the other two have their own tailoring businesses. A few of them are human resource consultants, consulting engineers, and legal advisors, and they are engaged for about four hours a day. Some of the other areas of current work among the Y-O respondents are as follows: one respondent was an owner of a *tavern* (liquor shop), another had a saloon of their own, a third was a driver, yet another a musician while another senior citizen had a business of selling pickles, syrups, knitted booties, etc. Among the rest was also a trade union representative; besides, there was a member of a Non-Governmental Organisation (NGO) called *Goa Heritage Group*, as well as a respondent who worked as a domestic helper.

Considering the O-Os, 30 are engaged in PRW (Table 8.4). Out of these, seven respondents were engaged in their businesses. For instance, one had a landscaping plant business and would be occupied with it for around seven hours daily. Three respondents

had their own retail shops, while one had a petroleum company. Two senior citizens reported cultivating and selling spices and fruits, while yet another went to sell fish daily. Two respondents were rentiers; one was an insurance agent, another a tailor, and another senior citizen practised his legal profession for around five hours thrice a week. Besides, some were engaged in the catering business, supervising construction work, and selling creative work skilfully made by them.

8.2.2.4 The Pull Factors drawing Older Adults into PRW

Carrying this analysis forward, we seek to determine: *What key pull factors have drawn older adults back to the labour market? (RQ7.4)*. As highlighted in the previous section, though most elderly were pushed out of the workforce due to the statutory retirement age cut-off, health problems, family issues, workplace stress, etc., we found that 20.5% are still engaged in PRW.

Table 8.5 lists the factors that pulled the elderly back into the labour force or compelled them to continue working. Out of the total number of senior citizens currently working for remuneration (82 respondents), 51 reported being pulled back into the labour force to supplement their economic resources due to insufficient income. This is in tune with the findings of Congdon-Hohman (2018, 583), who specifies that those requiring an additional source of funds, who have rental or insurance payments, or who need to pay back a loan are prone to unretire. The Chi-square test reveals there is a highly significant association between the Y-O and O-O and inadequacy of income is a factor pulling them to continue in the labour force ($\chi^2=20.855$, $df=1$, $p=.000$), compelling many of the Y-Os to do so, compared to the O-Os. A total of 34 respondents affirmed that their educational qualifications/skills (statement 2) and experience (statement 3) gave them the opportunity to continue in the labour force. This is consistent with the findings of Hokema and Scherger (2016, 91) and Oleksiyenko and Życzyńska-Ciołek (2018, 83), who showcased that higher academic achievement amalgamated with fairly profitable professions project a greater probability of continuing to work past the retirement age. The Chi-square tests also revealed the existence of significant associations between the Y-Os and O-Os regarding both the pull factors: education/skills ($\chi^2=4.505$, $df=1$, $p=.034$) and experience ($\chi^2=6.697$, $df=1$, $p=.010$) respectively, driving more O-Os into the labour force. Finally, it is observed that while 43 respondents continue to work as they are healthy and able to do so, 35 continue to work to keep themselves occupied, indicating that good health and the need to stay mentally fit act as essential pull factors. These findings are consistent with those of

Winkelmann-Gleed (2011, 80), who contends that the need to keep oneself mentally active and engaged post-retirement predisposes older adults to continue in the workforce. Greater physical and mental operation and embracing daily routine elements that boost wellbeing mitigate the physiological effects of ageing and keep elderly individuals healthy for work, life, and the future. Once again, highly significant associations were found between the Y-Os and O-Os, the results being $\chi^2=8.281$, $df=1$, $p=.004$ in the case of good health as a pull factor, and $\chi^2=22.332$, $df=1$, $p=.000$ in the case of the need to stay occupied or mentally fit as a pull factor.

Table 8.5: The Pull Factors that drew the Elderly into the Labour Force

Statement	Response	Y-O (n=52)	O-O (n=30)	Total
Lack of sufficient income pulled me back into the labour force	Yes	42	9	51
	No	10	21	31
My educational qualifications/skills enabled me to continue working	Yes	15	19	34
	No	37	11	48
My experience gave me a chance to continue in the workforce	Yes	16	18	34
	No	36	12	48
I am continuing to work to keep myself occupied/busy	Yes	12	23	35
	No	40	7	47
I am continuing to work as I am healthy and able to do so	Yes	21	22	43
	No	31	8	39

Source: Primary survey

8.2.2.5 Socio-demographic, Economic and Health Factors Pre-Disposing the Elderly into PRW

To identify *which categories of older adults are more inclined to engage in PRW (RQ7.5)*, the binary logistic regression method is used to understand the significance of the socio-demographic, economic, and health determinants of PRW. The choice of PRW is taken as the dependent variable wherein the two options considered are ‘Employed post-retirement’ and ‘Not employed post-retirement’. The independent variables are categorised into socio-demographic, economic, and health. The sociodemographic variables include gender, age, marital status, educational qualification, and locality. The economic variables comprise the natural logarithm of the respondent’s monthly per capita household income and the extent of financial dependence of the elderly on other people. The latter was measured by a three-point Likert scale, ranging from being fully financially dependent to partially financially dependent to being financially independent. The health variables comprised the older

adult's perception of their health status based on the statement, "Compared to one year ago, how would you rate your health in general now?" which they rated on a five-point Likert scale from much better now than one year ago to much worse now. The number of morbidities reported was analysed as the second health variable. The method of operationalisation is given in Table 8.6.

The following logistic regression model is tested:

$$PRW_i = \log \left(\frac{employed}{not\ employed} \right)_i = \alpha + \beta_1.SEX_i + \beta_2.AGE_i + \beta_3.MARRIED_i + \beta_4.EDU_i + \beta_5.LOC_i + \beta_6.lnMPCI(HH)_i + \beta_7.FINDEP_i + \beta_8.HEALTH_i + \beta_9.MORBID + \epsilon_i$$

Table 8.6: Mode of Operationalisation for Binary Logistic Regression of the PRW Model

Variable considered	Mode of Operationalisation	Variable type
Choice of Post-Retirement Work (PRW)	PRW=1: engaged in PRW, 0: otherwise	Categorical
Gender	SEX=1: male, 0: otherwise	Categorical
Age	AGE	Continuous
Current Marital Status	MARRIED=1: married, 0: otherwise	Categorical
Educational Qualification	EDU=1: formally educated, 0: otherwise	Categorical
Locality	LOC=1: Urban, 0: otherwise	Categorical
Monthly per capita household income	MPCI(HH)	Continuous
Financial Dependence	FINDEP	Likert scale
Health Status perception	HEALTH	Likert scale
Number of morbidities	MORBID	Ordinal

The model is highly significant based on the Omnibus tests of Model Coefficients ($\chi^2=121.559$, $df=9$, $p=.000$), signifying a very good fit. The Hosmer and Lemeshow test also indicates that the model adequately fits the data (since $p=0.823$). The predictor variables in the model account for a 41% change in the criterion variable based on Nagelkerke's R^2 . The Percentage Accuracy in Classification was 83.8%, indicating the model was accurate.

The results in Table 8.7 reveal that among the socio-demographic factors influencing the choice of PRW of older adults, taking a look at gender, it is found that the log odds of being employed in PRW is very significantly higher by 3.46 times among elderly males in comparison to their female counterparts (reference category), similar to the findings of Virtanen et al. (2014, 1). We also find that for every one-unit increase in age, the log odds of engaging in PRW significantly decreased by 0.44 times. Though the tendency to be employed post-retirement reduces in the case of married, educated, and

urban-area-based older adults, the results are not statistically significant. Concerning economic variables, we find that for every one-unit increase in the older adults' monthly per capita household income, the log odds of engaging in PRW significantly decreased by 0.51 times. Similarly, the log odds of being employed post-retirement is higher by 1.44 times with a unit increase in financial dependency among older adults. These findings resemble those of Congdon-Hohman (2018, 583), who also specifies the importance of economic factors. Regarding the health variables, we find that health status perception is not statistically significant. However, results indicate that as the number of comorbidities increases among older adults, the log odds of continuing in employment post-retirement very significantly decrease by 0.26 times. Thus, we find that socio-demographic variables (gender and age), economic variables (monthly household income of the elderly and financial dependency) and health variables (number of comorbidities) are significant predictors of PRW among older adults in Goa. In response to the fifth research question, we identify the categories of older individuals more inclined to work post-retirement. These include males, the Y-O, those with lower monthly per capita household income, primarily those who are financially dependent and trying to lower the burden on their families by earning, and finally, older adults having better health with fewer comorbidities.

Table 8.7: Socio-demographic, Economic, and Health Factors Pre-Disposing Older Adults to Work Post-Retirement

Factors	B	S.E.	Wald	df	Sig.	Exp(β)	95% C.I. for Exp(β)	
							Lower	Upper
SEX	1.240	.329	14.226	1	.000 ***	3.455	1.814	6.579
AGE	-.817	.266	9.442	1	.002 **	.442	.262	.744
MARRIED	-.117	.346	.114	1	.736	.890	.452	1.753
EDU	-.092	.595	.024	1	.878	.913	.284	2.927
LOC	-.291	.322	.815	1	.367	.748	.397	1.406
MPCI(HH)	-.823	.270	9.449	1	.003 **	.508	.267	.750
FINDEP	.363	.133	7.448	1	.006 **	1.438	1.108	1.867
HEALTH	-.047	.216	.047	1	.828	.954	.625	1.456
COMORBID	-1.365	.232	34.681	1	.000 ***	.255	.162	.402
Constant	-6.653	1.890	12.390	1	.000 ***	.001		

Note: *** $p < 0.001$; ** $p < 0.01$

8.2.3 Pension Provisions

8.2.3.1 Retirement Pensions

While attempting to analyse *whether significant differences exist concerning retirement pensions among the elderly (RQ7.6)*, it was found that among the elderly living in OAHs,

none of them claimed to be receiving any pension (retirement nor social), owing to premature retirement and management/misappropriation of their funds/documents by family members. Hence, a comparative analysis of the pension scenario among the elderly living at home: the Y-O and O-O is presented in Table 8.8.

A total of 156 elderly respondents received monthly retirement pensions, comprising a higher number of Y-Os (87 respondents) in comparison to the O-Os (69 respondents). The average monthly retirement pension received by the Y-Os is ₹ 19,435.76 compared to the O-Os, who, on average, receive ₹ 15,143.78. The t-test confirms the existence of significant differences in the monthly pension of the two samples (Y-Os and O-Os) at the 0.05 level ($t=2.164$, $df=398$, $p=.032$), with the average monthly pension of the Y-Os being 1.28 times that of the O-Os.

Table 8.8: Retirement Pension received by the Elderly Living at Home

	Y-Os (N=87)			O-Os (N=69)		
	Males	Females	Total	Males	Females	Total
Mean	₹ 21,886.0	₹ 17,698.9	₹ 19,435.7	₹ 16,972.4	₹ 12,008.1	₹ 15,143.7
(SD)	2354.91	2102.67	2365.77	1860.84	1460.97	1983.12

Source: Primary survey

Substantial gender differences in pensions of the elderly were also noticed, with elderly females receiving a lower average monthly retirement pension in both cases, i.e., the Y-O females (₹ 17,698.98) and the O-O females (₹ 12,008.13) compared to their male counterparts (who received ₹ 21,886.09 and ₹ 16,972.43 respectively). Once again, the t-test confirmed the existence of significant gender differences in the monthly retirement pension of the two samples (elderly males and females) at the 0.05 level ($t=2.125$, $df=398$, $p=0.043$), with the average monthly pension of the elderly males being 1.24 and 1.41 times that of the elderly females in Y-O and O-O samples respectively.

8.2.3.2 Social Pensions

8.2.3.2.1 Dayanand Social Security Scheme (DSSS)

The DSSS of the Government of Goa is a social pension scheme that provides financial security to needy single women, disabled persons, persons with mental illness, those suffering from immune deficiency and needy senior citizens. The latter receives a monthly amount of ₹ 2,000, provided the beneficiaries' annual income is less than the total pension amount per year. The amount has been increased to ₹ 2,500 for elderly widows from the year 2023. As per reports of Goa's DoSW in 2019, 1.18 lakh applicants (comprising all the

above-mentioned categories of individuals) benefited from this scheme, with the needy senior citizens forming only one component. Ground reality results displayed in Table 8.9 indicate that out of the 400 elderly living at home, only 24 elderly respondents (6%) were beneficiaries of DSSS, comprising 11 Y-O respondents and 13 O-Os.

8.2.3.2.2 Griha Aadhar Scheme

To address the problem of spiralling prices and to provide support to housewives/homemakers from middle, lower-middle, and poor sections of society to maintain a reasonable standard of living for their families, this scheme provides ₹ 1,500 to any married woman above the age of 18 years, who is a resident of Goa (for the last fifteen years) and whose gross family income (husband and wife taken together) should not exceed ₹ 3 lakh per annum. A woman can avail of this scheme provided that the beneficiary (or the husband of the beneficiary) is not receiving any benefit from DSSS of the DoSW. However, a widow having a living child shall be eligible for benefits under this scheme, even though she is a beneficiary of the DSSS until the child attains 18 years of age. Table 8.9 indicates that 14 respondents were beneficiaries of this scheme, comprising five Y-Os and nine O-Os.

8.2.3.2.3 Goa Welfare/Pension Scheme for Seafarers

Many Goans are employed as seamen on cruise liners, containers, tankers, cargo vessels, etc., wherein not all of them earn enough to sustain themselves in old age, particularly those engaged in petty jobs like painters, loaders, oilmen, and deck crew etc, are lowly paid. Consequently, they hardly derive any significant pension benefits after they are laid off due to physical disabilities or the retirement age. Through this scheme, launched in 2012, the Government of Goa provides assistance of ₹ 2,500 per month to retired Goan seamen on completion of 60 years who were employed in low-paid jobs on board the ship and retired, including seamen invalidated from sea service on medical grounds before retirement and widows of deceased seamen on compassionate grounds, provided the annual income from all sources does not exceed ₹ 1.20 lakhs. Suppose an applicant receives a monthly pension under the DSSS, Griha Aadhaar Scheme, etc., in the case when the pension amount of these schemes is less than the gross pension available under the seafarer's pension scheme, the applicant will receive only the difference between the amounts of gross pension available under the above schemes. Table 8.9 indicates that three elderly respondents were beneficiaries of this scheme, comprising two Y-Os and one O-O.

