ASSESSING DENTAL TREATMENT NEEDS IN OLDER PEOPLE: A SOCIO-DENTAL APPROACH

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A thesis submitted for the degree of
Doctor of Philosophy
of the University of London

Department of Epidemiology and Public Health
University College London

1997

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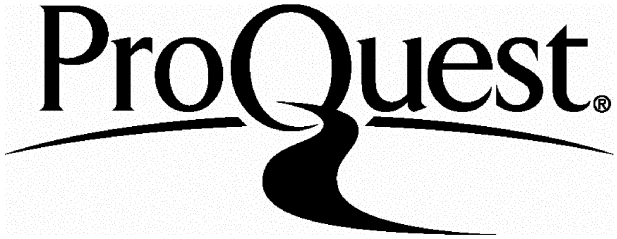

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ABSTRACT

Normative treatment need overestimates need and has other shortcomings. The integration of socio-dental indicators and other related factors, such as general health status should lead to a more realistic and appropriate needs assessment for dental service planning. The main objective of this study was to compare the needs estimates based on normative treatment need alone with the normative treatment need plus a socio-dental indicator to assess perceived oral impacts on daily performances, general health factors, behavioural propensity and economic status.

A socio-dental indicator, the Oral Impact on Daily Performances (OIDP) was used in the new approach mainly to assess the lay people's perception about the oral impacts. Undernutrition, two chronic medical conditions; diabetes mellitus and heart disease, were chosen as general health factors to integrate into the normative treatment need.

707 older people, 549 dentate and 158 edentulous, aged 60-74 years living in an urban community in Chiang Mai, Thailand were clinically examined and interviewed. The edentulousness rate was 11.9%. 41.2% and 11.1% of the dentate subjects had coronal and root caries respectively. 72.5% of dentate subjects had one or more teeth with loss of attachment of 6 mm or more whilst 62.9% had at least one or more mobile teeth.

Using the normative approach, 11.7% of dentate older people needed some restorative treatment, 28.6% needed extraction, 72.5% needed periodontal treatment, 60.7% needed partial dentures and 79.7% of edentulous people

needed full dentures. When using the new socio-dental approach, there was a substantial reduction of need. Only 11.5% needed periodontal treatment, 9.1% needed partial dentures and 23.5% of edentulous people needed full dentures.

By integrating different factors with normative need, different levels of treatment need were generated namely *'normative', 'general health related', 'impact-related', 'propensity related', 'accessible'* and *'non-accessible'* treatment needs. The percentage of older people with these different levels of need decreased compared to normative need. In 'normal health' group, when compared to normative treatment need taken as 100%, the *'impact-related treatment need'* for partial dentures, full dentures and periodontal treatment need was 50.5%, 60.5% and 16.4% respectively. *'Propensity related treatment need'* decreased to 13.8% and 69.9% for periodontal (non-rigid definition) and partial dentures treatment respectively. *'Accessible treatment need'* reduced to 14.5%, *non-accessible treatment need'* reduced to 20.8% and 32.9% in dentate and edentulous subjects respectively.

13.2% of dentates who had normative treatment need for partial dentures had *'general health related treatment need'* due to underweight. In edentulous subjects, 39.7% had *'general health related treatment need'*. 6.2% of dentates who had normative treatment need for periodontal treatment had *'general health related treatment need'* in relation to diabetes mellitus. In 'general health' group, when compared to normative treatment need taken as 100%,

'propensity related treatment need' decreased to 3.0% and 45.4% for periodontal treatment in group with high level of periodontal disease and for partial dentures treatment respectively. *'Accessible treatment need'* reduced to 2.4% and 12.7%, *'non-accessible treatment need'* reduced to 3.6% and 27.0% in dentate and edentulous subjects respectively.

By integrating a socio-dental index (OIDP) with normative need, the rank order of *'impact-related dental treatment need'* changed as the condition-specific score of OIDP changed, compared to the rank order of normative need. Dental treatment needs which had higher impacts on people's daily performances moved to a higher rank. *'Impact-related treatment need'* varied depending on the different cut-off points of condition-specific OIDP score. In most dental treatments, the higher the cut-off points, the lower the proportion of older people with *'impact-related treatment need'*.

Results showed that a socio-dental approach markedly reduced estimates compared with normative dental treatment needs estimation.

ACKNOWLEDGEMENTS

The person who inspired me about Dental Public Health, guided, directed and helped me is my supervisor, Professor Aubrey Sheiham. His critical comments, advice and efficiency are greatly appreciated.

I would like to express my deep gratitude to the Thai government for giving me a scholarship to carry out my PhD study. My most sincere thanks to all my colleagues in the Department of Community Dentistry, Faculty of Dentistry, Chiang Mai University who carrying out my teaching duties. My grateful thanks to Dr Naruemanas Korvanich who contributed a lot of his time and effort to assist me in my field work, Drs Peerasak Malikaew and Wichai Coonanuwatpakarn who also very kindly gave their help for my field work. I also appreciate the moral support from others in my department whose names are not mentioned.

I should like to thank Dr Chatpong Chunsuwankul, the Director of the Dental Health Division, Chiang Mai Municipality Hospital, who so kindly coordinated and organised the field work involving the older people in the Community Centre of Chiang Mai municipality. I should also like to thank other personnels from several Senior Day Centres, who helped with the co-ordination and co-operation throughout this study.

My grateful thanks to Drs Ray Croucher and Wagner Mercenes who have given me very valuable advice. My deep appreciation to my PhD friends who gave intellectual advice, made my life in London so very pleasant and for their support for getting through the many difficulties. I should like also to

express my warm thanks to Dr S Prince Akpabio OBE, my close friend, for his kindness and moral support throughout my time in London.

I could not even think of coming to study in London without the sacrifice of my parents who cared for my son. My sincere thanks to them for all their devoted time, and the loving care which they have given to him. I am very grateful to my husband who always gives me every opportunity to study, and who is very supportive of me to pursue any further education. To my dear son, Jom, who has grown up to tolerate life without his mother since he was so young, I am so grateful.

This study could not have been done without the kind, generous and cooperative support of my dear lovely Thai older people. They are the most wonderful people I have ever worked with in my dental public health career. I should like to express my sincere thanks to all of them.

CONTENTS

ABSTRACT 2
ACKNOWLEDGEMENTS 6
TABLE OF CONTENTS 9
LIST OF TABLES 18
LIST OF FIGURES 23

CHAPTER 1 BACKGROUND OF THE STUDY 26

CHAPTER 2 REVIEW OF LITERATURE 30
2.1 The definitions and concepts of need 31
2.2 Dental needs assessment 37
2.2.1 Dental needs assessment in older people 38
2.3 Socio-dental indicators 49
2.3.1 Socio-dental indicators 51
2.3.2 The relationship between socio-dental indicators and clinical variables 58
2.3.3 The relationship between socio-dental indicators and demographic variables 59
2.3.4 The relationship between socio-dental indicators and treatment need 60
2.4 Factors affecting needs for dental care of the older people 61
2.4.1 Factors affecting needs for older people 61
2.4.2 Quality of life of older people 64
2.4.3 General health 66
2.4.3.1 Physical disability 68
2.4.3.2 Mental status 70
2.4.3.3 General health perceptions 71
2.4.3.4 Specific medical conditions 72
2.4.3.5 Nutritional status 79
2.5 The propensity to adopt health behaviours 86
2.5.1 Behavioural factors 87
2.5.2 Enabling factors 91
2.5.2.1 Economic factors 92

2.6 Summary 93
2.7 Aim of the study 95
2.8 Hypothesis 95
2.9 Objectives 96

CHAPTER 3 THEORETICAL FRAMEWORK 97
3.1 The background of the theoretical framework 99
3.2 Theoretical levels of treatment need 104
3.3 General theoretical models for dental treatment need assessment in older people 108
3.3.1 General models, Model A and Model B 111
3.3.2 Model A1 for dentate subjects 117
3.3.3 Model A2 for edentulous subjects 120
3.3.4 Model B1 for dentate subjects 122
3.3.5 Model B2 Periodontal treatment need, dentate subjects with heart disease 125
3.3.6 Model B3 for edentulous subjects 127
3.3.7 Model B4 for dentate subjects 130

CHAPTER 4 METHODOLOGY 134
4.1 Samples selection 135
4.1.1 Study area 135
4.1.2 The age group of the sample 135
4.1.3 Sample size selection processes 136
4.1.4 Identifying the samples 138
4.1.5 Sample size estimation 140
4.1.5.1 Dentate and edentulous subjects 141
4.1.6 Sampling method and the number of samples 141
4.1.7 Supplemented edentulous subjects 142
4.2 Local contact 143
4.3 The questionnaire 144
4.3.1 The questionnaire 144

4.3.1.1 Criteria to assess general health status 145
4.3.1.2 Criteria used to assess perceived Oral Impact on Daily Performances (OIDP) 148
4.4 Clinical examination 148
4.4.1 The diagnostic criteria 148
4.4.1.1 Clinical data 148
4.4.1.2 Criteria for normative treatment need 149
4.5 The procedures to assess different levels of treatment need 151
4.5.1 Assessing a *'general health related treatment need'* 151
4.5.2 Assessing an *'impact-related treatment need'* 151
4.5.3 Assessing a *'propensity related treatment need'* 154
4.5.4 Assessing *'accessible treatment need'* 156
4.6 Examination sites and equipment 157
4.7 Examination bias 157
4.7.1 Inter-examiner reliability 157
4.7.2 Intra-examiner reliability 158
4.7.3 Pilot study 159
4.8 Data entry, verification, consistency check 160
4.9 Data analysis 161

CHAPTER 5 RESULTS: DEMOGRAPHIC BACKGROUND, CLINICAL ORAL HEALTH STATUS AND ORAL HEALTH BEHAVIOUR 163
5.1 Response rates and demographic background 164
5.1.1 Response rates 164
5.1.2 Demographic background 165
5.2 Clinical findings 166
5.2.1 Dentate subjects 166
5.2.2 Edentulous subjects 167
5.3 Dental service utilisation 168
5.4 Propensity for health behaviours 168
5.5 Enabling factors 169

CHAPTER 6 NORMATIVE AND PERCEIVED DENTAL TREATMENT NEED 178

6.1 Normative dental treatment need 179

6.2 Comparison between normative and perceived dental treatment need 180

6.3 The association between perceived need and social variables 181

6.3.1 Edentulous subjects 181

6.3.2 Dentate subjects 182

6.4 The association between perceived need and types of tooth loss in dentate subjects 183

CHAPTER 7 THE ORAL IMPACT ON DAILY PERFORMANCES (OIDP), THE RELATIONSHIP BETWEEN OIDP SCORES, SOCIAL VARIABLES, TREATMENT NEED AND ORAL HEALTH OF OLDER PEOPLE 191

7.1 The Oral Impacts on Daily Performances (OIDP) 192

7.1.1 Incidence of impacts 192

7.1.2 Main symptoms and main oral impairments causing oral impacts 193

7.2 The relationship between OIDP scores and social variables 194

7.3 The relationship between OIDP scores and clinical variables 195

7.4 The relationship between OIDP scores and perceived treatment need 196

CHAPTER 8 GENERAL HEALTH STATUS 203

8.1 Specific medical conditions 204

8.1.1 Specific medical conditions and OIDP scores 204

8.2 Functional disability 205

8.3 General health perception 205

8.4 Mental status 205

8.5 Nutritional status 206

8.5.1 The association between different BMI group, clinical variables and masticatory problems 207

CHAPTER 9 IMPACT RELATED TREATMENT NEED 215

9.1 Impact-related treatment need: the integration of normative treatment need and OIDP scores 216

9.2 'General' and 'Condition-specific' impacts in treatment need assessment 218

9.3 Comparison between normative treatment need, *'impact-related treatment need'* using general OIDP scores and condition-specific OIDP (CS-OIDP) scores at different cut-off points 219

CHAPTER 10 THE INTEGRATION OF GENERAL HEALTH FACTORS, ORAL IMPACT ON DAILY PERFORMANCES (OIDP) AND PROPENSITY FOR HEALTH BEHAVIOURS INTO A TREATMENT NEED MODEL 227

10.1 The integration of general health factors into normative treatment need for full dentures 231

10.1.1 Normal general health (normal weight) edentulous subjects 232

10.1.1.1 Integration of perceived Oral Impacts on Daily Performances (OIDP) into treatment need estimation 232

10.1.1.2 Integration of perceived Oral Impacts on Daily Performances (OIDP) and finance factors into treatment need estimation 233

10.1.2 Underweight edentulous subjects 235

10.1.2.1 Integration of underweight factor into normative treatment need 235

10.1.2.2 Integration of underweight and enabling factors such as finance 236

10.2 Integration of general health status into normative treatment need for partial dentures 238

10.2.1 Normal general health (normal weight) dentate subjects 238

10.2.1.1 Integration of perceived Oral Impacts on Daily Performances (OIDP) into treatment need estimation 238

10.2.1.2 Integration of perceived Oral Impacts on Daily Performances (OIDP) and a behavioural factor into normative treatment need 238

10.2.1.3 Integration of perceived Oral Impacts on Daily Performances (OIDP) and financial factors into normative treatment need 239

10.2.2 Underweight dentate subjects 241

10.2.2.1 Integration of underweight factor 241

10.2.2.2 Integration of underweight and propensity for health behaviour 241

10.2.2.3 Integration of underweight and finance problems 241

10.3 Integration of general health factors into normative treatment need for both full and partial dentures in dentate people 244

10.3.1 Normal general health (normal weight) dentate subjects 244

10.3.1.1 Integration of perceived Oral Impacts on Daily Performances (OIDP) into the estimation of dental needs 244

10.3.1.2 Integration of perceived Oral Impacts on Daily Performances (OIDP) and a behavioural factor into the estimation of dental needs 244

10.3.1.3 Integration of perceived Oral Impacts on Daily Performances (OIDP) and financial factors into normative treatment need 244

10.3.2 Underweight dentate subjects 247

10.3.2.1 Integration of underweight factor 247

10.3.2.2 Integration of underweight and behavioural factors of propensity for health behaviour 247

10.3.2.3 Integration of underweight and financial factors into treatment need estimations 247

10.4 Integrating of Oral Impact on Daily Performances (OIDP) using different cut-off points 255

10.5 Integration of general health factors, Oral Impact on Daily Performances (OIDP) and behavioural propensity into treatment need model for periodontal disease in dentate older people 257
10.5.1 Dentate subjects with specific medical conditions related to periodontal disease 257
10.5.1.1 Integration of specific medical conditions: diabetes mellitus 257
10.5.1.1.1 Integration of specific medical conditions and behavioural factors of propensity for health behaviour 258
10.5.1.2 Integration of specific medical condition: heart disease 266
10.5.1.2.1 Integration of specific medical conditions and behavioural factors of propensity for health behaviours 266
10.5.1.3 Treatment need in dentate subjects who had normal health 271
10.5.2 Treatment need in dentate subjects with normal health who had no perceived oral impacts 271
10.6 Implications of CS-OIDP at different cut-off points on *'impact-related treatment need'* and *'propensity related treatment need'* 274

CHAPTER 11 DISSCUSSION 276
11.1 The changes in different levels of dental treatment need after using a socio-dental approach of treatment need estimation 278
11.1.1 Prosthodontic treatment need 285
11.1.2 Periodontal treatment need 300
11.2 The effect of using the new socio-dental approach of treatment need estimation on the change in *'impact-related treatment need'* using different cut-off points of condition-specific OIDP 310
11.3 The effect of using the new socio-dental approach of treatment need estimation on the change in the rank order of dental 313

treatment need
11.4 The integration of general health with dental treatment need in the older population 316
11.5 A new approach of treatment need estimation and policy planning 318
11.6 Oral Impacts on Daily Performances (OIDP) in the Thai older people 321
11.7 The relationship between Oral Impacts on Daily Performances (OIDP) and perceived treatment need 323
11.8 The oral health status 326
11.9 Normative treatment need 331
11.10 Propensity for health behaviours and enabling factors 335
11.10.1 Propensity for health behaviours 335
11.10.2 Enabling factors 336
11.11 General health status of the older people 337
11.12 Strength and weakness of this study 338
11.13 Summary 342
11.14 Conclusions 348
11.15 Implications 350
11.16 Recommendations for future research 351

REFERENCES 353

APPENDIX 1 Sample size estimation 381
APPENDIX 2 Questionnaire (English version) 386
APPENDIX 3 Questionnaire (Thai version) 411
APPENDIX 4 The Oral Impact on Daily Performances (OIDP) 437
APPENDIX 5 Clinical examination form and clinical criteria 447
APPENDIX 6 Case reports of older people with different OIDP scores 471
APPENDIX 7 The 6-Item Orientation-Memory-Concentration Test 479

LIST OF TABLES

Table 2.1	Summary of data from recent studies on prosthetic treatment need estimations in older people	39
Table 2.2	Summary of data from recent studies on restorative treatment need estimations in older people	40
Table 2.3	Summary of data from recent studies on periodontal treatment need estimations in older people	41
Table 2.4	The proposed dimensions to include in a measure of dental needs	48
Table 2.5	Conditions that increase the risk of endocarditis	76
Table 3.1	Different levels of treatment need, factors to consider and expected service to be provided	107
Table 3.2	Summary of different theoretical models for treatment need in older people	110
Table 4.1	Definition of different social classes	138
Table 4.2	The proposed and final sample size according to social activity and social classes	143
Table 4.3	Possible related perceived impairments to identify the *'impact-related treatment need'*	153
Table 5.1	Response rates of studied subjects by place of recruitment	170
Table 5.2	Proposed and final sample size by social classes and social activities	170
Table 5.3	The distribution of 623 respondents by demographic variables, social activity and health care support	171
Table 5.4	Percent of dentate respondents with sound and functional teeth	172
Table 5.5	Decayed, filled, missing teeth and surfaces and percentage of coronal and root surfaces affected in dentate subjects	172
Table 5.6	Periodontal conditions in 512 dentate subjects	173
Table 5.7	Percentage of subjects with wear on teeth and mean number of teeth with cervical and coronal wear	173

Table 5.8	Numbers and percentages of original and total edentulous subjects by demographic characteristics	174
Table 5.9	Dental service utilisation, propensity for health behaviours and enabling factors of 623 subjects	175
Table 5.10	The sugar consumption in 623 older people	176
Table 5.11	Enabling factors of 623 older people	177
Table 6.1	Normative prosthetic treatment need in edentulous subjects	185
Table 6.2	Normative prosthetic treatment need in dentate individuals and in dentate individuals with one edentulous arch	186
Table 6.3	Comparison between normative and perceived treatment need in dentate and edentulous subjects	187
Table 6.4	Numbers and percentages of edentulous subjects who reported perceived need for full dentures, by demographic and social variables	188
Table 6.5	Number and percentage of dentate subjects who reported perceived dental treatment need by demographic and social variables	189
Table 6.6	Number and percentage of dentate subjects who reported perceived dental treatment need by type of tooth loss	190
Table 7.1	The incidence of oral impacts on different daily performances in dentate, edentulous and total subjects	198
Table 7.2	Main symptoms and oral impairments causing oral impacts on daily performances in those with one or more impacts	199
Table 7.3	Numbers and percentages of OIDP scores by social variables	200
Table 7.4	Numbers and percentages of OIDP scores by clinical variables	201
Table 7.5	Numbers and percentages of OIDP scores by perceived treatment needs	202
Table 8.1	Self-report of having specific medical conditions in 623 older people in Chiang Mai	208
Table 8.2	Mean OIDP score in 623 older people with specific medical conditions	209

Table 8.3	Numbers and percentages of 623 older people reporting having functional disability	210
Table 8.4	General health perception of 623 older people according to their self-reported specific medical conditions	210
Table 8.5	Numbers and percentages of 707 participants with different weighted error scores of the 6-Item Orientation-Memory-Concentration Test	210
Table 8.6	Mental impairment of 707 older people according to Orientation-Memory-Concentration Test Weighted error score	211
Table 8.7	Numbers and percentages of Body Mass Index (BMI) 623 Thai older people by sex and BMI percentile rank groups	211
Table 8.8	Mean (s.d) of Body Mass Index (BMI) of 623 Thai older people by sex and BMI percentile rank groups	211
Table 8.9	Numbers and percentages of 623 older people in different BMI groups by clinical variables and masticatory problems	212
Table 8.10	The association between underweight and related risk factors in 623 older people	214
Table 8.11	The association between underweight and edentulousness	214
Table 8.12	The association between underweight and posterior occlusal pairs in dentate subjects	214
Table 9.1	Comparison of numbers and percentages of older people with normative and impact-related treatment need at three OIDP cut-off points	221
Table 9.2	Comparison of normative need, considered as 100% and *'impact-related treatment need'* at three different cut-off points	222
Table 9.3	Comparison of numbers and percentages of older people with General OIDP and Condition Specific OIDP	223
Table 9.4	Comparison of numbers and percentages of older people with normative and *'impact- related treatment need'* and condition-specific treatment need	224
Table 9.5	Comparison of percentages of older people with normative and *'impact- related treatment need'* and condition-specific treatment need	225

different cut-off points

Table 10.1 Summary of different models and medical conditions used to illustrate the new approach to dental treatment need estimations 230

Table 10.2 Percentages of 512 dentate subjects with high level of periodontal disease according to different definitions 231

Table 10.3 Different levels of treatment need for full dentures in 'normal health' and 'health problem' groups for edentulous older subjects 252

Table 10.4 Different levels of treatment need for partial dentures in 'normal health' and 'health problem' groups for dentate older subjects 253

Table 10.5 Different levels of treatment need for full and partial dentures in 'normal health' and 'health problem' groups for dentate older subjects 254

Table 10.6 Comparison of normative treatment need considered as 100% with *'impact-related treatment need', 'non-accessible treatment need'* and *'accessible treatment need'* at different cut-off points in normal weight older people 256

Table 10.7 Definitions of propensity for health behaviour used in the Integrated models, number and percentages of 512 dentate subjects in each definition 259

Table 10.8 Comparison of different level of treatment need for periodontal disease in dentate older people with diabetes mellitus when considered normative need as 100% 270

Table 10.9 Comparison of number and percentage of older people with normative, impact-related, and propensity related need for periodontal treatment in 512 dentate older individuals 275

Table 10.10 Comparison of percentage of older people with normative, impact related, and propensity related need for periodontal treatment in 512 dentate older individuals 275

Table 11.2 Different levels of prosthodontic treatment need in 'normal health' and 'health problem' groups for the dentate older subjects 283

Table 11.3 Different levels of prosthodontic treatment need in 'normal health' and 'health problem' groups for edentulous older subjects 284

LIST OF FIGURES

Figure 3.1	Interaction between professional judgement, perceived oral impacts, behavioural and environmental propensities	99
Figure 3.2	Flow diagram showing a decision tree of 'Effective Treatment Need'	102
Figure 3.3	General theoretical model for 'normal general health' older people for all types of dental treatment	115
Figure 3.4	General theoretical model for 'general health problem' group for all types of dental treatment	116
Figure 3.5	Theoretical model for *'normal general health'* group for periodontal and /or partial denture treatment need	119
Figure 3.6	Theoretical model for *'normal general health'* group for full denture treatment	121
Figure 3.7	Theoretical model for *'general health problem'* group for periodontal and/or prosthodontic treatment	124
Figure 3.8	Theoretical model for *'general health problem'* (heart disease) for periodontal treatment need	126
Figure 3.9	Theoretical model for *'general health problem'* group for prosthodontic treatment need	129
Figure 3.10	Theoretical model for *'general health problem'* group for prosthodontic treatment need in dentate subjects when considered Shortened Dental Arch concept	131
Figure 3.11	Decision tree for comprehensive evaluation model for treatment need for partial dentures	133
Figure 10.1a	Treatment need assessment model for full dentures in edentulous population who had normal weight	234
Figure 10.1b	Treatment need assessment model for full dentures in edentulous population who had underweight	237
Figure 10.2a	Treatment need assessment model for partial dentures in dentate population who had normal weight	240
Figure 10.2b	Treatment need assessment model for partial dentures in dentate population who were underweight	243
Figure 10.3a	Treatment need assessment model for full and partial dentures in normal weight dentate population	246

Figure 10.3b	Treatment need assessment model for full and partial dentures in dentate population who were underweight	249
Figure 10.4a	Treatment need assessment model for periodontal disease in dentate subjects who had diabetes and high level of periodontal disease (Classification 1)	262
Figure 10.4b	Treatment need assessment model for periodontal disease in dentate subjects who had diabetes and high level of periodontal disease (Classification 2)	263
Figure 10.4c	Treatment need assessment model for periodontal disease in dentate subjects who had diabetes and low level of periodontal disease (Classification 3)	264
Figure 10.4d	Treatment need assessment model for periodontal disease in dentate subjects who had diabetes and low level of periodontal disease (Classification 4)	265
Figure 10.5	Treatment need assessment model for periodontal disease in dentate population who had heart disease	268
Figure 10.6	Treatment need assessment model for periodontal disease in dentate subjects who had normal general health	272
Figure 10.7	Treatment need assessment model for periodontal disease in dentate subjects who had normal general health and no perceived impacts	273

CHAPTER 1

BACKGROUND OF THE STUDY

Ageing is becoming an urgent public health and social problem in most parts of the world. The growing number of the older population creates a great need for acute and long-term care. The demand for all types of health services and for trained personnel to provide these services are also increasing. Long-term planning is needed to provide appropriate changes in the health services system to improve the quality of life and the quality of care to the older population. Quality of life is one of the major concerns for older people. Oral health affects the quality of life of the older people by having an impact on their feelings of well-being, ability to communicate and socialise, ability to maintain adequate nutrition, and their ability to taste and enjoy foods.

In industrialised countries, there are many studies on several aspects of the ageing. But in the developing countries, very few studies have focused on older people. For example, the health authority in Thailand has not given much attention to older people. Priority is given to solve the oral health problems of the pre-school and school children. As more people will live longer, the oral health of older people should not be neglected by the oral health authorities. Oral health goals and oral health policy for older people should be formulated and incorporated into the national oral health policies in order to ensure that adequate oral health care will be given to them.

To develop an oral health policy for the older population, precise data on the prevalence of oral diseases and the dental treatment needs of the older people are needed. An accurate assessment of dental treatment needs is important to the public health planner because of the limited health resources available,

especially in the developing countries. Only appropriate, carefully estimated need for dental care should be used to establish priorities in situations where resources are limited.

The early assessments of oral health status, done by professionals, were clinically oriented. They were based on the biomedical model, which focused on disease processes. Most of the oral health indices used are disease-based. To overcome this problem, broader measurements of health need were developed. There are methods which incorporate the social and psychological factors and the patient's perceived need into the process of dental treatment need assessment. A variety of socio-dental indicators have been developed to broaden the measurement of dental treatment need by incorporating the psycho-social and behavioural aspects into the assessment (Cushing et al. 1986; Locker and Grushka, 1987; Sheiham et al. 1987; Atchison and Dolan; 1990; Slade and Spencer, 1994a; Adulyanon, 1996).

Oral health is an integral part of general health. One Surgeon General of the US emphasised.....*'You're not healthy without good oral health'*....(Koop, 1993). In the vulnerable populations such as the older people, the disabled, and the low income groups, oral health and oral health services are even more important to maintain general health (Bolden et al. 1993). General health status of the older people is one of the important factors to determine the needs of dental treatment. Physical functioning could predict service utilisation and access to care (Blaum et al. 1994). Some specific medical conditions such as heart disease and diabetes are associated with oral diseases (Mattila et al.

1989; DeStefano et al. 1993; Beck and Slade, 1996). General health factors should not be overlooked when estimating the dental need in the older population.

In addition to the measurement of the oral and general health status and their perceived impact, behavioural factors affecting health gain from dental therapies should be incorporated into treatment need estimations. These factors include the appropriate use of services and delays in seeking treatment, compliance with treatment instructions, self-care potential, life-style such as smoking. More realistic assessments of the dental treatment needs must include the individual's propensity for dental health maintenance (Maizels et al., 1993). This additional dimension, propensity for health behaviour, is central to rational treatment planning.

There are a limited number of research studies on the integration of psycho-social dimensions into the development and evaluation of oral health services. In the older population, the integration of perceived oral impacts on daily life, the influence of general health and the propensity for health behaviour as well as the financial problems of the older people should provide better information on the priority to be given to various treatment needs. Such information should lead to a more realistic and appropriate needs assessment for dental service planning.

CHAPTER 2

REVIEW OF LITERATURE

This thesis is directed at developing a broader system of assessing dental needs in older people. Prior to the study of a new socio-behavioural approach of assessing treatment need in the older people, it is necessary to explore thoroughly the definition and the concepts of need in order to develop a better understanding of the main philosophy and concept of needs. This review will first survey current concepts of health need, then review methods of assessing dental needs. This will be followed by a discussion of broader socio-dental approaches to assessing need. The special aspects of assessing dental needs in older people are discussed. As general health affects oral health and the ability of the older people to have access to and respond to dental care, a review of the relationship between some health conditions such as heart disease, diabetes and undernutrition are reviewed in the subsequent section. Lastly smoking, toothbrushing behaviour, and financial factors which affect the outcome of dental care as well as the relationship between these factors and dental health are discussed.

2.1 The definitions and concept of needs

It is important when considering needs to recognise that needs can be defined in a variety of ways and from a variety of perspectives. This review deals with definitions and approaches.

Two different approaches to the definition of 'need' for health care have been widely accepted. They are *'humanitarian'* and *'realistic'* approaches (Acheson, 1978). In a *'humanitarian'* view, need was defined by Donabedian (1974) as 'some disturbance in health and well being'. Need is defined in terms of

phenomena that require medical services. This definition of need is defined as a *'humanitarian approach'* because it implies that when there is human suffering, something needs to be done. Emphasis is given to identifying the suffering rather than on how it can be relieved. It fails to take into account the consequences of limited resources for health care.

In contrast, a *'realistic approach'* to need focuses on the availability of resources which could meet the need (Matthew, 1971; Cochrane, 1976). According to Matthew and Cochrane, need should be recognised only when it can be met.

Needs may be assessed and conceived as three different processes. Firstly, a particular service can be translated into its capacity to satisfy need. Secondly, services can be translated into the resources required to produce that service. Thirdly, a set of resources in the services that can satisfy the needs is estimated (Donabedian, 1974). By these three processes, in the *'humanitarian'* approach, the service equivalent of need is first defined. Then services can be translated into the resources required for those services. Lastly, a set of resources will be allocated, which may be inequitable. In the *'realistic'* approach by contrast, resources for services need to be identified. Then, services within the given resources will be provided to satisfy the need.

In the most widely accepted definition, need is divided into four categories: *'normative need'* which is a need defined by the expert or professional, administrator or social scientist, who defines it as need in any given situation. *'Felt or perceived need',* equivalent to 'want', is a need expressed by the

individual. *'Expressed' need or demand* is a felt need converted into action by seeking assistance for care. Lastly, *'comparative need'* is need assessed by comparing health of different people with similar characteristics (Bradshaw, 1972). In addition to the four categories of need, the difference, if any, between these services judged necessary and those services actually being received is defined as *'unmet'* need (Carr and Wolfe, 1979).

Normative treatment need

Need in dentistry has traditionally been assessed in terms of technical procedures, manpower and resources. The most widely used criteria to assess the need is the one developed by WHO (1977). In the third edition of the World Health Organization Oral Health Survey manual (WHO, 1987), dental treatment needs are based solely on clinical findings. For example, restorative treatment needs are expressed in terms of the numbers of surfaces needed to be restored. Periodontal needs is classified as the need for oral hygiene instruction, scaling and surgery.

Attempts have been made to assess the need for dental treatment in older people. Most treatment need estimations have been based on the oral disease findings, mainly from epidemiological studies (Manderson and Ettinger, 1975; Rise and Heloe, 1978; Smith and Sheiham, 1980; Rise, 1982; Ekelund, 1984; Mersel et al. 1984; Mann et al. 1985; Brauer et al. 1986; Hand and Hunt, 1986; Drake et al. 1991; Kiyak et al. 1993). Many studies on treatment need in dentistry used the WHO criteria. Thus, the majority of the dental treatment need estimations in the last two decades have been based upon normative need.

The normative treatment need varies greatly in different populations. The normative need for restorative treatment in older populations ranged from 16% to 70%, while the treatment need for extractions ranged from 15% to 40% (Hand and Hunt, 1986; Stockwell, 1987; Vigild, 1987; Vigild, 1989a; Leake et al. 1990; Slade et al. 1990; Drake et al. 1991) or even as high as 68% (Angelillo et al. 1990).

Oliver et al. (1989) based their estimation of periodontal treatment needs on epidemiological data and concluded that the total periodontal services needed for scaling, surgery and prophylaxis would require 120 to 133 million hours and $5 to $6 billion annually if the total US population were treated for periodontitis over a 4-year period. All projections of time and expenditures were based on 100% demand for treatment, which does not exist in normal situations.

Perceived need

When assessing treatment need normatively, dentists are more experienced at recognising early signs of disease. Patients may recognise the importance of oral symptoms or the functional and psychological impacts of oral diseases when assessing their perceived need for dental care. Therefore, perceived need has become an important part of the estimation of dental treatment need.

A substantial difference between normative need for dental care determined by dentists and perceived needs of patients are commonly found (Grabowski and Bertram, 1975; Giddon et al. 1976; Reisine and Bailit, 1980; Smith and

Sheiham, 1980; Kiyak, 1981; Davis, 1982; Ettinger, 1984; Palmqvist, 1986; Douglass et al. 1988; MacEntee and Scully, 1988b; Tervonen and Knuuttila, 1988; Kiyak, 1989). Most of the differences are that some subjects reported no dental needs when their oral health was poor. Data from the Third National Oral Health Survey in Thailand indicated that a normative need for scaling was 99% for people aged 60 years and above, while only 1% of them perceived that need. The normative need for extractions was 57% while the perceived need for that treatment was 16% (Dental Health Division, 1991). The causes of these differences were the patients' lack of knowledge about dental health care; reduced access to dental care such as diminished mobility of the patient, travel difficulties, difficult access to dental surgeries and dental equipment, and economic factors such as a decrease of income after retirement and overall lack of resources.

There are three factors which relate to perceived need: the extent to which symptoms were perceived as threatening, disruptive, or painful; familiarity with the symptoms and the perceived personal responsibility for their occurrence; and how embarrassing the symptoms were (Jones et al, 1981). Vigild (1993) found that signs and symptoms that were painful, interfered with daily activities, or more easily recognised were the primary contributors for patients current perceived need.

Expressed need or demand for care

When a person has a perceived need, it does not necessary mean that he/she demands care. Cautley et al. (1992) found that over half of the older people who

had a perceived need for any form of dental treatment had still not sought treatment. They found that access to dental treatment appeared to be one of the major problems in the older group.

Vigild (1989b) clearly demonstrated the discrepancy between different types of treatment needs. In his study, the normative need assessed from the clinical examination showed that 90% of the older people in nursing homes need some kind of dental treatment, whereas the interviews revealed that only 44% had a self-perceived need, 33% expressed their demand for treatment, while only 6% had used the available dental services regularly. The '*unmet*' need was very high (84%). He then proposed the realistic treatment need which is based on the normative need, but takes into account the perceived need, the expressed demand, the physical and mental state of the patient. The realistic treatment need attempts to estimate the true need for treatment in institutionalised older people (Vigild, 1993).

It is very important to decide whether the oral health care is supposed to meet the normative treatment need, the perceived need, or the demand for treatment. If the oral health care is to meet the normative treatment need, this could lead to an overestimation of needs. The normative treatment need has sometimes been proposed under an assumption that older people will benefit from the treatment no matter what their perceived need. The alternatives will be that the oral health care system meets only the perceived need or the expressed demand for treatment. In that case, the problem may arise in frail

older persons who could not express their needs. Thus, the need will be underestimated.

In selecting an appropriate measure of need for a particular purpose, the user needs to give some thought to the question of whose perspective and definition of need is important. Some measures rely on the individual's own perception of need which might give a very low perception of need if he or she has low expectations of health. On the other hand, normative need tends to define needs in terms of the specific treatment techniques within their sphere of competence. This approach does not look at the overall aspect of the subject in which there may be a variety of needs to be met in different ways.

2.2 Dental needs assessment

The process to determine the service needs of an individual starts with the individual's desire for dental care and therefore makes a decision to visit a dentist (Schonfeld, 1981). The dentist will then examine the oral status of the patient, and makes plans for the treatment. Schonfeld described this approach where oral health needs are assessed on the basis of the nature and distribution of the oral health of a sample of the population and then translated into dental treatment as the condition-to-need approach.

When the oral health needs are assessed on the basis of the nature and distribution of the treatment needs, it is described as the direct treatment plan approach (Sheiham and Spencer, 1997). The treatment need assessed by the

direct treatment plan approach is based on direct examination of the individual.

The most widely used method in the direct treatment plan approach is the method recommended by the World Health Organization (1987) where restorative and periodontal treatment needs are measured by using the number of surfaces needing a filling, crowns or restoration, and the Community Periodontal Index of Treatment Need (CPITN) (Ainamo et al., 1982). Indices such as the DMF and CPITN have been criticised because they can not give any information on the status of oral health of a person as a whole and on subjectively perceived symptoms such as pain and discomfort (Locker, 1988).

The condition-to-need or the direct treatment plan approach does not consider either the outcomes of oral diseases or the consequences of limited resources of health care when estimating treatment needs.

2.2.1 Dental needs assessment in older people

Traditionally normative method has been used to assess dental need, as mentioned in the previous section. The following section will be a review of the methods currently used to estimate dental treatment need in older people. Tables 2.1, 2.2, 2.3 summarises data from recent studies on treatment needs estimation. Only prosthodontic, restorative and periodontal treatment needs were summarised in this review.

Table 2.1 Summary of data from recent studies on prosthetic treatment need estimations in older people

Country	Authors	Samples	Criteria	Type of dental needs	Normative Need	Realistic Need	Perceived Need
Australia	van Waas et al. 1993	1144 (Inst)[1]	professional judgement (WHO, 1977)	prosthetic care	70%	-	-
	Slade et al. 1993	178 (Ind)[2]	professional judgement	prosthetic care	23.6%	-	-
Canada	Slade et al. 1990	299 (Ind)[2]	professional judgement (Hunt et al, 1985b)	full dentures partial denture	46.2% 35.4%	-	-
	Mojon and MacEntee, 1992	269 (LTC)[3]	professional judgement	prosthetic care	83%	36%	54%
Denmark	Vigild, 1987	486 (NH)[4] 199 (LTC)[3]	professional judgement	prosthetic care	67% 71%	19% 32%	- -
England	Smith and Sheiham, 1980*	300 (Ind)[2]	professional judgement	some form of treatment	78%	5.3%**	28%
	Wilson et al. 1987*	150 (RH)[5]	professional judgement	general dental care	65%	32%	11%
	Diu and Gelbier, 1989*	293 (CCC)[6]	professional judgement	general dental care	82%	76%	53%
	Hoad-Reddick, 1991	41 (Inst)[1]	professional judgement	prosthetic care	75.6%	-	36.5%
Japan	Miyazaki et al. 1995	1908 (Inst)[1]	professional judgement (WHO, 1977)	new full and /or partial dentures	36%	-	-
Switzerland	Stuck et al. 1989	219 (GH)[7]	professional judgement (Hunt et al, 1985b)	general dental care prosthetic care	97.8% (dentate) 31.5% (edentate) 34.9% (dentate) 30.0% (edentate)	-	30.4% (dentate) 13.1 (edentate) - -

(Inst)[1] = institutionalised, (Ind)[2] = Independently living, (LTC)[3] = long term care, (NH)[4]= nursing home, (RH)[5]=residential home, (CCC)[6]= community care centre, (GH)[7] = geriatric hospital, *= general dental treatment need, not prosthetic need only, ** expressed need or demand

Table 2.2 Summary of data from recent studies on restorative treatment need estimations in older people

Country	Authors	Samples	Type of dental needs	Criteria	Normative Need	Realistic Need	Perceived Need
Australia	van Waas et al. 1993	1144 (Inst)[1]	some restorative treatment	professional judgement (WHO, 1977)	47%	-	-
	Slade et al. 1993	178 (Ind)[2]	some restorative treatment	professional judgement	50.8%	-	-
Canada	Slade et al. 1990	299 (Ind)[2]	some restorative treatment	professional judgement	42.1%	-	-
Italy	Angelillo et al. 1990	234 (Inst)[1]	some restorative treatment	professional judgement	37.2%	-	-
New Zealand	Cautley et al. 1992	815 (Ind)[2]	some restorative treatment	professional judgement (WHO, 1977)	89%	-	18.9%
Nigeria	Adegbembo and el Nadeef, 1995	154 (Ind)[2]	some restorative treatment	professional judgement (WHO, 1977)	19.7%	-	-
Switzerland	Stuck et al. 1989	219 (GH)[3]	some restorative treatment	professional judgement	58.4%	-	-

(Inst)[1] = institutionalised, (Ind)[2] = Independently living, (GH)[3] = geriatric hospital

Table 2.3 Summary of data from recent studies on periodontal treatment need estimations in older people

Country	Authors	Samples	Criteria	Type of dental needs	Normative Need	Realistic Need	Perceived Need
Australia	van Waas et al. 1993	1144 (Inst)[1]	CPITN (Ainamo et al.,1982)	scaling complex periodontal treatment	56% 17%	-	-
	Slade et al. 1993	178 (Ind)[2]	CPITN (1982) (Ainamo et al.,1982)	periodontal treatment	95%	-	-
Canada	Leake et al. 1990			periodontal care	86%	-	-
New Zealand	Cautley et al. 1992	815 (Ind)[2]	CPITN (Ainamo et al.,1982)	simple periodontal treatment complex periodontal treatment*	93% 10.5%	- -	4.2% -
Nigeria	Adegbembo and el Nadeef, 1995	71 (Ind)[2]	CPITN (Ainamo et al.,1982)	periodontal treatment	75%	-	-
Switzerland	Stuck et al. 1989	219 (GH)[3]	PI (Russell, 1956)	periodontal therapy	91%	-	-

(Inst)[1] = institutionalised, (Ind)[2] = Independently living, (GH)[3] = geriatric hospital, * more than simple scaling and root planing

Normative and perceived needs in older people

Most of the studies on prosthodontic treatment needs were based only on professional judgement. Therefore dental treatment needs were assessed normatively. Perceived need was assessed in some studies. The differences in needs assessment for prosthodontic treatment in different countries are presented in Table 2.1. Prosthodontic treatment needs for the maxilla and mandibular arch ranged from 23.5% to 83% (Vigild, 1987; Wilson et al. 1987; Stuck et al. 1989; Slade et al. 1990; Hoad-Reddick, 1991; Mojon and MacEntee, 1992; Slade et al. 1993; van Waas et al. 1993; Miyazaki et al. 1995). Normative need for prosthodontic treatment is much larger than perceived need in all studies (Table 2.1).

Normative need for restorative treatment based on the professional judgement, mainly followed the WHO criteria (Table 2.2). The restorative treatment need was low (19.7%) in Nigerian older people (Adegbembo and el Nadeef, 1995). In other studies, the restorative treatment need ranged from 37.2% to 50.8% (Stuck et al. 1989; Angelillo et al. 1990; Slade et al. 1990; Cautley et al. 1992; van Waas et al. 1993; Slade et al. 1993) (Table 2.2).

Various methods have been used to estimate treatment needs for periodontal disease. In the early US National survey (NHANES I), periodontal treatment need was assessed using the score from Periodontal Index (Oliver et al. 1989). A system to classify the need for periodontal treatment was first developed in 1973 by incorporated treatment time and methods combined with disease measures in the Periodontal Treatment Need System (PTNS) (Johansen et al.

1973). PTNS is a precursor of a more recent index, the Community Periodontal Index of Treatment Needs (CPITN) (Ainamo et al. 1982). CPITN has been widely used worldwide despite changing concepts of the pathogenesis and the treatment of periodontal disease (Stuck et al. 1989; Slade et al. 1993; van Waas et al. 1993; Adegbembo and el Nadeef, 1995). The CPITN index has been criticised as having several limitations. The index has been used for purposes it was not originally designed for, and because of recent advanced knowledge of the disease process (Holmgren, 1994). Both PTNS and CPITN were developed when it was accepted that the natural history of periodontal disease progressed from gingival inflammation to periodontitis to tooth loss (Loe et al. 1978a , Loe et al. 1978b). Treatment need estimation were based on preventing progression by controlling the gingivitis through the removal of calculus. Because the life history of periodontal disease are now known to differ from the earlier models, and gingivitis does not invariably progress to periodontitis. Therefore, the need to eliminate all pockets, remove all calculus and achieve plaque free teeth is questionable. Thus, the use of the CPITN is not recommended for assessing treatment needs of populations (Sheiham, 1991). Furthermore, in terms of using CPITN for planning, Lennon (1994) commented that CPITN has its deficiency that it is not easy to interpret or understand by decision makers or health care planners.

Periodontal treatment need assessed by CPITN ranged from 56% to 95% for simple periodontal treatment (Table 2.3). Perceived need for periodontal treatment was very low. Cautley et al. (1992) found that only 4.2% of subjects

perceived that they needed gum treatment while 93% were judged by clinical measures to need periodontal treatment.

Perceived need is usually assessed by asking the subjects directly about their perception of dental problems. The term 'perceived need' was defined in different ways. It could be used for subjects who could identify a problem (Mojon and MacEntee, 1992), for persons who express a need as a wish without actually being offered treatment, or for subjects who have complaints regarding their dental status (Wilson et al. 1987; Diu and Gelbier, 1989; Stuck et al. 1989).

Some researchers have included other aspects of health into treatment need estimations. They used the term 'realistic need' as an attempt to combine professionally assessed need with realistic treatment possibilities. 'Realistic need' has several meanings. In a study by Wilson et al. (1987) 'Realistic need' reflected the normative need in the context of what the examiners believe to be of benefit to the patient. 'Realistic need' considered different aspects which related to the need of each individual, for example, health and general condition, ability to coorporate in and understand the reason for treatment, and the patient's desire for the treatment to be carried out. In their study, the percentage of subjects who had a 'realistic need' was about half of the normative need.

In a review by Schou (1995), she categorised subjects who would benefit from treatment into groups with 'realistic need'. Diu and Gelbier (1989) presented

data on persons who might benefit from dental care which might be comparable to those with 'realistic need' in Wilson's study. Similarly, Mojon and MacEntee (1992) presented data on subjects who would seek and benefit from treatment. The magnitude of the 'realistic need' in both studies was half or less than half of the normative need (Diu and Gelbier, 1989; Mojon and MacEntee, 1992).

Ettinger and Beck (1984) proposed the Rational Dental Care Model where they listed all factors which could affect treatment plans of individual patients. Factors needed to be considered of the patient were: life expectancy, mental and medical status, mobility and dexterity, dental expectation and financial capability. This model was aimed to assist clinicians to make thoughful decisions for the most appropriate care after weighting all the modifying factors. This model concerned many important factors. However, it was aimed to be used in a clinical environment, and not for public health purposes.

Some authors included finance as one factor to consider when assessing dental need. Fenton (1994) proposed the Elderly Health Index to assist decision-making for removable partial dentures. This index evaluated the health of the patient, the health of dental tissues, and the health of subjects' finances. He concluded that the results from this index should respect the subjects' wishes, be feasible to accomplish, and financially manageable.

Mojon and MacEntee (1992) also proposed that the need for prosthodontic treatment could be considered under theoretical, clinical, and practical

conditions. They proposed a *'theoretical need'* for treatment assessed solely on the quality of the dentures, a *'clinical need'* for treatment based on an assessment of the denture and the condition of the residual ridge, a *'practical need'* for treatment considered only in subjects who complained of a problem. The first two considerations involved only the clinical aspect of the oral problem. A *'practical need'* took the subject's complaint of the problem into account. They found that almost half of the subjects with a *'clinical treatment need'* had no *'practical need'* for treatment.

The Socio-dental approach

Normative treatment need has several shortcomings in dental treatment need estimation. Firstly, it lacks objectivity. Normative treatment need depends mainly on the opinions of professionals which are not infallible and could vary greatly. The two most common causes of variability among professionals are inter-examiner and intra-examiner variability. It is very difficult to get absolute agreement on these, even when previously agreed criteria are used.

Secondly, it lacks accuracy. Normative treatment need assumes that the standards of care accepted by dentists are the norm for each person examined (Sheiham et al. 1982). But it is difficult to set a standard for each treatment especially for the conditions which lack clear definition such as occlusal disharmonies.

Thirdly, normative treatment need neglects the opinion of the consumer. Normative treatment need does not take into account the patients attitude and needs. Concepts of health and disease as visualised by lay persons often differ considerably from that of professionals.

Fourthly, normative treatment need could be overestimated. It assumes the need for treatment for every impairment found clinically. It does not take into account the realistic situation such as limited health care resources and the fact that the patient may not desire such treatment nor gain much benefit from it.

The method of estimating treatment need normatively may not be appropriate nor accurate, since it does not consider factors such as the general health of the subject, the subject's desire for treatment, discomfort, perceived treatment needs, and financial abilities which could influence treatment decisions. Moreover, the normative estimation of treatment needs based on the professional approach does not take into account the outcome of oral diseases and the consequence of limited resources for health care. Most of these needs would possibly not be perceived by people who would not seek the treatment proposed. To overcome the shortcomings of normative treatment need, Sheiham et al. (1982) suggested that an assessment of need should include social and psychological factors in addition to the clinical assessment. The individuals' perceptions of their own needs as well as the propensity of the individual to take preventive action and the perceived need and barriers to prevention should also be taken into account. Table 2.4 presents the summary

of the different dimensions which should be included in the measurement of dental needs by Sheiham and Spencer (1997).

Table 2.4 The proposed dimensions to include in a measure of dental needs

Dimensions	
A clinical dimension	Based on sound concepts of the life history of the disease
A measure of impairment	To assess the impacts of impairment
Measures of social dysfunction	
The wants of the individual	
Assessment of the propensity of the individual to take preventive action	Includes general health maintenance orientation, knowledge and attitudes about health matters
A prescription of effective and accepatable treatments or cures	

Adapted from Sheiham and Spencer (1997)

Drake et al. (1991) suggested that the determination of treatment need in the older population should not be based solely on clinical findings. Additional behavioural, social, and health factors should be included with dentists' decisions when determining treatment needs of older persons.

In an attempt to use a socio-dental approach to assess treatment needs, Adulyanon (1996) classified dental treatment needs into four levels. Normative treatment need, Impact-related treatment need which includes perceived impacts of oral problems on the quality of people's lives, Effective treatment need which takes into account the propensity of individual's health behaviour, Accessible treatment need which considers all barriers to effective treatment of the people such as socio-economic status, and access to service.

Adulyanon (1996) suggested that these different levels of treatment needs could be used to assist the planning of dental services as well as the improvement of the dental health care delivery system. Amounts of dental services vary between different levels of treatment needs. For example, when the estimation of treatment needs is based on normative judgement, the full treatment is expected. Selective treatment will be given only to those who perceived the oral impact when using *'impact-related treatment need'*. Moreover, *'effective treatment need'* could be used to help the planner to provide more effective treatment whilst *'accessible treatment need'* could lead to the improvement of the service system or to reduce the barriers of service access.

2.3 Socio-dental indicators

Many researchers have defined the broader conceptual framework of oral health which includes concepts of impairment, functional limitation, disability, social function, and quality of life (Cohen and Jago, 1976; Nikias et al. 1979; Reisine, 1984; Locker, 1988). These concepts have become significant in the development of socio-dental indicators.

The definitions of impairment, disability and handicap are based on the work of Nagi (1965), the World Health Organization (1980), Locker (1988) and Pope and Tarlov (1991). *Impairment* is defined as anatomical loss, structural abnormality or disturbance in physical or psychological processes, either present at birth or arising out of disease or injury, such as edentulousness, periodontium loss or malocclusion. *Functional limitation* is restriction in function customarily expected of the body or its component organ or system,

such as limitation of jaw mobility. *Disability* is any limitation in or lack of ability to perform the normal activities of daily living. It includes not only restriction in mobility, body movement or self-care, but also other distinct dimensions of physical, psychological and social well-being. *Handicap* is defined as the disadvantage experienced by impaired and disabled people because they do not or can not comform to the expectations of society or the social groups to which they belong.

Sheiham and Spencer (1997) gave an example related to dental health based on these concepts that a malposed or missing tooth (impairment) can lead to a restriction in eating or avoidance of hard foods (physical disability) which could make people feel embarrassed (psychological disability) and avoid eating in front of others (social disability).

Under a traditional 'medical model', assessing oral health status by using clinical measures could reflect only one aspect of the complex nature of oral health status. Clinical assessments of oral health also have a weak relationship with the individuals' perceptions and therefore, do not reflect their needs (Reisine and Locker, 1995). A 'bio-psychosocial model' of health has increased importance and could provide a useful framework for studying health conditions of all types. A 'bio-psychosocial model' of health proposes that health and illness constitute a complex relationship between symptoms of diseases/disorders, individual psychological processes (individual's perceptions, personality, stress, etc) and the structure of the social system for example cultural experience) (Engel, 1977). A 'bio-psychosocial model' of oral health is

being used more often in oral health outcomes studies. A more comprehensive approach to oral health status, a so called 'socio-dental indicators' has been recently developed by several researchers. A socio-dental indicator is based on the social, psychological, cultural, and economic effects of oral health problems, not only on the presence or absence of oral pathology.

Socio-dental indicators have been developed to improve the shortcomings of professionally defined need by adding a dimension of social impact into the measurement of dental health need. Nikias (1979) proposed a definition of socio-dental indicators as *'a measure of the extent to which oral conditions disrupt normal role function'*. Several researchers have tried to measure the impact of oral conditions on the social aspect of human life.

2.3.1 Socio-dental indicators

Cushing et al. (1986) developed socio-dental indicators by assessing the impact of dental status on perception of the people. The studied impacts were based on four categories; function (difficulty in eating), social interaction (difficulty in communication), comfort and well-being (pain and discomfort), self-image (dissatisfaction with aesthetics).

Rosenberg et al. (1988) developed the 'Dental Functional Status' which covers lack of oral pain and discomfort and a person's ability to chew, speak and interact with people without being self-conscious about appearance. The study found that perceived general health is significantly correlated with age, dental symptoms, and dental and medical functional status.

Gooch et al. (1989) proposed the 'Dental Health Index' to assess the personal impact of dental problems in terms of pain and distress, worry or concern, and reduced social interactions.

Fiske et al.(1990a)used a socio-dental index to assess any oral handicap in 100 older people. Their index measured four categories of oral handicap : impairment of function, comfort, self-image and social interaction. They also used the socio-dental index to evaluate the benefit of dental care. The socio-dental index showed that 74% of the subjects benefited from treatment. Self-image and social interaction showed the greatest improvements. The most difficult category to satisfy was function. They found that one third of subjects whose oral function was compromised before treatment were still in the same state after treatment.

In an attempt to assess the oral health impact on the social condition of the older population, Atchison and Dolan (1990) developed and tested the 'Geriatric Oral Health Assessment Index' (GOHAI). The instrument consists of 12 items; eat without discomfort, limit foods-dental problems, trouble biting or chewing, trouble speaking, uncomfortable eating with people, nervous; self-conscious, limit social contacts, worry and concern, use medication for teeth, teeth or gums sensitive, pleased with looks and swallow comfortably. These 12 items of the scale reflect problems affecting older people in three dimensions: (1) physical function, including eating, speech and swallowing; (2) psychosocial function, including worry or concern about oral health, self image, self conciousness about oral health, and avoidance of social contacts because of oral

problems; and (3) pain or discomfort. GOHAI has been used as an epidemiological tool to measure oral problems and as an outcome measure. As an outcome measure, GOHAI was useful for evaluating the effectiveness of dental treatment (Atchison, 1996). GOHAI has been used widely in all age groups rather than only on older people, the group it was originally developed for. The researchers who developed this index recommended that the name of the GOHAI be changed to General Oral Health Assessment index (Atchison, 1996). Therefore, this index will no longer be an index particularly for old people.

Chen and Hunter (1996) included various social dimensions in their study to relate biological measures of oral status to quality of life. The three major subjective measures were oral health-related quality of life, health beliefs and oral health behaviours. Oral health-related quality of life included the number of dental symptoms, the perception of oral well-being (perceived oral health status and perceived appearance of teeth) and physical and social functioning (chewing ability). Health beliefs included the importance of dental disease compared to other health problems, the value of dental health, the importance of keeping natural teeth, perceived seriousness of dental problems and perceived benefits of dental visits. Oral health behaviours measured personal oral hygiene and dental care ulitisation.

Strauss and Hunt (1993) developed a 'Dental Impact Profile' (DIP) to measure dental effects on the quality of life and social function. The 'Dental Impact Profile' consists of four social aspects; eating, health/well-being, social relations

and romance. The measure was tested on college students, private dental recall patients, and old people at a day-centre.

The Oral Health Impact Profile (OHIP) was developed by Slade and Spencer (1994b). The 49 scaled index of the social impact of oral disorders was derived from 535 statements by assessing 328 persons. The measure included six sub-scales of functional limitation, physical discomfort, psychological discomfort, physical disability, psychological disability, social disability and handicap. The OHIP could be used to measure the social impact of oral disorders and has potential benefits for clinical decision-making and research.

Rosenoer and Sheiham (1995) modified the questionnaires used by Cushing et al. (1986) to measure dental impacts on the daily life and satisfaction with teeth in combination with standard epidemiological indicators of dental status of an adult group.

Leao and Sheiham (1996) developed a weighted socio-dental indicator which includes measures of how oral health status affects the quality of daily living. The Dental Impact on Daily Living (DIDL) covers five dimensions; comfort, appearance, pain, performance and eating restriction. Their study confirmed that different levels of oral status had different impacts on people's daily living, and that social and psychological dimensions can be shown to be important factors that have to be assessed to reflect people's needs.

Most of the socio-dental measures described above cover broader and various dimension of social and behavioural factors which have an impact on oral health and quality of life. These dimensions include functional, social interaction, comfort, pain, and self-image. Most of these measures had no attempt to assess the different weights for different items and dimensions except the most recent measure developed by Leao and Sheiham (1996) and Adulyanon (1996).

Adulyanon (1996) developed the Oral Impact on Daily Performance index (OIDP). This index aims to be a concise index with a final single score, focusing on measuring the endpoint outcomes of oral conditions on daily livings.

The OIDP index measures nine items which cover three major groups of performances: physical, psychological and social. They are eating and enjoying food; speaking and pronouncing clearly; cleaning teeth; doing light physical activities such as housework or walking; sleeping and relaxing; smiling, laughing and showing teeth without embarrassment; maintaining usual emotional state without being irritable; carrying out major work or social role and enjoying contact with people. The scoring system of OIDP index quantifies the impacts by using frequency and severity score. Therefore, the severity score weights the relative importance of the individuals' perceived impacts within different performances. The index also has the advantage of a short length of questionnaire. It has been tested in a community-based population, and showed that it is a valid and reliable index to use as an oral outcomes measure for dental care planning.

The above brief review of sociodental indicators shows that there is some promise for developing a better and more appropriate measurement of dental needs. These indicators serve a wide variety of purposes, and are of varying degrees of sophistication and quality. There are no overall conclusions about which one is superior to the other but those with a weighting are more likely to be useful for assessing need. Sheiham and Spencer (1997) summarised the minimum qualifications for socio-dental indicators. They should be brief and easy-to-use, have an appropriate scoring system, and should be supported by a relevant theoretical model.

In this study, OIDP was selected for use as a socio-dental indicator because it is an interviewer-administered questionnaire which is more relevant to apply to the group of old people in Thailand where there is a poor rate of literacy. Slade (1996) found that by using self-completed OHIP questionnaire in a group with reading difficulty, the response rates was only 58%. The long and short version of the OHIP have 49 and 14 items respectively. The OIDP has only 9 items and is much shorter than the OHIP. Therefore, the length of time needed for interview is less. The average time used for an interviewer-administer version of OHIP was 17 minutes (Slade, 1996) compared to an average of 5 minutes to interview using OIDP (Adulyanon, 1997). Moreover, the 49 items of OHIP revealed problems of interviewer burden.

Most of the socio-dental indicators gave the descriptive findings of the oral impacts on quality of life or social function. Slade (1996) proposed the potential use of OHIP to identify groups with a high priority for dental care. Adulyanon

(1996) used the OIDP score with different cut-points of severity of impact to set priorities for dental treatment need. The high cut-points reflect the higher impact. With limited resources, priority could be aimed to those with higher impact scores.

In summary, the selection of an appropriate socio-dental indicator depends on the purpose and context of the index as well as the purpose of the study. This study used the Oral Impact on Daily Performance (OIDP) index as a socio-dental indicator to measure the impacts of oral health on the treatment need of the older people because it is short, it was developed to be used under an interviewer-administered condition and to be used for dental care planning and evaluation of outcomes. OIDP has an advantage in that it could be used to assess specific treatment needs by providing additional questions about the perceived causal symptoms and impairments of any impact on performance. The single final score of OIDP index is easy to interpret. The different cut-points of OIDP score could be used to illustrate to the health authorities the different number of individuals with different levels of oral impacts based on each level of cut-point. It could be used to generate different levels of treatment needs. Therefore, it is more appropriate to use to assess the need for dental treatment in the older people.

2.3.2 The relationship between socio-dental indicators and clinical variables

Socio-dental indicators could give some information on characteristics of people who experience dental problems. Cushing et al. (1986) reported that those who had eating problems had a higher DMFT and fewer functional teeth (sound teeth and filled teeth (Sheiham et al. 1987) than those with no problems. The higher mean decay scores were associated with dental pain and discomfort. Subjects with one or more decayed teeth and two or more missing teeth and three fewer functional teeth were more dissatisfied with their appearances. Decay status and functional teeth also associated with communication restriction.

In older people, Atchison and Dolan (1990) used GOHAI to compare number of remaining teeth and prosthodontic status with oral health impacts. They found that those with 21-32 teeth and had no removable denture had more positive impacts. People with natural teeth demonstrated significantly fewer problems with limited food choices, trouble biting and chewing, eating without discomfort, and sensitivity to temperature. They also had fewer psychosocial problems as reflected by limiting contacts with people and feeling uncomfortable eating with people.

Chen and Hunter (1996) related DMF components to quality of life indicators. They found that number of decayed teeth was significant for all dimensions of quality of life.

OHIP has been used in many epidemiological studies. Subjects with poorer clinical oral status as indicated by more missing teeth, more retained root fragments, more untreated decay, deeper periodontal pockets and more periodontal recession, had higher OHIP scores (Locker and Slade, 1994; Hunt et al. 1995; Slade et al. 1996). In a study in older Australians, edentulous subjects reported significantly more social impacts in four subscales: functional limitation, physical disability, social disability and handicap (Slade and Spencer, 1995). Slade and Spencer also found that tooth loss was associated with all seven subscales of social impact in dentate subjects. There were different impacts between anterior and posterior tooth loss. Anterior tooth loss was associated with more impact no matter if there was a replacement or not while posterior tooth loss was associated with social impacts only when they were no replacement.

2.3.3 The relationship between socio-dental indicators and demographic variables

In a study using the 'Dental Impact Profile (DIP)', Strauss and Hunt (1993) reported that age showed a significant effect on the health/well-being, romance and eating subscales. Impact on eating and health/well-being were lower in college students than private dental recall patients, and old people. Romance had a lower impact on old people. Higher OHIP scores were found in socially and economically disadvantaged groups and among subjects who had infrequent or problem-motivated dental visits (Slade and Spencer, 1994a; Locker and Slade, 1994; Hunt et al. 1995).

The GOHAI was associated with sociodemographic variables. Older people who had higher socioeconomic status had higher GOHAI scores. Those who were better educated, white and had high incomes also had higher GOHAI scores (Atchison and Dolan, 1990).

In studies on racial variations in the impact of oral disorders in older dentate African-Americans the Dental Impact Profile (DIP) was more negative, and there were fewer positive life impacts of teeth, than among dentate Caucasians. Large differences by race were found among dentates. Edentulous African-Americans perceived more positive and less negative life effects, than did dentate African-Americans. African-Americans more commonly perceived their natural teeth to negatively impact on their lives and were more positive than Caucasians with being edentulous (Hunt et al. 1993, Strauss and Hunt, 1993,). In a subsequent study Strauss (1996) commented that it was unlikely that racial groups place an intrinsically different value on teeth. It was more likely that value differences resulted from social and economic changes especially from disparate historical experiences among these groups of older people.

2.3.4 The relationship between socio-dental indicators and treatment need

There are very few studies which reported the relationship between socio-dental indicators and dental treatment need. Atchison and Dolan (1990) showed that older people with higher GOHAI scores tended to feel that they did not need dental treatment. Adulyanon (1996) developed the OIDP with the main purpose of using this socio-dental indicator to generate different levels of

treatment need. When he combined the condition-specific (CS-OIDP) scores and normative needs to generate the Effective treatment need, the percentage of people with need decreased compared to normative need. The reduction in needs were high (59-78%) for dental treatment need for prostheses, periodontal treatments and orthodontics, moderate (36%) for restorations and low (8-28%) for pulp care and extractions. In the same study, Adulyanon (1996) demonstrated that when using different cut-off points of CS-OIDP scores, the ranking among different dental treatment needs changed. For example, at the highest cut-off points, the dental treatments ranked the highest were need for extractions and fillings compared to scaling and root planing when assessed by normative need.

2.4 Factors affecting needs for dental care of the older people

2.4.1 Factors affecting needs for older people

What difference does dental care make? Do older patients derive perceptible benefits from their dental care and what dental treatments work the best are important questions related to oral health outcome for the older population (Dolan, 1993). In older populations whose physical, social, and psychological health becomes increasingly interrelated and varied with age, these questions become more challenging.

In the multidimensional perspective of health, psychological and social factors are critically important to determine need. The individual's perceptions, personality and stress had been shown, in a biopsychosocial model of health (Engel, 1980), to have an influence on disease and symptoms. Fiske et al.

(1990b) measured the impact of dental treatment on the recipient and concluded that treatment of the older people was more likely to succeed if it addressed oral problems that disturb self-image and social interaction rather than those related solely to function. Apart from clinical determinants, economic, psychological, socio-behavioural factors of the people have a big effect on the effectiveness of dental treatments. Maizels et al. (1993) suggested that the 'propensity' or motivation for preventive oral health behaviour (use of dental services; oral hygiene; perceptions of the significance of specific disorders) are appropriate group of variables to include when measuring the potential outcome of treatment. In the study of propensity for dental treatment among institutionalised elders, Mojon and MacEntee (1994) found that the need for dental treatment among residents of long-term care facilities is reduced by half if the propensity for treatment is considered.

Dolan (1993) proposed a definition of oral health for older populations as '*a comfortable and functional dentition that allows individuals to continue in their desired social role*'. This definition demonstrated a patient-centred definition of health rather than the disease-centred, which is traditionally used.

All older people are not alike. The individual differences are a reflection of a life course of experiences unique to those persons. Some principles of geriatric medicine and their influences on older dental patients need to be considered (Dolan, 1993). Firstly, older patients commonly experience multiple concurrent general and oral health problems. Secondly, certain problems such as cancer, are clearly more prevalent in the older population. Thirdly, the presentation of

oral problems can be atypical or non-specific. For example, older patients can report symptoms of burning mouth with no obvious clinical manifestation. Fourthly, researchers, clinicians, and patients have difficulty in differentiating the normal ageing process from disease processes. Finally, the goals of health care are often different for older than younger adults. In summary, older adults are characteristically different from younger adults in terms of their heterogeneity in both health and disease, and by the fact that they often demonstrate multiple acute or chronic oral diseases with interrelated symptoms and clinical findings, and with variable function, emotional, and social consequences.

Vigild (1993) attempted to assess the realistic treatment need of institutionalised older people. He based the estimation of need upon the normative need but took into account the perceived need, the expressed demand, and the physical and mental state of the patient. He suggested a frame of reference to estimate treatment need of the older people. It starts with the normative need where the determination of the need for treatment is assessed purely on the basis of the professional criteria. Then the general health of the elderly patient needs to be considered beside the perceived need and the expressed demand because some of the older people do not want treatment although they have a perceived need.

A functionally based clinical measure of oral health could be better applied to the older population. For example, the concept of the functional dental arch proposed by Käyser and colleagues identified three levels of oral functional

needs and expressed them in terms of pairs of occluding teeth or dental arch length which vary for different age groups. Recommendations for dental arch length are based on the minimum number of teeth needed to satisfy functional and systemic factors: the periodontal condition of the remaining teeth, the spatial relationship between the upper and lower teeth, the occlusal activity, food and eating patterns, adaptive capacity, and age (Käyser et al. 1990). The concept of the functional dental arch recognises that oral functional needs change with time, and treatment concepts should be dynamic by nature and primarily functionally based.

Physical handicap could be a significant factor affecting the dental treatment need of the older population. Taylor et al. (1986) concluded that the primary difference between handicapped and non-handicapped older people are focused more on the impact of specific potential barriers to care than on dental problems. Social, household and medical support are very important to these people. The barriers that are significant to dental care are mobility problems, transport, cost of treatment, fear of dentist and the feeling that older people should not 'bother' the dentist.

2.4.2 Quality of life of older people

Health-related quality of life has become important in the era of advanced medical technology because modern medicine can prolong life but not necessarily the quality of life. The aim of modern medicine should not be solely to prolong life but to improve the quality of life. Oral health-related quality of life of older people is a combination of clinical oral health, perceptions of actual

or potential oral health, and/or disability. It is reflected by a composite of clinical conditions and socio-behavioural factors (Gift and Atchison, 1995).

Oral health-related quality of life derives from two approaches: (1) The oral cavity as the outcome, and (2) the interrelation of the oral cavity with the rest of the body. In the second approach oral health is conceptualised as an integral part of general health and oral health contributes to overall health-related quality of life. The oral cavity contributes to health- related quality of life through protection from systemic infection, chewing and swallowing, and at a more social and psychological level through self esteem, self expression, communication, and facial aesthetics (Kiyak, 1981; Sheiham and Croog, 1981; Kiyak and Mulligan, 1987; Reisine et al. 1989). In this context, oral health-related quality of life incorporates survival of the individual namely absence of impairment of disease, discomfort, pain and symptoms, appropriate physical and emotional functioning associated with chewing, swallowing and smiling. Besides that, it includes social functioning associated with performing normal roles, perceptions of excellent oral health, satisfaction with oral health, and no social or cultural disadvantage due to oral status (Gift and Atchison, 1995).

Pain may be regarded as a disadvantage or handicap as it can detract from a sense of well-being. Pain was found to be an important factor which affected the ability of people to chew, and therefore reduces the pleasure of eating in older people (Smith and Sheiham, 1980). Unsatisfactory dentures also detract from the pleasures of eating. Poor appearance of teeth and dentures could cause social discomfort and embarrassment, and create difficulties while

talking, singing and kissing. Satisfactory teeth and dentures are important in maintaining the well-being and mental health of the older people.

The presence of single or multiple general diseases and their treatment could alter oral physiology and function, which may result in deleterious consequences to the people. These conditions could have an impact on the quality of life. For example, osteo-arthritis could decrease the movement of the mandible and cause pain on chewing (Ship, 1992).

When assessing dental treatment needs in the older people, oral related symptoms and consequences which affect the quality of life should be considered and emphasised.

2.4.3 General health

The mouth and its health are integral parts of the human body. In the older population, the oral conditions are very important to their general health. The question of how oral health affects and is affected by specific medical health conditions is of interest. Further questions on how the specific medical conditions affect the dental treatment needs and dental treatment planning are worth exploring.

General health could alter the treatment need. Vigild (1987) reported that about two thirds of the patients examined had defective dentures, but when the general health and wishes of the patients were considered, these needs were reduced to less than one third. The findings by Norlen et al. (1991)

indicated that oral health is closely related to general, physical as well as mental health.

Attempts have been made to integrate oral health into general health using the primary health care approach. The Community Care Model for Oral Health tested in Chiang Mai, Thailand, is one of the most widely discussed models had tried to add oral health responsibilities to the primary health care workers in the community (Anumarnrajdhon et al. 1996). The recommendation for the future is promising on condition that this new task will not impose an excessive burden on the work-load of the health workers.

Assessment of Health

In a comprehensive assessment of health, a consensus assessment including a measure of physical disability, mental health, social well-being, role functioning, general health perceptions is proposed (Ware, 1995). In this study, physical disability, mental health, general health perception and specific medical condition were measured. In addition, nutritional status was included into the health assessment as it is related to both oral and general health. These measurements of health represent basic human values relevant to functional status and well-being. Each measurement of health and their relationships to general and oral health will be reviewed in the following section. There will also be a discussion on the relationship between the two components of the general health factors: the specific medical conditions and nutritional status and the dental treatment need.

2.4.3.1 Physical disability

Physical disability or physical functioning is an important and common outcome of illness in older people (Ettinger et al. 1994). Physical disability is a consequence of acute and chronic diseases. The conceptual model of measurement in disability was proposed by Nagi (1965). There are three major consequences of disease or pathology. The first is impairment, representing the anatomical or physiological abnormality resulting from a pathologic process; the second, functional limitation, is the loss of ability to perform tasks and obligations of usual roles and normal daily life; and the third, disability, is an individual's behaviour pattern that evolves with long-term impairment. Age-related chronic diseases are important causes of disability in older people. The disease to which difficulty is attributed varies with the task. Heart disease and lung disease cause difficulty in tasks requiring high aerobic work, such as walking half mile, performing heavy housework, walking up steps, or lifting and carrying heavy loads. Ettinger et al. (1994) have shown that arthritis and other musculoskeletal diseases are the primary causes of difficulty in performing physical tasks, followed by heart diseases, lung disease and stroke. Thus, physical disability is disease-specific, and difficulty in performing specific functions can be linked to specific impairments.

Physical disability in relation to oral health status

Jette et al. (1993) linked some aspects of physical disability with oral health in older people. Older people with physical disability were regarded as being at a significantly increased risk of dental decay and edentulism but at no

increased risk of periodontal disease. One potential explanation is that physical limitations may make it more difficult for older persons to take proper care of their teeth, thus contributing to the higher prevalence of dental decay. They found that old people, disabled by immobility, were more likely to loose most of their natural teeth because of the limitation of access to dental care. Osterberg et al. (1996) studied the association between some general health factors and masticatory ability in Swedish aged 65 and over. They found that impaired general health and several physical disability were significantly associated with impaired masticatory ability. However, the direction of cause and effect was not clarified. Frail older individuals may report many health problems including impaired mastication.

Jette et al. (1993) also found that the more disabled were less likely to have seen a dentist recently. Lundgren et al. (1995) reported similar findings that older people who had functional impairments had low demand for dental services. According to other studies, mobility disability affects an older person's risk of edentulism by restricting access to necessary dental care (Antczak and Branch, 1985; Palmqvist, 1989; Gift and Newman, 1993).

In terms of oral health needs, older persons with physical disability may require more dental visits to compensate for their physical disability. They may require personal assistance to perform oral hygiene practices on a more regular basis.

