

**CONTEXTUAL EFFECT ON MENTAL HEALTH AMONG  
ELDERLY PEOPLE IN RURAL KANCHANABURI DSS,  
THAILAND**

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ABSTRACT

Global population is ageing and Thailand has one of the fastest growing ageing populations in this region. Combined with this, depression has become a major mental health problem for older people. Contextual characteristics often play a significant role on the mental health of older people. However, research on contextual influence on older adult's mental health, specifically, is limited. The objective of this study was to investigate whether contextual characteristics have an effect on the mental health of older people living in Kanchanburi Demographic Surveillance System (KDSS), Thailand. The data were used from 'Survey on health and social support among the older adults' in KDSS' in 2006, and 'Survey on migration and health in KDSS' in 2005'.

Depression was measured by a 12 item questionnaire of Thai validated Euro-D scale among 1001 respondents. The questions were on depression, pessimism, wishing to die, guilt, sleep disturbance, loss of interest, irritability, eating problems, fatigue, problem in concentration, lack of enjoyment, and tearfulness. Among the respondents 28.5% had depression. Univariate, bivariate, and multivariate analysis (logistic regression) and multilevel analysis were done. Contextual characteristics (village infrastructure, environmental problems, and community development programs) did not affect the depression of the elderly people significantly living in KDSS area. Individual characteristics such as female gender, infirmity, disability, and serious life events significantly affected the mental health of older people along with the household characteristics of living with grandchildren.

KEY WORDS: OLDER PEOPLE / DEPRESSION / EURO-D SCALE /  
CONTEXTUAL CHARACTERISTICS / THAILAND

124 pages

## CONTENTS

	<b>Page</b>
<b>ACKNOWLEDGEMENTS</b> .....	<b>iii</b>
<b>ABSTRACT</b> .....	<b>iv</b>
<b>LIST OF TABLES</b> .....	<b>viii</b>
<b>LIST OF FIGURES</b> .....	<b>x</b>
<b>LIST OF ABBREVIATIONS</b> .....	<b>xi</b>
<b>CHAPTER I INTRODUCTION</b> .....	<b>1</b>
1.1 Background and rationale .....	1
1.2 Research question .....	9
1.3 Research objectives .....	9
1.3.1 Ultimate objective .....	9
1.3.2 Immediate objectives .....	9
1.4 Strength of the study .....	10
<b>CHAPTER II LITERATURE REVIEW</b> .....	<b>11</b>
2.1 Ageing .....	11
2.1.1 Current definitions .....	12
2.1.2 Global ageing .....	12
2.1.3 Ageing in Thailand .....	15
2.2 Mental health .....	17
2.2.1 Mental disorder .....	18
2.2.2 Depression .....	18
2.2.3 Depression in old age .....	20
2.2.4 Measurement of depression .....	21
2.3 Contextual characteristics and depression .....	23
2.3.1 Infrastructure facilities .....	25
2.3.2 Environmental problems .....	26
2.3.3 Community development programs .....	27

## CONTENTS (cont.)

	<b>Page</b>
2.4 Theoretical perspectives .....	27
2.5 Individual characteristics and depression .....	31
2.5.1 Age.....	31
2.5.2 Gender.....	32
2.5.3 Marital status.....	33
2.5.4 Education .....	33
2.5.5 Employment.....	34
2.5.6 Physical health.....	35
2.5.6 Serious life events.....	36
2.6 Household characteristics and depression .....	37
2.6.1 Living arrangement.....	37
2.6.2 Migration of children .....	37
2.7 Contextual characteristics in KDSS .....	38
2.8 Conceptual framework .....	41
2.9 Hypothesis .....	41
<b>CHAPTER III METHODOLOGY .....</b>	<b>43</b>
3.1 Source of data .....	43
3.2 Methods .....	44
3.3 Description of variables .....	45
3.4 Measurement of variables .....	45
3.5 Unit of analysis .....	49
3.6 Method of analysis .....	50
3.7 Multilevel analysis .....	50
3.7.1 Rationale for use multilevel analysis .....	50
3.7.2 Difference with other techniques .....	51
3.7.3 Other applications of multilevel models .....	51

## CONTENTS (cont.)

<b>CHAPTER</b>	<b>IV FINDINGS .....</b>	<b>53</b>
	4.1 Description of sample .....	53
	4.1.1 Individual characteristics .....	53
	4.1.2 Household characteristics .....	58
	4.1.3 Village characteristics .....	59
	4.2 Bivariate analyses .....	62
	4.3 Logistic regression .....	67
	4.4 Mulilevel analysis.....	
	Individual and household model (Level I) .....	67
	Individual, household, and community model (Level II) .....	71
<b>CHAPTER</b>	<b>V DISCUSSION, CONCLUSION</b>	
	<b>AND RECOMMENDATION .....</b>	<b>79</b>
<b>REFERENCES</b> .....		<b>87</b>
<b>APPENDIX</b> .....		<b>108</b>
<b>BIOGRAPHY</b> .....		<b>124</b>

## LIST OF TABLES

<b>Table</b>	<b>Page</b>
1.1 Total population and age structure of population of Thailand, 2005-2025 .....	2
3.1 List of questions to measure depression .....	43
4.1 Socio-demographic characteristics of elderly people in rural KDSS, Thailand, 2006 .....	54
4.2 Living arrangement of elderly people and their children's migration status rural KDSS, Thailand, 2006.....	58
4.3 Contextual characteristics of villages (n=90) .....	59
4.4 Depression of elderly people with individual characteristics in rural KDSS, Thailand, 2006.....	62
4.5 Depression of elderly people with living arrangement and children's migration in rural KDSS, Thailand, 2006.....	64
4.6 Depression of elderly people with selected infrastructure facilities of KDSS villages, Thailand, 2006.....	65
4.7 Depression of elderly people with selected environmental problems of KDSS villages, Thailand, 2006 .....	66
4.8 Depression of elderly people with selected community development programs in KDSS villages, Thailand, 2006 .....	66
4.9 Matrix of Pearson Correlation Coefficients between 10 independent variables .....	67
4.10 Adjusted odds ratio (OR) of depression among older people by selected individual characteristics in KDSS, Thailand in 2006.....	69
4.11 Matrix of Pearson correlation coefficients between 10 independent variables .....	70

**LIST OF TABLES (cont.)**

<b>Table</b>	<b>Page</b>
4.12 Effect of individual and household characteristics on depression of elderly people in rural KDSS, Thailand, 2006.....	71
4.13 Matrix of Pearson correlation coefficients between 23 independent variables .....	72
4.14 Effect of individual, household and contextual characteristics .....	77

## LIST OF FIGURES

<b>Figure</b>	<b>Page</b>
1.1 Speed of population ageing in selected countries .....	2
1.2 Percentage of population 60 years or over in selected countries of Asia .....	3
1.3 Feminization of elderly population in selected countries of Asia .....	4
2.1 Population pyramid of Thailand from 1970-2030 .....	15
2.2 Proportion of elderly people aged 60 years and over in Thailand, 1960-2030 .....	16
2.3 Percentage of currently married population aged 60 years and over (2009) .....	16
2.4 Population support ratio in selected countries (15/64/65+) .....	17
2.5 Relations between key neighborhood characteristics and adult depression ...	31
2.6 Conceptual framework .....	42
4.1 Prevalence of depression .....	54
4.2 Infirmary .....	54
4.3 Disability .....	55
4.4 Serious life events .....	56
4.5 Self assessed health .....	56
4.6 Infrastructure facility .....	58
4.7 Environmental problems .....	59
4.8 Community development programs .....	59