Table 8.9: Number (Percentage) of Elderly receiving Social Pensions

	Y-O (n=200)	O-O (n=200)	Total (n=400)
Dayanand Social Security Scheme	11 (5.5%)	13 (6.5%)	24 (6%)
Griha Adhaar Scheme	5 (2.5%)	9 (4.5%)	14 (3.5%)
Goa Welfare Pension Scheme for Seafarers	2 (1%)	1 (0.5%)	3 (0.75%)

Source: Primary survey

8.2.3.2.4 Reasons for Not Availing Social Pensions

Among the elderly who are not availing of any social pension from the government, the reasons for not availing the same were identified and are illustrated in Figure 8.3.

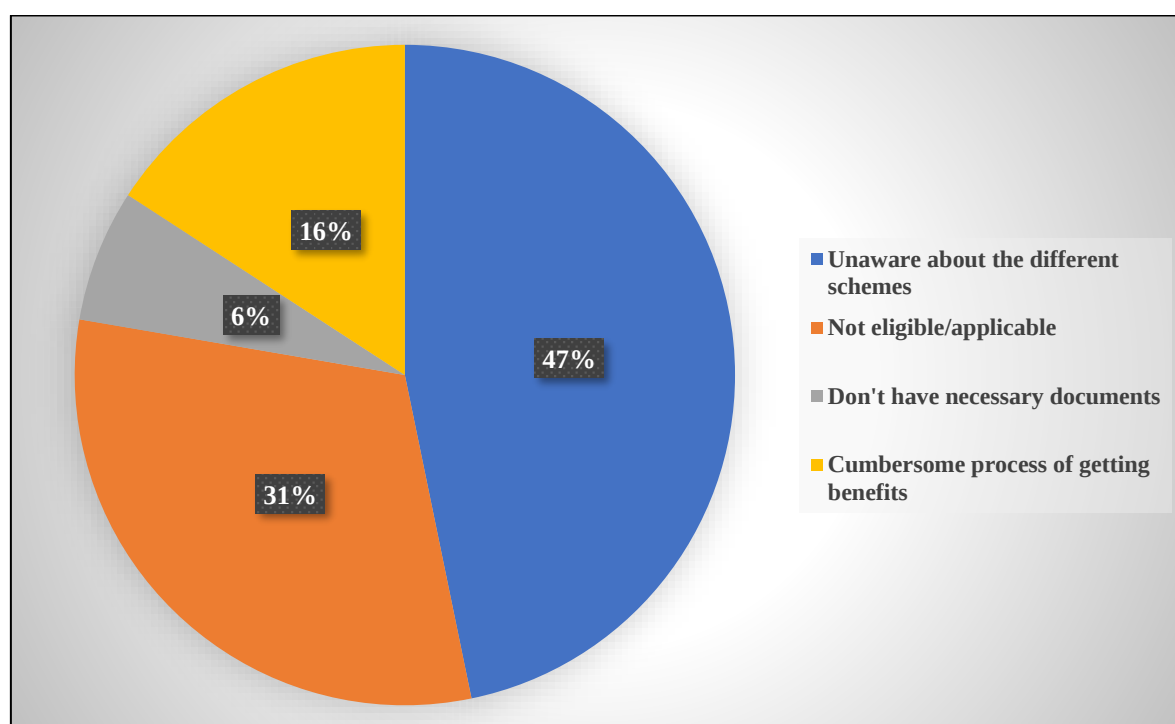


Figure 8.3: Reasons for Not Availing Social Pensions among the Elderly

Source: Primary survey

Figure 8.3 indicates that while most reported that they were unaware of the different government schemes (47%), 31% declared that they were ineligible for the scheme, in most cases, due to the income cut-off. The cumbersome process of applying for and getting the benefits (owing to lack of assistance, delays in processing, etc) was reported as a hindrance by 16% of the respondents. In comparison, 6% stated that they did not have the necessary documents to apply.

8.2.3.3 Other Key Social Welfare Benefits

8.2.3.3.1 Deen Dayal Swasthya Seva Yojana (DDSSY)

The DDSSY is a laudable initiative of the Government of Goa aimed at providing quality healthcare to those residing in Goa for five or more years, irrespective of their financial status. It is a contributory scheme where annual registration and renewal charges for insurance cover are ₹ 200 for any family (not restricted to senior citizens) of three or fewer members and ₹ 300 for a family of four or more members, giving them a cover of up to ₹ 2.5 lakhs and ₹ 4 lakh respectively, with a 50% concession for OBCs and the non-creamy layer, though the stipulated amounts are likely to change with time. Beneficiaries can access treatment at government hospitals, selected private hospitals, and selected clinics that are empanelled with the scheme. DDSSY covers a wide array of treatments and services, yet a few are not covered by the scheme. Nevertheless, this scheme is indeed a laudable initiative of the government to help many Goans. It is interesting to note from Table 8.10 that almost half the elderly living at home (49.5%) reported that their household had registered for this scheme, though only 13.5% reported that they had claimed the benefits. In both cases, a higher number of Y-Os reported the same.

Table 8.10: Registrations and Claims made by Elderly Households under DDSSY

	Y-O HHs (n=200)		O-O HHs (n=200)		Total HHs (n=400)	
	Freq.	(%)	Freq.	(%)	Freq.	(%)
Registered under DDSSY	108	54%	90	45.5%	198	49.5%
Claimed benefits under DDSSY	33	16.5%	21	10.5%	54	13.5%

Source: Primary survey

8.2.3.3.2 Maintenance and Welfare of Parents and Senior Citizens Act, 2007

The Maintenance and Welfare of Parents and Senior Citizens Act, 2007, is a legislative framework in India, enacted in December 2007 to ensure need-based maintenance and welfare for parents and senior citizens. The Act effectively aims to convert a moral duty into a legal one by offering some options for redressing elderly problems. Based on the above Act, the Government of Goa made rules for carrying out the purposes of the Act. It is called Goa Maintenance and Welfare of Parents and Senior Citizens Rules, 2009, wherein parents and senior citizens uncared for by their children or relatives can apply to their sub-divisional officers and deputy collectors to claim housing, food, and healthcare from their children or relatives. A recent report from a survey conducted by HelpAge India

revealed that over half of Goa's female senior citizens have been physically abused, 70% emotionally abused, and 65% financially exploited (Singh 2023, 31). Our study attempted to determine the awareness level among the elderly in Goa about this Act.

Table 8.11: Awareness among the Elderly about the Maintenance and Welfare of Parents and Senior Citizens Act, 2007

	Number (%) of Elderly		
	Y-Os	O-Os	Total
Aware	78 (39%)	46 (23%)	124 (31%)
Unaware	122 (61%)	154 (77%)	276 (69%)

Source: Primary survey

Table 8.11 indicates that out of 400 elderly living at home, only 124 of them (31%) were aware of this Act, comprising 78 (19.5%) Y-Os and 46 (11.5%) O-Os. However, the majority of the elderly [276 respondents (69%)] were unaware of the same, higher in the case of O-Os.

8.2.4. Summary

This section analysed the Labour Market Choices regarding pre-, voluntary-, and post-retirement work. A highly significant association was found between the nature of the pre-retirement occupational category and the nature of residence, with the majority of the elderly living in OAHs being homemakers, farmers, domestic helpers or unemployed. In contrast, most of those living at home were government and private sector employees. Among those who voluntarily resigned, the primary reasons were health or family-related. None of the OAHs surveyed permitted the elderly to engage in remunerative work outside the OAH. Out of the elderly living at home, 20.5% are involved in PRW in return for a monetary remuneration, which is significantly higher among the Y-Os, with the most highly reported nature of PRW encompassing business, farming, and professional services. A significantly higher number of Y-Os were pulled back into PRW due to inadequate income. In comparison, a significantly higher number of O-Os were pulled due to their education/skills and experience because they were healthy enough to continue working and stay mentally fit. Primarily, the Y-O males, those with lower monthly per capita household income, mainly those who are financially dependent and trying to lower the burden on their families by earning, besides those having better health with fewer morbidities, were significantly pre-disposed to work post-retirement.

None of the elderly residing in OAHs earned any retirement or social pension. Significant differences in monthly retirement pensions were observed among the elderly living at home, significantly lower among the O-Os and elderly females. A total of 10.25% were receiving social pensions. Reasons for not availing these benefits primarily included unawareness of the schemes, ineligibility, and the cumbersome process of applying for and getting benefits. Over half of the elderly were unaware of the Goa Maintenance and Welfare of Parents and Senior Citizens Rules, 2009. Nevertheless, the government's contributory household health insurance scheme has received a good response regarding registration for the same. However, the number of claimants for the benefits has yet to gain momentum. Thus, there is a need to encourage Productive Ageing and the accessibility and awareness of social welfare provisions.

CHAPTER 9: FINDINGS, CONCLUSION, AND RECOMMENDATIONS FOCUSING ON THE ‘NOW WHAT’ OF THE ECONOMICS OF AGEING

9.1 Summary of Chapters/Findings

The Economics of Population and Individual Ageing with Special Reference to Older Adults in Goa, encompassing nine chapters, has been systematically structured into three parts as outlined in the *Introduction (Chapter 1)*: (i) The ‘What?’, (ii) The ‘So What’, and (iii) the ‘Now What’ of the Economics of Ageing. The critical need for the nature of such a study, given the demographic transformations being experienced globally, nationally, and locally, has also been emphasised in the same chapter, along with the scope, objectives, limitations, and outline of the thesis.

The contributions of prior researchers in each area under investigation are detailed in the *Review of Literature (Chapter 2)*, wherein conflicting findings owing to sample/methodological reasons are highlighted, and research gaps and questions are identified. The econometric and statistical tests employed in our study, along with the blueprint behind the primary study design in Goa, encompassing questionnaire formulation and sample profile, are presented in *Chapter 3, Research Design and Methodology*.

Entitled *Economic Theory and Cross-National Empirical Analysis Underlying the Major Drivers of Population Ageing*, *Chapter 4* identified what has been driving global population ageing via the economic lens by integrating the trends and economic theory underpinning the three major drivers: fertility, life expectancy, and net migration. Overcoming the limitations of stable population models, this chapter tested the existence of a statistically significant dynamic long-run relationship between the three major demographic variables and population ageing, besides attempting to examine which among the three major drivers has reigned (and will reign) superior in driving the contemporary (and future) greying of nations.

Four categories of nations are studied (based on the share of older adults in the total population), namely: Potentially-Ageing nations ($<7\%$), Ageing nations ($\geq 7\%$), Aged nations ($\geq 14\%$), and Super-Aged nations ($\geq 20\%$). Given that over a six-decade period (1960-2020), nations transition from one stage to another, 72 countries have been categorised into panels comprising (i) Potentially-Ageing nations, (ii) Potentially-Ageing

to Ageing nations, (iii) Ageing to Aged nations, and (iv) Aged to Super-Aged nations. The former two are designated as being in the early stages of transition, while the latter two are in the advanced stages. The findings are as follows:

- From 1960 to 2020, while global fertility rates have fallen, longevity has soared. Nations in advanced ageing transitions, which primarily encompass developed nations, witnessed comparatively lower fertility and higher life expectancy rates than their counterparts in early stages (developing nations), with fluctuations in net migration.
- Reasons underpinning the trends behind the three major drivers of population ageing were identified through the prism of an economic theoretical framework. These included economic theories of fertility such as the Demand for Children, Quality of Children, Shadow Price of Children, Dynastic Model with Altruism, studies on Maternal Human Capital, Conspicuous Consumption theories, the Relative Income Hypothesis, Value of Children Theory, Wealth Flows Hypothesis, and the Postponement Transition Theory that advocated economic reasons for declining fertility rates. Economic literature that purported reasons for declining mortality and rising life expectancy included Preston's Curve, Sen's theory of Sharing, theories of Life Expectancy and Human Capital, studies on Economic Inequality and Mortality and the Epidemiologic Transition Hypothesis. Similarly, reasons for variations in net migration rates were traced to economic studies concerning working-age population migration and migration of people at pensionable age.
- The presence of CD based on Pesaran's CD test necessitated using a second-generation panel unit root test (CIPS), which confirmed that all the variables had a unit root at the level and were stationary at their first differences.
- Pedroni's Panel Cointegration tests revealed a significant long-run dynamic cointegrating relationship between the three major demographic variables and cross-national population ageing in the global panel comprising all 72 nations and among each of the four transition categories.
- Results yielded using unbiased and stable cointegrating regression estimators such as FMOLS and DOLS to examine the long-term equilibrium relation indicated that declines in fertility exerted the highest significant influence in increasing population ageing over the six decades in the global panel, compared to the magnitude of the coefficients of the other two drivers.

- Results from the remaining four panels of nation categories transitioning over various ageing stages also emphasised similar findings that declining fertility very significantly exerted the major influence in driving up population ageing, followed by rising life expectancy. However, net migration revealed mixed results; while a rise in net migration rate exerted a significantly positive impact on population ageing among nations at the advanced stages of their ageing transition, insignificant and inconsistent results were found among nations at the initial stages of their ageing transition.
- Projected data up to the year 2050 indicated a sharply rising global phenomenon of population ageing, which will be experienced by all nations, further transitioning currently Ageing to Aged nations into Super-Aged nations approximately by the year 2029. Nations that transitioned from being Potentially-Ageing to Ageing are further projected to transition to Aged nations by 2032, while the Potentially-Ageing nations are projected to transition to Ageing nations on an average by the year 2033.
- Projections indicated that though global fertility rates will continue to fall in future, nations at the advanced stages of their ageing transition will start experiencing a rise in fertility along with an influx of immigrants, leading to a positive net migration rate. Nevertheless, life expectancy is projected to rise among all nations.
- FMOLS and DOLS estimates of data for the period 2020-2050 indicate that rising life expectancy rates will highly significantly surpass fertility rates to become the primary driver of global population ageing in the future, while reductions in fertility will be the second major driver. Finally, a rise in net migration rate will also very significantly and positively influence population ageing in future, with the magnitude of the impact being higher compared to the prior six-decade period.

Chapter 5 delves into *The Implications of Population Ageing on Economic Growth*, given contradictory findings in the literature concerning this impact. Employing the same panel of 72 nations, however, ranging from 1990-2019, owing to data limitations, this chapter explores the possible existence of a significant global inverted U-shaped (nonlinear) relation between economic growth and population ageing and identifies the transition stage in which nations experience the threshold level below (above) which ageing population promotes (hampers) economic growth. Further, it examines whether this impact on economic growth intensifies as population ageing deepens by comparing nations across ageing transitions and if this nonlinear relation is consistent across developed and developing economies.