2.4.3.2 Mental status

Assessment of mental status is one of the most important and difficult assessments of the general health of older people. The cognitive functioning of old people can be assessed using a 6-item Orientation Memory Concentration test (Katzman et al. 1983). This 6-items Orientation-Memory-Concentration Test was modified from the original version of the Blessed Information-Memory-Concentration (BIMC) test which has 26-items (Blessed et al, 1968) to make this test more practical for field use. In the present study, a six-item Orientation-Memory-Concentration test was chosen to assess the cognitive impairment. This test is intended to measure three cognitive components: orientation for time, concentration, and recall. Scoring was in terms of errors made, and errors were weighted according to a regression-derived formula.

This test included 6 orientation questions, year, month, recite months backwards, the name and address memory phrase, the time of day, and counting from 20 to 1. Orientation-Memory-Concentration test is not affected by cultural and educational influences compared to other mental health measure such as the Mini Mental States Examination (MMSE) (Fillenbaum et al, 1980). The maximum possible error score (patients unable to answer any questions correctly) on the 6-item Orientation-Memory-Concentration Test is 28. Normal older individuals should have a weighted error score of 6 or less. Katzman et al. (1983) proposed that individuals with weighted error scores greater than 10 are consistently found to have dementia.

The test is intended to detect early dementia. Dementia is a pervasive syndrome affecting language, memory, cognition, an inability to maintain attention, personality and judgement (Loring et al., 1989). Older persons with poor cognitive performance on testing may be at increased risk for delirium following hospitalization, surgery, or medication use. Depression or other psychological impairment was not assessed in this study.

2.4.3.3 General health perceptions

Measures of general health perceptions are considered measures of general health for two reasons. They do not focus on specific dimensions of health. Further, they have been linked to a wide range of health concepts and to both physical and mental health dimensions (Ware, 1995). Beside that, a patient's perception of his or her health status provides information beyond clinical measures and laboratory findings that is useful in evaluating the subjects' condition as well as the effectiveness of care. This perception is considered as an essential part of a functional status measure (Rosenberg et al, 1988). Measures of general health perceptions could be criticised as subjective and unreliable. But Ware (1995) pointed out that their subjectivity is a strength because they reflect personal evaluations of health. The best person qualified to apply a person's value in a health formulation is the person him/herself. Measures of general health perceptions are among the best predictors of patient-initiated physician visits, including both medical and mental health visits (Strayer et al, 1988).

2.4.3.4 Specific medical conditions

Several studies indicate that many old people living in the community who have difficulty with performing the physical activity in daily life report having chronic diseases (Ettinger et al. 1994). Blaum et al. (1994) studied the disease-specific impacts on physical health status and the direct impact of specific disease on the utilisation of physician services. They also studied the indirect impact of specific diseases on utilisation of health services mediated through physical health status. They found that arthritis and other co-morbidity disease had large effects on disability and, subsequently, on self-rated health status (SRHS). Also, their effect on physical health affected utilisation. Atherosclerotic heart disease (ASHD) and diabetes mellitus had both direct and indirect impacts on utilisation. Cancer and hypertension had little effect on disability and SRHS exerted direct effects mainly on utilisation. They commented that chronic diseases have been seldom included as important variables in behavioural models of utilisation. Direct effects of specific chronic diseases on utilisation have rarely been evaluated. In the *'medical model'* health service delivery is usually based need on types of medical or surgical procedures which in turn inflate the figures of service utilisation. Using a disease-specific approach on physical health status and utilisation could promote incorporation of the link between the patient, behavioural models of health services utilisation, and the physician practice-centred, medical model of health services delivery.

Specific medical conditions and oral health status

Rosenberg et al. (1988) investigated the relationship between dental functional status, clinical dental measures and generic health measures. They found that the severity of medical conditions is significantly correlated to the decayed/missing teeth and periodontal status. A strong positive correlation was also found between stress-related systemic diseases and the incidence of periodontal breakdown.

Heart disease and periodontal treatment need

There are very few studies on how oral health affects and is affected by general health. It has been less than a decade since the first research group presented the association between dental infections and cerebral infarction (Syrjanen et al. 1989) and acute myocardial infarction (Mattila et al. 1989). These findings were extensively criticised because of the cross-sectional nature of the studies (Loesche, 1994). Nevertheless, a prospective study confirmed that periodontitis was significantly associated with coronary heart disease after all the known risk factors, such as smoking and serum cholesterol levels were controlled (DeStefano et al. 1993). DeStefano et al. (1993) found that edentulous patients were 2.6 times more likely to die than the individuals with no periodontal disease due to the accumulation of a disease products from periodontal disease and/or dental decay. They also found that subjects with periodontitis had a 25% increased risk of coronary heart disease relative to those with minimal periodontal disease. Periodontal diseases and heart disease may share some common aetiologic pathways. Nine characteristics out of 17 factors examined for periodontal disease were

also known risk factors for coronary heart disease (Beck, 1992). These common risk factors are age, education, gender, income, tobacco use, alcohol use, hypertension, stress and isolation.

The explanation for the association between periodontal disease and heart disease could be the effect of the large number of bacteria in plaque which provoke the inflammation, and caused a low-level bacteraemia (Newman and Calmes, 1981), elevated serum fibrinogen level and elevated white blood cell counts (Kweider et al. 1993) or increased platelet aggregation (Loesche, 1994).

Although periodontal disease increased the risk of coronary heart disease, it is not clear whether this relationship is causal. The biological mechanism by which periodontal disease could lead to coronary heart disease has not been clearly established (DeStefano et al. 1993). In a case-control study, Mattila et al. (1989) found that patients with acute myocardial infarction had worse dental health than matched controls. When controlling for age, social class, hypertension, smoking, presence of diabetes, the relationship between dental health and acute myocardial infarction remained significant.

Certain gram negative bacterial endotoxins could affect endothelial integrity, metabolism of plasma lipoprotein, blood coagulation, and the function of platelets and their synthesis of prostaglandin. All of these conditions could have an influence on the progression of arteriosclerosis and the processes triggering myocardial infarction and sudden death in individuals with

coronary heart disease. This gram negative bacteria containing endotoxin are also important factors in the cause of periodontal infections, and it may lead to the association with myocardial infarction. The long term effects of chronic low grade bacterial infections such as periodontitis may also have an effect on atherosclerosis (Mattila et al. 1989).

In conclusion, a combination of the known risk factors for heart disease such as smoking and serum cholesterol levels plus the presence of periodontal disease can place the individual at an even greater risk of heart disease.

Endocarditis and dental treatment

Older people are at risk of developing infective endocarditis when they have dental procedures that result in mucosal or gingival bleeding. Dental procedures such as extractions, periodontal probing, scaling and surgery, endodontics and restorative procedures which extend below the gingival line could often cause bacteraemia (Friedlander and Marshall, 1994). The risk of developing infective endocarditis in patients with underlying valvular or congenital heart disease has been acknowledged for more than 50 years (Lockhart et al. 1989). Many of these patients are asymptomatic. Moreover, these patients may not be adequately informed of the existence or the importance of the disease.

The American Heart Association has identified dental procedures as among those that increase the risk of endocarditis in susceptible patients.

Susceptible patients are identified by cardiac or cardiac-related conditions (Table 2.4) (Dajani et al. 1990).

Table 2.5 Conditions that increase the risk of endocarditis

Conditions that increase the risk of endocarditis
Prosthetic cardiac valves
Previous bacterial endocarditis
Most congenital cardiac malformations
Rheumatic and other acquired valvular dysfunction
Hypertrophic cardiomyopathy
Mitral valve prelapse with vulvular regurgitation

Felder et al. (1992) found 42% of nursing home residents needed endocarditis prevention prior to dental procedures. Endocarditis cases could be detected in 19% to 58% of individuals over the age of 60. In subjects who were unaware that they were at risk for endocarditis, when using improved noninvasive cardiac examination techniques, valvular disease was diagnosed in 75% of older institutionalised individuals (Felder et al. 1992).

The careful assessment of older subjects were recommended for a predisposition to endocarditis by means of their medical history and physical examination factors (Felder et al. 1992). The use of prophylactic antibiotics before invasive dental procedures are recommended (Felder et al. 1992; Davies, 1994; Friedlander and Marshall, 1994).

In an epidemiological study, Steele (1996) suggested omitting the periodontal examination for subjects who have any history of rheumatic fever, history

suggesting valvular heart disease, and a history of a joint replacement to reduce the risk of inducing a bacteraemia. He suggested that when subjects do not receive full benefit directly from the examination, an unethical risk should be avoided.

It could be concluded that in older people who are generally more at risk of endocarditis, the periodontal examination using periodontal probing technique should not be conducted to avoid any risk for bacteraemia.

Diabetes and periodontal treatment need

Diabetes mellitus is a metabolic disease that affects most of the body's organ systems, including the oral cavity (Ship, 1992). There are two main types of diabetes: Insulin-dependent diabetes mellitus (IDDM or Type I) and Non-insulin-dependent diabetes mellitus (NIDDM or Type II). NIDDM accounts for 85-90% of all diabetics (Thorstensson, 1995).

The association between periodontal disease and diabetes has been extensively studied. Loe (1993) stated that the periodontal signs and symptoms are now recognised as the 'sixth complication' of diabetes. He concluded, from the studies of people with IDDM and NIDDM that both types of diabetes were predictors of periodontal disease and that periodontal disease should be considered a complication of diabetes mellitus. Dental infection originated from periodontal diseases could worsen the diabetic state (Gottsegen, 1990). Moreover, the American Diabetes Association has listed periodontitis as a risk for diabetics (Oliver and Tervonen, 1994).

The degree of diabetic control is an important factor in the level of periodontal health. In uncontrolled or poorly controlled diabetic patients, there is an increased incidence of severe gingivitis and periodontal abscesses (Cianciola et al. 1982; Galea et al. 1986; Sastrowijoto et al. 1990). The periodontal condition of well-controlled diabetic subjects is similar to that of the healthy non-diabetic population (Ervasti et al. 1985; Tervonen and Knuuttila, 1986; Cherry Peppers and Ship, 1993). Hugoson et al. (1989) found that long-duration diabetics experienced more severe periodontal disease than non-diabetics. This finding was confirmed by Thorstensson (1995).

Oliver and Tervonen (1993) reported that attachment loss occurred more frequently and more extensively in moderate and poorly-controlled diabetics than in those under good control. This finding was supported by Safkan-Seppala and Ainamo (1992), Emrich et al. (1991), Shlossman et al. (1990) and Nelson et al. (1990). Diabetes has also been shown to be associated with higher rates of tooth loss (Bacic et al. 1988; Shlossman et al. 1990; Loe, 1993; Oliver and Tervonen, 1993). Many abnormal physiologic, biochemical and morphological changes in diabetics may have significant influence on the state of health or disease of the periodontal tissue. These changes are impair host resistance, vascular changes and altered collagen metabolism (Gottsegen, 1990).

Medical complications and treatment planning for diabetic patients

Diabetics with severe periodontal disease showed a higher prevalence of renal disease and cardiovascular complications such as stroke, transient ischemic

attacks, angina, myocardial infarct, heart failure than diabetics with only minor periodontal disease (Thorstensson, 1995). Thus, close cooperation between the diabetologist and the dentist is necessary in treatment planning for diabetic patients.

In summary, there have been several studies on the association between periodontal disease and heart disease. At present, our knowledge appears to show that the presence of periodontal disease combined with known risk factors such as smoking and cholesterol levels can place an individual at a higher risk of heart disease. The association between periodontal disease and diabetes has also been extensively studied. Periodontal disease has been generally accepted as a risk factor for diabetics. Poor oral health can have a negative effect on general health. In older people, masticatory disability could cause nutritional deficiency and weight loss.

2.4.3.5 Nutritional status

Nutritional factors have been shown to contribute significantly to the aetiology of many diseases. Nutritional deficiencies could be a consequence of chronic diseases, functional disabilities, social isolation, inadequate or inappropriate food intake, alcoholism, dental problems and economic limitations (Duthie et al. 1983; Lipschitz, 1994). The high prevalence of nutritional problems in older people justifies the need to evaluate the nutritional status of older individuals.

Nutritional status is very important when making a general assessment of the health of the older people. An evaluation of the ability to bite, chew and swallow food safely could provide useful information on the risk of malnutrition and other associated problems.

The body mass index (BMI) is a standard measure of overall nutrition. It also has been used as a nutritional risk assessment or assess nutrition related problem (Osler and Schroll, 1991; Keller, 1993; Posner et al. 1994; Potter et al. 1995). It is a ratio that requires only measurement of height and weight. BMI was defined as body weight in kilograms (kg) divided by the square of height in metres (m); BMI = kg/m^2. BMI is a simple measurement and it is applicable to population studies. Normal ranges of BMI was defined by ranked body mass index according to percentile. The range of normal lies between the 15th and 85th percentile (Cornoni Huntley et al. 1991). Most of the studies of the older people in Western countries found a body mass index between 21 and 30 as 'normal' under this definition (Koughan and Atkinson, 1993).

Nutritional status, chewing problems and prosthodontic treatment need

A good oral health status is important for chewing ability, taste perception, swallowing, phonetics and comfort (Ranta et al. 1988; Ekelund, 1989; Norlen et al. 1991). The number of natural teeth, the presence of removable partial dentures or full dentures may be linked to masticatory efficiency and ability.

Poor oral health can be a potential reversible factor which contributes to the development of involuntary weight loss in older people (Sullivan et al. 1993). Intake of food in insufficient quantities is often the result of dental status such as ill-fitting dentures or broken or missing teeth, swallowing problems and dysphagia (Gilmore et al. 1995). Chewing problems were often found in older patients with weight loss (Fischer and Johnson, 1990). Posner et al. (1994) considered dental health as one of the risk factors for potential nutrient deficiencies in the older people. In a study of the hospitalised older patients, Mowe et al. (1994) showed that about half of the undernourished patients had more chewing problems compared with a home-living group. In a study of factors related to unintentional weight loss in older adults, chewing problems, broken or missing teeth and ill-fitting dentures were reported in 53%, 28% and 14% respectively in medical records as factors contributing to unintentional weight loss. Reduced functional ability was recorded in 63% of the medical records (Gilmore et al. 1995).

Hollister and Weintraub (1993) studied the association between dietary choices or nutritional intake and oral conditions such as missing teeth and poorly-fitting dentures. They reported that food choices and the ability to chew are severely limited for those who are edentulous or have poorly-fitting dentures. This finding is similar to the study by Mojon et al. (1995) who found that poor oral health status is one factor associated with nutritional deficiency in very old people. Poor oral health status in these edentulous subjects was defined as having generalised stomatitis, absence of both dentures, broken or inadequate dentures and complaint about lost dentures.

An ability to chew in relation to different type of dentition could have an effect on food habits. Edentulous subjects with poor condition of their dentures are more likely to choose a soft diet which are easy to chew (Smith, 1979). Hard food is easier to chew with natural teeth than with removable prostheses (Chauncey et al. 1984; Wayler et al. 1984). Individuals with a removable denture in only one jaw considered their chewing ability to be reduced to the same extent as full denture wearers (Chauncey et al. 1984; Wayler et al. 1984; Peterkin et al. 1987). Removable dentures in good condition have been reported to improve chewing ability (Neill and Phillips, 1970; Neill and Phillips, 1972; Lappalainen et al. 1985). Edentulous older subjects who had been fitted with new dentures showed that their chewing ability increased markedly (Baxter, 1981). Ranta et al. (1988) found that adequate rehabilitation of edentulousness and wearing of removable denture(s) among dentate individuals showed a significant effect on their diets. Edentates could eat root vegetables, vegetables and fruits which have a high nutritive value. In dentate populations, those with removable denture(s) and those with higher numbers of remaining teeth increased the probability of having eaten root vegetables, vegetables, fruits and meat.

Various studies showed that low BMI and nutrition deficiency could increase infection rates and complications (Sandman et al. 1987), increase hospitalisation (Keller, 1993) and even increase mortality (Ismail et al. 1987; Sullivan et al. 1990; Sullivan, 1995).

Oral conditions and denture quality affect the masticatory ability of full denture wearers (Slagter et al. 1992). The improvement of masticatory performance was reported after mandibular ridge reconstruction and the provision of satisfactory new full dentures (Renaud et al. 1984).

Shortened Dental Arch (SDA) and the need for tooth replacement

The shortened dental arch (SDA) - the presence of the incisors and canines in both arches and 4 posterior occluding premolar pairs - has attracted considerable attention when attempting to reassess dental needs. Helkimo et al. (1978) stated that the number of teeth is less important in terms of chewing efficiency than the number of contacts between them. Many researchers concluded that people with 20 well-distributed teeth seemed to have a satisfactory chewing ability (Agerberg and Carlsson, 1981; Carlsson, 1984; Witter et al. 1990).

Käyser (1981) assessed oral functions in adults with SDA. He found that with decreasing numbers of contacting pairs of posterior teeth there was a turning point with loss of masticatory function when the number of occluding units was less than 4 in symmetrically reduced arches. An important "turning range" existed for various oral functions between 2 and 4 occluding units beyond which dysfunctional changes occurred. For persons over 45 years old with moderate occlusal activity, there was sufficient adaptive capacity to maintain adequate oral function with shortened dental arches of 20 teeth (6 aesthetic units and 4 premolar occluding pairs). Many researchers proposed that the decision to replace

missing teeth should be done only if they are causing aesthetic and chewing problems, not to replace all missing teeth as traditionally been used (Käyser et al. 1987; Kalk et al. 1993). Witter and associates (1994a; 1994b) studied the long term occlusal stability and oral comfort in SDA. they found that SDA provided durable occlusal stability. Moreover, they reported that the combination of existing periodontal involvement and increased occlusal loading from removable partial denture such as in reduced dentition, could be a potential risk factor for further loss of teeth.

There were more evidences that removable partial denture could not give additional benefit on oral function or chewing performance to subjects with SDA. Witter et al. (1989) reviewed the effects of removable partial dentures on the oral function in those with SDA. He found that there were no great differences between subjects with SDA and subjects with SDA and removable partial dentures (RPD). Oosterhaven et al. (1988) reported that the number of occlusal contacts in the premolar area was more important than the number of missing (pre-) molars for chewing performance. The conclusion of Witter et al. (1990) in their review of the effects of shortened dental arches was that "masticatory ability is generally sufficient as long as 20 or more 'well-distributed' teeth remain, such as in cases of SDA.".

Pairs of occluding posterior teeth (POPs)

The number of occluding pairs of teeth has been widely used to determine masticatory efficiency and chewing ability. Leake (1990) found that the

number of opposing pairs of posterior teeth is the most important factors in determining chewing ability.

Rosenoer and Sheiham (1995) measured whether older people having missing posterior teeth had few impacts and considered their teeth and mouth acceptable. They assessed the relationship between satisfaction with teeth and mouth and the number, position and condition of the natural teeth. POPs defined as pairs of occluding posterior teeth has been used to assess satisfaction with teeth. They found that people are satisfied with their teeth and mouth even if they have all molar pairs missing. Thus, satisfaction with the mouth was not related to the number of teeth which indicates that the number of teeth present within the oral cavity is not the major determinant of oral well-being. Satisfaction with teeth and mouth found to increase with an increased number of functional molar pairs. Those with more than 4 POPs had fewer dental impacts than those with less than 4.

Elias and Sheiham (1997) assessed satisfaction in relation to the number, position and condition of teeth in Brazilian transport workers. They reported that there was little association between molar pairs and satisfaction. Three premolar pairs and intact anterior sextants and no molars were sufficient to satisfy most persons in regard to their oral status even when the molar teeth were not replaced with partial dentures.

In summary, the replacement of a tooth will be necessary when the loss of the tooth affects masticatory function and cosmetic appearance. In the anterior area where the loss of the tooth often creates cosmetic problem, replacement of teeth will solve the problem and could improve the patient's satisfaction of his/her appearance as well as the quality of life. In the posterior area, dental practitioners should be aware of the concept of shortened dental arch before making the decision whether to replace or not replace the teeth.

2.5 The propensity to adopt health behaviours

Various studies attempted to identify factors believed to be important in adoption of health behaviours or seeking dental and medical care. These factors are socio-demographic, socio-psychological, socio-cultural, geographic, organisational (Pell et al. 1993); predisposing factors representing a person's propensity to use services, enabling factors which includes barriers to services, perceived needs for health care (Anderson and Newman, 1973); demographic, economic, structural, personal, psychological background (Gift, 1984).

There are three primary barriers to health care: structural, financial and personal/cultural (Bolden et al. 1993). Structural barriers are related to number, type, location, organisation of health providers. Financial barriers limit access by the patients' inability to pay for services. Personal and cultural barriers inhibit patients from seeking care or following provider recommendations properly.

From these numerous factors, the potential or propensity of people to adopt dental health care could be grouped into two broad factors; '*behavioural*' and '*enabling*' factors. This classification should be more relevant to the implication for the public health planning.

2.5.1 Behavioural factors

Health behaviour is an important determinant of success of treatment. Behavioural factors related to periodontal treatment will be reviewed in the following section. Smoking, infrequent professional care, old age, pre-existing generalised attachment loss and pocket depth, and infection with certain periodontal anaerobic species seem to be consistent risk indicators of advanced periodontitis. Moreover, advanced age is often associated with physical, cognitive, medical, and medicinal complications that may disrupt the sequence of regular professional and personal hygiene (Ellen, 1994).

Oral hygiene and smoking are the two most important behavioural factors of health behaviour related to the prognosis of periodontal treatment.

Oral hygiene

Oral hygiene and removable partial dentures

Selection of patients for a removable partial denture should be based on the history of dental neglect, the status of teeth and their periodontium, present oral hygiene status and patient motivation (Gomes and Renner, 1990). With regard to the prognosis of the remaining teeth, a patient with poor oral hygiene is not suitable for prosthodontic treatment (Gomes and Renner, 1990;

Budtz Jorgensen, 1996). The maintenance of good oral hygiene in subjects wearing a partial denture is necessary mainly for the prevention of periodontal disease (Wright and Hellyer, 1995). Oral hygiene instruction and regular recalls are very important among removable partial dentures wearers (Mojon et al. 1995; Bassi et al. 1996). Yusof and Isa (1994) studied the periodontal status of the teeth in contact with removable partial dentures. They found that in patients whose oral hygiene was less than adequate, the wearing of removable partial denture would damage the periodontal health.

Oral hygiene and periodontal treatment

It is widely acknowledged that twice daily tooth cleaning is the effective method of preventing the occurrence and recurrence of gingivitis and periodontal disease (Corbet and Davies, 1993). In diabetics, meticulous self-care could minimise the amount of plaque in order to reduce the risk of periodontitis (Tervonen and Oliver, 1993; Oliver and Tervonen, 1994). Various studies showed that the lack of proper and continued maintenance after periodontal therapy could account for recurrent periodontal disease (Magnusson and Walker, 1996).

Plaque control after periodontal treatment demonstrated the influence of positive oral health behaviour on maintaining the periodontal condition. Patient's oral hygiene affects the life of partial dentures (Bates, 1986). Oral hygiene is an important factor associated with loss of periodontal support in older populations (Ambjornsen, 1985). Some behavioural factors are indicators of increased risk of oral disease. Persons with tooth loss were less

frequent brushings, current or former smokers and less frequent dental care users (Gilbert et al. 1993). They also placed significantly less importance on regular dental care and oral hygiene to prevent oral disease.

Toothbrushing is the most important measure used by the public for preventing periodontal disease. Several studies showed that people who brush their teeth frequently have less periodontal pocketing than those who brush less frequently or occasionally (Sheiham, 1970; Addy et al. 1990). There is some evidence suggesting that twice per day is an appropriate frequency for people to brush their teeth (Ainamo and Parviainen, 1979; Chesters et al. 1992). Good oral hygiene is crucial to all periodontal therapy, regardless of age.

Smoking

Smoking is a major risk factor for destructive periodontitis, with odds ratios of the order of 3 to 6 (Bergstrom, 1989; Haber and Kent, 1992). There is more severe periodontal disease in smokers than non-smokers even when oral hygiene is controlled for (Bergstrom et al. 1991).

Surgical as well as non-surgical therapy, periodontal treatment procedures are less effective in smokers (Preber and Bergstrom, 1990; Ah et al. 1994). Periodontal healing following non-surgical as well as surgical therapy was significantly less favourable in smokers than non-smokers (Preber and Bergstrom, 1986; Preber and Bergstrom, 1990; Preber et al. 1995). Therefore, smoking impairs the outcome of periodontal therapy.

Bergstrom et al. (1991) studied the effect of the number of cigarettes used and found that subjects who smoked more than 10 cigarettes per day exhibited more bone loss than those who smoked less. Haber and Kent (1992) defined a heavy smoker as those who smoked more than 10 cigarettes per day. They found that in the group with advanced periodontitis, the odds for heavy smoking (>10 cigarettes/day) versus light smoking (<10 cigarettes/day) was 5.7. In the group with advanced periodontitis, the frequency of current smoking increased with disease severity. The association between smoking and periodontitis in their study confirmed that current smokers are at increased risk for periodontitis, and that cigarette smoking is a major risk factor for periodontitis.

There has not been a study on the effect of smoking cessation on destructive periodontal disease. However, some indirect evidence could be extrapolated from the observation that former smoker had the periodontal condition between current smokers and nonsmokers (Bergstrom et al. 1991; Haber et al. 1993, Bergstrom and Preber, 1994;). Thus, smoking cessation is one important factor to consider to prevent destructive periodontal disease.

Ellen (1994) proposed that the general practice guidelines for treatment of periodontal disease in older adults should be clearly targeted at managing principal risk indicators in the context of the overall health and behavioural expectations of the older patients. Control of principal risk factors include frequency of professional visits, smoking and daily mouth care.

When deciding what periodontal treatment should be rendered to individual older patients, their oral health status, their attitudes, previous dental experiences and expectations should be carefully considered. Their physical and emotional status and mobility need also to be assessed. Accumulated oral problems as well as medical and pharmacological complications may modify the treatment plan. A more holistic approach needs to be considered in planning the treatment for the older individual.

2.5.2 Enabling factors

Enabling factors were proposed as one of the three main factors to determine health care utilisation in Andersen's behavioural Model of Health Service Utilisation. The three main factors are predisposing factors, enabling factors and need (Andersen, 1968). This model has been widely used in various studies on health and dental health care utilisations for almost three decades (Heloe, 1972, Kiyak, 1986; Swank et al. 1986; Reisine, 1987; Melnyk, 1988; Strayer et al. 1988; Strain, 1991; Berkanovic and Hurwicz, 1995).

In a recent International Collaborative Study of Oral Health Outcomes (ICS-II) which was conducted in the United States, the conceptual framework based on an expanded version of this widely applied Andersen's model, enabling factors or enabling resources is one part of the personal characteristics which was considered to be a primary determinant of oral health (Andersen, 1995; Davidson et al. 1996). Personal characteristics of the population have an influence on oral health behaviours. Population characteristics are conceptualise as predisposing, sociodemographic and oral

health beliefs, enabling resources, and perceived need for dental treatment. In this recent framework, enabling resources refer to attributes specific to the individual (i.e., income, having dental insurance benefits or access to free or reduced cost care, having, usual source of dental care) or the community on which the individual lives (i.e., availability of dental care personnel in the community, community health programmes, and prices for dental care in the community).

In this study, financial status will be used as an enabling factor which influence the dental care utilisation in older people.

2.5.2.1 Economic factors

This study will focus only on economic factors as a barrier to dental care since it is one of the principal barriers to dental care (Hayward et al. 1989; Bolden et al. 1993; Dolan and Atchison, 1993).

Even though an individual might have a high need for dental treatment, there are some other factors which could affect the expressed need or the demand for care. Finance is one barrier often found in older people. Most older people live on pensions or depend on family support or some kind of support for their living and other expenses including health care expenses. Thus, their decision to seek treatment is not independent. Older people with economic problems may not be able to pay for the treatment. The cost of dental treatment especially the cost of prosthodontic treatment is often high. Cost of services is reported as the second most common reason for not visiting

the dentist (Brown and Treasure, 1992). Therefore, it could be concluded that economic barrier is an important factor for not utilising dental care.

2.6 Summary

Oral health is an intergral part of general health. In older people, maintaining good oral health is very important since oral health affects the quality of life. There has been progress on how to assess the dental needs in older people. There have been several attempts to measure the impacts of oral disease on the quality of life. The measures of psycho-social functioning have been developed to complement the traditionally clinical measures. Oral health status and treatment needs have conventionally been measured in terms of clinical indices and then translated into treatment need, or measured urgent treatment needs directly. This method is no longer appropriate.

Drake et al. (1991) concluded from their study that there was not a one-to-one relationship between disease state and treatment needs. They suggested that it should be recognised that the general health of an individual will have some effects on his or her dental needs. Poor general health may lead to neglect of oral health, and therefore produce increased dental treatment needs. The dentist's decision about treatment need should therefore not only depend on clinical findings of disease, but should be influenced also by the patient's general health, medical history, functional status, as well as economic, financial, social, mental, psycho-social and other behavioural factors.

The shortcomings and the inappropriateness of the conventional method of determining the treatment needs of the older person simply through clinicial oral examination and in terms of clinical indices suggests the need for developing a better and more appropriate measurement of dental need. A proposed approach is using a socio-dental system which covers a broader dimension of social and behavioural factors which invariably have some impacts on the oral health and the quality of life of the older person.

Many researchers have included psycho-social as well as economic problems into treatment needs assessment. In older people, it is well accepted that their general health is an important factor to consider in treatment need estimations. Some studies included the assessment of general health in their studies (Nery et al. 1987; Galan et al. 1993; Slade et al. 1993; Hildebrandt et al. 1995). However, they only reported the descriptive data on general health status. None have incorporated general health factors into the treatment need estimations.

From the review of the literature, it appears that propensity for health behaviour is an important component when determining the need for, and type of dental care for the older people. It contributes to assessing the use of services and compliance with regimens for care. There are, however, very few studies that have combined the behavioural and economical aspects of the older people in determining their treatment need estimations.

This study, therefore aims to integrate general health factors, in combination with using a socio-dental indicator, to assess treatment needs in older people in a more rational manner. The integration of a socio-dental indicator, general health factor and the propensity for health behaviour should be able to give better information on dental treatment needs, and should benefit dental health planning for older populations.

2.7 Aim of the study

This study aims to explore the assessment of dental treatment need in an older population using a socio-behavioural approach. Normative treatment need will be compared with *'general health related treatment need', 'impacted related treatment need', 'propensity related treatment need', 'accessible treatment need'* and *'non-accessible treatment need'* which integrates the factors of general health status, socio-behavioural factors, propensity for health behaviours and financial problems affecting oral impact on daily performance.

2.8 Hypothesis

This study aimed to test the hypothesis that treatment need assessed by integrating impact measures of general health status, Oral Impact on Daily Performances, propensity for health behaviours and financial problems into normative need, will significantly modify the type and extent of dental need as assessed by normative need alone.

2.9 Objectives

2.9.1 To estimate dental treatment needs in a population of older Thai people in Chiang Mai using the new approach by considering the general health status, socio-dental indicators, propensity for health behaviours and financial status

2.9.2 To assess the perceived oral impacts using a socio-dental indicator and to study the relationship between a socio-dental indicator, social variables, clinical variables and perceived treatment need of the older people in Chiang Mai

2.9.3. To assess the oral health status, normative treatment need, the propensity for health behaviours and enabling factors in a sample of older people in Chiang Mai

2.9.4 To assess the prevalence of medical conditions in the sample of older people in Chiang Mai

CHAPTER 3

THE THEORETICAL FRAMEWORK

Professional judgement has been shown to have shortcomings in the estimation of dental treatment need. More appropriate methods for determining dental treatment needs in older people should be considered which use other factors in addition to professional judgement. The theoretical treatment need models to be proposed in this thesis, are formulated by integrating general health status, Perceived Oral Impacts on Daily Performances (OIDP), propensity for health behaviours and economic factors with conventional normative need. From the previous chapter, in the assessment of treatment need in older people, the related socio-dental impact (Chapter 2, Section 2.3.1), general health status (Chapter 2, Section 2.4.3), the propensity to adopt health behaviours (Chapter 2, Section 2.5) should be considered in addition to professional judgement to overcome the shortcomings of normative treatment need. Socio-dental indicator measures the perceived impacts of oral health in the daily activities from lay people's perspective. General health status could affect the dental treatment need in older people. The propensity to adopt health behaviours could help to determine the success of the treatment. Economic factors help to determine the utilisation of dental care. When adding these related factors into normative treatment need, a new level of need should be more appropriate for health planning.

The new socio-dental approach of treatment need estimation will be illustrated through the general theoretical treatment need models for all types of dental treatment need. A more specific treatment need model for prosthodontic and periodontal disease will subsequently illustrate the approach.

3.1 The background of the theoretical framework

The theoretical framework of this study is a modification of the theoretical framework which was proposed by Adulyanon (1996) (Figure 3.1). In his comprehensive framework, different interaction models for treatment need estimations between normative need, perceived oral impacts of lay people, behavioural and environmental propensity for health behaviours were proposed. From his models, different levels of treatment need were generated namely *'Impact-related treatment need', 'Effective treatment need'* and *'Accessible treatment need'* (Figure 3.1). These different levels of treatment need were proposed to be more appropriate for health planning compared to normative treatment need.

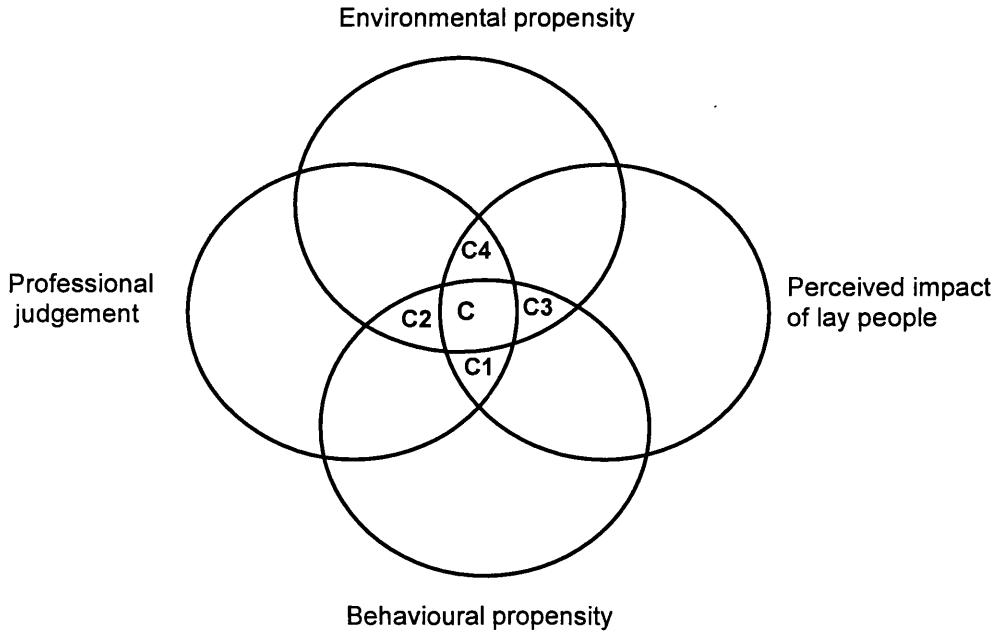


Figure 3.1 Interaction between professional judgement, perceived oral impacts, behavioural and environmental propensities (Adulyanon, 1996)

The first interaction between various dimensions in identifying dental treatment need in Adulyanon's model is the interaction between professional judgement and lay people's perceived oral impacts. *'Impact-related treatment need'* is the combination of professional judgement and lay people's perceived oral impacts which is represented by area "c, c_1 and c_4" (Figure 3.1). This area represents cases which are identified by professional examination as requiring treatment and the subjects also have significant perceived impacts from their oral disorders.

The next dimension integrated in his model is the behavioural factors which relate to people's propensity. *'Effective treatment need'* is the dental need derived by the integration of professional judgement with perceived impact and appropriate propensity of behaviour, represented by areas "c and c_1" (Figure 3.1). These areas represent cases with substantial propensity to comply with preventive behaviours.

At the next level, Adulyanon (1996) added environmental factors, such as demographic, economic and accessibility factors, which play an important role in treatment seeking and treatment compliance behaviours into his model. *'Accessible treatment need'* is the treatment need which combined the professional judgement with perceived impact, appropriate behavioural propensity and the environmental barriers to dental care represented by area "c". Therefore, area "c" represents the cases of *'Effective treatment need'* with environmental barriers which he considered in his model as groups wih higher need for treatment (Figure 3.1).

Besides the interaction model between related factors and normative treatment need, Adulyanon (1996) proposed the decision tree of 'Effective Treatment Need' (Figure 3.2). The flow diagram starts with treatment need judged by professional assessment. In this diagram, for normative treatment need, life threatening and conditions needing emergency treatment are considered to receive the highest priority for treatment. Apart from that, the availability of effective treatment needs to be taken into account. Alternative treatment plans may have to be made where the effective treatment is not available. For example, extraction might have to be the best option in areas where there is not enough dentists to provide pulp treatment or where endodontic treatment is not available.

When effective treatment is available, the next thing to consider is the dental conditions which are chronic or progressive with long term negative effects. These conditions such as active dental caries should receive dental treatment without assessment of the perceived impacts. However, their propensity for certain health-related behaviours should be taken into account. The patient's behavioural propensity are important factors to determine the health gain from treatment. The group with low propensity are in need of health promotion to improve their health behaviours for effective dental treatment before reassessing for change in behaviours in order to receive dental treatment.

For those with no normative treatment need but perceived impact from oral problems, special counselling will be needed to discuss and sort out the actual problem.

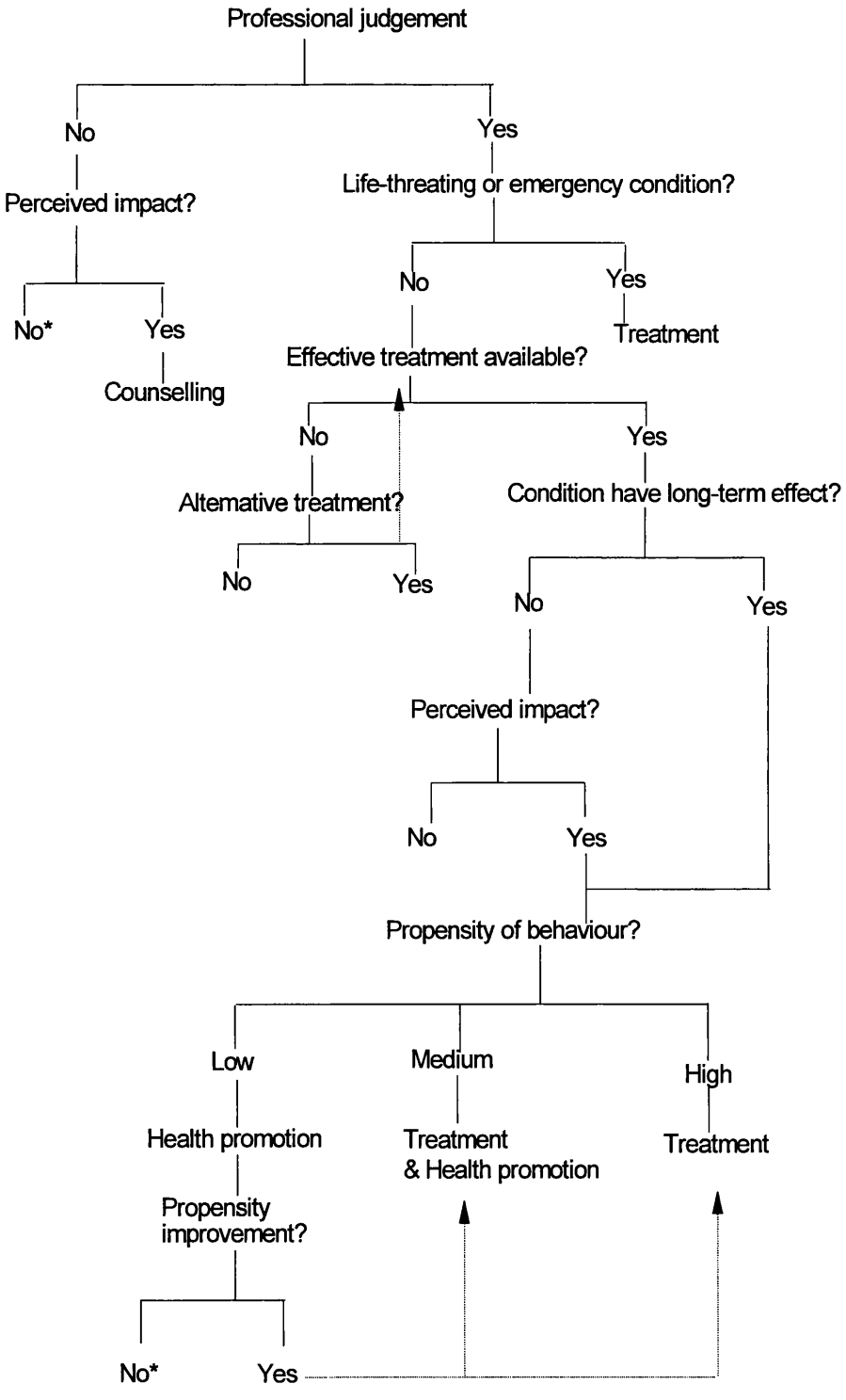


Figure 3.2 Flow diagram showing a decision tree of 'Effective Treatment Need' (Adulyanon, 1996)

Adulyanon's theoretical framework (1996) attempted to incorporate people's perception and propensity into dental public health planning. He expanded the approach to assessing dental need. In particular, he demonstrated, a practical way to generate *'impact-related need'* by combining normative need with quantifiable measures of ultimate impacts. His approach has some shortcomings. It does not take general health status into account. This is particularly relevant for assessing needs of people with mental and physical impairments and people with medical conditions. When assessing the needs of older people, considerations about medical and mental health status are particularly important. To overcome the shortcoming, a level of need *'general health related treatment need'* will be created and incorporated into dental treatment need system.

One other shortcoming of Adulyanon's approach is the mis-naming of *'effective treatment need'*. Effective treatment need does depend on behavioural propensity as suggested by Adulyanon (1996). But a number of other factors which affect effectiveness should be used. Ideally, *'effective treatment need'* should be based upon evidence from systematic reviews (White and Antczak-Bouckoms, 1995). Most dental treatments have not been subjected to critical reviews but for those that have the evidence must be used to assess effective treatment need.

To avoid confusion with scientifically conducted reviews on effectiveness, instead of using Adulyanon's definition of effectiveness, a new level of need *'propensity related treatment need'* was created to take into account well

established relationships between behaviours, such as oral hygiene practices and cigarette smoking, dietary behaviour, and oral diseases.

Adulyanon (1996) also defined *'accessible treatment need'* as cases with low propensity due to environmental factors, involving their disadvantages of socio-economic status and access to service. In his model, those with *'accessible treatment need'* were those who had economic problems and were considered a higher priority group of need. Therefore the term *'accessible treatment need'* used in his model could also cause confusion. For the general public, *'accessible treatment need'* could be considered as 'treatment need with acceptable level of access'. Those with *'accessible treatment need'* should be a group without problem related to access to dental service. Therefore in this thesis, *'accessible treatment need'* is re-defined as treatment need without problems with access to service or more specifically, with no financial problem to pay for dental services.

In the next section a general outline of the theoretical levels of treatment need and the treatment need models are presented. Then the theoretical basis for them are outlined.

3.2 Theoretical levels of treatment need

Table 3.1 demonstrates different levels of treatment need, factors to consider and expected services to be provided.

Normative treatment need

Planning of health services based on normative treatment need assumes that oral disease, as judged by the professional, needs some kind of treatment. This level of need gives full treatment to every individual who is in need. The full treatment could be an over-estimate. Normative treatment need is appropriate for life-threatening oral conditions such as oral cancer, precancerous lesions, chronic progressive conditions such as dental caries, and conditions needing emergency treatment such as severe infection. Therefore, for dental treatment need for the above conditions, such as restorative treatment, extraction, endodontic treatment, treatment for oral cancer or infection, normative treatment need is dominant.

General health related treatment need

This level of treatment need includes the general health factors of older people. Dental care will be provided to older people who have a normative need and who have general health problems affecting the prognosis of dental disease or the maintenance of acceptable oral health after treatment. Dental care will also be provided to those who are in greatest need due to their general health problems and to those where dental disease will affect the condition of a chronic disease or their general health status. Therefore, the treatment need is more selective. It will be based on general health status and the normative need.

Impact-related treatment need

Perceived oral impacts on daily performance are included in this level of treatment need. The treatment need which affects activities in daily living will be more realistic. Therefore, the treatment need is more selective and will be based on the level of oral impacts.

Propensity related treatment need

Propensity related treatment need takes into account the propensity for certain health behaviours of people. In addition to *'impact-related treatment need'*, past and present dental behaviours which relate to the effectiveness of dental treatment, could provide a more realistic treatment need. This level of treatment need is the most significant to the health planner in order to be able to allocate health care resources which are effective both curatively and for long term health.

Accessible treatment need

This level of need considers all barriers to treatment of the people. The economic factor is included in this level of treatment need. Those who can pay for the use of dental services will have a better chance in terms of 'access' to dental services.

Non-accessible treatment need

Non-accessible treatment need considers people with high barriers due to socio-environmental factors such as their economic disadvantage which will affect the use of dental services. This economically disadvantaged group will need an

improvement of the service system or change in economic or other environmental barriers.

Table 3.1 Different levels of treatment need, factors to consider and expected service to be provided

Treatment need level	Factors to consider	Expected service to be provided
Normative treatment need	Professional judgement	Full treatment
General health related treatment need	Professional judgement General health status	Full treatment for caries, infection and progressive pathology plus selective treatment based on general health status and normative need
Impact-related treatment need	Professional judgement General health status Perceived impacts (OIDP)	Selective treatment as for general health related need and based on level of impacts
Propensity related treatment need	Professional judgement General health status Perceived impacts (OIDP) Behavioural propensity	Selective treatment as for impact-related treatment need and based on level of propensity Health promotion (for those with low propensity)
Accessible treatment need	Professional judgement General health status Perceived impacts (OIDP) Behavioural propensity Financial problems	Selective treatment as for propensity related treatment need and based on economic status Health promotion (for those with low propensity)
Non-accessible treatment need	Professional judgement General health status Perceived impacts (OIDP) Behavioural propensity Financial problems	Selective treatment as for propensity-related treatment need and based on economic status Health promotion (for those with low propensity) Environmental and system change i.e financial support, access improved

3.3 General theoretical models for dental treatment need assessment in older people

The main theoretical models will be formulated in this chapter to give guidelines for dentists to assess different types of dental treatment need. Table 3.2 gives a summary of different theoretical models for treatment need in older people. Two main models, Model A for 'normal health' group and Model B for 'general health problem' group are proposed. These models demonstrate the incorporation of different socio-behavioural factors and other related factors, which influence the treatment needs estimation, with normative treatment need. These factors are the subjects' general health, perceived oral impacts of lay people, the propensity for health behaviours and financial problems. This study focuses on the estimation of treatment need of older people. Factors related to the treatment need in this specific group such as general health status are added to Adulyanon's theoretical framework to make the framework more relevant to older people.

In the models in category A and B, several specific theoretical models for different treatment needs are formulated based on the general health status and the edentulous or dentate status of subjects (Table 3.2). In category A, the models are for normal health groups whereas in category B they relate to groups with health problems. Different models (Models A1-A2, B1-B4) illustrate the integration of different socio-behavioural factors depending on different types of dental treatments according to their general health status.

Only in the 'normal health' group, will perceived oral impacts be integrated into the normative need in the models. Propensity for health behaviours are subsequently added into the models. Besides behavioural factors, financial problems are included in the treatment need models to justify the effect of financial problems on dental utilisation in older people.

According to these models, dentists should be able to make rational decisions about the most appropriate treatments for older individuals after a thorough consideration of all of these modifying factors.

Table 3.2 Summary of different theoretical models for treatment need in older people

Model	Dental status	Treatment need	General health problem	Factors to consider
Category A 'normal health' group				
General model Model A	Dentate/ edentulous	All types	None	Professional judgement General health status Perceived impacts (OIDP) Behavioural propensity Financial problem
Model A1	Dentate	Periodontal and/or Prosthodontic treatment	None	Professional judgement General health status Perceived impacts (OIDP) Behavioural propensity Financial problem
Model A2	Edentulous	Prosthodontic	None	Professional judgement General health status Perceived impacts (OIDP) Financial problem
Category B 'general health problem' group				
General model Model B	Dentate/ edentulous	All types	Specific medical conditions Nutritional problem Physical disability Mental status	Professional judgement General health status Behavioural propensity Financial problem
Model B1	Dentate	Periodontal and/or prosthodontic treatment	Underweight Diabetes mellitus	Professional judgement General health status Behavioural propensity Financial problem
Model B2	Dentate	Periodontal treatment	Heart disease	General health status Behavioural propensity
Model B3	Edentulous	Prosthodontic	Underweight	Professional judgement General health status Financial problem
Model B 4	Dentate	Periodontal and/or prosthodontic treatment	Underweight Diabetes mellitus	Professional judgement with special consideration for SDA General health status Behavioural propensity Financial problem

3.3.1 General models, Model A and Model B

Integration of 'general health status', 'perceived oral impacts on daily performances' of lay people, 'propensity for health behaviours' and 'financial problems' with 'professional judgement'

The main model for the new socio-dental approach to estimate dental treatment need is the model where general health status, perceived Oral Impacts on Daily Performances (OIDP) of lay people, propensity for health behaviours and financial problems are integrated into normative need. The general models are divided into Category A for normal health group and Category B for the general health problem group.

The general theoretical models of this study are based on the theoretical framework and the decision tree proposed by Adulyanon (1996) (Figures 3.1 and 3.2). All the treatment need models begin with professional assessment for need. According to Adulyanon's proposal and from the suggestion by Sheiham and Spencer (1997), life-threatening oral conditions such as oral cancer, precancerous lesions, chronic progressive conditions such as dental caries, and conditions needing emergency treatment such as severe infection will receive a high priority for treatment without further investigation of perceived oral impacts or behavioural propensity (Figure 3.3).

In subjects who have normative treatment need, the next factor to consider is general health factors. Different general health conditions which affect the need for dental treatment will be assessed in older people who had normative need. General health status includes specific medical conditions, physical

disability, general health perception, the mental and nutritional status (Figure 3.3).

Those who have a general health problem are considered to have *'general health related treatment need'* and will follow Model B for 'general health problem' group (Figure 3.4). Those who do not have a general health problem are considered to be in 'normal health' group and will continue to follow the flow diagram in Model A (Figure 3.3).

In a normal, generally healthy, dentate group who has no problem concerning their general health, perceived Oral Impacts on Daily Performance (OIDP), which have an effect on daily activities, are very important. Impacts have a strong influence on dental treatment. Dental treatment provided to cases judged by professional as needing treatment and also having perceived oral impacts on daily activities are more appropriate for treatment. Subjects with normative and impact related need are considered to have *'impact- related treatment need'* (Figure 3.3, Model A). The groups with low perceived oral impacts are low priority groups for dental treatment.

Further consideration in the model concerns health behaviours which affect the outcome of certain dental treatments. In dentate subjects who have normal general health, propensity for health behaviours: behavioural factors and economic problems will be integrated into *'impact-related treatment need'* (Figure 3.3). In the group with general health problem, propensity for health

behaviours will be integrated into *'general health related treatment need'* (Figure 3.4).

The patient's propensity for health behaviours play an important role in treatment compliance behaviours and the effectiveness of the dental treatment. The groups with high propensity have positive health behaviour related to the treatment need. This level of need will be called *'propensity related treatment need'* (Figures 3.3 and 3.4).

In the group with high propensity for dental treatment, enabling factors such as financial problems play an important role for access to dental services. Some dental treatments are expensive or not covered by national health care schemes or third party payment plans, therefore it is necessary to include financial problems of lay people into the dental treatment need estimations as for treatments which are relatively expensive such as prosthodontic treatment. Barriers such as economic factor will be integrated into the treatment need model at the next level. Financial status of older people can be assessed by asking whether or not they have problem paying for dental treatment. The level of treatment need at which the economic factor is integrated will be called *'accessible treatment need'* (Figures 3.3 and 3.4). Older people who have *'accessible treatment need'* are those who have sufficient funds to access dental services. They have a good chance of using the dental services because they are able to pay for the treatment.

Within the groups who have *'propensity related treatment need'* some may not have a good chance of seeking treatment due to their economic status. Since many older people are in the lower social class and have low incomes, financial problems could be an important barrier for access to dental services. Individuals who have financial problems are considered to have *'non-accessible treatment need'* (Figures 3.3 and 3.4).

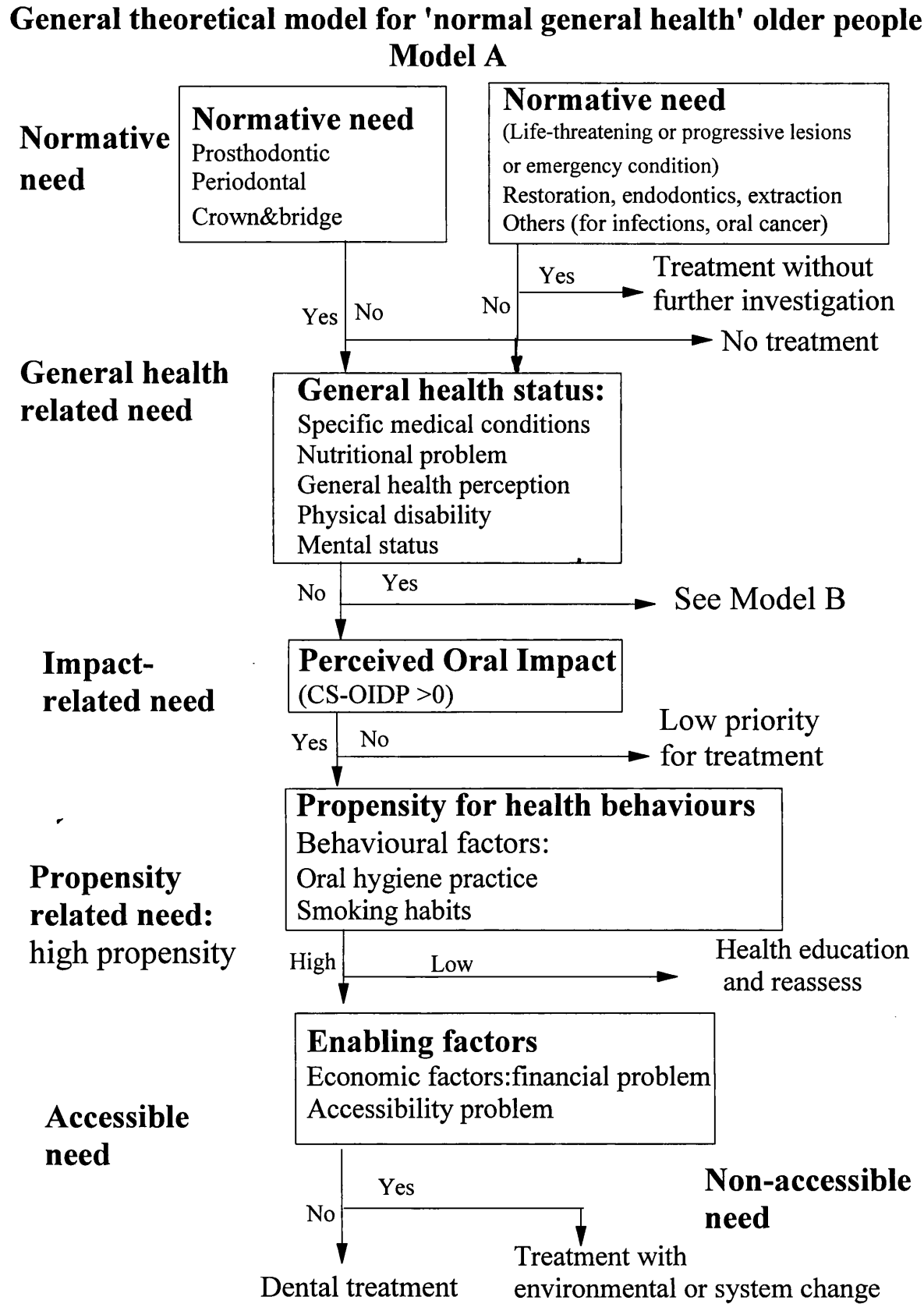


Figure 3.3 General theoretical model for 'normal general health' older people for all types of dental treatment

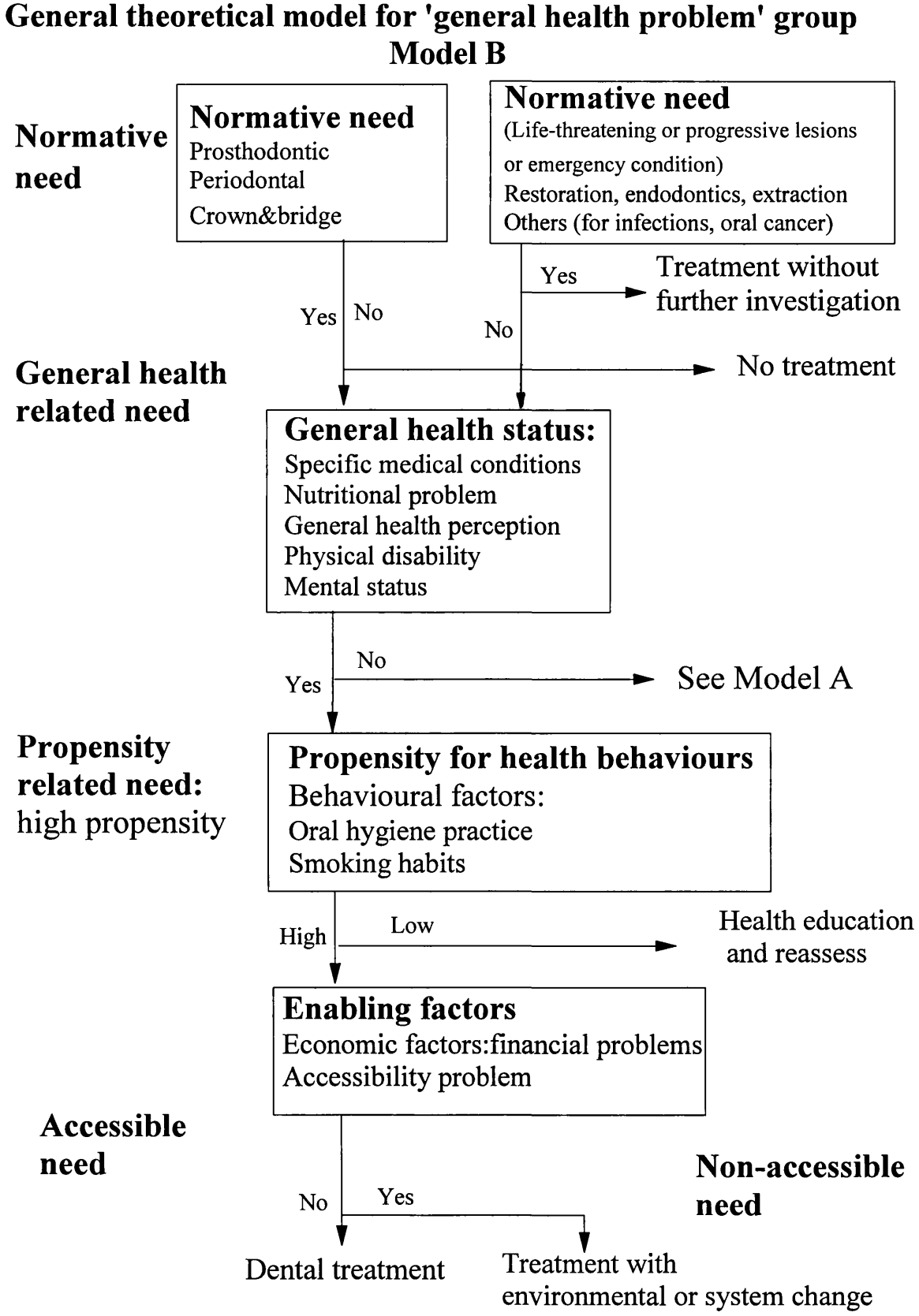


Figure 3.4 General theoretical model for 'general health problem' group for all types of dental treatment

In the following section, there will be illustrations of the new approach to estimate treatment needs of two dental conditions. Models A1, A2 and B1, B2, B3, B4 will be more specific to two dental treatment needs: prosthodontic and periodontal treatment need. These two dental treatments are not life-threatening, therefore the models will illustrate how general health status, perceived oral impacts, propensity for health behaviours and financial problems which relate to each treatment need could integrate into normative need in different treatment need models.

Category A when general health is normal

3.3.2 Model A1 (Dentate subjects) (Figure 3.5)

In older people who have normative treatment need for periodontal and prosthodontic treatment, the first factor to consider is the general health status. General health status, which relates to the treatment for periodontal and prosthodontic treatment will be used in the illustrative models, are those specific medical conditions; diabetes mellitus and heart disease, and undernutrition.

In a normal generally healthy dentate group, general health does not have a significant effect on the dental treatment need. Perceived oral impacts on daily performance are very important factors. Subjects with normative and perceived oral impacts have *'impact related treatment need'*.

Propensity for health behaviours are the next factor to integrate into treatment need model. Using periodontal treatment and partial denture treatment as an

illustrative theoretical model, 'Behavioural factors' which will be included in the model are oral hygiene practice and smoking habits.The groups with high propensity have positive health behaviour related to the treatment need. This level of need is called *'propensity related treatment need'* (Figure 3.5). The groups with low perceived oral impacts are a low priority groups for dental treatment. In the next level, the economic factor will be integrated into the treatment need model. The level of treatment need at which economic factor is integrated is called *'accessible treatment need'* (Figure 3.5). Older people who have an *'accessible treatment need'* are those who have general health problem and have sufficient funds to access dental services.

Within the groups who have *'propensity related treatment need'* some may not have a good chance of seeking treatment due to their economic status. Individuals who have financial problems are considered to have *'non-accessible treatment need'* (Figure 3.5).

Periodontal disease is common in older people. In the estimation for prosthodontic treatment, those who have normative need for prosthodontic treatment and at the same time have normative need for periodontal treatment should undergo periodontal treatment prior to receiving prosthodontic treatment. For the good comprehensive treatment plan, dentists have to take into account all clinical status before making decision on treatment plan. Figure 3.11 presents one example of decision tree for partial dentures when all clinical status are taking into account.

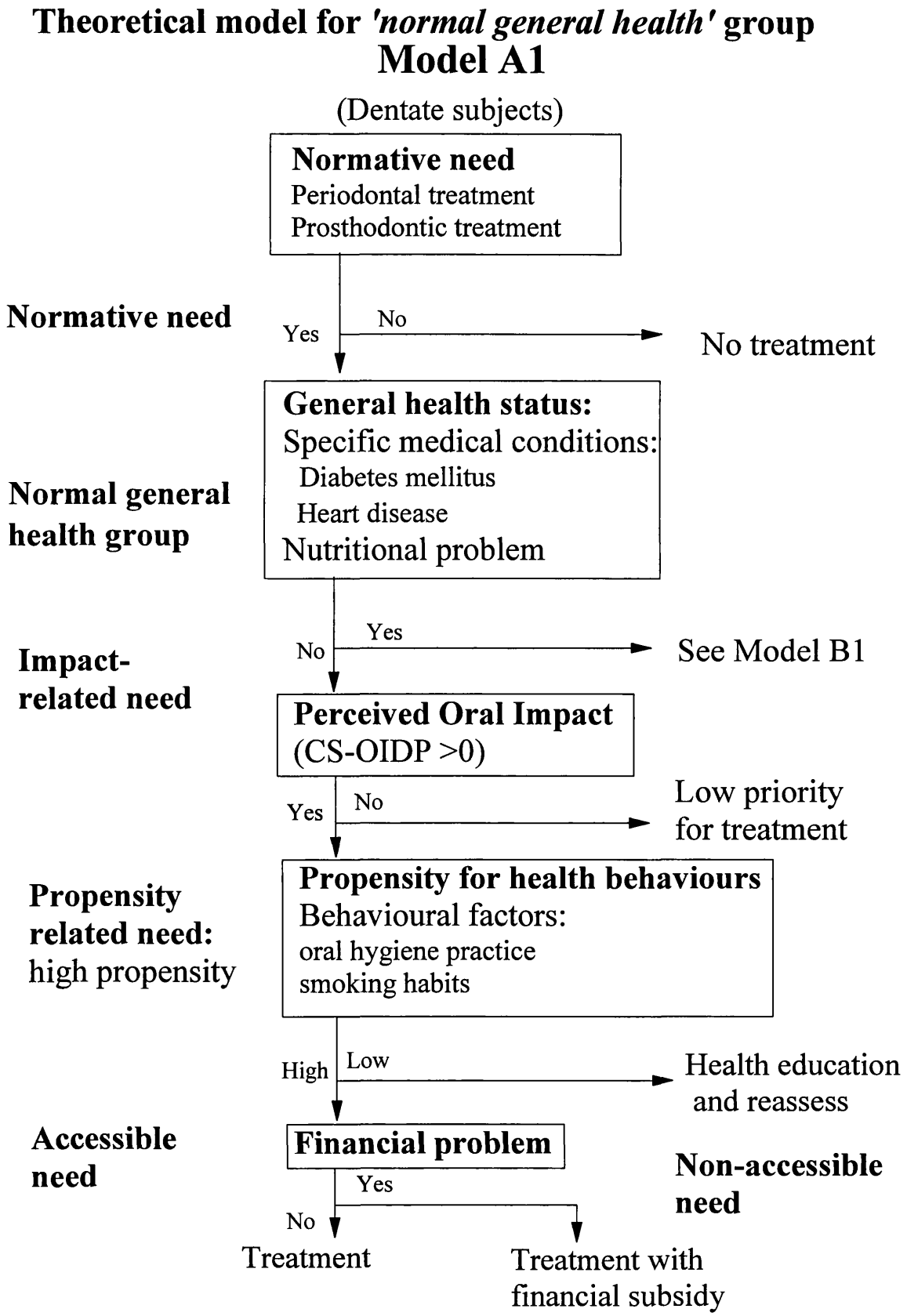


Figure 3.5 Theoretical model for *'normal general health'* group for periodontal and /or partial denture treatment need

3.3.3 Model A2 (Edentulous subjects) (Figure 3.6)

In a normal generally healthy edentulous group, perceived Oral Impacts on Daily Performances (OIDP) are integrated into normative need and *'Impact related treatment need'* is generated (Figure 3.6).

In edentulous subjects where propensity for health behaviours do not effect the prognosis of the treatment, financial problems play a more important role in the treatment need estimation.

After perceived oral impacts are integrated into the treatment need model, the next question to consider is whether these people who have *'impact-related treatment need'* will be able to pay for the treatment or not if those dental treatments are not covered by the third party payment system. Those who report no financial problems have *'accessible treatment need'*. After integrating the economic factors, those with financial problems are the *'non-accessible treatment need'* group.

Theoretical Model for *'normal general health'* group

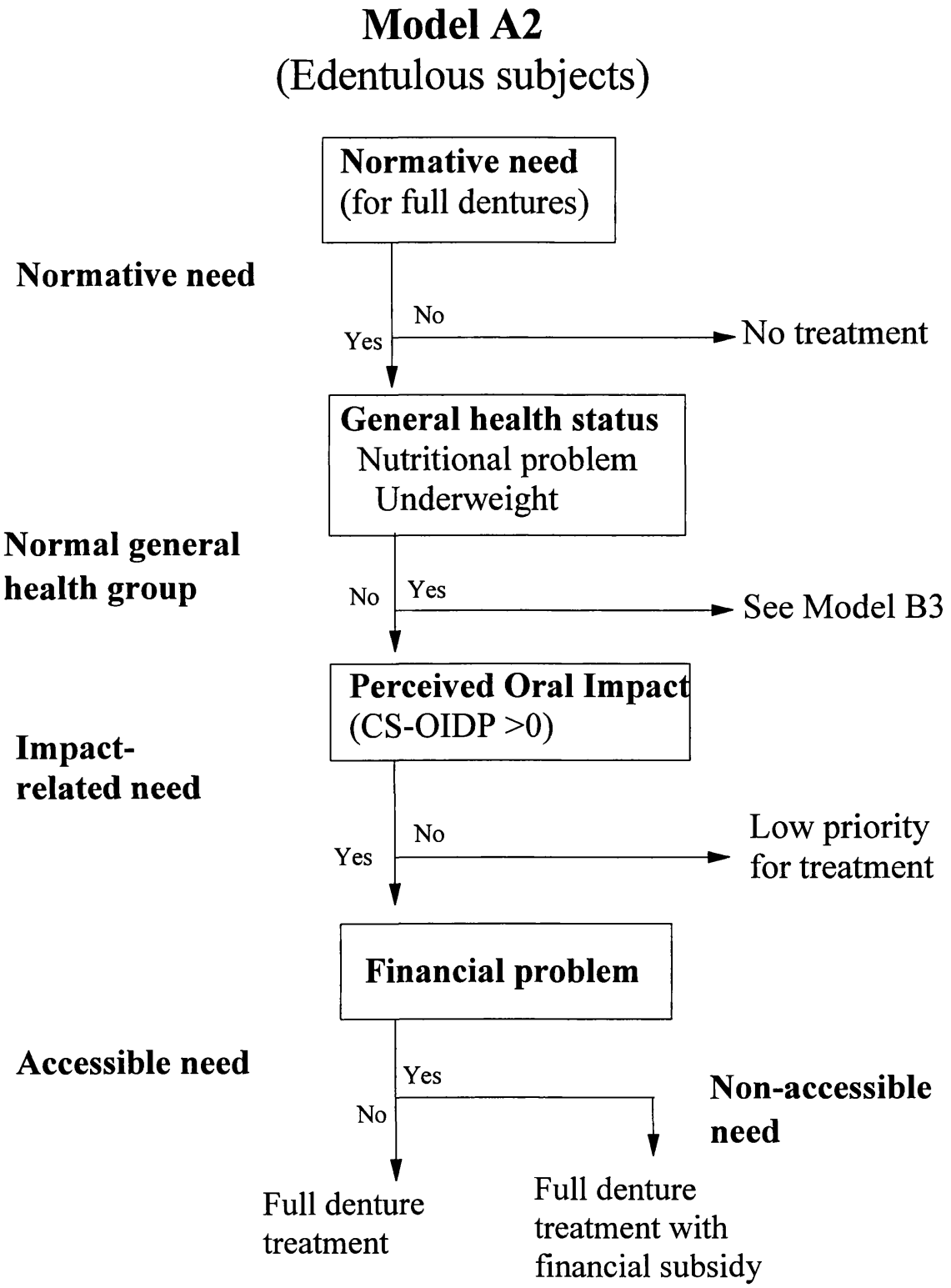


Figure 3.6 Theoretical model for *'normal general health'* group for full denture treatment

Category B where older people have general health problem

3.3.4 Model B1 (Dentate subjects) (Figure 3.7)

Integration of 'patient's general health factors', 'propensity for health behaviours' and 'financial problems' into 'professional judgement'

Model B1 is an illustrative theoretical treatment need model for dentate subjects who have normative need for periodontal and/or prosthodontic treatment but have a general health problem (Figure 3.7).

In this example, the general health status, to be included in the treatment need estimation models, are specific medical conditions and nutritional status. The level at which general health status is integrated with professional judgement is *'general health related treatment need'.*

In subjects with general health problems related to oral health, dental treatment should be provided on the basis of normative need without taking oral impacts into account. In dentate older subjects where the condition of the remaining natural teeth are very important factors for the prognosis of the treatment, a propensity for health behaviour which affects the effectiveness of the treatment process is added into the illustrative theoretical model. Using periodontal and/or prosthodontic treatment need for partial dentures as an example, the propensity for health behaviours such as oral hygiene practice and smoking habits need to be taken into account in the success of the treatment in dentate subjects. Propensity for health behaviours will be integrated into the treatment need for partial dentures. Dentate individuals who have *'general health related treatment need'*, after adding the propensity

for health behaviours into the model, will be *'propensity related treatment need'* group if they have high propensity. Subjects who have low propensity for health behaviour should receive health promotion to change their oral health behaviours and be reassessed before considering further treatment.

Among dentate individuals who had *'propensity related treatment need'*, some might not be able to obtain the treatment because of their financial status (*'accessible treatment need'*). Those with *'propensity related treatment need'* but cannot pay for the treatment are the *'non-accessible treatment need'* group.

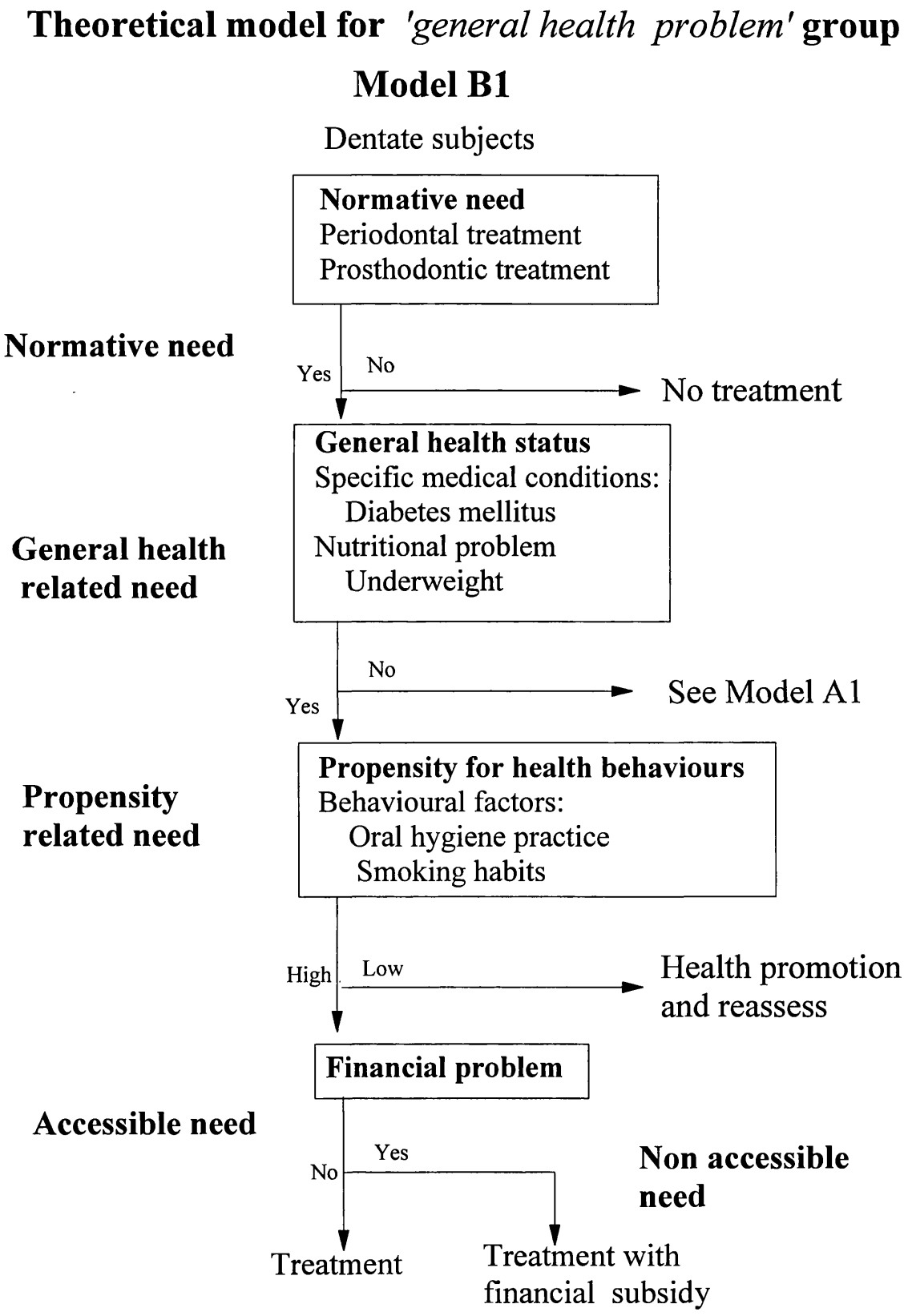


Figure 3.7 Theoretical model for *'general health problem'* group for periodontal and/or prosthodontic treatment

3.3.5 *Model B2 (Periodontal treatment need, dentate subjects with heart disease) (Figure 3.8)*

For some general health conditions, such as heart disease, periodontal disease could worsen the condition of heart disease (Chapter 2, Section 2.4.3.4). With the exception of certain general health conditions which periodontal disease could have an adverse effect on the condition of that particular specific medical conditions, periodontal treatment will be provided to subjects who are at risk for both periodontal disease and for specific medical diseases. Even though clinical assessment for periodontal disease could not be done for those with heart disease to avoid the risk of endocarditis, it was assumed that as older people are more prone to periodontal disease, the levels of disease would be as high as in the examined group. In order to prevent the risk for oral and medical conditions related to periodontal disease and heart disease, older people who have heart disease will be given periodontal treatment without clinical assessment for normative need (Figure 3.8).