## LIST OF ABBREVIATIONS

CES-D scale	Centre for Epidemiological Studies Depression Scale
DALYs	Disability Adjusted Life Years
GMS	Geriatric Mental State
IPSR	Institute for Population and Social Research
KDSS	Kanchanaburi Demographic Surveillance System
MMSE	Mini-Mental-State Examination
NSO	National Statistical Office
OTOP	One Tambon One Product
PTSD	Posttraumatic Stress Syndrome
ROC	Receiver Operating Characteristic
SES	Socioeconomic Status
THPF	Thai Health Promotion Foundation
TMSE	Thai Mental State Examination
WHO	World Health Organization
UNFPA	United Nations Population Fund
UN	United Nations
YLD	Years lost due to disability
YLDs	Years lived with disability

# CHAPTER I

## INTRODUCTION

### 1.1 Background and rationale

Population ageing is an inevitable result of the demographic transition associated with declining birth and death rates. This trend holds true in Thailand, where demographic changes are determined by past trends in fertility, mortality, and migration (Kespichayawattana & Jitapunkul, 2009; Muangpaisan & Assantachai, 2009). By the end of the twentieth century Thailand had experienced a transition toward population ageing as a major consequence of low fertility and increased longevity (Prachuabmoh & Mithranon, 2003).

The total fertility rate (TFR) of Thailand declined from over 6 children per woman in the early 1960s (Knodel et al., 1987) to 1.5 children per woman in 2010 (IPSR, 2010). Life expectancy at birth increased from 58.0 years for males and 63.8 years for females in 1975 (NSO, 1997) to 69.5 for males and 76.3 for females in 2010 (IPSR, 2010). As a result of these changes, the proportion of the elderly population rose from 4.6 per cent in 1960 to 9.5 per cent in 2000.

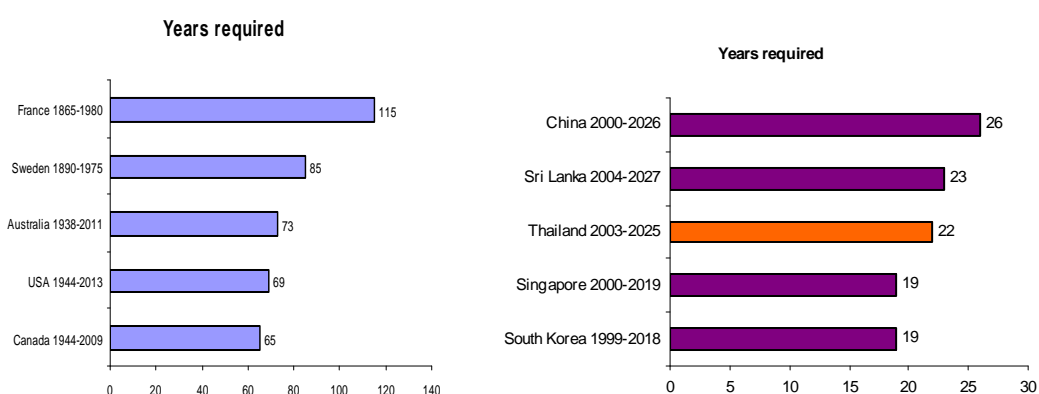
Between 2005 and 2025 the elderly population in Thailand is projected to increase from 10.3 per cent to 19.8 per cent while the populations of children and working age people are projected to decrease from 23 per cent to 16 per cent and from 66.1 per cent to 64.1 per cent, respectively (Table 1.1) (IPSR, 2006). The pace of population aging in Thailand has proceeded far faster than has been true historically for developed countries in the West (Knodel & Chayovan, 2009). Both in absolute numbers and proportionately, the population aged 60 years and over has increased more rapidly than has the overall population.

**Table 1.1 Total population and age structure of the population of Thailand, 2005-2025**

Year	Total Population	Age group (%)		
	(In thousands)	0-14	15-59	60 and over
2005	62,162.6	23.0	66.7	10.3
2010	6,365.2	20.7	67.4	11.8
2015	64,647.6	19.0	67.0	14.0
2020	65,138.3	17.2	66.0	16.8
2025	65,088.8	16.0	64.1	19.8

Source: Gray and Chamrathirong, 2009

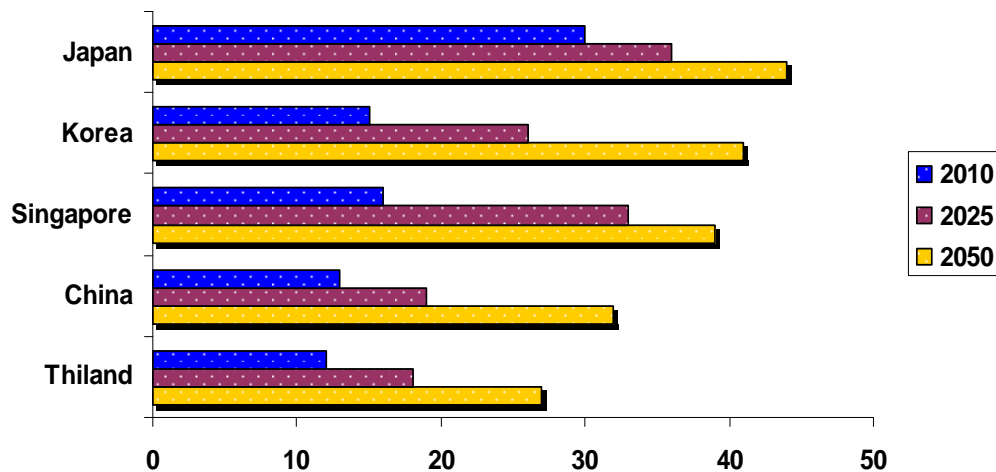
The United Nations (UN) projects that the proportion of elderly in Thailand will be about 14.4 per cent in 2020 (UN, 2001). But while in developed countries it will have taken more than half a century for the proportion of the elderly to grow from 7 per cent to 14 per cent, in Thailand this increase has occurred within 22 years, an even faster rate than in Japan, where it took 25 years for the elderly population to increase 7 per cent to 14 per cent (Chayovan, 2000). Figure 1.1 compares selected developed and developing countries in terms of the number of years or expected number of years for the per cent of the population aged 65 or over to rise from 7 per cent to 14 per cent. Compared to other countries in Asia the percentage for Thailand may be relatively low but is expected to increase.