- Based on FEM regressions for the global panel, controlling for regional dummies and time-fixed effects, and ensuring robustness in our analysis by using 5-year non-overlapping and consecutive average growth rate of real GDP per capita to measure economic growth, besides using robust standard errors, we find that in the short-run, a rising elderly population exerts a highly significant positive impact on economic growth. However, in the long-run, a nonlinear relation is found owing to a significantly negative quadratic coefficient of the share of the elderly.
- The findings of this non-monotonic relationship remain robust as OADR is proxied for the proportion of the elderly in the FEM models.
- Conversely, FEM results demonstrated only a positive linear relationship between working-age population share and economic growth, both in the short-run and long-run.
- The historical nonlinear association between the proportions of older adults and working-age individuals (illustrated in a scatter plot), when paired alongside our finding of a linear relation between economic growth and the share of the working-age population, a nonlinear relation emerges involving the proportion of older adults and economic growth, further justifying our findings of an inverted U-shaped (nonlinear) relation between global population ageing and economic growth.
- The threshold level below (above) which the ageing population positively (negatively) affects economic growth is calculated to be approximately 13.83% and 20.13% for the old age share and old age dependency proxies of ageing populations, respectively, highlighting that nations transitioning from Ageing to Aged witness the threshold level.
- The results of Marginal Effects of an ageing population and old age dependency on economic growth respectively corroborate our findings pertaining to the nonlinear effect and threshold level estimates and further suggest that the impact of population ageing on economic growth intensifies as population ageing deepens based on nations at various stages of their ageing transition. Findings indicate that at around 7% of the share of the elderly (a nation transitioning from being Potentially-Ageing to Ageing), a percentage point increase in population ageing leads to a significant increase in the 5-year GDP per capita growth rate by 0.029 percentage points. As the share of the elderly population continues to rise and touches around 11% of the population, positive effects turn negative, nevertheless remaining insignificant, until the share reaches around 13%, which represents the threshold level, wherein a percentage point increase in population ageing leads to a statistically significant decline in economic growth by 0.023

percentage points. This is the turning point from which an Ageing nation transitions to an Aged nation. As the share of the elderly continues to rise, and the nation further transitions into a Super-Aged nation, having an elderly share of more than 20%, the negative impact of an ageing population on economic growth continues to grow in magnitude while remaining statistically very significant. The Marginal Effects of OADR further support these findings.

- This empirical claim of the intensifying influence on economic growth rate as a result of deepening population ageing is justified by the phenomenon that so long as the Demographic Pressure from a growing share of older people is less than (or comparable to) the Demographic Gain from a rising percentage of working-age individuals, the Total Population Ageing Effect on the growth of the economy is unlikely to be substantially adverse as demonstrated by examples of individual scatter plots of one nation from each ageing category: Japan, Norway, Chile, and India.
- Splitting the sample of 72 nations into 35 developed nations (which are predominantly nations at advanced stages of their ageing transition) and 37 developing economies (which are predominantly nations at early stages of their ageing transition), FEM results suggested that a highly significant nonlinear relationship exists between economic growth and population ageing in developed economies, however, among developing economies, only a significant positive short-run effect was observed. Similar findings upon proxying OADR for the share of the elderly in the models ensure the robustness of the findings.

Chapter 6, entitled *Disparities among Indian Elderly: Navigating Economic Concerns of Aged Goans*, nurtures fertile ground for bridging the gap between the global and local analysis. It does so systematically by first presenting *A Situational Analysis of the Elderly in India (Section 6.1)*. Given that our relatively young population billionaire India, is transforming gradually into an Ageing nation, it sets the ground for understanding the altering demographics, besides focusing on a situational analysis of Goa's elderly in relation to those in other states/UTs in India, bringing to the fore vast State/UT-wise disparities, across dimensions pertinent to the analysis in ensuing chapters. Following are the key findings via data visualisation based on secondary data analysis:

- The percentage of the elderly in India has been increasing swiftly in recent years, and by the year 2046, will be higher than that of children aged 0–14 years, while the share of those 15–59 years will also see a dip. India is characterised by the Feminisation and

Ruralisation of the elderly, with the decadal growth rate of the aged outpacing that of the overall population. Kerala had the highest share of elderly in 2011, followed by Goa and Tamil Nadu, while Dadra and Nagar Haveli had the lowest.

- Given rising old age dependency (higher among elderly women and those in rural areas), 41% of older adults in Goa are fully financially dependent on others, not very far away from the all-India average (47%), with Puducherry having the lowest share of fully economically dependent elderly, while Daman and Diu reporting the highest share.
- Analysing the household wealth quintile to which the elderly belong, it was found that while, on average, around 21.7% reside in households belonging to the poorest wealth quintile, only 6.1% of the elderly in Goa live in such households, ranking Goan elderly households relatively better-off than a large majority of states/UTs.
- Another major concern of vulnerability of the elderly lies in the deterioration of their health. Cardiovascular and endocrine-related ailments are highly reported, followed by musculoskeletal ailments and infections. While on average, 23.3% of the elderly suffer from multimorbidity in India, Goa ranks as the second highest state in India, suffering from the same. Multimorbidity often leads to disability, impairing the elderly and making them dependent. For every 100 old persons, five are disabled in India. Scatter plots demonstrate the coexistence of the Double Vulnerability across Indian states.
- A substantial share of elderly aged 60-64 years, especially among males and those residing in rural areas, continue to be employed in India post the retirement age. A similar trend holds for the elderly aged 65 and above, though by a lesser proportion.
- Despite several social security schemes and social protection floors at different levels, vast state-wise differences are noticed, with almost half the percentage of senior citizens receiving pension benefits in Haryana and Puducherry in 2012, while only 2.97% and 3.51% receiving the benefits in Gujarat and Nagaland, respectively, while 8.74% of the elderly received the same in Goa.
- This section ends by emphasising the crucial need for conducting the primary study in Goa given the non-existence of a similar intensive study, the rising importance of this topic in light of the fast-changing demographics and the ensuing policy implications, unavailability of data on evolving dimensions such as living standards capabilities, HRQOL, life satisfaction using internationally validated scales, unavailability of data on various dimensions of elderly residing in OAHs, spurring the need for an intensive study on the elderly in Goa to assess their ground realities via field surveys at the grassroots.

Section 6.2 of Chapter 6 involves assessing heterogeneity in *The Inflows, Outflows, and Living Standards Capabilities of the Elderly in Goa*. Out of the total sample of 500 elderly, 100 were residing in OAHs, while 400 lived at home. Out of the latter group, 200 were aged 60-74 years. Hence, their household has been called Y-O HH, while the remaining 200 were 75 years and above; hence, their household has been called O-O HH. Some of the major findings of this section are as follows:

- All the 49 elderly respondents living in government-run OAHs had no income sources and were being cared for at the government's expense. However, among the 51 elderly living in non-government-run OAHs, 47 reported that their children/family members pay the monthly fee and their necessary expenditures, while only four of them had savings in banks and had authorised the superior/in-charge of the OAH to withdraw the required monthly amount from their account on their behalf, being unable to do the same by themselves. Given this scenario, it is amply clear that out of 100 elderly respondents residing in OAHs, only four had the income to pay for their expenditures, presenting a more or less homogenous pattern across the OAHs. Besides, most of them have not interacted with their family members for years together; most of those who have interacted with household members are unaware of their current household economic status, while quite a few do not have a family anymore. Owing to the above-mentioned reasons, financial and household economic status analysis is presented in terms of the elderly residing at home.
- Concerning household member profile, given the immense household transformations owing to shrinkage, nuclearisation, and relocation, Y-O HHs had fewer members than O-O HHs. Elderly members comprise the highest share in O-O HHs (resulting in a higher OADR), followed by working-age members. In contrast, among Y-O HHs, the share of working-age members is almost equal to that of elderly members. Young members make up the smallest share, marginally higher among O-O HHs. TADR is relatively higher among O-O HHs, owing to a relatively higher OADR, wherein middle-aged adults (Sandwich Generation) find themselves sandwiched between caring for their ageing parents and their own children.
- The size of the Y-O HH's total and per capita monthly household income was significantly much higher than that of the O-O HHs, with great heterogeneity in the minimum and maximum amounts. Slab-wise, total monthly household income indicates a relatively higher number of O-O HHs observed towards the lower rungs. However,

moving towards the higher income categories, the number of Y-O HHs surpassed their counterparts, bringing to light the inequality in monthly household income.

- In contrast to household income being higher among the Y-O HHs, the size of the O-O HH's total and per capita monthly household expenditure was significantly higher than that of the Y-O HHs, given the relatively larger household size and higher dependency ratio. A slab-wise classification of monthly household expenditure highlighted the widespread heterogeneity, given the sharp differences in the minimum and maximum amounts. A larger number of O-O HHs were observed at the lower-most and upper-most expenditure slabs, while most of the Y-O HHs were observed among the middle slabs.
- Moving focus exclusively on the elderly respondent, analysis of their average monthly income revealed that highly significant differences exist in the average monthly income of the Y-O and O-O respondents, to the disadvantage of the O-O. Both the categories were remarkably heterogeneous, with the minimum and maximum monthly incomes varying enormously. At the same time, a total of 124 older adults (71 O-O and 53 Y-O) reported no source of income of their own nor any support from the government and were at the mercy of their household members, who often ill-treated and abused them. A highly significant gender disparity is identified to the disadvantage of females.
- Very significant differences in the average monthly expenditure exclusively of the elderly were also found, with the Y-O spending higher amounts. Strongly significant gender differences were revealed, with expenditure by elderly males being higher.
- Per capita household figures mask the actual financial scenario of the elderly as household size enters the picture. For example, though monthly per capita household expenditure was significantly higher among O-O HHs, contrarily, average monthly expenditure patterns exclusively of the elderly indicated that the Y-O had significantly higher expenses than the O-O. The elderly are often an overlooked consumer category.
- Though older adults receive income from multiple sources, the major sources include interest on deposits and retirement pensions, with a significantly higher number of Y-Os receiving income from these sources.
- The primary category of expenditure among both the Y-O and O-O is on food items, followed by health-related expenses.
- Concerning debt repayments, a large majority do not have any debts. From a gender perspective, a significantly higher number of males have unpaid debt among the Y-Os.

- A significant association exists among the Y-O and O-O in terms of the status of their Financial Dependence on others to meet their needs. Out of the total older adults living at home, a little less than one-third are fully financially dependent on others, with O-Os constituting a higher share. Though many have their own sources of income, these often remain insufficient, making them partially reliant on others, once again being higher among the O-Os. While 50% of the Y-Os were financially independent, the same was true for 33.5% of the O-Os.
- Binary logistic results reveal that primarily elderly females, the O-O, those residing in urban areas, those with poorer perception of their health status, and those having high health expenses are significantly more inclined to be fully financially dependent.
- In certain cases, Reverse Financial Dependency also exist, with a significantly higher number of Y-Os still having to fully financially support their household members.
- Shifting focus from a 'Resource-based approach' that solely focuses on material resources (income, expenditure), we moved to the 'Living Standards Capabilities approach', which emphasises that the value of the living standard lies in the living and not in the possessing of commodities, which has derivative and varying relevance and evaluates people's ability to convert resources into valuable functionings. Based on CFA, given that the model fits the data well, besides establishing validity and reliability, LSCAPE-25 proved a suitable instrument for measuring the living standards capabilities of the elderly.
- The average LSCAPE score was lower than the median value, indicating a moderate living standard capability of older Goans. The average score and the scores on individual domains were lower among older Goans than those of older New Zealanders. The capability to live in physical comfort measured via the healthcare factor had the highest mean score, followed by the capability to be connected to others, while the capability to make choices and to feel secure about the future had the lowest scores.
- The overall living standards capabilities and scores on most individual domains were relatively lowest among elderly females, the uneducated, those aged 90 years and above, those living in OAHs, and those who never worked, while concerning marital status and locality, only the capability to make choices was significant, with the widowed and those residing in rural areas having the lowest score.

Chapter 7 evaluates the *Morbidity, Health-Related Quality of Life (HRQOL), and Healthcare Costs among the Aged in Goa*, presenting the major findings below:

- The top five highly reported chronic physical diseases among the entire sample of elderly include Diabetes, Hypertension, Cardiovascular disease, Rheumatoid-/Osteoarthritis, and Cancer. In contrast, the major mental diseases include Depression, Anxiety disorders, Dementia, and Alzheimer's disease. Only 18 out of 500 reported no disease.
- Though a relatively higher number of Y-Os were suffering from chronic diseases, no significant association was found, indicating that morbidity is plaguing Y-Os and O-Os alike. Conversely, a significantly higher number of females suffer from a range of morbid conditions, both physical and mental, relative to their male counterparts. A substantially higher number of elderly living in OAHs were reported to be suffering from mental health problems compared to those living at home. Among the elderly living at home, though almost half of them reporting a minimum of one chronic condition belonged to the lowest three monthly household income slabs (i.e., below ₹ 45,000), no statistically significant association was found between monthly household income and the presence of at least one chronic disease. Multimorbidity was also widely present among the elderly.
- Out of the 500 elderly respondents, relatively few require full assistance in performing their ADLs, with a comparatively higher number requiring partial assistance. A significantly higher number of elderly suffering from multimorbidity require assistance in bathing, dressing, toilet use, mobility, and feeding.
- CFA results revealed that SF-36 was a suitable instrument adopted to assess the HRQOL of all 500 respondents, given the good model fit, establishment of validity, reliability, and convergence of first-order factors onto second-order factors, besides demonstrating a relation between the physical and mental components.
- The mean score of mental health of the elderly was higher than physical health. Given that a higher score indicates better health status, among PCS domains, older adults had the lowest scores on the subdomains of physical functioning, general health, and bodily pain, while among the domains measuring MCS, the lowest mean score was on vitality, followed by social functioning.
- Nevertheless, significant differences exist with the PCS and MCS scores, including most of the sub-domain scores being the lowest among elderly females, those aged 90 years and above, the unmarried, uneducated, those residing in OAHs, and in rural areas.