However, propensity for health behaviours will be taken into account. Therefore, only two factors: specific medical conditions and propensity for health behaviours are integrated into this specific model (Model B2).

Theoretical model for *'general health problem'* group
(Heart disease)

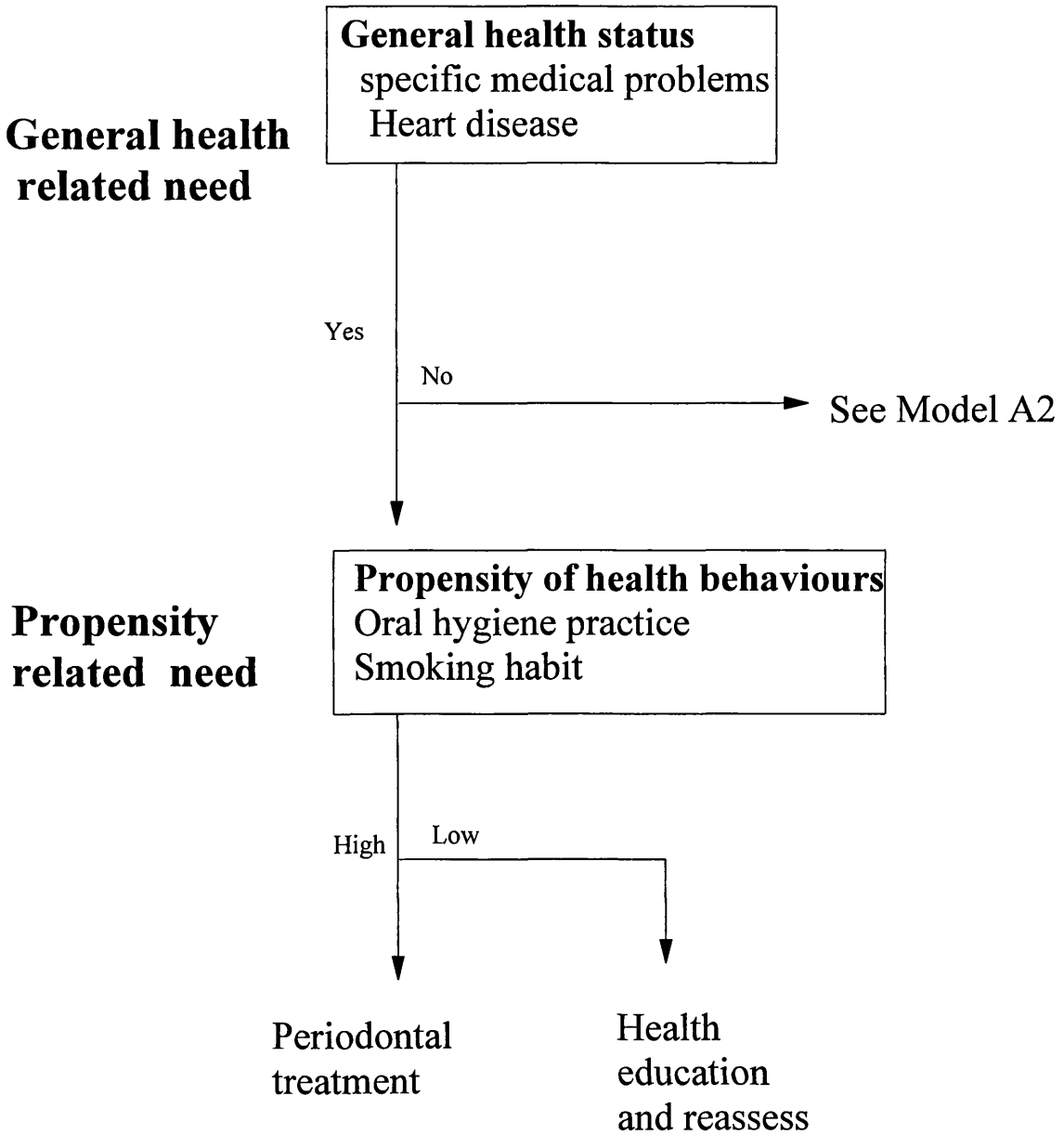


Figure 3.8 Theoretical model for *'general health problem'* group (heart disease) for periodontal treatment need

3.3.6 Model B3 (Edentulous subjects) (Figure 3.9)

Integration of 'patient's general health factors' and 'financial problems' into 'professional judgement'

Model B3 is an illustrative theoretical treatment need model for edentulous subjects who have normative need for prosthodontic treatment and have a health problem (Figure 3.9).

Similar to Model B1, general health status is one important factor which affects the need for dental treatment in old people. General health status is included in the treatment need estimation models to generate *'General health related treatment need'.*

In subjects who have general health problems related to oral health, dental treatment should be provided on the basis of normative need without oral impacts. (Refer to Model A2). In edentulous subjects, where propensity for health behaviours do not have an effect on the prognosis of the treatment, financial problem plays a more important role in the treatment need estimation especially for prosthodontic treatment. Some dental treatments are expensive or not covered by the third party payment plan, therefore it is necessary to include financial problems of lay people into the dental treatment need estimations for treatments such as prosthodontic treatment.

Similar to Model A2 economic factors are integrated into the treatment need model to generate *'accessible treatment need'.* Older people who have an *'accessible treatment need'* are those who have general health problem and

have sufficient funds to access dental services. Within the groups who have a *'general health related treatment need'*, those who have financial problems are considered to have a *'non-accessible treatment need'*.

Theoretical model for *'general health problem'* group

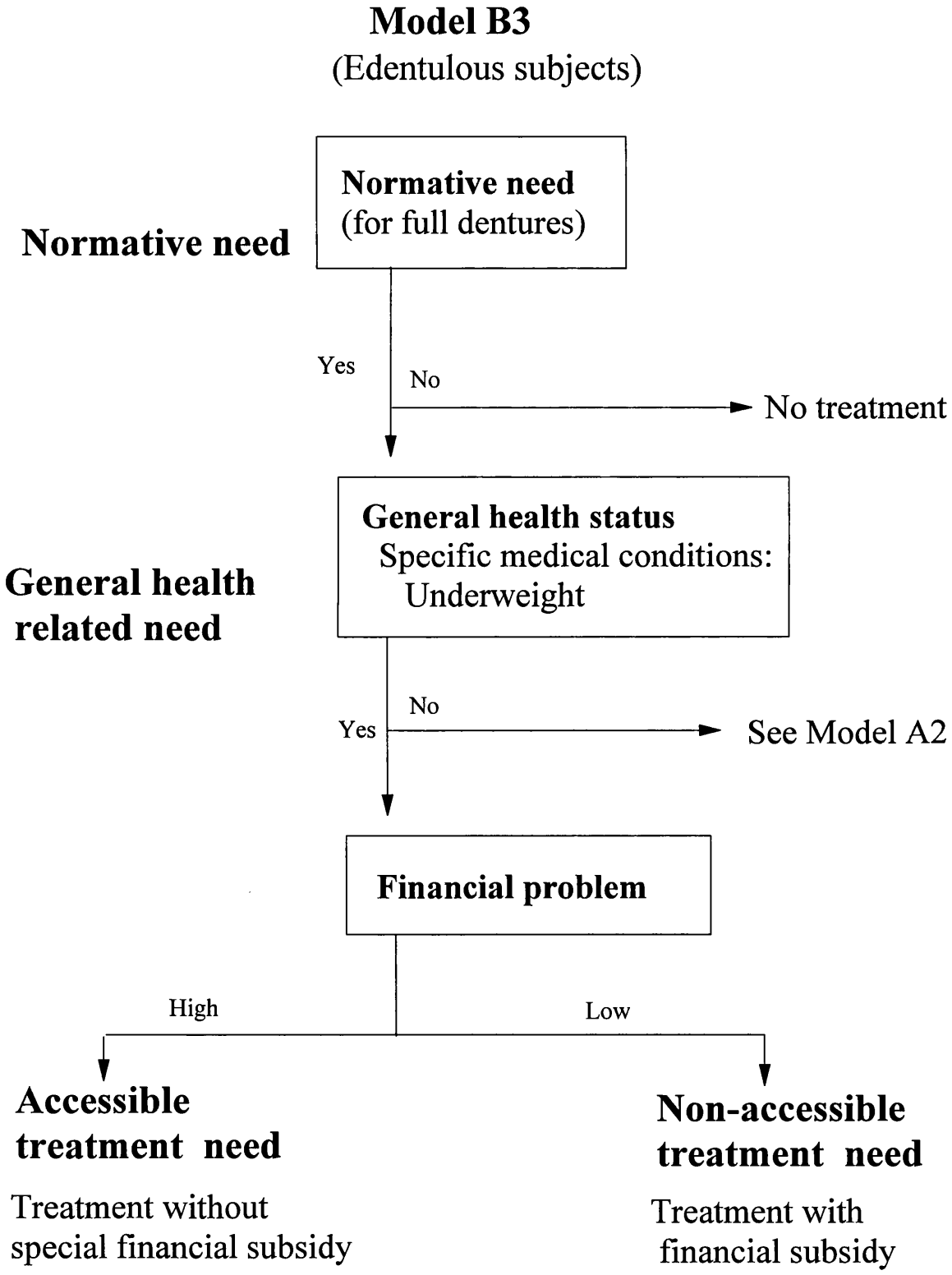


Figure 3.9 Theoretical model for *'general health problem'* group for prosthodontic treatment need

3.3.7 Model B4 (Dentate subjects) (Figure 3.10)

Model for partial denture treatment need when considered the concept of Shortened Dental Arch

Recently the concept of Shortened Dental Arch (SDA) becomes more important in the assessment of treatment need for partial dentures. The relationship between the need for partial denture and SDA has been described previously (Section 2.4.3.5). Therefore, in the treatment need model for partial denture, SDA should be added to provide a complete and more realistic need assessment. Figure 3.10 illustrates the inclusion of SDA concept into the dental treatment need for partial dentures using the model for 'general health problem' dentate group as an example. SDA is taken here for an illustrative purpose only since the criteria for normative treatment need for partial dentures did not include SDA.

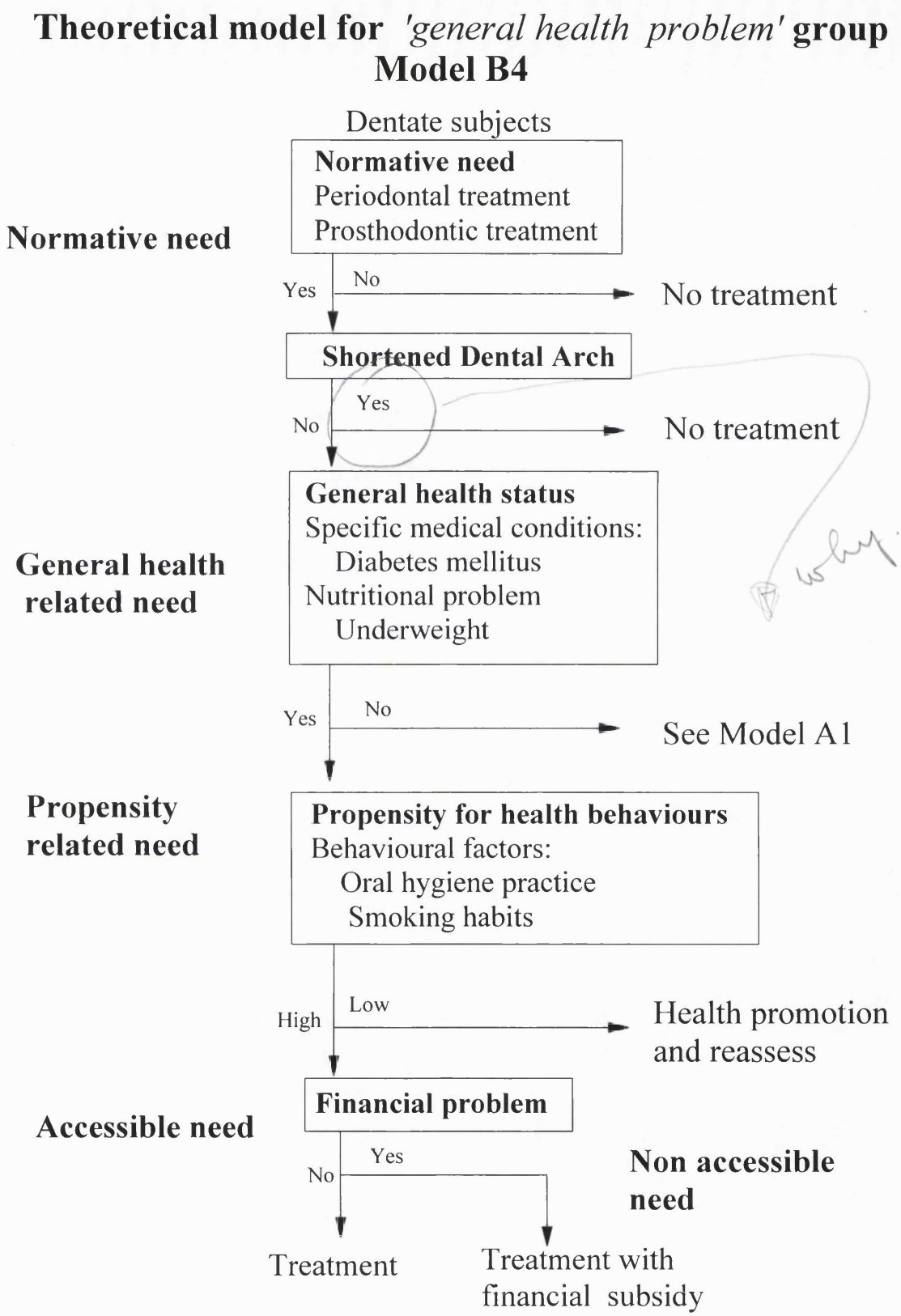


Figure 3.10 Theoretical model for *'general health problem'* group for prosthodontic treatment need in dentate subjects when considered Shortened Dental Arch concept

In Chapter 10, the different models for different types of treatment needs will be illustrated to give the amount of each level of treatment need in the study population.

For good comprehensive treatment plan, dentists have to take into account all clinical status before making decision on treatment plan. Figure 3.11 presents one example of the decision tree for partial dentures when all clinical status are taken into account.

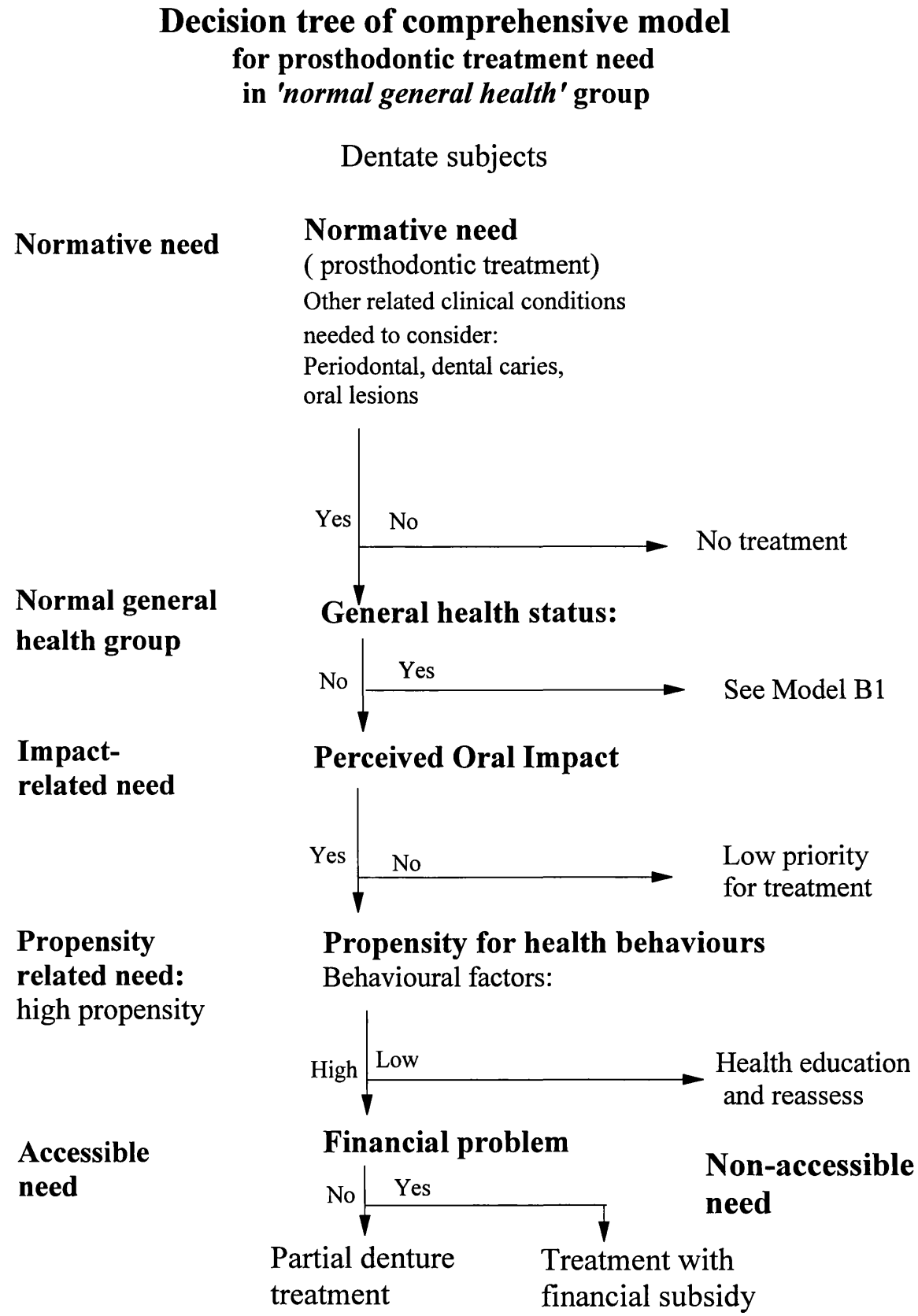


Figure 3.11 Decision tree for comprehensive evaluation model for treatment need for partial dentures

CHAPTER 4

METHODOLOGY

This was a cross-sectional study. It attempted to integrate general health factors and socio-dental factors, the Oral Impacts on Daily Performances (OIDP) index, with the normative need. The aim was to use this study to illustrate the integration of several factors into the treatment need model.

The results will not be appropriate to extrapolate to the total Thai population. But instead will give the dental health planner a new approach to assess the dental treatment need.

4.1 Sample selection

4.1.1 Study area

The sample was older individuals aged 60 to 74 living in the metropolitan area of Chiang Mai Province, Thailand. Chiang Mai is one of the 17 provinces located in the northern region of Thailand. Chiang Mai is divided into 21 districts (Amphoe). Amphoe Muang which is the centre of the commercial and governmental offices will be referred to as a metropolitan area. The total population on June 10, 1995 was 1,547,085 persons. The population in the metropolitan area is 17% of the total population in Chiang Mai province. The people aged 60 years and over represent approximately 10% of the total population.

4.1.2 The age of the sample

This study focused on the age group 60-74 years, firstly because the life expectancy in 1985-1989 of the male and female older people was 61.8 and 67.5 years respectively. It is expected that this will be 68.4 years and 72.8

years for males and females respectively in 2000-2005 (Human Resources Planning Division, 1991). The age group 60 to 74 years represents the majority of the older population in Thailand. They constitute 82% of the total population aged 60 and over. In a previous dental study on the older people in Chiang Mai metropolitan area, the age group 60 to 74 years were 82% of the total study group (Srisilapanan et al, 1994).

The second reason for choosing the age group was that in Thailand the official retirement age is 60 years. Studies on the older population in Thailand use the 60 years and over age group (Hematora et al, 1991; Otrakul et al, 1993; Somporn, 1994; Thienthong and Chareonkul, 1994) while in Western countries they usually study 65 year olds and older (Smith and Sheiham, 1980; Simard et al, 1985; Hand and Hunt, 1986; Stuck, 1989; Angelillo et al, 1990; Slade et al, 1990; Drake et al, 1991).

4.1.3 Sample selection processes

A non-probability sampling technique was used. The sample was not a representative sample because the main objective was to test the new approach of treatment need estimation. A representative sample would have all socio-economic classes. Non-random methods were used to obtain sufficiently large sample of older people from all social classes to assess the method being tested.

In Thailand many older people belong to social activity groups, especially senior day centres. These older individuals may have special characteristics.

For example they are more active compared to those who do not participate in social groups. As it was decided to select the samples from the activity groups, the samples were divided into two groups: a club member group and household groups. Club member groups are older individuals who belong to social groups. They are members of senior day centres, retirement clubs, exercise clubs or other social clubs. The household groups were older individuals who did not belong to social groups. Within each group, three social classes: high, middle and low were included.

In Thailand there is no definitive classification of social class for people living in a metropolitan area. Educational level and personal income could provide some information related to social class. The older individuals who had no education or less than 4 years of education were 43% to 91% of the population in urban areas (Hematora et al. 1991; Otrakul et al. 1993). Personal income of 1500 baht/month or less may be used as a classification for low social class. Hematora et al. (1991) and Otrakul et al. (1993) found that 67% of older people in urban area had personal incomes of less than 1100 baht/month (Hematora et al. 1991; Otrakul et al. 1993). In a study of the old people in Chiang Mai metropolitan areas, 76% had personal income of less than 1500 baht/month (Srisilapanan et al, 1994). It is therefore assumed that the lower social class are older people who had education of less than 4 years and income less than 1500 baht/month. They comprised approximately half of the population.

In this study, social class was described as shown in Table 4.1.

Table 4.1 Definition of different social classes

Social class	Educational level (years in school)	Personal income (baht/month)
Lower	< 4 yrs	< 1500
Middle	5 -12 yrs	1501-5000
High	> 12 yrs	5001 and above

4.1.4 Identifying the samples

A. Club member group

High, middle and low social class

Senior Day Centres

Older people who belonged to a senior day centre were selected because the Senior Day Centre is the most popular social activity group. There are several senior day centres in Chiang Mai metropolitan area. Each centre organises activities for members such as health care, group exercise, entertainment, small workshops or special lecture on interesting topics. There are four main senior day centres and several small centres. Three senior day centres were randomly selected for inclusion in this study. They were the Senior Day Centre organised by Faculty of Nursing, Chiang Mai University, Piyamarn Senior Day Centre organised by the Department of Social Welfare and Nakornping Senior Day Centre organised by the Chiang Mai Provincial Hospital.

The members in these senior day centres are older individuals from all social classes. Older people who participated in these Senior Day Centres were invited to participate through the director and board of committee of each centre.

B. Household groups

These groups of older people do not belong to any senior day centers. In Thailand a list of the older individuals in each household is not available. Telephone lists are uncommon. Thus, it is not possible to use a telephone list to randomly select the sample. Snowball sampling or networking was used to identify older individuals at the Tambon level (DePoy and Gitlin, 1994). Snowball or networking sampling is a method to obtain subjects by asking subjects themselves to provide the names of others who may meet the study criteria. This type of sampling is often used when access to a population is difficult.

Older people were approached through the places where the older people gathered together such as the temple or one individual's home. The older individuals were invited to participate in the study. Then each individual was asked to provide names of old friends or old neighbours who resided in the same area. They were then contacted and invited to participate.

Selecting high and middle social classes

Individual's homes and temples

High and middle social classes were selected from areas where the high and middle social classes resided. The metropolitan area is divided into approximately 20 sub-areas called 'Tambon'. Four 'Tambon' where there is a high possibility to be a residential area of the high and middle social classes were selected from the total of 20 Tambons. They were Tambon Suthep, Sripoom, Nong Hoi and Thippanate. Convenience sampling and snowball

networking techniques were used to recruit the samples in their homes in these Tambons.

During the data collecting period which was the Buddhist lent, many older people would gather in the temple to perform religious activities. Some of them stay overnight in the temple. In order to contact the old people in this group, five temples were randomly selected.

Selecting middle and lower social classes

Municipality community

In the metropolitan area, the municipality established several sections of the city to be low cost residential areas. There are approximately 30 municipality communities in Chiang Mai. The older people who resided in a municipality community are middle and lower social classes. The majority were in the lower social class.

Simple random sampling of 15 municipality communities were selected from the total of 21 municipality communities. This group comprises 23.6% of the total sample. Through the co-ordination from the leaders of each municipality community, older people were arranged to come to the municipality community centres to be interviewed and examined.

4.1.5 Sample size estimation

Minimum sample size for hypothesis testing was calculated on the basis of the hypothesis testing for comparison of two proportions (Kirkwood, 1988).

4.1.5.1 Dentate and edentulous subjects

The sample size calculation used the prevalence of normative need for restoration and replacement or repair of dentures from the previous study by Srisilapanan et al. (1994). From the previous information to estimate the sample size, the sample needed in this study could range from 350 to 480. The response rate from the previous study on the Thai older population was approximately 90% (Srisilapanan et al. 1994). It was expected to receive approximately 90% response rate. So, the total samples of 560 would be statistically adequate (See Appendix 1).

4.1.5.2 Edentulous subjects

The estimation of sample size for edentulous subjects was based on the prevalence of normative need in edentulous patients for replacement of full dentures from the previous study (Srisilapanan et al. 1994). The total sample size for edentulous individuals needed was 144 (Appendix 1).

The total sample for dentate and edentulous subject in this study was calculated previously to be 560. Thus, after the recruitment of subjects reached 560, only edentulous subjects were identified and invited to participate in the study until 144 for the total of edentulous subjects were included.

4.1.6 Sampling method and the number of samples

The total sample was estimated to be 560. Club member groups and household groups were equally divided into 280 samples in each group.

Within each group, three social classes were recruited. The data from the studies of older people in Thailand showed that approximately 50% of the older population belong to the lower social class (Hematora et al, 1991; Otrakul et al, 1993; Somporn, 1994; Srisilapanan et al, 1994; Thienthong and Chareonkul, 1994). Thus, in the lower social class there would be 140 older individuals. Middle and high social classes would included 70 each. The final number of total samples is shown in Table 4.2. There were 335 subjects who were club members and 288 were in household groups. The total number of subjects included were 623 (Table 4.2).

4.1.7 Supplemented edentulous subjects

From the sample size estimation, the total sample size for edentulous individuals needed was 144 (Section 4.1.5.2). The total sample for dentate and edentulous subject was calculated previously to be 560. Thus, when the recruitment of subjects reached 560, the edentulous subjects were identified and invited to participate in the study until it reached 144 for the total of edentulous subjects.

In the field work, when the recruitment of subjects reached 623, 74 of them were edentulous. Thus, 84 more edentulous subjects were invited to participate in the study. This group of 84 edentulous subjects was called 'supplemented edentulous subjects'. After adding the supplemented edentulous subjects, the total edentulous sample was 158. This total figure will be used in the assessment of treatment need only.

Table 4.2 The proposed and final sample size according to social activity and social classes

	Place recruited	Proposed sample size	Final sample size	Final sample size with supplemented edentulous subjects
Total sample		560	623	707
Club member				
Total		280	335	367
Social class				
High	Senior day centre	70	97	103
Middle	Senior day centre	70	120	128
Low	Senior day centre	140	118	136
Household group				
Total		280	288	340
Social class				
High	Selected Tambon and temple	70	51	67
Middle	Selected Tambon and temple	70	78	94
Low	Municipality community	140	159	179

4.2 Local contacts

The contact with the senior day centre at Faculty of Nursing had been made in December 1994. The contact at Piyamarn and Nakornping senior day centres were in June 1995. The contact with the Dental Health Division of the Chiang Mai municipality was in December 1994. After the simple random sampling, the exact date and list of names of the municipality communities was given to the Dental Health Division for local contact with the head of the municipality communities in July 1995. Personal contact to collect sample in Tambon was in August, 1995.

4.3 The Questionnaire

Each subject was interviewed by the author before the oral examination was performed. The interview time ranged between 10-30 minutes with an average time of 14.8 minutes.

4.3.1 The questionnaire

The questionnaire comprised four sections. Each section was divided into several parts. The detailed information of the questionnair in English and Thai versions are presented in Appendix 2 and 3 respectively.

Section 1 Demographic data

Section 2 General health status

Part 1 General health

Part 2 Smoking habits

Part 3 Mobility evaluation

Part 4 Mental status

Section 3 Oral health status

Part 1 Psychological assessment

Part 2 Physical assessment

Part 3 Perceived Oral Impacts on Daily Performances (OIDP)

Section 4 Perceived problems, discomfort, and need for treatment

Part 1 Past dental experiences

Part 2 Visits to dentist

Part 3 Oral health and oral hygiene behaviours

Part 4 Perceived and expressed needs

Part 5 Financial status

4.3.1.1 Criteria to assess general health status

Health status of the older people was assessed through five health measurements: specific medical conditions, physical disability, general health perception, cognitive functioning and nutritional status:

Specific medical conditions Symptoms which reflected acute and chronic problems involving one or more of the body's functional systems were assessed. A self-report of specific medical conditions was included in the interview.

Physical disability was measured through activities of daily living, mobility, household activities and physical activities.

General health perception was measured using a self-report assessment which reflects individual differences in the evaluation of information people have about health.

Cognitive functioning which is one of the important mental health concept was measured using the 6-items Orientation-Memory-Concentration Test (Katzman, 1983).

Nutritional status was assessed using the body mass index (BMI) as the indicator.

Specific medical conditions

Measurement of specific medical conditions

The presence of prevalent specific medical conditions was determined from self-report that a physician had told the participant. Specific medical conditions were grouped into seven conditions.

1. General pain including any type of pain in any area of the body.
2. Neurological disease including numbness in extremity, fingers or feet
3. Disease of bone and joint: joint pain, knee problems
4. Cardiovascular disease: any heart related disease, hypertension, hypotension
5. Gastrointestinal disease: peptic ulcer, heartburn, problems with intestinal system, gall bladder, gall stone
6. Endocrine disease: any disease related to endocrine or hormonal system such as diabetes, thyroid
7. Cancer or tumour: any cancer or tumour

Measure of Physical disability

Measuring the most basic activities of daily living (e.g bathing and toileting) were excluded from this study because little disability relating to these items was found in this group of older people living independently in the community.

Physical disability was ascertained using an interviewer-administered questionnaire on self-report of difficulty in performing any specific tasks of daily life. The questionnaire was a modified version of the British National Diet and Nutritional Survey (NDNS) (Department of Health, 1997).

In this study, two items of functional measures covering activities involving the lower extremities were used: walking up and down stairs, walking or moving around the house. Further, three measures covered functional tasks requiring both upper and lower extremities: moving and carrying loads such as when shopping or moving tables or chairs, light home tasks such as housekeeping, ironing, heavy home tasks such as washing windows, handwash for laundry were included. Each of these items was adapted from the NDNS and Rosow-Breslau Functional Health Index (Rosow and Breslau, 1966).

General health perceptions

General health perceptions are measured by self-rating of each older subject on their general health as excellent, good, fair, poor or uncertain about self-rating.

Nutritional status

Body Mass Index (BMI) was used to measure the overall nutritional status of the older people.

Cognitive functioning

The cognitive functioning of the Chiang Mai group of old people was assessed using the 6-item Orientation Memory Concentration test (Katzman, 1983).

4.3.1.2 Criteria used to assess perceived Oral Impacts on Daily Performances (OIDP)

A new socio-dental indicator: the Oral Impacts on Daily Performances (OIDP) developed by Adulyanon (1996) was selected to assess the effect of oral impacts on different performances in older people. The details of OIDP index is presented in Appendix 4.

4.4 Clinical examination

The subjects who told the interviewer that they had a heart problem were not examined for their periodontal condition to avoid the risk for endocarditis (See Chapter 2, Section 2.4.3.4).

4.4.1 The diagnostic criteria

4.4.1.1 Clinical data

The clinical criteria used in this study were adapted from the British National Diet and Nutrition Survey (NDNS) for people aged 65 and over

(Department of Health, 1997). The clinical examination form and details of criteria are presented in Appendix 5.

4.4.1.2. Criteria for normative treatment need

The following criteria were used to assess normative treatment need:

a) Restorative treatment need

The older people would have treatment need for restoration when they had at least one tooth under the following conditions:

New restoration was needed under the following conditions: visible active dental caries on coronal or root surfaces, active caries undermines extensive amount of restoration and fractured restoration.

Existing restorations was scheduled for replacement when any of the following conditions are presented: caries undermines extensive amount of restoration, fractured restoration, discoloured composite restoration.

b) Replacement of teeth

Removable partial denture would be constructed under the following conditions: missing anterior teeth, premolar or molar teeth. The evaluation of the periodontal condition or dental caries of the remaining natural teeth adjacent to the space or which would be involved with partial dentures construction was taken into account for judgement for partial dentures.

Replacement of removable partial denture when any of the following conditions were present: Breakage or deformity, loose, ill-fitting with insufficient retention or stability, excessive tooth wear or missing denture teeth, discolouration of tooth.

Complete denture would be constructed in edentulous individuals. Replacement of full dentures when any of the following conditions were present: Breakage or deformity, loose, ill-fitting with insufficient retention or stability, excessive tooth wear or missing denture teeth, discolouration of tooth.

Crowns were planned only when occlusal function could not be restored by more conservative methods or when a crown was required as an abutment for a prosthetic appliance.

c) Tooth removal

Extractions were indicated under the following conditions: tooth with abscess and pain, tooth with sign of pathology and infection, degree 3 mobility, all of which in the clinical judgement of the examiner, the tooth could not be restored to adequate function.

d) Periodontal treatment

Only non-surgical periodontal treatment was planned. Periodontal treatment need was divided into two categories. Subjects who had one or more teeth with loss of periodontal attachment less than 6 mm with calculus would need

debridement through scaling. Subjects who had one or more teeth with loss of periodontal attachment more than 6 mm would need root planing or more advanced periodontal treatment. In advanced periodontitis, extraction would be assigned for teeth with poor prognosis.

e) Treatment of oral mucosal lesions

The presence of oral mucosal lesions and denture related lesions such as denture stomatitis, denture hyperplasia, angular cheilitis were indications for treatment. In the older individual where oral mucosal lesions were diagnosed, a referral to an appropriate specialist for the proper treatment was given.

4.5 The procedures to assess different levels of treatment need

4.5.1 Assessing a *'general health related treatment need'*

'General health related treatment need' is a treatment need derived from a combination of normative treatment need and general health factors. In this study, two general health factors were used to illustrate a *'general health related treatment need'*. These factors were nutritional status (BMI) and specific medical conditions: heart disease and diabetes mellitus.

4.5.2 Assessing an *'impact-related treatment need'*

Impact-related treatment need is the need derived from the integration of perceived oral impacts of lay's people using OIDP system with normative treatment need which is judged by professionals. The detail on how to calculate OIDP scores is given in Appendix 4.

The integration involved the following processes:

a) Identifying the specific perceived impacts based on OIDP measures, which possibly causes normative treatment need

The Oral Impact on Daily Performance (OIDP) measures all oral impacts on subject's daily performances. It gives a total score for each subject. This general OIDP score is too general to be used to identify the specific impact from one particular oral impairment. Since specific dental treatment need was caused by different oral impairments, for example treatment need for prosthodontics was mainly due to missing teeth or loose dentures. The oral impairment assessed by using OIDP index reflects the impact of the oral problems on activity of daily life such as an inability to eat efficiently or feeling uncomfortable smiling in public. Missing teeth or loose dentures are examples of oral conditions that can cause a subject to perceive an impairment. OIDP index measures causal oral conditions as well as the oral impacts. Therefore, for each specific treatment need, only those oral conditions that possibly caused the subject to perceive an impairment were recorded.

Condition-specific OIDP (CS-OIDP) scores could then be calculated based on possible related perceived impairments for each treatment need (See Appendix 4). The criteria for selecting specific causal impairments for a specific treatment need in this study is presented in Table 4.3.

Table 4.3 Possible related perceived impairments to identify the *'impact- related treatment need'*

Treatment	**Possible related perceived impairments**
New or replacement/repair of full denture	- missing teeth - loose denture, colour, shape and size of denture teeth, wearing denture - sore spot or ulcer related to denture
New or replacement/repair of partial denture	- missing teeth - loose denture, colour, shape and size of denture teeth, wearing denture - sore spot or ulcer related to denture
New or replacement/repair full and partial denture	- missing teeth - loose denture, colour, shape and size of denture teeth, wearing denture - sore spot or ulcer related to denture
Extraction	- toothache, loose tooth, position of teeth, tooth decayed - bad breath - gum abscess
Restoration	- toothache, loose tooth, position of teeth, tooth decayed - bad breath - defective fillings
Pulp care	- toothache, loose tooth, tooth decayed - bad breath - gum abscess
Crown or bridge	- toothache, loose tooth, position of teeth, tooth decayed
Scaling	- bleeding gum, gum abscess, receding gum - calculus
Root planing/Periodontal surgery	- loose tooth - bad breath - bleeding gum, gum abscess, receding gum - calculus
Oral mucosa treatment	- Oral ulcer or sore spots
TMJ treatment	- jaw clicking, jaw locking

B) Selecting subjects with a normative treatment need, who also had condition-specific perceived impacts (specific OIDP scores)

In older people who had normative treatment need, after condition-specific OIDP score is integrated, the person who had normative treatment need and had specific OIDP score will have an *'impact-related treatment need'*. Older people who had OIDP scores above zero had some perceived oral impacts. The appropriate cut-off points of OIDP scores were drawn from a distribution of scores combined with a suitable percentile. For example, the two cut-off points used in this study: cut-off point of 8 fell at the 55th percentile and cut-off point 16 fell at the 82th percentile.

Condition-specific OIDP could be used to identify priority groups by dividing them into groups with different cut-off points. The individuals who had a higher cut-off point of CS-OIDP score represented those reporting higher impacts related to their mouths. Therefore if health planners selected higher cut-off points for OIDP scores, the group which will have the highest priority will include older subjects who had serious *'impact-related treatment need'*.

4.5.3 Assessing a *'propensity related treatment need'*

'Propensity related treatment need' is the treatment need derived from a combination of normative treatment need, perceived oral impacts and behavioural factors which could affect the prognosis of specific treatment need.

This study illustrates a *'propensity related treatment need'* for prosthodontic and periodontal disease. The first step is to identify the behavioural factors related to specific treatment needs.

a) Identifying the appropriate behavioural propensity

Prosthodontic treatment

In dentate subjects oral hygiene practice is an important behavioural propensity of people for the effectiveness of prosthodontic treatment. From Chapter 2 (Section 2.5.1), behavioural factors affecting a *'propensity related treatment need'* for partial dentures in dentate subjects are the oral hygiene practice and smoking habit.

With regard to the prognosis of the remaining teeth, the maintenance of good oral hygiene in subjects wearing a partial denture is necessary mainly for the prevention of periodontal disease. Smoking could have a negative effect on periodontal conditions. Subjects who had acceptable level of behavioural propensity were defined as those who cleaned their teeth more than once a day and who were non-smokers.

Periodontal disease

Based on current concepts of periodontal disease, behavioural propensity of people for effective care of periodontal disease were reviewed. Oral hygiene practice and smoking were the two most important behavioural factors affecting a *'propensity related treatment need'* for periodontal disease. Subjects who had an acceptable level of behavioural propensity were defined

according to a rigid or non-rigid definition. A rigid definition included those who were non-smokers and cleaned their teeth more than once a day. A non-rigid definition included those who smoked 10 or less cigarettes per day and cleaned their teeth more than once a day.

b) Selecting subjects who had 'propensity related treatment need'

Persons with *'propensity related treatment need'* for prosthodontic or periodontal treatment were selected from subjects with *'general health related treatment need'* or *'impact-related treatment need'* who also had the acceptable level of behavioural propensity.

4.5.4 Assessing *'accessible treatment need'*

Individuals with a *'propensity related treatment need'* may not be able to use the dental services due to *'access'* related factors such as finance, physical disability and so on. Factors affecting *'access'* to dental care is identified and then integrated into a *'propensity related treatment need'*. This study used financial status to illustrate *'accessible treatment need'*. Older people who had financial problems were those who reported that they would have problem paying for dental treatment.

Therefore, an *'accessible treatment need'* is the treatment need derived from a combination of normative treatment need, perceived oral impacts, behavioural factors and financial status. Subjects who had an *'accessible treatment need'* were those who did not have problems paying for dental

services. Older individuals who had *'non-accessible treatment need'* were those having financial problems using dental services.

4.6 Examination sites and equipment

A separate room in the Senior Day Centre, municipality communities centre, a courtyard or a corner in the temple and the old people's home were used as the examination and interview sites. A portable dental chair was used in an upright position when examination were done in a temple in a municipality community and at the Senior Day Centres. This portable dental chair allowed the older people to lean back more comfortably during the oral examination. It was decided to use any comfortable chair when examining the older people in their homes. Portable rechargeable head lamps (Sunshine Rechargeable Flashlight, Model 312A, Thailand) were used for all subjects.

4.7 Examiner bias

4.7.1 Inter-examiner reliability

To reduce the inter-examiner variation, training sessions were conducted before the actual survey.

Training session

Two dentists did the clinical examinations. The training sessions about the criteria were done prior to the actual field work to try to standardise scoring. The training session was conducted during July 1995 at the Faculty of Dentistry. Two examiners, the author and one other, a lecturer from Department of Community Dentistry (N.K), took part in the training. The

examiners examined the same subjects and areas of disagreement were discussed and subjects re-examined. The sessions were done in the same environment as the actual field work. For example the same light condition and patient position. Three sessions were needed to clarify the criteria of clinical diagnosis. One session was done at the municipality community centre to test it in the fieldwork atmosphere.

A minimum of 20 dentate and 10 edentulous subjects were examined by both dentists to measure inter-examiner reliability during the pilot study. The Kappa statistic of inter-examiner reliability was calculated on DMFT for coronal and root caries and tooth wear for coronal and cervical area. The Kappa statistics during the pilot study ranged from 0.84-0.96. There was high agreement between the two dentists.

4.7.2 Intra-examiner reliability

Clinical examination

Since it was not practical to re-examine every 10th subject to test for intra-examiner reliability, re-examination sessions were organised with three groups of subjects. These three groups were two groups from the municipality centre and one from the senior day centre. A total of 49 subjects were re-examined during the data collection period; 39 dentate and 10 edentulous subjects. The re-examination was scheduled not later than 3 weeks after the original examination for each subject. Subjects who had some dental treatment during that period were excluded from the re-examination process.

The Kappa statistics for intra-examiner were calculated on mobility, DMFT for coronal and root caries, treatment need for crown and treatment need for root caries. The Kappa statistic for total subjects ranged from 0.92 to 0.98. When the Kappa statistics was calculated for dentate subjects, the Kappa ranged from 0.91 to 0.97. The Kappa revealed high consistency for each examiner.

Intra-examiner variability for the interview

One re-interview session was organised at the senior day centre. The re-interview session was 3 weeks after the initial interview. 51 subjects were included in the re-interview session. Subjects were re-interviewed for the questions on chewing performance, Oral Impact of Daily Performance (OIDP) and perceived treatment need.

The Kappa statistic for intra-examiner reliability for chewing performance, OIDP and perceived treatment need were 0.64, 0.69 and 0.53 respectively.

4.7.3 Pilot study

The pilot study was conducted to test the feasibility of the interview and the clinical examination. A group of 30 older people living in a municipality community were selected in a pilot study for clinical examination and interview.

Interview and questionnaire

The full questionnaire was piloted on the same group of subjects. Understanding, phrasing and sequence of questions were checked. Small modifications or adjustments were performed to achieve better understanding of the questionnaires and to achieve better answers.

4.8 Data entry, verification, cleaning and consistency check

Data from the survey was entered by two secretaries at the Faculty of Dentistry, Chiang Mai University, Thailand. The clinical data were entered directly into the statistical programme SPSSx for Windows Version 6.0 (SPSS Inc., Chicago Illinois). The questionnaire data were entered to a SURVEY programme (Center of Disease Control, Atlanta, Georgia) provided by the Research Institute for Health Science, Chiang Mai University. The SURVEY programme gave an advantage for entry of the questionnaire data especially for the questionnaire with several skip patterns. Then the questionnaire file was converted into SPSSx for Windows programme.

Data cleaning and verification took place at two stages.

1. All clinical and questionnaire forms were checked by the author daily after the examination and interview. This was to ensure that every box was completed, and that all the variables had been entered correctly. Any unclear or missing data were sorted out between the two examiners.
2. At data entry stage all forms were entered by one secretary and cross-checked by the other. Any inconsistencies between entries were corrected by the author.

4.9 Data analysis

Descriptive level

The clinical and questionnaire data were analysed using descriptive statistics on sample distribution, demographic background, oral health status, perceived impacts of oral health problems, oral health behaviour and general health status.

Analytical level

Bivariate and multivariate statistics were used to analyse the relationship between normative treatment need, perceived treatment need with selected clinical and social variables. The relationship between OIDP scores and clinical, social variables, normative and perceived treatment need were also analysed.

Some demographic variables were categorised into binary variables for analysis purpose as follows:

Marital status:	Married = Married
	Not married = Single, widow, divorced/separated
Educational level:	High = > 4 years
	Low = ≤ 4 years
Income:	High = > 1500 baht/month
	Low = ≤ 1500 baht/month

see social class descriptor ≤ 1500 baht

Illustrative level

In Chapter 10, general health factors such as nutritional status, specific medical conditions, selected factors affecting dental service utilisation such as finance, behavioural factors such as oral hygiene practice were integrated into normative treatment need for prosthodontic and periodontal disease. Each variable integrated into the model illustrates the change in number and percentage of subjects who need treatment at different levels of treatment need. Several models in Chapter 10 will illustrate the percentage of subjects who had different levels of dental treatment needs.

CHAPTER 5

RESULTS

DEMOGRAPHIC BACKGROUND, CLINICAL ORAL HEALTH STATUS AND PROPENSITY FOR HEALTH BEHAVIOURS

In this chapter, Section 5.1 describes the response rates and demographic backgrounds of the study population. Section 5.2 presents the results of descriptive analysis of clinical oral health status in dentate and edentulous subjects. Sections 5.3, 5.4 and 5.5 cover the descriptive data on dental service utilisation, propensity for health behaviours as well as financial problems of the study population.

5.1 Response rates and demographic background

5.1.1 Response rates

779 subjects were contacted (Table 5.1). Among the total 779 contacted older subjects, fifty-eight of them refused to take part in the examination and 14 were classified as incomplete cases (Table 5.1). These incomplete cases had been interviewed but refused to wait for the clinical examination. 707 subjects had both clinical examinations and interviews. The overall response rate was 90.8%. The response rate was very high in older subjects recruited from the senior day centres and from their own homes (99.3%). The group which had the lowest response rate (78.1%) was older people from the municipality community centres.

The final sample size with supplemented edentulous subjects were 707. The number was higher than the estimated sample of 560 (Table 5.2). There were two reasons for examining more subjects than proposed. First, at the Senior Day Centre organised by the Faculty of Nursing, the author was asked to examine all the older people who participated in the annual health check week. Thus, 369 subjects were included instead of 280 as estimated for the

Club Member Group (Table 5.2). Second, it was decided to recruit more edentulous individuals to get a sample of 144 edentulous subjects (See Chapter 4). When the subjects in all social classes were examined, there was only 74 edentulous subjects. 84 more edentulous individuals were then invited to participate in the study. Thus the total of 707 subjects were participated in the study of whom 158 were edentulous. 369 subjects were club members and 338 subjects were household group.

5.1.2 Demographic background

The demographic and general background of the subjects examined is summarised in Table 5.3. Seven hundred and seven older people were examined during July 1995 to January 1996. After excluding the supplemented edentulous group, the total number of subjects was 623. Of the total 623 subjects, 62.1% were females, and the average age for the group was 67.2 (± 4.9) years. There were more female than male subjects (62.1% compared to 37.9%). About half of them were married. 74% had education less than or equal to 4 years and about 20% of the subjects never attended school. The majority had a monthly income between 1,500-5,000 baht (£38-£125).

Before the retirement age of 60 years, 36.2% of the subjects were self-employed, about 20.4% had earned their living from agriculture, 17.8% had been employed by the government, 16.2% were employees, and about 10% had stayed at home, usually as housewives. At the time of investigation, 20.5% of the subjects were still actively working.

Approximately 54% were members of a Senior Day Centre or other type of social club. About 27% of them did not have any health care support. 31.6% of them were entitled to the government elderly health support scheme.

5.2 Clinical Findings

5.2.1 Dentate subjects

Number of teeth

The majority of dentate subjects (52.4%) had 21 or more teeth (Table 5.4). 18.9% of subjects had 28 or more sound natural teeth. 47.6% had less than 20 sound teeth. The average number of sound and functional teeth were 19.3 (±8.6) and 20.1 (±8.6) respectively (Table 5.4). The number of functional teeth was defined as the aggregate of filled (otherwise sound) and sound teeth (Sheiham et al, 1987).

Decayed and filled crowns and roots

The mean DMFT was 12.7 (± 8.6) of which the missing component was 10.8 teeth per person and the mean DFT was only 1.9 (±3.2) (Table 5.5). More than one-third (41.2%) had dental caries. Most of the carious lesions were on crowns, and most of the decay was primary, not recurrent. About 95% of the subjects had missing teeth while only 20% had one or more teeth filled. Root caries was diagnosed in only 11.1% of the subjects. Only 9.3% of the root decay was filled (Table 5.5).

Periodontal condition

Subjects who had any heart related problems were excluded from periodontal assessment. Periodontal condition was analysed in 512 subjects. 22.3% had deep periodontal pockets of 6 mm or more (Table 5.6). A very high proportion (72.5%) had one or more teeth with loss of attachment 6 mm or more. 36.7% had one or more teeth with attachment loss of 9mm or more. Around 63% had one or more mobile teeth. Mean number of teeth affected per person for deep periodontal pocket, loss of attachment 6 mm or more, loss of attachment 9 mm or more and mobile teeth were 0.8, 4.8, 1.0 and 3.1 respectively (Table 5.6).

Tooth wear

62.5% of the sample had cervical wear and 91.8% had coronal wear. On average about 4 teeth per person had cervical wear while 14 teeth had coronal wear (Table 5.7).

5.2.2 Edentulous subjects

Edentulousness

The percentage of edentulous in original edentulous group was 11.9%. This figure represents the actual prevalence of edentulousness in the original 623 population studied. It did not include the supplemented edentulous group (Table 5.8). Table 5.8 describes the demographic characteristics of edentulous subjects in the original and the total groups. The proportion of edentulous subjects in each demographic variables were similar. In both groups, the majority had lower education, had lower income, had some kind of health

care support and were some attender to dental services. There were similar proportions between sex and marital status (Table 5.8).

5.3 Dental service utilisation

Approximately 23% of the older people had not seen a dentist in the past year, 25.3% had seen a dentist during the last year (Table 5.9). Among those who had seen a dentist, the majority had seen a dentist during the last 5 years (60.5%). Most dentate and edentate subjects usually went to see a dentist only when having trouble.

5.4 Propensity for health behaviours

Smoking habits

More than half of the 623 subjects (55.7%) were non-smokers (Table 5.9). 20.2% were current smokers and 24.1% were ex-smokers.

Oral cleanliness

In dentate individuals, the majority (88.5%) brushed their teeth more than once a day (Table 5.9). 3.3% stated that they never brush their teeth. In edentate subjects who wore dentures, 70.3% said they cleaned their dentures more than once a day. 27.0% of the edentates never cleaned their dentures.

Sugar consumption

When asking the older people if they added sugar to food, 29.7% never added sugar to food (Table 5.10). 46.6% of the subjects added sugar into food regularly. 63.1% of the sample added sugar to coffee or tea while 29.7% did

not drink coffee or tea. Eating sweets was not a common practice in this population. 62.4% did not eat any sweets.

5.5 Enabling factors

Access to dental services

Most of the older subjects (67.3%) travelled 1-5 kilometres to see a dentist. 23.3% travelled less than one kilometre to see a dentist whilst 5.2% had to travel more than 15 kilometres to see a dentist (Table 5.11). The most common mode of transportation to see a dentist was public transport by either a bus or minibus (34.4%). 21.0% could walk to see a dentist, 15.5% could drive themselve to see a dentist, 12.6% needed someone else to drive them to see a dentist. 9.0% needed someone to accompany when using public transportation. About 7.8% had dentist come to their home for treatment.

Most of them (89.5%) reported that the journey to see a dentist was a very easy journey (Table 5.11). Only 0.2% said that they had a fairly difficult journey to see a dentist.

Financial problems

43.7% said they would have problem paying for dental treatment (Table 5.11). Within this group, the majority of them (29.4%) would be able to pay comfortably less than 500 baht (£12) per treatment. Most of them (48.5%) were responsible for their own payment while about 40% had support from their family.

Table 5.1 Response rates of studied subjects, by place of recruitment

	Number of subjects				
	Contacted	**Refused**	**Incompleted cases**	**Final sample size with supplemented edentulous subjects**	**Response rates**
Total sample	779	58	14	707	90.8%
Senior day centre	298	2	5	296	99.3%
Municipality community	203	45	2	168	78.1%
Household (Tambon)	150	1	-	149	99.3%
Temple	104	10	7	94	84.7%

Table 5.2 Proposed and final sample size by social classes and social activities

	Proposed sample size	**Final sample size**	**Final sample size with supplemented edentulous subjects**
Total sample	560	623	707
Club member			
Total	280	335	369
Social class			
High	70	97	103
Middle	70	120	136
Low	140	118	130
Household group			
Total	280	288	338
Social class			
High	70	51	67
Middle	70	78	93
Low	140	159	178

Table 5.3 The distribution of 623 respondents by demographic variables, social activity and health care support

Variables	n	%
Sex		
Male	236	37.9
Female	387	62.1
Age		
Mean age (s.d)	67.2 (± 4.9)	
Marital status		
Single	29	4.7
Married	315	50.6
Widow	259	41.6
Divorced/Separated	20	3.2
Educational level		
no education	118	18.9
4 yrs or lower	343	55.1
5-10 yrs	86	13.8
10 yrs and higher	76	12.2
Personal income (in baht)		
no income	100	16.1
<1,500	177	28.4
1,500-5,000	198	31.8
>5000	148	23.8
Present working status		
Actively working	128	20.5
Not working	495	79.5
Previous occupation		
Government officer	111	17.8
Self-employed	226	36.2
Employee	101	16.2
Agriculture	127	20.4
Housework and other	58	9.3
Club member		
Yes	337	54.1
No	286	45.9
Health Care Support		
None	169	27.1
Low income support	3	0.5
Government or company support	224	36.0
Health volunteer card & military support	30	4.8
Elderly health support	197	31.6

Table 5.4 Percent of dentate respondents with sound and functional teeth

	Sound teeth	**Functional teeth**
Mean number of teeth (s.d)	19.3 (± 8.6)	20.1 (± 8.6)
% of subjects with 28 teeth or more	18.9% (n=104)	22.4% (n=123)
% of subjects with 21 teeth or more	52.4% (n=288)	58.7% (n=322)
% of subjects with 11-20 teeth	29.0% (n=159)	23.5% (n=129)
% of subjects with 1-10 teeth	18.6% (n=102)	17.8% (n=98)

Table 5.5 Decayed, filled, missing teeth and surfaces and percentage of coronal and root surfaces affected in dentate subjects

	Coronal caries	**Root caries**
Mean (s.d) DMFT DFT	 12.7 (± 8.6) 1.9 (± 3.2)	 0.5 (± 1.6)
% of people affected Decayed Filled Missing	 41.2% 20.4% 94.5%	 11.1% 9.3%
Mean (s.d) Mean # of decayed teeth (s.d) Mean # of filled teeth (s.d) Mean # of missing teeth (s.d)	 1.1 (± 2.5) 0.8 (± 2.2) 10.8 (± 8.7)	 0.2 (± 0.6) 0.3 (± 1.4)
Mean (s.d) DMFS DFS	 60.5 (± 42.7) 6.3 (± 12.2)	 1.6 (± 6.2)
Mean (s.d) Mean # of decayed surfaces (s.d) Mean # of filled surfaces (s.d) Mean # of missing surfaces (s.d)	 4.4 (± 11.0) 2.0 (± 6.4) 54.2 (± 43.3)	 0.2 (± 1.2) 0.3 (± 1.6)

Table 5.6 Periodontal conditions in 512 dentate subjects

	% affected	**Mean number of teeth affected (s.d)**	**Range**
Deep pockets* (6+ mm)	22.3	0.8 (2.5)	0-25
LOA[a] ≥ 6mm*	72.5	4.8 (5.4)	0-28
LOA[a] ≥ 9mm*	36.7	1.0 (1.8)	0-12
Mobile teeth*	62.9	3.1 (3.8)	0-23

[a] loss of attachment
* at least in one tooth

Table 5.7 Percentage of subjects with wear on teeth and mean number of teeth with cervical and coronal wear

	Cervical wear	**Coronal wear**
% with wear on teeth	62.5% (n=343)	91.8% (n=504)
Mean # of teeth with wear (s.d)	3.6 (4.7)	14.1 (10.2)

Table 5.8 Numbers and percentages of original and total edentulous subjects by demographic characteristics

Demographic variables	**Original edentulous subjects (n=74) numbers (%)**	**Total edentulous subjects (n=158) numbers (%)**
Prevalence of edentulousness	74 (11.9)	158 (22.3)
Sex		
Male	40 (54.1)	80 (50.6)
Female	34 (45.9)	78 (49.4)
Marital status		
Married	37 (50.0)	76 (48.1)
Not married	37 (50.0)	82 (51.9)
Personal income		
Low	56 (75.7)	118 (74.7)
High	18 (24.3)	40 (25.3)
years of schooling		
≤ 4 yrs	55 (74.3)	129 (81.6)
> 4 yrs	19 (25.7)	29 (18.4)
Dental utilisation pattern		
Attender	62 (83.8)	126 (79.7)
Non-attender	12 (16.2)	32 (20.3)

Table 5.9 Dental service utilisation, propensity for health behaviours and enabling factors of 623 subjects

	Persons (%)
Dental service utilisation	
Last dental visit	*n = 623*
Never	145 (23.3)
>20 years	23 (3.7)
<10-20 years	43 (6.9)
< 5-10 years	35 (5.6)
<5 years	219 (35.2)
<1 years	158 (25.3)
The reasons for dental visits (in dentate)	*n = 549*
Regular check up	5 (0.9)
Occasionally	6 (1.1)
Only when having trouble	405 (73.8)
Never seen dentists	133 (24.2)
The reasons for dental visits (in edentate)	*n = 74*
Regular check up	0 (0.0)
Occasionally	0 (0.0)
Only when having trouble	62 (83.8)
Never seen dentists	12 (16.2)
Propensity for heaith behaviours	*n = 623*
Smoking habit	
Current smoker	126 (20.2)
Non-smoker	347 (55.7)
Ex-smoker	150 (24.1)
Oral cleanliness	*n = 549*
Cleaning teeth (In dentate)	
Brush more than once a day	486 (88.5)
Brush less than once a day	43 (7.8)
Brush once or twice a week	2 (0.4)
Never brush	18 (3.3)
Cleaning denture (In edentate)	*n = 74*
Clean denture more than once a day	52 (70.3)
Clean denture less than once a day	2 (2.7)
Never clean denture	20 (27.0)

Table 5.10 The sugar consumption in 623 subjects

	Persons (%)
Sugar consumption	*n* = 623
Add sugar to food	
Never	185 (29.7)
Rarely	86 (13.8)
Occasionally	62 (10.0)
Usually	290 (46.6)
Add sugar to coffee or tea	
Yes	393 (63.1)
No	31 (5.0)
Use sweetener	14 (2.2)
Do not drink coffee or tea	185 (29.7)
Number of times having sweets the day before the interview	
None	386 (62.4)
1	182 (29.2)
2	29 (4.7)
>2	23 (3.7)

Table 5.11 Enabling factors of 623 older people

	Persons (%)
Enabling factors	
Access to dental service	
(only in those seen the dentist in past 5 years)	
(n = 477)	
Distance to travel to see dentist	
< 1 km	111 (23.3)
1-5 km	210 (44.0)
6-10 km	32 (6.7)
11-15 km	24 (5.0)
15 + km	25 (5.2)
Home visit by dentist	39 (8.2)
Others	36 (7.5)
Mode of transportation to see a dentist	
Walk	100 (21.0)
Car driven by subjects	74 (15.5)
Care driven by someone else	60 (12.6)
Bus/minibus by themselve	121 (25.4)
Bus/minibus accompany by others	43 (9.0)
Bicycle	6 (1.3)
Home visit by dentist	37 (7.8)
Others	36 (7.5)
The ease of the journey to see a dentist	
a very easy journey	427 (89.5)
a fairly easy journey	13 (2.7)
a fairly difficult journey	1 (0.2)
a very difficult journey	0 (0.0)
Others	36 (7.5)
Financial situation	*n = 623*
Problem paying for dental treatment	
Yes	272 (43.7)
No	351 (56.3)
Amount comfortably pay for treatment (in those having problem with payment)	
(n = 272)	
less than 100 baht	80 (29.4)
100-500 baht	97 (35.7)
501-1000 baht	49 (18.0)
1001-2000 baht	36 (13.2)
2001-5000 baht	10 (3.7)
How to finance dental treatment	
Own support	302 (48.5)
Family support	252 (40.4)
Government support	42 (6.7)
Social or income support	24 (3.9)
No support	3 (0.5)

CHAPTER 6

NORMATIVE AND PERCEIVED DENTAL TREATMENT NEED

This chapter describes normative and perceived treatment need for different dental treatments in dentate and edentulous older people. Normative treatment need was assessed during the clinical examination. Criteria for normative treatment need were presented in Chapter 4. Perceived dental treatment need derived from the interview from the direct question on whether subjects perceived they needed any kind of treatment.

6.1 Normative dental treatment need

Edentulous subjects

Normative treatment need for prosthetics in edentulous subjects was mainly the replacement or repair of both upper and lower full denture (40.5%) (Table 6.1). 27.0% needed to have new dentures fabricated in both upper and lower arches.

Dentate subjects and dentate subjects with one edentulous arch

In dentate subjects, the major normative need for prosthetics was new partial denture in both arches (23.1%). 31.3% needed new full denture in upper arch and new partial denture in lower arch (Table 6.2). 4.7% needed replacement or repair of existing partial denture in both arches.

In dentate subjects who had one edentulous arch, 31.3% needed new full dentures in upper arch and new partial dentures in lower arch. In the same group, 11.9% needed new full dentures in lower arch and new partial dentures in upper arch (Table 6.2).

6.2 Comparison between normative and perceived dental treatment need

The distribution of several categories of normative and perceived treatment needs in the population is shown in Table 6.3. A big discrepancy between normative and perceived need is noted in all categories.

Edentulous subjects

Prosthodontic treatment need

The normative need for new, replacement or repair full denture in original edentulous subjects was 85.1%. In other words, only 15% of the edentulous population had a clinically satisfactory full denture. 24.3% of the original edentulous subjects perceived a need for new, replacement or repair of full dentures. A similar finding of high discrepancy between normative and perceived need was found in total edentulous subjects (79.7% vs 22.8%) (Table 6.3).

Dentate subjects

Prosthodontic treatment need

The normative need for partial denture in dentate subjects was high (60.7%). Only 8.4% of the dentate subjects thought they needed new, replacement or repair of partial dentures. 15.3% had normative treatment need for new, replacement or repair of full and partial denture but only 0.7% of this group had perceived need for the same treatment (Table 6.3).

Restorative treatment need

Only 11.7% of the dentate subjects required any restorative treatment. Perceived need for restoration was about half of the normative need (6.0%) (Table 6.3). Very few older people needed crowns or bridges (3.3%). Only 1.3% perceived that they needed crowns or bridges (Table 6.3).

Periodontal treatment need

The major normative need for any type of treatment in the dentate population was for dental scaling (77.8%). Only 7.6 % of those considered to be in need for scaling thought that they required scaling (Table 6.3). 72.5% needed periodontal treatment including root planing while none of the subjects perceived that they needed periodontal treatment. Therefore, only perceived need for scaling was used in subsequent analysis (Table 6.3).

Treatment need for extraction

28.6% of the dentate subjects needed extraction of one or more teeth (Table 6.3). Only 7.6% of them perceived that they needed teeth to be extracted.

6.3 The association between perceived need and social variables

6.3.1 Edentulous subjects

Perceived need for full denture

A slightly higher proportion of female edentulous subjects had perceived needs for full denture compared to the male subjects (Table 6.4). A higher proportion of edentulous subjects who had perceived need for full denture were married and had more than 4 years of education (Table 6.4). The higher

proportion of edentulous subjects who had perceived need for full denture were sometimes attender of dental services (Table 6.4).

6.3.2 Dentate subjects

There were some significant association between perceived need for dental treatment by some demographic variables (Table 6.5).

Perceived need for any type of dental treatment

When dentate subjects were categorised as having a perceived need for any kind of dental treatment or not, there were no significant differences between perceived need for any type dental treatments and some demographic variables (Table 6.5).

Perceived need for partial dentures

The proportion of subjects with perceived need for partial denture was significantly higher among those who were not married and were some attender of dental services ($p<0.05$) (Table 6.5).

Perceived need for extractions

A larger proportion of the older subjects who were married, had more than 4 years of education, had lower income, had health care support, and who were some attender of dental services perceived the treatment need for tooth extraction. This association was not statistically significant (Table 6.5).

Perceived need for restorations

There were significant differences between perceived need for restoration and several demographic variables. Those who had perceived need were more likely to have higher education ($p<0.05$), had higher income ($p<0.001$) and were some attender of dental services ($p<0.05$) (Table 6.5).

Perceived need for dental scaling

Dentate subjects with higher income and higher education were more likely to have perceived need for dental scaling ($p<0.05$) (Table 6.5).

6.4 The association between perceived dental treatment need and types of tooth loss in dentate subjects

Perceived need for any types of dental treatment

There were no significant differences between perceived need for any type of dental treatment and types of tooth loss (Table 6.6).

Perceived need for partial denture

The proportion of subjects with perceived need for partial denture was significantly higher among those who had missing some anterior teeth ($p<0.05$), had higher number of missing posterior teeth ($p<0.001$) and had posterior occlusal pairs (POPs) equal or less than four POPs ($p<0.001$) (Table 6.6).

Perceived need for extraction

The proportion of subjects with perceived need for extraction was significantly higher among those who had missing some anterior teeth ($p<0.05$) and had higher number of missing posterior teeth ($p<0.05$) (Table 6.6).

Perceived need for restoration

There was an association between perceived need for restoration and tooth loss in posterior teeth ($p<0.05$). Those who had perceived need for restoration were more likely to have more than four posterior occlusal pairs (POPs) ($p<0.05$) (Table 6.6).

Perceived need for dental scaling

Dentate subjects who had more than four posterior occlusal pairs (POPs) were more likely to have perceived need for dental scaling ($p<0.05$) (Table 6.6).

Table 6.1 Normative prosthetic treatment need in edentulous subjects

Normative prosthetic treatment need in edentulous subjects (*n*=74)	*n*	%
New full denture		
Need new upper and lower full denture	20	27.0
Need new upper complete denture only	0	0.0
Need new lower complete denture only	0	0.0
Replacement/repair of full denture		
Need replacement/repair of upper and lower full denture	30	40.5
Need replacement/repair of upper full denture only	4	5.4
Need replacement/repair of lower full denture only	8	10.8
New and replacement/repair of full denture		
Need new lower and replacement/repair of upper full denture	1	1.4

Table 6.2 Normative prosthetic treatment need in dentate individuals and in dentate individuals with one edentulous arch

Normative prosthetic treatment need	**Dentate individuals** *(n=549)*	**Dentates with one edentulous arch** *(n=67)*
	n (%)	n (%)
New partial denture		
Need new upper and lower partial denture	127 (23.1)	0 (0.0)
Need new upper partial denture only	50 (9.1)	2 (3.0)
Need new lower partial denture only	77 (14.0)	6 (9.0)
New full and partial denture		
Need new upper full and lower partial denture	26 (4.7)	21 (31.3)
Need new lower full and upper partial denture	10 (1.8)	8 (11.9)
Replacement/repair of partial denture		
Need replacement/repair of upper and lower partial denture	26 (4.7)	0 (0.0)
Need replacement/repair of upper partial denture only	17 (3.1)	1 (1.5)
Need replacement/repair of lower partial denture only	12 (2.2)	0 (0.0)
New and replacement/repair of partial denture		
Need new upper and replacement/repair of lower partial denture	8 (1.5)	-
Need new lower and replacement/repair of upper partial denture	18 (3.3)	-
New and replacement of full and partial denture		
Need new upper full denture and replacement/repair of lower partial denture	2 (0.4)	2 (3.0)
Need new lower full denture and replacement/repair of upper partial denture	2 (0.4)	2 (3.0)
Need new upper partial denture and replacement/repair of lower full denture	0 (0.0)	0 (0.0)
Need new lower partial denture and replacement/repair of upper full denture	4 (0.7)	4 (6.0)
Replacement/repair of full denture and partial denture		
Need replacement/repair of upper full denture and lower partial denture	3 (0.5)	3 (4.5)
Need replacement/repair of lower full denture and upper partial denture	2 (0.4)	2 (3.0)

Table 6.3 Comparison between normative and perceived treatment need in dentate and edentulous subjects

Treatment	Normative treatment need	Perceived treatment need
	n (%)	*n* (%)
Total edentulous subjects *(n=158)* New or replacement/repair of full dentures	126 (79.7)	36 (22.8)
Original edentulous subjects *(n=74)* New or replacement/repair of full dentures	63 (85.1)	18 (24.3)
Dentate subjects *(n=549)* New or replacement/repair of partial dentures	333 (60.7)	46 (8.4)
New or replacement/repair of full and partial dentures	49 (15.3)	4 (0.7)
Tooth extractions	157 (28.6)	42 (7.6)
Restorations	64 (11.7)	33 (6.0)
Crown and bridge	18 (3.3)	7 (1.3)
Dentate subjects *n=512* Dental scaling	427 (77.8)	39 (7.6)
Periodontal treatment (root planing)	371 (72.5)	0 (0.0)

Table 6.4 Numbers and percentages of edentulous subjects who reported perceived need for full dentures, by demographic and social variables

Variables	Numbers (%) edentulous subjects with perceived need for full denture (n=36)
Gender	
male	18 (22.5)
female	18 (23.1)
Marital status	
Married	20 (26.3)
Not married	16 (19.5)
Education	
≤ 4 yrs	27 (20.9)
> 4 yrs	9 (31.0)
Personal income	
Low	28 (23.7)
High	8 (20.0)
Health care support	
Yes	26 (23.0)
No	10 (22.2)
Utilisation pattern	
Some attender	36 (100.0)
Non user	0 (0.0)

Table 6.5 Number and percentage of dentate subjects who reported perceived dental treatment need by demographic and social variables

	Numbers (%) of dentate subjects with different perceived needs (total dentate subjects n=549)				
Variables	**Need any treatment *(n=114)***	**Need partial dentures *(n=45)***	**Need extraction *(n=41)***	**Need restoration *(n=37)*[a]**	**Need dental scaling *(n=39)***
Sex					
male	41 (20.9)	15 (7.7)	15 (7.7)	15 (7.7)	11 (5.6)
female	73 (20.7)	30 (8.5)	26 (7.4)	22 (6.2)	28 (7.9)
Marital status					
Married	58 (20.9)	15 (5.4)*	25 (9.0)	21 (7.6)	24 (8.6)
Not married	56 (20.7)	30 (11.1)	16 (5.9)	16 (5.9)	15 (5.5)
Education					
≤ 4 yrs	88 (21.7)	30 (7.4)	29 (7.1)	19 (4.7)*	23 (5.7)*
> 4 yrs	26 (18.2)	15 (10.5)	12 (8.4)	18 (12.6)	16 (11.2)
Personal income					
Low	94 (22.4)	33 (7.9)	36 (8.6)	20 (4.8)**	24 (5.7)*
High	20 (15.4)	12 (9.2)	5 (3.8)	17 (13.1)	15 (11.5)
Health care support					
Yes	91 (22.6)	34 (8.5)	33 (8.2)	32 (8.0)	29 (7.2)
No	23 (15.6)	11 (7.5)	8 (5.4)	5 (3.4)	10 (7.2)
Utilisation pattern					
Some attender	82 (19.8)	42 (10.1)*	36 (8.7)	34 (8.2)*	33 (8.0)
Non user	32 (23.7)	3 (2.2)	5 (3.7)	3 (2.2)	6 (4.4)

*$p < 0.05$ (Chi-square test)
**$p < 0.001$ (Chi-square test)
[a] included need for fillings, crown and bridge and pulp care

Table 6.6 Number and percentage of dentate subjects who reported perceived dental treatment need by type of tooth loss

	Numbers (%) of dentate subjects with different perceived needs (total dentate subjects n=549)				
Variables	**Need any treatment *(n=114)***	**Need partial denture *(n=45)***	**Need extraction *(n=41)***	**Need restoration *(n=37)*[a]**	**Need dental scaling *(n=39)***
Tooth loss Anterior teeth					
No missing	48 (20.7)	10 (4.3)*	11 (4.7)*	20 (8.6)	20 (8.6)
Missing 1-12 teeth	66 (20.8)	35 (11.0)	30 (9.5)	17 (5.4)	19 (6.0)
Tooth loss Posterior teeth					
No missing	7 (17.9)	2 (5.1)##	0 (0.0)#	3 (8.1)*	2 (5.1)
Missing 1-10 teeth	71 (21.0)	16 (4.7)	22 (6.5)	30 (81.1)	30 (8.9)
Missing 11-20 teeth	36 (20.9)	27 (15.7)	19 (11.0)	4 (10.8)	7 (4.1)
Posterior occlusal pairs (POPs)					
≤ 4 POPs	57 (22.6)	35 (13.9)**	24 (9.5)	10 (4.0)*	10 (4.0)*
> 4 POPs	57 (19.2)	10 (3.4)	17 (5.7)	27 (9.1)	29 (9.8)

*$p < 0.05$ (Chi-square test)
**$p < 0.001$ (Chi-square test)
# $p < 0.05$ (Chi-square test for trends)
$p < 0.001$ (Chi-square test for trends)
[a] included need for fillings, crown and bridge and pulp care

CHAPTER 7

THE ORAL IMPACT ON DAILY PERFORMANCES (OIDP), THE RELATIONSHIP BETWEEN OIDP SCORES, SOCIAL VARIABLES, TREATMENT NEED AND ORAL HEALTH OF OLDER PEOPLE

This chapter is divided into four parts. The first section (Section 7.1) presents the descriptive information on the incidence of oral impacts assessed by using the socio-dental indicator: the Oral Impact on Daily Performances (OIDP) index. The remaining three parts show the relationship between OIDP scores and different variables. Section 7.2 covers the relationship between OIDP scores and social variables. Sections 7.3 and 7.4 presents the relationship between OIDP scores and perceived dental treatment need and oral health of older people.