**Figure 1.1 Speed of population ageing in selected countries**

Source: Kinsella and Phillips (2005)

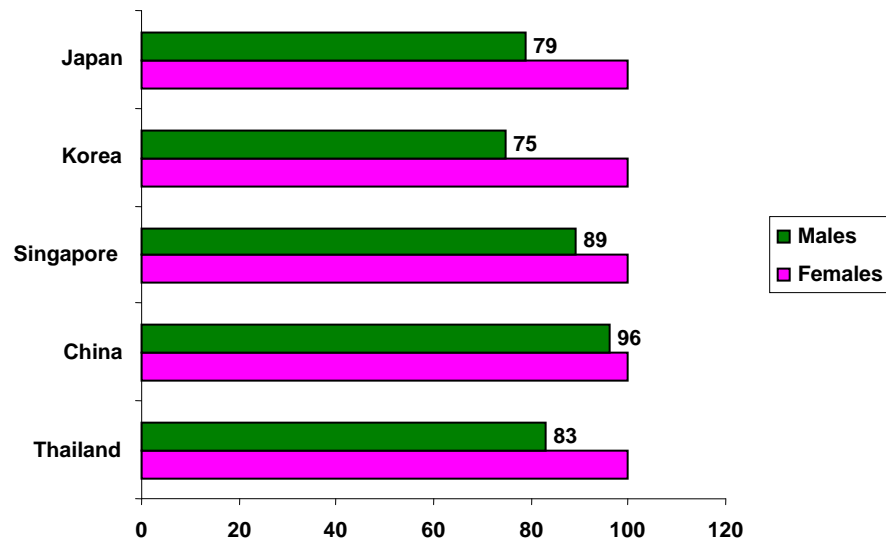
Figure 1.2 compares the population of those 60 years and above in Thailand with the population of those 60 years and above in Japan, Korea, Singapore, and China in 2010, 2025, and 2050. For all four countries, the population of those 60 years and above will increase more than it will for Thailand, although the proportion of Thai elderly will be more than 25 per cent in the year 2050.



**Figure 1.2 Percentage of population 60 years or over in selected countries of Asia**

Source: UN, 2008

Another feature of ageing population is the feminization of the elderly population (meaning that there are more female elderly than male elderly). This phenomenon is evident in Thailand, Japan, and the Republic of Korea. In these countries male-to-female sex ratios at ages 60 years and older and 80 years and older are significantly lower. In Thailand, females outnumber males and constitute the major portion of the older population. Since women have longer life expectancy, the ratio of males to females declines with age, and as a consequence females outnumber males in older age groups (Haseen & Punpuing, 2010). In 2005, more than half (50.6 per cent) of the older population were female, and females made up 70 per cent of the oldest old (UNFPA, 2006). Figure 1.3 shows the feminization of the elderly population in selected countries of Asia including Thailand.



**Figure 1.3 Feminization of elderly population in selected countries of Asia**

Source: UN, 2008.

Considering this trend, the population of Thailand will be noticeably older in the future, provided fertility remains low and life expectancy continues to improve. Such a shift in age structure will place new demands on individuals, families, communities, and government to meet the needs of an increasingly elderly population (Prachuabmoh & Mithranon, 2003). And since Thai families have fewer children, there will be fewer traditional caregivers for elderly parents. The situation is aggravated by the fact that young people are struggling to find employment. Thailand's major economic development has occurred in urban areas and young people often migrate to the cities, thus distancing themselves from parents, siblings, relatives, and communities. There is a concern in Thai society that these changes might jeopardize the custom of reciprocity of care for parents (Choowattanpakorn, 1999).

The coming generation of older Thais will spend their elderly years in a different social and economic environment than exists today. The impact of ongoing social and economic change on the well-being of future elderly is often a subject for speculation. But the elderly of the future who will experience these changes will differ considerably from the elderly of today. The next generation of elderly Thais will differ from the present generation in terms of their family size and education (Knodel & Chayovan, 2009).

As people age, their social roles and relationships change. The way older people interact in their social world of family, friends, and neighbors is affected by physiological, psychological, and social changes. For example, with children gone from the home and without daily contacts with co-workers, older people lose a critical context for social involvement. At the same time, their need for social support may increase because of changes in cognitive, emotional status, and health. Such gaps between needs and environmental opportunities can result in stress for some people (Hooyman & Kiyak, 1996). Society can be considered as comprised of social institutions that exert a significant impact on individual relationships. Local community, neighbors, and other residents living in the same area represent social contexts that play a relevant role in many older people's every day, contributing to their well-being and quality of life. Differences in this regard exist, however, between rural and urban contexts. Relationships with neighbors and community participation among the elderly differ between rural and urban residents. Older people in rural areas seem to rely on broader or stronger networks of social support than is the case for those in urban areas (Bond et al., 2007).

As ageing has been very fast in low and middle income countries, mental health illnesses such as depression in the elderly are emerging as new public health problems in these countries, where adverse social conditions are more pronounced. Mental health conditions affect millions of people in the world. The World Health Organization (WHO) estimates that 151 million people suffer from depression and 24 million from Alzheimer and other dementias. Around 844 thousand people die by suicide every year in all age group. In low-income countries, depression represents almost as large a problem as does malaria (3.2% versus 4.0% of the total disease burden), but the funds being invested to combat depression are only a very small fraction of those allotted to fight malaria (WHO, 2010).

In the developed world depression is one of the most common psychiatric conditions among the elderly, and it has been observed that those with depressive symptoms are at greater risk for functional disability, use of health services, and mortality (Carvalho et al., 2008). We must remember that mental health is more than the mere lack of mental disorders. The positive dimension of mental health is stressed in the WHO's definition of health as contained in its constitution, namely, that "health

is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.” Measures of mental health include subjective well-being, perceived self-efficacy, autonomy, competence, intergenerational dependence, and recognition of the ability to realize one’s intellectual and emotional potential. It has also been defined as “a state of well-being whereby individuals recognize their abilities, are able to cope with the normal stresses of life, work productively and fruitfully, and make a contribution to their communities.” This is about enhancing competencies of individuals and communities and enabling them to achieve their self-determined goals (WHO, 2003).

Mental health problems affect society as a whole, and not just a small, isolated segment. They are therefore a major challenge to global development. No group is immune to mental disorders, but the risk is higher among the poor, the homeless, the unemployed, persons with low education, victims of violence, migrants and refugees, indigenous populations, children and adolescents, abused women, and the neglected elderly. For all individuals, mental, physical and social health are closely interwoven, vital strands of life. As this interdependent relationship grows, it becomes ever more apparent that mental health is crucial to the overall well-being of individuals, societies, and countries. Unfortunately, in most parts of the world, mental health and mental disorders are not accorded anywhere the same importance as physical health. Rather, they have been largely ignored or neglected (WHO, 2003).

As fertility and mortality have decreased and people’s life expectancy increased, there is growing concern in Thailand over the mental health of the elderly as well as other age groups. Over the past decade several studies have been conducted to measure the prevalence of depression among the Thai population in different age groups, occupations, disease conditions, and among victims of environmental disasters in different settings such as hospitals, academic environments, communities, or shelters. Various standardized and mostly validated measurement scales were used for measuring the prevalence of depression (Abas et al., 2009a, Silpakit et al., 2007; Kanchanatawan et al., 2006; Train The Brain Forum Committee, 1993, 1994). Besides studies measuring depression, research was conducted to understand the relationship of depression among elderly people and the Thai socio-cultural context. For example, Abas et al. conducted a study of elderly people living in the Kanchanaburi

Demographic Surveillance System (KDSS) in Kanchanaburi province and examined the effect of migration of children (2009a), psychological well-being, and physical impairments (2009b) on their mental health. Another study by Sukying (2008), found that depression of Thai elderly people was strongly related to insomnia. Soonthornchaiya et al. (2003) conducted a qualitative study among Thai elderly immigrants and defined depression as “feeling disappointment and pressure in the mind and including symptoms of isolation, heart pounding, and dissatisfaction.”