- Moving on to health-related costs, it was noted that in government-run OAHs, the health costs of the elderly are borne by the government, while in non-government-run OAHs, the family members of the elderly pay the fee amount and whatever extra medical expenditure is required for the elderly inmate, who were unaware about the same. Hence, the health costs of the elderly living at home were evaluated. Significant differences in the average annual healthcare expenditure of the Y-O and O-O were observed, being higher among the O-O. Gender differentials were also noted, with health expenses being higher among elderly females.
- Medical expenditure of the O-O constitutes 13.95% of the average monthly household expenditure in O-O HHs, while that in the case of the Y-O constitutes 12.5% of their household budget. While the proportion of expenditure is higher by 1.94 times for elderly females compared to elderly males in Y-O HHs, not much of a gender difference is observed in O-O HHs, being marginally higher by 0.06% among O-O females.
- From the perspective of the proportion of medical expenses out of the total expenditure incurred exclusively by the senior citizen himself/herself, while the average monthly medical expenditure of Y-Os is 34.1% of their total expenditure, the same is 1.58 times higher in the case of the O-O (53.75%). The burden is much higher among elderly females, both Y-O females (amounting to 48.5% of their personal expenditure) and O-O females (amounting to 85.67% of the same). In contrast, the proportion of average medical expenses of elderly males is comparatively lesser, amounting to 28.12% among Y-O males and 47.06% in the case of O-O males.
- Component-wise health-related expenditures indicate that the top five highly reported items of health expenditure include medicines, health-related transportation costs, clinical/diagnostic tests, doctor consultation charges, and expenses on special diet/supplements. While expenditure on health insurance premiums and hospitalisation expenses were incurred by slightly over half the elderly, with a significant association being found between the presence of multimorbidity and the need for hospitalisation, less than half of the elderly reported incurring expenditure on therapy.
- Nevertheless, slab-wise distribution of expenditure on each component of medical expenditure reveals vast variations in the amount incurred on each item. Though medicines and health-related transport costs ranked equally as the items having the highest number of elderly spending money, while the majority (43.25%) incurred expenses over ₹ 9,000 on an annual basis on medicines, a relatively lesser amount,

somewhere below ₹ 1,000 was spent by the majority of them (44.75%) on health-related transport costs. Among those reporting hospitalisation and therapy costs, the highest percentage of elderly were concentrated towards the upper-most expenditure slabs. Apart from those spending a nominal amount on public health insurance plans, those incurring money on private health insurance paid relatively high premiums as age advanced. Similarly, among those incurring expenses on therapy, the percentage of elderly rose towards the higher expenditure slabs. Nevertheless, the Chi-square test and FET failed to reveal any significant associations (except for therapy charges) between the Y-O and O-O concerning the slab-wise distribution of each health expenditure item.

- Out of 400 elderly living at home, 40.25% needed the assistance of caregivers, being significantly higher among O-Os. In almost half the cases, caregivers were family members whose services were often unacknowledged and unpaid for, often burning them out, leading to their loss of job and, thereby, income in some cases. In contrast, 81 elderly were cared for by paid personnel, including trained caretakers and domestic helpers. Relatively higher amounts of remuneration have to be paid to specialised/trained caregivers, in comparison to domestic helpers wherein, in most cases, the latter are paid in the range of ₹ 10,000 - ₹ 15,000, and sometimes even below ₹ 10,000 on a monthly basis, while majority report paying the former between ₹ 15,000 - ₹ 25,000 a month, with the amount increasing as the health and physical activity condition of the elderly deteriorate. A significantly higher number of O-Os have to bear caregiving costs, whose burden is often too expensive for the elderly to finance and are paid for by other family members.
- Concerning the relation between health expenditures and HRQOL, a highly significant negative correlation was found, highlighting that better physical and mental health results in significantly lower medical expenditure and vice versa.
- As for the choice of HCU in terms of public, private or a combination of the two, it was found that government-run OAHs take sick, elderly inmates to public hospitals/health centres. However, most of the non-government-run OAHs have a private doctor-on-call, and based on the doctor's recommendation, the choice of hospital is made. Hence, the HCU choices are pre-decided in OAHs. Thus, to evaluate this choice, we focus on the elderly living at home, out of which the majority of the elderly (53.25%) opted for private health facilities in comparison to 37.75% who chose public health facilities, while 9% opted for a combination.

- Binary logistic regression results based on Andersen's HBM revealed that among the pre-disposing factors, having a formal education was the only factor that increased the odds of preferring a private hospital compared to a public hospital. However, neither the enabling factors nor the need factors were found to influence the choice of HCU significantly, thus highlighting that regardless of any of these factors, the elderly Goans prefer to go to private hospitals for treatment.
- Upon analysing the quality factors that drive the choice of HCU among the elderly, we find that the choice of a public healthcare facility is primarily driven by the low/no cost factor, availability of well-qualified medical practitioners, and proximity to the health facility. In contrast, the choice of a private health facility was influenced primarily by fewer waiting hours, availability of timely treatment, patient safety, and service efficiency. Besides, the patient's privacy, a clean and sanitised environment, and the availability of well-qualified medical personnel are prominent factors influencing the choice of a private health facility. Finally, the respondents opting for a combination of public and private health facilities, sought a combination of quality factors such as proximity, timely treatment, efficiency, clean environment, privacy, and patient safety.

Chapter 8 is divided into two sections. **Section 8.1** analyses the phenomenon of *Healthy Ageing encompassing the Interplay between Economic, Health, and Subjective Wellbeing domains*. The following are the major findings:

- Building on dual variable models, our triple variable SEM model of healthy ageing is based on the definition promulgated by the WHO involving the interplay between living standards capabilities (economic), HRQOL (health), and life satisfaction (subjective wellbeing) among the entire sample of 500 elderly.
- Mediation analysis using SEM revealed that living standards capabilities significantly positively affected life satisfaction.
- LSCAPE, in turn, very significantly and positively influenced HRQOL by impacting both its dimensions, PCS and MCS, with the influence being higher on MCS.
- HRQOL, in turn, had a highly positive and significant influence on life satisfaction.
- Thus, HRQOL very significantly mediated the relation between living standards capabilities and life satisfaction, with direct, indirect, and total effects being statistically significant. In other words, merely having good living standards capabilities is not the only criterion for improving older adults' life satisfaction; their HRQOL also significantly influences wellbeing, signifying partial and complementary mediation.

The final segment of **Chapter 8, Section 8.2** analyses the **Labour Market Choices** in terms of pre-, voluntary-, and post-retirement work, besides analysing the **Pension Provisions**, encompassing Retirement and Social pensions and other social welfare benefits availed by the elderly. The major findings are as follows:

- A highly significant association between the nature of the pre-retirement occupational category and the nature of residence, i.e., at home and in OAHs, was found, with the majority of the latter category being homemakers, farmers, domestic helpers or unemployed, while the majority of the former being government/private sector employees, besides others.
- Though many were naturally pushed out of the workforce by the legal retirement age cut-off, 83 respondents voluntarily resigned mainly due to health or family reasons.
- Concerning PRW, the terms and conditions of the OAHs surveyed in the present study did not permit the elderly living on their premises to engage in any remunerative work. Among the elderly living at home via a comparison of the Y-O and O-O is analysed, with a total of 20.5% being currently engaged in PRW in return for a monetary remuneration, being significantly higher among the Y-Os.
- The most highly reported nature of PRW among both the Y-O and O-O included some form of business (such as food catering, tailoring, real estate, etc.) or engaging in farming and its produce sale, besides offering professional services.
- A significantly higher number of Y-Os were pulled back into PRW owing to the inadequacy of income. In comparison, a significantly higher number of O-Os reported that they were pulled into the labour force due to their education/skills and experience and because they were healthy enough to continue to work and by the need to stay mentally fit.
- Results of binary logistic regression revealed that the Y-O, males, those with lower monthly per capita household income, primarily those who are financially dependent and trying to lower the burden by earning, besides those having better perception of their health, and with fewer morbidities were significantly pre-disposed to PRW.
- Pension provisions are of two types: Retirement pensions and Social pensions. Of the elderly residing in OAHs, none claimed to be presently earning any retirement pension (owing to premature retirement and management/misappropriation of their funds/documents by family members), nor were beneficiaries of any social benefits.

- Significant differences in the monthly retirement pension of the Y-O and O-O living at home were observed, with a total of 156 elderly receiving the same, and the amount being significantly higher among the Y-Os. Gender differences were also observed with elderly females receiving significantly lower pensions.
- Concerning social pensions, a total of 6% of the respondents were beneficiaries of DSSS, receiving ₹ 2,000 monthly, while elderly widows received ₹ 2,500, 3.5% received ₹ 1,500 on a monthly basis under Griha Aadhaar. In comparison, 0.75% were beneficiaries of Goa Welfare/Pension Scheme for Seafarers receiving ₹ 2,500 monthly. In each case, a higher number of Y-Os received the benefit.
- Among the elderly living at home who did not avail of any social pension from the government, the majority reported that they were unaware of the different schemes of the government (47%), and 31% declared they were ineligible. In contrast, the cumbersome process of applying for and getting the benefits (owing to lack of assistance, delays in processing, etc.) was reported as a hindrance by 16%. In comparison, 6% did not have the necessary documents to apply.
- Among the other key social welfare benefits offered by the Government of Goa, the DDSSY, a contributory family health scheme not restricted to the elderly, gives a cover of up to ₹ 2.5 lakhs (for a family of three or less) and ₹ 4 lakhs (for four or more members). Almost half the sample of elderly living at home (49.5%) reported that their household had registered for this scheme, though only 13.5% reported that they had claimed the benefits. In both cases, a higher number of Y-O reported the same.
- The majority of the elderly (69%) were unaware of the Maintenance and Welfare of Parents and Senior Citizens Act, 2007, which was higher among O-Os.

The present **Chapter 9** presents a **Summary of Findings**, followed by the **Conclusion** and **Recommendations focusing on the ‘Now What’ of the Economics of Ageing**.

9.2 Conclusion

The study has indisputably shed light on the fact that Population Ageing is a global reality, with nations being at various stages of the ageing transition. To best comprehend the underlying causes and consequences of this global phenomenon, a panel of nations, including each stage of the ageing transition, was studied to bridge the research gaps outlined earlier. A major contribution of this thesis involves defining a fourth category, the ‘Potentially Ageing Nations’ to include India in the global analysis. Nevertheless, the

consequences on individuals (and their households) generate far-reaching ripple effects at the national and international levels, ultimately influencing the economic growth rate of nations primarily via the financial, health, labour market, and social security (fiscal) channels. Hence, a situational analysis of the elderly in our population billionaire India (which is soon transforming from a relatively young to a fast-paced Ageing nation) has been showcased to get a comprehensive glimpse into the position of Goa's elderly in relation to the rest of India (based on secondary data), before documenting the ground-realities faced by them (based on primary survey), incorporating evolving dimensions unresearched/under-researched at the individual level, in the smallest state of India, yet home to the second-highest elderly populace, yielding far-reaching policy implications.

The study brings to the fore the strong economic theoretical reasons underlying the drivers of population ageing. Declining fertility has predominantly driven global population ageing. However, the influence of the same will diminish in years to come, and the continued greying of nations in the future will be primarily driven by rising life expectancy rates, with net migration also playing a significantly greater role in this process. The rejuvenating role of migration is questioned, and the need for nations to focus on ensuring Healthy Life Expectancy is highlighted.

Population ageing has a nonlinear impact on the economic growth of nations, resulting in an inverted U-shaped relation, indicating the existence of a threshold level below (above) which the ageing population positively (negatively) affects economic growth. As nations transition towards advanced ageing stages, the adverse impact on economic growth intensifies. Given that most developed countries are in their advanced ageing transition stages, the nonlinear impact of population ageing on economic growth is observed. The need for adopting suitable measures to reduce the negative impact of ageing on growth and instead reap the Silver Demographic Dividend is emphasised.

Characterised by feminisation and ruralisation, with their decadal growth rate dramatically outpacing that of the overall population, India's elderly will outpace its young in two decades. Though the share of fully financially dependent elderly in Goa is relatively high, Goan elderly households are relatively better off than most states/UTs based on household wealth quintile. On the health front, Goa is the second-highest state suffering from multimorbidity. The coexistence of the double vulnerability (economic and health) is evident across states. A substantial share of the elderly is employed in India post-retirement age. Despite social security schemes, vast state-wise differences are noticed concerning the beneficiaries. India has a long way to go in preparing for an ageing future.

Based on the analysis of the financial status of the elderly in Goa, we conclude that most elderly in OAHs lack their own income and are cared for by the government or via family fee payments. The financial burden is relatively higher in O-O HHs owing to larger household size, higher TADR owing to higher OADR, accompanied by fewer members of working-age, lower total and per capita monthly household income, and relatively higher household expenditure than Y-O HHs. The personal finances exclusively of the elderly also vary enormously, with a little less than one-third being fully financially dependent, primarily including elderly females, the O-O, those residing in urban areas, with a poorer perception of their health status, and having high health expenses. On the other hand, instances of reverse financial dependency also exist. The living standards capabilities were found to be moderate, with vast heterogeneity being noticed among the elderly. The extensive heterogeneity observed among the elderly necessitates the need for assistance, primarily for vulnerable sections.

Evaluation of the health status of the elderly revealed the presence of morbidity and multimorbidity plaguing Y-Os and O-Os alike, being higher among females. Mental health problems are higher in OAHs. The elderly suffering from multimorbidity require assistance in performing their ADLs. HRQOL assessment revealed that the physical health of the elderly was worse than their mental health, with elderly females, the very old, the unmarried, the uneducated, and those residing in OAHs and rural areas having relatively poorer HRQOL. The burden of health expenditure as a proportion of household and personal expenditure is relatively high, especially in the latter case, exceeding over half the monthly budget expenses of O-Os. Highly reported items of health expenditure include medicines, health-related transportation costs, clinical/diagnostic tests, and doctor consultation charges. Caregiving costs are also quite high, especially in the case of trained caretakers and domestic helpers. Better HRQOL correlates with lower health expenditure and vice versa. HCU choices are pre-decided in OAHs. However, more than half of the elderly living at home prefer private health facilities regardless of any predisposing (except for education), enabling or need factors. Nevertheless, the elderly seek quality factors to determine their choice. Healthy ageing involves an interplay of three dimensions: economic (living standards capabilities), health (HRQOL), and subjective wellbeing (life satisfaction), wherein HRQOL very significantly mediates the relation between living standards capabilities and life satisfaction. A need arises to take appropriate actions to enhance HRQOL, lower the health expenses of older adults, and strive towards Healthy Ageing.