7.1 The Oral Impacts on Daily Performances (OIDP)

7.1.1 Incidence of impacts

Total subjects

Of the total 623 subjects, 371 (52.8%) had at least one daily performance affected by an oral impact during the past 6 months. The oral impact which affected the older people the most was the physical performance: eating. About half the subjects had eating problems. The psychological performances: emotional stability or ability to maintain usual emotional state without being irritable affected 26.8% of the sample. Smiling, laughing and showing teeth without embarrassment was found to affect 13.8% of the sample. Inability to speak and pronounce clearly occurred in 9.8%. The other performances were found to have some effects in less than 10% of the sample. The oral impact which had the least effect in the physical performance was: doing light physical activities such as house work or walking (Table 7.1).

Dentate and edentulous subjects

The highest incidence of performances affected in both dentate and edentulous subjects was eating. 45% of dentate subjects and 63.5% of edentulous subject had oral impacts from eating. The daily performances which affected more dentate subjects than edentulous subjects were smiling, sleeping and relaxing, cleaning teeth, and performing physical activities (15.3% vs 2.7%, 6.0% vs 1.4%, 2.2% vs 0%, 1.5% vs 0%). Eating, speaking and enjoying contact with people affected more edentulous compared to dentate subjects (63.5% vs 45.0%, 14.9% vs 9.1%, 6.8% vs 4.4%) (Table 7.1).

7.1.2 Main symptoms and main oral impairments causing oral impacts

The two main symptoms which caused oral impacts on daily performances in the total sample were functional limitation and pain. Functional limitation was the main causal symptom for speaking (93.4%) and eating (88.1%) (Table 7.2). Pain was the main causal symptom for sleeping and relaxing (100%), cleaning teeth (91.7%), performing physical activities (87.5%), contact with people (51.7%) and emotional stability (46.7%) (Table 7.2).

Missing teeth and loose tooth were the major causal impairments for almost all aspects of performances. The only exception was for cleaning teeth, in which the major causal impairment was gum abscess.

7.2 The relationship between OIDP scores and social variables

In order to assess the relationship between different levels of OIDP scores, social and clinical variables, levels of OIDP scores were divided into 4 groups. In this study, after analysing the frequency distribution of total OIDP scores of more than zero and the 50th percentile, the OIDP value above and below which one-half of the subjects fall was 7.5. It was decided to use the full integer of 8 as a first cut-off point (percentile 55) and 16 (percentile 82) as a second cut-off point. Appendix 6 gives examples of the oral conditions and the detail information concerning oral impacts on daily performances in older individuals with different OIDP scores.

The OIDP score which half of the subjects had some kind of impacts lay between 0.1-7.9. Thus, the OIDP score was divided into 4 groups: the zero group, the low OIDP impact group (OIDP score 0.1-7.9), the moderate OIDP impact group (OIDP score 8.0-15.9), and the high OIDP impact group (any score more than 16.0).

The chi-square test for trends was used for bivariate analysis between different level of OIDP scores and social variables. There were significant differences between subjects with different OIDP scores by low and high incomes ($p<0.001$) and by dental attendance ($p = 0.02$) (Table 7.3). Individuals with high income were more likely to have lower OIDP score (OIDP = 0 and OIDP = 0.1 to 7.9) while the low income counterparts were more likely to have higher OIDP score (OIDP = 8 and above). Subjects who had seen dentists were more likely to have no oral impact (OIDP = 0) or lower oral

impacts scores compared to those who had never seen dentists. There was no significant differences between marital status and different OIDP scores.

7.3 The relationship between OIDP scores and clinical variables

Table 7.4 presents the relationship between categories of OIDP score and clinical variables. There was a significant difference between OIDP scores in dentate and edentulous subjects ($p = 0.002$), in those with some mobile teeth and those who did not have any mobile teeth ($p = 0.005$), in those with loss of periodontal attachment and those without periodontal attachment loss ($p<0.001$), in those who had no missing anterior teeth and those who had some anterior teeth missing ($p<0.001$), and in those who had no missing posterior teeth, those missing 1-10 posterior teeth and those missing 11-20 posterior teeth ($p<0.001$).

A higher proportion of edentulous individuals perceived oral impacts (OIDP score < 0) compared to dentate subjects. A higher proportion of older individuals with no perceived oral impacts had no mobile teeth. The proportion of subjects with low oral impacts (OIDP 0.1 to 7.9) were similar whether they had mobile teeth or not. But a greater proportion of subjects had higher OIDP scores when they had one or more mobile teeth. Older people with some teeth with attachment loss of more than 6 mm had highly significant differences in OIDP score compared to those without attachment loss ($p<0.001$).

Highly significant differences in OIDP score were found in older individuals who have lost anterior or posterior teeth and those without tooth loss ($p<0.001$). A higher proportion of older people who had no missing either in anterior or posterior teeth had no perceived oral impacts (OIDP score = 0). In posterior teeth, the more the number of missing teeth, the higher the proportion of older individuals with higher OIDP scores (Table 7.4).

7.4 The relationship between OIDP scores and perceived treatment need

In edentulous subjects, highly significant differences were found between OIDP scores in those who perceived that they needed treatment for full dentures in both total and original edentulous subjects ($p<0.001$). In both edentulous groups, a higher proportion of those who had no perceived dental treatment need for full dentures had no oral impact (OIDP score = 0), or had lower oral impact (OIDP score 0.1 to 7.9) compared to their counterparts who had perceived treatment need. The proportion of edentulous subjects who perceived the need for full dentures was significantly increased as the OIDP scores increased (Table 7.5). For example, among edentulous subjects who had OIDP score $\geq$ 16, 30.6% of them perceived the need for full denture treatment compared to only 7.4% of those who did not perceived the need.

In dentate subjects, there was a significant difference between the proportion of subjects who perceived that they needed some form of dental treatment and different categories of OIDP scores ($p = 0.044$) (Table 7.5). Older people who perceived they need some kind of treatment, who perceived the need for

partial denture, who perceived a need for tooth removal and those who perceived a need for dental scaling were more likely to have a OIDP score of 8 and above compared to those who did not perceive the need ($p<0.05$).

Higher proportions of dentate subjects who had no perceived need for any kind of partial dentures, for tooth extraction and for dental scaling had no oral impacts (OIDP score = 0) compared to those who perceived the need for the same dental treatment. No significant differences were found between those who perceived they needed restorative treatment and different OIDP scores.

Table 7.1 The incidence of oral impacts on different daily performances in dentate, edentulous and total subjects

Daily Performances	***n* (%) person affected**		
	dentate ***n* = 549**	**edentulous** ***n* = 74**	**Total subjects** ***n* = 623**
Physical performances			
1. Eating	247 (45.0)	47 (63.5)	294 (47.2)
2. Cleaning teeth	12 (2.2)	0 (0.0)	12 (1.9)
3. Speaking	50 (9.1)	11 (14.9)	61 (9.8)
4. Perform physical activities	8 (1.5)	0 (0.0)	8 (1.3)
Psychological performances			
5. Sleeping and relaxing	33 (6.0)	1 (1.4)	34 (5.5)
6. Smiling	84 (15.3)	2 (2.7)	86 (13.8)
7 Emotional stability	153 (27.0)	14 (18.9)	167 (26.8)
Social performances			
8. Contact with people	24 (4.4)	5 (6.8)	29 (4.7)
Total	**323 (58.8)**	**48 (64.9)**	**371 (52.8)**

Table 7.2 Main symptoms and oral impairments causing oral impacts on daily performances in those with one or more impacts

Daily performances	**Main symptoms relating to oral impacts**			**Main oral impairments causing oral impacts**		
		n	%		*n*	%
Physical performances						
1.Eating (n = 294)	Functional limitation	259	88.1	Missing teeth	177	60.2
				Wearing denture	37	12.6
	Pain	22	7.5	Loose tooth	22	7.5
	Discomfort	11	3.7	Loose denture	19	6.5
2.Cleaning teeth (n = 12)	Pain	11	91.7	Gum abscess	5	41.7
				Loose tooth	3	25.0
				Tooth decay	2	16.7
3. Speaking (n = 61)	Functional limitation	57	93.4	Missing teeth	52	85.2
				Loose denture	4	6.6
				Wearing denture	3	4.9
4. Perform physical activities (n = 8)	Pain	7	87.5	Loose tooth	5	62.5
	Discomfort	1	12.5	Toothache	2	25.0
				Gum abscess	1	12.5
Psychological performances						
5. Sleeping and relaxing (n = 34)	Pain	34	100	Loose tooth	22	64.7
				Toothache	6	17.6
				Gum abscess	3	8.8
6. Smiling (n = 86)	Dissatisfaction with appearance	81	94.2	Colour of teeth	31	36.0
				Missing teeth	30	34.9
				Position of teeth	15	17.4
				Denture appearance	3	3.5
7 Emotional stability (n = 167)	Pain	78	46.7	Loose tooth	49	29.3
	Functional limitation	48	28.7	Missing teeth	30	18.0
				Loose denture	13	7.8
	Discomfort	35	21.0	Wearing denture	13	7.8
Social performances						
8. Contact with people (n = 29)	Pain	15	51.7	Loose tooth	9	31.0
	Functional limitation	5	17.2	Missing teeth	4	13.8
				Bad breath	3	10.3
	Discomfort	5	17.2	Gum abscess	3	10.3
	Dissatisfaction with appearance	3	10.3	Loose denture	2	6.9

Table 7.3 Numbers and percentages of OIDP scores by social variables

	Numbers (%) of subjects with different OIDP scores					
Variables	**OIDP score 0**	**OIDP score 0.1-7.9**	**OIDP score 8.0-15.9**	**OIDP score >16.0**	**Total *n (100)***	**P-value***
Gender						
male	125 (45.3)	74 (26.8)	49 (17.8)	28 (10.1)	276 (100)	$p = 0.510$
female	197 (45.7)	130 (30.2)	64 (14.8)	40 (9.3)	432 (100)	
Marital status						
Married	177 (50.0)	83 (23.4)	59 (16.7)	35 (9.9)	354 (100)	$p = 0.387$
Not married	145 (41.1)	121 (34.3)	54 (15.3)	33 (9.3)	353 (100)	
Personal income						
Low	228 (42.5)	153 (28.5)	95 (17.7)	61 (11.4)	537 (100)	$p<0.001$
High	94 (55.3)	51 (30.0)	18 (10.6)	7 (4.1)	170 (100)	
Years of schooling						
≤ 4 yrs	237 (44.3)	153 (28.6)	90 (16.8)	55 (10.3)	535 (100)	$p = 0.108$
> 4 yrs	85 (49.4)	51 (29.7)	23 (13.4)	13 (7.6)	172 (100)	
Dental utilisation pattern						
Attender	251 (46.5)	164 (30.4)	81 (15.0)	44 (8.1)	540 (100)	$p = 0.020$
Non attender	71 (42.5)	40 (24.0)	32 (19.2)	24 (14.4)	167 (100)	
Have medical support for health care						
Yes	231 (44.9)	150 (29.1)	89 (17.3)	45 (8.7)	515 (100)	$p = 0.920$
No	91 (47.4)	54 (28.1)	24 (12.5)	23 (12.0)	192 (100)	

* Chi-square test for trends

Table 7.4 Numbers and percentages of OIDP scores by clinical variables

	Numbers (%) of subjects with different OIDP scores					
Variables	**OIDP score 0**	**OIDP score 0.1-7.9**	**OIDP score 8.0-15.9**	**OIDP score >16.0**	**Total *n (100)***	**P value***
Dentition status						
Dentate	266 (48.5)	155 (28.2)	80 (14.6)	48 (8.7)	549 (100)	$p = 0.002$
Edentulous	56 (35.4)	49 (31.0)	33 (20.9)	20 (12.7)	158 (100)	
Coronal caries						
Some	106 (46.9)	68 (30.1)	31 (13.7)	21 (9.3)	226 (100)	$p = 0.433$
None	216 (44.9)	136 (28.3)	82 (17.0)	47 (9.8)	481 (100)	
Root caries						
Some	26 (51.0)	17 (33.3)	4 (7.8)	4 (7.8)	51 (100)	$p = 0.396$
None	240 (48.2)	138 (27.7)	76 (15.3)	44 (8.8)	498 (100)	
Mobile tooth						
Some	145 (45.0)	89 (27.6)	54 (16.8)	34 (10.6)	322 (100)	$p = 0.005$
None	106 (55.8)	52 (27.4)	20 (10.5)	12 (6.3)	190 (100)	
Loss of attachment > 6 mm						
Some	166 (44.7)	101 (27.2)	62 (16.7)	42 (11.3)	371 (100)	$p < 0.001$
None	85 (60.3)	40 (28.4)	12 (8.5)	4 (2.8)	141 (100)	
Pocket depth > 6 mm						
Some	54 (47.4)	34 (29.8)	17 (14.9)	9 (7.9)	114 (100)	$p = 0.994$
None	197 (49.5)	107 (26.9)	57 (14.3)	37 (9.3)	398 (100)	
Tooth loss Anterior teeth						
No missing	152 (65.5)	53 (22.8)	16 (6.9)	11 (4.7)	317 (100)	$p<0.001$
Missing one or more teeth	114 (36.0)	102 (32.2)	64 (20.2)	37 (11.7)	232 (100)	
Tooth loss Posterior teeth						
No missing	30 (76.9)	6 (15.4)	2 (5.1)	1 (2.6)	39 (100)	$p<0.001$
1-10 teeth	186 (55.0)	91 (26.9)	42 (12.4)	19 (5.6)	338 (100)	
11-20 teeth	50 (29.1)	58 (33.7)	36 (20.9)	28 (16.3)	172 (100)	

* Chi-square test for trends

Table 7.5 Numbers and percentages of OIDP scores by perceived treatment needs

	Numbers (%) of subjects with different OIDP score				
Perceived treatment need	**OIDP score 0**	**OIDP score 0.1-7.9**	**OIDP score 8.0-15.9**	**OIDP score >16.0**	**P value***
Total edentulous subjects *(n = 158)*					
Need any kind of full dentures					
Yes = 36	4 (11.1)	9 (25.0)	12 (33.3)	11 (30.6)	$p<0.001$
No = 122	52 (42.6)	40 (32.8)	21 (17.2)	9 (7.4)	
Original edentulous subjects *(n = 74)*					
Yes = 18	2 (11.1)	4 (22.2)	8 (44.4)	4 (22.2)	$p<0.001$
No = 56	26 (46.4)	19 (33.9)	7 (12.5)	4 (7.1)	
Dentate subjects *(n = 549)*					
Need any kind of treatment					
Yes = 114	42 (36.8)	42 (36.8)	18 (15.8)	12 (10.5)	$p=0.044$
No = 435	224 (51.5)	113 (26.0)	62 (14.3)	36 (8.3)	
Need any kind of partial denture					
Yes = 45	11 (24.4)	12 (26.7)	12 (26.7)	10 (22.2)	$p<0.001$
No = 504	255 (50.6)	143 (28.4)	68 (13.5)	38 (7.5)	
Need tooth extractions					
Yes = 41	12 (29.3)	12 (29.3)	11 (26.8)	6 (14.6)	$p = 0.003$
No = 508	254 (50.0)	143 (28.1)	69 (13.6)	42 (8.3)	
Need restorations**					
Yes = 37	21 (56.8)	9 (24.3)	5 (13.5)	2 (5.4)	$p = 0.301$
No = 512	245 (47.9)	146 (28.5)	75 (14.6)	46 (9.0)	
Need dental scaling					
Yes = 39	14 (35.9)	11 (28.2)	8 (20.5)	6 (15.4)	$p=0.035$
No = 510	252 (49.4)	144 (28.2)	72 (14.1)	42 (8.2)	

* Chi-square test for trends
**=fillings, pulp care, crown and bridge

CHAPTER 8

GENERAL HEALTH STATUS

This chapter presents the descriptive data on the general health status of the older people in terms of specific medical conditions, functional disability, general health perception, nutritional status and mental status. The relationships between specific medical conditions and the perceived Oral Impacts on Daily Performances (OIDP) is described as well as the relationships between nutritional status, some clinical variables and masticatory problems.

8.1 Specific medical conditions

Approximately 75% of older people had at least one specific medical condition. The first three most prevalent self-reported medical conditions were chronic pain (62.3%), bone and joint problem (54.7%) and cardiovascular diseases (27.9%) (Table 8.1). Carcinoma was the least prevalent (2.4%) medical condition.

8.1.1 Specific medical conditions and OIDP scores

Specific medical conditions which were significantly related to mean OIDP score were any chronic problem ($p<0.001$), bone and joint problem ($p<0.001$) and gastrointestinal problem ($p<0.01$) (Table 8.2). Older people who had specific medical conditions specified above were more likely to have higher mean OIDP score compared to those who did not have specific medical conditions.

8.2 Functional disability

The most common functional disability in older people was carrying loads. 18.8% of older subjects reported having difficulty carrying loads. The second most important functional disability for older individuals was walking upstairs. 18.0% of subjects had problem walking upstairs. 10.8% of older people had problem doing heavy household task. Very few people (2.4%) had problems doing light household tasks such as cleaning house. (Table 8.3).

8.3 General health perception

89% of those who had no medical problem rated their general health status as good or excellent (Table 8.4). 67% of those who had one or more medical problem rated their general health status as good or excellent. Only 33.0% of those having one or more medical problems rated themselves as fair or poor (Table 8.4).

8.4 Mental status

Mental status of the Chiang Mai group of old people was assessed through cognitive functioning. It was assessed by using the 6-item Orientation Memory Concentration test (Katzman et al. 1983). In this study, this test was used to assess the mental status in term of memory validation of the questionnaire data. Weighted error score was calculated for each subject and used as the score to identify subject with acceptable cognitive function. Scoring was in terms of errors made, and errors were weighted according to a regression-derived formula. Detail on the structure of this test and how to calculate weighted error score is given in Appendix 7.

The majority (74.1%) of the older people had weighted error score = 0 (Table 8.5). The cut-off point for mental impairment is weighted error score >6. 99.8% of the subjects had no mental impairment (weighted error score ≤6). Those who had weighted error score 10 or more would be diagnosed dementia. Only one person had weighted error score more than 6 but less than 10 (Table 8.6). Thus, none of the subjects were classified as having dementia.

8.5 Nutritional status

Nutrition is an important factor when making a general assessment of the health of the older people. An evaluation of the ability to bite, chew and swallow food safely could assess the risk of malnutrition and other associated problems in the older person. Normal range of BMI was defined by ranked body mass index according to percentile. The range of normal lies between the 15th and 85th percentiles (Cornoni Huntley et al. 1991). Most of the studies of older people in Western countries found a body mass index between 21 and 30 as 'normal' under this definition (Koughan and Athinson, 1993). The normal range of 15th and 85th percentile for the Thai older people lies between 18 and 26. Thus, 15.9% of the older people were underweight, 15.4% were overweight and 68.7% had normal weight (Table 8.7). There was a significant difference between the percentile rank by sex ($p<0.05$) (Table 8.7). A higher proportion of males were underweight while a higher proportion of females were overweight.

The average body mass index for the entire sample was 22.1 (± 4.1) (Table 8.8). Females had higher mean BMI score than males (22.6 ± 4.2 vs 21.3 ± 3.6).

8.5.1 The association between different BMI group, clinical variables and masticatory problems

Table 8.9 displays the proportion of older people with different BMI categories with some clinical findings and masticatory problems. There were significant differences between the proportion of older people who were underweight, normal or overweight with edentulousness, had different number of posterior occlusal pairs, had biting and chewing problems, ($p<0.001$) and with number of mobile teeth ($p = 0.006$). A higher proportion of underweight individuals were edentulous. Dentate subjects were more likely to be overweight compared to edentulous subjects. The older people who were underweight were more likely to have one or more teeth with mobility, less posterior occlusal pairs, had some biting and chewing problems.

There was a significant association between underweight, chewing problems, edentulousness, smoking habit, educational level and income (Table 8.10). The odds ratio for older individuals who had chewing problems, were edentulous, or were smokers showed that they had 2.9, 2.6 and 3.1 times the odds of being underweight than those who did not have chewing problems, were dentates or were non-smokers. The odds ratios for older subjects who had high education and high income showed that they were 0.3 and 0.4 times

the odds of being underweight than those who had low education and had low income. Using logistic regression analysis with underweight as the dependent variable, the odds of being underweight was 2.4 times in edentates than dentates after controlling for chewing problems, smoking habit and educational level (Table 8.11). In dentate subjects, the logistic regression analysis showed that those who had posterior occlusal pairs (POPs) less than or equal to 4 pairs had 2.2 times the odds of being underweight than those who had (POPs) more than 4 pairs >4 (Table 8.12).

Table 8.1 Self-report of having specific medical conditions in 623 older people in Chiang Mai

	n (%)
Number of specific medical conditions	
None	154 (24.7)
1 or more	469 (75.3)
Specific medical conditions	
Chronic pain	388 (62.3)
Bone and joint	341 (54.7)
Cardiovascular	174 (27.9)
Gastrointestinal	125 (20.7)
Neurological	113 (18.1)
Endocrine	45 (7.2)
Carcinoma	15 (2.4)

Table 8.2 Mean OIDP score in 623 older people with specific medical conditions

Subjects with chronic medical conditions	**Mean (s.d) OIDP score**	**P value***
Has chronic problem Yes (n=469) No (n=154)	 6.6 (9.9) 3.9 (5.7)	 p<0.001
General pain (pain anywhere in the body) Yes (n=388) No (n=235)	 6.1 (9.9) 5.7 (7.9)	 p=0.590
Bone and joint Yes (n=341) No (n=282)	 7.0 (10.5) 4.7 (7.0)	 p<0.001
Cardiovascular Yes (n=174) No (n=449)	 6.0 (9.6) 5.9 (9.0)	 p=0.883
Gastrointestinal Yes (n=129) No (n=494)	 8.4 (12.2) 5.3 (8.0)	 p<0.01
Neurological Yes (n=113) No (n=510)	 6.8 (11.3) 5.7 (8.6)	 p=0.274
Endocrine Yes (n=45) No (n=578)	 6.2 (11.2) 5.9 (9.0)	 p=0.810
Carcinoma Yes (n=15) No (n=608)	 8.7 (11.8) 5.8 (9.1)	 p=0.234

* t-test

Table 8.3 Numbers and percentages of 623 older people reporting having functional disability

Activity with difficulty	**n (%)**
Carry loads	117 (18.8)
Walking upstairs	112 (18.0)
Heavy home tasks	67 (10.8)
Moving around house	46 (7.4)
Walking	30 (4.8)
Light home tasks	15 (2.4)

Table 8.4 General health perception of 623 older people according to their self-reported specific medical conditions

	Self-report of having specific medical conditions ***n* (%)**	
General health perception	**None** ***(n=154)***	**1 or more condition** ***(n=469)***
Good-Excellent	137 (89.0)	314 (67.0)
Fair-Poor	17 (11.0)	155 (33.0)

Table 8.5 Numbers and percentages of 707 participants with different weighted error scores of the 6-Item Orientation-Memory-Concentration Test

Weighted error score	**n (%)**
0	524 (74.1)
2	151 (21.4)
4	23 (3.3)
5	1 (0.1)
6	7 (1.0)
9	1 (0.1)

Table 8.6 Mental impairment of 707 older people according to Orientation-Memory-Concentration Test Weighted error score*

Level of impairment	***n***	**%**
No impairment (weighted error score ≤ 6)	706	99.8
Dementia (weight error score >10)	0	0

* one subject had weighted error score more than 6 but less than 10

Table 8.7 Numbers and percentages of Body Mass Index (BMI) of 623 Thai older people by sex and BMI percentile rank groups

	Body Mass Index		
BMI* **Percentile Rank**	**Males** **n (%)**	**Females** **n (%)**	**Total** **n (%)**
<18 (underweight)	45 (19.1)	54 (14.0)	99 (15.9)
18-26 (normal)	169 (71.6)	259 (66.9)	428 (68.7)
>26 (overweight)	22 (9.3)	74 (19.1)	96 (15.4)
Total	236 (39.0)	387 (61.0)	623 (100.0)

* chi-square test, p<0.05

Table 8.8 Mean (s.d) of Body Mass Index (BMI) of 623 Thai older people by sex and BMI percentile rank groups

	Mean (s.d) Body Mass Index		
BMI **Percentile Rank**	**Males** **Mean (s.d)**	**Females** **Mean (s.d)**	**Total** **Mean (s.d)**
<18 (underweight)	16.4 (1.2)	15.9 (1.6)	16.2 (1.5)
18-26 (normal)	21.7 (2.2)	22.3 (2.1)	22.1 (2.2)
>26 (overweight)	27.9 (1.8)	28.5 (2.8)	28.4 (2.6)
Total	21.3 (3.6)	22.6 (4.2)	22.1 (4.0)

Table 8.9 Numbers and percentages of 623 older people in different BMI groups by clinical variables and masticatory problems

	Body Mass Index (BMI)			P value
Variables	**underweight**	**normal**	**overweight**	χ^{2*}
Edentulousness				
Dentate (*n*=549)	77 (14.0)	382 (69.6)	90 (16.4)	p <0.001
Edentulous (*n*=74)	22 (29.7)	46 (62.2)	6 (8.1)	
Tooth Mobility**				
No mobility (*n*=190)	19 (10.0)	132 (69.5)	39 (20.5)	p=0.006
One or more teeth (*n*=322) with mobility	50 (15.5)	231 (71.7)	41 (12.7)	
Posterior occlusal pairs (POPs)***				
≤ 4 POPs (*n*=252)	51 (20.2)	168 (66.7)	33 (13.1)	p<0.001
>4 POPs (*n*=297)	26 (8.8)	33 (13.1)	57 (19.2)	
Full denture status****				
Wear some kind (*n*=54) of dentures	14 (25.9)	35 (64.8)	5 (9.3)	p=0.227
No denture (*n*=20)	8 (40.0)	11 (55.0)	1 (5.0)	
Partial denture status***				
Wear some kind of dentures (*n*=162)	16 (9.9)	125 (77.2)	21 (13.0)	p=0.843
No denture (*n*=387)	61 (15.8)	257 (66.4)	69 (17.8)	
Biting problems				
No problems (*n*=326)	34 (10.4)	226 (69.3)	66 (20.2)	p<0.001
Some problems (*n*=297)	65 (21.9)	202 (68.0)	30 (10.1)	
Chewing problems				
No problems (*n*=248)	29 (11.7)	169 (68.1)	50 (20.2)	p<0.001
Some problems (*n*=375)	70 (18.7)	50 (20.2)	46 (12.3)	
Swallowing problem				
No problem (*n*=605)	95 (15.7)	415 (68.6)	95 (15.7)	p=0.213
Some problems (*n*=18)	4 (22.2)	13 (72.2)	1 (5.6)	

* chi-square test for trends
** Total dentate subjects examined for tooth mobility was 512
*** In dentate subjects only, **** In edendulous subjects only

Table 8.10 The association between underweight and related risk factors in 623 older people

Variables	Odds Ratio*	95% Confidence Interval*	P-value*
Chewing problems (Chewing problem = 1, no problem = 0)	2.912	1.86 to 4.57	p<0.001
Edentulousness (Edentulous = 1, dentate = 0)	2.593	1.48 to 4.54	p<0.001
Smoking habit (Smoker = 1, non-smoker = 0)	3.086	1.92 to 4.96	p<0.001
Educational level (High education = 1, low education = 0)	0.275	0.14 to 0.55	p<0.001
Income (High income = 1, low income=0)	0.394	0.21 to 0.75	p = 0.003
Chronic medical conditions (Had one or more conditions = 1, no condition = 0)	0.673	0.42 to 1.08	p = 0.098
Sex (Female = 1, male =0)	0.688	0.44 to 1.06	p = 0.091

* unadjusted

Table 8.11 The association between underweight and edentulousness

Dependent variable: underweight (Yes = 1, no = 0)			
Independent variables	**Odds ratio**	**95% Confidence interval**	**P value**
Edentulousness* (Edentulous = 1, dentate = 0)	2.389	1.33 to 4.29	p<0.001

* controlled for chewing problem, educational level, smoking habit

Table 8.12 The association between underweight posterior occlusal pairs in dentate subjects

Dependent variable: underweight (Yes = 1, no = 0)			
Independent variables	**Odds ratio**	**95% Confidence interval**	**P value**
Posterior occlusal pairs (≤ 4 pairs = 1, >4 pairs = 0)	2.174	1.25 to 3.80	p = 0.006

* controlled for chewing problem, educational level and income

CHAPTER 9

IMPACT-RELATED TREATMENT NEED

This chapter presents data on *'impact-related treatment need'* for different types of dental treatment need in the total sample. The integration process of socio-dental indicator, namely OIDP with normative treatment need and the results will be given as well as the comparison of the number and percentage of people with normative need and *'impact-related treatment need'*. The results in this chapter are based on the total 707 older subjects.

9.1 Impact-related treatment need: the integration of normative treatment need and OIDP scores

'Impact-related treatment need' is an integration of perceived oral impacts (OIDP score) with normative treatment need. Adulyanon (1996) attempted to incorporate the socio-dental indicator, OIDP, into the treatment need estimation. He integrated OIDP with normative need. After selecting subjects with a normative need, the subjects who had normative need and also had perceived oral impacts assessed by OIDP were considered as having *'impact-related treatment need'*. The total OIDP score was used in this integrating process. To give a better impression of different levels of oral impacts, Adulyanon (1996) suggested using different cut-off points of OIDP scores to classify subjects into priority groups.

Adulyanon (1996) arbitrarily set cut-off points for *'impact-related treatment need'* at 0, 5 and 10 to test the effects of different cut-off points on the amount of treatment need. He considered that cut-off points could vary among different target populations and were frequently arbitrary; *'.....the score is subjective, psychological and socio-cultural in nature and will vary from*

group to group of study populations, the distribution of OIDP within each target population should be taken into consideration in generating cut-off points.....' (Adulyanon, 1996). In this study the cut-off points of 0, 8, 16 were used to assess the change of need across different perceived levels of oral impacts in the older population.

When the OIDP score was integrated with the normative treatment need, the new level of treatment need *'impact-related treatment need'* decreased (Tables 9.1 and 9.2). When OIDP scores at different cut-off points were integrated into normative need, the numbers and percentages of people decreased as the cut-off point increased (Table 9.1). The differences between percentages of subjects who had normative need compared to those having *'impact-related treatment need'* at OIDP cut-point >0 varied between different treatments. The normative need of 79.7% for full dentures decreased to 56.3% when OIDP > 0 was added (Table 9.1). The difference was highest for scaling teeth while the need for new or replacement/repair of full and partial dentures had the lowest difference (Table 9.1).

When considering normative treatment need as 100%, at OIDP cut-off point > 0, *'impact-related treatment need'* for new or replacement/repair of full dentures, or for new or replacement/repair of full and partial dentures were approximately three-fourths (70.6% and 71.4%) of normative treatment need (Table 9.2). The *'impact-related treatment need'* for new or replacement/repair of partial dentures, crown and bridge, scaling and periodontal treatment

decreased to about one-half of normative treatment need (56.8%, 50.0%, 52.0% and 55.3%, respectively).

The proportion of subjects who had *'impact-related treatment need'* could be as low as 5.6% to the highest of 71.4% compared to 100% of normative treatment need in different kinds of treatment (Table 9.2).

9.2 'General' and 'Condition-specific' impacts in treatment need assessment

The use of the total OIDP score to estimate *'impact related treatment need'* was not logical for specific types of treatment (Adulyanon, 1996). Adulyanon proposed that since the OIDP score derived from the combination of all impacts on daily performances while treatment need may have a more specific causal for the impact, a condition specific OIDP should be calculated. For example, treatment need for prosthodontics is related to the impact from chewing or aesthetic problems but not from toothache. In order to make the OIDP score more specific and relate to each treatment need, a condition-specific OIDP was generated. The OIDP questionnaire also included the assessment of the causal impairment for each impact on daily performance. From the interview, each individual was asked to identify the casual impairment which they considered caused the oral impacts for each of the 8 performances. Adulyanon (1996) used the questions on causal impairment to establish the 'condition-specific' OIDP score (CS-OIDP). CS-OIDP scores or the OIDP scores from some causal oral conditions will be used in the

following section to identify a specific treatment (See Chapter 4, Section 4.5.2 and Appendix 4).

When using 'condition-specific' OIDP (CS-OIDP) score, the numbers and percentages of edentulous or dentate older people were different from when using general OIDP score (Table 9.3). The number of older people in each treatment need were less when using CS-OIDP because CS-OIDP counted only those affected by specific causal oral conditions indicating particular treatments. For example, in dentate subjects treatment need for new and replacement/repair of partial dentures, the total number of older people who had CS-OIDP score at cut-off point > 0 is 218 compared to the total number of 283 who had the general OIDP at the same cut-off point (Table 9.3).

9.3 Comparison between normative treatment need, *'impact-related treatment need'* using general OIDP scores and condition-specific OIDP (CS-OIDP) scores at different cut-off points

Table 9.4 shows the comparison between the numbers and the percentages of older people who had normative treatment need, *'impact-related treatment need'* using general OIDP score and condition-specific OIDP (CS-OIDP) score at different cut-off points. Table 9.5 shows the numbers and the percentages change of older people when considered normative need as 100%. When comparing *'impact-related treatment need'* using CS-OIDP with normative need, there were small differences between treatment need for full and partial dentures and for treatment need of full dentures (71.4% and 70.6%,

respectively). Moderate differences were found for periodontal treatment, scaling and crown and bridge (ranging from 50.0% to 55.3%) (Table 9.5).

When comparing general OIDP with CS-OIDP, no difference was found in treatment need for new or replacement of full and partial dentures. The highest difference was found for scaling while treatment needs for full dentures and for partial dentures show small differences. The proportion of subjects who need dental treatment was lower when using CS-OIDP compared to general OIDP scores at all the cut-off points (Table 9.5). For example, at cut-off point ≥8, the proportion of edentulous subjects who need full dentures was 17.5% when using CS-OIDP score compared to 40.5% when using general OIDP score (Table 9.5).

Table 9.6 shows the ranking of different treatment need using different approaches of treatment need estimations. When treatment need was assessed using normative need, the ranking of needs were full dentures first, followed by scaling, root planing, partial dentures, full and partial dentures and crown and bridge. But when adding the perceived oral impacts into treatment need estimation, the ranking of treatment need changed. For example, at CS-OIDP cut-off point >0, the rank of treatment need changed to full dentures followed by crown and bridge, partial dentures, full and partial dentures, root planing and then scaling.

Table 9.1 Comparison of numbers and percentages of older people with normative and impact-related treatment need at three OIDP cut-off points

		Varying cut-off points for OIDP score		
Treatment	**Normative need**	**Impact-related need (OIDP > 0)**	**Impact-related need (OIDP ≥ 8)**	**Impact-related need (OIDP ≥ 16)**
Edentulous subjects ***(n = 158)*** New, replacement/repair of full dentures				
n	126	89	51	20
%	(79.7)	(56.3)	(32.3)	(12.7)
Dentate subjects ***(n = 549)*** New, replacement/repair of partial dentures				
n	333	189	85	35
%	(60.7)	(34.4)	(15.5)	(6.4)
New, replacement/repair of full and partial dentures				
n	49	35	27	7
%	(8.9)	(6.4)	(4.9)	(1.3)
Crown or bridge				
n	18	9	3	1
%	(3.3)	(1.6)	(0.5)	(0.2)
(n = 512)* Scaling				
n	427	222	101	41
%	(83.4)	(43.4)	(19.7)	(8.0)
Periodontal treatment (root planing)				
n	371	205	104	42
%	(72.5)	(40.0)	(20.3)	(8.2)

* total number of dentate subjects examined for periodontal conditions

Table 9.2 Comparison of normative need, considered as 100% and *'impact-related treatment need'* at three different cut-off points

		Varying cut-off points for OIDP scores		
Treatment	**Normative need**	**Impact-related need (OIDP > 0)**	**Impact-related need (OIDP ≥ 8)**	**Impact-related need (OIDP ≥ 16)**
Edentulous subjects ***(n = 158)*** New, replacement/repair of full dentures %	100.0	70.6	40.5	15.9
Dentate subjects ***(n = 549)*** New, replacement/repair of partial dentures %	100.0	56.8	25.5	10.5
New, replacement/repair full and partial dentures %	100.0	71.4	55.1	14.3
Crown or bridge %	100.0	50.0	16.7	5.6
(n = 512)* Scaling %	100.0	52.0	23.7	9.6
Periodontal treatment (root planing) %	100.0	55.3	28.0	11.3

* total number of dentate subjects examined for periodontal conditions

Table 9.3 Comparison of numbers and percentages of older people with General OIDP and Condition Specific OIDP

Type of OIDP Score	OIDP group		
	>0 n (%)	≥8 n (%)	≥16 n (%)
Total subjects (n = 707) OIDP	385 (54.5)	181 (25.6)	68 (9.6)
Edentulous subjects (n = 158)			
OIDP	102 (64.6)	53 (33.5)	20 (12.7)
CS-OIDP for new, replacement/repair of full dentures	99 (62.7)	22 (13.9)	11 (7.0)
Dentate subjects (n=549)			
OIDP	283 (51.5)	128 (23.3)	48 (8.7)
CS-OIDP for new, replacement/repair of partial dentures	218 (39.7)	40 (7.3)	22 (4.0)
CS-OIDP for new, replacement/repair of full and partial dentures	218 (39.7)	40 (7.3)	22 (4.0)
CS-OIDP for crown and bridge	224 (40.8)	53 (9.7)	29 (5.3)
(n = 512)* CS-OIDP for scaling	20 (3.9)	4 (0.8)	3 (0.6)
CS-OIDP for periodontal treatment (root planing)	84 (16.4)	23 (4.5)	14 (2.7)

* total number of dentate subjects examined for periodontal conditions

Table 9.4 Comparison of numbers and percentages of older people with normative and *'impact- related treatment need'* and condition-specific treatment need

Treatment	Normative need	Impact-related need OIDP > 0	Impact-related need CS-OIDP > 0	Impact-related need OIDP ≥ 8	Impact-related need CS-OIDP ≥ 8	Impact-related need OIDP ≥ 16	Impact-related need CS-OIDP ≥ 16
Edentulous subjects							
(n = 158)							
New, replacement/repair of full dentures							
n	126	89	86	51	22	20	11
%	79.7	56.3	54.4	32.3	13.9	12.7	7.0
Dentate subjects							
(n = 549)							
New, replacement/repair of partial dentures							
n	333	189	146	85	25	35	14
%	60.7	34.4	26.6	15.5	4.6	6.4	2.6
New, replacement/repair of full and partial dentures							
n	49	35	35	27	11	7	6
%	15.3	6.4	6.4	4.9	2.0	1.3	1.1
Crown or bridge							
n	18	9	6	3	1	1	1
%	3.3	1.6	1.1	0.5	0.2	0.2	0.2
(n = 512)*							
Scaling							
n	427	222	13	101	3	41	2
%	83.4	43.4	2.5	19.7	0.6	8.0	0.4
Periodontal treatment (root planing)							
n	371	205	60	104	20	42	13
%	72.5	40.0	11.7	20.3	3.9	8.2	2.5

* total number of dentate subjects examined for periodontal conditions

Table 9.5 Comparison of percentages of older people with normative and *'impact- related treatment need'* and condition-specific treatment need

Treatment	Normative need	Impact-related need OIDP > 0	Impact-related need CS-OIDP > 0	Impact-related need OIDP ≥ 8	Impact-related need CS-OIDP ≥8	Impact-related need OIDP ≥16	Impact-related need CS-OIDP ≥ 16
Edentulous subjects *(n = 158)*							
New, replacement/repair % of full dentures	100.0	70.6	68.3	40.5	17.5	15.9	8.7
Dentate subjects *(n=549)*							
New, replacement/repair % of partial dentures	100.0	56.8	43.8	25.5	7.5	10.5	4.2
New, replacement/repair % of full and partial dentures	100.0	71.4	71.4	55.1	22.4	14.3	12.2
Crown or bridge %	100.0	50.0	33.3	16.7	5.6	5.6	5.6
(n = 512)* Scaling %	100.0	52.0	3.0	23.7	0.7	9.6	0.5
Periodontal treatment (root planing) %	100.0	55.3	16.2	28.0	5.4	11.3	3.5

* total number of dentate subjects examined for periodontal conditions

Table 9.6 Comparison of the rank of treatment need assessed using normative and *'impact-related treatment need'* with different cut-off points

Ranking	Normative need	Impact-related need CS-OIDP > 0	Impact-related need CS-OIDP ≥ 8	Impact-related need CS-OIDP ≥ 16
1	Full dentures (79.7%)	Full dentures (54.4%)	Full dentures (13.9%)	Full dentures (7.0%)
2	Scaling (77.8%)	Partial dentures (26.6%)	Partial dentures (4.6%)	Partial dentures (2.6%)
3	Periodontal treatment/Root planing (67.6%)	Periodontal treatment/Root planing (10.9%)	Periodontal treatment/Root planing (3.6%)	Periodontal treatment/Root planing (2.4%)
4	Partial dentures (60.7%)	Full & partial dentures (6.4%)	Full & partial dentures (2.0%)	Full & partial dentures (1.1%)
5	Full & partial dentures (15.3%)	Scaling (3.6%)	Scaling (0.5%)	Scaling (0.4%)
6	Crown & Bridge (3.3%)	Crown & Bridge (1.1%)	Crown & Bridge (0.2%)	Crown & Bridge (0.2%)

CHAPTER 10

THE INTEGRATION OF SOME GENERAL HEALTH FACTORS, ORAL IMPACT ON DAILY PERFORMANCES (OIDP), PROPENSITY FOR HEALTH BEHAVIOURS AND FINANCIAL STATUS INTO A TREATMENT NEED MODEL

In this study, treatment need was assessed by integrating the effect of general health status, perceived Oral Impacts on Daily Performance (OIDP) and propensity for health behaviours with conventional normative treatment need assessment. There is no question that normative treatment need dominates the treatment decision for life-threatening conditions such as oral cancer, fractures of the jaw and severe infections. Similarly, for long-term progressive dental conditions in which severe tooth destruction may result if left untreated, such as in teeth with gross and active caries, treatment need is wholly determined by normative decisions. Therefore, only the effect of general health and OIDP on treatment need for prosthodontic treatment for full and partial dentures and periodontal treatment will be discussed here.

Table 10.1 gives the overview of the classifications used in different integrated models illustrated in this chapter. Models 1a, 1b, 2a, 2b, 3a and 3b illustrate the integration of a nutritional factor namely body weight, into the prosthodontic treatment need assessment. Models 4a to 4d, Model 5 and Model 6 illustrate the integration of different specific medical conditions, different levels of periodontal disease, and different levels of propensity for health behaviour into the periodontal treatment need assessment. Model 7 illustrates the treatment need assessment model for periodontal disease in subjects who had normal general health and had no perceived oral impacts.

There are two classifications for high level of periodontal disease. Classification 1 (Model 4a) defines *high* level as having 4 or more teeth with

loss of attachment 6+ mm and pocketing of 4+ mm in the same tooth. Classification 2 (Model 4b) defines *high* level as having 3 or more teeth with loss of attachment 6+ mm and pocketing of 4+ mm in anterior teeth (Table 10.1). Similarly, Models 4c and 4d illustrate the integration of general health factors in people with diabetes who had a *high* level of periodontal disease. There are two classifications for low level of periodontal disease. Classification 3 (Model 4c) defines *low* level as having less than 4 teeth with loss of attachment 6+ mm and pocketing of 4+ mm in the same tooth.

Classification 4 (Model 4d) defines *low* level as having less than 3 teeth with loss of attachment 6+ mm and pocketing 4+ mm in anterior teeth (Table 10.1).

Table 10.1 Summary of different models and medical conditions used to illustrate the new approach to dental treatment need estimations

Models	Classifications
Model 1a	Assessing need for full dentures
Illustration Ia	Normal weight group
Model 1b	Assessing need for full dentures
Illustration Ib	Underweight group
Model 2a	Assessing need for partial dentures
Illustration Ic	Normal weight group
Model 2b	Assessing need for partial dentures
Illustration Id	Underweight group
Model 3a	Assessing need for full and partial dentures
Illustration Ie	Normal weight group
Model 3b	Assessing need for full and partial dentures
Illustration If	Underweight group
Model 4a	Assessing need for periodontal treatment
Illustration IIa	Group with diabetes mellitus
Classification 1	**high** level of periodontal disease = loss of attachment 6+mm and pocket depth 4+mm in ***4 or more teeth***
Model 4b	Assessing need for periodontal treatment
Illustration IIb	Group with diabetes mellitus
Classification 2	**high** level of periodontal disease = loss of attachment 6+mm and pocket depth 4+mm in ***3 or more anterior teeth***
Model 4c	Assessing need for periodontal treatment
Illustration IIIa	Group with diabetes mellitus
Classification 3	**low** level of periodontal disease = loss of attachment 6+mm and pocket depth 4+mm in ***less than 4 teeth***
Model 4d	Assessing need for periodontal treatment
Illustration IIIb	Group with diabetes mellitus
Classification 4	**low** level of periodontal disease = loss of attachment 6+mm and pocket depth 4+mm in ***less than 3 anterior teeth***
Model 5	Assessing need for periodontal treatment
Illustration IV	Group with heart disease
Model 6	Assessing need for periodontal treatment
Illustration V	Group with **normal** health *(no diabetes, well-controlled diabetes, no heart disease)*
Model 7	Assessing need for periodontal treatment
Illustration VI	Group with **normal** health and had no perceived oral impacts

Table 10.2 shows the percentages of dentate subjects who had high level of periodontal disease using the different definitions as previously described in Table 10.1. 38.3% of dentates who had been examined for periodontal conditions had 4 or more teeth with loss of attachment of 6 mm or more and had pocket depth of 4 mm or more in the same tooth. 34% had 3 or more anterior teeth with loss of attachment of 6 mm or more and had pocket depth of 4 mm or more in the same tooth. 63.7% had one or more tooth with loss of attachment of 6 mm or more and had pocket depth of 4 mm or more in the same tooth.

Table 10.2 Percentages of 512 dentate subjects with high level of periodontal disease according to different definitions

Definitions	n (%)
4 or more teeth with loss of attachment of 6 mm or more and had pocket depth of 4 mm or more in the same tooth	196 (38.3)
3 or more anterior teeth with loss of attachment of 6 mm or more and had pocket depth of 4 mm or more in the same tooth	174 (34.0)
one or more tooth with loss of attachment of 6 mm or more and had pocket depth of 4 mm or more in the same tooth	326 (63.7)

10.1 Integration of general health factors into normative treatment need for full dentures

This study will demonstrate how underweight, as one general health factor, may affect treatment need for full dentures in edentulous individuals when

integrating the underweight factor into conventional normative treatment need assessment. The following section will cover Model 1a and Model 1b.

10.1.1 Normal general health (normal weight) edentulous subjects

10.1.1.1 Integration of perceived Oral Impacts on Daily Performances (OIDP) into treatment need estimation

Older people who had normal weight were considered to be in a *'normal general health'* group. In Model 1a, the normal general health group who had normative treatment need for full dentures was considered as 100%. At this stage, OIDP was added to assess how many per hundred individuals had normal general health and perceived oral impacts related to prosthodontic treatment. In those who had normal weight, perceived Oral Impacts on Daily Performances (OIDP) was integrated into the model. Using CS-OIDP score at a cut-off point > 0, 60.5% of *'normal general health'* individuals with normative treatment need for dentures had *'impact- related treatment need'* (Model 1a). Those with *'impact-related treatment need'* or those who had normative treatment need and had perceived impacts on daily performance, will be given priority for treatment.

10.1.1.2 Integration of perceived Oral Impacts on Daily Performances (OIDP) and finance factors into normative treatment need

Within the groups who had *'general health related treatment need'*, economic status plays an important role for accessibility to dental service utilisation. At this level, financial problem was integrated into the treatment need model (Model 1a). Older people who had an *'accessible treatment need'* were those in 'normal general health' group who had an *'impact-related treatment need'*, and had sufficient funds to access dental services. Using CS-OIDP score at a cut-off point >0, among edentate individuals who had an *'impact-related treatment need'*, 45.7% had an *'accessible treatment need'* or had a good chance of using dental services after taking into account the financial factor (Model 1a).

Within the groups who had a *'general health related treatment need'*, some may not have a good chance of seeking treatment due to their economic status. Individuals who had financial problems were considered to have a *'non-accessible treatment need'*. Of the group who had an *'impact-related treatment need'*, 54.3% of edentate subjects who had perceived oral impacts had a *'non-accessible treatment need'* or had financial problems. In addition to needing treatment, financial support will be needed for this group with a *'non-accessible treatment need'*.

Model 1a

Full dentures

Illustration Ia

Older people who had normal weight

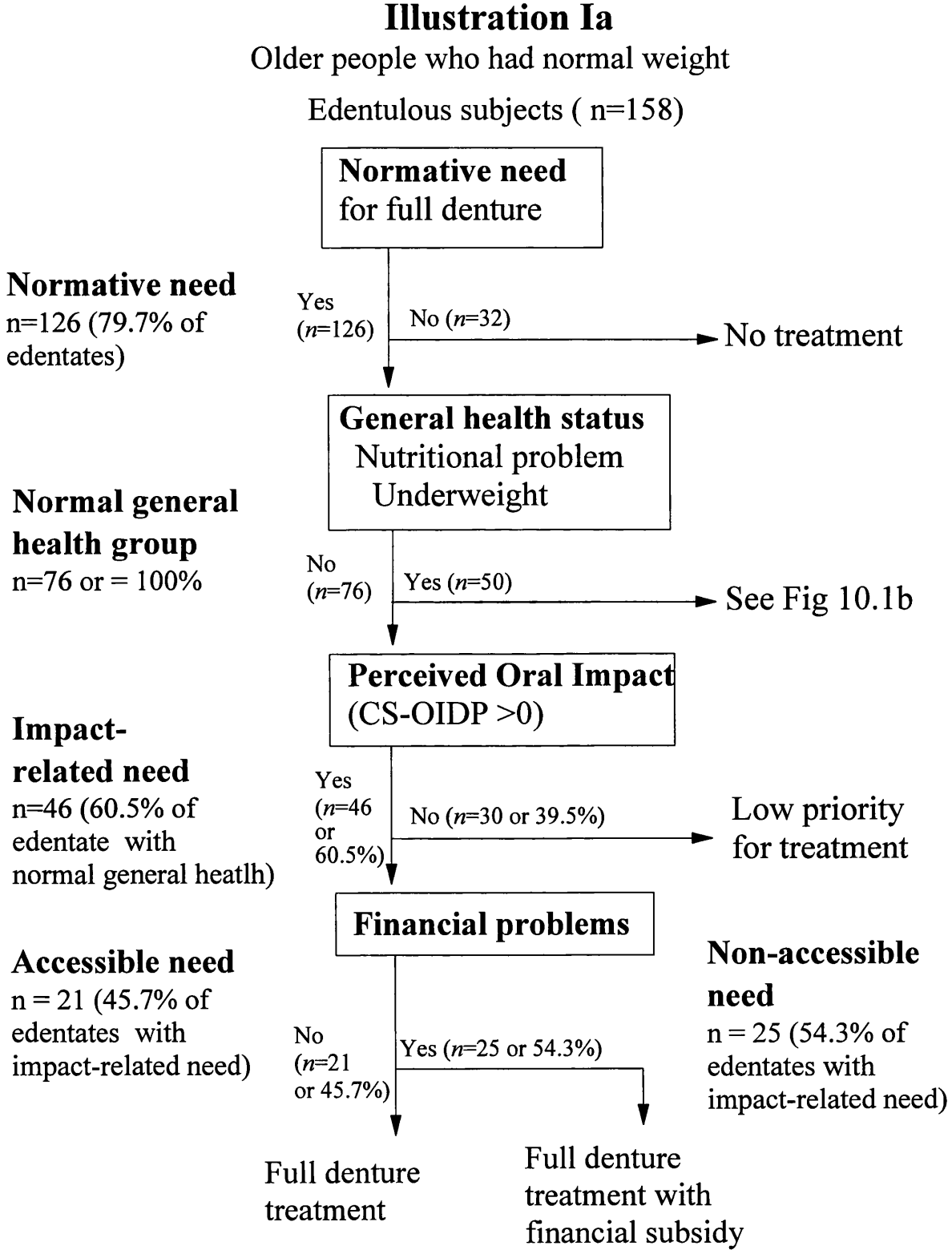


Figure 10.1a Treatment need assessment model for full dentures in edentulous population who had normal weight

10.1.2 Underweight edentulous subjects

10.1.2.1 Integration of underweight factor into normative treatment need

From the literature reviews (Chapter 2, Section.2.4.3.5), oral health is often associated with low weight in older people. Tooth loss could cause underweight and undernutrition. Using a logistic regression analysis with underweight as the dependent variable, edentulousness was significantly related to underweight ($p<0.001$) when controlled for chewing problems, smoking habits and educational level. Underweight was also significantly related to number of posterior occlusal pairs in dentate subjects (Chapter 8, Section 8.5.1).

Figure 10.1b, Model 1b illustrates how general health can be integrated into normative treatment need for full dentures in edentulous subjects. 79.7% of edentulous subjects had a normative need for full dentures. Among edentulous subjects who had a normative need, 39.7% were underweight (Model 1b). This group of edentate subject had a *'general health related treatment need'*. They were edentulous individuals, who were judged by the professionals as needing full dentures, and they may have a nutritional problem due to their oral status. Therefore, priority for dental treatment, which in this case is new or replacement/repair of full dentures, which were considered inadequate, is recommended to improve their general health.

10.1.2.2 Integration of underweight and enabling factors such as finance

As in Model 1a for the older people who were in 'normal general health' group, those who had an *'general health related treatment need'* could have economic barriers to seeking treatment. Financial problem is integrated into the model. The proportion of individuals with *'accessible treatment need'* for dentures was 32% of edentate people who were underweight.

After taking those with low or negative *'access'* factors into account and who would therefore not be able to avail themselves of services without a financial subsidy, the proportion of individuals with a *'non-accessible treatment need'* for dentures was 68% of edentate people who were underweight (Model 1b).

Model 1b
Full dentures

Illustration Ib
Older people who were underweight

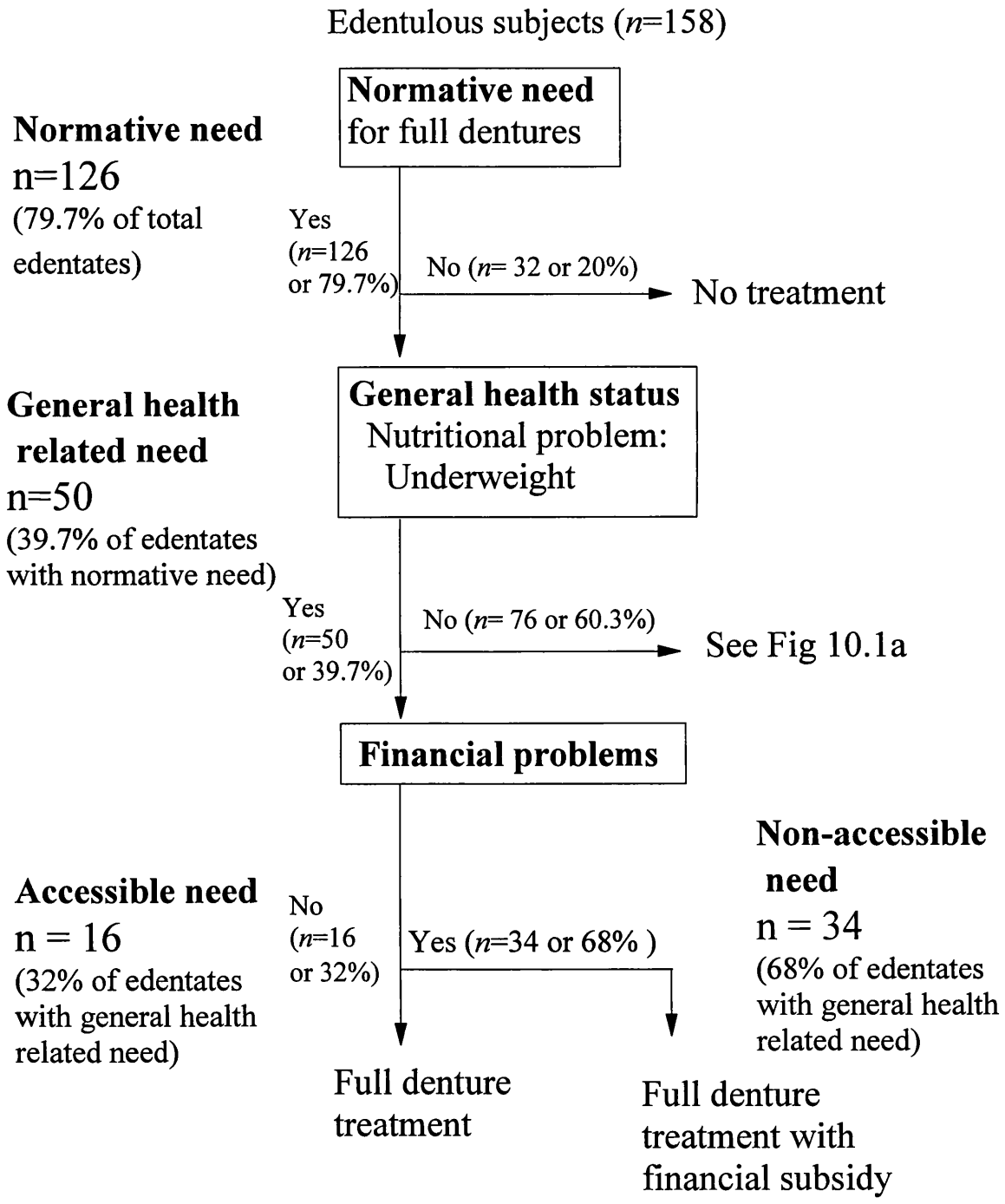


Figure 10.1b Treatment need assessment model for full dentures in edentulous population who had underweight

10.2 Integration of general health status into normative treatment need for partial dentures

10.2.1 Normal general health (normal weight) dentate subjects

10.2.1.1 Integration of perceived Oral Impacts on Daily Performances (OIDP) into treatment need estimations

In Figure 10.2a, older people who were in a 'normal health' group and had normative treatment need were considered as 100%. Perceived Oral Impacts on Daily Performances were then integrated into the model. Using CS-OIDP score at cut-off point >0, among dentate individuals who had normal general health, 50.5% of them had an *'impact-related treatment need'* (Model 2a).

10.2.1.2 Integration of perceived oral impacts on daily performances (OIDP) and a behavioural factor into normative treatment need

When considering partial denture treatment in dentate individuals, one important factor which needs to be taken into account is the oral hygiene condition and smoking habit. Oral hygiene practice and smoking habit are behavioural factors to be integrated into the treatment need estimation for partial dentures. Among dentate individuals who had *'impact-related treatment need'*, the group who had a high propensity for health behaviour (had a positive oral hygiene and being a non-smoker), namely those having *'propensity related treatment need'*, was 69.9% (Model 2a). The group with low propensity for health behaviour should be given health promotion in order to improve their oral hygiene and smoking behaviours. They should then be reassessed before treatment is considered.

10.2.1.3 Integration of perceived Oral Impacts on Daily Performances (OIDP) and financial factors into normative treatment need

Similar to Model 1a, the proportion of dentate individuals who had sufficient funds to pay for treatment or had a good chance of using health services, namely those having *'accessible treatment need'* for partial dentures, was 41.2% of dentates who were in 'normal general health' group and had good oral health behaviour (Model 2a).

Dentate individuals who also had *'propensity related treatment need'* but had financial problems relating to the treatment or those who could not afford to pay for the treatment were in a group with *'non-accessible treatment need'*.

58.8% had *'non-accessible treatment need'* or had low propensity for health behaviour due to financial barrier. In addition to needing treatment, financial support will be needed for this group with *'non-accessible treatment need'*.

In Chapter 3, comprehensive decision tree has been proposed in order to make a complete treatment plan for prosthodontic treatment for dentate subjects. The illustration for treatment need for partial dentures in this study did not follow the decision tree proposed in Figure 3.11. It is not practical for examiner to take into account the periodontal conditions as well as other related condition during the field examination.

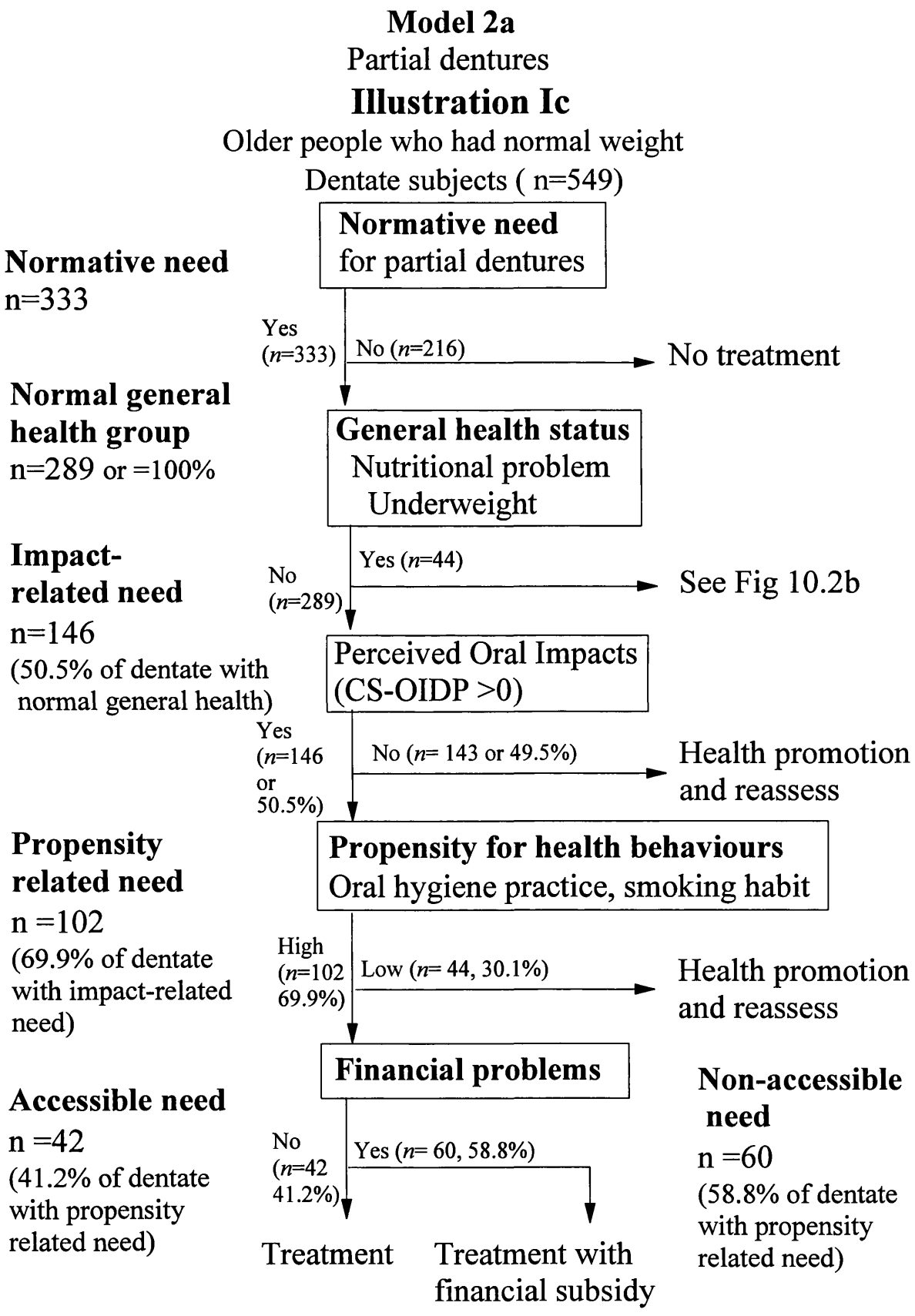


Figure 10.2a Treatment need assessment model for partial dentures in dentate population who had normal weight

10.2.2 Underweight dentate subjects

10.2.2.1 Integration of underweight factor

Figure 10.2b (Model 2b) illustrates how underweight could have an effect on the treatment need for partial dentures in dentate individuals when integrating the underweight factor into conventional normative need assessment. 60.6% of dentate subjects had normative treatment need for partial dentures. Among dentate individuals who had normative treatment need for partial dentures, the proportion of dentate subjects who had *'general health related treatment need'* was 13.2% (Model 2b).

10.2.2.2 Integration of underweight and propensity for health behaviours

Similar to Model 1b, oral hygiene practice and smoking habit are behavioural factors to integrate into the treatment need for partial dentures. Among dentate individuals who had *'general health related treatment need'*, when adding behavioural factors into the treatment need model, the proportion of dentate individuals who had high propensity for health behaviour or those having *'propensity related treatment need'* was 45.4% (Model 2b).

10.2.2.3 Integration of underweight and finance problems

As in Model 2a, individuals who had *'propensity related treatment need'* and had no economic barrier have *'accessible treatment need'*. 40% of the group with *'propensity related treatment need'* had *'accessible treatment need'* or had high propensity for health behaviour after taking the financial factor into account (Model 2b).

Dentate individuals who also had *'propensity related treatment need'* but had financial problems relating to the treatment or those who could not afford to pay for the treatment were in a group with *'non-accessible treatment need'*. The proportion of the group with *'non-accessible treatment need'* was 60% of dentates who were underweight and had good oral health and smoking behaviours (Model 2b).

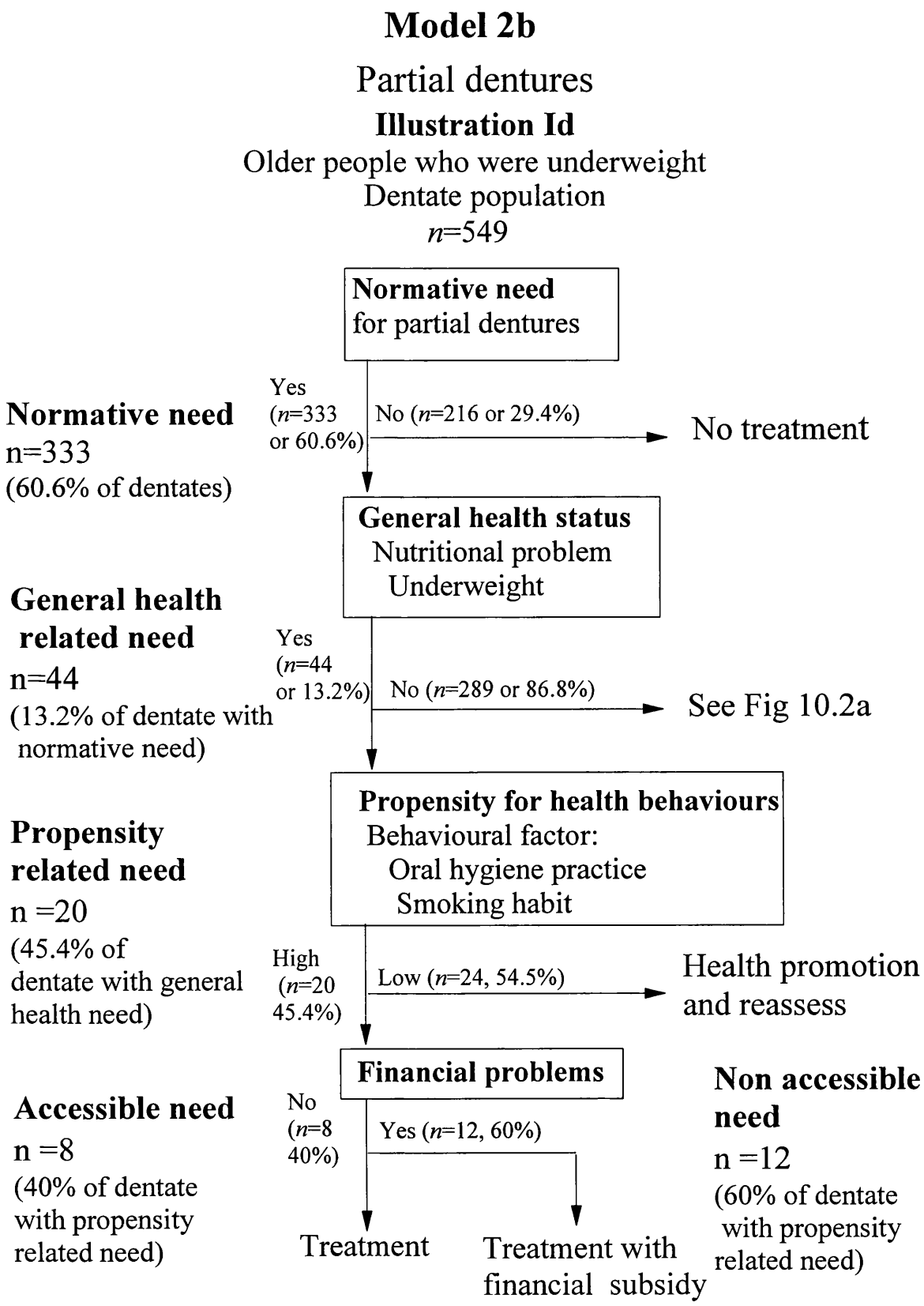


Figure 10.2b Treatment need assessment model for partial dentures in dentate population who were underweight

10.3 Integration of general health factors into normative treatment need for both full and partial dentures in dentate people

10.3.1 Normal general health (normal weight) dentate subjects

10.3.1.1 Integration of perceived Oral Impacts on Daily Performances (OIDP) into the estimation of dental needs

Similar to Model 2a, older people with normal weight were considered to be in a 'normal general health' group. In Figure 10.3a these people who had normative treatment need were considered as 100%. Perceived Oral Impacts on Daily Performances were then integrated into the model. Using CS-OIDP score at cut-off point > 0, 71.9% of dentate individuals with normal general health had *'impact-related treatment need'* (Model 3a).

10.3.1.2 Integration of perceived Oral Impacts on Daily Performances (OIDP) and a behavioural factor into the estimation of dental needs

Similar to Model 2a, oral hygiene practice and smoking habit are behavioural factors to integrate into the treatment need assessment for full and partial dentures. Among dentate individuals who had *'impact-related treatment need'*, the group who had a high propensity for health behaviour, namely those having *'propensity related treatment need'*, was 34.8% (Model 3a).

10.3.1.3 Integration of perceived Oral Impacts on Daily Performances (OIDP) and financial factors into normative treatment need

As in Model 2a, older people who had *'impact-related treatment need'* could have economic barriers to seeking treatment. Individuals who had *'impact-related treatment need'* and also had no economic barrier had *'accessible*

treatment need'. 50.0% of older individuals with *'propensity related treatment need'* had *'accessible treatment need'* or having no problem to pay for the treatment after taking into account the financial factors (Model 3a). 50.0% of subjects who had *'propensity related treatment need'* had *'non-accessible treatment need'*.

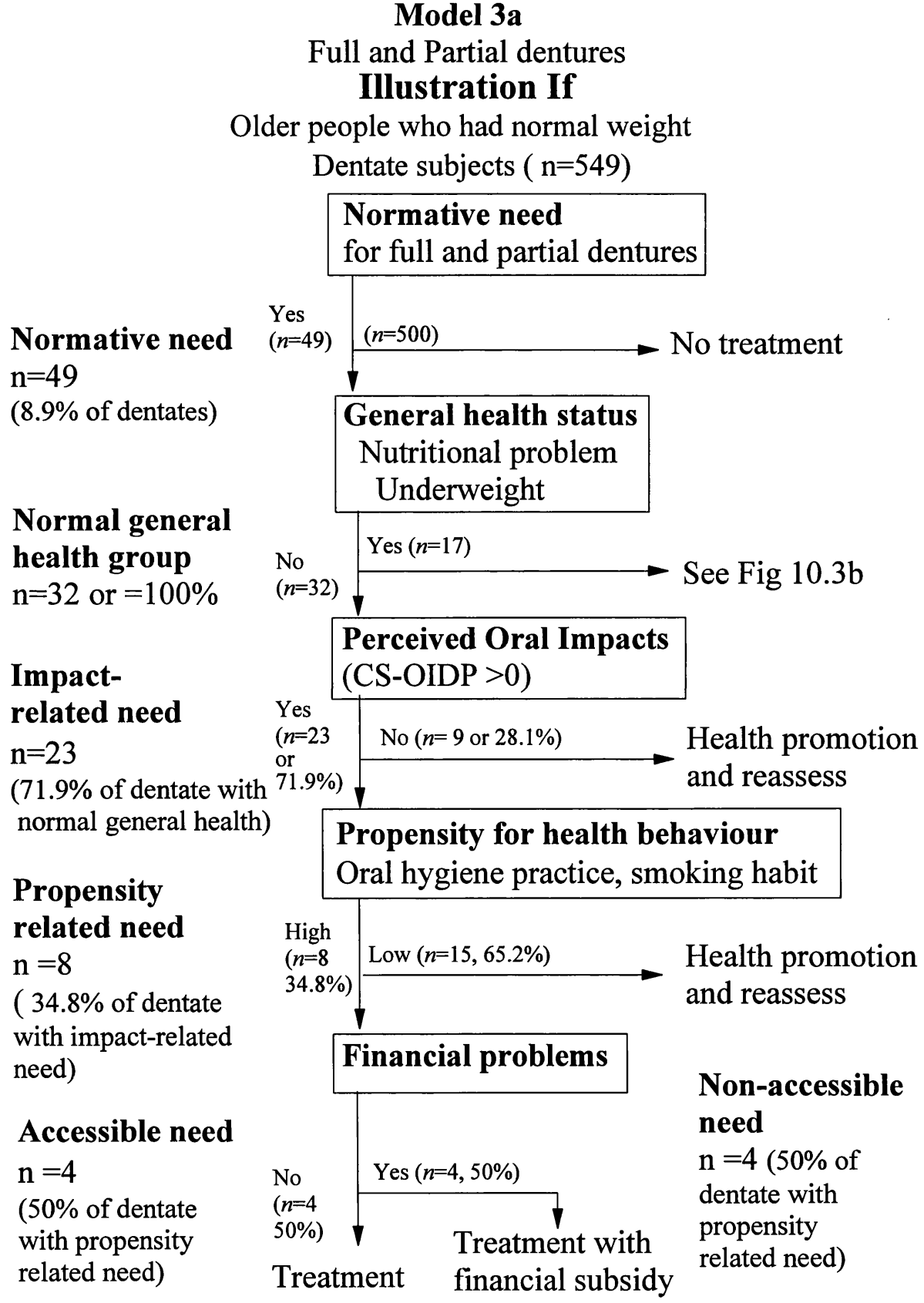


Figure 10.3a Treatment need assessment model for full and partial dentures in normal weight dentate population

10.3.2 Underweight dentate subjects

10.3.2.1 Integration of underweight factor

Figure 10.3b illustrates how underweight could have an effect on treatment need for full and partial dentures in dentate individuals when integrating the underweight factor into conventional normative need assessment. Among dentate individuals who had normative treatment need for full and partial dentures, the proportion of dentate subjects who had a *'general health related treatment need'* was 34.7% (Model 3b).