From the opposite perspective, studies were conducted to examine how happy elderly people were in Thailand. Recently a study was done in various senior clubs of Chonburi Province to determine the level of happiness. More than half (51.3 per cent) of the respondents perceived their level of happiness as good or fair; the rest (49.7 per cent) perceived their happiness level as poor (Sumngern et al., 2010). The studies which were conducted in Thailand were mostly cross-sectional and the results show that depression is present in different age groups in Thailand and that the elderly also suffer from depression. But there are very limited research on mental health of elderly people and context.

In recent years, the idea that contextual characteristics such as neighborhood characteristics, build environments, or village characteristics affect health has gained increasing acceptance among researchers and policymakers as a result of studies that have come out showing that contextual characteristics are important predictors for mental health of elderly people (Wight et al., 2008). The elderly are more sensitive to their physical surroundings and are more vulnerable than younger adults to the health effects of environmental degradation and pollution (Zeng et al., 2010). Environmental pollution (air, noise and excessive light), crowdedness or lack of space exerts effect on health outcomes partly through psychological mechanisms mediated via the neuroendocrine system to increase allostatic load (Woo et al., 2010).

Several studies have also found associations between neighborhood of residence and health outcomes in the general population (Yen et al., 2009). Perceived neighborhood environment is important for health and well-being. A number of studies have shown a link between an individual's perception of his/her neighborhood environment and health, psychiatric as well as self-reported general and physical

health (Borell et al., 2004). Perceptions of neighborhood and housing problems, lower access to private transport, poor housing, lack of social and health services, and lack of health-related recreational facilities were the mechanisms studied to explain the relationship (Wong et al., 2010).

The effect of neighborhood on physical and mental health was also examined for different types of individual and household characteristics (Jackson et al., 2009). Psychological, social, cultural, and material factors played important roles in mediating the relationship between poor neighborhoods and poor health (Wong et al., 2010). As neighborhood-health research has become more established, the mechanisms that connect place to health are gaining more attention. Such mechanisms can differ depending on the characteristics of a given population (Yen et al., 2009).

As research expands, it is worthwhile to consider specific populations such as older adults. The relationship of mental health and neighborhood is complex, and only limited work has been done to investigate specific characteristics that are linked to health outcomes, or the processes through which neighborhoods affect health (Yen et al., 2009). Research is urgently needed to examine neighborhood effects into effective public policy and programs (Jackson et al., 2009).

Kanchanaburi is a large province located in the western part of Thailand. The province shares a long border with Myanmar and contains a variety of ethnic groups and migrants from Myanmar. The province is close to Bangkok and is the location of many industries. The demographic surveillance system began in 2000 and had annual census of households in 100 sampling units comprising 87 villages and 13 urban census blocks. These were selected on ecological, socioeconomic and population criteria by stratified random sampling from the province population of 871 villages and 131 urban census blocks. The census includes a questionnaire for each household completed by the household head, for each individual household member aged 15 years or more and for each village completed by the village headmen, supplemented by a geographic information system. The 5 round surveillance data was collected from the year 2000 to 2004 Thailand. The KDSS was maintained by the Institute for Population and Social Research, Mahidol University and supported by the Wellcome Trust, United Kingdom (IPSR, 2001).

To examine the effect of contextual factors on elderly mental health in Thailand, the present study utilizes three datasets. The individual and household dataset were taken from the survey Health and Social Support among Older Adults in Kanchanaburi Demographic Surveillance System (KDSS) in Kanchanaburi province, Thailand, conducted in 2006. Village information was taken from the Migration and Health Survey conducted in 2005 by the Institute for Population and Social Research, Mahidol University. The reasons for choosing KDSS were: (1) 'The Health and Social Support Survey among Older Adults was conducted there which has different variables to identify elderly people's mental health status; (2) the KDSS has village information that allows us for examination of elderly mental health within the village context; (3) population ageing is progressing in the KDSS area; and (4) Kanchanaburi province consists of a diversified geographical area in social, economic, and ecological features and has a unique combination of both industrial and agricultural sectors.

## **1.2 Research question**

Do contextual characteristics affect the mental health of elderly people of Kanchanaburi DSS, Thailand?

## **1.3 Research objectives**

### **1.3.1 Ultimate objective**

The ultimate objective of this study is to provide evidence on the effect of contextual characteristics on mental health of elderly people for policy to ensure the quality of life of the elderly people.

### **1.3.2 Immediate objectives**

The main purpose of this study is to examine the effect of contextual characteristics on mental health of elderly people by controlling individual and household characteristics. In detail, the focus of this study is:

- a) to determine the effect of individual characteristics on mental health of elderly people
- b) to examine the effect of individual and household characteristics on mental health of elderly people
- c) to investigate the effect of contextual characteristics on mental health of elderly people

#### **1.4 Strength of the Study**

The survey on elderly was conducted in the KDSS area, which has information on mental health of elderly people and contextual characteristics. Information on mental health of elderly in a demographic surveillance system is not very common. A causal relationship between independent and dependent variables could be established. Another strength of this study is that the use of validated Euro D scale for the measurement of depression among elderly people. This scale was developed by Price et al. (1999). EURO-D scale was validated by Jirapramukpitak et al. (2009) among the Thai elderly before it was used for data collection in the KDSS area.

## **CHAPTER II**

### **LITERATURE REVIEW**

Four main sections were discussed under the literature review for this thesis. The first section described about the ageing, the second section deals with the mental health and depression, third section described contextual characteristics and other factors and their relationship with elderly depression. The final section discussed about the multilevel analysis.

#### **2.1 Ageing**

Ageing is an inevitable life process that every living organism must undergo. The ageing process is characterized by a gradual change in an organism that leads to increased risk of weakness, disease, and death. The changes can be at the level of the cell, organ, or whole organism. There is an overall decline in biological functions such as immunity, muscle strength, and memory (Desai et al., 2010). Normal ageing is not a disease, but denotes a series of progressive changes associated with increasing risk of mortality. But not all age-related changes involve mortality. For example, hair turns gray with advancing age, but this does not diminish survival prospects. On the contrary, other changes lead to reduced functional capacity or ability to perform a job properly. For example, as blood vessels age, atherosclerosis develops. Therefore the risk of stroke or heart attack increases (Moody, 2010).

Multiple changes occur in the ageing brain, leading to age related emotional disorder. Cortical receptor (brain) plays critical role in anxiety and depressive like behaviour. The older adults are more likely to have major depression biologically as a result of less blood supply in the brain. Old age results in physical, psychological and cognitive changes like cardiovascular, respiratory, digestive malfunctioning, depression, impaired memory functioning, sleep disturbance and so on (Hooyman & Kiyak, 1996). Psychological ageing process includes changes in

personality, mental functioning, and sense of self during adult years. Some changes are considered a normal part of adult development, some are the result of physiological changes in the way the brain functions, and some psychological dimensions show little change at all in later years (Morgan & Kunkel, 1998).