Based on the labour market choices of the elderly, we conclude that the nature of the pre-retirement occupational category is associated with the nature of the residence. Health or family reasons are the major causes of voluntary retirement. The terms and conditions of OAHs do not permit the elderly living on their premises to engage in any remunerative work. A higher number of Y-Os engaged in PRW were pulled back to work owing to inadequate income, while education/skills, experience, good health, and the need to stay mentally fit pulled a higher number of O-Os. None of the elderly residing in OAHs received any retirement or social pension. The monthly retirement pension of the Y-Os was significantly higher. Cumulating the total number of recipients of social pensions across the various schemes, a very small minority reported to be beneficiaries of the same. Unawareness of the schemes was the primary reason among the non-beneficiaries, while ineligibility, cumbersome process, and lack of necessary documents were other reasons stated. Nevertheless, almost half the sample had registered for the government's contributory family health insurance scheme, though there were few claimants. Finally, over half of the elderly living at home were unaware of the Maintenance and Welfare of Parents and Senior Citizens Act, 2007. Thus, there is a need to encourage Productive Ageing and the accessibility and awareness of social welfare provisions.

9.3 The ‘Now What’ of the Economics of Ageing

The comprehensive, cross-cutting, and universal nature of the 2030 Agenda enshrined in the Sustainable Development Goals (SDGs), adopted in 2015 by the UN, provides this study an opportunity for integrating an ageing perspective in terms of recommending a forward-looking policy agenda in the context of Goa (India). The SDGs offer a blueprint for a more inclusive, supportive, and sustainable world revolving around ‘Leaving no one behind’, including older individuals (UNDESA 2015, 7). As correctly acknowledged by the UK Government’s Department for International Development, *there is a need, first of all, to establish who is being left behind and where they are*, for which the department asserts that *strengthening the collection and use of disaggregated data is crucial*. The present study presents its immense contribution in performing this task of collecting and analysing rich data pertaining to older adults, thereby identifying the vast heterogeneity in this age subset, owing to the existence of significant differences among them.

Having identified the evolving needs of the elderly and the economic fallouts it entails, the final leg of this thesis is embarked upon via *The ‘Now What?’ of the Economics of Ageing* by putting forth policy recommendations, off-shooting from the

study. This section reflects an understanding of and presents the need to revamp and standardise the existing policy framework to ensure better efficiency and functional relevance by critically assessing existing provisions and bringing to the fore deficiencies in adequate functionality of institutionalised systems and implementation failures of policy-supported mechanisms leading to the identification of key intervention areas and proposes relevant recommendations, with few examples to provide necessary support to the elderly.

The key recommendation of this study revolves around the creation of a vibrant, enabling senior care ecosystem to fulfil the need for services and social protection for the elderly, besides protecting their rights, thus enabling them to contribute to the development process, incorporating tailor-made interventions, necessitating structural changes in critical components of elder care. This requires sustained government support and collaboration of individuals, families, communities, institutions of civil society, and the private sector to convert the policy *intent* into *action* for high-quality outcomes for seniors.

9.3.1 Promoting Financial Security given the Financial Crunch

While SDG 1 (*No Poverty*) aims to end poverty in all its forms everywhere, it is closely linked to SDG 10, which is focused on *Reducing Inequality*. Despite having the lowest percentage of Below-Poverty Line households compared to other states in India, Goa witnessed a fivefold increase in this population between the years 2002 and 2014. However, a recent report by the National Institution for Transforming India (NITI Aayog 2023, 37) claims that 0.11% of Goa's population share has exited multidimensional poverty. Nevertheless, our study emphasised the financial crunch many elderly face, especially priority groups in need of assistance, such as elderly women, the O-Os, the widowed, the uneducated, and those burdened with high health and caregiver expenses. Besides combatting poverty, social pensions contribute to the economy through the disposable income they provide by increasing spending (Kang, Park, and Ahn 2022, 1).

- **Need for Streamlining of the Goa Dayanand Social Security Scheme (DSSS)**

Despite earnest attempts at trying to bridge administrative gaps by Goa's DoSW, Fernandes (2013) highlighted that non-eligible beneficiaries were milking a lot of benefits of DSSS via sanction of ineligible, bogus, and duplicate sanctions to the same person, a continuation of pension remittance to the accounts of dead beneficiaries, while genuine beneficiaries were facing problems in getting timely benefits. Based on data provided by personal visits to the DoSW, the total financial cost to the state exchequer owing to this scheme, exclusively for 2019-2020, was ₹ 206.93 crores.

Shetye (2019) pointed out that in 2019, the state government appointed a company to carry out a survey concerning illegal beneficiaries and issued notices to around 11,000 illegal beneficiaries demanding recovery of the amount with interest; if not, criminal action would be taken. *Having a well-functioning Grievance Redressal Committee, making it mandatory for beneficiaries to produce their life certificate every year, and conducting such periodic surveys, besides obtaining feedback from disbursing banks, would help in keeping a check on illegal beneficiaries, besides avoiding unnecessary burden on the state's exchequer.*

- **Periodic Revisions and Amendments required**

Timely implementation of policies, with a provision for evaluation of the process and outcome, is critical to making timely amendments at periodic intervals. It is equally essential for the geriatric population to draw the maximum benefits out of it. For instance, in many states, *owing to paltry amounts of the benefits, a revision in the rate at intervals is necessary as they often do not match the inflation* (Sharma 2023). When compared with pension schemes of other states, Rai and Bharti (2023) noted that Goa is fortunate to be one of the states providing the highest pension of ₹ 2,000/₹ 2,500 per month per person in the country, along with Delhi, Kerala, and the Andaman and Nicobar Islands, while Mizoram and Madhya Pradesh giving pensions as low as ₹ 250 and ₹ 300 a month per person. Besides, another 14 states provide pensions of less than ₹ 500 per month. These sums are often insufficient to cover even basic needs (especially when the elderly have no other source of income) and do not lift the elderly out of poverty. *Adhering to social protection floors is mandatory.*

- **Need for a separate Directorate or Commission for Senior Citizens in Goa, especially devoted to advocacy and awareness of various schemes and facilitating the registration process, besides performing other functions**

At the Rashtriya Vayoshri Yojana event organised at Ravindra Bhavan, Margao, on December 9, 2017, the late Manohar Parrikar, then Chief Minister of Goa, had announced that he would be setting up a Commission for Senior Citizens in Goa (Narayan 2021). An article in the *Indian Observer Post*, dated July 5, 2022, highlighted that when India can have a Commission for Women and Child Development, why not for Elders? The Department of Women and Child Development in India, initially part of the Ministry of Human Resource Development, was upgraded to a Ministry in 2006, given the pressing

concerns of women and children. In contrast, there is only a Senior Citizen Division under India's Ministry of Social Justice and Empowerment. *Given the rapid pace at which India will grey, serious thought needs to be given whether this division would be adequate in handling the multi-fold areas in which welfare measures must be provided to senior citizens.* Coordinating institutions that currently operate for their welfare is essential for better results. In a similar vein, to give more impetus to Women and Children in Goa, the Government of Goa carved an independent Directorate in 1997 and called it the Directorate of Women and Child Development, bifurcating from erstwhile DoSW. However, presently in Goa, the DoSW deals with the implementation of schemes for the welfare of SCs, STs, and Other Backward Classes, the Differently-abled, Senior Citizens, Destitutes, Prisoners and their dependents, Safai Karmacharis, and Beggars, often not being able to do justice to each category appropriately, missing out many deserving and in-need-of-help individuals due to lack of awareness and un-identification problems.

The establishment of a Directorate or Commission exclusively devoted to senior citizens in Goa, addressing, administering, handling, and resolving their grievances and day-to-day issues on a timely basis so that matters do not reach a critical stage of severity is required urgently, besides engaging in policy development for senior citizens in Goa and administration of social security schemes, both Central and State. Advocacy and awareness are of priority as most senior citizens are unaware of their rights and the benefits of schemes that they can receive from the government. A need arises for overseeing and supporting the establishment and regulation of elderly care facilities, nursing homes, and senior activity centres. Besides providing legal assistance and protection of their rights, especially in cases of abuse, coordination of emergency response services and support systems during natural disasters or crises remain essential. Research and data collection by them on senior citizens' needs and demographics will help inform policy decisions and allocate resources effectively, besides regularly evaluating the effectiveness of senior citizen programs and services and making necessary improvements. Collaborations can also be forged with Panchayati Raj institutions, NGOs, and community organisations to undertake various initiatives.

9.3.2 Promoting Improved HRQOL and Healthy Ageing

SDG 3 advocates *Good Health and Well-being*. The focus on *Universal Health Coverage* in the SDGs provides an opportunity to address a range of barriers faced by older people to accessing health and care services – from primary health to long-term care.

- **Need to Increase the Functional Frequency of the Geriatric Care Unit in Goa**

Seniors have special healthcare needs that increase stress on the existing healthcare system. This demands a cadre of a well-trained workforce offering professional and specialised services, knowledgeable about ageing populations, to ensure a healthy and happy ageing experience for seniors, thus calling for a structured senior care sector that is currently in its nascent stage in Goa (India), yet rich with opportunities and growth prospects. The geriatric healthcare programme should focus on the Outpatient Department (OPD), palliative care, rehabilitation care, respite care, and preventative and curative treatment. The *Geriatric Care Unit (GCU)* was established in 2015 at GMC and has been attending exclusively to elderly patients in the OPD; however, it is only attended once a week, i.e., every Saturday, on prior appointments. *A suggestion would be to permit consultations at the GCU on more days for the elderly and, if possible, on a daily basis.*

- **Need for Specialised Geriatric Professionals given the presence of Multimorbidity**

Given that multimorbidity is highly common among the elderly, due focus should be given to identifying and building the necessary skill sets to meet the specialised service requirements of the elderly. There are few medical doctors specialising in geriatric treatment in India, and there are few Indian institutes imparting gerontological and geriatric studies. Upon being granted permission by the *National Medical Commission*, the GMC will be one of the few colleges in the country offering the Doctor of Medicine in Geriatrics (MD Geriatrics), a three-year postgraduate programme that candidates can pursue from the academic year 2023-24, highlighting the urgent need for specialists in this area. Geriatrics is the branch of medical science that prevents and treats diseases in older adults. *There is an absolute dearth of Specialised Geriatric doctors in Goa.*

Geriatrics is also accompanied by *Geriatric Nursing Care*, and here, too, there is a dearth of resources and training (Narayan 2022). *No specialised programme is yet available in Goa/India where candidates can get their licenses to become specialised gerontological nurses.* Cues can be taken from the *American Nurses Credentialing Centre's Gerontological Nursing Board certification examination*, a competency-based examination that provides a reliable assessment of the entry-level clinical knowledge and skills of registered nurses in the gerontological speciality after initial registered nurse licensure. Besides, *senior living facilities/care homes for the elderly should also employ certified caregivers to provide specialised care to the residents.* This will further ensure the availability of high-quality services in the senior care space.

- **Need for curbing high costs of treatment/price of medicines in Private hospitals**

An analysis of medical bills from four reputed private hospitals in Delhi by the *National Pharmaceutical Pricing Authority* (as in Nagarajan 2018) revealed that they are making profits of up to 1,737 times the original amount on drugs, consumables, and diagnostics and that these three account for about 46% of a patient's bill. Most drugs, devices, and disposables are sold by private hospitals from their in-house pharmacies, limiting patients' choice to buy them from elsewhere. This practice of *artificial inflation* is a case of market distortion wherein patients incur substantial out-of-pocket expenses. While there are price controls in place for specific healthcare consumables in India, the scope and effectiveness of these regulations vary. Differentials in healthcare pricing are noticeable in Goa, too.

Since healthcare is a service and not a business, the state government should review the pricing of health services, within the parameters of law. Quality healthcare should be accessible to all. A need arises to lay out strict standards for accreditation, licensing requirements, and clinical guidelines for private operators in the sector; failure to comply to which would lead to severe penalties, ensuring services are provided to the elderly at affordable rates. Preventive/corrective mechanisms should be implemented to avoid malpractices. Another aspect to consider is the coverage, quality, and cost of drugs distributed in public and private healthcare institutions. Although many life-saving drugs and injections are available free to the public, doctors sometimes recommend medicines unavailable at the GMC, thus patients have to purchase the same from the market.

- **Inefficiencies/delays in Public Health facilities: Digitalisation showing the way ahead**

Despite having some of the best health infrastructure facilities compared to most other states in India, including super speciality services, Goa's premier public medical institution, GMC faces a shortage of medical personnel in critical areas owing to an ever-increasing workload of patients, leading to inefficiencies in health service delivery, precisely in the form of long waiting hours and delays in getting the next appointment in certain instances, posing immense hardship especially for the elderly, leading to further decrease in their wellbeing (Costa 2014). Similar inefficiencies are sometimes experienced at PHCs and district hospitals. For instance, an article in a local daily highlighted that nearly 20 villages within the Pernem constituency are grappling with a severe health facility crisis as the only health centre serving these areas remains inadequately equipped. From Cansarvornem to Patradevi, villagers are forced to rely on the Cansarvornem PHC, which lacks essential facilities (*oHeraldo* 21/05/2023).

Notwithstanding the above, a generalisation cannot be made about the same across all public health facilities. For instance, Chadha (2023) points out that a PHC in North Goa's Corlim shows how patients are taken online. By creating an *Ayushman Bharat Health Account ID* – a digital health identification number for the patients – a token number is digitally generated on their mobile phone after downloading the app, and the consultation timing at the OPD is displayed. Upon visiting the doctor, the diagnosis gets uploaded online, and an e-prescription is sent to the pharmacist. This results in shorter queues and digital health records at the fingertips, leading to better-informed doctors on the next visit. This PHC caters to a population of over 48,000 people across ten villages in the Tiswadi taluka, offering five OPD consultations (general, ayurvedic, dental, ophthalmic, and physiotherapy), a laboratory, an antenatal clinic, and a pharmacy, with an average footfall of at least 100 people a day. This PHC is a classic case that offers a seamless, hassle-free, time-saving patient experience, from registration to diagnosis, prescription to lab, and pharmacy services. The PHC is still operating in hybrid mode due to specific operational challenges. Registrations and services are also manually provided at separate counters for people who do not use a smartphone or are not tech-savvy.