10.3.2.2 Integration of underweight and behavioural factors of propensity for health behaviour

Among dentate individuals who had a *'general health related treatment need'*, when adding the positive oral health behaviours into the treatment need model, the proportion of dentate individuals who had a high propensity for health behaviour or those having an *'propensity related treatment need'* was 17.6% (Model 3b).

10.3.2.3 Integration of underweight and financial factors into treatment need estimations

Among dentate individuals who had *'propensity related treatment need'*, when integrating the economic barrier into the model, the proportion of dentate individuals who had no financial problems or those having *'accessible treatment need'* was 33.3% (Model 3b).

Dentate individuals who also had *'propensity related treatment need'* but had a financial problem to pay for the treatment or those who had a barrier to *'access'* to dental services had *'non-accessible treatment need'*. The proportion of the group with *'non-accessible treatment need'* was 66.7% (Model 3b).

Model 3b

Full and Partial dentures

Illustration Ie

Older people who were underweight

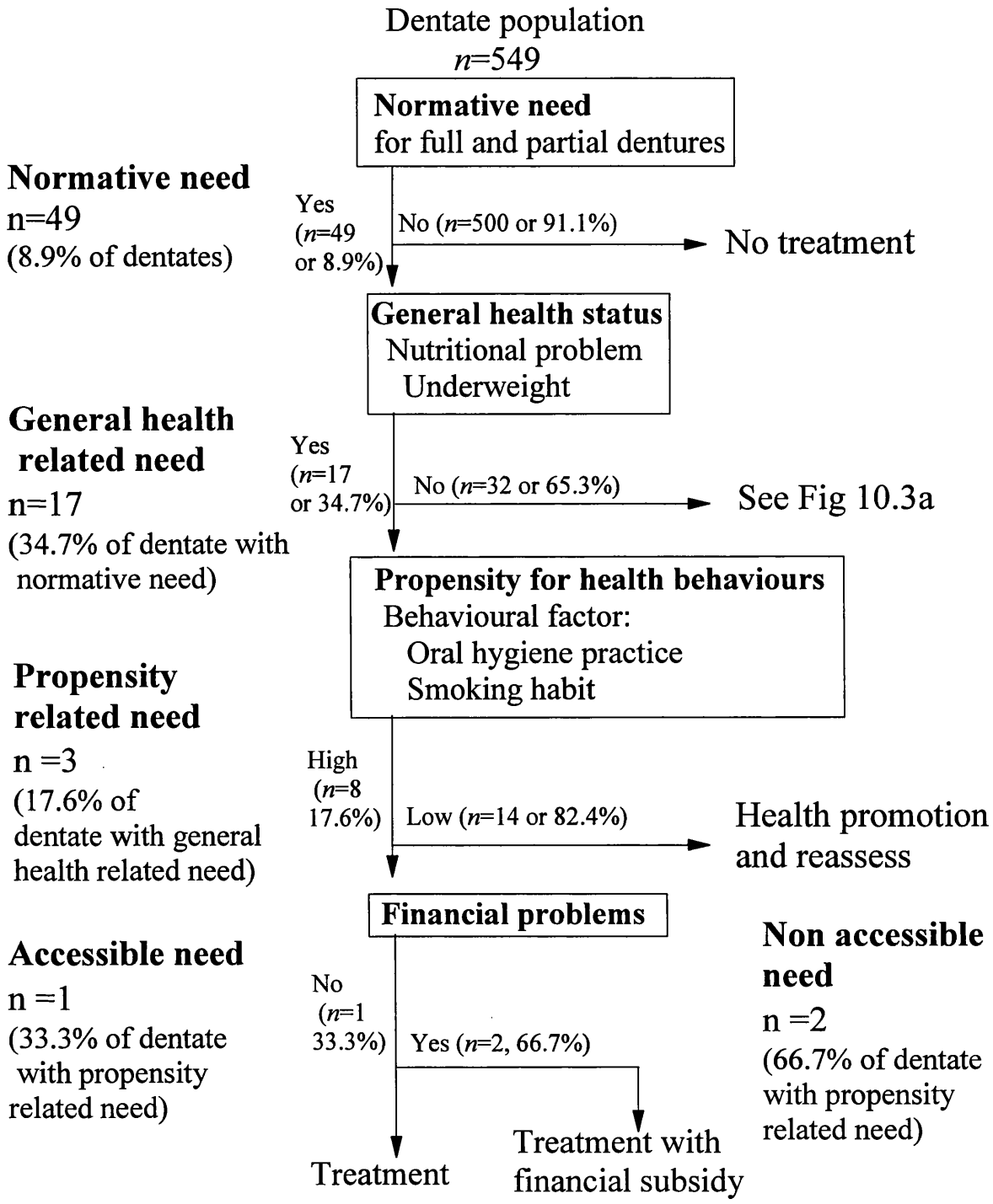


Figure 10.3b Treatment need assessment model for full and partial dentures in dentate population who were underweight

Tables 10.3, 10.4 and 10.5 summarise the results from using the new socio-dental approach to assessing the dental treatment need for full dentures, for partial dentures, and for full and partial dentures in edentulous and dentate older people. In these tables, the percentages of older people with different levels of treatment need were presented according to the general health status of the subjects. In the first and the third columns, the percentages of each level of treatment need were compared with normative treatment need. In the second and fourth columns, the percentages of each level of treatment presents the amount of treatment need when compared to the preceding level of treatment need.

In Table 10.3, when normative treatment need of edentulous subjects who had normal health was considered as 100%, 60.5% of those with normative need had *'impact-related treatment need'*, 14.5% had *'accessible treatment need'* and 32.9% had *'non-accessible treatment need'*. The percentages of different level of dental treatment need in the second column in the same table were the same as presented in Figure 10.1a. 79.7% of edentulous subjects who had normative treatment need for full dentures had normal health (normal weight). 60.5% of edentates who had normal weight had *'impact-related treatment need'*. 45.7% and 54.3% of edentates who had *'impact-related treatment need'* had *'accessible treatment need'* and *'non-accessible treatment need'* respectively.

Similarly, in Table 10.4, per 100 dentate subjects who had normative treatment need for partial dentures and had normal weight, 50.5% had *'impact-related*

treatment need', 35.5% and *'propensity related treatment need'*, 14.5% had *'accessible treatment need'* and 20.8% had *'non-accessible treatment need'* (Table 10.4). 13.2% of dentate subjects who had normative treatment need for partial dentures had *'general health related treatment need'*. Among those dentates who had 'general health' problem, 6.0% had *'propensity related treatment need'*, 2.4% had *'accessible treatment need'* and 3.6% had *'non-accessible treatment need'*

In Table 10.5, per 100 dentate subjects who had normative treatment need for full and partial dentures and had normal weight, 71.9% had *'impact-related treatment need'*, 25% and *'propensity related treatment need'*, 12.5% had *'accessible treatment need'* and 12.5% had *'non-accessible treatment need'* (Table 10.5). 34.7% of dentate subjects who had normative treatment need for full and partial dentures had *'general health related treatment need'*. Among those dentates who had 'general health' problem, 6.1% had *'propensity related treatment need'*, 2.0% had *'accessible treatment need'* and 4.1% had *'non-accessible treatment need'*

Table 10.3 Different levels of treatment need for full dentures in 'normal health' and 'health problem' groups for edentulous older subjects

Treatment need level	**Edentulous subjects** (considered normative need in normal health group as 100%)	**Edentulous subjects*** (for full dentures in normal health group)	**Edentulous subjects** (considered normative need as 100% in health problem group)	**Edentulous subjects**** (for full dentures in health problem group)
Normative need	-	-	**100%**	**100%**
Normative treatment need (Normal health group)	**100%**	**100%**	-	-
General health related treatment need	-	-	**39.7%**	**39.7%** (of edentates with normative need)
Impact related treatment need	**60.5%**	**60.5%** (of edentates with normal health)	-	-
Propensity related treatment need	-	-	-	-
Accessible treatment need	**14.5%**	**45.7%** (of edentates with impact-related need)	**12.7%**	**32%** (of edentates with general health related need)
Non-accessible treatment need	**32.9%**	**54.3%** (of edentates with impact-related need)	**27.0%**	**68%** (of edentates with general health related need)

* reproduced from Figure 10.1a

** reproduced from Figure 10.1b

Table 10.4 Different levels of treatment need for partial dentures in 'normal health' and 'health problem' groups for dentate older subjects

Treatment need level	**Dentate subjects** (considered normative need in normal health group as 100%)	**Dentate subjects*** (for partial dentures in normal health group)	**Dentate subjects** (considered normative need as 100% in health problem group)	**Dentate subjects**** (for partial dentures in health problem group)
Normative need	-	-	**100%**	**100%**
Normative treatment need (Normal health group)	**100%**	**100%**	-	-
General health related treatment need	-	-	**13.2%**	**13.2%** (of dentates with normative need)
Impact related treatment need	**50.5%**	**50.5%** (of dentates with normal health)	-	-
Propensity related treatment need	**35.3%**	**69.9%** (of dentates with impact-related need)	**6.0%**	**45.4%** (of dentates with general health related need)
Accessible treatment need	**14.5%**	**41.2%** (of dentates with propensity related need)	**2.4%**	**40%** (of dentates with propensity related need)
Non-accessible treatment need	**20.8%**	**58.8%** (of dentates with propensity related need)	**3.6%**	**60%** (of dentates with propensity related need)

* reproduced from Figure 10.2a
** reproduced from Figure 10.2b

Table 10.5 Different levels of treatment need for full and partial dentures in 'normal health' and 'health problem' groups for dentate older subjects

Treatment need level	Dentate subjects (considered normative need in normal health group as 100%)	Dentate subjects* (for partial dentures in normal health group)	Dentate subjects (considered normative need as 100% in health problem group)	Dentate subjects** (for partial dentures in health problem group)
Normative need	-	-	**100%**	**100%**
Normative treatment need (Normal health group)	**100%**	**100%**	-	-
General health related treatment need	-	-	**34.7%**	**34.7%** (of dentates with normative need)
Impact related treatment need	**71.9%**	**71.9%** (of dentates with normal health)	-	-
Propensity related treatment need	**25%**	**34.8%** (of dentates with impact-related need)	**6.1%**	**17.3%** (of dentates with general health related need)
Accessible treatment need	**12.5%**	**50%** (of dentates with propensity related need)	**2.0%**	**33.3%** (of dentates with propensity related need)
Non-accessible treatment need	**12.5%**	**50%** (of dentates with propensity related need)	**4.1%**	**66.7%** (of dentates with propensity related need)

* reproduced from Figure 10.3a
** reproduced from Figure 10.3b

10.4 Integrating of Oral Impact on Daily Performances (OIDP) using different cut-off points

Among the group with normal general health, the proportion of older people who had *'impact-related treatment need'*, *'propensity related treatment need'*, *'accessible treatment need'* and *'non-accessible treatment need'* varied with different cut-off points of CS-OIDP score. For example, when considering normative need for full dentures as 100%, at cut-off point ≥8 , 9.5% compared to 64.5% at cut-off point >0 of edentulous subjects had *'impact-related treatment need'* for full dentures. Edentulous individuals who had *'non-accessible treatment need'* or who needed a financial subsidy were approximately 21.4% at CS-OIDP cut-off point >0 whilst at cut-off point ≥8, the group with *'non-accessible treatment need'* decreased to 6.3% (Table 10.6).

Different CS-OIDP cut-off points give different numbers of older people who need certain treatments. In Table 10.6, for each treatment need, the proportions of edentulous and dentate older people who have CS-OIDP scores at cut-off points >0, ≥8 and ≥16 are presented. A *'propensity related treatment need'* was not included in this table.

Table 10.6 Comparison of normative treatment need considered as 100% with *'impact-related treatment need'*, *'non-accessible treatment need'* and *'accessible treatment need'* at different cut-off points in normal weight older people

Treatment	Normative need	CS-OIDP >0 Impact-related need	CS-OIDP >0 Accesible need	CS-OIDP >0 Non-Accesible need	CS-OIDP ≥8 Impact-related need	CS-OIDP ≥8 Accesible need	CS-OIDP ≥8 Non-Accesible need	CS-OIDP ≥16 Impact-related need	CS-OIDP ≥16 Accesible need	CS-OIDP ≥16 Non-Accesible need
Edentulous subjects *(n=158)*										
New or replacement %	100.0	64.5	17.5	21.4	9.5	3.2	6.3	5.6	2.4	3.2
full dentures (n)	(126)	(49)	(22)	(27)	(12)	(4)	(8)	(7)	(3)	(4)
Dentate subjects *(n=549)*										
New or replace %	100.0	43.8	20.1	17.4	5.1	2.1	2.7	4.2	1.2	2.4
partial dentures (n)	(333)	(146)	(67)	(58)	(17)	(7)	(9)	(14)	(4)	(8)
Dentate and one edentulous arch subjects *(n=67)*										
New or replace full %	100.0	46.9	12.2	20.4	12.2	4.1	8.2	6.1	4.1	2.0
and partial dentures (n)	(49)	(23)	(6)	(10)	(6)	(2)	(4)	(3)	(2)	(1)

10.5 Integration of general health factors, Oral Impact on Daily Performances (OIDP) and behavioural propensity into treatment need model for periodontal disease in dentate older people

10.5.1 Dentate subjects with specific medical conditions related to periodontal disease

10.5.1.1 Integration of specific medical conditions: diabetes mellitus

Periodontal disease can be associated with some specific medical conditions such as diabetes mellitus and heart disease in older people (Chapter 2, Section 2.4.3.4).

Diabetes mellitus is one of the major risk factors for periodontal disease. This specific medical condition was integrated into the treatment need model as illustrated in Figures 10.4a to 10.4d (Models 4a, 4b, 4c, 4d). Figures 10.4a and 10.4b illustrate the integration of general health health in terms of specific medical condition (diabetes mellitus) in people with *high* levels of periodontal disease. 6.2% of those with normative periodontal treatment need had diabetes. The treatment need in this group is called a *'general health related treatment need'*. They need the treatment because of the higher risk of periodontal disease progression and severity from their general health, in this case diabetes. Therefore, a high priority for periodontal treatment will be given to them in order to decrease the risk of advanced periodontal disease.

10.5.1.1.1 Integration of specific medical conditions and behavioural factors of propensity for health behaviour

Table 10.7 gives a summary of the different definitions for propensity for health behaviour. Two behavioural factors, oral hygiene practice and smoking habit were significant in predicting the loss of periodontal attachment in diabetic individuals (Chapter 2, Section 2.5.1). Two options for defining propensity for health behaviour were used in the integrating processes: rigid propensity and non-rigid propensity. High propensity with rigid definition included those brushing more than once a day and were non-smokers. Whilst high propensity with non-rigid definition included those brushing teeth more than once a day and smoking 10 cigarettes or less a day (Table 10.7). 86.1% of 512 subjects examined for periodontal disease had high propensity for health behaviours (non-rigid definition). Under a rigid definition, 72.3% had high propensity for health behaviours.

Table 10.7 Definitions of propensity for health behaviour used in the Integrated models, number and percentages of 512 dentate subjects in each definition

Propensity for health behaviour	Definitions	n (%)
High propensity		
Rigid definition	Brushing more than once a day and being a non-smoker	370 (72.3)
Non-rigid definition	Brushing more than once a day and smoke 10 or less cigarettes per day	441 (86.1)
Low propensity		
Rigid definition	Brushing less than once a day and being a smoker	142 (27.7)
Non-rigid definition	Brushing less than once a day and smoke 11 or more cigarettes per day	71 (13.9)

Within the groups who had *'general health related treatment need'*, the propensity for health behaviours to maintain good periodontal health after the treatment is very important for the prognosis of the treatment. At the Propensity Level, oral hygiene practice and smoking habits, the two important behaviours related to periodontal treatment are integrated into the treatment need model (Figure 10.4a). This level of treatment need is described as a *'propensity related treatment need'* (Model 4a, Figure 10.4a). Older people who had *'propensity related treatment need'* were those who have diabetes mellitus and had high propensity for health behaviours related to periodontal treatment.

When considering a *'general health related treatment need'* as 100%, dentate individuals who had *'propensity related treatment need'* with high propensity (rigid definition), high propensity (non-rigid definition), low propensity (rigid

definition) and low propensity (non-rigid definition) were 39.1%, 47.8%, 13.0% and 4.3% respectively (Figure 10.4a).

In Figure 10.4b, using Classification 2 for a definition for high levels of periodontal disease, the same integration process was done for Model 4b. When considering *'general health related treatment need'* as 100%, dentate individuals who had *'propensity related treatment need'* with high propensity

(rigid definition), high propensity (non-rigid definition), low propensity (rigid definition) and low propensity (non-rigid definition) were 43.5%, 47.8%, 8.7% and 4.3% respectively (Figure 10.4b).

Using the same integration process, Figures 10.4c and 10.4d (Model 4c and Model 4d) illustrates the integration of those having diabetes and low levels of periodontal disease. In dentate subjects with low levels of periodontal disease (Classification 3, Table 10.1), when considered general health related need as 100%, dentate subjects who had *'propensity related treatment need'* with high propensity (rigid definition), high propensity (non-rigid definition), low propensity (rigid definition) and low propensity (non-rigid definition) were 43.5%, 43.5%, 4.3% and 4.3% respectively (Figure 10.4c).

Figure 10.4d illustrates the integrating model to assess periodontal treatment need in older people who had diabetes and low levels of periodontal disease under Classification 4 (Table 10.1). When considering a *'general health related treatment need'* as 100% dentate individuals who had *'propensity*

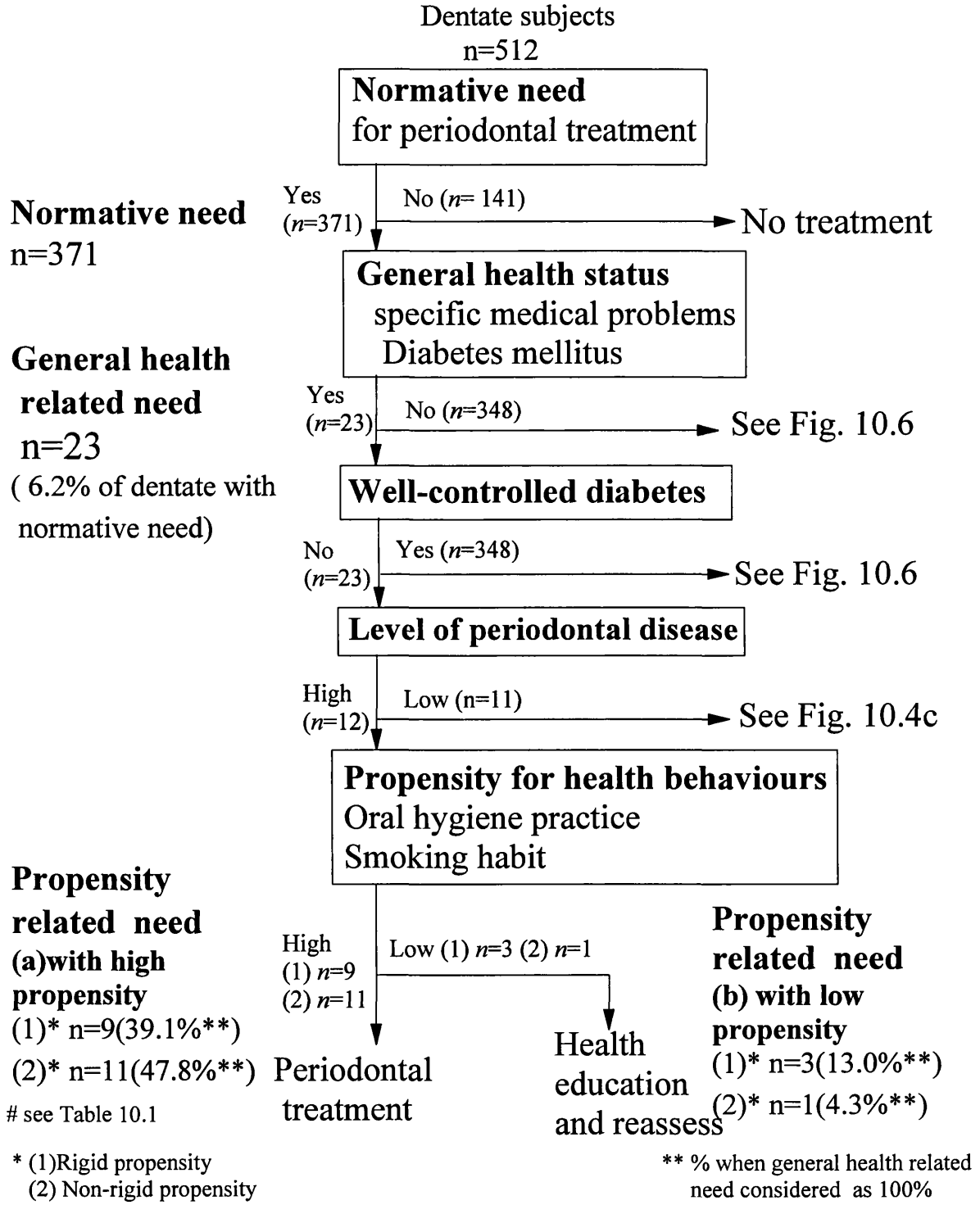
related treatment need' with high propensity (rigid definition), high propensity (non-rigid definition), low propensity (rigid definition) and low propensity (non-rigid definition) were 39.1%, 43.5%, 8.7% and 4.3% respectively (Figure 10.4d).

Model 4 a

Illustration IIa

Older people who had diabetes with **high** level of periodontal disease

Classification1#



* (1)Rigid propensity
(2) Non-rigid propensity

** % when general health related need considered as 100%

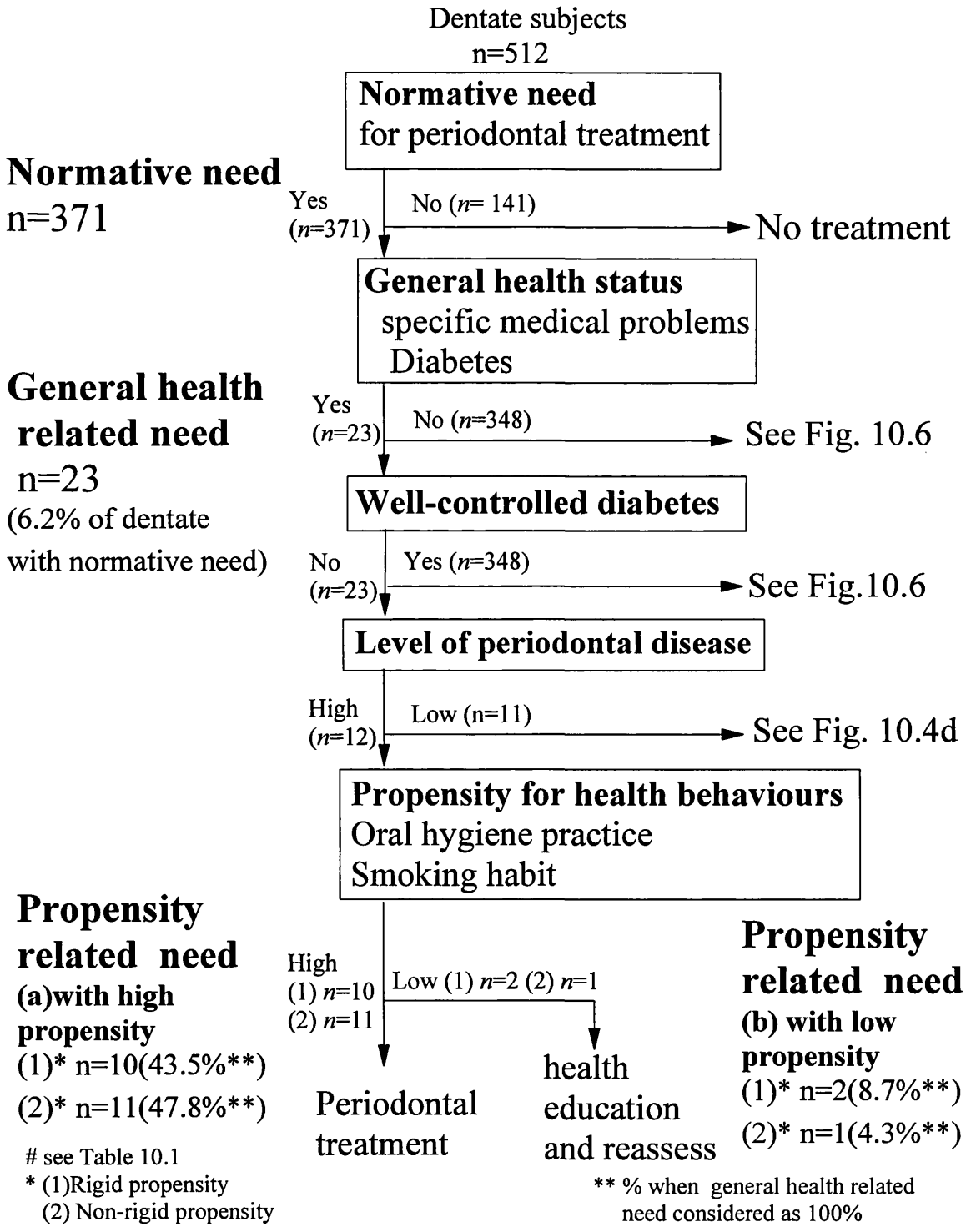
Figure 10.4a Treatment need assessment model for periodontal disease in dentate subjects who had diabetes and high level of periodontal disease (Classification 1)

Model4 b

Illustration IIb

Older people who had diabetes with **high** level of periodontal disease

Classification 2#



\# see Table 10.1

* (1)Rigid propensity
(2) Non-rigid propensity

** % when general health related need considered as 100%

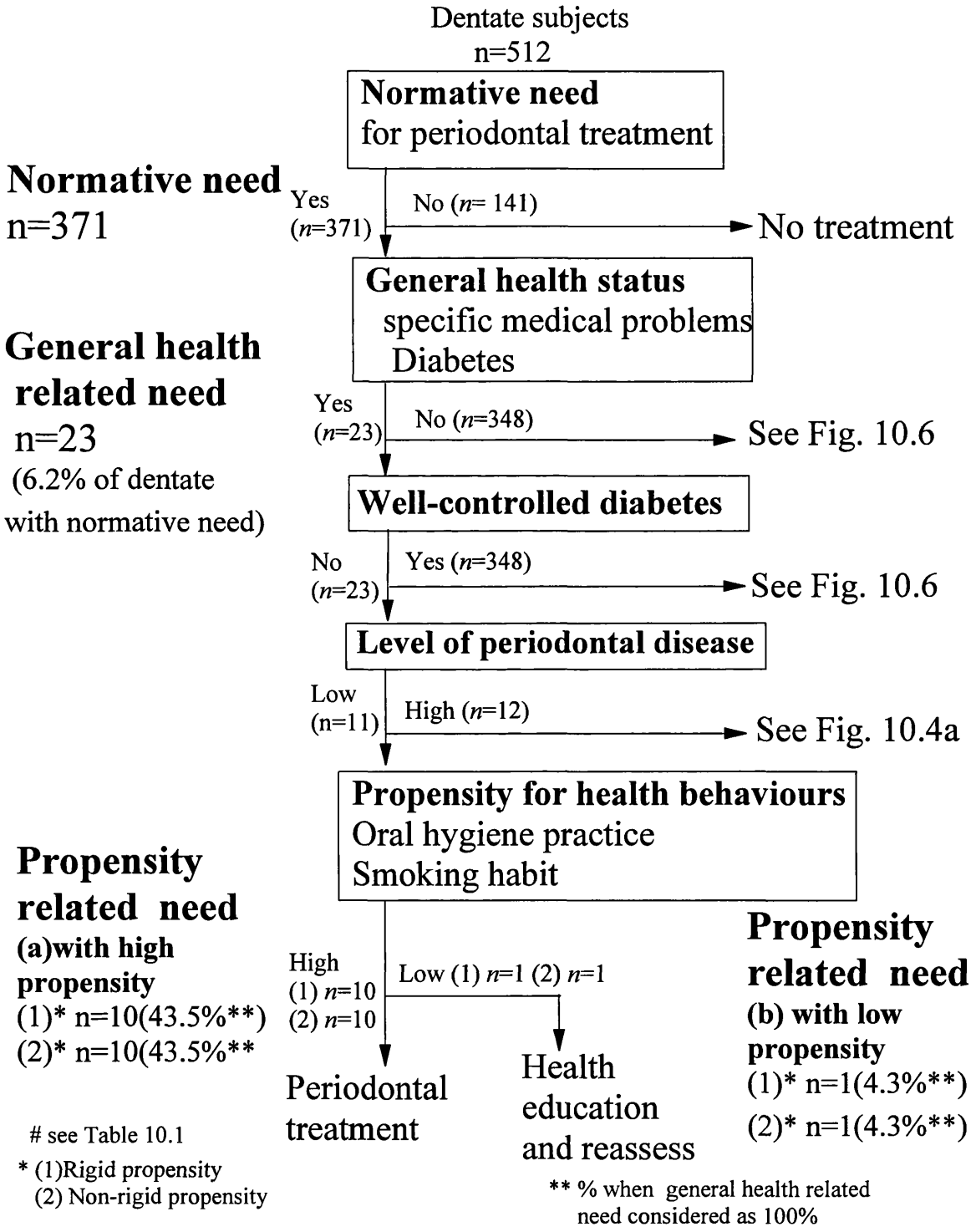
Figure 10.4b Treatment need assessment model for periodontal disease in dentate subjects who had diabetes and high level of periodontal disease (Classification 2)

Model 4 c

Illustration IIIa

Older people who had diabetes with **low** level of periodontal disease

Classification 3#



see Table 10.1

* (1)Rigid propensity
(2) Non-rigid propensity

** % when general health related need considered as 100%

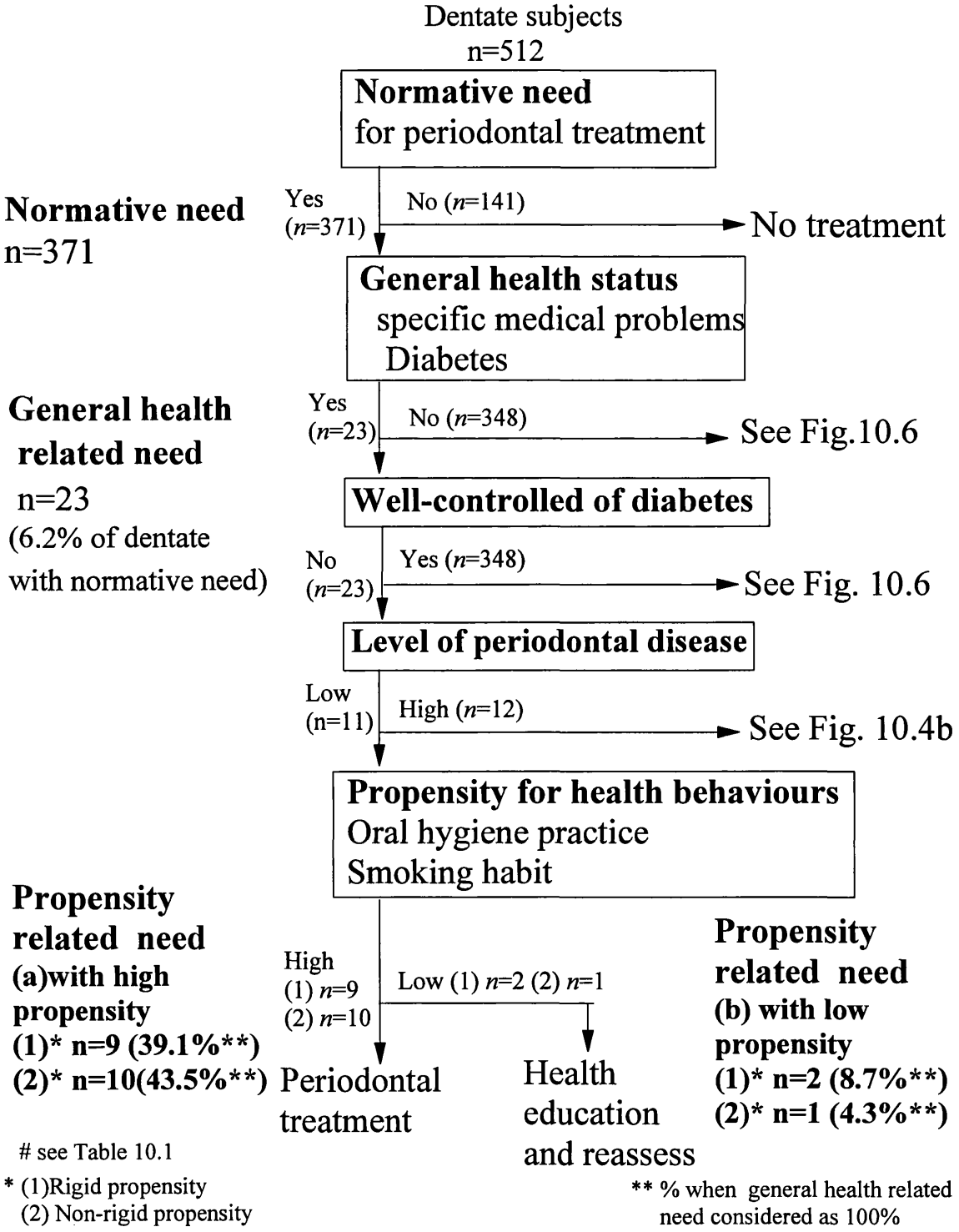
Figure 10.4c Treatment need assessment model for periodontal disease in dentate subjects who had diabetes and low level of periodontal disease (Classification 3)

Model 4 d

Illustration IIIb

Older people who had diabetes with **low** level of periodontal disease

Classification 4#



see Table 10.1

* (1)Rigid propensity
(2) Non-rigid propensity

** % when general health related need considered as 100%

Figure 10.4d Treatment need assessment model for periodontal disease in dentate subjects who had diabetes and low level of periodontal disease (Classification 4)

10.5.1.2 Integration of specific medical conditions: heart disease

Figure 10.5 demonstrates how heart disease is integrated into the treatment need model for periodontal treatment in dentate subjects. Among 549 dentate subjects, 37 had heart disease (Model 5). The group with heart disease did not have a periodontal examination because of their health. Even though their periodontal conditions had not been assessed, it has been acknowledged that the treatment need for periodontal disease is high in older populations. The prevalence of the normative need for periodontal treatment in this study was 72.5% which confirmed the high percentage of periodontal treatment need in older people. Beside that, there is evidence that periodontal disease could pose a risk to health for individuals with heart disease (Chapter 2, Section 2.4..3.4). Therefore, all the dentate individuals with heart disease were considered as having a *'general health related treatment need'* for periodontal treatment. They need the treatment because of the adverse effect on their general health. Consequently, they have a high priority for periodontal treatment to decrease the risk to their general health.

10.5.1.2.1 Integration of specific medical conditions and behavioural factors of propensity for health behaviours

When older individuals with *'general health related need'* are considered as 100%, dentate subjects who had *'propensity related treatment need'* with high propensity using rigid and non-rigid definitions were 89.2% and 100.0% respectively (Model 5) (Figure 10.5). Dentate subjects who had *'propensity related treatment need'* with low propensity using rigid and non-rigid definition were 10.8% and 0.0% respectively (Figure 10.5).

Older individuals who had *'propensity related treatment need'* with high propensity should have periodontal treatment while the group with low propensity will need health education to improve their health behaviours and be reassessed before receiving periodontal treatment.

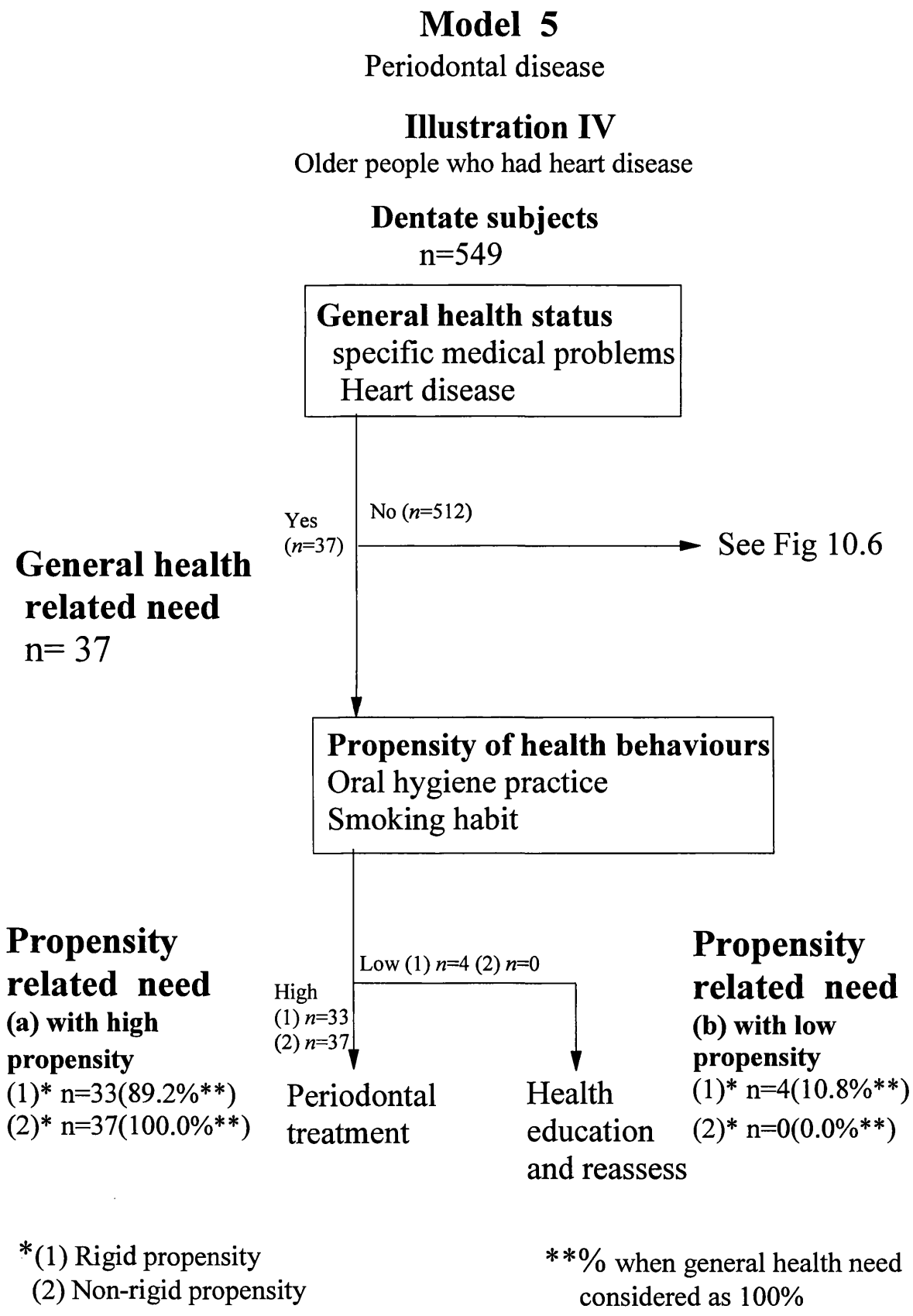


Figure 10.5 Treatment need assessment model for periodontal disease in dentate population who had heart disease

Table 10.8 summarises the results from using the new socio-dental approach to assessing the dental treatment need for periodontal disease. When normative treatment need of dentate subjects who had normal health was considered as 100%, 16.4% of those with normative need had *'impact-related treatment need', 'Propensity related treatment need'* ranged from 2.6% to 13.8%. Per 100 dentate subjects who had health problem or had diabetes mellitus, 6.2% had *'general health related treatment need'*. Among those dentates who had 'general health' problem, *'propensity related treatment need'* ranged from 0.3% to 3.0% when compared to normative treatment need depending on different classifications (Table 10.8).

Table 10.8 Comparison of different level of treatment need for periodontal disease in dentate older people with diabetes mellitus when considered normative need as 100%

	Periodontal treatment				
	Normal health	Health problem (diabetic group			
Treatment level	Normal health (considered normative need in normal general health group as 100%)	Classification 1 (High level of periodontal disease) considered normative need as 100%	Classification 2 (High level of periodontal disease) considered normative need as 100%	Classification 3 (Low level of periodontal disease) considered normative need as 100%	Classification 4 (Low level of periodontal disease) considered normative need as 100%
Normative need	-	100%	100%	100%	100%
Normative need (Normal general health group)	100%	-	-	-	-
General health related need	-	6.2%	6.2%	6.2%	6.2%
Impact-related need	16.4%	-	-	-	-
Propensity related need: high propensity	(1)* 9.8% (2) 13.8%	(1)* 2.4% (2) 3.0%	(1)* 2.7% (2) 3.0%	(1)* 3.0% (2) 3.0%	(1)* 2.4% (2) 3.0%
Propensity related need: low propensity	(1)* 6.6% (2) 2.6%	(1)* 0.8% (2) 0.3%	(1)* 0.5% (2) 0.3%	(1)* 0.3% (2) 0.3%	(1)* 0.5% (2) 0.3%

** (1) =rigid propensity, (2)= non-rigid propensity*

10.5.1.3 Treatment need in dentate subjects who had normal health

Older people who were in 'normal health' group had no diabetes or well-controlled diabetes and did not have heart disease. Among older individual who had normative need for periodontal treatment, 93.8% had normal general health. When considering this 'normal health' group as 100%, 16.4% had *'impacted related treatment need'*. Within the group who had *'impacted related treatment need'*, dentate subjects who had *'propensity related treatment need'* with high propensity using rigid and non-rigid definitions were 59.6% and 84.2% respectively (Model 6) (Figure 10.6). Dentate subjects who had *'propensity related treatment need'* with low propensity using rigid and non-rigid definition were 40.4% and 15.8% respectively (Figure 10.6).

10.5.2 Treatment need in dentate subjects with normal health who had no perceived oral impacts

Older individuals who had no perceived oral impacts were less likely to seek dental treatment. Therefore, they were not the priority group for dental treatment. Nevertheless, these individuals could not be ignored. Figure 10.7 illustrates the different levels of periodontal disease in this group. A slightly higher proportion of subjects had low level of periodontal disease. When adding the propensity for health behaviours, a higher proportion of subjects had high than low behavioural propensity. Those subjects with low propensity should be informed about their oral problem, health promotion should be given and then they should be reassessed for any changes in the perceived oral impacts and behaviours.

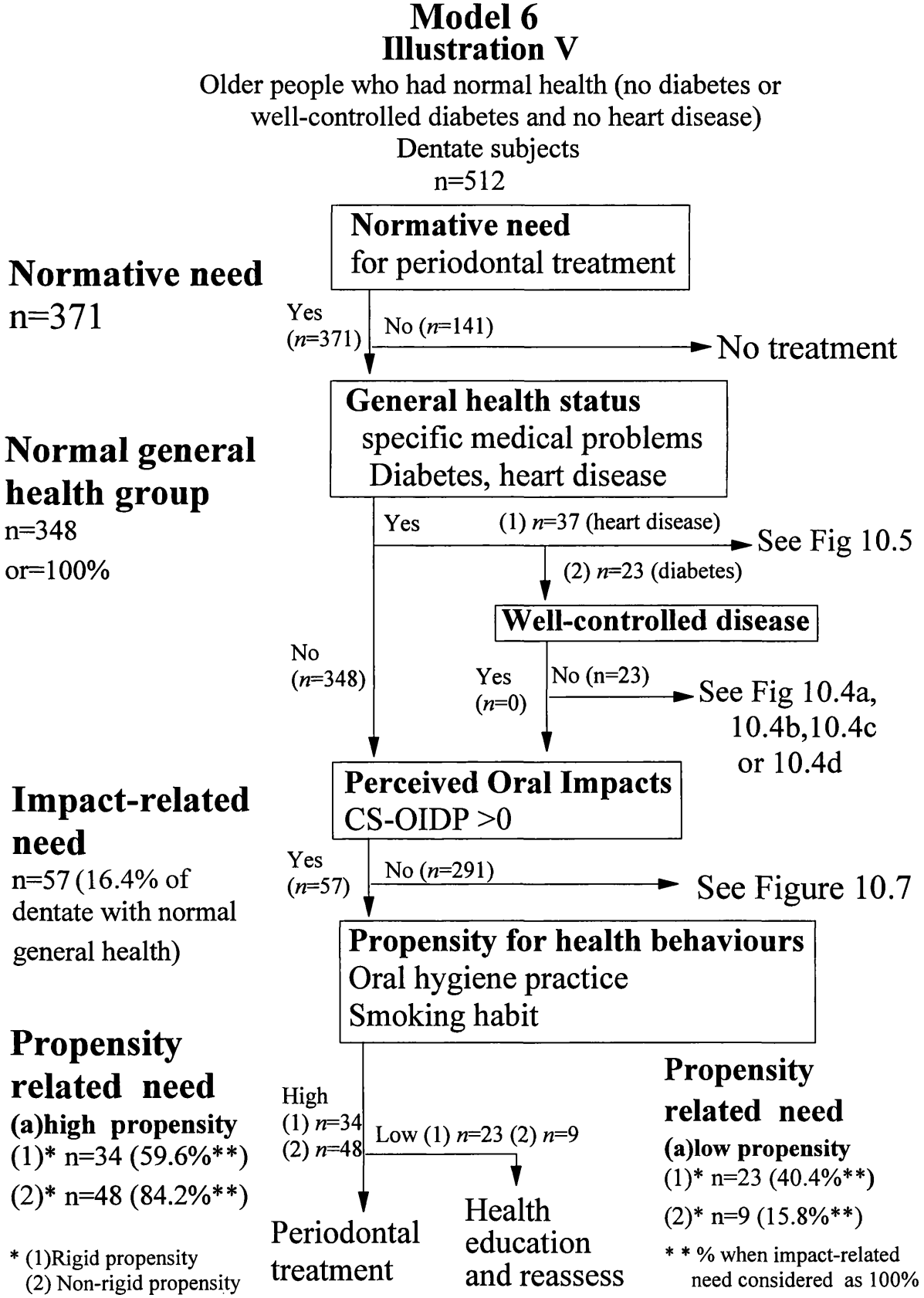


Figure 10.6 Treatment need assessment model for periodontal disease in dentate subjects who had normal general health

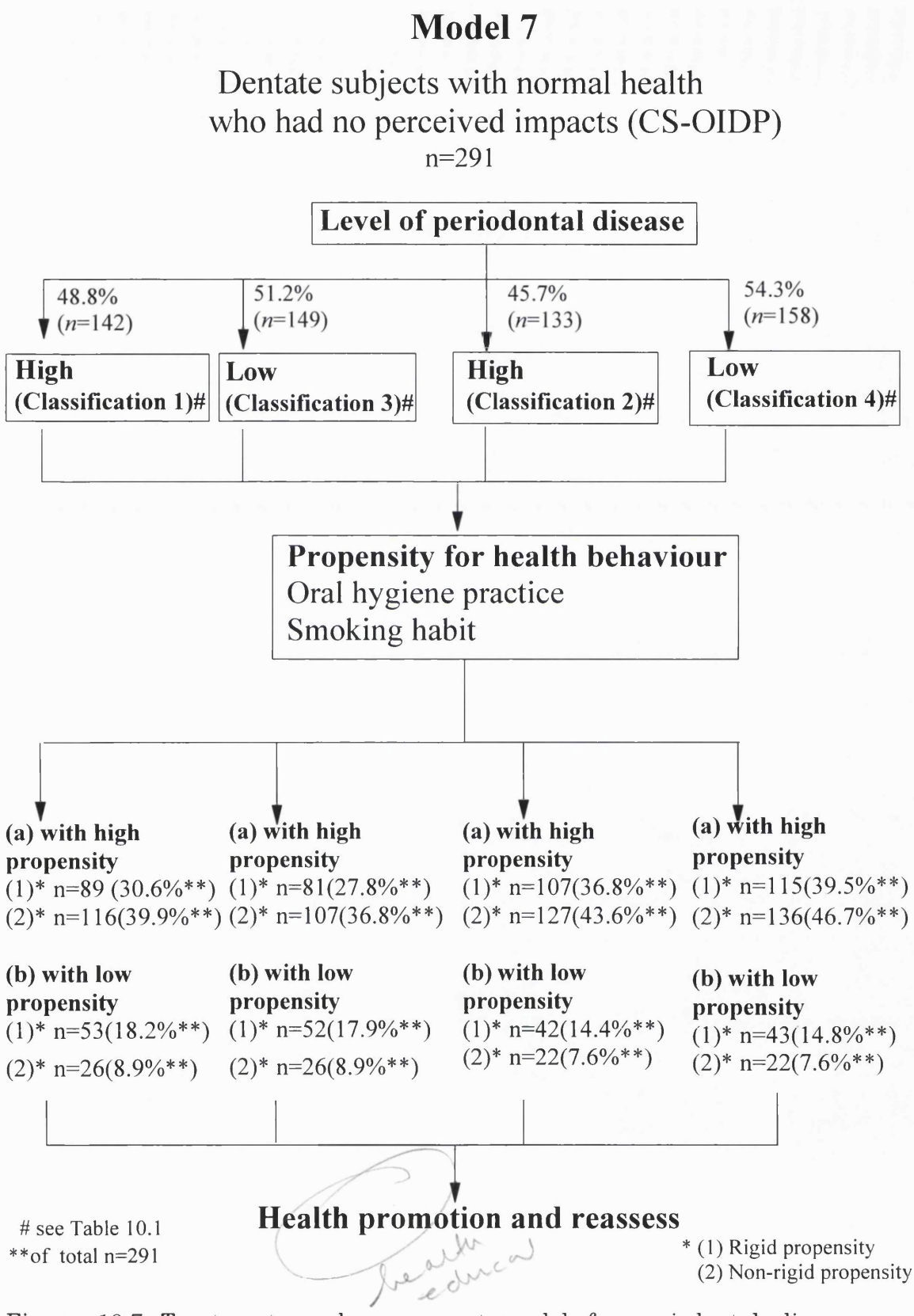


Figure 10.7 Treatment need assessment model for periodontal disease in dentate subjects who had normal general health and no perceived impacts

10.6 Implications of CS-OIDP at different cut-off points on *'impact-related treatment need'* and *'propensity related treatment need'* for periodontal treatment

'Impact-related treatment need' and *'propensity related treatment need'* varies on the cut-point of CS-OIDP scores. The previous section used only one cut-point, namely CS-OIDP >0. When using higher cut-point at ≥8 and ≥16, the number and percentages of older people with periodontal treatment need reduced dramatically (Table 10.9). When considering normative treatment need as 100%, *'Impact-related treatment need'* reduced from 16.4% to 5.2% and 3.4% when cut-off points changed from >0 to ≥8 and ≥16 respectively (Table 10.10). Similarly *'propensity related treatment need'*, for example, with high propensity (non-rigid definition) decreased from 13.8% to 4.3% and 2.9% respectively.

Table 10.9 Comparison of number and percentage of older people with normative, impact-related, and propensity related need for periodontal treatment in 512 dentate older individuals

	Normative need	Impact-related need	Propensity related need with high propensity (rigid)	Propensity related need with high propensity (non-rigid)	Propensity related need with low propensity (rigid)	Propensity related need with low propensity (non-rigid)
CS-OIDP Cut point >0 %	68.0	11.1	6.6	9.4	4.5	1.8
(n)	(348)	(57)	(34)	(48)	(23)	(9)
CS-OIDP Cut point ≥8 %	68.0	3.5	2.0	2.9	1.6	5.9
(n)	(348)	(18)	(10)	(15)	(8)	(3)
CS-OIDP Cut point ≥16 %	68.0	2.3	1.4	2.0	1.0	0.4
(n)	(348)	(12)	(7)	(10)	(5)	(2)

Table 10.10 Comparison of percentage of older people with normative, impact-related, and propensity related need for periodontal treatment in 512 dentate older individuals

	Normative need	Impact-related need	Propensity related need with high propensity (rigid)	Propensity related need with high propensity (non-rigid)	Propensity related need with low propensity (rigid)	Propensity related need with low propensity (non-rigid)
CS-OIDP Cut point >0	100.0	16.4	9.8	13.8	6.6	2.6
CS-OIDP Cut point ≥8	100.0	5.2	2.9	4.3	2.3	0.9
CS-OIDP Cut point ≥16	100.0	3.4	2.0	2.9	1.4	0.6

CHAPTER 11

DISCUSSION

The main objective of this thesis is to develop a broader approach to assess the dental treatment need which could be applied to the general public of all ages. However, in this study the new approach will be illustrated in older people particularly in those having general health problems, for example in the underweight and diabetic subjects, and in those with normal general health. In this study, the new approach of assessing the dental treatment needs started by using normative treatment need under the conventional system which has been recognised as having several shortcomings. To the normative need was added a series of measures such as general health factors, socio-dental indicator (OIDP), which provided a broader aspects of perceived oral impacts from lay people, propensity for health behaviours which affect the health gains from dental treatment, and financial status which affects the use of dental care. By using this new approach, more accurate different levels of treatment needs could then be estimated. Each level of need could be calculated depending on which factors were integrated. Moreover, each level of treatment need could be used as a guideline for health planners to plan the dental services indicated according to different levels of resources.

In this chapter there will be a discussion of the important findings according to the four objectives of the thesis.

An overview of the general background of the study population

The majority of the older subjects were dentate with the mean functional teeth of 20.1 (±8.6) per person. The prevalence of edentulousness was only 11.9%. They had a low prevalence of dental caries in coronal and root surfaces. The mean DMFT was 12.7 (±8.6), and the main component was the missing teeth. The mean DFT was 1.9 (±3.2) per person. The percentages of older subjects who had decayed, filled and missing teeth were 41.2%, 20.4% and 94.5% respectively. There were higher prevalence for periodontal disease. 72.5% had loss of attachment of 6 mm or more. 62.9% had at least one mobile tooth.

The first part of the discussion in Sections 11.1 to 11.5 will focus on Objective 1 "*to estimate dental treatment needs in a population of older Thai people in Chiang Mai using the new approach by considering the general health status, socio-dental indicators, propensity for health behaviours and financial status*" which is the main objective of this study.

11.1 The changes in different levels of dental treatment need after using a socio-dental approach of treatment need estimation

Table 11.1 gives an overall summary of the findings of the dental treatment needs assessed by using a conventional approach as compared to the new socio-dental approach. Per 100 dentate older people examined using the normative approach, 11.7% needed some restorative treatment, 28.6% needed extraction of teeth, 72.5% needed periodontal treatment, and 60.7% needed

partial dentures. 79.7% of edentulous subjects needed full dentures In the new approach of assessing dental treatment needs, the normative need estimation is dominant for chronic progressive conditions such as dental caries, life-threatening conditions such as oral cancer or severe infections. Therefore, normative treatment need estimation for restoration and extraction are dominant.

When the new socio-dental approach was applied to the treatment need estimations for other types of dental treatment, there was a substantial reduction in the number of the treatment need. From the total of 100 older people, only 11.5% needed periodontal treatment compared to 72.5% assessed using the conventional approach. Dental treatment need for full dentures was reduced from 79.7% to 23.5% whilst the treatment need for partial dentures was reduced from 60.7% to 9.1%.

The new socio-dental approach took into account various factors which could affect the treatment need of lay people. The detailed discussion of this new approach wil be given in the subsequent section.

Table 11.1 Dental treatment need assessed by using the conventional normative approach compared to using a socio-dental approach per 100 older people

Treatment need	Conventional approach (Normative need)	Socio-dental approach		
		Normal health group	Health problem group	Total
Restoration	11.7	-	-	-
Extraction	28.6	-	-	-
Periodontal treatment	72.5	9.4**	2.1**	11.5**
Full dentures*	79.7	13.4***	10.1***	23.5***
Partial dentures*	60.7	7.6***	1.5***	9.1***

* new or replacement /repair
** propensity related need (non-rigid definition)
*** accessible need

Tables 11.2 and 11.3 summarise the results from using the new socio-dental approach to assessing the prosthodontic treatment need in dentate and edentulous older people. The percentages of older subjects with different levels of treatment need were presented according to the general health status of the subjects. The percentages in the first and the third columns show the amount of dental treatment need when normative need is considered as 100%. In contrast, in the second and fourth columns, the percentages of each level of treatment presents the amount of treatment need when compared to the preceding level of treatment need. For example, in Table 11.2, second column, the *'propensity related treatment need'* in dentate subjects who had normal health of 69.9% means that within 100 dentates with *'impact-related treatment need'*, 69.9% had *'propensity related treatment*

need'. Therefore, each level of treatment need could be compared to either the normative treatment need (as in columns 1 and 3) or compared to the previous levels of treatment need (as in columns 2 and 4).

Two types of dental treatment need: prosthodontic and periodontal treatment, have been used as illustrative models of a new socio-dental approach to assess treatment needs (Chapter 10). A higher proportion of edentulous subjects had moderate oral impact (OIDP score 8.0 - 15.9) and high oral impact (OIDP score > 16) compared to dentates (20.9% vs 14.6% and 12.7% vs 8.7% respectively) (Table 7.4). General health status affects the perceived oral impacts in older people. Older individuals who had at least one specific medical condition had significantly higher perceptions of oral impacts as shown by a higher mean OIDP score compared to those who did not experience chronic medical problem (6.6 vs 3.9) (Table 8.2). Therefore, it is necessary to separate two groups, namely the treatment need in the edentulous and dentate subjects, into the 'normal health' group, and the group with 'general health problems' when assessing the dental treatment need in the older people. After integrating general health status, perceived oral impacts, propensity for health behaviours and financial problem into normative need, different levels of need were estimated. Changes in the proportion of older people who had different levels of need for prosthodontic and periodontal treatment could be demonstrated.

In the following sections, the changes from normative need in each level of treatment need will be discussed. Section 11.1.1 will focus on prosthodontic treatment need, and Section 11.1.2 will focus on periodontal treatment need.

Table 11.2 Different levels of prosthodontic treatment need in 'normal health' and 'health problem' groups for the dentate older subjects

Treatment need level	Dentate subjects (considered normative need in normal health group as 100%)	Dentate subjects* (for partial dentures in normal health group)	Dentate subjects (considered normative need as 100% in health problem group)	Dentate subjects** (for partial dentures in health problem group)
Normative need	-	-	**100%**	**100%**
Normative treatment need (Normal health group)	**100%**	**100%**	-	-
General health related treatment need	-	-	**13.2%**	**13.2%** (of dentates with normative need)
Impact related treatment need	**50.5%**	**50.5%** (of dentates with normal health)	-	-
Propensity related treatment need	**35.3%**	**69.9%** (of dentates with impact-related need)	**6.0%**	**45.4%** (of dentates with general health related need)
Accessible treatment need	**14.5%**	**41.2%** (of dentates with propensity related need)	**2.4%**	**40%** (of dentates with propensity related need)
Non-accessible treatment need	**20.8%**	**58.8%** (of dentates with propensity related need)	**3.6%**	**60%** (of dentates with propensity related need)

* reproduced from Figure 10.2a
** reproduced from Figure 10.2b

Table 11.3 Different levels of prosthodontic treatment need in 'normal health' and 'health problem' groups for edentulous older subjects

Treatment need level	**Edentulous subjects** (considered normative need in normal health group as 100%)	**Edentulous subjects*** (for full dentures in normal health group)	**Edentulous subjects** (considered normative need as 100% in health problem group)	**Edentulous subjects**** (for full dentures in health problem group)
Normative need	-	-	**100%**	**100%**
Normative treatment	**100%**	**100%**	-	-
General health related treatment need	-	-	**39.7%**	**39.7%** (of edentates with normative need)
Impact related treatment need	**60.5%**	**60.5%** (of edentates with normal health)	-	-
Propensity related treatment need	-	-	-	-
Accessible treatment need	**14.5%**	**45.7%** (of edentates with impact-related need)	**12.7%**	**32%** (of edentates with general health related need)
Non-accessible treatment need	**32.9%**	**54.3%** (of edentates with impact-related need)	**27.0%**	**68%** (of edentates with general health related need)

* reproduced from Figure 10.1a

** reproduced from Figure 10.1b

11.1.1 Prosthodontic treatment need

'Normal general health' group

In the treatment need models for prosthodontic treatment, older subjects were assessed as underweight or not. Those who did not have underweight problem were considered to be in 'normal general health' group. 86.8% of dentates with normative need for partial dentures were in 'normal general health' group (Figure 11.1) while 60.3% of edentulous subjects with normative need for full dentures were in 'normal general health' group (Figure 11.2).

Normative treatment need

Normative treatment needs for prosthodontic treatment were high for both dentate and edentulous groups. More than half (60.6%) of dentate subjects were judged by professionals as needing a new or replacement/repair partial dentures (Figure 11.1), and 79.7% needed new or replacement/repair of full dentures (Figure 11.2). The comparison of normative need with other studies and the discussion concerning the shortcomings of normative need will be discussed later in Section 11.9.

Impact-related treatment need

Changes in prosthodontic treatment need after integrating perceived oral impacts (OIDP)

In older people who had normal weight, after integrating the socio-dental indicator (OIDP), only those who perceived problems relating to eating should be more likely to benefit from prosthodontic treatment. If using Model 2a (Figure 11.1) and Model 1a (Figure 11.2) as examples, when integrating OIDP index into normative need for prosthodontic treatment, normative needs for partial and full dentures were reduced to 50.5% (Table 11.2) and 60.5% (Table 11.3) respectively in those who had normative need and had normal health. The normative need was reduced almost by half for both partial and full denture treatment need. It is common to find high normative treatment need because this type of need does not take into account the perception of need from lay people nor other related factors which might influence the need.

In this new approach, the Oral Impact on Daily Performance (OIDP) index, a socio-dental indicator was used, in the treatment need estimation to formulate *'impact-related treatment need'*. Those who had *'impact-related treatment need'* perceived that they had functional or aesthetic problems related to loose teeth or inadequate dentures or other related problems and therefore would be considered to be in need. Adulyanon (1996) pointed out that the OIDP index has an advantage that it focuses on measuring the endpoint of the consequences of impacts. Thus an *'impact-related treatment need'* reflects disability and handicaps resulting from oral problems. It is the

advantage of the socio-dental approach under the 'biopsychosocial' model over the conventional approach under the 'bio-medical' model since the dimensions of disability and handicap are not included in the 'bio-medical' model. In other studies where perceived need was assessed in studied populations, lack of perceived need is one of the most common reason for not seeking dental treatment (Benson et al. 1984; Ettinger et al. 1988; Mattin and Smith, 1991; Dolan and Atchison, 1993; Lundgren et al. 1995).

Recently there are several studies concerning the perceived impact of oral conditions on functioning and well-being or oral health related quality of life. Strauss and Hunt (1993) reported that among older people, eating was the most psychosocial impact from oral conditions. Locker and Gruskha (1987) studies the oral facial pain and its effect on daily activities. They found that oral facial pain could cause worry as the psychosocial result. Reisine et al (1989) studied the impact of dental conditions in patients' quality of life and found that patients who wore dentures report considerable impact from their conditions especially in social interaction and home task.

Even though there are many studies on socio-dental indicators, very few studies relate the oral impacts with treatment needs. Adulyanon (1996) used the same socio-dental indicator (OIDP) to assess *'impact-related treatment need'*. He found a high difference between normative need and *'impact-related treatment need'*. The largest difference was for deep pocket treatment where *'impact-related treatment need'* was only 40.2% of normative need. Leao and Sheiham (1995) used a socio-dental indicator, the Dental Impact of Daily

Living (DIDL) to assess the relationship between subjective oral impact and clinical status but not in assessing need. They found that subjects' satisfaction decrease in appearance, performance, and comfort when gingival bleeding, calculus and number of pockets increased. However, they suggested that clinical status and the DIDL should be assessed simultaneously when dental needs are assessed.

In those whose oral problems did not provoke any impacts on their daily life, for example, they had no problem with eating without a prosthesis or could use their inadequate dentures to eat without problem, had no need for replacing missing teeth. Making or replacing these prostheses will be a waste of time, effort and money.

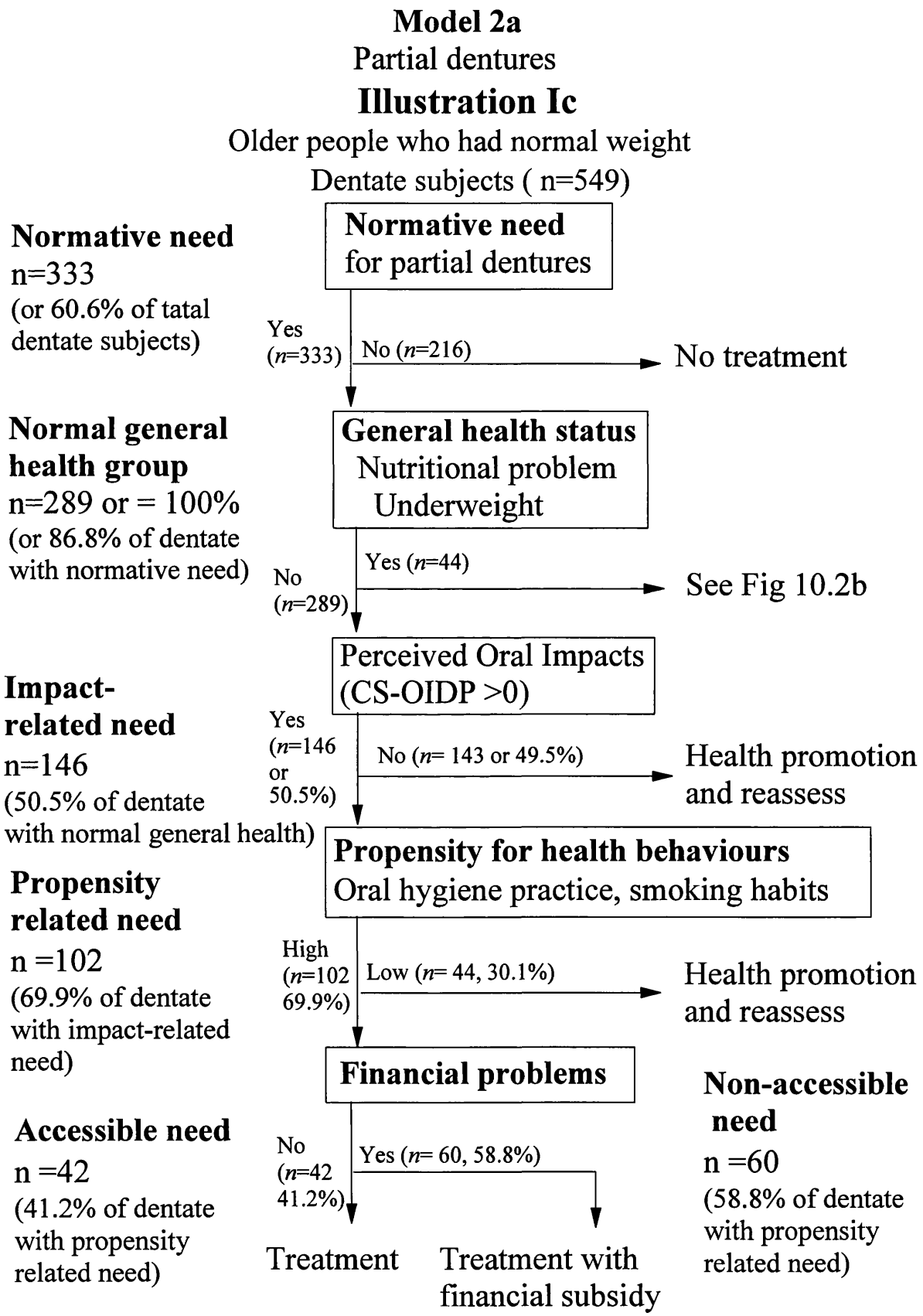


Figure 11.1 Treatment need assessment model for partial dentures in dentate population who had normal weight

Model 1a

Full dentures

Illustration Ia

Older people who had normal weight

Edentulous subjects (n=158)

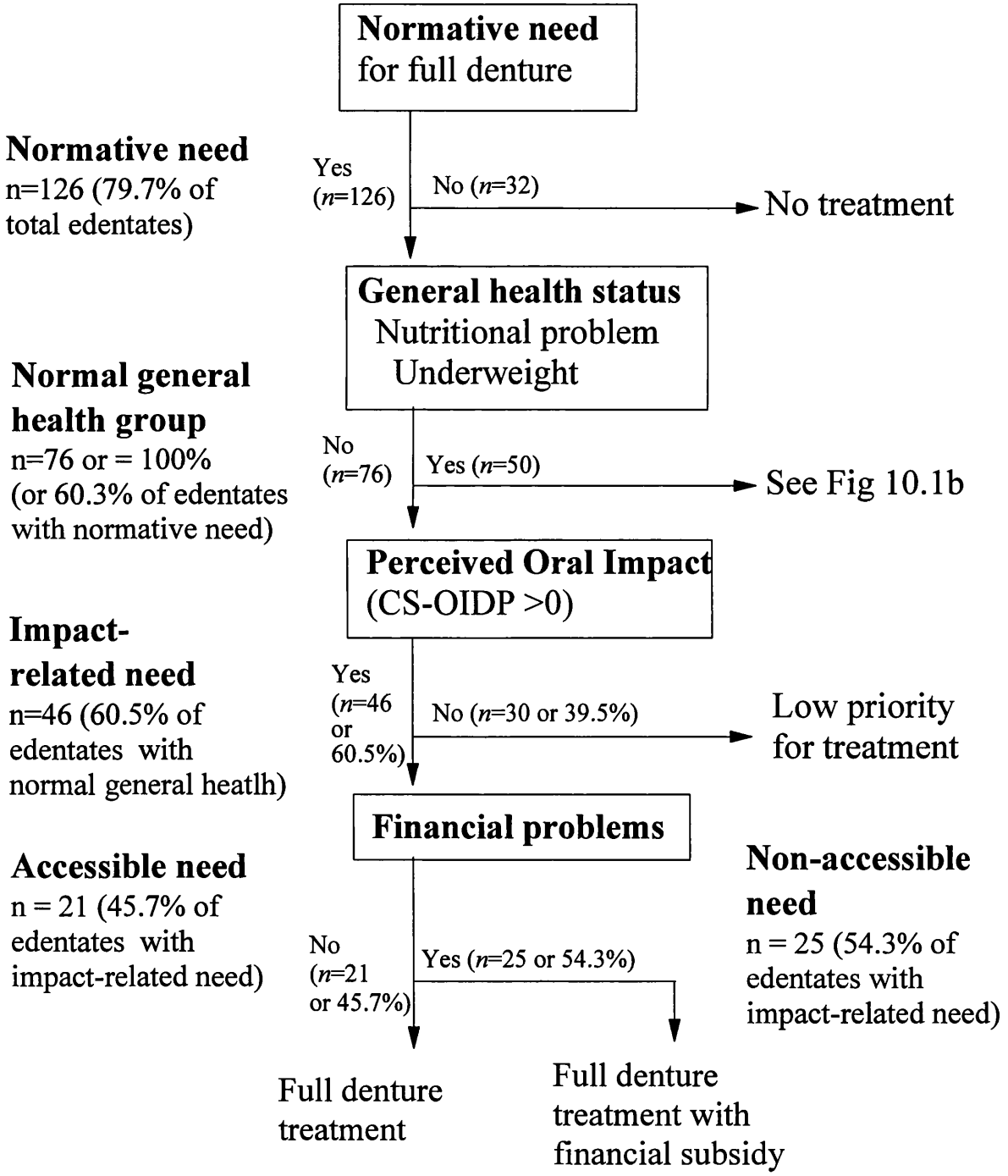


Figure 11.2 Treatment need assessment model for full dentures in edentulous population who had normal weight

Propensity related treatment need

Changes in prosthodontic treatment need after integrating propensity for health behaviours

Sheiham and Spencer (1997) suggested that in addition to the measurement of oral health status and their perceived impacts, behavioural factors affecting health gain from dental therapies should be included in needs estimations. These behavioural factors could be the appropriate use of service and delays in seeking treatment (Locker, 1989), propensity to carry out preventive behaviours and self-care (Maizels et al. 1993) and compliance with treatment instructions.

An integrating process to estimate a *'propensity-related treatment need'* in this study takes into account a behavioural propensity related to the effectiveness of dental treatment. This study used oral hygiene practice and smoking habit as the behavioural factors of propensity for health behaviours. Good oral hygiene practice and non-smoking habit are important factors to maintaining good periodontal condition of the remaining teeth (Bergstrom, 1989; Gomes and Renner, 1990; Haber and Kent, 1992; Mojon et al. 1995b; Wright and Hellyer, 1995; Bassi et al. 1996; Budtz Jorgensen, 1996). Drake et al. (1990) also stated that good oral self-care was essential in older people who wear removable partial dentures. Therefore, these two behavioural factors are essential for the success of partial denture treatment

After integrating propensity for health behaviours into *'impact-related treatment need'*, 69.9% of dentate subjects with *'impact-related treatment*

need' had *'propensity related treatment need'* (Table 11.2). About 70% of the older subjects who perceived the oral impacts had high propensity for health behaviours which would affect the effectiveness of their partial denture treatment.

When compared to normative treatment need taken as 100%, only 35.3% of dentate subjects with normative need for partial dentures had *'propensity related treatment need'* (Table 11.2). Only about one third of older subjects judged by professionals as needing prosthodontic treatment perceived the impacts from their oral disorders and had high propensity for health behaviour. Therefore, when adding propensity for health behaviours combined with the socio-dental indicator (OIDP), normative treatment need was reduced from 100% to only 35.3%.