Growing old is associated with many undeniable declines and losses, such as poorer health, worse working memory, slower reaction time, and ageism in the society. For many years researchers and lay people alike have believed that because of all these declines and losses, old age is characterized by depression and unhappiness. However, recent empirical findings do not support these beliefs. These findings reveal that older people enjoy the same, if not higher, levels of life satisfaction than are younger people. They also experience a more positive emotional profile (Randol, 2007).

### **2.1.1 Current definitions**

Current definition of old age is influenced by both public policy and by the rapid increase in life expectancy (Bonder & Bello-Haas, 2009). Neugarten (1996) identified two groups of older adults, the “young old”, those from 55 to 75 years, and “old-old” those 76 and older. Some definitions go further to describe a group of “oldest old” who are 85 years or older, and add a group of “middle-old” individuals aged 76 to 84. Definitions of old age must differentiate the old person (an individual) from old people (a group). And it is important to distinguish old age (a period of life) from aging (which occurs throughout life). However, it is important to keep in mind that particularly in terms of public policy, old age most often refers to those individuals 65 years or older. This definition is based on The 2003 Elderly Persons Act in Thailand defined the “elderly” as “those 60 aged years and older” (Gray & Chamratrithirong, 2009).

### **2.1.2 Global ageing**

Population ageing, the process by which older individuals become a proportionally larger share of the total population, was one of the most distinctive demographic events of the twentieth century. It will remain important throughout the twenty-first century. Initially experienced by the more developed countries, the

process has recently become apparent in much of the developing world as well. For the near future, virtually all countries will face population ageing, although at varying levels of intensity and in different time frames (UN, 2002). The dynamics of population aging vary internationally, as the drivers, such as fertility and longevity, are not uniform (Palmore et al., 2008).

Population ageing occurs when large numbers of people survive into old age and relatively few children are born. Life expectancies are high and the proportion of the population age 65 and above is high. How can we tell that population is ageing? The five commonly measures of population ageing are population pyramids, proportion aged, mean and median ages, dependency ratios, and life expectancy. Each of these measures tells part of the story of society's age. The population pyramid tells us something about the past, present and a future of a society - not only the fertility, mortality and migration trends, but also something about life in that society. A very straight forward measure of population ageing is to consider the proportion of a society that is older. Most reports of proportion aged use 65 as the marker, but some, especially those comparing countries around the world, use 60, so it is wise to be careful about the precise definition of 'proportion of aged'. The mean and the median ages are single numbers that are often used in conjunction with other measures of population ageing. Curiosity about these patterns would lead us to investigate the recent history, fertility patterns, political turmoil, natural disasters, and food shortages that might have befallen a country with unusual demographic pattern. The dependency ratios are the measures of the proportion of a population that falls within age categories traditionally thought to be economically dependent: those under 15 and over 64 years (Morgan & Kunkel, 1998).

Population ageing is likely to be one of the most significant phenomena of the 21st century with far reaching consequences for individuals, families, communities and society at large (Knodel & Chayovan, 2009). Global Population ageing is a result of the demographic transition by which both mortality and fertility decline. The growth rate of the older population is faster than that of the total population globally. Developing countries are predicted to reach the stage of an ageing society over a much shorter time than that experienced by more developed countries despite low economic development in same countries (Muangpaisan & Assantachai, 2009).

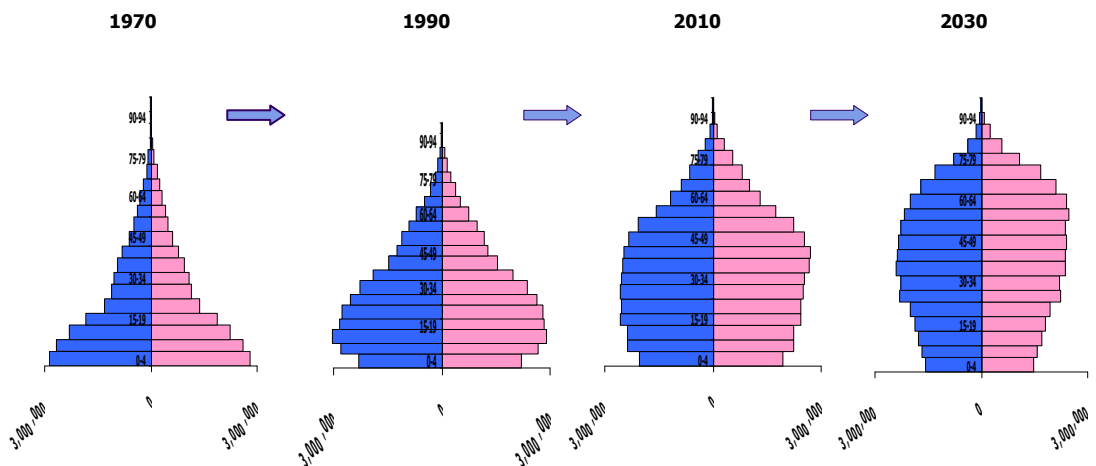
The global population aged 65 and over was estimated to be 506 million as of midyear 2008, about 7 per cent of the world's population. By 2040, the world is projected to have 1.3 billion older people accounting for 14 per cent of the total. Over half of the world's people aged 65 and over now live in developing nations (62 per cent, or 313 million people, in 2008). By 2040, this share is projected to exceed three-quarters, with the absolute number of older people in developing countries topping 1 billion (Kinsella & He, 2008). If we consider the older people aged 60 and over, in 2000, the population aged 60 years or over numbered 600 million, triples the number present in 1950. In 2006, the number of older persons had surpassed 700 million. By 2050, 2 billion older persons are projected to be alive, implying that their number will once again triple over a span of 50 years. Globally the population of older persons is growing at a rate of 2.6 per cent per year, considerably faster than the population as a whole which is increasing at 1.1 per cent annually. At least until 2050, the older population is expected to continue growing more rapidly than the population in other age groups. Such rapid growth will require far-reaching economic and social adjustments in most countries (UN, 2007).

This global ageing has some distinct characteristics. People aged 65 and over will soon outnumber children under age 5 for the first time in history. Life expectancy is increasing. Most countries show a steady increase in longevity over time. The number of the oldest old is rising. The world's population aged 80 and over is projected to increase 233 per cent between 2008 and 2040, compared with 160 per cent for the population aged 65 and over and 33 per cent for the total population of all ages. Noncommunicable diseases are becoming a growing burden. Chronic noncommunicable diseases are now the major cause of death among older people in both developed and developing countries. Family structures are changing. As people live longer and have fewer children, family structures are transformed and care options in older age may change. Patterns of work and retirement are shifting. Shrinking ratio of workers to pensioners and people spending a larger portion of their lives in retirement increasingly tax existing health and pension systems. Social insurance systems are evolving. As social insurance expenditures escalate, an increasing number of countries are evaluating the sustainability of these systems and revamping old-age security provisions. New economic challenges are emerging. Population ageing has

and will have large effects on social entitlement programs, labor supply, and total savings around the globe (Kinsella & He, 2009).