In the long-run, digitisation of health services would enable a more robust and transparent method of record-keeping and data collection, necessitating a 'behavioural change' for patients to transition from a paper-based information system to a digital one, which could help frame policy decisions, build capacity and identify trends in health outcomes in a particular region and presents a classic example for emulation.

- **Need for emphasis on Quality of Service and Patient Safety**

Besides, while considering the choice of HCU, many elderly respondents opted for private health facilities despite the higher costs because quality factors play a major role in the patient's HCU choice, wherein the patient's safety is of prime importance. *There is a need to minimise the risk of harm to patients from medical errors, infections or other adverse events. Similarly, there should be proper sanitation, infection control, and evidence-based practices to ensure patients' safety, accompanied by continuous monitoring, evaluation, and improvement of healthcare services by the government through the Department of Health Services to ensure patient safety is a priority.*

- **Sustainable technologies promoting eHealth**

While not a replacement for conventional healthcare systems, telemedicine can serve as a means to address healthcare disparities in underserved regions. Bridging the digital health divide, *eSanjeevani, A National Telemedicine Service of India*, is a step towards digital health equity to achieve Universal Health Coverage. eSanjeevani facilitates quick and easy access to doctors and medical specialists through the smartphone, following a five-step consultation process of (i) registering/logging in to the e-Sanjeevani portal, (ii) booking a consultation, (iii) entering the eOPD, (iv) consulting the doctor/specialist virtually, and (v) getting an e-prescription. Recently, the Goa chapter of the Indian Telemedicine Society was inaugurated on July 8, 2023, marking the presence of Goa on the map of the Indian Telemedicine Society, a national organisation active in the field of telemedicine and e-health for the past 20 years and aims at making telehealth the new normal for affordable access to best-in-class universal healthcare, in a connected and comprehensive healthcare ecosystem, with an aim to inculcate telemedicine as an integral part of healthcare delivery in the present and future, fostering a partnership with the government and shaping the long way ahead that Goa has to tread in this area (Datta 2023).

- **Need for Moving towards Age-Friendly Greener Societies**

SDG 11 calls for *Sustainable Cities and Communities*. Target 11.7 of this SDG aims to *provide universal access to safe, inclusive, and accessible green public spaces, particularly for women and children, ‘older persons’, and persons with disabilities by 2030*. Given our finding that many of the diseases suffered by the elderly are lifestyle diseases, establishing green spaces in proximity to neighbourhoods with a high concentration of elderly residents directly capitalises on their longing for greenery, improves emotional wellbeing, minimises loneliness and hopelessness, fosters social relations, and improves overall health (Tabrizi, Lak, and Moussavi 2023, 1). Regular exercise in such green spaces can help prevent lifestyle diseases among individuals in general and the elderly in particular. In Goa, several public gardens and parks commonly used by the elderly exist, such as the *Senior Citizens Park* in Campal, Miramar. The recently inaugurated *Nana-Nani-Natwanche Park* for ‘grandparents’ and their ‘grandchildren’ at Porvorim is a recreational state-of-the-art garden with modern amenities such as an indoor cricket court, yoga facility, newspaper reading room, basketball court, walking track and multiple play equipment for children and helps in combatting social isolation for the elderly. On the other hand, a report in a local daily brought to the fore that senior citizens of Chicalim received a great setback when

their park in the vicinity had been brutally stripped of all its natural greenery and shade-giving trees, leaving no space for recreational activity and exercise, and thus gathered in large numbers and took to the streets to mark a silent protest against the massive ongoing destruction of the greenery in the park, and expressing fear that business interests and hidden agenda may lead to the end of such green habitats of Dabolim (*Gomantak Times* 20/02/2023). Another worrisome phenomenon is that green spaces turn ‘dark’ during the night, often due to poor maintenance and neglect by the authorities. A report highlighted an instance in Vasco, where public gardens, which act as green havens for citizens during the day, turn into dark, desolate places at night, providing ample opportunities for anti-social elements to misuse the facility (*oHeraldo* 12/04/2018). *Building green spaces wherever required and adequately maintaining them is equally important.*

- **Need for Age-Friendly Infrastructure: Grey Characteristics of Green Spaces**

In connection to the above point, the web of utilities, including roadways, accessible architecture, illumination systems, and street furniture in green spaces, constitute the key components of *Grey Infrastructure*. Elderly individuals would be deterred from exercising in green spaces by the absence of essential amenities like benches, parking spaces, handrails, and ramps (Kimic and Ostrysz 2021, 2). Lopes (2017) underscores the inadequacy of public parks and gardens in providing adequate toilets and drinking water facilities. Additionally, the insufficient number of waste bins results in plastic wrappers and empty bottles being strewn around parks. *It is critical to promote inclusive green space planning that considers the unique requirements of the elderly.*

9.3.3 Post-Retirement Employment: Promoting Productive Ageing

SDG 8 emphasises the goal of *Decent Work and Economic Growth*. Ageism, which relies on negative stereotypes and misconceptions of older people, is common and must be confronted and challenged if they are to be included in society and not left behind. *There is a need to offer training and reskilling programs to help older workers adapt to changing job markets. Promoting entrepreneurship and self-employment opportunities for older adults, enabling longer working lives through investments in lifelong learning, age-adapted workplaces and reforms in employment and retirement policies, to name but a few, are being undertaken by many nations in the advanced stages of their ageing transition, and are key mitigating measures preparing for this shift in age structure. For instance, an initiative promoting life-long learning among older adults in Greece is the*

National Network of Lifelong Learning, encompassing all lifelong learning governing bodies and service providers, promoting access to high-quality education and educators in the interests of lifelong learning, stimulating employment, and entrepreneurship for the elderly. The Super-Aged nation Japan offers an example of encouraging the participation of older persons in the labour market via the *Plan for Dynamic Engagement of All Citizens*, which aims to achieve a society where all citizens, including older persons, can play active roles in all places: the workplace, at home, and the local community, and offers employees opportunities for continued employment after reaching the retirement age, thus promoting *Productive Ageing*. *Due importance is also to be given to non-economic tasks performed by the elderly, such as child-rearing and caregiving, usually of grandchildren, that often go unpaid and unappreciated, however, which enables their children to continue in economic activities* (Marfeo and Ward 2020, 2).

In India, the Ministry of Social Justice and Empowerment launched an Electronic Employment Exchange for Senior Citizens: the *Senior Able Citizen for Re-employment in Dignity (SACRED) scheme* in October 2021 to bring together job providers and senior citizens seeking a job on a transparent online portal, where private and public sector enterprises across sectors can share their demand for human resources, and also help experienced senior citizens having diverse and relevant skillsets, to get themselves registered for visibility of the emerging workplace demands, and apply for relevant job opportunities. As of August 2022, 4,527 senior citizens registered on the SACRED portal. At the same time, only 13 senior citizens registered on the SACRED portal from Goa, 431 registered from Kerala, and around 871 in Uttar Pradesh. However, only 63 senior citizens across India received employment via this portal. An amount of ₹ 10 crores is provided for funding the development of the platform, besides a maintenance grant of ₹ 2 crores per year for five years (Press Information Bureau, GoI 2022).

As of November 2023, the SACRED portal indicates that a total of 2,778 industries have registered, offering a total of 6,84,930 jobs, with a total of 6,481 interested senior citizens having registered; however, only a total of 72 having actually got the job. *Though a great, innovative initiative by the government, the reason for only so few senior citizens having been employed needs to be assessed, and the inhibiting barriers seriously need to be mitigated.*

- **Silver Economy**

Silver Economy refers to a system of production, distribution, and consumption of goods and services that uses older and ageing people's purchasing power to meet their consumption, living, and healthcare needs. Based on the Expert Group on the Silver Economy's recommendations, the Ministry of Social Justice and Empowerment, Government of India, virtually launched the *Seniorcare Ageing Growth Engine (SAGE)* portal on June 4, 2021, to select, support, and create a *one-stop access* of elderly care products and services, to encourage the chosen startups promoting out-of-the-box and innovative solutions for the commonly faced problems of the elderly, addressing the services from health, housing, care centres, technology access linked to needs ranging from finances, food, and wealth management to legal guidance, support private businesses that innovate in their processes and products for the benefit of the elderly. Its main component is *Geron-technology*, a brand-new paradigm in science, research, and application.

A special scheme, *SAGE Venture Fund*, was launched in August 2022 as a Securities and Exchange Board of India Registered Category-II Alternative Investment Fund to provide equity support to start-ups that innovate on products, processes, and services for the elderly. All proposals need to be uploaded, and the selection is based on blind review by an independent screening committee of experts. The selected start-up ideas are provided equity support of up to ₹ 1 crore per project while ensuring that the total government equity in the start-up does not exceed 49%.

Some of the very innovative selected start-ups include *Neomotion*, which has developed an accessibility solution where a user can attach a wheelchair to a motorbike and travel. Similarly, *Newnara's Indoknee* offers lightweight, unhindered corrective support, *Flexmo* offers a wearable hip guard, and *Ducere* provides smart insoles for fall prevention. The startup *Avyantra* is working to deliver an automated medical device for home dialysis. *KareVoyage* and *Mediyatra* are designed for the travel-loving elderly. *Senior World*, *Goodfellows*, and *GetSetUp* offer innovative products such as an online peer-to-peer community, the companionship of young adults, customised mobile phones, and senior-convenient travel packages. The advent of *Artificial Intelligence*, *Robotics*, and the *Internet of Things* are stimulating the conception of more products aimed at making life easier and healthier for senior citizens. As is well known, the rise of any economy is a function of demand and supply. Based on the changes that are underway, it will not be long before wordsmiths tag the 'Silver Economy' as the 'Platinum Economy' – *a similar colour, just 50 times more valuable!* (Nirula 2023).

9.3.4 Promoting Safety and Security

The finding of a shallow awareness level of the Act pertaining to the Maintenance of Welfare of Parents and Senior Citizens, 2007 among the elderly comes at a crucial time when a recent report from a survey conducted by HelpAge India revealed that over half of Goa's female senior citizens have been physically abused, 70% emotionally abused, and 65% financially exploited (Singh 2023, 31). Similarly, a local daily highlighted that according to the National Crime Records Bureau, Goa's crime rate against seniors stood at 21.4%, not far from the national average of 27.3% (*Navhind Times* 6/12/2023). The Goa Maintenance and Welfare of Parents and Senior Citizens Rules, 2009, mandates that each police station maintain an up-to-date list of the elderly living by themselves where a police station representative and a social worker or volunteer are expected to visit them regularly. Nevertheless, *this latter initiative is not being witnessed adequately in all areas in Goa, and steps need to be taken to ensure the safety and security of our elderly, especially those staying alone, besides strengthening laws and penalties for elder abuse perpetrators.*

9.3.5 Research: The Need for Disaggregated Data and Intersectoral Cooperation

The SDGs have been accompanied by a call for a *Data Revolution*, with Target 17.18 of the SDGs emphasising that *by 2030, it is imperative to bolster capacity-building assistance, particularly for developing nations, to substantially augment the accessibility of high-calibre, prompt, and dependable data that is disaggregated by gender, race, income, age, migratory status, geographic location, disability, and other pertinent characteristics within national contexts.* Data on older people is either not collected, or where it does exist, it is not thoroughly analysed, reported, or utilised, leading to severe gaps in policy and planning. A thorough comprehension of the societal and familial shifts prompted by the country's escalating economic and geopolitical dynamics is imperative for delivering effective health, social, and economic support to the elderly. Integrating expertise from other disciplines is essential to grasp the multifaceted changes and navigate the intricate web of political and economic transformations, facilitating improved planning and implementation. With the evolving demography in India, it is crucial that our thinking, research, and policy frameworks evolve in tandem. *There is a need for supporting and funding research and development in the Economics of Ageing, Gerontology, and Geriatric Medicine. A paper on the Economics of Ageing as part of the Post-Graduation Programme (Masters of Arts) in Economics at Goa University can be introduced, enhancing the curriculum with emerging areas on par with international universities.*

9.3.6 Long-term Residential Care for the Elderly: Where we are and what is lacking?

- **OAHs in need of Assistance to enable to Assist the Elderly better**

The findings of relatively low HRQOL, poor living standards capabilities, and lowest life satisfaction among the elderly living in OAHs, besides observations based on field visits, point to the fact that certain things are lacking. *Firstly, OAH staff should be well-trained and certified to ensure they possess the necessary skills and knowledge in geriatric care to enhance the quality of care often not seen in OAHs. Secondly, regular medical check-ups must be conducted for the elderly, and not wait until they fall sick to take them to the doctor. Thirdly, though recreational time is given to the elderly, which often sees them huddled in chairs in the veranda corridors or a room before the television, trained instructors in yoga and physiotherapists need to be appointed to visit OAHs regularly to keep them mentally and physically active, which will help combat depressive and lonely feelings. Fourthly, private OAHs, especially those run by religious institutions, face a dearth of financial support and incentives as they solely rely on nominal fees paid by the inmates and on whatever donations from charity they get. They are in dire need of assistance, which could take the form of grants, subsidies, or tax incentives for investments in elder-friendly infrastructure and accessibility features to upgrade their facilities, enhance services, and maintain high standards of care. Such maintenance and high standards are also lacking in government-run OAHs. Fifthly, establishing and enforcing clear regulatory standards for OAHs, covering aspects such as infrastructure, healthcare services, staff training, and resident care. Regular inspections and compliance checks can ensure adherence to these standards. Besides, the introduction of performance-based incentives for OAHs that demonstrate a commitment to continuous improvement in the quality of care, resident satisfaction, and overall well-being will help maintain better standards of quality and care for the elderly.*

- **Need for Public-Private Partnership for Affordable Assisted Living Facilities**

Often touted as luxury retirement/senior care homes, a few senior assisted living facilities have been raising their heads in Goa, with the aim that the elderly remain independent, but not alone, run solely by the private sector, nurturing *Continuing Care Retirement Community (CCRC)* services. For instance, *Ikigai Goa*, developed by a real estate company, offers one/two-bedroom apartments involving a vibrant community of like-minded senior people and activities ranging from art, culture, music, and fitness and

wellness programs promoting healthy living. Concierge and housekeeping services, meals cooked with health/nutrition in mind, and healthcare and medical assistance on call are all available. A safe environment accompanied by transportation services to facilitate the mobility of the elderly offers the time and freedom to re-discover themselves. However, *the relatively high prices, ranging between several lakhs of rupees, are quite unaffordable to many older adults, especially those living alone, who wish to be independent yet long for the company of others. Thus, a Public-Private Partnership in such a venture, taking Japan's 'Community-Based Integrated Care System' and Singapore's 'Ageing in Place' as models, would aid in making such quality facilities affordable to many older Goans who desire such facilities, given nuclearisation, relocation, and household size shrinkage.*

9.3.7 Partnerships for the Goals

SDG 17 emphasises that *partnerships are required to achieve the goals*. For effectively tackling the challenges posed by an ageing populace and fostering the development and execution of age-inclusive policies, there is a pressing need for the fusion of ideas and collaboration across diverse sectors, including the public and private sectors, NGOs, civil society, and international bodies. Moreover, active engagement from older adults is vital in this endeavour, facilitating the promotion of shared knowledge and resources.