The integration process of a *'propensity related treatment need'* is not static. It could change over time. The dynamics of propensity for health behaviours depends on the type of dental treatment, the scientific evidence of the effect of propensity for health behaviours to the prognosis of each treatment or age group. The use of oral hygiene practice and smoking habit as behavioural factors to estimate *'propensity related treatment need'* in the younger group of older people (aged 60 to 74 years) should be appropriate. Most of the older people in this age group can clean their own teeth or dentures. However, there may be a time when an older person would not be able to clean their own teeth. In such cases, oral hygiene practice may not be an appropriate propensity for health behaviours to include in the model. Moreover, the two

behavioural factors used in this study may not be appropriate in the future if there is evidence of a better behavioural factor associated with effectiveness of prosthodontic treatment.

Accessible treatment need and *non-accessible treatment need*

Changes in prosthodontic treatment need after integrating financial problems

In dentate subjects with normal health, when financial problems were added to *'propensity related treatment need'*, 41.2% had *'accessible treatment need'* (Table 11.2). In the 'normal general health' edentulous groups, perceived oral impacts had been integrated into the treatment need models to estimate *'impact-related treatment need'* (Table 11.3). Financial problems were then integrated into *'impact-related treatment need'*. 45.7% of edentulous subjects with *'impact-related treatment need'* had *'accessible treatment need'*.

Economic factors are one of the principal barriers to dental care (Ettinger and Beck, 1980; Hayward et al. 1989; Bolden et al. 1993). The cost of services is also reported to be one of the most common reasons for not visiting a dentist (Brown and Treasure, 1992). *'Accessible treatment need'* helps to reflect the proportion of older people who had normative need for prosthodontic treatment, perceived oral impacts or had high propensity for health behaviours, and could afford to pay for the dental services. 58.8% of dentate and 54.3% of edentulous older people had *'non-accessible treatment need'*. They had financial problems concerning the cost of prosthodontic treatment.

Overall findings

Of the 100% of people who had a normative need for partial dentures, 14.5% had *'accessible treatment need'* (Table 11.2). Similarly, of the 100% of subjects who had a normative need for full dentures, 14.5% had *'accessible treatment need'* (Table 11.3). Therefore, among 100 older people with normative need for full dentures or partial dentures, 85.5% of them had *'non-accessible treatment need'*. This high amount of *'non-accessible treatment need'* suggests that economic factor is one of the principle barrier to dental care (Palmqvist et al. 1986; Hayward et al. 1989; Bolden et al. 1993; Dolan and Atchison, 1993). Strayer et al. (1988) found that income and a perception of few financial constraints could affect the use of dental services. A number of studies in older persons reported that the greater use of dental services in older individual was significantly associated with high income (Evashwick et al. 1984; Branch et al. 1986; Bolden et al. 1993). Locker et al (1991a) found that income and dental insurance coverage were important factors in not making a dental visit in the older adult in Canada. The results from several studies mentioned above support the need to provide financial support to older people who had *'non-accessible treatment need'*.

'Accessible treatment need' in this study took only one enabling factor which is financial problem into account (See Section 2.5.2). Therefore, subjects who had *'accessible treatment need'* will have the ability to obtain any dental services without financial problems. If other enabling factors such as access to dental services or transportation were taken into account, subjects with

'accessible treatment need' will have the ability to obtain any dental services without financial problems, and there is a capacity of the system or the availability of the services to match the subject's needs.

This findings also confirms that normative treatment need alone could be overestimated. When considering all related factors which could affect the treatment need of older people, the amount of treatment need was reduced to only about 15% of the original normative treatment need as presented in *'accessible treatment need'* for partial dentures in dentate subjects (Table 11.2) and for full dentures in edentulous subjects (Table 11.3). These 15% represents the amount of dentate or edentulous subjects who had normal general health and would be an appropriate group to receive prosthodontic treatment. At the same time, 20.8% of those with normative need in dentates and 32.9% of edentulous subjects with normative need for prosthodontic treatment had *'non-accessible treatment need'* (Tables 11.2 and 11.3).

Therefore the findings from this summarised table confirms the hypothesis that by integrating the impact measures of general health status, Oral Impact on Daily Performances (OIDP), and the propensity for health behaviours into normative need estimation, this new approach ***significantly*** modifies the type and extent of dental treatment need as assessed by the normative need alone. The summarised tables (Tables 11.2 and 11.3) show that the new socio-dental approach could estimate different types of dental treatment need beside normative need. The extent of normative need is also changed as each

different type of dental treatment need gives different amounts of need when compared to using normative need alone.

'General health problem group'

The summary of the different levels of prosthodontic treatment need in 'general health problem' groups for dentate and edentulous older subjects is presented in Tables 11.2 and 11.3. In this group general health status of the older subjects was integrated in the treatment need model.

General health related treatment need

In Tables 11.2 and 11.3, nutritional status was used as an example of a general health status which relates to the prosthodontic treatment need. Older subjects were assessed as either underweight or not. Almost half (40%) of the edentulous subjects had *'general health related treatment need'*. A higher proportion of edentulous subjects had underweight problems compared to dentates (40% vs 13.2%). Among 100 dentate subjects with normative need, 13.2% had *'general health related treatment need'*. The high proportion of *'general health related treatment need'* for full dentures supported the previous findings that edentulousness and chewing problems could have an effect on weight loss (Chapter 8, Section 8.5.1).

'General health related treatment need' considers the importance of chronic diseases which may require dental treatment. It helps to provide information

on the number of older individuals in the community who may be suffering from chronic diseases with the higher risk of the disease progressing from related oral diseases. Health related treatment need may help to identify the older individuals who may need to maintain good oral health as part of the general health treatment. For the benefit of the older people's health, a *'general health related treatment need'* should be given some attention without further investigation on the perceived oral impacts. Edentulousness and chewing problems are problems which are significantly related to underweight (Ismail et al. 1987a; Sandman et al. 1987; Fischer and Johnson, 1990; Sullivan et al. 1990; Keller, 1993; Mowe et al. 1994; Gilmore et al. 1995; Sullivan, 1995). Prevention of unintentional weight loss in the older people is a key factor to improving the quality of their life. Therefore, those who are underweight and have a normative need for full denture or partial denture treatment should be given high priority. Prosthodontic treatment should help them to restore their masticatory function. Dentures cannot fully replace the chewing efficiency of the natural dentition. It can at least improve the chewing ability, and therefore, help the older people to live with dignity and possibly maintain an acceptable degree of physical, mental and psychological well-being.

Impact-related treatment need

Changes in prosthodontic treatment need after integrating perceived oral impacts (OIDP)

In older people who were underweight, socio-dental indicators were not integrated into the treatment need estimation model because underweight

could lead to poorer health (Ismail et al. 1987a; Sandman et al. 1987; Sullivan et al. 1990; Keller, 1993; Sullivan, 1995). Therefore prosthodontic treatment should be provided to edentulous subjects with normative need and who were underweight without assessing their perceived oral impacts.

Propensity related treatment need

Changes in prosthodontic treatment need after integrating propensity for health behaviours

In older subjects who have *'general health related treatment need'*, their propensities to adopt healthy behaviour and life-styles would affect the success of prosthodontic treatment. These behavioural propensities should be evaluated and taken into account in the treatment need estimations.

After integrating the behavioural factors; oral hygiene practice and smoking habits into the *'general health related treatment need'* among those who had *'general health related treatment need'*, only 45.4% of older people had *'propensity related treatment need'* or had high propensity for health behaviours (Table 11.2). Of the total 100% of dentate subjects, only 6% had *'propensity related treatment need'*.

Accessible treatment need* and *non-accessible treatment need

Changes in prosthodontic treatment need after integrating financial problems

45.7% of underweight dentate subjects who had *'impact-related treatment need'* had *'accessible treatment need'* (Table 11.2). In edentulous subjects, 32%

of those who were underweight and were in need of prosthodontic treatment had *'accessible treatment need'* (Table 11.3). Those with *'accessible treatment need'* had no financial problem which might lead them to not using the dental services. The higher proportion of both edentulous and dentate subjects who were underweight had *'non-accessible treatment need'* compared to *'accessible treatment need'* (68% and 54.3% vs 32% and 45.7%).

Financial problem is one important factor which needs to be taken into account in the assessment of prosthodontic treatment. It is a factor which should be integrated into the treatment need models of both 'general health problem' group and the 'normal health' group. In older people who have dental problem and dental treatment will improve their oral health as well as their general health, economic barrier should be removed by any means. In order to provide a successful prosthodontic treatment to the older people, firstly, they need to be informed that they are underweight and prosthodontic treatment will help them to have a better masticatory function. Secondly, it is also important to consider the other factors which affect their utilisation of the dental services, especially the financial problem since prosthodontic treatments are considered to be an expensive treatment for the older people.

Overall findings

When compared to normative treatment need, of the 100% older subjects who had a normative treatment need for partial dentures and were underweight, only 2.4% had *'accessible treatment need'* (Table 11.2). 12.7% of edentulous subjects who had normative treatment need for full dentures and were

underweight, had *'accessible treatment need'* (Table 11.3). Among 100 older people who had normative treatment need for full dentures, and were underweight, 27% had *'non-accessible treatment need'* (Table 11.2). Of total of 100% of dentate subjects who had normative treatment need for partial dentures and underweight, 3.6% had *'non-accessible treatment need'* (Table 11.3). Similar to the 'normal health' group, *'accessible treatment need'* reduced dramatically from 100% of normative need to only 2.4% and 12.7% in dentate and edentulous subjects respectively.

11.1.2 Periodontal treatment need

The following discussion will be based on the changes in periodontal treatment needs in 'normal health' and 'general health problem' groups. The general health problem considered in the next illustrative section is diabetes mellitus. Table 11.4 summarises the different levels of treatment needs for periodontal treatment in 'normal health' and 'general health problem' groups or in those who have suffered from diabetes mellitus in dentate subjects when considered normative need as 100%.

Table 11.5 gives a summary of different levels of periodontal treatment need when compared to each preceding level.

Table 11.4 Comparison of different level of treatment need for periodontal disease in dentate older people with diabetes mellitus when considered normative need as 100%

Treatment level	Periodontal treatment				
	Normal health	**Classification 1 (High level of periodontal disease)**	**Classification 2 (High level of periodontal disease)**	**Classification 3 (Low level of periodontal disease)**	**Classification 4 (Low level of periodontal disease)**
Normative need	-	100%	100%	100%	100%
Normative need (Normal general health group)	100%	-	-	-	-
General health related need	-	6.2%	6.2%	6.2%	6.2%
Impact-related need	16.4%	-	-	-	-
Propensity related need: high propensity	(1)* 9.8% (2) 13.8%	(1)* 2.4% (2) 3.0%	(1)* 2.7% (2) 3.0%	(1)* 2.7% (2) 2.7%	(1)* 2.4% (2) 2.7%
Propensity related need: low propensity	(1)* 6.6% (2) 2.6%	(1)* 0.8% (2) 0.3%	(1)* 0.5% (2) 0.3%	(1)* 0.3% (2) 0.3%	(1)* 0.5% (2) 0.3%

** (1) =rigid propensity, (2)= non-rigid propensity (see Table 10.6)*

Table 11.5 Comparison of different level of treatment need for periodontal disease in dentate older people with diabetes mellitus

Treatment level	Periodontal treatment#				
	Normal health	**Classification 1 (High level of periodontal disease)**	**Classification 2 (High level of periodontal disease)**	**Classification 3 (Low level of periodontal disease)**	**Classification 4 (Low level of periodontal disease)**
Normative need	-	100%	100%	100%	100%
Normative need (Normal general health group)	100%	-	-	-	-
General health related need	-	6.2% (of normative need)	6.2% (of normative need)	6.2% (of normative need)	6.2% (of normative need)
Impact-related need	16.4% (of dentates with normal health)	-	-	-	-
Propensity related need: high propensity	(1)* 59.6% (2) 84.2% (of dentates with impact-related need)	(1)* 39.1% (2) 47.8% (of dentates with impact-related need)	(1)* 43.5% (2) 47.8% (of dentates with impact-related need)	(1)* 43.5% (2) 43.5% (of dentates with impact-related need)	(1)* 39.1% (2) 43.5% (of dentates with impact-related need)
Propensity related need: low propensity	(1)* 40.4% (2) 15.8% (of dentates with impact-related need)	(1)* 13.0% (2) 4.3% (of dentates with impact-related need)	(1)* 8.7% (2) 4.3% (of dentates with impact-related need)	(1)* 4.3% (2) 4.3% (of dentates with impact-related need)	(1)* 8.7% (2) 4.3% (of dentates with impact-related need)

 # reproduced from Figures 10.6, 10.4a to 10.4d respectively
** (1) =rigid propensity, (2)= non-rigid propensity*

The following discussion is focused on the above summary table of the effect of diabetes mellitus on periodontal treatment need. In diabetics, three levels of treatment need were generated for their periodontal treatment needs from the new socio-dental approach namely *'general health related treatment need', 'impact-related treatment need'* and *'propensity related treatment need'*.

When compared to normative need, only 16.4% of dentate with normal health (no diabetes, no heart disease) had *'impact-related treatment need'* (Table 11.4). In the 'normal health' group, *'propensity related treatment need'* ranged from 2.6% to 13.8% under different definition compared to normative need.

'Normal general health' group

Normative treatment need

There were very high normative treatment need (72.5%) for periodontal treatment in dentate subjects (Table 6.3). The normative treatment need for periodontal treatment is defined earlier (Chapter 4, Section 4.4.1.2) as having one or more teeth with loss of attachment of 6 mm or more. The percentage of older people who had normative need for periodontal treatment is similar to the study in Hong Kong old people by Holmgren et al. (1994) assessed using the same criteria. They found that 69% of older people in Hong Kong had loss of attachment of 6 mm or more in one or more teeth. There will be further discussion on normative treatment need for periodontal disease in a later section (Section 11.9).

Impact-related treatment need

When perceived oral impacts was integrated into normative need for periodontal treatment, the amount of treatment need reduced dramatically. Whilst 72.5% of dentate subjects who had normal general health had normative need for periodontal treatment, only 16.4% of them perceived the oral impacts related to periodontal conditions (Table 11.5). This big reduction from normative need to *'impact-related treatment need'* for periodontal treatment has also been found by Adulyanon (1996). He found a big difference between professional judgement and lay people's perception of oral impacts and to need for periodontal care.

The *'impact-related treatment need'* reflects the discrepancy between perceived oral impacts and normative need. For instance, only 16.4% of dentate individuals who had normative need for periodontal treatment had *'impact-related treatment need'*. Large discrepancies are usually found for gum disease where there is a tendency toward overestimating for periodontal treatment (Heloe, 1972; Brady, 1984; Cushing et al. 1986; Tervonen and Knuuttila, 1988; Stuck et al. 1989; Cautley et al. 1992; Gilbert et al. 1994). One example was from the work by Cautley et al (1992) where they reported that only 4.2% of older subjects perceived they need gum treatment whilst 93% had normative need for periodontal treatment. In a study on impact of oral condition on quality of life, subjects with periodontal disease experience few symptoms and reported smallest social impacts compared to the denture group and the group with temporo-mandibular joint problems (Reisine et al. 1989).

The perception of impacts from oral disorders is very important to the success of periodontal treatment. Zimmerman (1986) commented that in treating chronic conditions such as periodontal disease, it is the patient who suffers from the disease and the patient is the one who will benefit from therapy. Therefore, the perception of impact from the disease is a good determinant of the need for treatment.

Propensity related treatment need

Two definitions of propensity for health behaviours for periodontal treatment were used, namely rigid propensity and non-rigid propensity (Table 10.6). The proportion of older people who had *'propensity-related treatment need'* with high or positive propensity was 59.6% (rigid propensity) and 84.2% (non-rigid propensity) of those who had *'impact-related treatment need'*. Older subjects who had *'propensity-related treatment need'* with low propensity was 40.4% (rigid propensity) and 15.8% (non-rigid propensity) respectively of those with *'impact-related treatment need'* (Table 11.5). In this group of older people if using the rigid definition for propensity, 59.6% of those with *'impact-related treatment need'* had good behavioural propensity towards the success of periodontal treatment. More than half of older people with *'impact-related treatment need'* had *'propensity-related treatment need'* with high propensity.

When compared to normative treatment need taken as 100%, only 9.8% and 13.8% of dentate subjects had *'propensity related treatment need'* with high propensity whilst 6.6% and 2.6% had *'propensity related treatment need'* with

low propensity using rigid and non-rigid definitions respectively. A high proportion of older people had high propensity for health behaviour especially with the non-rigid definition. More people reported that they brushed their teeth at least once a day and did not smoke.

Effective oral hygiene and smoking habits are very important to the success of periodontal treatment (Bergstrom, 1989; Gomes and Renner, 1990; Haber and Kent, 1992; Mojon et al. 1995b; Wright and Hellyer, 1995; Bassi et al. 1996; Budtz Jorgensen, 1996). The new approach of treatment need estimation gave the amount of treatment need in older people who had high propensity to adopt good oral health behaviours which favoured the prognosis of the treatment. Older people who have *'propensity related treatment need'* with high propensity or people who had good oral hygiene practice and who were non-smokers or smoked less than 10 cigarettes per day should be the appropriate group to receive periodontal treatment. They are more likely to achieve success in their periodontal treatment. The criteria for high or low propensity is dynamic. When the criteria are changed, the proportion of older individuals with *'propensity-related treatment need'* will subsequently change.

'General health problem group'

General health related treatment need

'General health related treatment need' represents the amount of treatment need of the older people who had diabetes and periodontal disease (Table

11.5). The illustrative models (Chapter 10, Models 4a to 4d) only focused on subjects whose diabetic conditions were not under control. There is evidence that diabetic patients with acceptable control of disease have similar periodontal conditions as the non-diabetic individuals (Ervasti et al. 1985; Tervonen and Knuuttila, 1986; Hallmon and Mealey, 1992; Cherry Peppers and Ship, 1993). Therefore, they are not at higher risk for periodontal disease, as are uncontrolled or poorly controlled diabetics, and should be considered as a group with 'normal health'.

Although *'general health related treatment need'* is not so high (6.2% of normative need), there was a precaution that this rate has a tendency to increase in developing countries due to the changing in life-style (WHO, 1997). As severe or advanced periodontal disease occurred more frequently and more extensively in poorly controlled diabetics, the group with *'general health related treatment need'* should receive periodontal treatment to reduce the risk for advanced periodontitis (Nelson et al. 1990; Shlossman et al. 1990; Safkan Seppala and Ainamo, 1992; Oliver and Tervonen, 1993). In addition, the periodontal treatment in diabetics could reduce medical complications such as renal disease or cardiovascular complication which is found in a high proportion of diabetics with severe periodontal disease (Thorstensson, 1995).

A *'general health related treatment need'* gives information on the dental treatment which should be provided to reduce the health problems from chronic diseases. Inexpensive interventions with emphasis on prevention would offer the best value for money for the older population. There is an

increasing number of the older people in all societies. They constitute a high burden of care from chronic diseases, such as diabetes mellitus or heart problems. Thus, it is necessary and appropriate to take into account any risk factors which could be prevented, or which could increase the risk of other diseases.

Propensity-related treatment need

The proportion of older people who had *'propensity related treatment need'* with high propensity ranged from 39.1% to 47.8% of those who had normative need for periodontal treatment and were diabetics under different classification of level of periodontal disease (Table 11.4). These percentages were higher than those with low propensity. Similar to the findings in the 'normal health' group, a higher proportion of older subjects had high propensity for health behaviour.

Overall findings

When compared to normative need taken as 100%, *'propensity related treatment need'* ranged from 0.3% to 2.7% depending on different definitions of propensity for health behaviour (Table 11.4). There were higher proportions of subjects with high propensity (2.4% to 3.0% vs 0.3% to 0.8%).

Treatment need for periodontal disease in older people with normal health who had no perceived oral impacts

In older people who had normal health, perceived oral impacts were the important component to integrate into the treatment need models. Only

16.4% of those who had *'impact-related treatment need'* would receive dental treatment (Figure 10.7). The question arises for those who had no perceived oral impacts, what should be done for these groups of older people? Even though they may not be a priority group for periodontal treatment, they should received health promotion in order to raise the awareness of their dental problems.

As mentioned earlier (Section 11.1.2) the perception of impact from periodontal disease is a good determinant of the need for treatment (Zimmerman, 1986), therefore, dentate older individuals who had no perceived oral impacts with different levels of periodontal disease were not a priority group for dental treatment. It is common to find a wide discrepancy between perceived impacts, or awareness of lay people and professional clinical judgement especially for periodontal disease. The perception of periodontal disease is poor (Ainamo, 1972; Cushing et al. 1986; Adulyanon, 1996). However, groups with no perceived oral impacts should not be ignored, health promotion should be given to them and a re-evaluation of the change in their perception will be necessary before further dental treatment planning.

Summary

By integrating different factors namely general health status, perceived oral impacts, propensity for health behaviours, and financial problems into normative need, different levels of treatment need can be estimated. These levels of need are *'general health related treatment need', 'impact-related*

treatment need', 'propensity related treatment need', 'accessible treatment need' and 'non-accessible treatment need'. Each level of need gives a more rational estimate of the amount of need, when compared to normative need because it takes into account various factors which affect the need of lay people in their treatment need estimations. After integrating related factors into normative need, these different level of treatment need change. The reduction in treatment need could be observed in all levels of treatment need estimation when compared to normative treatment need. This finding stresses the shortcomings of using only normative judgements to estimate dental needs in older population.

11.2 The effect of using the new socio-dental approach of treatment need estimation on the change in *'impact-related treatment need'* using different cut-off points of condition-specific OIDP

The change in the number and percentage of older people who had different dental treatment needs when identified by normative approach and a new socio-dental approach after integrating perceived oral impacts (OIDP index) is presented in Table 11.6. The percentage of people with *'impact-related treatment need'* decreased when condition-specific OIDP (CS-OIDP) score was applied with higher cut-off points (8, 16). The differences between normative need and *'impact-related treatment need'* varied among different kind of treatment needs. The reduction from normative need to *'impact-related treatment need'* was more prominent in dental treatment for scaling and periodontal treatment which had less oral impacts in lay people's perception.

For example, when compared normative need to *'impact-related treatment need'* at cut-off point > 0, 97% reduction could be observed for scaling compared to only 31.7% reduction for full denture treatment (Table 11.6).

The process of using the socio-dental approach is flexible. Adulyanon (1996) concluded that the concept of an *'impact-related treatment need'* does not rely solely on a definite cut-off points for OIDP. Different cut-off points for OIDP can be used to assess an *'impact-related treatment need'*. Appendix 7 gives examples of subjects who reported different impacts from oral disorders with different OIDP scores. The cut-off points can be changed depending on the associated factors for example; the age groups of the population, the specific type of dental treatment, different level of disease prevalences, or different cultural background of study population. By adjusting different cut-off points, OIDP could be a useful indicator in planning dental treatment need in older population.

If the policy planner would like to provide the treatment to subjects who reported having any impact on their daily activities or those with CS-OIDP >0, cut-off point CS-OIDP >0 will be chosen. At this cut-off point, the amount of need will cover a higher percentage of subjects. Under some circumstances, for example when the policy maker has to face a limited budget or the policy planner need to provide quality services to as many older individuals as possible, the policy planner could choose the highest cut-off point of CS-OIDP (CS-OIDP >16). In other words, those individuals who had the highest oral impacts to their daily activities will be treated first. According to objective 1,

the new socio-dental approach could estimate the more rational treatment need which should give a better estimation of dental treatment need compared to conventional normative need.

Table 11.6 Comparison of numbers and percentages of older people with normative and *'impact- related treatment need'* and condition-specific treatment need

Treatment	Normative need	Impact-related need CS-OIDP>0	Impact-related need CS-OIDP≥8	Impact-related need CS-OIDP≥16
Edentulous subjects *(n=158)*				
New or replacement of full dentures %	100.0	68.3	17.5	8.7
Dentate subjects *(n=549)*				
New or replace of partial dentures %	100.0	43.8	7.5	4.2
New or replace full and partial dentures %	100.0	71.4	22.4	12.2
Crown or bridge %	100.0	33.3	5.6	5.6
Scaling %	100.0	3.0	0.7	0.5
Periodontal treatment (root planing) %	100.0	16.2	5.4	3.5

Summary

'Impact-related treatment need' could vary depending on the different cut-off points of condition-specific OIDP score. This study proposed the use of cut-off points at 0, 8 and 16. The amount of *'impact-related treatment need'* changes when the cut-off points change. When compared to normative need, *'impact-related treatment need'* decreased at all cut-off points.

11.3 The effect of using the new socio-dental approach of treatment need estimation on the change in the rank order of dental treatment need

An *'impact-related treatment need'* could be used to set priorities for the planning dental services. The amount of treatment need and the ranking of percentages of people who need treatments changed proportionately from normative need to an *'impact-related treatment need'* as the cut-off point of CS-OIDP increased. For example, scaling was ranked as second most important treatment need using the normative approach (Table 11.7). In contrast, when integrating the perceived oral impacts (CS-OIDP) to treatment need estimation, at CS-OIDP cut-off point >0, scaling dropped from second to fifth on the list while full dentures remained ranked first. Partial dentures became the second in rank instead of scaling (Table 11.7). Dental treatment needs which had higher impacts on lay people's daily performances moved to a higher rank compared to normative need. Normative treatment need for scaling is always very high as professionals usually judge the treatment for scaling based on the presence of calculus. In a study on Thai adults aged 35-44 years, Adulyanon (1996) found that 98.7% of the subjects had normative need for scaling. From this study, the *'impact-related treatment need'* showed that calculus or oral problems which needed to be treated by scaling had the least oral impact on daily performance for older people.

From a policy perspective, the rank order of *'impact-related treatment need'* will assist or guide policy makers on what will be the best treatment which will benefit the older people the most under a given resources.

Table 11.7 Comparison of the rank of treatment need assessed using normative and *'impact-related treatment need'* with different cut-off points

Ranking	Normative need	Impact-related need CS-OIDP>0	Impact-related need CS-OIDP≥8	Impact-related need CS-OIDP≥16
1	Full dentures (79.7%)	Full dentures (54.4%)	Full dentures (13.9%)	Full dentures (7.0%)
2	Scaling (77.8%)	Partial dentures (26.6%)	Partial dentures (4.6%)	Partial dentures (2.6%)
3	Periodontal treatment/Root planing (67.6%)	Periodontal treatment/Root planing (10.9%)	Periodontal treatment/Root planing (3.6%)	Periodontal treatment/Root planing (2.4%)
4	Partial dentures (60.7%)	Full & partial dentures (6.4%)	Full & partial dentures (2.0%)	Full & partial dentures (1.1%)
5	Full & partial dentures (15.3%)	Scaling (3.6%)	Scaling (0.5%)	Scaling (0.4%)
6	Crown & Bridge (3.3%)	Crown & Bridge (1.1%)	Crown & Bridge (0.2%)	Crown & Bridge (0.2%)

Normative need does not depend on the subjective perception of lay people. Thus, when adding lay people's perceived oral impacts, *'impact-related treatment need'* is smaller than normative need. The reduction in normative need after integrating the perceived oral impacts creates the changes in ranking order of dental treatment need. Dental conditions which have more impacts on lay people's daily activities rank higher. This finding re-emphasises one of the shortcomings of normative need where normative need depends on the standard norm of measures of 'disease' accepted by dentists.

This standard norm is not always the norm in terms of functional or social requirements of people examined (Sheiham and Spencer, 1997). The need for replacing missing teeth or denture status is a good example where dental professions set a high standard norm for treatment while lay people do not perceive the oral conditions judged as deviations from the professional norm, as high.

Although normative need has dominated the assessment of oral health status and the estimation of need, Sheiham and Spencer (1997) pointed out that there are areas where normative need is deficient especially in the case of missing teeth or need to extract third molars. In the case of replacement teeth, there is a need to add a more subjective lay assessment of need. When adding perceived oral impacts to normative need, in the older people, the need to replace missing teeth is perceived by lay people to be one oral impairment which affects their daily activities mainly in dentate subjects. Treatment need for partial dentures moved to a higher rank when using *'impact-related treatment need'* instead of normative need (Table 11.7).

'Impact-related treatment need' provides a more systematic approach in prioritising for resource allocation in planning dental services. Priorities of dental treatment needs changed when *'impact-related treatment need'* was used instead of normative need.

Summary

By integrating socio-dental index (OIDP) to normative need to formulate *'impact-related treatment need'*, the ranking order of *'impact-related dental treatment need'* changed as compared to ranking order of normative need. The reduction of normative treatment need is proportional to the extent of their impacts on daily living. The difference in the ranking order of treatment need enables the health planner to prioritise dental treatment.

11.4 The integration of general health with dental treatment need in the older population

Although oral health should be considered as an integral part of general health, health status models generally do not include oral health as a dimension of general health. Dolan et al. (1991) concluded that there were three reasons for this. Firstly, dental health has traditionally been assessed independently from general health, secondly, oral health has been considered as unimportant, thirdly, the results of oral diseases are not well recognised by medical researchers for incorporating into the assessment of general health status.

Similarly when assessing dental needs, general health status must be an integral part of the assessment. In this study, *'general health related treatment need'*, was integrated into normative need in the older people. As older people commonly experience concurrent multiple general and oral health problems, this level of need identifies and creates some awareness of the association between the medical conditions and the oral conditions.

In edentulous subjects, approximately 40% had *'general health related treatment need'*. The *'general health related treatment need'* suggests to health planner that among the older individuals who were judged by professional as needing dental treatment, how many should be treated because their problems were related to their general health status.

This study used two chronic diseases: diabetes mellitus and heart disease, and one health condition: underweight, which are commonly found in the older people, to illustrate how some chronic diseases and general health affect the dental treatment need for periodontal disease and the provision of prosthodontic treatment. There are obviously other chronic medical conditions which may need to be considered when planning the dental treatment in the older people. Arthritis, for example, could have a large effect on the oral hygiene practice, which consequently affects the prognosis of many types of dental treatments such as periodontal therapy, restorative and prosthodontic treatments.

As stated earlier (Section 11.1.1), older subjects with a general health problem and those with normal health had different perceptions of oral impacts, therefore dental treatment need should be assessed separately. Dental treatment need should be provided to those with *'general health related treatment need'* without assessing their perceived oral impacts.

Ettinger and Beck (1984) included factors associated with general health such as mental status, medical history and status, medications, mobility and

dexterity, neuromuscular coordination into the treatment plan considerations in their Rational Dental Care Model. They concluded that there is little information on how dentist make decision and there is a need for a measurable characteristic which could assist dentist in clinical decision making. Chen and Hunter (1996) included perceived general health as a socioeconomic status in their conceptual model for oral health status and quality of life. In their study, dentate adults who perceived their general health to be good are also likely to report better perceived oral well-being.

Even though many studies suggested that general health status is an important factor in assessing treatment need in older people (Ettinger, 1984; Schou, 1995), none have included general health factors into the treatment need assessment in a quantifiable context. Most studies only reported the association between general health factors with oral problems (Nordstrom, 1990; Dornenval et al. 1995; Osterberg et al. 1996), or with utilisation of dental services (MacEntee et al. 1988a; Diu and Gelbier, 1989; Fiske et al. 1990; Lundgren et al. 1995). An illustration of the integration of general health factor into dental treatment need estimation in this study should, therefore, shown to be a further step toward the concept that oral health is an integral part of general health.

11.5 A new approach of treatment need estimation and policy planning

In terms of setting priorities in health care, need could be defined as the burden of disease (Health need) or as the capacity to benefit from appropriate

treatment (Health care need) (Coast, 1996). 'Health needs' concern the severity of the patient's illness and the extent of the illness in the population but do not take into account the potential benefit for the patient from the treatment. In contrast, 'health care need' relates need to capacity to benefit. It takes into account the extent to which patients are able to benefit from the provision of health care. Therefore, 'health care needs' reflect the potential ability to benefit from particular interventions, whether curative or preventive.

Previous research activity is normally concerned about the need for health rather than the distribution of those who could be expected to benefit from an intervention. This present study illustrates the distribution of older people who are more likely to benefit from the treatment in each level of treatment need.

Decision-makers should balance all aspects of needs and the current scientific information on the health gain from the provision of treatment in order to be able to determine the priority target group within a limited budget. Yule (1984) pointed out that at the policy level, the fundamental question for the provision of health services is *'what type of needs would be met if resources were available? and what type of needs should be met?*. Decision-making of how to allocate resources to dental care is a complex issue. Several questions arise for the decision-maker. For example: *how much of what type of treatment should be provided and for whom?* The findings from this study should be able to give the answer to those questions and should be able to

assist decision-makers to allocate the budget according to the priority and the importance of the problem.

In the theoretical framework of this study, the socio-dental approach of dental treatment need assessment gives an alternative option to health planners. Different dental services will be provided to the older people according to different levels of treatment need estimation (Table 3.1). If health care planners base their plans for dental care on *'normative treatment need'*, they should be confident that they will have enough resources to provide full dental treatments for everyone who had *'normative treatment need'*. *'Normative treatment need'* is dominant only for the so called life-threatening diseases such as acute infection or progressive pathology such as dental caries where full dental services will be provided.

In other levels of treatment needs, selective dental treatment will be given based on the factors integrated into the treatment need models, for example based on general health status or on the level of oral impacts or on the propensity for health behaviours. These selective treatments are not arbitrarily chosen but are based on the evidence shown to have an effect on the individual's need, as illustrated in this study. Therefore, the use of the new approach of dental treatment need estimation to generate different levels of treatment needs as well as giving suggested relevant dental services will be a practical approach to plan the dental services in contrast to the conventional approach, based mainly on professional judgement or normative need.

The following discussion in Sections 11.6-11.7 will be based on Objective 2 *"To assess the perceived oral impacts using a socio-dental indicator and to study the relationship between a socio-dental indicator, social variables, clinical variables and perceived treatment need of a sample of older people in Chiang Mai"*

11.6 Oral Impacts on Daily Performances (OIDP) in the Thai older people

A socio-dental indicator, the Oral Impact on Daily Performances (OIDP) was used to assess the lay people's perception about oral impacts. Approximately half of the total subjects (52.8%) had at least one oral impact (Chapter 7, Section 7.1.1). The incidence of oral impacts in the older people was lower than in the younger Thai adult population aged 35-44 when using the same measurement (Adulyanon et al. 1996). Adulyanon and co-workers found that 73.6% of all subjects had at least one daily performance affected by an oral impact. The incidence of at least one oral impact was lower than the finding by Cushing et al. (1986).

The highest incidence of oral impacts found in this study was eating. When oral impacts were calculated separately between dentates and edentates, 45% of dentates had oral impacts from eating and 63.5% of edentates had eating related oral impacts. Even though more older people were edentulous and had a smaller number of teeth, the impacts from eating is similar to the percentage of impacts in the younger Thai adults assessed by OIDP index (Adulyanon et al. 1996). In the National Diet and Nutrition Survey (NDNS)

of adults aged 65 years and over in Great Britain, when using the OIDP index to assess oral impacts on daily performances, 12.0% of free livings people reported oral impacts on eating (Department of Health, 1997). This percentage is much lower than the impact reported by Thai older and younger adult. The difference in the amount of impact may be due to the better condition of the remaining teeth in British older adult or the difference in types of food. Locker (1992) reported only 30.5% of Canadian adults aged 50 years and over had chewing limitation. The lower percentage of people having chewing problem may be because his study included subjects aged between 50-60 years who might have had better oral conditions. Eating and appearance are perceived as the most positive effects of teeth in older adult population in a study by Strauss and Hunt (1993).

Unlike the younger Thai adults, the main symptoms causing oral impacts for eating for older people was functional limitation. This is consistent with the finding by Slade and Spencer (1993) using OHIP. They found that edentulous subjects had significantly higher scores for functional limitation and physical disability. In their study 88% of the subjects stated that functional limitation was the main symptoms for eating. Adulyanon et al. (1996) found that 58.6% of younger adults reported that pain was the main reason for oral impacts from eating. The main oral impairments causing oral impacts in the older population were loose teeth and/or missing teeth. This finding was different from the younger adults where toothache was the main oral impairment for most of the oral impacts (Adulyanon et al. 1996).

When using the total OIDP score to measure the oral impacts, a higher proportion of subjects had OIDP scores between 0.1-7.9 for all types of normative treatment need. The finding was different from the perceived need, especially for edentulous subjects. The highest proportion of edentates who perceived a need for any kind of full denture had moderate OIDP scores between 8.0-15.9. The edentates with higher OIDP scores perceived more need for full denture treatment.

A higher proportion of edentulous subjects had significantly higher OIDP score compared to dentates (Table 8.4). This finding is similar to those reported by Dolan and Atchison (1990). They showed that people with natural teeth had a higher GOHAI score. For GOHAI, higher scores represent more positive oral health. Most studies which used GOHAI score either as an epidemiological tool or as an outcome measure, usually reported the mean GOHAI scores (Marcus et al. 1983; Dolan et al. 1990; Calabrese et al. 1996; Kressin, 1996; Marcus et al. 1996; Tourville et al. 1996). It is difficult to interpret the degree of psychosocial impacts from the mean score.

11.7 The relationship between Oral Impact on Daily Performances (OIDP) and perceived treatment need

As stated earlier (Chapter 6), perceived treatment need was derived from a direct question ... *'Do you perceive the need for specific dental treatment?'* Edentulous subjects who had perceived treatment need for full dentures tended to have high OIDP scores. There was a very significant relation between perceived need and OIDP scores (Table 7.5).

A higher proportion of older individuals who had no perceived dental treatment need for full dentures reported no oral impacts (OIDP score = 0) (46.4% vs 11.1%), or had lower oral impacts (OIDP score 0.1 to 7.9) (33.9% vs 22.2%) compared to those who had perceived treatment need.

The perceived need for most dental treatments, except for restorations were significantly related to OIDP scores. Although the assessment of perceived treatment need, which used only one direct question, and the assessment of perceived oral impacts using OIDP index are aimed to measure the same thing, the use of OIDP has more advantages. Concerning the perceived oral impacts, OIDP scores could give the magnitude of the oral impacts where the higher the scores means the higher the impacts.

In dentate subjects there was a very highly significant findings in the perceived need for partial dentures. Perceived need for prosthodontic treatment and perceived oral impacts (OIDP) had a strong relationship (Table 7.5). For example, more proportion of those who had perceived need for partial dentures had higher OIDP score than those who did not perceived the need (at OIDP score 8.0 - 15.9, 26.7% vs 13.5%, at OIDP score >16, 22.2% vs 7.2%). It showed that for lay people, missing teeth had high oral impacts. The relationship between perceived need for partial dentures and perceived oral impacts (OIDP) supported the earlier findings when OIDP was analysed separately for individual items where eating due to functional limitation was the main oral impact in these older people (Chapter 7, Section 7.1.1).

There was no positive significant relationship between perceived need for restorations and OIDP scores. The dental problems such as fillings, pulp care, crown and bridge may not affect the daily performance of older people as much as other dental problems. Further investigation is needed to confirm this finding. The perceived need for restorations might need to be more specific. For example, the perceived need for filling new dental caries may have a different impact compared to the perceived need for replacement of existing fillings.

The OIDP index focuses on measuring the significant impacts in performing three main daily performances: physical, psychological and social. The index has acceptable psychometric properties (Adulyanon, 1996). Therefore, an *'impact-related treatment need'* derived from integrating perceived oral impacts using OIDP index into normative need provides a better information of need compared to perceived need which derived from one direct question alone.

Many studies showed that there is a high discrepancy between normative need and perceived need (Smith and Sheiham, 1980; Stuck et al. 1989; Hoad-Reddick, 1991; Cautley et al. 1992; Miyazaki et al. 1995). The findings from this study using perceived oral impact (OIDP) confirmed this discrepancy. The *'impact-related treatment need'* reflects the discrepancy between perceived oral impacts and normative need. For instance, only 50.5% of dentate individuals who had normative need for partial dentures treatment had *'impact-related treatment need'*.

Therefore, the perceived oral impact assessed by the OIDP confirmed the findings from other studies using one question on perceived need that there is a high discrepancy between the lay people perception of oral disorders and the clinical judgement by professionals.

The discussion in Section 11.8 and 11.9 will focus on Objective 3 *"To assess the oral health status, normative treatment need, the propensity for health behaviours and enabling factors in a sample of older people in Chiang Mai"*

11.8 The Oral Health Status

The samples from this study were not representative. However, the sampling technique had taken into account the different social classes and social activities. Even though the subjects were not randomly selected, the demographic background of the older people in this study were similar to the other studies on the Thai older populations. In this study, 62.1% were female, 74% had education less than 4 years and about half had low personal income. The other studies on the older population in Thailand found that the proportion of females was higher than males. The majority had educational level less than 4 years and most of them had low personal incomes (Hematora et al. 1991; Otrakul et al. 1993; Pochanapan et al. 1995). The aim of the following discussion concerning clinical findings was to give general information about the clinical dental status of these Chiang Mai older people compared to other studies.

Dental status and dental caries

Almost one fifth of the dentate subjects had 28 teeth or more. This proportion is very high compared to the findings from Western countries. The study of the non-white older people of Native Americans aged 65-74 found only one participant with all 28 natural teeth (Phipps et al. 1991). The average number of sound teeth, 19.3, and 58.7% of the study subjects had 21 or more functional teeth, is considered to be high. Steele et al. (1996) found that only a minority of British people aged 65 and above had 21 or more functional teeth. In the Chiang Mai study the DMFT was 12.7 teeth per person which was lower than other Asian samples such as Hong Kong older people aged 65-74 where their DMFT was 18.9 (Lo and Schwarz, 1994a). The DFT was low; only 1.9 teeth per person, which was the same as the DFT in older people in Hong Kong. It is not surprising to see that the majority of the DMFT component was missing teeth. Root caries was not prevalent in the sample. Only 10% had root caries whilst root caries in Western older people could range from 7.3% to 100% (Burt et al. 1986; Fure and Zickert, 1990; Steele et al. 1996; Walls, 1996). The differences in prevalences of root caries may also be due to some natural variation of the disease and the variation in the diagnostic criteria (Walls, 1996).

Periodontal diseases

Periodontal disease seems to be a major problem in these subjects. Approximately three-fourth (72.5%) had loss of attachment of 6 mm or more and 63% had one or more mobile teeth. The use of CPI (Community Periodontal Index) to assess loss of attachment of 6 mm or more in the 4th

National Oral Health Survey of the Thais aged 60 to 74 found only 33.1% of the sample had attachment loss of 6 mm or more (Dental Health Division, 1995). This may be due to the different clinical criteria used. Whereas the CPI used representative teeth in a sextant, all teeth were examined in this study. The percentage of older people who had one or more teeth with loss of attachment of 6 mm or more is similar to the findings in other Asian populations. Holmgren et al. (1994) reported a prevalence of 69% in Hong Kong older people using the same criteria as this study. Baelum et al. (1988) found about 50% of the tooth surfaces had a loss of attachment of 4 mm or more in Chinese aged 60-80 years. In older Japanese, Okamoto et al. (1988) reported that 68% of 60-79 yr-olds had loss of attachment of 6 mm or more. These results are comparable to Chiang Mai older people when taking into account slight differences in age ranges and attachment loss levels.

When the periodontal condition is assessed using indices of attachment loss, the variability depends on the teeth and sites measured, the type of probe used, and the method of analysis (Beck and Slade, 1996). The high percentages of older subjects with loss of attachment of 6 mm or more in these Asian older populations could give an implication that the threshold level of $\geq$ 6 mm may not be appropriate to identify older people with severe periodontal attachment loss. Holmgren et al. (1994) suggested that for older subjects, a threshold of $\geq$ 9 mm may be more appropriate.

Edentulousness

The extent of edentulousness has traditionally been the primary measure of oral health status in the older populations. The edentulous rate of the Thai older people (11.9%) is considerably lower when compared to rates found in the 1990s from the studies in Western countries (Smith, 1979; Bergman et al. 1991; Drake et al. 1991; Locker et al. 1991b; Liedberg et al. 1991; Phipps et al. 1991; Douglass et al. 1993; Steele et al. 1996; Bengtsson et al. 1996). In the older people in Western countries, the rates of edentulousness in the 1970s and 1980s were well above 50 % (Grabowski and Bertram, 1975; Rise and Heloe, 1978; Smith and Sheiham, 1979; Tobias, 1988). In the 1990s, the edentulousness rates ranged between 17 to 64%. The report of the FDI working group in 1988 (Ettinger, 1992) based on the data from 31 countries shows that more than one-half of these countries had edentulousness rates above 50% in persons aged 60 and over.

Compared to other Asian population, the prevalence of edentulousness in this study was very similar to 12% prevalence in the older people in Hong Kong aged 65-74 years old (Lo and Schwarz, 1994a). The rate of edentulousness in people aged 60-80 years in China ranged from 0-29% (Baelum et al. 1988). The prevalence of edentulousness in this study was lower compared to a higher developed countries in Asia like Japan. Japanese aged 65-74 years old had an edentulousness rate of 27%. When compared to the data from the 4th National Oral Health Survey of older people in the same age group in Thailand, the prevalence of edentulousness was lower than the rate of 16.3% in older people from all regions (Dental Health Division, 1995).

Although Thai populations retain more natural teeth than other populations, the quality of the remaining natural teeth may be poor. The mean number of retained teeth was 15.0 in Hong Kong older people aged 65-74 which was lower than the Thais (19.3 teeth/person) (Lo and Schwarz, 1994a).

Socioeconomic status and cultural factors have been associated negatively with edentulousness (Kandelman et al. 1986; Phipps et al. 1991). Most of the edentates had lower education and low income which is in accordance with the findings by other researchers (Hunt et al. 1985a; Kandelman et al. 1986; Ismail et al. 1987b; Phipps et al. 1991). Phipps et al. (1991) stated that edentulousness is the 'final' consequence of oral disease. The low level of edentulousness in older Thais suggests that they have fewer oral problems. Culture and life-style could explain the lower rate of edentulousness. This cohort of the older Thai people were not exposed to Westernised life-style especially consumption of refined sugar or processed foods. One-third of them rarely drank coffee or tea, 62.4% did not eat sweets. Therefore, the dental caries level was very low.

Dental service utilisation

About one-fourth (23.3%) of the subjects had never seen a dentist. This finding is very common in the older population. 39.5% of the subjects had not seen a dentist in the last 5 years. This figure is comparable with the other studies where the percentages of older people who had not seen a dentist in the last 5 years ranged between 32% to 43% (Kiyak, 1986; Mann et al. 1990; Phipps et al. 1991). Regular dental checkups are not the normal dental health

practice in this population. This finding is in accordance with other studies (Fiske et al. 1990; Mann et al. 1990; Merelie and Heyman, 1992; Lo and Schwarz, 1994b). Older people are less likely to have seen a dentist in the previous year and less likely to attend regularly for check-ups compared to the younger age groups (Locker, 1989).

11.9 Normative treatment need

This study confirms the big gap between normative and perceived need. Normative treatment need for all types of full dentures was quite high. Almost 80% of total (158) edentulous subjects had a normative need for full dentures treatment whilst only 22.8% had a perceived need for full dentures (Table 6.3). This finding confirms the high discrepancy between normative and perceived prosthodontic need similar to those reviewed by Schou (1995). She reported the differences in needs assessment from nine surveys. In all surveys, normative need for prosthodontic treatment in old persons was much larger than perceived need.

When assessing normative treatment need for partial dentures, the examiners had taken into account the periodontal condition and oral hygiene of the remaining teeth. 60.7% of dentate subjects had a normative need for new or replacement/repair partial dentures. The assessment of need for new or replacement/repair partial dentures showed the high difference between normative and perceived need. Only 8.4% of the older people perceived that they needed partial dentures. Partial dentures are normally needed mainly for two main reasons: function and aesthetics. The very low perceived need

could be interpreted as older people had few dental problems as long as they have some natural teeth. In this group of the population where the average number of teeth is high (19.3 teeth per person), partial dentures may seldom be necessary.

Criteria for normative prosthodontic treatment need are very subjective. Pincent and Laird (1989) commented that there was a need for more reliable criteria and objective tests of the performance of full dentures. For partial dentures, even though the clinical judgement takes into account all factors related to the prognosis of abutment teeth, the normative assessment could vary greatly. Although the criteria had been discussed prior to the examination, judgement for dentures still varied and depended on different factors. There are other factors such as the belief of each examiner of the benefit of treatment, the response of subjects during examination, their economic status, their ability to cooperate and understand the reasons for treatment. These factors were not included in the proposed criteria and might have had an influence on the subjective normative judgement for treatment need.

Small differences between normative and perceived need could be seen in tooth extraction and restorative treatment. Older people could perceive the need for these treatments through toothache or a hole in a tooth.

Big differences between normative and perceived need were very obvious for all dental procedures especially for dental scaling and periodontal treatment.

This discrepancy was found in numerous studies (Wilson et al. 1987; Diu and Gelbier, 1989; Hoad-Reddick, 1991; Cautley et al. 1992; Mojon and MacEntee, 1992). Normative need does not take into account the lay people's attitude and need. Self-awareness of periodontal disease is poor (Ainamo, 1972; Cushing et al. 1986).

There are several shortcomings of normative need. Taking periodontal treatment as an example, one shortcoming of normative need is the lack of objectivity mainly due to the variability among professional judgements. Mojon et al. (1996) studied the examiner agreement on periodontal indices in older people. They found that by using CPITN, there was a high disagreement on evaluation of bleeding and shallow pockets. It should be noted that their study was conducted using dental chair under good illumination. Under field conditions where the conditions are often lower than this standard which is common in epidemiological surveys, this agreement could be expected to be much lower. In a similar study, Mojon et al. (1995a) found that intra- and inter-examiner reliability for oral hygiene using Plaque Index (PI) was poor. Therefore, it is common to find a high discrepancy between normative and perceived need for scaling or periodontal treatment.

In order to overcome the overestimation of normative need for periodontal disease, the clinical criteria for periodontal disease should be the combination of the extent and the severity of the disease (Carlos et al. 1986; Okamoto et al. 1988; Beck et al. 1990). Since periodontal attachment loss in older

population had a high prevalence and severity was higher than in younger cohorts, there is a need for a different definition of serious periodontal disease in this population. Beck et al. (1990) suggested to use the distributions of attachment loss severity scores and pocket depth scores in sites with attachment loss to define a group with a more severely level of disease. In their study, the more severe groups were those who had four or more sites with loss of attachment of 5 mm or more and one or more of those same sites had pocket depth of more than 3 mm. The number of sites used as cut-point for the more severe group in the study by Beck et al. (1990) arbitrary derived from the expert opinion based on the older people of 75 years olds (Beck, 1997).

Therefore the level of periodontal disease distinguishes between the treatment need in subjects with low levels or high levels of disease. In the illustrations of treatment need model for periodontal treatment (Models 4a to 4d), low and high levels of periodontal disease was defined using the combination of extent and severity of the disease to achieve a more accurate data for periodontal conditions. By modifying the suggestion by Beck et al. (1990) combined with the frequency distribution of tooth with attachment loss and pocketing in this studied population, Table 10.1 presents two classifications for high level of periodontal disease in this study. Classification 1 used in Model 4a defines high level as having 4 or more teeth with loss of attachment 6 mm or more and pocketing of 4 mm or more in the same tooth. Classification 2 used in Model 4b defines high level as having 3 or more teeth with loss of attachment 6 mm or more and pocketing of 4 mm or

more in anterior teeth. Table 10.2 shows the percentages of dentate subjects with high level of periodontal disease. 38.3% and 34.0% of them had high level of periodontal disease according to Classification 1 and 2 respectively. These percentages were lower than the percentage of having one or more tooth with loss of attachment. The combination of extent and severity of disease should give a better implication of the prevalence of periodontal disease in older population. Level of periodontal disease should assist decision-maker to set priority group for planning treatment for subjects with periodontal disease.

In summary, the problem concerning normative treatment need was confirmed the shortcomings of this type of treatment need stated earlier (Chapter 2, Section 2.2).

10.10 Propensity for health behaviours and enabling factors

10.10.1 Propensity for health behaviours

Oral hygiene practice

In general the older subjects in Chaing Mai had positive propensities for health behaviours. The majority of dentate subjects (88.5%) reported brushing their teeth at least once a day (Table 5.9). In those wearing dentures, about 70% cleaned their dentures more than once a day. The tooth brushing habits in this population is comparable to the British study. 67% of British adults reported brushing twice a day or more (Todd and Lader, 1991).

Smoking habits

Only 20.2% of the total sample were current smokers. The percentage of smokers was very low compared to other studies. Grossi et al. (1994) found 53.3% of subjects aged 65-74 years were smokers. A study in 650 veteran showed a high proportion of smokers (69.9%) (Weyant et al. 1993).

11.10.2 Enabling factors

Financial problems

Almost half of the 623 subjects reported that they would have problems paying for dental treatment (Table 5.9). Most of them (76%) were in a lower income groups (Table 5.3). Financial problems are important barrier which limit access by the subjects' inability to pay for services. In this group of Chiang Mai older people, financial problem is a big barrier to dental care which is in accordance with many other studies (Hayward et al. 1989; Bolden et al. 1993; Dolan and Atchison, 1993).

Accessibility

Accessibility to dental care could be the distance to travel to see dentist, transportation or their journey to see dentist or their mobility. The journey to see the dentist was not a big problem in this group of older people. Most of them (58.8%) travelled less than 15 kilometres to see the dentist. 47.9% could independently go to see the dentist by themselves either by walking, driving or used public transport. Transportation difficulties is the most frequently identified barrier that limited access to dental care (Strayer, 1995). When older individuals do not drive or are dependent on others for transportation,

transportation becomes barrier for dental care. Difficulty with transportation is a bigger problem for homebound older people (Stiefel et al. 1979; Strayer and Ibrahim, 1991).

The following discussion in Section 11.11 will be based on Objective 4 *"To assess the prevalence of medical conditions in the sample of older people in Chiang Mai"*

11.11 General health status of the older people

The Chiang Mai older people were moderately healthy. 25% of the total sample had no specific medical conditions. The most prevalent chronic medical condition was chronic pain. Cardiovascular disease ranked third. 7.2% had endocrine problems, mainly from diabetes mellitus. The prevalence of diabetes mellitus in older people in various countries ranged from 5.6% to 28.2% (Harris, 1990; Litvak, 1990; Musaiger, 1992; Hiltunen et al. 1994; Pagano et al. 1994; Papazoglou et al. 1995; Stolk et al. 1997). The prevalence of diabetes from other studies in Thailand ranged from 1.6% to 18.8% (Swaddiwudhipong et al. 1991; Isaraporn, 1993; Pothiban, 1996).

Older people who had at least one specific medical condition had significantly higher mean OIDP scores compared to those who did not experience chronic medical problems. The symptoms from chronic disease may have had an effect on the response to the OIDP questionnaire. Even though the OIDP questionnaire asked only about the impacts from oral diseases, the older people may relate the impact from general health to oral health. 89% of those

who had no medical problem rated their health as good or excellent compared to 67% in those who had at least one medical problem. Most of them had normal physical functioning. At least 80% of them had no difficulty in physical functioning (Table 8.3). Therefore, they were independently mobile. Mobility and physical access to dental services should not be a problem in these older people. Almost all of them had good cognitive memory.

Body mass index (BMI) was a simple measurement which could be added into the assessment of oral health of the older people in any epidemiological study. The measurement of height and weight could be performed by dental or health personnel. The BMI index could give general information on nutritional status of the older people. In this study sample the majority had normal weight. 15.9% were underweight and 15.4% were overweight.

11.12 Strength and weakness of this study

Response rates

The response rate of 90.8% was very high. The most important factors contributed to the high response rate were the good coordination between the author and the local authorities such as the director of the Dental Division of Municipality Health service, the organisers of all senior day centres for club member group. For household group, high response rate could depend on personal approach. Nevertheless, in Thai culture, older people are willing to participate in any programme which they perceived as beneficial to the general public. Therefore, the important strategy to organise field study in

older people is the good management of local authority and good personal contact.

Sample selection

This study is a cross-sectional study. Even though the aim of the thesis was to illustrate the new approach of treatment need estimation, it did not need representative samples. However, the representative samples could give more strength to the findings especially in clinical findings. If using representative samples, the clinical findings could be extrapolated to the total population or directly compared to other epidemiological studies.

Data collection

The applications of the Oral Impact on Daily Performance (OIDP) index

The OIDP index was developed to be used in an interview format. The response from the subjects could vary between different interviewers. In older people who were not familiar with any type of interview, interviewers did add explanations and examples of event related to oral impacts during the interview. This could create variability of responses.

In the pilot study, Kappa statistic was analysed for the reliability when subjects were re-interviewed using the OIDP questionnaire within the one month time frame. The Kappa statistic was 0.69. Therefore, it could imply that based on this moderate reliability, the data from the older people could vary.

The response of older people about their oral impacts may be an underestimate since older people tend to under report illness or assume that nothing can be done for problem that they think is normal to their ages. Their beliefs or attitudes could affect their perception of their health and could influence care-seeking behaviour. Thus, their reported oral impact may be underestimated if they think that their oral problems are the consequences of normal ageing process (Dolan and Atchison, 1993).

Information on general health status

This study attempted to illustrate the effect of general health to treatment need estimation. Several components of general health status had been assessed. The two general health conditions used in the illustrations were specific medical conditions and underweight. Specific medical conditions had been assessed from self-reported symptoms from the subjects. Self-reported medical conditions has been accepted as valid information in various studies (Peacock and Carson, 1995; Markides et al., 1996; Williamson and Fried, 1996; Herndon et al., 1997). It could pose some bias due to memory especially in older people. To improve the quality of the information regarding general health status, the information should be collected from medical records. However, access to medical records was not possible in this study. Some clinical assessment could be more accurate by adding specific diagnostic tests. For example, the diagnostic test for diabetes mellitus may be needed to compliment the self-reported data.

The process of assessing normative treatment need

There was high inter- and intra-examiner agreement regarding the reliability of criteria used to assess normative need especially for dentures. Although criteria had been discussed prior to the examination, judgement for dentures still varied and depended on different factors. There are other factors such as the belief of each examiner of the benefit of treatment, the response of subjects during examination, their economic status, their ability to cooperate in and understand the reasons for treatment. These factors were not included in the proposed criteria and might have had an influence on the subjective normative judgement for treatment need.

Criteria for normative treatment need

The criteria for normative treatment need varies from study to study. The normative treatment need for each type of treatment depends on different criteria used. Using normative treatment need for periodontal disease as an example, this study used loss of attachment as a clinical criteria to assess periodontal disease. Several epidemiological studies in older population reported the percentage of older people with one or more tooth with certain level of attachment loss (Haffajee et al. 1983; Okamoto et al. 1988; Papapanou et al. 1991; Axelsson et al. 1991). For example, the prevalence of periodontal disease could be the percentage of older subjects with one or more tooth with attachment loss of 3 mm or more (Beck and Koch, 1994; Haffafee et al., 1991). Hunt et al. (1990) reported the prevalence of advanced periodontal disease as percentage of subjects having at least one site with attachment loss of 7 mm or more. Clinical attachment loss currently is the

best field examination indicator of the progress of periodontal disease and is used by many investigators (Carlos et al., 1986; Haffafee and Socransky, 1986; Beck and Koch, 1994). However, it is difficult to differentiate between attachment loss that results from deep pockets and attachment loss that results primarily from recession of the gingiva from brushing. Therefore, in the treatment need model for periodontal disease, the combination of extent and severity was used to identify older individuals who had normative treatment need for periodontal treatment into high and low level of disease

This study used the percentage of dentate subjects who had at least one tooth with attachment loss of 6 mm to report the prevalence of periodontal disease. The prevalence of periodontal disease was 72.5%. When using the same criteria to assess normative treatment need, the normative treatment need of periodontal disease was inevitably high.

11.13 Summary

In this section each of the objectives of this study and the findings which are most relevant to each are summarised.

Objective 1 *To estimate dental treatment needs in a population of older Thai people in Chiang Mai using the new approach by considering the general health status, socio-dental indicators, propensity for health behaviours and financial status*

The estimation of prosthodontic treatment need: full dentures

- In edentates who had normal general health, *'impact-related treatment need'*, *'accessible treatment need'* and *'non-accessible treatment need'* reduced need to 60%, 14.5% and 32.9% of the normative need for full dentures respectively.

- Among edentates who had normative need for full dentures, 39.7% had *'general health related treatment need'* for full dentures due to underweight, 12.7% had *'accessible treatment need'* whilst 27% had *'non-accessible treatment need'*.

The estimation of prosthodontic treatment need: partial dentures

- The normative need for partial dentures in the total sample with normal general health reduced to about half (50.5%) when the impacts on daily life was considered. 35.3% of dentates in the same group had *'propensity related treatment need'*. 14.5% had *'accessible treatment need'* and 20.8% had *'non-accessible treatment need'*.

- 13.2% of dentates who had normative need had *'general health related treatment need'* for partial dentures due to underweight, 6.0% were considered as having *'propensity related treatment need'*. 2.4% had *'accessible treatment need'* and 3.6% had *'non-accessible treatment need'*.

The estimation of prosthodontic treatment need: full and partial dentures

- In dentates who were in 'general health' group, the normative need for full and partial dentures reduced to 71.9% when the impacts on daily life

(OIDP) was considered. 25% had *'propensity-related treatment need'* with high propensity. 12.5% had *'accessible treatment need'* and *'non-accessible treatment need'*.

- Among dentates with normative need, 35% had *'general health related treatment need'* for full and partial dentures due to underweight, 6.1% were considered as having *'propensity related treatment need'*, 2.0% had *'accessible treatment need'* and 4.1% had *'non-accessible treatment need'*.

The estimation of periodontal treatment need in older people with diabetes melhitus

- Among dentate subjects who had normal general health, 16.4% of total subjects who had normative need for periodontal treatment had *'impact-related treatment need'*, 2.6%-13.8% had *'propensity related treatment need'* with high propensity when compared to normative need.

- 6.2% of total dentates who had normative need for periodontal disease had *'general health related treatment need'* due to diabetes. Among dentate subjects who had high level of periodontal disease, the proportion of people who had *'propensity related treatment need'* with high propensity ranged from 0.3% to 3.0% when compared to normative need. Similarly, the proportion of people who had *'propensity related treatment need'* but with low propensity ranged from 0.3% to 2.7% compared to normative need.

The estimation of periodontal treatment need in older people with heart disease

- 6.7% of total older subjects who had normative need for periodontal disease had *'general health related treatment need'* due to heart disease. More than 80% of older people had a high propensity for health behaviour and considered as having *'propensity related treatment need'* with high propensity. A small proportion (less than 11%) of those who had *'propensity related treatment need'* with low propensity were unlikely to gain benefit from treatment if their oral behaviour were not improved.

Objective 2. *To assess the perceived oral impacts using a socio-dental indicator and to study the relationship between a socio-dental indicator, social variables, clinical variables and perceived treatment need of the older people*

- 52.8% of 623 subjects had at least one daily performances affected by an oral impact during the past 6 months. The most important performances affected was eating (45.0% in dentates, 63.5% in edentates). The daily performances which affected more in dentate subjects than edentulous subjects were smiling, sleeping and relaxing, cleaning teeth, and performing physical activities (15.3% vs 2.7%, 6.0% vs 1.4%, 2.2% vs 0%, 1.5% vs 0%). Eating, speaking and enjoying contact with people affected more edentulous compared to dentate subjects (63.5% vs 45.0%, 14.9% vs 9.1%, 6.8% vs 4.4%). Missing teeth and loose tooth were perceived as the major cause of impacts for almost all aspects of performances.

- Individuals with high income were more likely to have lower OIDP scores (OIDP = 0 and OIDP = 0.1 to 7.9) while the low income counterparts were more likely to have higher OIDP score (OIDP = 8 and above). Subjects who had visited dentists were more likely to have no oral impact (OIDP = 0) or lower oral impacts scores compared to those who had never seen dentists. There was no significant differences in OIDP score between marital status.

- There were significant differences between OIDP scores and clinical variables. Higher proportion of edentulous individuals perceived oral impacts compared to dentate subjects. A higher proportion of older individuals with no perceived oral impacts had no mobile teeth. More older people who had no missing teeth either in anterior or posterior sextants had no perceived oral impacts (OIDP score = 0). For posterior teeth, the more the number of missing teeth, the higher the proportion of older individuals with higher OIDP scores.

- In edentulous subjects, a higher proportion of those who had no perceived dental treatment need for full dentures had no oral impact (OIDP score =0), or had lower oral impact (OIDP score 0.1 to 7.9) compared to their counterparts who had perceived treatment need. The proportion of edentulous subjects who perceived the need for full dentures was significantly increased as the OIDP scores increased.

- In dentate subjects, those who perceived that they need some kind of treatment, need partial denture, need tooth removal and need dental scaling were more likely to have a OIDP score of 8 and above compared to those who did not perceive the need.

Objective 3 *To assess the oral health status, normative treatment need, the propensity for health behaviours and enabling factors in a sample of older people in Chiang Mai*

- 52.4% of older people aged 60-74 years had 21 or more teeth. 18.9% of subjects had 28 or more natural teeth. The mean DMFT was 12.7 (±8.6) while the mean DFT was 1.9 (±3.2). 41.2% had dental caries mainly on crowns. Only 11.1% had root caries.

- 22.3% had deep periodontal pockets of 6 mm or more. 72.5% had loss of attachment more than 6 mm. 62.9% had one or more mobile teeth. The rate of edentulousness was 11.9%.

- Normative treatment needs for prosthodontic treatment were high: 79.7% and 60.7% for full dentures and for partial dentures respectively. Only 24.3% of edentates and 8.4% of dentates had perceived need for full dentures and for partial dentures

- Normative need for extractions, restorations, crown and bridge were 28.6%, 11.7% and 3.3% respectively whilst the corresponding perceived needs were 7.6%, 6.0% and 1.3%.

- The normative need for dental scaling and periodontal treatment were high: 77.8% and 72.5% respectively in contrast to only 7.6% of perceived need for dental scaling.

- 86.1% of 512 subjects had high propensity for health behaviour (non-rigid definition). Under a rigid definition, 72.3% had high propensity. 53.6% of the subjects were non-smokers. 20.2% were current smokers. 88.5% of dentate subjects brushed their teeth more than once a day. 70.3% of

edentulous subjects cleaned their dentures more than once a day. 43.7% would have problem paying for dental treatment.

Objective 4. *To assess the prevalence of medical conditions in the sample of older people in Chiang Mai*

- Approximately 75% of the older people had at least one specific medical condition. The first three most prevalent self-reported medical conditions were chronic pain (62.3%), bone and joint problems (54.7%) and cardiovascular diseases (27.9%).

- The most common physical difficulty in older people was carrying loads. 18.8% of older subjects reported having difficulty carrying loads. The second most important physical difficulty for older individuals was walking upstairs. 18.0% of subjects had problem walking upstairs.

- 89% of older people who had no medical problem rated their general health as good or excellent. 99.8% of the total subjects had no mental impairment.

- The average body mass index (BMI) for the entire sample was 22.1 (±4.1). 15.9% of the older people were underweight and 15.4% were overweight.

11.14 Conclusions

1. By integrating different factors namely general health status, perceived oral impacts, propensity for health behaviours, and financial problem into normative need, different levels of dental treatment need could be estimated.

These levels of need are *'general health related treatment need', 'impact-related treatment need', 'propensity related treatment need', 'accessible treatment need' and 'non-accessible treatment need'.* Each level of need gives a more realistic estimate of the amount of need, when compared to normative need because it takes into account various factors which affect the need of lay people into their treatment need estimations. After integrating related factors into normative need, these different levels of treatment need changes. The reduction in treatment need could be observed in all level of treatment needs when compared to normative treatment need. This finding stresses the shortcoming of using only normative judgements to estimate dental needs in older population.

2. *'Impact-related treatment need'* varied depending on the different cut-off points of condition-specific OIDP score. The amount of *'impact-related treatment need'* changes when the cut-off points change. When compared to normative need, *'impact-related treatment need'* decreased at all cut-off points.

3. By integrating socio-dental index (OIDP) with normative need to formulate *'impact-related treatment need'*, the ranking order of *'impact-related dental treatment need'* changes as compared to ranking order of normative need. The reduction of normative treatment need is proportional to the extent of their impacts on daily living. The difference in the ranking order of treatment need enables the health planner to prioritise dental treatment.

4. In older people general health status should be included in the assessment of dental treatment need. Those with general health problems and those with normal health should be assessed separately. Dental treatment need should be provided to those with *'general health related treatment need'* without assessing their perceived oral impacts.

5. This new approach modifies the extent of normative need and emphasises the need to incorporate general health conditions in assessing treatment need. It reduces the dental treatment need for oral conditions with low impacts on daily performances, with low effectiveness of treatment in people who had a low behavioural propensity, and in people with financial problems.

6. The use of the new approach of dental treatment need estimation to generate different levels of treatment needs will provide a practical approach to plan the dental services.

11.15 Implications

1. The different levels of treatment need assessed using the socio-dental approach could be used to set priorities for appropriate dental health planning.

2. The loss of natural teeth is the endpoint of oral disease commonly found in older people. The majority of this study sample perceived oral impacts on eating, which were mainly caused by missing teeth. Therefore, the maintenance of a reasonable number of functional natural teeth will be the

best solution to guarantee good masticatory efficiency in the ageing population.

11.16 Recommendations for future research

1. This present study aimed to illustrate a model of treatment need estimation using a socio-behavioural approach. A non-representative sampling technique was used and therefore, the findings could not be used to represent the total population or compare directly to other studies. Future research using the appropriate sampling technique to examine a representative sample including the older people residing in rural areas. This will give a better and a more conclusive result.

2. This study focused on only one age group, the so called 'younger old'. Older adults often demonstrate multiple acute or chronic diseases with variable functional, emotional, and other social consequences. They experience a variety of disease process over many years and have variable access to using the dental care system over the course of their life. As a result, oral health knowledge, attitudes, expectations, behaviour and satisfaction with care vary within and between the age groups. The new or younger older people may have a different attitudes and utilisation behaviour from the older age group. The perceived oral impacts which affect their daily performances as well as the severity of chronic diseases may vary between the younger and the older group. Therefore, there may be a cohort effect in this study. The result from this study could not apply directly to all age groups among the older population. Further studies, comparing the treatment need between the

different age groups among the older people will be more appropriate and helpful to be used as guidelines for health planning for the total older population.

3. The integrating process for each level of treatment need is flexible and dynamic. In older people, there are many other related factors which could affect their dental treatment need, and might be included in the treatment needs estimations. For example, physical disability could affect access to care, arthritis affects manual dexterity which influences the oral hygiene practice. Further study of the effects of other related factors is recommended.

4. The practical intervention of each level of treatment need and the evaluation of the change in oral health status as well as the outcome of the treatment after using the new approach of dental treatment need estimation will be worth exploring.

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approx 350 refs

APPENDIX 1

SAMPLE SIZE ESTIMATION

Although this study did not intend to generalise the findings to the total population, the study would be worthwhile if there was a sufficient sample size. The sufficient sample size would produce a significant result in the data analysis.

Sample size estimation

Minimum sample size in this study was calculated on the basis of the hypothesis testing for comparison of two proportions using the following formula (Kirkwood, 1988):

Formula (1)

$$\text{n in each group} = \frac{\left\{\mu\sqrt{\left[\pi_1(1-\pi_1)+(1-\pi_2)\right]}+\upsilon\sqrt{\left[2\bar{\pi}(1-\bar{\pi})\right]}\right\}^2}{(\pi_2-\pi_1)^2}$$

where $\bar{\pi} = \frac{\pi_1+\pi_2}{2}$

n = required minimum sample size in each group

π_1, π_2 = Proportions of interest

μ = One-sided percentage point of the normal distribution corresponding to 100% power, in this study the power = 80%, $\mu = 0.84$

υ = Percentage point of the normal distribution corresponding to the (two-sided) significance level, in this study, significance level = 5%, $\upsilon = 1.96$

The hypothesis for calculating the sample size was that the proportion of older people with *'impact-related treatment need'* would be significantly smaller that the proportion of older people with normative need.

Po = The proportion of normative treatment need

Pa = The proportion of *'impacted related treatment need'*

Ho: Pa = Po

Ha: Pa < Po

Dentate and edentulous subjects

The calculation based on the normative treatment need for restoration and prosthodontic treatment from the previous study by Srisilapanan et al. (1994). From the previous study by Srisilapanan et al. (1994), the prevalence of the normative need for restoration (both new and replacement) was 35%. At the confidence level of 95%, and the power of the test of 80%, it was decided that the prevalence of *'impact-related treatment need'* for restorations of 23% would be acceptable.

Using formula (1)

$$\text{n in each group} = \frac{\left\{0.84\sqrt{[0.35(1-0.35)+0.23(1-0.23)]}+1.96\sqrt{[2(0.29)(1-0.29)]}\right\}^2}{|(0.23-0.35)|^2}$$

n (in each group) = 223

The total sample size needed was 446 to demonstrate a significant difference between normative and *'impact- related treatment need'* at the 5% level.

Based on the prevalence of normative need for replacement of dentures in the previous study, 70% of the older people need denture replacement (Srisilapanan et al. 1994). At the confidence level of 95%, and the power of the test of 80%, it was decided that the prevalence of *'impact-related treatment need'* for replacement of dentures of 55% would be acceptable.

Using formula (1)

n in each group

$$= \frac{\left\{0.84\sqrt{[0.70(1-0.70)+0.55(1-0.55)]}+1.96\sqrt{[2(0.625)(1-0.625)]}\right\}^2}{(0.55-0.70)^2}$$

n (in each group) = 163

The total sample size needed was 326 to demonstrate a significant difference between normative and *'impact- related treatment need'* at the 5% level.

From the two sources of information to estimate the sample size, the sample needed in this study could range from 326 to 446. The response rate from the Thai older population was approximately 90% (Srisilapanan et al. 1994). It was expected to receive approximately 90% response rate from this sample population. So, the total samples of 550 would be statistically adequate.

Edentulous subjects

Based on the prevalence of normative need in edentulous patients for replacement of full dentures in the previous study, 87% of the older people need full dentures replacement (Srisilapanan et al. 1994). It was expected

that the *'impact- related treatment need'* in this study would be 75% at the confidence level of 95% and the power of the test of 80%.

Using formula (1)

n in each group

$$= \frac{\left\{.64\sqrt{[0.87(1-0.87)+0.75(1-0.75)]}+1.28\sqrt{[2(0.795)(1-0.205)]}\right\}^2}{(0.75-0..87)^2}$$

n (in each group) = 72

The total sample size for edentulous individuals needed was 144. The total sample for dentate and edentulous subject in this study was calculated previously to be 550. Thus, when the recruitment of subjects reached 550, the edentulous subjects would be identified and invited to participate in the study until 144 for the total of edentulous subjects was reached.