### 2.1.3 Ageing in Thailand

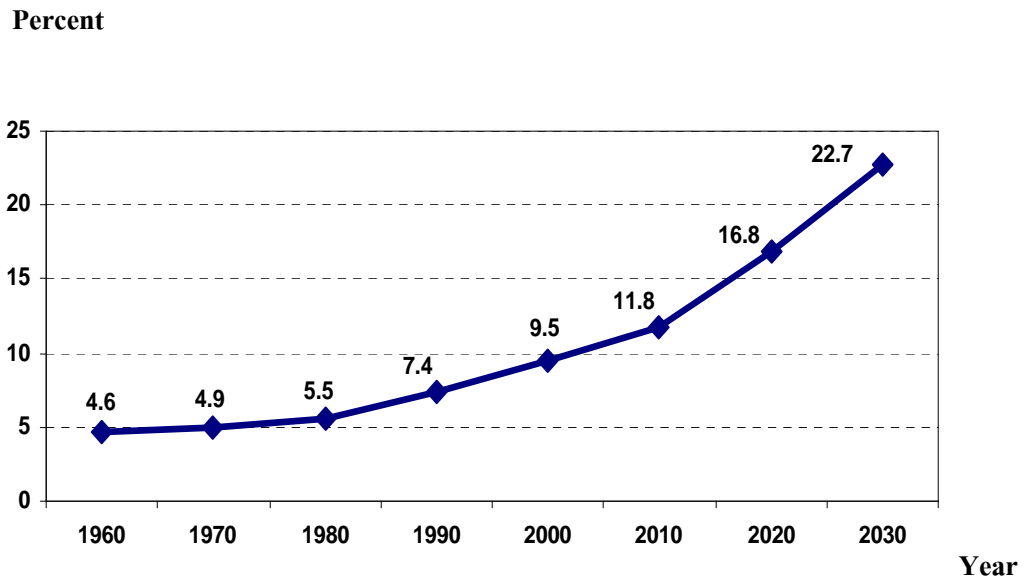
Both in absolute numbers and in proportion, the population aged 60 years and over have increased faster compare to overall population in Thailand. The population share of 5.5 per cent in 1980, about 9.5 per cent in 2000 (NSO, 1980, 2000), and will be about 14.4 per cent in 2020 (UN, 2001). Figure 2.1 shows the population pyramid of Thailand in 1970, 1990, 2010 and 2030. These pyramids clearly show how Thai population structure will be transformed from a young population to ageing population within 40 years (Figure 2.1).



**Figure 2.1 Population pyramid of Thailand from 1970-2030**

**Source:** NSO, 1960-2000, Mahidol University Population Gazette, 2007

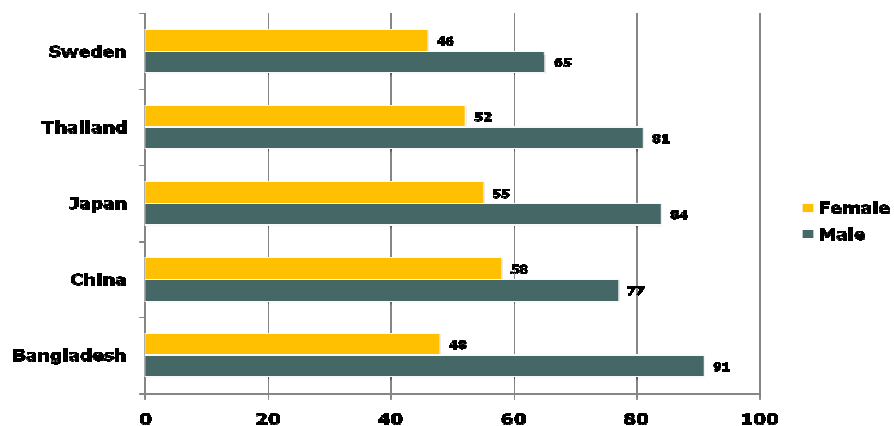
The proportion of elderly who aged 60 years and over in Thailand has been increased very fast within last 50 years (NSO, 1960, 1970, 1980, 1990, 2000; IPSR, 2007). Figure 2.2 shows that the proportion of elderly people is gradually increasing and it was below 5 per cent in the year 1970 and will be more than 20 per cent in the year 2030. The National Statistical Office has forecast that in 2020, the number of older persons will increase upto 10.8 million or equivalent of 16.8 per cent of the total population (Ministry of Social Development and Human Security, Thailand, 2007).



**Figure 2.2 Proportion of elderly people aged 60 years and over in Thailand, 1960-2030**

Source: NSO, 1960-2000, IPSR, 2007

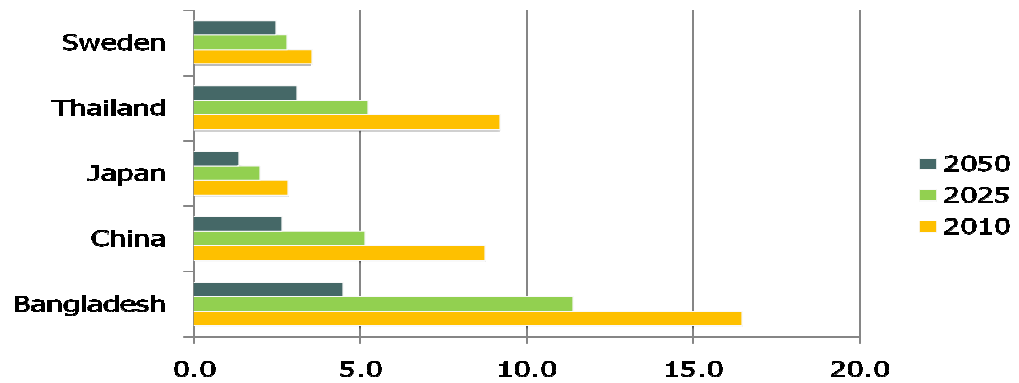
Another feature of the population ageing is interesting to note that the percentage of currently married population aged 60 years and over. If we take examples from both developed and developing countries we will find that the proportion of currently married is higher among the male population compare to female population (Figure 2.3).



**Figure 2.3 Percentage of currently married population aged 60 years and over (2009)**

Source: UN, 2009

The population support ratio (PSR) is also going to be decrease in future. It is defined as persons aged 15-64 per persons aged 65 years and over. It will happen both in developed and developing countries. For example, In Thailand the PSR is around 9 and it will be less than 5 by the year 2050 (Figure 2.4).



**Figure 2.4 Population support ratio in selected countries (15/64/65+)**

Source: UN, 2008

## 2.2 Mental health

The ‘mental health’ is defined as a state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community (WHO, 2010). American Psychiatric Association defined ‘mental health’ as simultaneous success at working, loving, and creating with the capacity for mature and flexible resolution of conflicts between instincts, conscience, important other people and reality (Shives, 1994).

According to the medical social science three factors affect the development of mental health including biological, psychological and sociological factors. They are known as the ‘Biopsychosocial’ model or BPS model (Engel, 1977). The biological factors include personal physiological function, genetic, antenatal factors, toxicity, harmful substance, malnutrition, family history illness, infectious disease, immune system and inherited characteristics. The psychological factor consists of internal factors (personality, cognition, motivation) and external factors (family, social interaction with people, socio-cultural, technological, natural-

environmental, economics and politics). Social factors are socioeconomic status, race, religion, social support, social climate, home environment, work place, smoking, drinking, dressing and major life changes. Major life changes include death of spouse or divorce (Shives, 1994; Sarafino, 1994; Nevid et al., 1999).