• Corporate Social Responsibility (CSR): Emerging Avenue for Senior Citizen Welfare (SCW)

According to Schedule VII of the Companies Act 2013, corporate entities are mandated to allocate 2% of their net profits averaged over the preceding three financial years for social development, commonly called CSR. Among the recent additions to the CSR mandate is the inclusion of SCW initiatives. Data from the Ministry of Corporate Affairs, Government of India, reveals that despite a considerable increase in CSR spending since 2014, investment in SCW has remained below 0.3% of the total expenditure, rising from ₹ 89 million to ₹ 551 million over the past seven years. While this growth signifies a noteworthy shift in corporate attention toward SCW, the relatively small share underscores the need for greater efforts to sensitise the corporate sector to the vulnerabilities of the older population and encourage increased investment. State-wise distribution of CSR funds from corporate entities for SCW primarily concentrates on five states: Maharashtra, Uttar Pradesh, Delhi, Tamil Nadu, and Gujarat. While the percentage of CSR funding devoted to SCW of certain prominent companies in India has been gradually rising in recent years (Gail India Limited and Shree Cement Limited), that of most companies devoted to SCW

has been declining (International Tractors Limited, State Bank of India Card Services Private Limited, Bharti Airtel Limited, and National Stock Exchange of India Limited). However, a few companies (for example, Kothari Products Limited and Navneet Education Limited) that once spent CSR funds on SCW no longer do so and have now diverted the funds to other areas (IIPS and UNFPA 2023, 120). *This presents an emerging area for CSR initiatives to be undertaken in Goa.*

The National Stock Exchange Foundation's CSR endeavours in the elder care domain have been comprehensive and multifaceted, serving as a source of inspiration and guidance for other corporate entities. In addition to initiatives aimed at enhancing healthcare accessibility and providing palliative care and wellness services for older adults through health camps and the provision of medical aids, their tailored approach revolves around the theme of *Empowerment of the Elderly by the Elderly*. This model fosters social cohesion by establishing robust networks of elders known as *Elderly Self-Help Groups (ESHGs)*, facilitating their federation, and offering essential seed capital, loans, and business expertise while extending support to other disadvantaged elders. For example, *Project Samarthya* is being implemented in Nandurbar, Maharashtra, a relatively underprivileged district in the country. The project involves ventures such as organic farming of chia seeds and quinoa, food processing, and poultry farming, which fetch better market prices. Additionally, the project has initiated a branding strategy under which elder groups can market and sell their products. In terms of healthcare, the project has introduced mobile medical units with dedicated weekly time slots for elders, along with provisions for health and nutrition education and referrals to specialist care services.

Project Urban Elder Care was launched in Mumbai, targeting areas like Dharavi, Jogeshwari, Sewree, and other low-income and slum communities. Interventions included the establishment of *Elder Enrichment Centres* offering tailored services such as social, recreational, educational, counselling, and care for destitute community members, benefitting approximately 51,000 elders in total. Additionally, initiatives like *Project Aalambana* focus on digital inclusion through common service centres providing elders with digital literacy training. Other noteworthy projects include *Project Shraddha*, *Project Clean*, and *Project Sustainable Livelihood in Agri-allied Business* (*ibid*, 114-116).

- **Community-based organisations (CBOs) and Non-Governmental Organisations (NGOs)**

The *Goa Forum for Senior Citizens* is one of the only active CBOs in Goa. Established in June 1998, initially with a dozen-odd members, it now boasts of having over 19,000

members residing over Goa. Their activities are mostly health-related, with free medical camps, lectures on health, and yoga being conducted. Also, free legal advice is provided to senior citizens by the *Grievance Cell*, comprising of members who are lawyers and who assist in settling disputes. The forum has decentralised its administration by constituting an 11-member committee in each taluka that functions independently under the guidance of the central committee: the *Forum for Senior Citizens of India*. The forum also assists the police department in recording statements of the elderly, with five to seven senior citizens constituting the volunteer committee at each police station in South Goa.

Across Indian states, a few noteworthy CBOs and NGOs can be emulated to increase the number of such organisations. For example, the *Alzheimer's and Related Disorders Society of India* (Kerala), *Tamil Nadu Senior Citizens' Association* (Tamil Nadu), *Bharat Pensioners Samaj* (New Delhi), *Federation of Senior Citizens of Maharashtra* (FESCOM), *International Longevity Centre-India* (ILC-I), *All-India Senior Citizens' Confederation* (AISCCON), etc. By being members of such organisations, older adults get a voice towards redressing power imbalances, strengthening their capacity to express their views, leading to inclusion in decision-making and influence over government policies, representing one way of exercising their capabilities, giving them the freedom to value their life. For example, ILC-I consistently holds representation on numerous committees formed by both central and state governments, as well as the *National Human Rights Commission*. They actively contribute to committees tasked with drafting key policies such as the National Policy for Older Persons and provide insights for international initiatives like the Madrid International Plan of Action on Ageing and the Maharashtra Policy for Older Persons. Similarly, organisations like AISCCON and FESCOM advocated for the enhancement of interest rates on senior citizens' deposits, travel concessions, subsidies in healthcare, and financial assistance for the elderly. AISCCON also campaigned vigorously to amend the Senior Citizens' Maintenance Act, 2007 (*ibid*, 89-90).

The central area dampening the enthusiasm for the execution of regular activities by CBOs/NGOs is the absence of financial stability, which frequently compels them to reduce or eliminate services and programs. The provision of financial support by the government to CBOs/NGOs, along with regular audits and transparency of allocation of funds, would ensure sustainability in the functioning of these organisations.

9.4 Suggestions for Further Research

1. Questioning the rejuvenating role of migration, the study spurs the need to investigate the rising phenomenon of *Elderly Migration*. Cross-national empirical comparisons of the economic and non-economic factors influencing elderly migration need to be conducted. Given that the elderly themselves are a heterogeneous group, analysing differences in migratory inclinations within the elderly subset, such as among the *Young-Old*, *Old-Old*, and *Very-Old*, could provide insights into this phenomenon, which is of immense necessity owing to the far-reaching implications it will have on the labour markets and welfare systems of the source and destination countries.
2. From the macro perspective, in a similar manner in which the present study assessed the impact of population ageing on the overall indicator of the health of the economy, i.e. per capita GDP growth, across nations at various stages of their ageing transitions and among developed and developing economies, future studies can carry forward such cross-national comparative studies across nations at advanced age-transition stages and those at the initial stages, in terms of other aspects of macroeconomic significance. The presence of a linear v/s nonlinear ageing impact can be explored on national savings, fiscal deficit, governmental health expenditures, inflation, etc.
3. An intensive study comparing government-run and private-run OAHs can be conducted at several levels. Firstly, a comparison in terms of infrastructure and facilities offered. Secondly, the health status and satisfaction level of the elderly and the reasons that brought them to the OAH can be compared between the two categories of OAHs. Thirdly, structured surveys of the superiors in charge of the OAHs can be undertaken to analyse further aspects such as financial management of the institution and the elderly, etc. This study could be intensified by extending similar comparisons to assisted living facilities and luxury retirement homes.
4. The dynamic nature of ageing and the evolving economic and health challenges and opportunities over time can be evaluated better from a longitudinal perspective over different life stages. For instance, the higher levels of chronic illness among many of the elderly may be an outcome of their past unhealthy lifestyle coupled with poor food habits. There is a need to view these parameters of the elderly from a life course perspective.
5. Though this study has attempted to analyse Productive Ageing in terms of elderly engaged in PRW, besides suggesting the great potential that lies in the silver economy,

further research needs to be undertaken in these areas, which should also highlight the often unpaid, overlooked, and under-acknowledged indirect role of the elderly in the household via caregiving especially for their grand-children, which permits their adult children to engage in productive work outside the home.

6. As research progresses daily, the scales measuring HRQOL, living standards capabilities, subjective wellbeing, and similar other domains need constant revisions and improvements. Nation-specific adaptations need to be incorporated besides serving as a blueprint for cross-regional/national comparisons.
7. Based on personal surveys conducted with the elderly, a number of instances of elder abuse and discrimination by their own family members were narrated by the respondents. These aspects form the ground for an in-depth investigation into elder abuse and discrimination among the elderly in Goan households and its economic and health fallouts in terms of deprivation and mental/physical health deterioration.
8. Studies on assessing financial literacy among households directed towards encouraging households to prefer a diversified portfolio of investments (keeping in mind the inflation effect) and thus engaging in appropriate steps towards financial planning for their retirement years are needed.
9. Similar intensive studies can be undertaken in other States/UTs in India, as findings are often influenced by unique state-specific economic/health policies or cultural factors. A comparative analysis of different domains affecting the life of the elderly and their households across Indian states/UTs can be undertaken based on data from the forthcoming Census, contrasting the findings with earlier Censuses, presenting a comprehensive basis for policy-making as India gears towards an Ageing nation.
10. Several cultural, social, political, environmental, technological, legal, and cohort factors play a role in the economic, health, and labour market dynamics of the elderly. A rigorous investigation, yet unexplored to quite an extent, would demand the time and curious intellect of a number of researchers in future.

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Appendix I: Questionnaire

THE ECONOMICS OF INDIVIDUAL AGEING WITH SPECIAL REFERENCE TO OLDER ADULTS IN GOA

As part of the research work related to my Ph.D. degree in Economics, this study gauges the ground realities of senior citizens from various aspects and will aid in identifying areas of amelioration and assistance. I assure you that your response will be kept strictly confidential and will be used solely for academic purposes. Thanking you in anticipation for your time, co-operation and valuable inputs.

*-Ms. Charmaine Siqueira Lobo, Research Scholar and Assistant Professor in Economics,
Fr. Agnel College of Arts and Commerce, Pilar, Goa*

Kindly tick the box { ☐ } corresponding to your response or specify your answer in the space {_____} provided.

I. DEMOGRAPHIC DETAILS

1. **Sex:** a) Male ☐ b) Female ☐ c) Other ☐
2. **Age:** _____ years
3. **Educational Qualification:** a) Uneducated ☐ b) High school ☐ c) Higher Secondary ☐
d) Diploma ☐ e) College and above ☐
4. **Marital Status:** a) Unmarried ☐ b) Married ☐ c) Widowed ☐ d) Divorced/Separated ☐
5. **Living arrangement:** a) Alone ☐ b) With helper ☐ c) With family ☐ d) In Old Aged Home ☐
6. **Locality of residence:** a) Rural ☐ b) Urban ☐

II. HOUSEHOLD PROFILE

1. **Total number of members residing in your household in the following age groups:**
 - Number of Young members (aged below 15 years): _____
 - Number of Working-age members (between 15-59 years): _____
 - Number of Senior citizens (60 years and above): _____
2. **Total Monthly Household Income earned by ALL members in the household from all sources. ₹ _____ .**
3. **Total Monthly Household Expenditure earned by ALL members in the household from all sources. ₹ _____ .**

III. INFLOWS AND OUTFLOWS OF THE SENIOR CITIZENS

1. **Total Monthly Income ONLY of the SENIOR CITIZEN from all sources.** ₹ _____.
2. **Sources of Income ONLY of the SENIOR CITIZEN in the last one month.**
(You can select more than one option)
- | | | | |
|---|--------------------------|---|--------------------------|
| a) Trade/Business | ☐ | h) Intra-household familial financial aid | ☐ |
| b) Agriculture/Allied activities | ☐ | i) Funds from relatives in Goa/India | ☐ |
| c) Self-Employment | ☐ | j) Remittances from relatives abroad | ☐ |
| d) Salary (if still working) | ☐ | k) Retirement Pension | ☐ |
| e) Rentier | ☐ | l) Financial support from charities | ☐ |
| f) Returns from Shares/Bonds/Dividends/etc. | ☐ | m) Social security from the government | ☐ |
| g) Interest on Savings/fixed deposits/etc. | ☐ | n) Other (please specify) _____ | ☐ |
3. **Do you have any debt (loan taken) that is yet to be repaid?** a) Yes ☐ b) No ☐
4. **Total Monthly Expenses ONLY of the SENIOR CITIZEN (on all items)** ₹ _____.
5. **On which of the following items have YOU (SENIOR CITIZEN) spent money in the last one month?** (You can select more than one response)
- | | | | |
|--|--------------------------|--|--------------------------|
| a) Food Items | ☐ | h) Education costs of children/grandchildren | ☐ |
| b) Cooking Fuel | ☐ | i) Clothing/footwear | ☐ |
| c) Payment of bills (Water/Electricity/etc.) | ☐ | j) Consumer services (salary of domestic help/ tailoring costs/laundry, etc) | ☐ |
| d) Transport (Fuel/Hired vehicle/Bus fares) | ☐ | k) Personal care/Toiletries | ☐ |
| e) Telephone/Mobile phone charges | ☐ | l) Alcohol/cigarettes/tobacco | ☐ |
| f) Entertainment/Outings | ☐ | m) Repair/maintenance of house/goods | ☐ |
| g) Health-related expenses | ☐ | n) Expenses on social/religious events | ☐ |
6. **Kindly rate your level of financial dependence:** a) Fully Financially Dependent ☐
b) Partially Financially Dependent ☐ c) Financially Independent ☐
7. **Do you financially support any of your household members?** a) Yes ☐ b) No ☐