APPENDIX 2

QESTIONNAIRE (ENGLISH VERSION)

Questionnaire
Chiang Mai Older Population

General information

i) ID:..... (1-3)

ii) AGE:..... (4-5)

iii) DATE OF INTERVIEW:..... DAY MONTH YEAR

iv) TIME VISIT BEGAN:..... HOUR MINUTE (6-9)

(24 hour clock)-

v) EXAMINATION OUTCOME
CHECK WITH EXAMINER AS NECESSARY AND CODE ONE ☐ (10)

Fully completed	1
Complete without periodontal	2
Not completed	3

SECTION 1 DEMOGRAPHIC DATA

1. Sex .....___(11)
   - Male 1
   - Female 2
2. Age .....years ___(12-13)
3. Date of Birth .....___(14-17)
4. Marital status___(18)
   - Single 1
   - Married 2
   - Widow 3
   - Divorced Separate 4
5. Educational level___(19)
   - No education 1
   - ≤4 yrs 2
   - 5-7 yrs 3
   - 8-10 yrs 4
   - 11-12 yrs 5
   - Vocational 6
   - University 7
   - Higher 8
6. Present occupation ___(20)
   - Retiree 1
   - Enployee 2
   - Labour 3
   - Agricultural 4
   - Housework 5
   - No occupation 6
   - Others 7
7. Past occupation___(21)
   - Retiree 1
   - Enployee 2
   - Labour 3
   - Agricultural 4
   - Housework 5
   - No occupation 6
   - Others 7
8. Personal income___(22)
   - No income 1
   - < 1,500 baht/month 2
   - 1,501 - 3,000 baht/month 3
   - 3,001 - 5,000 baht/month 4
   - 5,001 - 10,000 baht/month 5
   - > 10,000 baht/month 6
9. Household income___(23)
   - < 1,500 baht/month 1
   - 1,501 - 3,000 baht/month 2
   - 3,001 - 5,000 baht/month 3
   - 5,001 - 10,000 baht/month 4
   - 10,001 - 15,000 baht/month 5
   - 15,001 - 30,000 baht/month 6
   - > 30,000 baht/month 7
10. Number of individuals with income in family___(24-25)
11. Number of members living in household___(26-27)

12. Type of health care support___(28-29)

None	0
Personal health card	1
Family health card	2
Low income support	3
Governmental Support	4
Health Volunteer	5
Village leader	6
Company support	7
Elderly Welfare	8
Health card and low income support	9
Health card and other welfare	10
Others	11

SECTION 2 GENERAL HEALTH

PART 1 GENERAL HEALTH

G.1. Height (cm.)___(30-32)

G.2. Weight (kg.)___(33-35)

G.3. In general how do you rate your health___(36)

Excellent	1
Good	2
Fair	3
Poor	4
Uncertain	5

G.4. In the past 6 months have your experience unusual weight loss or not (37)

Yes	1	**GO TO G.5**
No	2	**GO TO G.6**

G.5. How much is the weight loss? ..... kg___(38-39)

G.6. At present do you go to see a doctor for any treatment?___(40)

No	1	**GO TO G.7**
Yes	2	**GO TO G.10**
Don't know	9	**GO TO G.7**

G.7. Do you go to see Western doctor or traditional doctor___(41)

Western doctor	1
Traditional doctor	2

G.8. Please state the reason that you go to see a doctor___(42-47)

.....

G.9. When was the last time you go to see your doctor?___(48)

During the last month	1
During the last 6 months	2
During the last year	3
More than a year ago	4

G.10. The next question will be about your health problem during the past 6 months.

	G.10.1 Do you have any of these health problems?		G.10.2 How often did you have the problem ?	G.10.3 How much did the health problem affect your life?	G.10.4 Do you need to see a doctor?		G.10.5 Have you been admitted in the hospital because of the health problem?	
	Yes	No	Frequency	Give code	Yes	No	Yes	No
General Pain (49-53)	1	2			1	2	1	2
Neurological Problem (54-58)	1	2			1	2	1	2
Bone and Joint (59-63)	1	2			1	2	1	2
Circulatory (64-68)	1	2			1	2	1	2
Gastrointestinal (69-73)	1	2			1	2	1	2
Endocrine (74-78)	1	2			1	2	1	2
Carcinoma (79-83)	1	2			1	2	1	2

G.11. At present do you take any kind of medicine?___(84)

1. Take some kind of medicine
2. Do not take any medicine
3. Could not answer

G.12. Please indicate the medicine you are currently taking___(85-98)

Yes 1
No 2

Antihyperglycemic drugs
Antiarrhythmic drug
Coronary vasodilators
Anticoagulant
Tranquilizers, psychosedatives
Drugs for hypothyroidism
Drugs for hyperthyroidism
Steroid hormone
Antihypertensive drugs
Gastric ulcer drug
Traditional medicine
Paracetamol
Antihistamine

Others.....

G.13. Please give rank for the following symptoms according to the important of these symptoms on your health___(99-103)

Headache, general pain
Irregular heart beat
Bone and joint pain
Stomachache, toothache

G.14. If you have the above symptoms, which symptom will you treat first___(104-108)

Headache, general pain
Irregular heart beat
Bone and joint pain

Stomach ache, toothache

PART 2 SMOKING HABITS

S.1. Do you currently smoke? ____(109)

Yes	1	**GO TO S.2**
No	2	**GO TO PART 3**
Used to smoke but quit	3	**GO TO PART 3**

S.2. Which type of cigarrette do you smoke?___(110)

Factory made	1
Home made	2

S.3. How often do you smoke?___(111)

Regularly at least 1 cigarrette per day	1	**GO TO S4**
Irregularly	2	
Once in a while	3	

S.4. How many cigarerettes do you smoke in one day?___(112-113)

PART 3 MOBILITY EVALUATION

M.1. From observation___(114)

The participant could walk	1
The participant could not walk	2

M.2. Could you be able to walk___(115)

Yes	1	**GO TO M.4**
No	2	
Yes but need some walking aids	3	**GO TO M.3**

M.3. Type of walking aids__(116)

Cane	1
Other walking aids	2
Wheel chair	3

M.4. The next question will be about the frequency of your daily activities

Activities	**Frequency**				
	More than once a day	**Once a day**	**More than once a week**	**Less than once a week**	**Could not do**
Walk upstair (117)					
Walk in the house (118)					
Carry Load (119)					

M.5. Can you be able to do light household task such as cleaning the house, ironing?___(120)

Yes	1	**GO TO M.6**
No	2	**GO TO M.7**

M.6. How often can do you do that task?___(121)

More than once a day	1
Once a day	2
5-6 times a week	3
3-4 times a week	4
Once or twice a week	5
Once a week	6
Twice a week	7
Once a month	8
Rarely	9

M.7. Can you be able to do heavy household task such as mowing the lawn?___(122)

Yes	1	**GO TO M.8**
No	2	**GO TO PART 4**

M.8. How often can do you do that task?___(123)

More than once a day	1
Once a day	2
5-6 times a week	3
3-4 times a week	4
Once or twice a week	5
Once a week	6
Twice a week	7
Once a month	8
Rarely	9

PART 4 MENTAL STATUS

The next section will be general questions.

Correct answer	1
Wrong answer	2

1. Do you know what year is this year?___(124)
2. Do you know what month is this month?___(125)
   * Please repeat the sentence after the interviewer
   "Mr. Banharn Number 10 Tok Road Supanburi"
3. Do you know what time is it now? or is it in the morning or in the afternoon)___(126)
4. Please count backward from 20 to 1___(127)

All correct	1
1 mistake only	2
2 or more mistakes	3

5. Please state the month backward from December___(128)

All correct	1
1 mistake only	2
2 or more mistakes	3

6. Please say the previous sentence___(129)
7. General evaluation___(130)

Normal	1
Some memory problem	2

SECTION 3 ORAL HEALTH STATUS

A. NATURAL TEETH__(131)
Respondent has:

Any natural teeth	1
No natural teeth	2

B. DENTURE
Respondent has:__(132)

Any dentures	1	**ASK Q.C**
No dentures	2	**GO TO Q.F**

C. COMPLETE DENTURE(S)
Respondent has:__(133)

Complete denture on <u>both</u> jaws	1
Complete denture on <u>upper</u> jaw only	2
Complete dentures on <u>lower</u> jaw only	3
<u>No</u> complete dentures	4

D. PARTIAL DENTURE(S)
Respondent has:__(134)

Partial denture on <u>both</u> jaws	1
Partial denture on <u>upper</u> jaw only	2
Partial dentures on <u>lower</u> jaw only	3
<u>No</u> partial dentures	4

F CHECK Qs A AND B AND CODE <u>ONE</u> BELOW:

Both natural teeth and dentures (CODE 1 AT A AND B)	1 **ASK Q1a**
Natural teeth only (CODE 1 AT A AND CODE 2 AT B)	2 **GO TO Q1b**
Dentures only (CODE 2 AT A AND CODE 1 AT B)	3 **GO TO Q1c**
Neither natural teeth nor dentures (CODE 2 AT A AND B)	4 **GO TO Part 3**

PART 1 PSYCHOLOGICAL ASSESSMENT

Satisfaction with teeth/denture(s)

The first few questions are about how satisfied you are with your teeth as a whole, including both teeth and the artificial teeth you have in your denture(s).

1. How satisfied are you with the appearance (colour,size,shape) of your teeth/denture(s)?
Are you ... **READ OUT** ...

very satisfied	1
fairly satisfied	2
fairly unsatisfied	3
or very unsatisfied?	4
(Can't say)	9

1.a) Both natural teeth and dentures__(135) **GO TO Q2b or Q2c**
1.b) Natural teeth only__(136) **GO TO Q4**
1.c) Denture__(137) **GO TO Q2a**

2. How satisfied are you with the overall comfort of your teeth/denture(s)?.....
Are you ... **READ OUT** ...

very satisfied	1
fairly satisfied	2
fairly unsatisfied	3
or very unsatisfied?	4
(Can't say)	9

2a) complete dentures__(138) **GO TO Q3**
2b) partial dentures__(139) **GO TO Q4**
2c) natural teeth__(140) **GO TO Q4**

3. **ALL WITH COMPLETE DENTURE(S)**
Do you ever feel embarrassed because of your complete denture(s)?__(141)

Yes	1
No	2
(Can't say)	9

ALL WITH ANY TEETH OR DENTURES
4a) Some people who are not satisfied with their teeth or dentures avoid showing them when they smile. Do you ever try to avoid showing your teeth or dentures when smiling or laughing?__(142)

Yes	1	**ASK b)**
No	2	**GO TO Q5a**

IF YES AT a)
b) Would you say you do this ... **READ OUT** ...__(143)

very often	1
fairly often	2
not very often	3
or hardly ever?	4

ALL
5a) Have you suffered from bad breath at all in the past 6 months (as far as you are aware)?__(144)

Yes	1	**ASK b) and c)**
No	2	**GO TO Part 2**
Can't say	9	

IF YES
b) In the past 6 months has bad breath caused you ...**READ OUT** ...__(145)

a great amount of social discomfort	1
a fair amount of social discomfort	2
or little social discomfort?	3

c) Do you think that bad breath caused by something in your mouth?__(146)

Yes	1
No	2

PART 2 PHYSICAL ASSESSMENT

FOR COMPLETE DENTURE WEARERS (CODE 1-3 AT QC)

1. I am going to read out some changes which some people sometimes notice when they wear complete dentures. For each change please could you tell me whether or not it has applied to you.

a) Would you say that wearing a complete denture makes your mouth feel full?__(147)

Yes	1
No	2
(Can't say)	9

b) Would you say that wearing a complete denture makes you eat more slowly than before?__(148)

Yes	1
No	2
(Can't say)	9

c) Would you say that wearing a complete denture changes the flavour of your food?__(149)

Yes	1
No	2
(Can't say)	9

d) Would you say that wearing a complete denture changes the way you speak?__(150)

Yes	1
No	2
(Can't say)	9

2. **CHECK Q.C ON SCREENING PAGE AND RECORD:**__(151)

Respondent has a complete denture on <u>both</u> jaws (CODE 1)	1	**ASK Q3**
Respondent has a complete denture on <u>upper</u> jaw only (CODE 2)	2	
Respondent has a complete denture on <u>lower</u> jaw only (CODE 3)	3	**GO TO Q5**

IF COMPLETE DENTURE ON UPPER JAW (CODES 1-2 AT Q2)

3a) Does the denture on your upper jaw ever drop when you speak?__(152)

Yes	1
No	2
(Can't say)	9

b) And does the denture on your upper jaw ever drop when your mouth is open (apart from when you speak)?__(153)

Yes	1
No	2
(Can't say)	9

4. **CHECK Q.C ON SCREENING PAGE AND RECORD:**__(154)

Respondent wears a complete denture on <u>both</u> jaws (CODE 1)	1	**ASK Q5 FOR BOTH JAWS**
Respondent wears a complete denture on <u>upper</u> jaw only (CODE 2)	2	**ASK Q5 FOR UPPER JAW ONLY**
Respondent wears a complete denture on <u>lower</u> jaw only (CODE 3)	3	**ASK Q5 FOR LOWER JAW ONLY**
Respondent does <u>not</u> wear a complete denture (CODE 4)	4	**GO TO Q6**

5. The next few questions are about your complete denture(s)

ASK Q5 SEPARATELY FOR EACH COMPLETE DENTURE/JAW

(Thinking about the denture in your upper jaw...)

(Thinking about the denture in your lower jaw...)

TICK BOX IF APPLICABLE:	**Upper Jaw**	**Lower Jaw**
a) How long have you had your present denture in your ... (upper/lower) ... jaw?	years	years
Can't say	99	99
b) How long is it since the last of your natural teeth in your ... (upper/lower) ... jaw were removed?	years	years
(One or more teeth still present)	88	88
(Can't say)	99	99
c) In general, do you wear your ... (upper/lower) ... denture when you sleep at night?		
Yes	1	1
No	2	2
d) And apart from when you sleep, do you wear your ... (upper/lower) ... denture **READ OUT** ...		
all of the time	1 **GO TO Q5 FOR LOWER JAW (IF APPLICABLE)**	1 **GO TO Q9**
or only some of the time?	2 **ASK e-f**	2 **ASK e-f**
IF DENTURE WORN SOME OF THE TIME		
e) In general, do you wear your (upper/lower) ... denture for social occasions?		
Yes	1	1
No	2	2
f) And, in general, do you wear your ... (upper/lower) ... denture for eating?		
Yes	1	1
No	2	2
	NOW GO TO Q5 FOR LOWER JAW (IF APPLICABLE) (155-162)	**NOW GO TO Q9** (163-170)

FOR PARTIAL DENTURE WEARER

6a) **CHECK Q.D ON SCREENING PAGE AND RECORD:** (171)

Respondent has a partial denture on both jaws (CODE 1)	1	**ASK Q7 FOR BOTH**
Respondent has a partial denture on upper jaw only (CODE 2)	2	**ASK Q7 FOR UPPER JAW ONLY**
Respondent has a partial denture on lower jaw only (CODE 3)	3	**ASK Q7 FOR LOWER JAW ONLY**
Respondent does not wear a partial denture (CODE 4)	4	**GO TO Q8**

7. The next few questions are about your partial denture(s).

ASK Q7 SEPARATELY FOR EACH PARTIAL DENTURE/JAW

(Thinking about the denture in your upper jaw...)
(Thinking about the denture in your lower jaw...)

TICK BOX IF APPLICABLE:	**Upper Jaw**	**Lower Jaw**
a) How long have you had your present denture in your ... (upper/lower) ... jaw?	years	years
Can't say	99	99
b) How long is it since the last of your natural teeth in your (upper/lower) jaw were removed?	years	years
(One or more teeth still present)	88	88
(Can't say)	99	99
c) In general, do you wear your ... (upper/lower) ... denture when you sleep at night?		
Yes	1	1
No	2	2
d) And apart from when you sleep, do you wear your ... (upper/lower) ... denture		
READ OUT ...all of the time	1 **GO TO Q7 FOR LOWER JAW (IF APPLICABLE)**	1 **GO TO Q8**
or only some of the time?	2 **ASK e-f**	2 **ASK e-f**
e) **IF DENTURE WORN SOME OF THE TIME** In general, do you wear your ... (upper/lower) ... denture for social occasions?		
Yes	1	1
No	2	2
f) And, in general, do you wear your ... (upper/lower) ... denture for eating?		
Yes	1	1
No	2	2
	NOW GO TO Q7 FOR LOWER JAW (IF APPLICABLE) (172-177)	**NOW GO TO Q8** (178-183)

8. Now I am going to read out some reasons why people choose to wear a partial denture. For each reason, please could you say whether or not it applies to you? Which, if any, of the following reasons for wearing a partial denture apply to you?

READ OUT AND CODE `YES' OR `NO' FOR EACH

- I wear a partial denture because it improves my appearance__(184)

Yes	1
No	2

- I wear a partial denture because it helps me to eat__(185)

Yes	1
No	2

- I wear a partial denture because my dentist recommended it__(186)

Yes	1
No	2

- I wear a partial denture because it is the only treatment I can afford__(187)

Yes	1
No	2

- I wear a partial denture because it is the only treatment available__(188)

Yes	1
No	2

ALL

9. I would now like to ask you about how well you are able to eat foods nowadays. I will ask you separately about biting, chewing and swallowing.

a) In general, how well are you able to bite food that you eat nowadays? Would you say you have ... **READ AND CODE ONE ONLY** ...__(189)

no difficulty	1
a little difficulty	2
a fair amount of difficulty	3
or a great amount of difficulty biting food?	4

b) And in general, how well are you able to chew food that you eat nowadays? Would you say you have ... **READ OUT AND CODE ONE ONLY** ..__(190).

no difficulty	1
a little difficulty	2
a fair amount of difficulty	3
or a great amount of difficulty chewing food?	4

c)And in general, how well are you able to swallow food that you eat nowadays. Would you say you have ... **READ AND CODE ONE ONLY** ...__(191)

no difficulty	1
a little difficulty	2
a fair amount of difficulty	3
or a great amount of difficulty swallowing food?	4

ALL

10. Now I am going to read out a list of different types of food and I would like you to tell me for each one whether you could eat it easily, with with some difficulty or not at all. It doesn't matter whether or not you like the types of food or ever choose to eat it nowadays. We are interested in how well you could eat it if you wanted to. **READ OUT EACH ITEM AND CODE**
N.B Eat means bite, chew and swallow.
PROMPT: Could you eat ... **(ITEM)** ... easily, with some difficulty or not at all?___(192-207)

	Could eat easily	Could eat with some difficulty	Could not eat at all
Steamed rice	1	2	3
Sticky rice	1	2	3
Noodle	1	2	3
Crisp pork skin	1	2	3
Omelette	1	2	3
Spicy ground beef dish	1	2	3
Stir fry vegetable	1	2	3
Steamed green vegetables	1	2	3
Raw vegetables	1	2	3
Sliced cooked meats	1	2	3
Grilled chicken	1	2	3
Fried fish	1	2	3
Oranges	1	2	3
Nuts	1	2	3
Guava	1	2	3
Fried banana	1	2	3

PART 3 ORAL IMPACT ON DAILY PERFORMANCES (OIDP)

ALL

1a) I will ask you about some everyday activities.
For each activity I would like you to tell me whether or not problems with your mouth, teeth or dentures have caused you difficulty with it in the past 6 months.
In the past 6 months, have problems with your mouth, teeth or dentures caused you any difficulty ... **(ACTIVITY)**...?
READ OUT FOR EACH ACTIVITY AND CODE `YES' OR NO'

FOR EACH ACTIVITY CODED `YES' ASK b-g:

b) Have you had this difficulty ... (**ACTIVITY**) ... on a regular basis over the past 6 or only for part of this period?
CODE ONE ONLY, THEN ASK c OR d AS INDICATED

IF ABILITY RESTRICTED `ON A REGULAR BASIS' (CODE 1 AT b)

c) During the past 6 months how often have you had this difficulty ... (**ACTIVITY**) ...
PROMPT: (In the past 6 months) Have you had this difficulty ... (**ACTIVITY**) ... **READ OUT** ...

	ANSWER CODE
every day or nearly every day	5
about three or four times a week	4
about once or twice a week	3
about once or twice a month	2
or less often than once a month?	1
(Can't say)	(9)

IF ABILITY RESTRICTED `ONLY FOR PART OF THIS PERIOD' (CODE 2 AT b)

d) For how much of the past 6 months have you had this difficulty ... **(ACTIVITY)** ....
(In the past 6 months) Have you had this difficulty ... **READ OUT** ...

	ANSWER CODE
for more than 3 months	5
for more than 2, up to 3 months	4
for more than 1, up to 2 months	3
for more than 5 days, up to a month	2
or for 5 days or less?	1
(Can't say)	(9)

ENTER ANSWER CODE IN BOX UNDER d) ON GRID. GO TO e).

e) And using a scale from 0 to 5, where 0 is no effect and 5 is a very severe effect, how much effect would you say that this difficulty ... **(ACTIVITY)** ... has had on your everyday life?

IF RESPONDENT IS UNABLE TO ANSWER WITH NUMBERS, PROMPT VERBALLY AS FOLLOWS:

Has this difficulty ... **(ACTIVITY)** ... had **READ OUT** ... on your everyday life?

	ANSWER CODE
no effect	0
a very minor effect	1
a fairly minor effect	2
a moderate effect	3
a fairly severe effect	4
or a very severe effect	5
(Can't say)	(9)

ENTER ANSWER CODE (0-5) IN BOX UNDER e)

f) Which one of the following conditions has caused you this difficulty..(ACTIVITY)...
Has this difficulty ...(ACTIVITY)... affected you because of ....

ENTER ANSWER CODE (1-9) IN BOX UNDER f)

	ANSWER CODE
pain	1
discomfort	2
limitation in function (e.g. chewing, biting or opening mouth wide)	3
dissastisfaction about appearance	4
or any other reason (PLEASE SPECIFY)	5
(can't say)	9

g) Please give a specific oral condition which caused you the problem stated earlier

ENTER ANSWER CODE (1-27) IN BOX UNDER g)
(MORE THAN ONE ANSWER COULD APPLIED FOR EACH CONDITION)

	ANSWER CODE
TEETH	
Toothache	01
Tooth loss	02
Loose tooth	03
Colour of teeth	04
Position of teeth	05
Shape and size of teeth	06
Maloccluded teeth	07
MOUTH	
Oro-facial deformity	08
Oral ulcer or sore spots (not denture related)	09
Burning sensation of the mouth	10
Bad breath	11
Taste disturbance	12
Unpleasant taste	13
Dry mouth	14
GUMS	
Bleeding gums	15
Receding gums	16
Gum abscess	17
JAW	
Clicking or grating noise in jaw joint	18
A pain in jaw joint	19
Difficulty in opening mouth wide	20
DENTURED RELATED	
Loose or ill-fitting denture	21
Colour, shape, size of denture teeth	22
Sore spot or ulcer	23
Other (SPECIFY)	24
Cannot specify	25
Wearing denture	26

	a)Whether difficulty with activity	b)Whether has had this difficulty...		c) On a regular basis	d) Only for part of period	e)Effect of this difficulty on every day life	f)Major cause of difficulty	g)Specify dental problem causing difficulty
	Yes No	On a regular basis	Only for part of period	How often? (ENTER CODE)	How much? (ENTER CODE)	(ENTER CODE)	(ENTER CODE)	(ENTER CODE)
Eating food (208-215)	1 2	1-----c)	2-----d)					
Speaking clearly (216-223)	1 2	1-----c)	2-----d)					
Cleaning your teeth or dentures (224-231)	1 2	1-----c)	2-----d)					
Doing light physical activities such as housework (232-239)	1 2	1-----c)	2-----d)					
Going out, for example, to shop or visit someone (240-247)	1 2	1-----c)	2-----d)					
Relaxing (248-255)	1 2	1-----c)	2-----d)					
Sleeping (256-263)	1 2	1-----c)	2-----d)					
Enjoyment of contact with other people, such as relatives, friends or neighbours (264-271)	1 2	1-----c)	2-----d)					
Maintain your usual emotional state without being irritable (272-279)	1 2	1-----c)	2----d)					
Smiling, laughing and showing teeth without embarrassment (280-287)	1 2	1-----c)	2-----d)					

SECTION 4 PROPENSITY FOR HEALTH BEHAVIOURS

PART 1 PAST DENTAL EXPERIENCES

Problems with teeth or dentures

The next few questions are about any problems which you may have experienced with your teeth or dentures in the past 6 months, that is since ... (**DATE/MONTH 1995/6**)

CHECK MONTH 6 MONTHS AGO:			
CURRENT MONTH		**6 MONTHS AGO**	
July	1995	January	1995
August	1995	February	1995
September	1995	March	1995
October	1995	April	1995
November	1995	May	1995
December	1995	June	1995
January	1996	July	1995
February	1996	August	1995

INTERVIEWER CHECK Q.A ON SCREENING PAGE AND RECORD:__(288)

Respondent has any natural teeth (CODES 1-3)	1	**ASK Q1**
Respondent has no natural teeth (CODE 4)	2	**GO TO Q2**

IF ANY NATURAL TEETH ASK a) THEN b) FOR EACH PROBLEM

1a) In the past 6 months have you experienced ... (**PROBLEM**) ...?
READ OUT BOTH ITEMS AND CODE YES' OR NO'
IF YES AT a) ASK b)

b) Have you experienced this problem very often,quite often, sometimes or hardly ever in the past 6 months?

Problems:	a) Yes	No	b) very often	quite often	some-times	hardly ever?
Sensitive teeth when eating or drinking anything cold, hot or sweet? (289-290)	1	2	1	2	3	4
Any other mild discomfort with your teeth (291-292)	1	2	1	2	3	4
Any pain or severe discomfort with your teeth (293-294)	1	2	1	2	3	4

ALL WITH ANY TEETH OR DENTURES

2a) In the past 6 months have you experienced any difficulties due to food getting stuck between teeth or under dentures?__(295)

Yes	1	**ASK b)**
No	2	**GO TO Q3a**

IF DIFFICULTIES DUE TO FOOD STICKING (CODE 1 AT a)

b) And in the past 6 months has food sticking between teeth or under dentures caused you ...

READ OUT ...__(296)

a great amount of discomfort	1
a fair amount of discomfort	2
a little discomfort	3
or no discomfort?	4

3a) In the past 6 months since ... (**MONTH**) 1995,
have you experienced any of the following problems with your mouth, teeth or dentures.
Please say `yes' or `no' for each problem I read out?
READ OUT EACH PROBLEM AND
CODE `YES' OR NO' (And in the past 6 months have you experienced ...?

b) **FOR EACH PROBLEM CODED 'YES' AT a, ASK b AND c:**
How much discomfort has ... (**PROBLEM**) ... caused you in the past 6 months?
Would you say it caused you... **READ OUT** ...

a great amount of discomfort	1
a fair amount of discomfort	2
a little discomfort	3
or no discomfort?	4

c) Did you take any action to treat this problem?	a) Whether problem experienced		b) Amount of discomfort				c) Whether took action to treat problem	
	Yes	No	A great amount of dis-comfort	A fair amount of dis-comfort	A little dis-comfort	No dis-comfort	Yes	No
A pain in your jaw joint (297-9)	1	2	1	2	3	4	1	2
A clicking or grating noise in your jaw joint (300-2)	1	2	1	2	3	4	1	2
Difficulty in opening your mouth wide (303-5)	1	2	1	2	3	4	1	2
A loose or ill-fitting denture (306-308)	1	2	1	2	3	4	1	2
A loose natural tooth (309-11)	1	2	1	2	3	4	1	2
A broken or chipped natural tooth (312-14)	1	2	1	2	3	4	1	2
Dryness in your mouth (315-17)	1	2	1	2	3	4	1	2
A burning sensation in your mouth (318-20)	1	2	1	2	3	4	1	2
Sore spots or ulcers (321-3)	1	2	1	2	3	4	1	2
A sore or painful mouth or tongue (excluding sore spots or ulcers) (324-6)	1	2	1	2	3	4	1	2
Bleeding gums (327-9)	1	2	1	2	3	4	1	2
Dry, sore or cracked lips (330-2)	1	2	1	2	3	4	1	2

4. CHECK SEVENTH ITEM AT Q.3a (MARKED **) AND RECORD:__(333-4)

Respondent has experienced dryness of mouth (CODE 1)	1	**ASK Q5**
Respondent has <u>not</u> experienced dryness of mouth (CODE 2)	2	**GO TO Part 2**

IF EXPERIENCED DRYNESS OF MOUTH

5a) You mentioned that you had experienced some dryness in your mouth in the past 6 months.I would like to ask you a little more about this problem. Does your mouth ever ..

READ OUT EACH ITEM AND CODE `YES' OR `NO'

	Yes	No	(Can't Say)
feel dry when you are eating a meal__(335)	1	2	9
feel dry at other times of the day__(336)	1	2	9
feel dry at night__(337)	1	2	9

b) Does dryness in your mouth ever cause you any of the following difficulties?

READ OUT EACH DIFFICULTY AND CODE `YES' OR `NO'

	Yes	No	(Can't Say)
No difficulty__(338)	1	2	9
Difficulty chewing food__(339)	1	2	9
Difficulty swallowing food__(340)	1	2	9
Difficulty taking medication__(341)	1	2	9

c) Have you done any of the following to relieve your dry mouth?

READ OUT EACH MEASURE AND CODE `YES' OR `NO'

	Yes	No	(Can' Say)
Chew gum to relieve your dry mouth__(342)	1	2	9
Suck hard sweets or mints to relieve your dry mouth__(343)	1	2	9
Sip water or other liquid to help you swallow dry foods__(344)	1	2	9
Take any other product or medication to relieve your dry mouth__ (345)	1	2	9

PART 2 VISIT TO DENTIST/NON-DENTIST, ACCESS TO SERVICE

1. CHECK Q.A OF SCREENING PAGE AND RECORD:

Respondent has any natural teeth (CODE 1)	1	**GO TO Q3__(346)**
Respondent has no natural teeth (CODE 2)	2	**GO TO Q2__(347)**

IF NO NATURAL TEETH

2. Thinking about when you had your own teeth, would you say that you saw a dentist for ...

READ OUT__(348)

Regular checkups	1
Occasional checkups	2
or only when you were having trouble with your teeth?	3
Never saw a dentist	4

3. In general, would you say that you see a dentist <u>nowadays</u> for ... **READ OUT** __(349)

Regular checkups	1
Occasional checkups	2
or only when you are having trouble with your teeth?	3
Never see dentist	4

4. The reason that you did/do not to see a dentist is...**READ OUT**__(350)

I do not think I have any problem	1	
I think the problem will soon recover by itself	2	
Nobody to take me to see the dentist	3	
I am afraid of the high cost	4	
I am afraid of the treatment	5	
Other reason..probe	6	

5. When did you last see a dentist for an examination or treatment?__(351)

CODE ONE ONLY

In last six months	1	
More than six months, up to a year ago	2	
More than a year, up to 5 years ago	3	**ASK Q6**
More than 5, up to 10 years ago	4	
More than 10, up to 20 years ago	5	
More than 20 years ago	6	
Have never seen dentist	7	
(Can't say)	9	

IF VISIT BECAUSE OF TROUBLE WITH TEETH

6. What was the trouble you were having with your teeth which caused you to see a dentist?__(352-8)
PROBE FULLY

_____
_____
_____

7. **CHECK Q5 AND RECORD:**__(359)

Respondent last saw dentist in past 5 years (CODES 1-3)	1	**ASK Q8**
Respondent last saw dentist more than five years ago, has never seen dentist or can't say (CODES 4-7, 0)	2	**GO TO Part 3**

IF DENTIST SEEN IN PAST 5 YEARS

8. Where will you go if you want to see your dentist?__(360)

Community Hospital	1
General Hospital/Municipality Hospital	2
Private Hospital	3
Private clinic	4
Local(Illegal) dentist	5

9. How far do you travel to see your dentist?__(361)

< 1km	1
1-5 km	2
5^{+} - 10 km	3
10^{+} - 15 km	4
15^{+} km	5
Home visit by dentist	6
other	7

10. How do you usually travel to the dentist?__(362)

Walk	1
Car driven by respondent	2
Car driven by someone else	3
Bus/minibus	4
Bicycle	5
Other (SPECIFY)	6
Home visit by dentist	7

11. And thinking about how you usually travel to visit your dentist, would you say that this is... **READ OUT BELOW**.. for you to make?__(363)

a very easy journey	1
a fairly easy journey	2
a fairly difficult journey	3
or a very difficult journey	4

12. You go to the local (illegal) dentist for.....

Yes = 1
No = 2

All kind of dental treatment__(364)	1
Restorative treatment__(365)	2
Prosthodontic treatment__(366)	3
Other (SPECIFY)_____(367)	

13. The reason that you go to see the local (illegal) dentist is...._(368)

convenience	1
low cost	2
the quality of treatment	3
treatment takes less time	4
he/she is the only person available	5

PART 3 ORAL HEALTH AND ORAL HYGIENE BEHAVIOUR

1.**CHECK Q.A ON SCREENING PAGE AND RECORD:**__(369)

Respondent has any natural teeth (CODE 1)	1	**ASK Q2a**
Respondent has no natural teeth (CODE 2)	2	**GO TO Q4a**

IF ANY NATURAL TEETH

2a) **(IF ANY DENTURES ALSO WORN READ AS PREAMBLE:**
Now thinking only about your natural teeth ...
Do you clean your (natural) teeth yourself?

IF `NO', PROMPT: Does someone else clean them for you?__(370)

Yes, respondent cleans own teeth	1	**GO TO d)**
No, teeth cleaned by someone else	2	
No, teeth are not cleaned at all	3	**ASK b)**

IF DOES NOT CLEAN OWN TEETH

b) Why do you not clean your (natural) teeth yourself?__(371-7)
PROBE FULLY

_____
_____
_____

c) **INTERVIEWER CHECK a AND RECORD** _____(378)

Teeth are cleaned by respondent or someone else (CODES 1 OR 2)	1	**ASK d)**
Teeth are not cleaned at all (CODE 3)	2	**GO TO Q4**

IF TEETH ARE CLEANED AT ALL (CODES 1 OR 2 AT Q2a)

d) How often do you (does someone else) clean your (natural) teeth?
PROMPT AS NECESSARY: Would that be ..__(379)

more than once a day	1
about once a day	2
about once or twice a week	3

3. **INTERVIEWER CHECK SCREENING PAGE AND RECORD FIRST TO APPLY:**__(380)

Respondent has any dentures (CODE 1 AT Q.B)	1	**ASK Q4**
Respondent has no dentures (CODE 2 AT Q.B)	2	**GO TO Part 4**

IF HAS ANY DENTURES

4a) Do you clean your denture(s) yourself?
IF 'NO', PROMPT: Does someone else clean it/them for you?__(381)

Yes, respondent cleans own dentures	1	**GO TO b)**
No, dentures cleaned by someone else	2	
No, dentures are not cleaned at all	3	**GO TO Part 4**

IF DENTURES CLEANED AT ALL (CODES 1 OR 2 AT Q4a)

b) How often do you (does someone else) clean your dentures? Would that be ..__(382)

more than once a day	1
about once a day	2
about once a week	3
or less often than once a week?	4

5a) How often do you add sugar into your food (when cooking or add in noodle dish)?__(383)

never	1
rarely	2
occasionally	3
usually	4
always	5

b) Do you add sugar to either coffee or tea?__(384)

Yes	1
No	2
I use artificial sweeteners	3
I don't drink tea or coffee	4

c) If yes, how many teaspoons do you usually add?_____(385-6)

d) Thinking about yesterday, how many times had you eaten sweets or desserts?
_____Times__(387-8)

e) How many sweet drinks you had yesterday (e.g coffee, tea, carbonated drink)?
_____Times__(389-90)

PART 4 PERCEIVED AND EXPRESSED NEED

ALL

1a) At present, do you think that have any problem with your mouth or teeth ? ___(391)
Yes = 1 **ASK b)**
No = 0

b) If you think that you have a problem, what is your problem?
Yes = 1
No = 0

Toothache__(392)
Tooth decay__(393)
Chipped tooth__(394)
Tooth mobility__(395)
Calculus__(396)
Bleeding gum, swollen gum__(397)
Ill-fitting denture, loose denture, broken denture__(398)
Bad breath__(399)
Other (SPECIFY)__(400)

c) If you visited a dentist tomorrow do you think you would need any treatment or not?__(401)

Respondent thinks (s)he would need treatment	1	**ASK d) and e)**
Respondent thinks (s)he would not need treatment	2	**ASK f)**
(Can't say)	9	

IF THINKS WOULD NEED TREATMENT

d) What treatment do you think you would need? **Yes = 1**
No = 0

New restoration__(402)
Replacement of restoration__(403)
Fixed restoration__(404)
Tooth removal__(405)
New complete denture__(406)
Replacement of complete denture(upper only)__(407)
Replacement of complete denture(lower only)__(408)
New partial denture__(409)
Replacement of partial denture(upper only)__(410)
Replacement of partial denture(lower only)__(411)
Treatment of gum problem__(412)
Other (SPECIFY)__(414)

e) Have you made any arrangement to see a dentist for....treatment mentioned in Q1b?__(415)

Yes	1
No	0

f) If thinks would not need any treatment, the reason(s) is/are__(416)

Yes	1
No	0

there is no problem	1
fear of the dental treatment	2
finance	3
time problem	4
travelling problem	5
do not think the treatment will solve the problem	6

2a) Do you think that going to see a dentist will help solving your oral problem(s)?___(417)

Yes	1
No	0

b) Do you agree that it is normal to loose natural teeth when you get older?___(418)

Agree	1
Not agree	0

c) Do you think that oral health is important for your health? ____(419)

Yes	1
No	0

PART 5 FINANCIAL STATUS

1a) If you have a dental problem and need to see a dentist tomorrow will you have a problem paying for the treatment__(420)

Yes	1
No	0

b) If yes, how much will you be able to pay for the treatment comfortably?__(421)

less than 100 baht	1
100 - 500 baht	2
501 - 1000 baht	3
1001 - 2000 baht	4
2001 -5000 baht	5

2. How will you finance your dental treatment fee?__(422)

on your own	1
family support	2
reimbursment from government	3
need to be on social service scheme	4
don't have any support	5
don't know	6

TIME INTERVIEW ENDED
(24 hour clock)

APPENDIX 3

QUESTIONNAIRE (THAI VERSION)

แบบสัมภาษณ์

การศึกษาเปรียบเทียบปัจจัยด้านจิตสังคมและพฤติกรรมที่มีต่อความจำเป็นในการรักษาทางทันตกรรมตามความคิดเห็นของทันตแพทย์ และการรับรู้ถึงความจำเป็นในการรักษาทางทันตกรรมของผู้สูงอายุ

ภาควิชาระบาดวิทยาและสาธารณสุข มหาวิทยาลัยคอลเลจ ลอนดอน

แบบสัมภาษณ์เลขที่ ..... (1-3)

ชื่อผู้ให้สัมภาษณ์.....
บ้านเลขที่.....หมู่..... ถนน.....
ตำบล..... อำเภอ เมือง จังหวัด เชียงใหม่
โทรศัพท์.....
เป็นสมาชิกชมรม 1. ผู้สูงอายุ 2. ไม่เป็น 3. อื่นๆ ระบุ..... (4)

วันที่สัมภาษณ์.....
เริ่มสัมภาษณ์เวลา.....เสร็จเวลา.....รวม.....นาที (5-7)

สถานที่สัมภาษณ์ 1. ชมรมผู้สูงอายุ 3. บ้านผู้สูงอายุ (8)
2. ชุมชนเทศบาล 4. คณะพยาบาลศาสตร์

ตรวจสภาวะช่องปาก เมื่อวันที่..... (9)
สุ่มเช็ค.....
ลงรหัส.....
ตรวจสอบรหัส.....

ผลการตรวจในช่องปาก (10)
1. ตรวจครบสมบูรณ์
2. ไม่ได้ตรวจสภาวะโรคปริทันต์
3. ข้อมูลไม่สมบูรณ์

ส่วนที่ 1 : ลักษณะทางประชากร เศรษฐกิจ และ สังคม

1. เพศ 1. ชาย 2. หญิง (11)

2. อายุ.....ปี (12-13)

3. วัน เดือน ปีเกิด ..... (14-17)

4. สถานภาพสมรส (18)
   1. โสด 3. หม้าย
   2. แต่งงาน 4. หย่า/แยกกันอยู่

5. การศึกษา (19)
   1. ไม่ได้เรียน 5. มัธยมปลาย (11 - 12 ปี)
   2. ป. 4 (หรือต่ำกว่า 4 ปี) 6. อนุปริญญาหรือเทียบเท่า
   3. ป. 5 - ป. 7 (5 - 7 ปี) 7. ปริญญาตรีหรือเทียบเท่า
   4. มัธยมต้น (8 - 10 ปี) 8. สูงกว่าปริญญาตรี

6. อาชีพของท่านในปัจจุบัน (20)
   1. ข้าราชการบำนาญ 5. แม่บ้าน, งานบ้าน
   2. ทำงานส่วนตัว, ค้าขาย 6. ไม่มีอาชีพ
   3. รับจ้าง 7. อื่นๆ ระบุ .....
   4. เกษตรกร (ทำไร่ ทำนา ทำสวน เลี้ยงสัตว์)

7. อาชีพเดิม (21)
   1. ข้าราชการบำนาญ 5. แม่บ้าน, งานบ้าน
   2. ทำงานส่วนตัว, ค้าขาย 6. ไม่มีอาชีพ
   3. รับจ้าง 7. อื่นๆ ระบุ .....
   4. เกษตรกร (ทำไร่ ทำนา ทำสวน เลี้ยงสัตว์)

8. รายได้ของท่าน (22)
   1. ไม่มีรายได้ 4. 3,001 - 5,000 บาท/เดือน
   2. ต่ำกว่า 1,500 บาท/เดือน 5. 5,001 - 10,000 บาท/เดือน
   3. 1,501 - 3,000 บาท/เดือน 6. มากกว่า 10,000 บาท/เดือน

9. รายได้รวมของทุกคนในครอบครัวของท่าน (ครอบครัวที่ผู้สูงอายุอาศัยอยู่) (23)
   1. ต่ำกว่า 1,500 บาท/เดือน 5. 10,001 - 15,000 บาท/เดือน
   2. 1,501 - 3,000 บาท/เดือน 6. 15,001 -30,000 บาท/เดือน
   3. 3,001 - 5,000 บาท/เดือน 7. มากกว่า 30,000 บาท/เดือน
   4. 5,001 - 10,000 บาท/เดือน

10. จำนวนผู้มีรายได้ในบ้าน ..... คน (24-25)

11. จำนวนสมาชิกที่อาศัยอยู่ในบ้านทุกคน ..... คน (26-27)

12. ท่านมีสิทธิหรือมีบัตรยกเว้นค่ารักษาพยาบาลหรือไม่ (28-29)
ถ้ามีเป็นสิทธิหรือบัตรอะไร

0	ไม่มี	6	ผู้ใหญ่บ้าน/กำนัน/อส ฯลฯ
1	บัตรสุขภาพบุคคล	7	สวัสดิการบริษัทเอกชน
2	บัตรสุขภาพครอบครัว	8	บัตร/สิทธิผู้สูงอายุ
3	บัตร สปน	9	บัตรสุขภาพกับบัตร สปน
4	สิทธิข้าราชการ	10	บัตรสุขภาพและสิทธิยกเว้นอื่น ๆ
5	อสม/ผสส	11	อื่น ๆ ระบุ .....

ส่วนที่ 2 : ข้อมูลสุขภาพทั่วไป

ตอนที่ 1 สุขภาพร่างกายทั่วไป

G1. ส่วนสูง (ซ.ม.) (30-32)

G2. น้ำหนัก (กก.) (33-35)

G3. โดยทั่วไปแล้ว ท่านคิดว่าสุขภาพร่างกายของท่านเป็นอย่างไร (36)

1.แข็งแรงดีมาก 3. พอใช้

2. ดี 4.สุขภาพไม่ดี 5.ไม่แน่ใจ

G4. ในช่วง 6 เดือนที่ผ่านมา (37)
ท่านเคยมีปัญหาเกี่ยวกับน้ำหนักลดหรือเพิ่มอย่างผิดปกติหรือไม่

1 มีปัญหา 2 ไม่มีปัญหา

ถ้าตอบว่า มีปัญหา (รหัส 1) ให้ถามต่อข้อ G5
ถ้าตอบว่า ไม่มีปัญหา (รหัส 2) ให้ถามต่อข้อ G6

G5. น้ำหนักที่ลดหรือเพิ่มประมาณกี่กิโลกรัม (38-39)

G6. ปัจจุบันนี้ท่านไปพบแพทย์เพื่อรับการรักษาอาการอย่างใดอย่างหนึ่งหรือไม่ (40)
(ไม่ได้พบแพทย์ 1, ไปพบแพทย์ 2, ไม่ทราบ 9)

ถ้าตอบไปพบแพทย์ (รหัส 2) ถามต่อ G7
ถ้าตอบข้ออื่น ถามต่อ G10

G7. ท่านไปพบแพทย์แผนปัจจุบันหรือแพทย์แผนโบราณ (41)
(แพทย์แผนปัจจุบัน 1, แพทย์แผนโบราณ 2)

G8. สาเหตุที่ท่านไปพบแพทย์_____ (42-47)

G9. ท่านไปพบแพทย์เพื่อทำการรักษาครั้งสุดท้ายประมาณเมื่อไร (48)

1.ในช่วง 1 เดือนที่ผ่านมา 3. ในช่วง 1 ปีที่ผ่านมา

2. ในช่วง 6 เดือนที่ผ่านมา 4. มากกว่า 1 ปีที่ผ่านมา

5. ไม่เคยไปพบแพทย์

G10. ต่อไปนี้ขอถามเกี่ยวกับปัญหาด้านสุขภาพในช่วง 6 เดือนที่ผ่านมา

	G10.1 ท่านมีปัญหาสุขภาพเหล่านี้หรือไม่		G10.2 มีปัญหามากน้อยเพียงใด	G10.3 ผลกระทบต่อกิจวัตรประจำวัน	G10.4 จำเป็นต้องไปพบแพทย์เพื่อรักษาหรือไม่		G10.5 เคยไปนอนรักษาตัวใน ร.พ. หรือไม่	
	ใช่	ไม่ใช่	ความถี่ของการมีปัญหา(ใส่รหัส)	(ใส่รหัส)	ใช่	ไม่ใช่	เคย	ไม่เคย
ปวดทั่วไป(ปวดเมื่อยบริเวณใดบริเวณหนึ่งในร่างกาย) (49-53)	1	2			1	2	1	2
โรคเกี่ยวกับระบบประสาท (54-58)	1	2			1	2	1	2
โรคกระดูกและข้อ (59-63)	1	2			1	2	1	2
โรคเกี่ยวกับระบบเลือด (64-68) - โรคหัวใจ -ความดันโลหิต	1	2			1	2	1	2
โรคกระเพาะอาหาร ลำไส้ นิ่ว (69-73)	1	2			1	2	1	2
โรคเกี่ยวกับระบบฮอร์โมน (74-78) - เบาหวาน - ไทรอยด์	1	2			1	2	1	2
โรคเกี่ยวกับเนื้องอก, มะเร็ง (79-83)	1	2			1	2	1	2

G11. ในขณะนี้ท่านกำลังรับประทานยาชนิดใดชนิดหนึ่ง (84)
ไม่ว่าจะเป็นยาที่ซื้อมากินเองหรือแพทย์สั่งเป็นประจำบ้างหรือไม่

1 กินยาชนิดใดชนิดหนึ่ง(ถามต่อข้อ G12)

2 ไม่ได้กินยา

3 ตอบไม่ได้

G12. กรุณาระบุชื่อยาที่ท่านรับประทาน (85-98)

1 = ใช่ 0 = ไม่ใช่

1. ยาลดน้ำตาลในเลือด (Antihyperglycemic drugs)
2. ยาแก้อาการเต้นของหัวใจที่ผิดปกติ (antiarrhythmic drugs) ได้แก่ quinidine, propranolol (Inderal)
3 ยาขยายหลอดเลือดเลี้ยงหัวใจ (coronary vasodilators) ได้แก่ isosorbide dinitrate (Isordil),
4. ยาป้องกันการแข็งตัวของโลหิต ได้แก่ warfarin (coumadin)
5 ยากล่อมประสาท สงบประสาท (tranquilizers, psychosedative) ได้แก่ meprobamate (Equanil), diazepam (Valium), chlorpromazine (Thorazine), trifluoperazine (Stelazine)
5. ยารักษาโรค thyroid แบ่งได้เป็น
ยารักษาโรค hypothyroidism และ myxedema ได้แก่ thyroid extract, eltroxin, levothyroxin (synthroid), liothyronine (Cytomel)
7. ยารักษาโรค hyperthyroidism และ thyrotoxicosis ได้แก่ propylthiouracil, methimazole (tapazole), carbimazole (neo-mercazole)
8. ยา steroid hormone ได้แก่ prenisolone, hydrocortisone (Solu-Cortef), dexamethasone (Decadron)
9. ยาลดความดันโลหิตสูง (antihypertensive drug) ได้แก่ hydrochloro-thiazide (Dichlortich), methyldopa (Aldomet), reserpine (Serpasil), guanethidine (Ismelin)
10. ยารักษาโรคกระเพาะ ลำไส้
11. ยาจีน ยาสมุนไพร (Traditional medicine)
12 ยาแก้ปวด แก้ไข้ เช่น paracetamol
13.ยาแก้แพ้
14. ยาอื่นๆ ระบุ.....

G13. ท่านให้ความสำคัญสำหรับอาการเหล่านี้ตามลำดับ (99-103)

ปวดหัว ปวดเมื่อย ปวดข้อ ปวดกระดูก
เหนื่อยหอบ หัวใจเต้นผิดปกติ ปวดท้อง กระเพาะ ปวดฟัน

G14. ถ้าท่านมีอาการต่างๆเหล่านี้ (104-108)

ท่านจะรักษาอาการอะไรก่อนหลัง(ให้ความสำคัญตามลำดับ)

ปวดหัว ปวดเมื่อย ปวดข้อ ปวดกระดูก
เหนื่อยหอบ หัวใจเต้นผิดปกติ ปวดท้อง กระเพาะ ปวดฟัน

ตอนที่ 2 นิสัยในการสูบบุหรี่

S.1. ปัจจุบันท่านสูบบุหรี่หรือไม่ (109)

1. สูบ (ถามต่อข้อ S.2)
2. ไม่สูบ (ถามต่อตอนที่ 3)
3. เคยสูบ แต่เลิกแล้ว (ถามต่อตอนที่ 3)

S.2. ท่านสูบบุหรี่มวนแบบซอง หรือบุหรี่ชนิดมวนยาสูบเอง (110)

1. แบบมวนซอง 2. ชนิดมวนสูบเอง

S.3. ท่านสูบบุหรี่ (111)

1. เป็นประจำอย่างน้อยวันละ 1 มวน (ถามต่อข้อ S4)
2. สูบไม่สม่ำเสมอ
3. นานๆ จะสูบบุหรี่ครั้งหนึ่ง

S.4. ในแต่ละวัน ท่านสูบบุหรี่โดยเฉลี่ย.....ม้วน/วัน (112-3)

ตอนที่ 3 การประเมินความสามารถในการเคลื่อนไหว

M.1. จากการสังเกตการเคลื่อนไหวของผู้สูงอายุ (114)

1.ผู้สูงอายุสามารถเดินได้ด้วยตนเอง (แม้จะต้องอาศัยเครื่องมือช่วยเดิน)
2. ผู้สูงอายุไม่สามารถเดินได้เอง

M.2. ท่านสามารถเดินได้เองหรือไม่ (115)

1. เดินได้ (ถามต่อข้อ M4)
2. เดินไม่ได้
3. เดินได้แต่จำเป็นต้องใช้เครื่องมือ เช่น ไม้เท้า หรือรถเข็น ช่วยในการเดิน(ถามต่อข้อ M3)

M3. อุปกรณ์หรือเครื่องมือที่ช่วยในการเดินคือ (116)

1. ไม้เท้า 3. รถเข็น
2. ไม้ค้ำหรือเครื่องมือช่วยเดินอื่นๆ 4. อื่นๆ ระบุ.....

M4. ข้อต่อไป จะถามเกี่ยวกับจำนวนความถี่ของกิจวัตรประจำวันที่ท่านสามารถทำได้

กิจกรรม	ความถี่				
	วันละหลายๆ ครั้ง	วันละครั้ง	อาทิตย์ละหลายๆ ครั้ง	น้อยกว่าอาทิตย์ละครั้ง	ทำไม่ได้เลย
เดินขึ้นลงบันได (117)	1	2	3	4	5
เดินหรือเคลื่อนไหวไปมาในบ้าน (118)	1	2	3	4	5
ถือหรือยกของเอง เช่น ถือของเองเวลาไปจ่ายตลาด เคลื่อนย้ายเฟอร์นิเจอร์ในบ้าน (119)	1	2	3	4	5

M5. ท่านสามารถทำงานบ้านชนิดเบาๆ เช่น ปัดกวาด เช็ด ถูบ้าน รีดผ้า ได้หรือไม่ (120)

1. ทำได้ (ถามข้อ M6) 2. ทำไม่ได้ (ถามข้อ M7)

M6. กรณีที่ทำได้ ท่านทำงานบ้านเหล่านี้บ่อยเพียงใด (121)

1. วันละหลาย ๆ ครั้ง
2. วันละครั้ง
3. อาทิตย์ละ 5-6 ครั้ง
4. อาทิตย์ละ 3-4 ครั้ง
5. ประมาณอาทิตย์ละครั้งหรือสองครั้ง
6. ประมาณอาทิตย์ละครั้ง
7. ประมาณสองอาทิตย์ครั้งหนึ่ง
8. ประมาณเดือนละครั้ง
9. ทำน้อยมาก

M7. ท่านสามารถทำงานบ้านที่ต้องออกแรงมาก ๆ อาทิเช่น ซักผ้าด้วยมือ ขัดถูพื้น ตัดหญ้า ได้หรือไม่ (122)

1. ทำได้ (ถามข้อ M8)
2. ทำไม่ได้ (ถามต่อตอนที่ 4)

M8. กรณีที่ทำได้ ท่านทำงานเหล่านี้บ่อยเพียงใด (123)

1. วันละหลาย ๆ ครั้ง
2. วันละครั้ง
3. อาทิตย์ละ 5-6 ครั้ง
4. อาทิตย์ละ 3-4 ครั้ง
5. ประมาณอาทิตย์ละครั้งหรือสองครั้ง
6. ประมาณอาทิตย์ละครั้ง
7. ประมาณสองอาทิตย์ครั้งหนึ่ง
8. ประมาณเดือนละครั้ง
9. ทำน้อยมาก

ตอนที่ 4. การประเมินความจำ

คำถามต่อไปนี้ จะเกี่ยวกับเรื่องทั่ว ๆ ไป รหัสคำตอบ 1 = ตอบได้ถูกต้อง 2 = ตอบผิด

1. ท่านทราบหรือไม่ว่า ปีนี้เป็นปี พ.ศ. อะไร (2538) (124)

2. ท่านทราบหรือไม่ว่า เดือนนี้เป็นเดือนอะไร (125)
   * ต่อไปนี้ขอให้ท่านพูดตามผู้สัมภาษณ์ "นายบรรหาร บ้านเลขที่ 10 ถนนตก สุพรรณบุรี"

3. ท่านทราบหรือไม่ ตอนนี้เวลาประมาณกี่โมง (หรือเวลาเช้า/สาย/บ่าย/เย็น) (126)

4. ขอให้ท่านนับเลขย้อนหลังจาก 20 ถึง 1 (127)
   1. ไม่ผิดเลย
   2. ผิด 1 แห่งเท่านั้น
   3. ผิด 2 ครั้งหรือมากกว่า

5. ขอให้ท่านบอกชื่อเดือนย้อนหลัง ตั้งแต่เดือนธันวาคม (128)
   1. ไม่ผิดเลย
   2. ผิด 1 แห่งเท่านั้น
   3. ผิด 2 ครั้งหรือมากกว่า

6. ขอให้ท่านทวนประโยคที่ให้จำ ในตอนแรก (129)

7. การประเมินความจำโดยรวม (130)
   1. ความจำปกติ
   2. มีปัญหาด้านความจำ

ส่วนที่ 3 : ข้อมูลทันตสุขภาพ

ก. สภาพช่องปากโดยทั่วไป (131)

ผู้สูงอายุมี 1. ฟันธรรมชาติเหลืออยู่

2. ไม่มีฟันธรรมชาติเหลืออยู่เลย

ข. ฟันปลอม (132)

ผู้สูงอายุมี 1. ฟันปลอมชนิดใดชนิดหนึ่ง (ถามต่อข้อ ค)

2. ไม่มีฟันปลอมเลย (ถามต่อข้อ จ)

ค. ฟันปลอมทั้งปาก (133)

ผู้สูงอายุมี 1. ฟันปลอมทั้งปากบนและปากล่าง

2. ฟันปลอมเฉพาะฟันบน

3. ฟันปลอมเฉพาะฟันล่าง

ง. ฟันปลอมบางส่วน (134)

ผู้สูงอายุมี 1. ฟันปลอมบางส่วน ในฟันบนและฟันล่าง

2. ฟันปลอมบางส่วน เฉพาะฟันบน

3. ฟันปลอมบางส่วน เฉพาะฟันล่าง

4. ไม่ได้ใส่ฟันปลอมบางส่วน

จ. ตรวจสอบคำถามข้อ ก. และ ข. และตอบคำถามต่อไปนี้

1. มีฟันธรรมชาติและฟันปลอม (ถามข้อ 1a)
   (รหัส 1 ในข้อ ก และ ข)
2. มีฟันธรรมชาติเท่านั้น (ถามข้อ 1b)
   (รหัส 1 ในข้อ ก และรหัส 2 ในข้อ ข)
3. มีเฉพาะฟันปลอม (ถามข้อ 1c)
   (รหัส 2 ในข้อ ก และรหัส 1 ในข้อ ข)
4. ไม่มีฟันธรรมชาติ และ ไม่มีฟันปลอม (ถามข้อ 5a หน้า 9)
   (รหัส 2 ในข้อ ก และ ข้อ ข)

ส่วนที่ 4 ปัจจัยทางจิตสังคมและผลกระทบของสุขภาพช่องปากต่อการดำเนินชีวิตประจำวัน

ตอนที่ 1 : ด้านจิตวิทยา

ความพึงพอใจในฟันธรรมชาติ/ฟันปลอม

คำถามต่อไปนี้จะเกี่ยวข้องกับความพึงพอใจโดยทั่วไปของท่าน ที่มีต่อฟันธรรมชาติหรือฟันปลอมของท่าน

1. ท่านมีความพึงพอใจต่อฟันธรรมชาติหรือฟันปลอมของท่านในด้านขนาด รูปร่าง สี ความสวยงามมากน้อยเพียงใด

   1. พึงพอใจมาก 3. ไม่ค่อยชอบเท่าไร 9. ตอบไม่ได้
   2. พึงพอใจพอประมาณ 4. ไม่ค่อยชอบเลย

   1.a กรณีที่มีฟันธรรมชาติและฟันปลอม (รหัส 1 ในข้อ จ) (135)

   1.b ในคนที่มีเฉพาะฟันธรรมชาติ (รหัส 2 ในข้อ จ) (136)

   1.c ในคนที่มีเฉพาะฟันปลอม (รหัส 3 ในข้อ จ) (137)

2. ท่านมีความพึงพอใจต่อฟันธรรมชาติหรือฟันปลอมของท่าน ในด้านความสบาย (ไม่มีปัญหา) มากน้อยเพียงใด

   1. พึงพอใจมาก 3. ไม่ค่อยชอบเท่าไร 9. ตอบไม่ได้
   2. พึงพอใจพอประมาณ 4. ไม่ค่อยชอบเลย

   2.a ผู้ที่ใส่ฟันปลอมทั้งปาก (รหัส 3 ในข้อ จ) (ถามต่อข้อ 3) (138)

   2.b ผู้ที่ใส่ฟันปลอมบางส่วน (รหัส 1 ในข้อ จ) (ถามต่อข้อ 4) (139)

   2.c ผู้ที่มีฟันธรรมชาติ (รหัส 2 ในข้อ จ) (ถามต่อข้อ 5) (140)

3. ถามเฉพาะผู้ที่ใส่ฟันปลอมทั้งปาก (รหัส 3 ในข้อ จ) (141)
   ท่านเคยรู้สึกอับอายจากการใส่ฟันปลอมทั้งปากบ้างหรือไม่(เช่น ฟันปลอมหลุด พูดไม่ชัด ฯลฯ)

   1. เคย 2. ไม่เคย 9. ตอบไม่ได้

4. ถามในผู้ที่มีฟันหรือผู้ที่ใส่ฟันปลอม (รหัส 1-3 ข้อ จ) (142)

   4.aคนบางคนที่ไม่ค่อยพึงพอใจในฟันธรรมชาติหรือฟันปลอม มักจะหลีกเลี่ยงที่จะยิ้มให้เห็นฟัน เวลาท่านยิ้มหรือหัวเราะ ท่านเคยหลีกเลี่ยงที่จะให้เห็นฟันของท่านบ้างหรือไม่

   1. เคย (ถามต่อข้อ 4b) 2. ไม่เคย

   4.b ท่านหลีกเลี่ยงการยิ้มให้เห็นฟันบ่อยแค่ไหน (143)

   1. บ่อยมาก 3. ไม่ค่อยบ่อยเท่าไร
   2. บ่อยพอสมควร 4. นาน ๆ จะทำครั้งหนึ่ง 5. ไม่เคยเลย

5. **ข้อนี้ถามทุกคน** (144)

   5.a ท่านเคยมีปัญหาเนื่องจากการมีกลิ่นปากในช่วง 6 เดือน ที่ผ่านมาหรือไม่

1. เคย(ถามต่อข้อ 5b และ 5c) 2. ไม่เคย (ถามต่อตอนที่ 2)
9. ตอบไม่ได้ (ถามต่อตอนที่ 2)

5.b กรณีที่ตอบว่า "เคย" ในช่วง 6 เดือนที่ผ่านมา การมีกลิ่นปาก ทำให้ท่าน (145)
1. เกิดความไม่สบายใจ ไม่มั่นใจที่จะพูดคุยกับผู้อื่นอย่างมาก
2. เกิดความไม่สบายใจ ไม่มั่นใจที่จะพูดคุยกับผู้อื่นพอสมควร
3. เกิดความไม่สบายใจ ไม่มั่นใจที่จะพูดคุยกับผู้อื่นเล็กน้อย

5.c ท่านคิดว่าการมีกลิ่นปาก เกิดจากปัญหาในช่องปากของท่าน (146)
1. ใช่ 2. ไม่ใช่

สำหรับผู้ที่ใส่ฟันปลอมทั้งปาก (รหัส 1-3 ในข้อ ค) ถามต่อตอนที่ 2 ข้อ 1-5
สำหรับผู้ที่ใส่ฟันปลอมบางส่วน (รหัส 1-3 ในข้อ ง) ถามต่อตอนที่ 2 ข้อ 6-8
สำหรับผู้ที่มีรหัส 1-4 ในข้อ จ ถามต่อตอนที่ 2 ข้อ 9-10

ตอนที่ 2 : ด้าน Physical

คำถามข้อ 1 ถามเฉพาะผู้ที่ใส่<u>ฟันปลอมทั้งปาก</u> (รหัส 1-3 ในข้อ ค ในหน้า 7)

1. ในคนที่ใส่ฟันปลอมทั้งปาก อาจก่อให้เกิดการเปลี่ยนแปลงบางอย่างได้
อยากทราบว่าท่านเคยมีประสบการณ์เหล่านี้บ้างหรือไม่

1.a เมื่อท่านใส่ฟันปลอมทั้งปาก ท่านรู้สึกเหมือนท่านอมอะไรไว้เต็มปาก (147)
1. เคยรู้สึก 2. ไม่เคยรู้สึก 9. ตอบไม่ได้

1.b เมื่อท่านใส่ฟันปลอมทั้งปาก ท่านกินอาหารช้าลงกว่าปกติ
หรือชากว่าช่วงก่อนใส่ฟันปลอม (148)
1. ใช่ 2. ไม่ใช่ 9. ตอบไม่ได้

1.c เมื่อท่านใส่ฟันปลอมทั้งปาก การรับรสอาหารเปลี่ยนไป (149)
1. ใช่ 2. ไม่ใช่ 9. ตอบไม่ได้

1.d เมื่อท่านใส่ฟันปลอมทั้งปาก วิธีการพูด การออกเสียง เปลี่ยนไป (150)
1. ใช่ 2. ไม่ใช่ 9. ตอบไม่ได้

2. ตรวจสอบคำถามข้อ ค ในหน้า 9 และบันทึก (151)
1. ผู้สูงอายุใส่ฟันปลอมทั้งปากบนและล่าง (รหัส 1) ถามต่อข้อ 3
2. ผู้สูงอายุใส่ฟันปลอมเฉพาะฟันบน (รหัส 2) ถามต่อข้อ 3
3. ผู้สูงอายุใส่ฟันปลอมเฉพาะฟันล่าง (รหัส 3) ถามต่อข้อ 4

3. ในผู้ที่ใส่ฟันปลอมทั้งปากหรือใส่เฉพาะฟันบน (รหัส 1-2 ในข้อ 2)

3.a เวลาที่ท่านพูด ฟันปลอมบนเคยหลุดลงมาหรือไม่ (152)
1. เคย 2. ไม่เคย 9. ตอบไม่ได้

3.b เวลาที่ท่านอ้าปาก ฟันปลอมบนเคยหลุดลงมาหรือไม่ (153)
1. เคย 2. ไม่เคย 9. ตอบไม่ได้

4. ตรวจสอบคำถามข้อ ค ในหน้า 7 แล้วบันทึก (154)
1. ผู้สูงอายุใส่ฟันปลอมทั้งปากบนและล่าง
(รหัส 1) ถามข้อ 5 ในช่องฟันปลอมบนและล่าง
2. ผู้สูงอายุใส่ฟันปลอมเฉพาะฟันบน
(รหัส 2) ถามข้อ 5 เฉพาะช่องฟันปลอมบน
3. ผู้สูงอายุใส่ฟันปลอมเฉพาะฟันล่าง

(รหัส 3) ถามข้อ 5 เฉพาะช่องฟันปลอมล่าง

4. ผู้สูงอายุไม่ได้ใส่ฟันปลอมทั้งปาก (รหัส 4) ถามข้อ 6

5. คำถามในข้อต่อไปนี้ จะเกี่ยวข้องกับ**ฟันปลอมทั้งปาก**
ถามคำถามสำหรับฟันปลอมบนและฟันปลอมล่างแยกกัน

	ฟันปลอมบน	ฟันปลอมล่าง
5.aท่านใส่ฟันปลอม(บน/ล่าง)มานานประมาณกี่ปีแล้ว	ปี	ปี
ตอบไม่ได้	99	99
5.bฟันซี่สุดท้ายของท่านถูกถอนไปประมาณกี่ปีมาแล้ว	ปี	ปี
ยังมีฟันเหลืออยู่	88	88
ตอบไม่ได้	99	99
5.c โดยทั่วไปแล้ว ท่านใส่ฟันปลอม (บน/ล่าง) เวลานอนด้วย		
ใช่	1	1
ไม่ใช่	2	2
5.d นอกจากจะใส่ฟันปลอมเวลานอนแล้ว ท่านยังใส่ฟันปลอม(บน/ล่าง)		
ตลอดเวลา	1 (ถามต่อคำถามเกี่ยวกับฟันปลอมล่าง)	1 ถามต่อข้อ 9
ใส่เป็นบางเวลา	2 ถามข้อ e - f	2 ถามข้อ e - f
กรณีที่ใส่ฟันปลอมเป็นบางเวลาเท่านั้น		
5.eท่านมักจะใส่ฟันปลอมเฉพาะเมื่อออกนอกบ้านหรือเพื่อเข้าสังคม		
ใช่	1	1
ไม่ใช่	2	2
5.f โดยทั่วไป ท่านมักใส่ฟันปลอม (บน/ล่าง) เวลากินข้าว		
ใช่	1	1
ไม่ใช่	2	2
	ถามคำถามเกี่ยวกับฟันปลอมล่าง (155-162)	ถามต่อข้อ 9 (163-170)

สำหรับผู้ที่<u>ใส่ฟันปลอมบางส่วน ชนิดถอดได้ทุกชนิด</u>

6. ตรวจสอบคำถามข้อ ง ในหน้า 7 แล้วบันทึก (171)

1. ผู้สูงอายุใส่ฟันปลอมบางส่วน ทั้งบนและล่าง
(รหัส 1) ถามคำถามข้อ 7 ในฟันบนและล่าง
2. ผู้สูงอายุใส่ฟันปลอมบางส่วน เฉพาะฟันบน
(รหัส 2) ถามคำถามข้อ 7 เฉพาะฟันบน
3. ผู้สูงอายุใส่ฟันปลอมบางส่วน เฉพาะฟันล่าง
(รหัส 3) ถามคำถามข้อ 7 เฉพาะฟันล่าง

4. ผู้สูงอายุไม่ได้ใส่ฟันปลอมบางส่วน (รหัส 4) ถามคำถามข้อ 8

7. ต่อไปนี้จะเป็นคำถามเกี่ยวกับ**ฟันปลอมบางส่วนชนิดถอดได้**
ถามคำถามแยกกันสำหรับฟันปลอมบนและฟันปลอมล่าง

	ฟันปลอมบน	ฟันปลอมล่าง
5.a ท่านใส่ฟันปลอม (บน/ล่าง) มานานประมาณกี่ปีแล้ว	ปี	ปี
ตอบไม่ได้	99	99
5.b โดยทั่วไปแล้ว ท่านใส่ฟันปลอม(บน/ล่าง) เวลานอนด้วย		
ใช่	1	1
ไม่ใช่	2	2
5.c นอกจากจะใส่ฟันปลอมเวลานอนแล้ว ท่านยังใส่ฟันปลอม (บน/ล่าง)		
ตลอดเวลา	1 (ถามต่อคำถามเกี่ยวกับฟันปลอมล่าง)	1 ถามต่อข้อ 8
ใส่เป็นบางเวลา	2 ถามข้อ d - e	2 ถามข้อ d - e
กรณีที่ใส่ฟันปลอมเป็นบางเวลาเท่านั้น 5.dท่านมักจะใส่ฟันปลอมเฉพาะเมื่อออกนอกบ้านหรือเพื่อเข้าสังคม		
ใช่	1	1
ไม่ใช่	2	2
5.e โดยทั่วไป ท่านมักใส่ฟันปลอม (บน/ล่าง) เวลากินข้าว		
ใช่	1	1
ไม่ใช่	2	2
	ถามคำถามเกี่ยวกับฟันปลอมล่าง (172-177)	ถามต่อข้อ 8 (178-183)

8.คนบางคนมีเหตุผลในการใส่ฟันปลอมต่างกัน (184)
เหตุผลข้อใดตรงกับเหตุผลในการใส่ฟันปลอมของท่าน

8.a) ท่านใส่ฟันปลอมเพื่อความสวยงาม
1. ใช่ 2. ไม่ใช่

8.b) ท่านใส่ฟันปลอมเพื่อช่วยในการเคี้ยวอาหาร (185)
1. ใช่ 2. ไม่ใช่

8.c) ท่านใส่ฟันปลอมเพราะทันตแพทย์แนะนำให้ใส่ (186)
1. ใช่ 2. ไม่ใช่

8.d) ท่านใส่ฟันปลอมชนิดถอดได้ เพราะราคาไม่แพง (187)
1. ใช่ 2. ไม่ใช่

8.e) ท่านใส่ฟันปลอมชนิดถอดได้ (188)
เพราะไม่เคยมีใครแนะนำการใส่ฟันปลอมชนิดอื่นให้
1. ใช่ 2. ไม่ใช่

คำถามข้อ 9 ให้ถาม<u>ผู้สูงอายุทุกคน</u>

9.ต่อไปจะขอถามเกี่ยวกับปัญหาของท่านในการกินอาหารชนิดต่าง ๆ
โดยจะถามแยกเกี่ยวกับการกัด การเคี้ยว และการกลืน

9.a) โดยทั่วไปแล้ว ท่านมีปัญหาในการใช้ฟันกัดอาหารมากน้อยเพียงใด (189)

1. ไม่มีปัญหาเลย
2. มีปัญหาบ้างเล็กน้อย
3. มีปัญหาพอสมควร
4. มีปัญหามาก

9.b) โดยทั่วไปแล้ว ท่านมีปัญหาในการเคี้ยวอาหารเพียงใด (190)

1. ไม่มีปัญหาเลย
2. มีปัญหาบ้างเล็กน้อย
3. มีปัญหาพอสมควร
4. มีปัญหามาก

9.c) โดยทั่วไปแล้ว ท่านมีปัญหาในการกลืนอาหารเพียงใด (191)

1. ไม่มีปัญหาเลย
2. มีปัญหาบ้างเล็กน้อย
3. มีปัญหาพอสมควร
4. มีปัญหามาก

คำถามข้อ 10 ให้ถาม<u>ผู้สูงอายุทุกคน</u>

10. ในข้อต่อไปจะขอถามท่านเกี่ยวกับอาหารชนิดต่าง ๆ ขอความกรุณาท่านบอกว่า (192-207)
ท่านสามารถกินอาหารชนิดนั้น ๆ ได้อย่างสบาย ๆ
หรือกินได้แต่มีปัญหาเล็กน้อย เช่น เคี้ยวลำบาก หรือกินไม่ได้เลย

	กินได้สบาย	กินได้แต่มีปัญหาเล็กน้อย	กินไม่ได้เลย
ข้าวสวย	1	2	3
ข้าวเหนียว	1	2	3
ก๋วยเตี๋ยว บะหมี่ ขนมจีน	1	2	3
แคบหมู	1	2	3
ไข่เจียว	1	2	3
ลาบดิบ, สุก	1	2	3
ผัดผัก	1	2	3
ผักต้ม นึ่ง	1	2	3
ผักสด	1	2	3
เนื้อวัวทอด/ผัด	1	2	3
ไก่หมูปิ้งทอด/ผัด	1	2	3
ปลาทอด	1	2	3
ส้มเขียวหวาน	1	2	3
ถั่วต่าง ๆ	1	2	3
ฝรั่ง พุทรา	1	2	3
กล้วยทอด	1	2	3

ตอนที่ 3 ผลกระทบของสุขภาพช่องปากต่อการดำเนินชีวิตประจำวัน

คำถามช่วงต่อไปนี้ ถาม<u>ผู้สูงอายุทุกคน</u>

สำหรับคำถามช่วงต่อไปนี้ อยากทราบว่า ปาก ฟัน ฟันปลอมของท่าน
มีผลกระทบต่อการดำเนินชีวิตประจำวันของท่านในช่วง 6 เดือนที่ผ่านมาอย่างไรบ้าง
โดยอยากรู้ว่าปัญหาเกี่ยวกับปาก ฟัน หรือฟันปลอม ทำให้ท่านไม่สามารถทำกิจกรรมต่าง ๆ บ่อยครั้งเพียงใด
หรือท่านรู้สึกว่าปัญหาที่เกิดขึ้นนั้นรุนแรงเพียงใด