### **2.2.1 Mental disorder**

A mental disorder or mental health problem or mental illness refers to a group of illnesses that significantly affects person's feeling, thinking and behaviour and interaction with other people. Mental disorders are perhaps the largest class of diseases for which evidence exists of a substantial discordance between societal burden and health-care expenditures. WHO 'Global Burden of Disease Study' estimated in the mid-1990s that commonly occurring mental disorders such as major depression, bipolar depression, schizophrenia, and substance abuse are amongst the highest-ranked diseases in the world in terms of disease specific disability (Kessler & Ustun, 2008). Mental illnesses are of different types and degrees of severity and are diagnosed according to the standardized criteria.. Some of the major types are depression, anxiety, schizophrenia, bipolar mood disorder, personality disorders, and eating disorders. The most common mental illness is depression.

### **2.2.2 Depression**

Depression is the most common type of mental disorder (Morgan & Kinkel, 2001). Perhaps the strongest association between negative affect and health in late life is found with depression (Aldwin & Gilmer, 2004). Depression is a mood disorder which includes negative signs and symptoms, such as sadness, despair, anxiety, sleep disturbance, psychomotor disturbance, fatigue or loss of energy, difficulty concentrating, feelings of worthlessness or guilt, or recurrent thoughts of death (Radloff, 1977). Depression can also be defined as the primary symptom of mood disorders, such as major depressive disorder, dysthymia (mild, prolonged depression) and bipolar depression. Major depressive disorder, the most common type of major depression in older adults is characterized by persistent depression in thought and mood, loss of interest and pleasure, sleep disturbance, reduced appetite and weight loss, and low energy and fatigue. The ability to concentrate, remember, and think are

affected, and feelings of pessimism, hopelessness, and worthlessness, as well as suicidal thoughts, may also be present. These symptoms are less severe in minor depression, which is more common than major depression. Major or minor depression occurring for the first time after age 60 is referred to as *late onset depression*. Late onset depression may be precipitated by physical illness, widowhood, and other traumatic events occurring in late life. Prolonged depression, by whatever name, increases the risk of death from diseases such as myocardial infarction (Aiken, 2001).

There are another kind of classification, endogenous depression and reactive depression. In endogenous depression there is a biochemical imbalance that leads to a depressed condition. In reactive depression, events in the life of the person bring about depression. In addition, some people suffer from seasonal affective disorder; as winter approaches and the days grow shorter, they begin chronically depressed. In another type of depression, bipolar depression, a biochemical imbalance brings about emotional mood swings (Riekse & Holstege, 1996).

Depression is an important global public health problem due to both its relatively high lifetime prevalence and the significant disability that it causes. At its worst, depression can lead to suicide. Currently 121 million people worldwide are suffering from depression. It is the leading cause of disability, measured by years lived with disability (YLDs) and was the 4th leading contributor to the global burden of disease in 2000. By the year 2020, depression will reach 2nd place of the ranking of disability adjusted life years (DALYs) calculated for all ages, both sexes (WHO, 2010). In 2002, depression accounted for 4.5 per cent of the worldwide total burden of disease (in terms of disability-adjusted life years). In 2004, depression was the leading global cause of years lost due to disability (YLD) for both males and females (WHO, 2004). Every year about 850,000 people loss their life due to depression (WHO, 2010).

Several studies were conducted to measure the prevalence of depression in Thailand. These studies used different age-groups, occupation, disease condition or after natural calamities in different settings like hospital, community or shelter home for studying depression. Various standardized and mostly validated measurement scales were used. Some studies validated the scales in Thai context, for example, EURO-D, Mini Mental State, Thai mental state examination, Thai geriatric depression

scale, Clock drawing test (Jirapramkuptak, et al., 2009; Silpakit et al., 2007; Train the Brain Forum Committee, 1993, 1994; Kanchanatawan, et al., 2006). Prevalence of depression varied among different age groups across the studies. For example the prevalence of depression was 11.0 percent among displaced children living in camps after tsunami; 30.0 per cent among displaced adults after tsunami, 50.0 per cent among baccalaureate nursing students, 37.6 per cent among 8-11 years aged school students in Bangkok; 38.3 per cent among epileptic patients; 20 per cent in hospital setting; 13.4 per cent among gynecologic cancer patients of tertiary level hospital; 29.2 per cent among population 45 and older in Chiang Mai; 12.78 per cent among elderly living in the community and 78.0 per cent among HIV-positive pregnant women (Tienkrua et al., 2006; van Griensven, et al., 2006; Ross et al., 2005, 2009, Wacharasindhu & Panyyayong, 2002; Nidhinandana et al., 2007; Phabphal et al., 2007; Hengrasmee, et al., 2004; Wangtongkum, et al, 2008; Thongtang et al., 2002 Thaweboon, 1999). Other studies examined the association of depression with children's migration, psychological wellbeing, role of social support, living arrangement or place of living (Abas, et al., 2009a, 2009b; Suttajit, et al., 2010; Darawuttimaprakorn & Punpuing, 2010; Sukhatunga, et al., 1999).

### **2.2.3 Depression in old age**

Depression is a common mental health problem of old aged people and is associated with considerable morbidity. The prevalence of psychological disorders among elderly who are living in the community ranges from 15 to 25 per cent, depending on population studied and the categories of disorder examined. Institutionalized elderly could have depression from 10 to 40 per cent with mild to moderate impairments and additional 5 to 10 per cent depression due to severe impairment (Hooyman & Kiyak, 2009).

The causes for depression among elderly people are complex and multifactorial. Risk factors include female gender, low income, social isolation, loneliness, life events; absence of confiding relationships, and physical illness (Ketumarn, 2010; Walters et al., 2004). Higher population density could be associated with increased depression and anxiety in the elderly people (Walters et al., 2004). The association between area deprivation and depression in older people was also explained by

individual health, demographic, and socioeconomic factors. The depression of older people varies in urban and rural areas. Crowell (1986) found that among adults in a region of North Carolina, USA major depression was nearly three times more common in urban than in rural counties whereas Probst et al. (2006) found that the prevalence of depression is slightly higher in residents of rural areas compare to urban areas in USA. In the year 2008 it was found that the average happiness score was lowest among the Thai elderly (7 out of 10) (IPSR, THPF & NSO, 2010).

#### **2.2.4 Measurement of depression**

A multitude of scales are available to assess the effect of the mental and physical problem in older people. Different types of scales are used to measure depression of old people. Rating can be self-reported, observer-rated, or based on information or an informant. The choice of instrument is often based on a combination of user's familiarity with the scale, the time available for its application and the presence and the reliability of an informant. The time available and the person who is to carry out the rating are the key factors in determining the choice of scale. For a scale to be used as part of routine clinical practices it has to be brief and easy to administer. There is vast array of scale available to assess all aspects of mental and physical health in older people (Burns et al., 2002). Commonly used scales to measure the depression of old people are discussed here. Some of them were validated in Thailand.

*Geriatric Depression Scale:* This is a 30-question self-report scale developed by Yesavage (1983). Thai version of Geriatric Depression Scale (TGDS) was validated among the Thai elderly by Thai Brain Forum Committee (1994). TGDS is a self-answering sheet for Thai elderly to assess the self-feeling in the last week events.