IV. LIFE SATISFACTION AND LIVING STANDARDS CAPABILITIES

- | 1. Indicate how true these statements are for you: | SD | D | SLD | N | SLA | A | SA |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| a) In most ways, my life is close to ideal | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| b) The conditions of my life are excellent | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| c) I am satisfied with my life | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| d) So far, I have got the important things I want in life | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| e) If I could live my life again, I would change nothing | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
- (SD=Strongly disagree, D=Disagree, SLD=Slightly disagree, N=Neutral, SLA=Slightly agree, A=Agree, SA=Strongly Agree)

2. Indicate how true these statements are for you	SD	D	N	A	SA
a) I can afford anything I need to remain well	☐	☐	☐	☐	☐
b) I can afford all that I need to be healthy	☐	☐	☐	☐	☐
c) I can afford to go to a medical specialist if I need to	☐	☐	☐	☐	☐
d) I can get all the healthcare I need	☐	☐	☐	☐	☐
e) I am able to visit people whenever I wish*	☐	☐	☐	☐	☐
f) I am able to travel as much as I would like*	☐	☐	☐	☐	☐
g) I am able to take part in any regular activities I want	☐	☐	☐	☐	☐
h) I am able to go on special outings*	☐	☐	☐	☐	☐
i) I am able to give to others as much as I want	☐	☐	☐	☐	☐
j) I can provide for others when I wish	☐	☐	☐	☐	☐
k) I can help people whenever I want	☐	☐	☐	☐	☐
l) I can give as much as I like to charity/a religious organisation	☐	☐	☐	☐	☐
m) I am able to follow my interests	☐	☐	☐	☐	☐
n) I am able to do all things I love	☐	☐	☐	☐	☐
o) I can have everything I need to be happy	☐	☐	☐	☐	☐
p) I can have regular treats	☐	☐	☐	☐	☐
q) I expect to have enough money to last my lifetime	☐	☐	☐	☐	☐
r) I expect a future without money problems	☐	☐	☐	☐	☐
s) I have enough money to feel secure about the future	☐	☐	☐	☐	☐
t) I have enough money for unexpected costs	☐	☐	☐	☐	☐
u) My choices are limited by money	☐	☐	☐	☐	☐
v) I have to be careful with spending	☐	☐	☐	☐	☐
w) Lack of money stops me from doing things	☐	☐	☐	☐	☐
x) More money would make my life easier	☐	☐	☐	☐	☐
y) There are things I would like to buy but cannot afford	☐	☐	☐	☐	☐

(SD=Strongly disagree, D=Disagree, N=Neutral, A=Agree, SA=Strongly Agree)

*Assess your capability to engage in social activities just prior to the COVID-19 pandemic period

V. HEALTH-RELATED QUALITY OF LIFE (HRQOL)

1) Nature of diseases suffered over the last one year (You can select more than 1 option)

a) Rheumatoid-/Osteo-Arthritis	☐	l) Parkinson's disease	☐
b) Cardiovascular disease	☐	m) Alzheimer's disease	☐
c) Diabetes	☐	n) Depression	☐
d) Hypertension	☐	o) Dementia	☐
e) Asthma	☐	p) Anxiety disorders	☐
f) Chronic Respiratory Disease	☐	q) Accidental injury	☐
g) Cancer	☐	r) Hearing loss	☐
h) Cirrhosis	☐	s) Vision loss	☐
i) Chronic Kidney Disease	☐	t) Chronic bodily pain	☐
j) Irritable Bowel Syndrome	☐	u) Prostrate/Hernia problems	☐
k) Paralysis	☐	v) Other (specify) _____	☐

2) Kindly rate your response	Poor	Fair	Good	Very Good	Excellent
In general, would you say your health is	☐	☐	☐	☐	☐

3. Kindly rate your response	Much worse now	Some-what worse now	About the same	Some-what better now	Much better now
Compared to a year ago, your health is	☐	☐	☐	☐	☐

4. Kindly rate your response. Does your health limit you in performing these activities?

	Not at All	A little bit	Moderately	Quite a bit	Extremely
a) Vigorous activities like running, lifting heavy objects, etc.	☐	☐	☐	☐	☐
b) Moderate activities like moving a table, pushing a vacuum cleaner, etc.	☐	☐	☐	☐	☐
c) Lifting or carrying groceries	☐	☐	☐	☐	☐
d) Climbing several flights of stairs	☐	☐	☐	☐	☐
e) Bending, kneeling or stooping	☐	☐	☐	☐	☐
f) Walking for one kilometre	☐	☐	☐	☐	☐
g) Bathing or dressing yourself	☐	☐	☐	☐	☐
h) To what extent has your physical health or emotional problems interfered with normal social activities with family, friends, etc.	☐	☐	☐	☐	☐
i) To what extent did you have bodily pain during the past four weeks?	☐	☐	☐	☐	☐
j) During the past four weeks, how much did pain interfere with your normal work?	☐	☐	☐	☐	☐
k) During the last four weeks, did you feel full of energy?	☐	☐	☐	☐	☐

5. How much of the time during the past 4 weeks....

	None of the time	Little of the time	Some of the time	Most of the time	All the time
a) Did you feel full of energy?	☐	☐	☐	☐	☐
b) Have you been a very nervous person?	☐	☐	☐	☐	☐
c) Have you felt so down that nothing could cheer you up?	☐	☐	☐	☐	☐
d) Have you felt calm and peaceful?	☐	☐	☐	☐	☐
e) Have you felt downhearted and sad?	☐	☐	☐	☐	☐
f) Have you been a happy person?	☐	☐	☐	☐	☐

6. During the past 4 weeks, have you had any of the following problems with your regular daily activities due to your Physical health?

	SD	D	N	A	SA
a) Cut down time you spent on work/ activities	☐	☐	☐	☐	☐
b) Accomplished less than you would like	☐	☐	☐	☐	☐
c) Were limited in the kind of work/ activity	☐	☐	☐	☐	☐
d) Had difficulty performing work/ other activities (for example, It took extra effort)	☐	☐	☐	☐	☐

(SD=Strongly disagree, D=Disagree, N=Neutral, A=Agree, SA=Strongly Agree)

7. During the past 4 weeks, have you had any problems with your regular daily activities due to any Emotional problems?

	SD	D	N	A	SA
a) Cut down time you spent on work/activities	☐	☐	☐	☐	☐
b) Accomplished less than you would like	☐	☐	☐	☐	☐
c) Did not do work/activities carefully as usual	☐	☐	☐	☐	☐

(SD=Strongly disagree, D=Disagree, N=Neutral, A=Agree, SA=Strongly Agree)

8. How true or false is each of the following statements for you

	Definitely false	Mostly false	Don't know	Mostly true	Definitely true
a) I seem to get sick a little easier than others	☐	☐	☐	☐	☐
b) I am as healthy as anybody I know	☐	☐	☐	☐	☐
c) I expect my health to get worse	☐	☐	☐	☐	☐
d) My health is excellent	☐	☐	☐	☐	☐

9. Kindly assess your level of independence in the Activities of Daily Living (ADLs)

	Require full assistance	Require partial assistance	Do not require assistance
a) Bathing	☐	☐	☐
b) Dressing	☐	☐	☐
c) Toilet use	☐	☐	☐
d) Moving about (Mobility)	☐	☐	☐
e) Feeding	☐	☐	☐

VI. HEALTH EXPENDITURE AND HEALTHCARE UTILISATION

1. Specify your health expenditure incurred over the last year on these components

	Nil	Below ₹1,000	₹1,000- ₹3,000	₹3,000- ₹6,000	₹6,000- ₹9,000	₹9,000- ₹12,000	₹12,000 and above
a) Hospitalisation charges	☐	☐	☐	☐	☐	☐	☐
b) Doctor consultation charges	☐	☐	☐	☐	☐	☐	☐
c) Clinical/diagnostic tests	☐	☐	☐	☐	☐	☐	☐
d) Medicines	☐	☐	☐	☐	☐	☐	☐
e) Transport costs to/from hospital	☐	☐	☐	☐	☐	☐	☐
f) Therapy charges	☐	☐	☐	☐	☐	☐	☐
g) Expenses on special diet/supplements	☐	☐	☐	☐	☐	☐	☐
h) Health insurance premiums	☐	☐	☐	☐	☐	☐	☐

2. Kindly specify your total Health expenditure over the last year. ₹ _____.

3. Who takes care of you on a daily basis?

- | | | |
|---|---------------------------------------|---|
| a) Self ☐ | b) Spouse ☐ | c) Children ☐ |
| d) Other relatives ☐ | e) Caretaker ☐ | f) Domestic help ☐ |

4. In case you pay any monetary remuneration to the one who takes care of you (if any), kindly specify the amount paid on a monthly basis.

- a) Nil ☐ b) Less than ₹ 10,000 ☐ c) ₹ 10,000 - ₹ 15,000 ☐ d) ₹ 15,000 - ₹ 20,000 ☐
e) ₹ 20,000 - ₹ 25,000 ☐ f) ₹ 25,000 - ₹ 30,000 ☐ g) Above ₹ 30,000 ☐

5. What is your preferred Healthcare Utilisation (HCU) choice?

- a) Private Hospital/doctor ☐ b) Public hospital/doctor ☐ c) Both ☐

6. Kindly specify the reason for your HCU choice (You can select more than one option)

- a) Low cost ☐ b) Proximity ☐ c) Well qualified Medical personnel ☐
d) Privacy ☐ e) Efficiency ☐ f) Less waiting hours/Timely treatment ☐
g) Patient safety ☐ h) Clean environment ☐

VII. LABOUR MARKET CHOICES OF THE ELDERLY

1. What was your Occupation for the major part of your life, pre-retirement age?

- a) Agriculturist ☐ b) Business ☐ c) Professional (specify) _____ ☐
d) Skilled worker ☐ e) Educationist ☐ f) Rentier ☐
g) Government Employee ☐ h) Housewife ☐ i) Domestic-help ☐
j) Private Employee ☐ k) Unemployed ☐ l) Other ☐

2. Did you take Voluntary Retirement?

- a) Yes ☐ (specify the reason) _____ b) No ☐

3. Post-retirement age, are you engaged in any job that earns you income?

- a) Yes ☐ b) No ☐

4. If Yes, kindly specify the nature of your post-retirement work. _____.

5. If you are currently engaged in post-retirement work, kindly rate your opinion:

- | | SD | D | N | A | SA |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| a) Lack of sufficient income pulled me back into the labour-force | ☐ | ☐ | ☐ | ☐ | ☐ |
| b) My education/skills enabled me to continue working | ☐ | ☐ | ☐ | ☐ | ☐ |
| c) My experience gave me a chance to continue in the workforce | ☐ | ☐ | ☐ | ☐ | ☐ |
| d) I am continuing to work to keep myself occupied/busy | ☐ | ☐ | ☐ | ☐ | ☐ |
| e) I am continuing to work as I am healthy and able to do so | ☐ | ☐ | ☐ | ☐ | ☐ |

(SD=Strongly disagree, D=Disagree, N=Neutral, A=Agree, SA=Strongly Agree)

VIII. RETIREMENT PENSION AND MAJOR SOCIAL PROVISIONS

1. Do you get a Retirement Pension?

a) Yes ☐ (Kindly specify the monthly amount): ₹ _____ b) No ☐

2. Are you availing of any Social Pension/Security schemes of the government?

a) Yes ☐ b) No ☐

3. If Yes, kindly specify the name(s) of the scheme(s).

_____.

4. If No, what is the reason for not availing any social security schemes?

- a) Unaware of different schemes ☐
- b) Not eligible ☐
- c) Don't have necessary documents ☐
- d) Cumbersome process of applying and getting benefits ☐
- e) Other (specify) _____. ☐

5. Concerning the Deen Dayal Swasthya Seva Yojana (DDSSY) public health insurance scheme, have you (your household):

- i) Registered for DDSSY a) Yes ☐ b) No ☐
- ii) Claimed benefits from DDSSY a) Yes ☐ b) No ☐

6. Are you aware of the Maintenance and Welfare of Parents and Senior Citizens Act 2007?

a) Yes ☐ b) No ☐

*** Thank You ***

Appendix II: Contribution of the Thesis

I. Papers Published

Sr. No.	Title of the Paper	Name of the Journal	Volume (Issue) Number	Year of Publication	UGC Care-list/ SCOPUS
1	Differences in Mental and Physical Health-related Quality of Life of Older Adults in Goa	Asian Pacific Journal of Health Sciences (APJHS)	Volume 9 (Issue 4)	2022	UGC Care-list
2	Work, Retirement and Post-retirement Employment among Older Adults in India	International Journal of Advanced and Applied Sciences (IJAAS)	Volume 10 (Issue 10)	2023	SCOPUS
3	The Implications of Population Ageing on Economic Growth: Evidence of Nonlinearity	Asian Economic and Financial Review (AEFR)	Volume 14 (Issue 06)	2024	SCOPUS
4	The Economic Condition of Older Adults in Goa	Arthshastra Indian Journal of Economics & Research (AIJER)	Volume 13 (Issue 02)	2024	UGC Care-list
5	A Cross-National Empirical Analysis of the Contribution of Fertility, Life Expectancy and Net Migration in Driving Contemporary and Future Population Ageing	Population and Economics	Volume 08 (Issue 04)	2024	SCOPUS

II. Papers Presented

Sr. No.	Title of the Paper	Name and Nature of the Seminar/ Conference	Name and Place of Organizing Institution	Year
1	Testing the Construct Validity, Model Fit and Second-Order Factorial Structure of the 36-Item Short Form Health Survey among Senior Citizens in Goa: A Confirmatory Factor Analysis	UGC-sponsored, two-day National Conference on Advanced Statistics and Applied Sciences (ASAS)	Ramanujan College, University of Delhi	2022
2	An Evaluation of the Physical and Mental Health Status and Health Costs of the Aged	Fifth International Multidisciplinary Conference on Current Research Trends, 2022	International Institute of Knowledge and Research, Maharashtra	2022
3	Greener through Grey: Linking Economic, Health and Social Dimensions of an Ageing Population with a Need for Age-friendly Greener Societies	National Seminar on Moving Towards Green Economy	St. Xaviers College of Management and Technology, Patna	2023
4	The Importance of Digital Transformation in an Ageing World: From Vulnerable to Valuable	Sixth International Conference on Leading Digital Transformation: Past, Present and the Future	St. Joseph's Institute of Management, Bangalore	2024