1 a) ต่อไปนี้จะขอถามเกี่ยวกับกิจวัตรประจำวัน
ในช่วง 6 เดือนที่ผ่านมา ปัญหาเกี่ยวกับปาก ฟัน หรือฟันปลอม
ก่อให้เกิดปัญหาแก่ท่านในกิจกรรมต่าง ๆ ต่อไปนี้หรือไม่
(ผู้สัมภาษณ์อ่านกิจกรรมในแต่ละข้อ และเลือกคำตอบ “มี” หรือ “ไม่มี”)

1 b) กรณีที่ตอบว่า “มี” ในข้อ a

ปัญหาที่เกิดขึ้นนั้น เกิดเป็นประจำตลอดระยะเวลา 6 เดือน หรือเกิดขึ้นเป็นบางเวลาเท่านั้น
(หากตอบว่า "เกิดเป็นประจำ" ถามต่อข้อ C หากตอบว่า "เกิดบางเวลา" ถามต่อข้อ d)

1 c) กรณีที่ตอบว่า "เกิดเป็นประจำ"
ในช่วง 6 เดือนที่ผ่านมา ปาก ฟัน ฟันปลอม ที่ก่อให้เกิดปัญหาในการดำเนินกิจวัตรประจำวันนั้น เกิดขึ้น

	คำตอบ
ทุวันหรือเกือบทุกวัน	5
เกิดประมาณ อาทิตย์ละ 3-4 ครั้ง	4
เกิดประมาณ อาทิตย์ละ 1-2 ครั้ง	3
เกิดประมาณ เดือนละ 1-2 ครั้ง	2
เกิดน้อยกว่าเดือนละ 1 ครั้ง	1
ตอบไม่ได้	9

1 d) กรณีที่ตอบว่า "เกิดบางเวลา"
ในช่วง 6 เดือนที่ผ่านมา ปาก ฟัน ฟันปลอม ที่ก่อให้เกิดปัญหาในการดำเนินกิจวัตรประจำวันนั้น เกิดขึ้น

	คำตอบ
เกิดโดยรวมมากกว่า 3 เดือน	5
เกิดโดยรวมมากกว่า 2 เดือน แต่ไม่เกิน 3 เดือน	4
เกิดโดยรวมมากกว่า 1 เดือน แต่ไม่เกิน 2 เดือน	3
เกิดโดยรวมมากกว่า 5 วัน แต่ไม่เกิน 1 เดือน	2
เกิดน้อยกว่า 5 วัน	1
ตอบไม่ได้	9

1 e) หากให้คะแนนจาก 0 ถึง 5 โดยที่ 0 หมายถึงไม่เกิดผลกระทบอะไรเลย และ 5 หมายถึงเกิดผลกระทบอย่างมาก อยากทราบว่าปัญหาจากปาก ฟัน หรือฟันปลอม ที่มีผลกระทบต่อการดำเนินชีวิตประจำวันนั้น เกิดผลกระทบต่อชีวิตประจำวันของท่านมากน้อยเพียงใด

คำตอบ

ไม่มีผลกระทบเลย	0
มีผลกระทบน้อยมาก	1
มีผลกระทบเล็กน้อย	2
มีผลกระทบพอสมควร	3
มีผลกระทบมากพอสมควร	4
มีผลกระทบมากเหลือเกิน	5
ตอบไม่ได้	9

1 f) สาเหตุสำคัญจากปาก ฟัน หรือฟันปลอมที่ทำให้เกิดผลกระทบต่อกิจกวัตรประจำวันนั้น เกิดจากอะไร

	คำตอบ
ความเจ็บปวด	1
ความไม่สบาย	2
เกิดข้อจำกัดในการใช้งาน (การเคี้ยว, การกัด, อ้าปาก)	3
เกิดความไม่พึงพอใจต่อด้านความสวยงาม	4
เหตุผลอื่นๆ	5
ตอบไม่ได้	9

1 g) กรุณาระบุสาเหตุในช่องปากที่ก่อให้เกิดปัญหาในข้อข้างต้นแก่ท่าน

	คำตอบ
ปัญหาจากฟัน	
ปวดฟัน	01
การสูญเสียฟัน	02
ฟันโยก	03
สีของฟัน	04
ตำแหน่งของฟัน	05
ขนาดและรูปร่างของฟัน	06
ฟันเก	07
จากปาก	
ความผิดปกติของรูปร่างช่องปากหรือใบหน้า	08
มีแผลในปาก (ที่ไม่ได้เกิดจากฟันปลอม)	09
อาการปวดแสบปวดร้อนในปาก	10
กลิ่นปาก	11
การรับรสเปลี่ยนไป	12
การรับรสผิดปกติ	13
ปากแห้ง	14
จากเหงือก	
เลือกออกจากเหงือก	15
เหงือกร่น	16
เหงือกบวม	17
จากขากรรไกร	
เกิดเสียงดังลั่นเวลาอ้าปาก	18
ปวดข้อต่อขากรรไกร	19
อ้าปากลำบาก	20
จากฟันปลอม	
ฟันปลอมหลวม	21
สี รูปร่าง ขนาดของฟันปลอม	22
แผลจากฟันปลอม	23
สาเหตุอื่น ๆ (โปรดระบุ)	24
ไม่สามารถบอกสาเหตุแน่นอนได้	25
การใส่ฟันปลอม	26

กิจกรรม	a) มีปัญหาหรือไม่		b) ปัญหาเกิดอย่างไร		c) กรณีเกิดเป็นประจำ	d) กรณีเกิดบางเวลา	e) ผลกระทบต่อชีวิตประจำวัน	f) ปัญหาเกิดจาก	g) สาเหตุในช่องปาก	
	มี 1	ไม่มี 2	เกิดเป็นประจำ 1.....c	เกิดบางเวลา 2.....d	บ่อยเพียงใด (ใส่รหัส)	เกิดโดยรวมประมาณเท่าร (ใส่รหัส)	(ใส่รหัส)	(ใส่รหัส)	(ใส่รหัส)	
1.การกินอาหาร										208-215
2.การพูดหรือการออกเสียงให้ชัดเจน										216-223
3.การทำความสะอาดช่องปากหรือฟันปลอม										224-231
4.การดำเนินชีวิตทั่วๆไป(การทำงานบ้าน การทำความสะอาดบ้านเรือน การทำอาหาร										232-239
5.การออกนอกบ้านไปซื้อของหรือพบปะเพื่อนฝูง										240-247
6. การนอนหลับ										248-255
7.การพักผ่อน										
8.ความสนุกสนานในการได้ออกไปพบญาติสนิทมิตรสหาย										256-263 264-271
9.อารมณ์และจิตใจเป็นปกติ ไม่หงุดหงิดรำคาญง่าย										272-279
10.สามารถ ยิ้ม หัวเราะ อวดฟันได้โดยไม่อายใคร										280-287

ส่วนที่ 5 : ปัจจัยทางจิตสังคมที่มีผลต่อแนวโน้มของพฤติกรรมสุขภาพ

ตอนที่ 1 ประสบการณ์การมีปัญหาในช่องปาก

ปัญหาในช่องปากในช่วง 6 เดือนที่ผ่านมา
ตรวจสอบคำถามข้อ ก ในหน้า 7 แล้วบันทึก (288)

1. ผู้สูงอายุมีฟันธรรมชาติ ถามข้อ 1
2. ผู้สูงอายุไม่มีฟันธรรมชาติเหลืออยู่และใส่ฟันปลอม ถามข้อ 2
3. ผู้สูงอายุไม่มีฟันธรรมชาติเหลืออยู่และไม่ใส่ฟันปลอม ถามข้อ 3

สำหรับผู้ที่มีฟันธรรมชาติเหลืออยู่

1a) ในช่วง 6 เดือนที่ผ่านมา คือตั้งแต่เดือน.....ท่านเคยประสบปัญหาเหล่านี้หรือไม่
(อ่านปัญหาในตาราง) ให้รหัส 1 (มีกรณีที่มีปัญหา ถามข้อ 1b) 2 ไม่มี

1b) กรณีที่เคยมีปัญหา ปัญหานั้นๆ เกิดบ่อยแค่ไหน

1. บ่อยมาก
2. บ่อยพอสมควร
3. นานๆ ครั้ง
4. แทบจะไม่เกิดขึ้นเลย

ปัญหา	1a) มี	ไม่มี	บ่อยมาก	บ่อยพอสมควร	นานๆ ครั้ง	แทบจะไม่เกิดขึ้นเลย
เสียวฟันเวลาดื่มน้ำร้อนหรือน้ำเย็นหรือเวลากินอาหารหวาน (289-290)	1	2	1	2	3	4
ในช่องปากหรือฟันเกิดอาการไม่สบาย ไม่ปกติ พอประมาณ (291-292)	1	2	1	2	3	4
ในช่องปากหรือฟันเกิดอาการปวดหรือไม่สบาย ไม่ปกติอย่างรุนแรง (293-294)	1	2	1	2	3	4

สำหรับผู้ที่มีฟันธรรมชาติหรือผู้ที่ใส่ฟันปลอม

2a) ในช่วง 6 เดือนที่ผ่านมาท่านเคยเจอปัญหาเศษอาหารติดตามซอกฟันหรือติดใต้ฟันปลอมหรือไม่ (295)

1. เคย (ถามข้อ 2b) 2. ไม่เคย (ถามข้อ 3a)

2b)เมื่อมีเศษอาหารติดตามซอกฟันหรือใต้ฟันปลอม ท่านเกิดความรำคาญหรือไม่สบายเพียงใด (296)

1. เกิดความรำคาญอย่างมาก
2. เกิดความรำคาญพอสมควร
3. เกิดความรำคาญเล็กน้อย
4. ไม่เกิดความรำคาญเลย

ข้อนี้<u>ถามทุกคน</u> คำถามในข้อ 3 จะเป็นคำถามเกี่ยวกับอาการผิดปกติต่าง ๆ ในตาราง

3a) ในช่วง 6 เดือนที่ผ่านมาคือตั้งแต่เดือน.....ท่านเคยมีปัญหาต่าง ๆ เหล่านี้หรือไม่(อ่านปัญหาในตาราง)

1. เคย 2. ไม่เคย

3b) ปัญหาที่เกิดขึ้นก่อให้เกิดความไม่สบายมากน้อยเพียงใด

1. เกิดความไม่สบายอย่างมาก 3. เกิดความไม่สบายเล็กน้อย
2. เกิดความไม่สบายพอสมควร 4. ไม่เกิดความไม่สบายเลย

3c) เมื่อปัญหาเกิดขึ้น ท่านได้พยายามแก้ไขปัญหาเหล่านั้นหรือไม่

ปัญหา	a) เคยมีปัญหาหรือไม่		b) ก่อให้เกิดความไม่สบายมากน้อยเพียงใด				c) ได้หาทางแก้ไขปัญหาหรือไม่	
	เคย	ไม่เคย	มาก	พอสมควร	เล็กน้อย	ไม่เกิดเลย	ทำ	ไม่ได้ทำ
ปวดบริเวณข้อต่อขากรรไกร (297-9)	1	2	1	2	3	4	1	2
ข้อต่อขากรรไกรลั่นหรือมีเสียงดัง (300-302)	1	2	1	2	3	4	1	2
อ้าปากลำบาก (303-5)	1	2	1	2	3	4	1	2
ฟันปลอมหลวม (306-8)	1	2	1	2	3	4	1	2
ฟันโยก (309-11)	1	2	1	2	3	4	1	2
ฟันหัก บิ่น (312-4)	1	2	1	2	3	4	1	2
ริมฝีปากแตก แห้ง มีอาการปวด (315-7)	1	2	1	2	3	4	1	2
ปวดแสบปวดร้อนในปาก (318-20)	1	2	1	2	3	4	1	2
มีแผลในปาก(321-3)	1	2	1	2	3	4	1	2
ปวดในปากหรือที่ลิ้น (ไม่ใช่แผล) (324-6)	1	2	1	2	3	4	1	2
เลือดออกที่เหงือก (327-9)	1	2	1	2	3	4	1	2
ปากแห้ง (330-2)	1	2	1	2	3	4	1	2

4. ตรวจสอบคำตอบเกี่ยวกับอาการปากแห้งในตารางที่มีเครื่องหมาย * แล้วบันทึก

1. ผู้สูงอายุเคยมีอาการปากแห้ง (ถามข้อ 5) (333)
2. ผู้สูงอายุไม่เคยมีอาการปากแห้ง (ข้ามไปตอนที่ 2) (334)

กรณีที่เคยมีอาการปากแห้ง

5a)เนื่องจากท่านเคยมีอาการปากแห้ง
อยากขอทราบรายละเอียดเพิ่มเติมสักเล็กน้อย

1. ใช่ 2. ไม่ใช่ 9. ตอบไม่ได้

รู้สึกปากแห้งเวลากินอาหาร	1	2	9	(335)
รู้สึกปากแห้งช่วงเวลาอื่น	1	2	9	(336)
รู้สึกปากแห้งเวลากลางคืน (เวลานอนหรือหลังจากตื่นนอน)	1	2	9	(337)

5b) เมื่อท่านมีอาการปากแห้ง ท่านมีปัญหาเหล่านี้หรือไม่ (338)

ไม่มีปัญหา	1	2	9	(339)
ทำให้เคี้ยวอาหารลำบาก	1	2	9	(340)
ทำให้กลืนอาหารลำบาก	1	2	9	(341)
ทำให้กินยาลำบาก	1	2	9	

5c) ปกติเมื่อมีอาการปากแห้ง ท่านทำอย่างไร

เคี้ยวหมากฝรั่งเพื่อลดอาการปากแห้ง	1	2	9	(342)
กินลูกอมเพื่อลดอาการปากแห้ง	1	2	9	(343)
จิบน้ำหรือเครื่องดื่มเพื่อลดอาการปากแห้ง	1	2	9	(344)
กินยาเพื่อลดอาการปากแห้ง	1	2	9	(345)

ตอนที่ 2 การไปพบทันตแพทย์/ทันตบุคลากร

1. ตรวจสอบรหัสในข้อ ก หน้า 7 แล้วบันทึก

1. ผู้สูงอายุมีฟันธรรมชาติเหลืออยู่ (รหัส 1) (ถามข้อ 3) (346)
2. ผู้สูงอายุไม่มีฟันธรรมชาติเหลืออยู่ (รหัส 2) (ถามข้อ 2) (347)

กรณีไม่มีฟันธรรมชาติเหลืออยู่

2.ขอให้ท่านนึกย้อนไปถึงช่วงเวลาที่ท่านเคยมีฟันธรรมชาติเหลืออยู่ ท่านมักไปพบทันตแพทย์เพื่อ (348)

1. ตรวจสุขภาพฟันเป็นประจำ
2. นาน ๆ จะไปตรวจฟันครั้งหนึ่ง
3. จะไปพบทันตแพทย์ต่อเมื่อมีปัญหาเท่านั้น (ถามต่อข้อ 4)
4. ไม่เคยไปพบทันตแพทย์เลย

3. ในปัจจุบันนี้ท่านจะไปพบทันตแพทย์เพื่อ (349)

1. ตรวจสุขภาพฟันเป็นประจำ
2. นาน ๆ ครั้ง จะไปตรวจฟันครั้งหนึ่ง
3. จะไปพบทันตแพทย์ต่อเมื่อมีปัญหาเท่านั้น(ถามต่อข้อ 5)
4. ไม่เคยไปพบทันตแพทย์เลย (ถามต่อข้อ 4)

กรณีตอบว่า ไม่เคยไปพบทันตแพทย์

4. เหตุผลที่ท่านไม่ไปพบทันตแพทย์ (350)
   1. ไม่เคยมีปัญหาในช่องปาก
   2. คิดว่าปัญหาในช่องปาก ทิ้งไว้ก็หายได้เอง
   3. ไม่มีคนพาไป
   4. คิดว่าค่ารักษาแพง
   5. กลัวการทำฟัน
   6. อื่นๆ ระบุ.....

5. ท่านไปพบทันตแพทย์ครั้งสุดท้ายเมื่อไร (351)
   1. ในช่วง 6 เดือนที่ผ่านมา
   2. 6 เดือน - 1 ปี มาแล้ว
   3. มากกว่า 1 ปี ถึง 5 ปี มาแล้ว
   4. มากกว่า 5 ปี ถึง 10 ปี มาแล้ว
   5. มากกว่า 10 ปี ถึง 20 ปี มาแล้ว
   6. มากกว่า 20 ปี มาแล้ว
   7. ไม่เคยไปพบทันตแพทย์
   9. ตอบไม่ได้

กรณีที่เคยไปพบทันตแพทย์ เฉพาะเมื่อมีปัญหา(รหัส 3 ในข้อ 3) (352-8)

6. ปัญหาในช่องปาก ที่ทำให้ท่านต้องไปพบทันตแพทย์ คืออะไร

.....

.....

7. ตรวจสอบคำถามข้อ 5 แล้วบันทึก (359)
   1. ผู้สูงอายุไปพบทันตแพทย์ในช่วง ในช่วง 5 ปี ที่ผ่านมา (รหัส 1-3) (ถามข้อ 8)
   2. ผู้สูงอายุไปพบทันตแพทย์นานมากกว่า 5 ปี มาแล้ว ผู้สูงอายุไม่เคยไปพบทันตแพทย์ หรือตอบไม่ได้ (รหัส 4-7, 9) (ถามต่อตอนที่ 3)

กรณีที่ไปพบทันตแพทย์ในช่วง 5 ปี ที่ผ่านมา

8. ท่านไปพบทันตแพทย์ที่ไหน (360)
   1. โรงพยาบาลชุมชน
   2. โรงพยาบาลศูนย์/รพท./โรงพยาบาลเทศบาล
   3. โรงพยาบาลเอกชน ถามข้อ 9
   4. คลินิกเอกชน
   5. คณะทันตแพทยศาสตร์
   6. หมอชาวบ้าน (ถามต่อ ข้อ 12-13)

9. เวลาท่านไปพบทันตแพทย์ ท่านต้องเดินทางในระยะทางประมาณเท่าใด (361)
   1. น้อยกว่า 1 กม.
   2. 1 - 5 กม.
   3. 5^{+} - 10 กม.
   4. 10^{+} - 15 กม.
   5. 15^{+} กม.
   6. อื่นๆ ระบุ .....

10 ท่านไปพบทันตแพทย์ด้วยวิธีใด (362)
   1. เดินไป
   2. มีคนขับรถให้ มีคนขับรถไปส่ง
   3. ขับรถไปเอง
   4. นั่งรถเมล์ รถสองแถว ไปเอง
   5. นั่งรถเมล์ รถสองแถว โดยมีคนไปส่ง
   6. รถจักรยาน
   7. อื่นๆ ระบุ .....

11 ท่านคิดว่า การเดินทางไปพบทันตแพทย์ (363)
   1. สะดวกสบาย ไม่มีปัญหา
   2. สะดวกสบาย พอสมควร
   3. ลำบากบ้างเล็กน้อย
   4. ลำบากมาก

12 ท่านมักไปรับการรักษาจากหมอชาวบ้าน ในเรื่องใด(364-7)

รหัส 1 ใช่ 2 ไม่ใช่

(364) รักษาปัญหาในช่องปากทุกชนิด

(365) เพื่ออุดฟันเท่านั้น

(366) ใส่ฟันปลอมเท่านั้น

(367) อื่น ๆ ระบุ .....

13. เหตุผลที่ท่านไปรักษากับหมอชาวบ้าน (368)

1. สะดวก อยู่ใกล้บ้าน
2. ค่ารักษาไม่แพง
3. ชอบใจในผลงาน
4. ใช้เวลาทำน้อย (ไม่ต้องรอนาน)
5. รู้จักแต่หมอชาวบ้านเท่านั้น

ตอนที่ 3 พฤติกรรมการดูแลอนามัยช่องปาก

1. ตรวจสอบรหัสในข้อ จ ในหน้า 8 แล้วบันทึก (369)

1. ผู้สูงอายุมีฟันธรรมชาติเหลืออยู่ (รหัส 1) ถามข้อ 2a
2. ผู้สูงอายุไม่มีฟันธรรมชาติเหลืออยู่และใส่ฟันปลอม (รหัส 3) (ถามข้อ 4a)
3. ผู้สูงอายุไม่มีฟันธรรมชาติเหลืออยู่และไม่ใส่ฟันปลอม (รหัส 4) (ถามข้อ 5a)

กรณีที่มีฟันธรรมชาติเหลืออยู่ (370)

2a) ท่านทำความสะอาดฟันด้วยตนเอง ใช่หรือไม่

1. ใช่ ถามข้อ 2c)
2. ไม่ใช่ มีผู้อื่นทำให้ ถามข้อ 2b)
3. ไม่เคยทำความสะอาดเลย(ถามข้อ 5)

กรณีไม่ได้ทำความสะอาดฟันด้วยตนเอง (371-7)

2b) เหตุผลที่ท่านไม่สามารถทำความสะอาดฟันด้วยตนเอง

ระบุ .....

.....

2c) ตรวจสอบรหัสในข้อ 2a แล้วบันทึก (378)

1. ผู้สูงอายุทำความสะอาดฟัน (รหัส 1 หรือ 2) ถามข้อ 3
2. ผู้สูงอายุไม่เคยทำความสะอาดฟัน (รหัส 3) ถามข้อ 4

2d) ท่านทำความสะอาดฟัน บ่อยเพียงใด (379)

1. มากกว่าวันละ 1 ครั้ง
2. วันละ 1 ครั้ง
3. อาทิตย์ละ 1 - 2 ครั้ง

3. ตรวจสอบข้อ ข หน้า 7 แล้วบันทึก (380)

1. ผู้สูงอายุมีฟันปลอม (รหัส 1) ถามข้อ 4a
2. ผู้สูงอายุไม่มีฟันปลอม (รหัส 2) ถามตอนที่ 4

กรณีที่มีฟันปลอม

4a) ท่านทำความสะอาดฟันปลอมด้วยตนเองหรือไม่ (381)

1. ใช่ } ถามข้อ 4b
2. ไม่ใช่ }
3. ไม่เคยทำความสะอาดฟันปลอมเลย (ถามตอนที่ 4)

4b) ท่านทำความสะอาดฟันปลอมบ่อยเพียงใด (382)

1. มากกว่าวันละ 1 ครั้ง
2. วันละ 1 ครั้ง
3. ประมาณอาทิตย์ละครั้ง
4. น้อยกว่าอาทิตย์ละครั้ง

<u>การบริโภคน้ำตาล</u>

5a) ท่านเติมน้ำตาลลงในอาหารหรือในก๋วยเตี๋ยวบ้างหรือไม่ (383)

1. ไม่เคยเลย
2. แทบจะไม่เคยเลย
3. นานๆ ครั้ง
4. เติมเกือบทุกครั้ง
5. เติมเป็นประจำ

5b) ท่านเติมน้ำตาลใส่ใน ชา หรือ กาแฟ หรือไม่ (384)

1. เติม (ถามต่อข้อ 5c)
2. ไม่เติม
3. ใช้น้ำตาลเทียม
4. ไม่ดื่มชา หรือ กาแฟ

5c) กรณีที่ท่านเติมน้ำตาล ท่านเติมน้ำตาลประมาณกี่ช้อนชา (385-6)

5d) เมื่อวานนี้ท่านได้กินขนมหวานประมาณกี่ครั้ง (387-8)

5e)เมื่อวานนี้ท่านได้ดื่มเครื่องดื่มที่มีรสหวาน(โอเลี้ยง,ชา,กาแฟ,ชาดำเย็น,น้ำอัดลม ฯลฯ)ประมาณกี่ครั้ง (389-90)

ตอนที่ 4 การรับรู้และการแสดงออกถึงความต้องการในการรับการรักษาทางทันตกรรม

1a) ท่านคิดว่าในขณะนี้ท่านมีปัญหาในช่องปากหรือไม่ (391)

1.มี 2. ไม่มี

1b) กรณีที่มีปัญหา ท่านคิดว่าปัญหาในช่องปากของท่านคืออะไร (392-400)

รหัส 1 = ใช่ 0 = ไม่ใช่

ปวดฟัน

ฟันผุ

ฟันบิ่น

ฟันโยก

มีหินปูน

มีเลือดออกที่เหงือก เหงือกบวม

ฟันปลอมหลวม แตกหัก บิ่น

มีกลิ่นปาก

อื่นๆ_____

2a) ท่านคิดว่า ขณะนี้ท่านมีความต้องการที่จะไปรับการรักษาทางทันตกรรมหรือไม่ (401)

1. ผู้สูงอายุมีความต้องการที่จะไปรับการรักษา (ถามข้อ 2b)
2. ผู้สูงอายุไม่มีความต้องการที่จะไปรับการรักษา (ถามข้อ 2d)

2b) ท่านต้องการไปรับการรักษาด้านใด (402-414)

รหัส 1 = ใช่ 0 = ไม่ใช่

อุดฟัน

อุดฟันใหม่ในซี่เดิม

ใส่ฟันปลอมชนิดติดแน่น

ถอนฟัน

ทำฟันปลอมทั้งปากใหม่ ทั้งบนและล่าง

ทำฟันปลอมทั้งปากใหม่ หรือแก้ไขเฉพาะฟันบน

ทำฟันปลอมทั้งปากใหม่ หรือแก้ไขเฉพาะฟันล่าง

ใส่ฟันปลอมชนิดถอดได้บางส่วนใหม่ทั้งบนและล่าง

ใส่ฟันปลอมชนิดถอดได้บางส่วนใหม่หรือแก้ไขเฉพาะฟันบน

ใส่ฟันปลอมชนิดถอดได้บางส่วนใหม่หรือแก้ไขเฉพาะฟันล่าง

รักษาโรคเหงือก

อื่นๆ ระบุ .....

2c) ท่านได้นัดหมายกับทันตแพทย์เพื่อไปรับการรักษาในข้อ 2b แล้วหรือยัง (415)

1. นัดทันตแพทย์ไว้แล้ว 0. ไม่ได้นัด

2d) ถ้าท่านคิดว่า ท่านไม่ต้องการรับการรักษา เหตุผลที่ท่านไม่อยากไปคือ (416)

1. ไม่มีปัญหาอะไร
2. กลัวการรักษา
3. ปัญหาด้านการเงิน
4. ไม่มีเวลา
5. มีปัญหาเรื่องการเดินทาง
6. ไม่คิดว่าหมอฟันจะแก้ปัญหา หรือรักษาให้หายได้

3a) ท่านคิดว่า (417)
การไปพบทันตแพทย์จะช่วยแก้ไขหรือทำให้สุขภาพช่องปากของท่านดีขึ้น

1 ใช่ 2 ไม่ใช่

3b) ท่านเห็นด้วยหรือไม่ว่า เมื่อมีอายุมากขึ้น การสูญเสียฟันเป็นเรื่องธรรมดา (418)

1 เห็นด้วย 2 ไม่เห็นด้วย

3c) ท่านเห็นความสำคัญต่อปัญหาเกี่ยวกับฟันหรือปัญหาในช่องปากใช่หรือไม่ (419)

1 ใช่ 2 ไม่ใช่

ตอนที่ 5 สภาวะทางเศรษฐกิจ

1a) สมมติว่าท่านมีปัญหาในช่องปาก แล้วต้องไปรับการรักษาในวันพรุ่งนี้ (420)
ท่านคิดว่าจะมีปัญหาในการชำระค่ารักษาหรือไม่

1 มี 0 ไม่มี

1b)ถ้าท่านคิดว่าจะมีปัญหาด้านการเงิน (421)
ท่านยินดีที่จะจ่ายค่ารักษาในวงเงินประมาณเท่าใด

1. น้อยกว่า 100 บาท
2. 100 - 500 บาท
3. 501 - 1000 บาท
4. 1001 - 2000 บาท
5. 2001 - 5000 บาท

2) ท่านจ่ายค่ารักษาอย่างไร (422)

1. ด้วยเงินรายได้ของตนเอง
2. ลูกหลาน ญาติ จ่ายให้
3. สามารถเบิกจากราชการได้
4. ใช้บัตรสงเคราะห์ บัตรสุขภาพ
5. ไม่มีรายได้ ไม่มีเงินจะจ่าย ต้องไปกู้เงินหรือหยิบยืมมาจ่าย
6. ไม่รู้

เวลาสัมภาษณ์สิ้นสุด .....

APPENDIX 4

THE ORAL IMPACTS ON DAILY PERFORMANCES (OIDP)

The Oral Impacts on Daily Performances

A new socio-dental indicator: the Oral Impacts on Daily Performances (OIDP) developed by Adulyanon (1996) was selected to assess the effect of oral impacts on different performances in older people. The OIDP index measures three main categories of performances: physical, psychological and social performances. Eight impacts of the index were used in this study .

Eight impacts of the index were used in this study.

Physical performance

1. Eating and enjoying food
2. Speaking and pronouncing clearly
3. Cleaning teeth
4. Doing light physical activities such as housework or walking

Psychological performance

5. Sleeping and relaxing
6. Smiling, laughing and showing teeth without embarrassment
7. Maintain usual emotional state without being irritable

Social performance

8. Enjoying contact with people

OIDP questions format

a) In the past 6 months, have problems with your mouth, teeth, or dentures caused you any difficulty in ....*(performance)*..? (See Table 1 for list of performances)

If yes,

b) a. Have you had this difficulty in ..*(performance)*.. on a regular basis or or only for part of this period?

IF ABILITY RESTRICTED `ON A REGULAR BASIS' (CODE 1 AT b)

c) During the past 6 months how often have you had this difficulty

	ANSWER CODE
every day or nearly every day	5
about three or four times a week	4
about once or twice a week	3
about once or twice a month	2
or less often than once a month?	1
(Can't say)	(9)

IF ABILITY RESTRICTED `ONLY FOR PART OF THIS PERIOD' (CODE 2 AT b)

d) For how much of the past 6 months have you had this difficulty

	ANSWER CODE
for more than 3 months	5
for more than 2, up to 3 months	4
for more than 1, up to 2 months	3
for more than 5 days, up to a month	2
or for 5 days or less?	1
(Can't say)	(9)

ENTER ANSWER CODE IN BOX UNDER d) ON GRID. GO TO e).

e) And using a scale from 0 to 5, where 0 is no effect and 5 is a very severe effect, how much effect would you say that this difficulty has had on your everyday life?

IF RESPONDENT IS UNABLE TO ANSWER WITH NUMBERS,
Has this difficulty had on your everyday life?

	ANSWER CODE
no effect	0
a very minor effect	1
a fairly minor effect	2
a moderate effect	3
a fairly severe effect	4
or a very severe effect	5
(Can't say)	(9)

ENTER ANSWER CODE (0-5) IN BOX UNDER e)
f) Which one of the following conditions has caused you this difficulty

ENTER ANSWER CODE (1-9) IN BOX UNDER f)

	ANSWER CODE
pain	1
discomfort	2
limitation in function (e.g. chewing, biting or opening mouth wide)	3
dissastisfaction about appearance	4
or any other reason (PLEASE SPECIFY)	5
(can't say)	9

g) Please give a specific oral condition which caused you the problem stated earlier
ENTER ANSWER CODE (1-27) IN BOX UNDER g)
(MORE THAN ONE ANSWER COULD APPLIED FOR EACH CONDITION)

	ANSWER CODE
TEETH	
Toothache	01
Tooth loss	02
Loose tooth	03
Colour of teeth	04
Position of teeth	05
Shape and size of teeth	06
Maloccluded teeth	07
MOUTH	
Oro-facial deformity	08
Oral ulcer or sore spots (not denture related)	09
Burning sensation of the mouth	10
Bad breath	11
Taste disturbance	12
Unpleasant taste	13
Dry mouth	14
GUMS	
Bleeding gums	15
Receding gums	16
Gum abscess	17
JAW	
Clicking or grating noise in jaw joint	18
A pain in jaw joint	19
Difficulty in opening mouth wide	20
DENTURED RELATED	
Loose or ill-fitting denture	21
Colour, shape, size of denture teeth	22
Sore spot or ulcer	23
Other (SPECIFY)	24
Cannot specify	25
Wearing denture	26

Table 1 OIDP questionnaire

	a)Whether difficulty with activity	b)Whether has had this difficulty...		c) On a regular basis	d) Only for part of period	e)Effect of this difficulty on every day life	f)Major cause of difficulty	g)Specify dental problem causing difficulty
	Yes No	On a regular basis	Only for part of period	How often? (ENTER CODE)	How much? (ENTER CODE)	(ENTER CODE)	(ENTER CODE)	(ENTER CODE)
Eating food	1 2	1-----c)	2-----d)					
Speaking clearly)	1 2	1-----c)	2-----d)					
Cleaning your teeth or dentures	1 2	1-----c)	2-----d)					
Doing light physical activities such as housework	1 2	1-----c)	2-----d)					
Going out, for example, to shop or visit someone	1 2	1-----c)	2-----d)					
Relaxing	1 2	1-----c)	2-----d)					
Sleeping	1 2	1-----c)	2-----d)					
Enjoyment of contact with other people, such as relatives, friends or neighbours	1 2	1-----c)	2-----d)					
Maintain your usual emotional state without being irritable	1 2	1-----c)	2----d)					
Smiling, laughing and showing teeth without embarrassment	1 2	1-----c)	2-----d)					

Scoring method

OIDP score = [(frequency score*of oral impact on "Eating" X severity score*of impact on "Eating")+
(frequency of "Speaking" X severity of "Speaking") +
(frequency of "Cleaning teeth" X severity of "Cleaning teeth") +
(frequency of "Doing light physical activities" X severity of "Doing light physical activities") +
(frequency of "Sleeping and relaxing" X severity of "Sleeping and relaxing") +
(frequency of "Smiling" X severity of "Smiling") +
(frequency of "Emotional stability" X severity of "Emotional stability") +
(frequency of "Contact with people" X severity of "Contact with people")] X 100/ 200**

---

* *score ranged from 0 to 5*
** *maximum possible score [Sum of 8 performances score{ 5 frequency score x 5 severity score} = 200]*

The calculation of condition-specific OIDP score (CS-OIDP)

The general OIDP score derived from combining all impacts on daily performances. In order to have a more specific OIDP score related to specific oral impairments, questions relaing to causal impairment in the OIDP questionnaire were used to established the 'Condition-specific OIDP score (CS-OIDP).

The calculation of CS-OIDP involves 3 variables:

General OIDP score, 8 oral impacts on daily performances and 26 causal impairments

General OIDP score included individuals who had oral impacts from all 8 performances as mentioned in the previous section.

CS-OIDP includes only individuals who had oral impacts related to specific the treatment needs. Table 2 presents possible related perceived impairments for different treatment needs. For example, for the need for new or replacement of full dentures, the possible related perceived impairments are missing teeth, loose denture, colour of teeth, shape and size of denture teeth, wearing denture, sore spot or ulcer related to denture.

Calculation process

Calculate score for each of the 8 oral impacts due to each casual impairment

CS-OIDP of a treatment need in an individual is the sum of OIDP score of 8 performances which caused by the possible causal impairment of that treatment need.

Example: Calculation CS-OIDP for treatment need for full dentures

CS-OIDP of a full denture treatment need in an individual is the sum of OIDP score of 8 performances which caused by the possible causal impairment of treatment need for full dentures.

1. Identify the possible causal impairment of treatment need for full dentures

The possible causal impairment of treatment need for full dentures could be: missing teeth, loose denture, colour of teeth, shape and size of denture teeth, wearing denture, sore spot or ulcer related to denture.

2. Calculating CS-OIDP score for each of the eight oral impacts due to each causal impairment

The first oral impacts to calculate is eating.

First step: Calculating CS-OIDP score due to missing teeth

Second step: Calculating CS-OIDP score due to loose denture.....

.

.

.....*Eight step*: Calculating CS-OIDP score due to sore spot or ulcer related to denture

Then using the same procedure, calculating the CS-OIDP score of second oral impacts: cleaning teeth, the next oral impacts and so on until the last impact: enjoy contact to people.

3. Summation of CS-OIDP score for full denture treatment from each oral impacts

CS-OIDP score for full denture treatment = [(*"eating score"* due to missing teeth + *"cleaning teeth score"* due to missing teeth + *"speaking score"* due to missing teeth+.....+ *"contact with people score"* due to missing teeth) +

(*"eating score"* due to loose denture + *"cleaning teeth score"* due to loose denture +.....+ *"contact with people score"* due to loose denture)+..... +

(*"eating score"* due to sore spot or ulcer related to denture +.....+ *"contact with people score"* due to sore spot or ulcer related to denture)]

Table 2 Possible related perceived impairments to identify the *'impact- related treatment need'*

Treatment	**Possible related perceived impairments**
New or replacement/repair of full denture	- missing teeth - loose denture, colour, shape and size of denture teeth, wearing denture - sore spot or ulcer related to denture
New or replacement/repair of partial denture	- missing teeth - loose denture, colour, shape and size of denture teeth, wearing denture - sore spot or ulcer related to denture
New or replacement/repair full and partial denture	- missing teeth - loose denture, colour, shape and size of denture teeth, wearing denture - sore spot or ulcer related to denture
Extraction	- toothache, loose tooth, position of teeth, tooth decayed - bad breath - gum abscess
Restoration	- toothache, loose tooth, position of teeth, tooth decayed - bad breath - defective fillings
Pulp care	- toothache, loose tooth, tooth decayed - bad breath - gum abscess
Crown or bridge	- toothache, loose tooth, position of teeth, tooth decayed
Scaling	- bleeding gum, gum abscess, receding gum - calculus
Root planing	- loose tooth - bad breath - bleeding gum, gum abscess, receding gum - calculus
Oral mucosa treatment	- Oral ulcer or sore spots
TMJ treatment	- jaw clicking, jaw locking

APPENDIX 5
CLINICAL EXAMINATION FORM
AND
CLINICAL CRITERIA

ORAL HEALTH EXAMINATION FORM

(1-3)

Name _____ Age _____

Address _____

_____

Date of Examination _____

Examiner _____ 4

Duplication 5

Location 6

SECTION 1 SOFT TISSUE (7-13)

Angular Cheilitis	
Denture Stomatitis I	
Denture Stomatitis II	
Denture Stomatitis III	
Denture Hyperplasia	
Ulcer assoc. with Denture	
Other	

CODES

Unaffected	0
Affected	1
Unrecordable	9

Other Lesions

site: Clinical Diagnosis:

Description:

Follow up Y/N

SECTION 2 PERIODONTAL DISEASE

UPPER

	18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28	
P																	(14-29)
L																	(30-45)
C																	(46-61)
B																	(62-77)
M																	(78-93)

LOWER

	48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38	
P																	(94-109)
L																	(110-125)
C																	(126-141)
B																	(142-157)
M																	(158-173)

CODES-Poc/loa		CODES-Calculus		CODES-Bleeding		CODES-Mobility	0
0-3mm	0	Absent	0	None	0	<1mm horiz.	1
4-5 mm	1	Present	1	Present	1	>1mm horiz.	2
6-8 mm	2					Horizontal & vertical	3
9-11 mm	3						
12+ mm	4						

Unrecodable 9

In all cases, where tooth is missing, score - and where a surface is unscorrable score 9

SECTION 3 DENTAL CARIES AND TREATMENT NEED

DECAYED, MISSING AND FILLED SURFACES

		18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28	
Crown	D																	(174-189)
	O/I																	(190-205)
	M																	(206-221)
	B																	(222-237)
	L																	(238-253)
Txneed	Tc																	(254-269)
Root	D																	(270-285)
	M																	(286-301)
	B																	(302-317)
	L																	(318-333)
Txneed	Tr																	(334-349)

LOWER

		48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38	
Crown	D																	(350-365)
	O/I																	(366-381)
	M																	(382-397)
	B																	(398-413)
	L																	(414-429)
Txneed	Tc																	(430-445)
Root	D																	(446-461)
	M																	(462-477)
	B																	(478-493)
	L																	(494-509)
Txneed	Tr																	(510-525)

CODE : Decayed, missing and filled

CROWN		ROOT	TREATMENT	
missing	_	missing	none	0
sound	0	present-no recession	caries arresting	1
	1	gingival recession-sound	one surface filling	2
carious-restorable	2	gingival recession-caries	two or more surface fillings	3
carious-exposed	3	gingival recession-gross caries/unstorable	crown or bridge abutment	4
restored-needs replacement	4	gingival recession-surface restored,requires replacement	bridge element	5
restored-satisfactory	5	gingival recession-satisfactorily restored	pulp care	6
			extraction	7
crown-satisfactory	6	gingival recession-arrested caries	need scaling	8
crown-unsatisfactory	7		excluded tooth	9
bridge pontic	8		need for other care	10
unscorable surface	9	unrestorable		

NEED FOR DENTURES

- Upper ☐ 526
- Lower ☐ 527

0 = no denture needed
1 = need for complete denture
2 = need for partial denture
3 = need to repair complete denture
4 = need to repair partial denture

BRIDGE STATUS

- Upper ☐ 528
- Lower ☐ 529

0 = no bridge
1 = 1 bridge
2 = 2 or more bridges

NEED FOR BRIDGE

- Upper ☐ 530
- Lower ☐ 531

0 = no bridge needed
1 = 1 new bridge
2 = 1 new resin-boned bridge
3 = 2 or more new bridges
4 = 1 replacement bridge
5 = 2 or more replacement bridges

TMJ ASSESSMENT ☐ 532

0 = normal
1 = clicking
2 = self-correcting blocking
3 = dislocation of TMJ
4 = pain related to TMJ

NEED FOR IMMEDIATE CARE

- life-threatening condition ☐ 533
- jaw/fracture ☐ 534
- pain or infection ☐ 535
- other ☐ 536
- Need full mouth scaling ☐ 537

SECTION 4 TOOTH WEAR

UPPER

	18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28	
Coronal																	(538-553)
Cervical																	(554-569)

LOWER

	48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38	
Coronal																	(570-585)
Cervical																	(586-601)

SPACING

	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8	
Upper																	(602-617)
Lower																	(618-633)

CONTACTS

8I	8m	7d	7m	6d	6m	5	4	4	5	6m	6d	7m	7d	8m	8d	
																(634-649)

	Yes = 1		
Is there contact of the natural anterior teeth?	No = 0		650
If YES .How many (lowers)?	Yes = 1		651
If NO, can contact be achieved?	No = 0		652
How many natural POSTERIOR teeth have no opposing natural tooth			653-654
How many natural POSTERIOR teeth are opposed only by a denture			655-656

CODES - Tooth Wear

All - Tooth missing

All - No dentine exposed or minimal cervical loss

B/L/O - Loss of enamel exp. dentine < 1/3rd surface

I - Loss of enamel just exposing dentine

C - Definite defect < 1mm

B/L/O - exp. dentine > 1/3rd surface

I - extensive dentine loss, not to 2 dentine/pulp

C - Defect 1 - 2 mm deep

B/L/O - Complete enamel loss/exp. 2 detine/pulp

I - 2 detine/plup exposure

C - > 2 mm or exposure of 2 dentine/pulp

Cannot be scored due to restoration/disease

SECTION 5 PARTIAL DENTURE AND COMPLETE DENTURE

Does the subject have a partial denture which he/she normally wear? (657-658)

- Upper ☐ Yes 1
- Lower ☐ No 0

Does the Partial Denture replace all missing teeth? (659-660)

- Upper ☐ Yes 1
- Lower ☐ No 0

Are any natural anterior teeth missing which are replaced by the denture? (661-662)

- Upper ☐ Yes 1
- Lower ☐ No 0

Does the denture provide additional posterior function? (663-664)

- Upper ☐ Yes 1
- Lower ☐ No 0

Has the subject ever had a partial denture which could not be, or was not worn? (665-666)

- Upper ☐ Yes 1
- Lower ☐ No 0

Kennedy Class (1-4) (667-668)

- Upper ☐
- Lower ☐

Class I 1
Class II 2
Class III 3
Class IV 4

RB (669-670) _ Upper ☐ Yes 1
_ Lower ☐ No 0

TB (671-672) _ Upper ☐ Yes 1
_ Lower ☐ No 0

Material (673-674) _ Upper ☐ _ Lower ☐
Acrylic only 1
Acrylic+clasps 2
metal based 3

Support (675-676) _ Upper ☐ _ Lower ☐
Tissue 1
Tooth only 2
Both 3

Retention (677-678) _ Upper ☐ _ Lower ☐
Adequate 1
Inadequate 2
Unrecordable * 9

Defect (679-688)

	Yes 1 / No 0	Upp	Low
- Anterior teeth missing			
- Posterior teeth missing			
- Fractured base			
- Repair/rebase			
- Requires remake			

COMPLETE DENTURES

Does the patient have a complete denture which he/she normally wears? (689-690)

- Upper ☐ Yes 1
- Lower ☐ No 0

Ridge form (691-692)

- Upper ☐
- Lower ☐

Adequate 1
Poor 2

Matching set (693) ☐ Yes 1 / No 2

Are the complete denture done by the dentist? (694-695)

- Upper ☐ Yes 1
- Lower ☐ No 0

Occlusal Wear (696-697)

- Upper ☐
- Lower ☐

Satisfactory 1
Excessive 2
Unrecordable 9

Adaptation (Stability) (698-699)

- Upper ☐
- Lower ☐

Adequate 1
Inadequate 2
Unrecordable 9

Retention (700-701)

- Upper ☐
- Lower ☐

Adequate 1
Inadequate 2
Unrecordable 9

Defects (702-713) Yes 1 / No 0

	Upp	Low
- Anterior teeth missing		
- Posterior teeth missing		
- Fractured base		
- Repair/rebase		
- Requires remake		
- Rubber suction		

Clinical criteria used to assess oral health status

Examination took place in the senior centre, the participant's home or the temple. Examinations are conducted using a head-lamp to provide standard illumination. The subject are seated in a comfortable chair in the most relaxable position. The examiner's position is in front of the subject, and using No. 4 plain mouth mirrors, sickle-shaped explorer and World Health Organization's recommended periodontal probe (CPITN probe). The explorer is used only to remove debris, to check for interproximal caries and to check occlusal cavitation where doubt existed on visual inspection, and to detect the surface texture of root surface lesions. The explorer is not routinely be inserted into the pit and fissure systems of the teeth. The criteria used in this study is adapted from WHO (WHO, 1987) criteria and the 1995 British National Oral Health Survey for people 65 years and over (Department of Health, 1997).

1. Clinical Examination

1.1 Dental status

All surfaces of the teeth are examined and recorded. A tooth is considered present in the mouth when any part of it is visible or can be touched with the tip of the explorer.

1.1.1 Diagnostic criteria for decayed, missing and filled surfaces

The coronal and root surfaces are examined separately. Each surface is coded according to the criterial given below.

Coronal tissue

Coronal surfaces are scored as follows:

Missing:	-
Sound:	0
Carious - restorable	2
Carious - exposed	3
Restored - needs replacement	4
Restored - satisfactory	5
Crown - satisfactory:	6
Crown - unsatisfactory:	7

Bridge pontic: 8
Unscorable surface: 9

Missing: - (dash or minus)

Indicated that tooth is missing , for whatever reason.

Sound: 0

A tooth surface is recorded as sound if it shows no evidence of treated or untreated clinical caries, included: white or chalky spots, stained or discoloured pit or surface.

Carious - restorable: 2

A carious cavity is present which, taking into account the subjects oral status, is deemed to be restorable. The criteria for diagnosis of a carious cavity are:
Pits and fissures - Breakdown of the walls of a pit or fissure or shadowing beneath the enamel surface, detected visually after cleaning with a probe. Stained fissures are not necessarily designated as carious.

Approximal surface and smooth surfaces - Caries is recorded as present when as lesion in a pit or fissure, or on a smooth tooth surface, has a detectably soften floor, undermined enamel or softened wall including temporary filling. On approximal surfaces, the examiner must be certain that the exporer has entered a lesion. Where any doubt exists, caries should not be recorded as present.
Arrested caries - A dark/black appearance with a hard floor is not designated carious, nethier are hard floored hypoplastic pits.

Carious - exposed/unrestorable: 3

A carious cavity, as defined above, which is considered to be so extensive that (a) there is pulp involvement or (b) restoration is not possible, bearing in mind the present dental health status of the subject. This may include frank pulpal exposure or deep decay without visible exposure or obvious pulpal involvement. This should include teeth which are so carious or broken down

that they are deemed to be unrestorable, even where little or no coronal tissue remains. All surfaces involved are coded in these cases.

Restored - needs replacement: 4

Presence of one or more restorations whch require further treatment. The may have been due to :

a) Caries, whether or not it is associated with the restoration.

b) The presence of a temporary filling

c) Grossly defective permanent restoration, with deficient or overhaning margins that could not be satisfactorily improved by adjustment, or the presence of a fracture.

Restored satisfactorily: 5

One or more restorations whose margins are intact and not associated with caries, and which do not require further treatment as defined by the code above. A permanent restoration may have been amalgam, composite, glass polyalkenoate, gold or porcelain.

Crown - satisfactorily : 6

Presence of a satisfactory full veneer crown which do not fulfill any of the criteria listed below.

Crown - unsatisfactory: 7

A full veneer crown is presented which is considered to be unsatisfactory. This could be due to:

a) Caries at the margin

b) A gross positive margin which cannot be satisfactorily reduced with a bur.

c) A crown preparation is present and satisfactory, or could be made to be satisfactory, but the crown has been lost.

d) A deficient margin into which a probe may be inserted.

Bridge pontic: 8

The presence of a bridge pontic replacing a single tooth.

Unscorable: 9

This should include overdenture abutments or (for example) rare cases of severe wear where the surface has been completely lost.

This should not include cases where there have been extensive carious destruction leading to complete surface loss (e.g. gross caries or large filling missing).

Exposed Root Surfaces

The scores are given below:

Missing:	-
Present - no recession:	0
Gingival recession - sound:	1
Gingival recession - caries:	2
Gingival recession - gross caries/unrestorable	3
Gingival recession - surface restored, requires replacement	4
Gingival recession - satisfactorily restored:	5
Gingival recession - arrested caries	6
Unscorable:	9

The diagnostic criteria are given below. The general rule should be that if root surface is visible and detectable it is scored.

Missing: -

As for crowns

No gingival recession: 0

The gingival margin is at or above the CEJ with no exposure of root surface.

Gingival recession/exposed root - sound: 1

The gingival margin is below the CEJ exposing some root surface. The exposed root surface should be sound, with no evidence of restoration or caries.

Gingival recession/exposed root - caries: 2

Exposed root surface is carious as detected visually by yellow/brown discolouration and a softened floor on gentle probing. In the case of a large lesion which crosses the CEJ, the observer must make a judgement about its origins.

Gingival recession - root surface caries with exposure: 3

Root surface caries is present which clearly involves, or is strongly suspected of directly involving the pulp.

Gingival recession - surface restored - requires replacement: 4

Exposed root surface contains one or more permanent restorations which requires complete replacement. This may include:

a) Caries associated with an existing restoration(s).

b) Temporary restoration (e.g. ZOE, polycarboxylate).

c) Grossly defective or overhanging restoration which will need to be replaced to make satisfactory.

Gingival recession - satisfactory restoration: 5

Exposed root surface contains one or more permanent restorations whose margins are intact and are not associated with caries.

A permanent restoration can be defined (regarding material) as for crowns above. Coronal restorations which extended onto the root surface for 3mm or more should be coded as a filled root surface, coronal restorations extending onto the root surface for less than 3mm should be coded as purely coronal, and the root surface dealt with separately. In cases such as full coverage crowns extended beyond the gingival margin they have been extended, they are coded only as a coronal restoration if no root surface is exposed, and code the root surface appropriately if it is exposed (above the gingival margin).

Where root restorations extend onto the crown by 3mm or more both the crown and root should be coded as restored, otherwise it should be coded only as a root surface restoration.

In some cases where restorations straddle the CEJ, but do not extend as far as 3mm in either direction, a subjective decision has to be made as to whether it is primary a crown or a root restoration.

Gingival recession - arrested caries - 6

Exposed root surface contains an area of decay which is considered to be arrested, as indicated by the presence of a hard dark brown/black floor, resistant to gentle probing.

Present - unscorable: 9

The tooth is present, but the presence of recession cannot be judged. If any root surface is visible it should be scored, even where there is extensive calculus, as caries is considered rare under calculus. Only if it is unclear whether any recession has taken place should the unscorable code be used. This may be because there is a crown or total coverage of calculus making it impossible to assess the status of the root. In many cases where there are crowns there will be some root exposure. If exposed root surface is present, clearly recession has taken place.

In some cases there will be more than one possible code per surface. As it is impossible to multicode, a convention for priority should be as followed:

Primary caries > Secondary caries/restoration requiring replacement > Sound restoration > Exposed root > no recession > unscorable.

1.1.2 Diagnostic criteria for the measurement of tooth wear

A modification of the "Tooth Wear Index", (Smith and Knight, 1984) will be used. The system which will be used on this study will score only surfaces

where there has been appreciable wear (scores of over 2 on the TWI). This will provide a convenient cut off point for measurement such that all potentially relevant data is collected.

In this age group, wear appears to be very rare on non-functional surfaces (i.e. those which are not involved in occlusal contact). For this reason only two parts of the teeth are coded, the crowns and the roots. Crowns are not coded surface by surface. However if wear of non-functional surfaces is observed this should be recorded in the additional box with an appropriate comment.

The Examination

The teeth are gently dried with a piece of gauze, and then visually examined, a probe may be used to remove loose deposits and to aid diagnosis, particularly where there may be difficulty scoring in the cervical region. Teeth are examined surface by surface, in the order: cervical, buccal, lingual. The teeth are scored as follows:

Score	Surface	Criteria
-	All	Tooth missing
0	All	Wear not into dentine or no distinct cervical cavity.
2	B/L/Occ	Loss of enamel exposing dentine less than one third of the individual surface
	Incisal	Loss of enamel just exposing dentine
	C	A definite defect present but less than 1mm in depth.
3	B/L/Occ	Loss of enamel exposing dentine for more than one third of the individual surface.
	Incisal	Loss of enamel and extensive loss of dentine, but not exposing seondary dentine or pulp.
	C	A defect 1-2mm deep
4	B/L/Occ	Complete loss of enamel, or pulp exposure, or exposure of secondary dentine
	Incisal	Pulp exposure or exposure of secondary dentine
	C	A defect more than 2mm deep, or pulp exposure or exposure of secondary dentine
9	C	**Unscorable.** If any restoration, decay or calculus is present at the depth of a cervical abrasion, then this is scored 9. If the depth of any abrasion lesion does not coincide with an existing restoration or lesion this may be scored 0-4 as above.

If a cervical restoration is present which may possibly have been placed to treat cervical wear, given the rest of the subjects dentition, then this code should be used. However where there is almost no possibility that the restoration is placed for this purpose, and no other cervical wear is present on the tooth, it should be coded as 0.

Where doubt exists the lower score should be given.

1.1.3 Diagnostic criteria for the measurement of periodontal disease

In this study both the pocket depth and the loss of attachment scores as well as a few other key variables will be recorded.

The examination

The periodontal examination should only be undertaken if the patient has no medical history to contra-indicate this. Patients with a history of valvular heart disease, prosthetic heart valves, a history of Rheumatic Fever, a coronary artery by-pass or a prosthetic joint should not be examined.

Two sites on every tooth will be probed. On the upper teeth these will be the mid-buccal and mesio-buccal, and on the lower teeth the mid-lingual and mesio-lingual. Under recording is inevitable unless all sites are scored but

this would be neither practical nor valuable. In this the worst score from the two sites will be recorded.

The CPITN probe is graduated into bands which will correspond to the codes recorded. Each tooth will be checked for mobility and scored according to an existing scale (see below).

Each tooth:

Pocket depth	0	0-3mm
and	1	4-5mm
Loss of Attachment	2	6-8mm
	3	9-11mm
	4	12+mm (rare)
	9	unrecordable

The surface is recorded as unscorable if the CEJ cannot be estimated due to gross decay, wear or the presence of a restoration. If the position of the CEJ can be estimated with some confidence, the total loss of attachment should be measured. Crowns cause a particular problem where the crown margin has extended past the CEJ. In these cases it is reasonable to record loss of attachment from the crown margin, unless the morphology of the restoration is allowed to estimate the attachment loss. Generally loss of attachment should be recorded if possible.

Probing should be gentle (25g). Note that somtimes subgingival calculus can stop a probe penetrating to the depth of the pocket, and it may be neccessary to gently work the probe down the root surface. Loose debris can be cleared from the gingival margin using the probe if neccessary.

Mobility

This should be measured using a finger at one side of the tooth to detect movement while a rigid instrument (e.g. a mirror handle) is applied to the other, the tooth is then very gently wiggled. The coding for mobility is as followed:

No increased mobility	0
Increased mobility but less than 1mm movement horizontally	1
Gross movement, >1mm or vertical/rotational movement	2
Unscorable	9

IF IN DOUBT, SCORE LOW

1.1.4 Occlusal Examination

There are two grids for this examination. One records the presence of spaces and unopposed teeth, the other records the exact pattern of occlusal contacts. This may seem to involve some duplication, but in order to make the examination less prone to error the procedure is best performed in this way.

Posterior occlusal contacts

This section need only be completed if there are some natural teeth in both arches.

The subject is asked to close their teeth together normally. The premolars and molars are now split into occlusal units, and it is the lower teeth which are used for measurement. An occlusal unit is a single premolar or half a molar (mesial or distal). These are counted back from the first premolar. There are potentially eight occlusal units. Like spacing, the position of an occlusal unit does not depend on which tooth is present, but on the position in which the unit is lying . A contact is recorded as present (1) or absent (0). For a contact to be present it must form an occlusal stop with a natural tooth in the opposing arch, or at least appear to do so. In rare cases pairs of teeth may slide past each other and end up with mesial or distal surfaces in contact, but not forming any sort of stop, these should be coded as no contact (0). **Note that fixed bridges should be counted as fixed occlusal units, just like a natural tooth**.

Note that coding takes place from the first premolar backwards as this makes it much easier to keep track of the position.

After the grid is complete a box is also present to code the response to each of the questions:
"are any anterior teeth in contact?" **IF YES** "how many"

There is a single box representing all NATURAL anterior teeth. If the anterior teeth are already in contact it should be coded as yes (1). Where there is believed to be no contact the subject should be asked to bite edge to edge to see if contact can be obtained, if this is possible the second box should be coded as yes (1). "How many" can be recorded as anything between 0 and 6 and is based on the estimated number of contacts made by the lower teeth. Where there is a deep overbite this may be very difficult to assess accurately so should just be estimated if there is a problem. Again, actual contact is not strictly necessary if the patient can achieve some sort of contact by protrusion of the mandible. A phrase such as "can you bite on your front teeth like this", with the examiner demonstrating incisal contact may be used if there is any problem. If any pair of anterior teeth can contact, it is coded as present.
Two other questions then follow:

How many posterior teeth (upper or lower) have no natural or artificial opposing tooth? How many natural posterior teeth (upper or lower) are opposed only by denture?

These are self explanatory and are easily assessed by visual examination with the teeth together, although where there are partial dentures they will often have to be inserted prior to this part of the examination. This is to identify how many teeth are non-functional

1.1.5 Temporo-mandibular joint assessment

Temporo-mandibular joints are palpated to detect tenderness and then the jaw opened and closed two or three time with the examiner's index or middle fingers touching the skin over the joint to feel for clicks or dislocation.
Codes for this assessment are as follows:

Code	*Description*
0	Normal TMJ functions without pain, sounds or other signs of dysfunction
1	Clicking. TMU functions witout pain, or other sign of dysfunction, but clicking is heard on opening and closing]
2	Self-correcting blocking. TMJ occasionally dislocates but relocates without professional care
3	Dislocation of TMJ. There is spontaneous dislocation that requires professional care
4	Pain related to TMJ. There is pain in the TMJ area or elsewhere in the head, neck, or shoulder region related to joint dysfunction

1.1.6 Soft tissue pathology

Examination: A brief visual examination of the lips and perioral tissues should precede intra-oral examination. Most intra-oral areas can be easily visualised during the dental examination, however several areas MUST be visualised specifically.

These are: -

1. Floor of mouth. A piece of gauze is used to hold the tongue and it is gently lifted and deflected to right and left.
2. Mucosal surface of lips. The upper and lower lips are gently inverted to visualise.
3. Buccal sulci. The mouth is half closed and the cheeks gently retracted.
4. Soft palate - visualise directly.

Soft tissue lesion(s)

- None
- Angular cheilitis
- Denture stomatitis I
- Denture stomatitis II
- Denture stomatitis III
- Denture hyperplasia
- Ulcer associated with denture trauma
- Other (see below)

More than one code can be recorded as these diseases are not mutually exclusive. The coding is Yes - 1, No - 0.

The three classifications of denture stomatitis are based on a WHO classification (WHO, 1987).

I - patchy or localised redness over denture bearing area
II - redness over full denture bearing area

III - multiple small nodular or granular lesions covering denture bearing area with associated inflammation

Angular Cheilitis is defined as inflammation with or without cracking localised to one or both commisures. Denture Hyperplasia is a firm enlargement of the vestibular mucosa, clearly related to the flange of a denture. "Ulcer associated with denture trauma" applies to any ulcerated lesion which is believed to be due to trauma alone and not any other pathological process (e.g. malignancy).

Other pathology

Description -

A concise but meaningful description is required, **INCLUDING THE SITE**, eg soft, non-fluctuant, non-inflamed swelling, 2 cm diameter on left anterior floor of mouth.

Follow-up required

- yes
- no

Clearly there is an ethical obligation to ensure that any findings which MAY point to a serious or life threatening condition are appropriately dealt with.

1.1.7 Diagnostic criteria for the assessement of dentures status

Partial dentures

Does the subject have a partial denture which he/she normally wears?
- Yes 1
- No 0

Does the partial denture replace all missing teeth?
- Yes 1
- No 0

If extractions have been undertaken since the denture is constructed, without alteration to the denture, score "no". This question does not mean that the denture has to replace third molars, or even second molars for that matter, but refers to gaps that are unfilled for the reason given above.

Are any natural anterior teeth missing which are replaced by the denture?

- Yes
- No

Does the denture provide additional posterior function?

- Yes
- No

This should be coded as "yes" if the denture has any contact with an opposing natural posterior tooth or denture.

Has the subject ever had a partial denture which could not be, or is not worn?

- Yes 1
- No 0

The denture should only be assessed if it is ever actually worn. It does not have to be in the mouth during a visit provided the subject wears it on some sort of regular basis. The examiner can probe regarding usage. It should not be scored if it resides only in a drawer and is never used.

Kennedy Class

-I (two free end saddles)
-II (one free end saddles)
-III (no free end saddles, one or more posterior teeth replaced)
-IV (anterior teeth only replaced)

Material

- Acrylic only
- Acrylic+ clasps
- Metal based

Support

- Tissue
- Tooth only
- Both

Dentures are coded as tooth only where there are **bounded saddles only**, and where these are completely supported by the teeth at either end.
Note that sometimes support is provided by a lingual plate or a dental bar, as well as by occlusal rests, and this should be taken into account when choosing the appropriate code.

Retention

- Adequate
- Inadequate
- Unrecordable

Where clasps have fractured or no longer serve any useful purpose "tissue /friction" is the correct option.

Defects

The defects refer to actual physical defects of the substance of the denture, not ot any fault which has already been scored.

Complete Dentures

Each denture or set of dentures will be assessed according to the criteria given below. The dentures to be assessed are the ones that the patient normally wears.

Does the subject have a complete denture which he/she normally wears?
- Yes 1
- No 0

Ridge form

- Adequate
- Poor

Adequate ridges are where there is a definite bony ridge which should resist lateral and anterio-posterior movement of the dentures, but the ridge may be relatively low or irregular. Poor ridges are those which are atrophic, flabby or inverted.

Matching set

-yes
-no

This refers to wheter the dentures which are normally worn are made to match each other. Where there is any doubt this question should be scored as yes.

Are the complete dentures done by the dentist?

-Yes
- No

If the dentures were done by others beside a qualified dentist, this question should be scored as no.

Occlusal wear

- Satisfactory
- Excessive
- Unrecordable

Upper and lower should be scored separately. Excessive wear of the denture teeth is where all occlusal morphology is lost on the posterior teeth, or only the remnants of the fissure pattern remain. Alternatively, wear of the anterior teeth, such that over one third of the crown height is lost is also considered excessive.

Adaptation (stability)

- Adequate
- Inadequate
- Unrecordable

Index fingers and thumbs are placed either side of the premolars and rotatory, and lateral forces applied. Where movement over the tissues is greater than considered acceptable, taking into account the denture bearing area, then the adaptation is considered inadequate. Clearly the denture bearing areas should be examined prior to this examination.

Retention

- Adequate
- Inadequate
- Unrecordable

Upper: Index fingers are carefully placed in the premolar areas, taking care not to stretch the cheek excessively and break the peripheral seal, and gentle vertical downward pressure exerted. Retention is adequate when resistance to removal is felt and when there is audible or tactile evidence of the peripheral seal being broken.

Lower: Index finger and thumb of one hand are used to grip either side of the central incisors and gentle upward force exerted. Retention is adequate when some resistance to removal is felt. No evidence of the seal breaking is required.

Defects

- Missing anterior or first premolar tooth
- Missing posterior teeth
- Fractured or deficient base
- Repair/rebase
- Requires remake
- Rubber suction

This refers to actual physical defects of the substance of the denture, not to any fault which has already been scored.

1.2 Need for treatment

The criteria for treatment need is adapted from a standard WHO oral health assessment form (WHO, 1987) using the following criteria:

1.2.1 Need for dental treatment

Criteria for diagnosis for both crown and root

Code	*Description*
0	None; not treatment required
1	Caries arresting; remineralised lesion with no treatment required
2	One surface filling; one surface filling required due to caries
3	Two or more surface fillings; included separate or compound fillings or proximal filling involving occlusal opening
4	Crown or bridge abutment; crown required in case of large carious lesion or loss of majority of tooth crown without pulp involvement
5	Bridge element; pontic of bridge replacing missing tooth
6	Pulp care; pulp treatment probably required prior to restoration or crown
7	Extraction; toogh extraction required due to : loss of crown that cannot be restored, retained root, wevere loose or funcionless, impaction, prosthetic or orthodontic reason
8	Need for scaling
9	Excluded tooth; tooth that cannot be examined
10	Need for other care (Specify)

1.2.2 Need for dentures

Denture status is evaluated using the following criteria and code:

Code	*Description*
0	No denture needed -either because of a completely or satisfactorily intact dentition or the denture is worn and satisfactory
1	Need for full denture, either from edentulous, the denture being worn is unsatisfactory, missing teeth, occlusal wear, inadequate retention, inadequate stability
2	Need for partial denture - either from insufficient dentition or the denture being worn is unsatisfactory, missing teeth, occlusal wear inadequate retention, inadequate stability
3	Need to replace or repair full denture- need repair due to a crack, a missing piece or need for reline

4	Need to replace or repair partial denture- need repair due a missing piece or need for extension, need for reline, aesthetic inadequacy

NB: For partial dentures, basic clinical judgements based on prognosis of abutments shoud be applied e.g. mobility, attachment loss, position or supporting structure and space ratio, oral hygiene status.

1.2.3 Need for bridges

The need for bridges is evaluated using the following criteria and code:

Code	*Description*
0	No bridge needed
1	One new bridge needed
2	2 or more new bridges needed
3	One replacement bridge needed
4	2 or more bridges needed

NB: Basic clinical judgements based on prgnosis of abutments shoud be applied e.g. mobility, attachment loss, position or supporting structure and space ratio, oral hygiene status.

1.2.4 Need for immediate care

Conditions needing immediate care

There is a need for immediate care if pain, infection or serious illness will result unless treatment is provided within a certain period of time, such as; oral cancer or precancerous lesions, fracture of the jaw, periapical abscess, acute necrotizing ulcerative gingivitis, gross caries.

APPENDIX 6

CASE REPORTS OF OLDER PEOPLE WITH DIFFERENT OIDP SCORES

The following section gives some examples of the older individuals with different OIDP scores. The OIDP scores were grouped into three levels: low oral impact, moderate oral impact and high oral impact.

Low oral impact (OIDP score < 8.00)

Case 1 *OIDP score = 5*

A female aged 64 who was a club member, had high education, but was in a low income category. She reported having chronic pain, bone and joint problems and had some problem walking upstairs but had no other physical disability.

She had one anterior tooth and 10 posterior teeth missing. Her DMFT score was 13. She had loss of attachment of more than 6 mm on one tooth and had no teeth with mobility. She did not wear any dentures.

She reported that during the past 6 months, oral problems had an impact only on eating. The problem occurred on a regular basis which was every day or nearly every day (frequency score = 5). The eating problem had a fairly minor effect on her every day life (severity score = 2).

OIDP score = [eating (5 × 2)] 100/200 = 5

Case 2 *OIDP score = 7*

A female aged 64, a club member, had high education and high income. She had chronic pain, neurological problems, heart disease, bone and joint problems. She had no physical disability.

She had DMFT score of 16. She had 13 missing posterior teeth, 3 filled teeth, no coronal or root caries. She had no tooth with loss of attachment of 6 mm or more and had no tooth with mobility. She wore an upper partial dentures for 1 year.

She reported having difficulties from oral disorders which affected her daily performances on eating, maintaining emotional status and enjoying contact with people. The two difficulties, eating and maintaining emotional status occurred on regular basis. She had eating problem about once or twice a week (frequency score =3) and problem with maintaining emotional status about once or twice a month (frequency score = 2). The problem with enjoying contact with people occurred only for part of the period with the total length of more than 5 days but not more than a month (frequency score = 2). Oral problems had a fairly minor effect on all the three performances (severity score = 2).

OIDP score = [eating (3 × 2) + enjoy contact with people (2 × 2) + maintain emotional status (2 × 2)]100/200 = 7

Moderate oral impact (OIDP score 8.00-15.99)

Case 3 *OIDP score = 10*

A male aged 74, not a club member, had low education and low income. He had chronic pain, gastrointestinal problem and bone and joint problems. He had no physical mobility.

He had 31 missing teeth of which 12 were anterior and 19 were posterior. His DMFT score was 31. The only tooth left had loss of attachment of more than 6 mm but was not mobile. He did not wear any dentures.

He reported that his oral problem affected only one of his daily activities which was speaking. This problem occurred on a regular basis every day or nearly every day (frequency score = 5). It had a fairly severe effect on his daily life (severity score = 4).

OIDP score = [eating (5 × 4)] 100/200 =10

High oral impact (OIDP score >16.00)

Case 4 *OIDP score = 17.5*

A male, aged 71, not a club member, had high education and low income. He had heart disease and bone and joint problem. He could not walk up stairs.

He was edentulous and did not wear full dentures. He reported that his oral problems caused him difficulties with eating and maintaining emotional status. These two difficulties occurred on a regular basis which was every day or nearly every day (frequency score = 5). The oral problems had severe effect on his eating performance (severity score = 4) while they had a moderate effect on emotional status (severity score = 3).

OIDP score = OIDP score = [eating (5 × 4) + maintain emotional status (5 × 3)]100/200 = 17.5

Case 5 *OIDP score = 20*

A female subject age 64, a club member, had high education with low income. She had chronic pain, gastrointestinal problem and diabetes mellitus. She had no physical disability.

She had DMFT score of 22. She had 3 decayed, 19 missing teeth, 6 anterior and 13 posterior teeth. She had 12 remaining functional teeth. Of these remaining teeth, 3 had loss of attachment of 6 mm or more and tooth mobility was detected in 7 teeth. She did not wear any dentures.

She reported that her oral problems caused her some difficulty with eating. The oral problems affected the stabilisation of her usual emotional state and affected her performances in smiling, laughing and showing teeth. These different performances were affected on a regular basis which was every day or nearly every day (frequency score = 5). The oral problems had a moderate effect on her eating and emotional status (severity score = 3) while they had a fairly minor effect on smiling, laughing and showing teeth without embarrassment (severity score = 2).

OIDP score = [eating (5 × 3) + maintain emotional status (5 × 3) + smiling (5 × 2)] 100/200 = 20

Case 6 *OIDP score = 26*

A female, aged 66, a club member, had low education and low income. She had bone and joint problems but had no physical disability.

She was edentulous and did not wear full dentures. She reported that her oral problems caused her difficulties in eating, enjoying contact with people, maintaining emotional status and smiling, laughing and showing teeth without embarrassment The two difficulties, eating and maintaining emotional status occurred on a regular basis which was every day or nearly every day (frequency score = 5). The difficulty about enjoying contact with people occurred less often than once a month (frequency score = 1). The problem with smiling, laughing and showing teeth without embarrassment occurred only for part of the period with the total length of more than 5 days

but not more than a month (frequency score = 2). Oral problems had a very severe effect on her eating performance (severity score = 5), a moderate effect on enjoy contact with people, maintain emotional status and smiling (severity score = 3).

OIDP score = [eating (5 × 5) + enjoy contact with people (2 × 3) + maintain emotional status (5 × 3) + smiling (2 × 3)]100/200 = 26

Case 7 *OIDP score = 78*

A female subject aged 69, not a club member, had low education and low income. She had chronic pain, neurological, bone and joint problems. She had no physical mobility problem.

She had 20 missing teeth, 8 in anterior and 12 posterior. Her DMFT score was 20. She had no caries on the coronal or root surfaces. She had 12 remaining functional teeth in which 11 had loss of attachment 6 mm or more and one was mobile. She did not wear dentures.

She reported that her oral problems caused her difficulties in all aspects of daily performances which were eating, speaking clearly, cleaning teeth, doing light physical activities, going out, sleeping and relaxing, enjoying contact with other people, maintaining her usual emotional state without being irritable and smiling, laughing and showing teeth without embarrassment. All of the problems affected her every day or nearly every day (frequency score = 5). Most of the problems had a very severe effect on her daily life

(severity score = 5), except the effects on maintaining emotional state and smiling, laughing or showing teeth where they had a fairly severe effect (severity score = 4). Oral problems only had a very minor effect on speaking (severity score = 1).

OIDP score = [eating (5 × 5) + Speaking (5 × 1) + Cleaning teeth (5 × 5) + doing physical activities (5 × 5) + maintain emotional status (5 × 4) + sleeping and relaxing (5 × 5) + smiling (5 × 4)]100/200 = 78

APPENDIX 7

THE 6-ITEM ORIENTATION-MEMORY-CONCENTRATION TEST

This 6-items Orientation-Memory-Concentration Test is modified from the original version of the Blessed Information-Memory-Concentration (BIMC) test which has 26-items (Blessed et al, 1968) to make this test more practical for field use. A six-item Orientation-Memory-Concentration test was chosen to assess the cognitive impairment. This test is intended to measure three cognitive components: orientation for time, concentration, and recall. Scoring was in terms of errors made, and errors were weighted according to a regression-derived formula.

This test included these 6 orientation questions, year, month, recite months backwards, the name and address memory phrase, the time of day, and counting from 20 to 1.

The questions and how to calculate the weighted error score

Items	Maximum error	Score[a]	Weight
1 What *year* is it now?	1	____	4 =___
2 What *month* is it now?	1	____	3 =___
Memory phrase — Repeat this phase after me: John Brown, 42 Market Street, Chicago			
3 About what *time* is it? (within 1 hour)	1	____	3 =___
4 *Count* backward 20 to 1	2	____	2 =___
5 Say the months in reverse order	2	____	2 =___
6 Repeat the memory phrase	5	____	2 =___

[a]Score of 1 or each incorrect response;

Weighted error score = sum of weighted score of each item, maximum weighted error score = 24