*Mini-Mental-State Examination (MMSE):* Originally this scale was developed by Folstein et al. (1975) in order to screen organic causes from mental disorders. MMSE usually needs more than 10 minutes which depends on education level and age of the subject. Later this scale was compared with other scales in Thailand by Silpakit et al. (2007).

*Thai Mental State Examination (TMSE)*: This scale was developed by the Thai Brain Forum Committee in 1993. This was the first neuropsychiatric test for the standard mental status examination for Thai subjects. The total score of TMSE was 30 points and it contains 6 basic orientation, registration, attention, calculation, language and recall. It is quick and takes less than 10 minutes of time (Thai Brain Forum Committee, 1993).

*Clock Drawing Test*: The clock drawing test takes only 2 minutes to administer and reflects frontal and temporo-parietal functioning and was developed by Shulman et al., (1986). This scale was validated among the Thai elderly people by Kanchanatawan et al. in 2006.

*Centre for Epidemiological Studies Depression Scale (CES-D scale)*: It is a 20-item self administered scale, taking 5 minutes to complete. This scale was originally developed for a general population study (Radloff, 1977; Kubzansky, et al., 2005).

*Hamilton Rating Scale for Depression*: This scale is the gold standard of observer rated depression rating scale. Semi-structured interview, requires training to complete and takes 20-30 minutes to administer (Hamilton, 1960).

*Montgomery-Asberg Depression Rating Scale*: It is used to measure the change in studies of the treatment of depression (Montgomery & Asberg, 1979).

*EURO-D Scale*: This is a 12-item scale for screening depression among older people. The questions include are about depression, pessimism, life not worth living, wishing death, guilt, trouble sleeping, lost of interest, irritability, appetite, eating, fatigue, concentration on environment, enjoyment and tearfulness. This scale can be used by lay interviewers. Prince et al. (1999) conducted a 14 population- based surveys in 11 European countries among 21,724 subjects aged > or = 65 years. Most participating centres used the Geriatric Mental State (GMS), but other measures were also used. The aim of the survey was to develop a common depression symptom scale, EURO-D. Common items were identified from the instruments. Algorithms for fitting items to

GMS were derived by observation of item correspondence or expert opinion. The resulting 12-item scale was checked for internal consistency, criterion validity and uniformity of factor-analytic profile. The study found that EURO-D was internally consistent, capturing the essence of its parent instrument. A two-factor solution seemed appropriate: depression, tearfulness and wishing to die loaded on the first factor (affective suffering), and loss of interest, poor concentration and lack of enjoyment on the second (motivation). Prince et al concluded that the EURO-D scale should permit valid comparison of risk-factor associations between centres, even if between-centre variation remains difficult to attribute.

To standardize the EURO-D scale as a method for detecting depression in Spanish older people the EURO-D scale was validated in a sample of 1080 community older people by Larranga et al. (2006). The study found that the EURO-D scale is a reliable and valid instrument for detecting probable cases of depression in older people in Spain. But illiteracy and cognitive difficulties should be considered when interpreting the results. The reported prevalence of late-life depressive symptoms varies widely between studies, a finding that might be attributed to cultural as well as methodological factors. Later EURO-D scale was used by Castro et al. (2008) to allow valid comparison of prevalence and risk associations between 10 European countries.

EURO-D scale was validated in Thailand by Jirapramukpitak et al. (2009) to assess the concurrent and the construct validity of the Euro-D in older Thai persons. The major depressive episode section of the Mini International Neuropsychiatric Interview was used to interview the respondents. A trained interviewer administered the Euro-D. Receiver operating characteristic (ROC) analysis was used to assess the overall discriminability of the Euro-D scale and principal components factor analysis to assess its construct validity. Among Thai psychiatric clinic attendees Euro-D is moderately valid for major depression. A much higher cut-point may be required than that which is usually advocated. The Thai version also shares two common factors as reported from most of previous studies.

### **2.3 Contextual characteristics and depression**

The notion that environmental features may be related to psychological well-being and mental health has a long history (Mair et al., 2008). The contextual or

neighborhood characteristics are not fixed. These characteristics vary according to the contextual and compositional components of neighborhood (Kim, 2008). The functional definition of neighborhood depends on the characteristics measured (Kruger et al., 2007). The contextual characteristics or neighborhood characteristic was defined in different ways. For example, Kubzansky et al. (2005) used five neighborhood characteristics to examine the contextual influences on depressive symptoms which includes neighborhood socioeconomic disadvantages (percentage of people living in poverty), racial/ethnic heterogeneity (percentage of black residents, residential stability (percentage of people who have been in their homes longer than 5 years), age structure (percentage of individuals aged over 64 years), and socioeconomic advantage. Kruger et al. (2007) and Berke et al. (2007) defined “neighborhoods” as buffer zones around a respondent’s home. They used GIS to locate the addresses of survey respondents and selected residential and commercial structures on a map of the site.

Mair et al. (2008) found that the neighborhood characteristics fall into two categories: structural characteristics (neighborhood socioeconomic and racial/ethnic composition, residential stability, and the built and service environments) and measures of social processes (neighborhood disorder, social cohesion and ties with neighbors, and perceived exposure to crime, violence, drug use and graffiti). Structural characteristics were the most common features examined. Kim (2008) found that neighborhoods were defined using a variety of geographic units, ranging from US census block groups to clusters of areas in Sweden and to townships in Taiwan. He broadly categorized neighborhood environment into material/physical and psychosocial environments. O’Compo (2009) defined it a physically bounded area characterized by some degree of homogeneity and sometimes social cohesion.

The relationship of contextual characteristics and mental health was examined in different ways. Kubzansky et al. (2005) examined the relationship between the environmental context and the onset of depression in late life. They found that living in poor neighborhoods was associated with higher levels of depressive symptoms in older adults and that the greater the percentage of elderly people in the neighborhood the better the mental health of an older individual. Greater neighborhood poverty was associated with higher levels of depressive symptoms,

while a greater neighborhood concentration of Mexican Americans was associated with lower levels of depression.

Variations in health status by socioeconomic (SES) condition at the local level have been found in many contexts. Majority of the research found that individuals living in high SES neighborhoods have higher levels of self-reported health, lower incidence of mental health problems and emotional distress than individuals living in low SES neighborhoods (Wilson et al., 2010). While the link between health and SES at the local level may vary within and between jurisdictions (Borrell et al., 2004). Neighborhood residential segregation can have deleterious effects on depressive symptoms and anxiety on different group of people (Lee, 2008). Neighborhood deprivation can also associated with depression, after considering individual characteristics (Silver et al., 2000; Ross, 2000; Ostir et al., 2003). Living in disadvantaged neighborhood or with poor facilities health was related with more mental illness (Kubzansky et al., 2005). To

Walters et al. (2004) found that living in the highest density and intermediate low-density areas was associated with depression compared with the lowest density areas. One important aspect of the neighborhood is the feeling of solidarity. It has been shown that the stronger the feeling of belonging, and the more positive the experience of a neighborhood environment, the lower the degree of ill health amongst its inhabitants. Variations in health status by socioeconomic status (SES) at the local level have been studied in many contexts (Borell et al., 2004).

### **2.3.1 Infrastructure facilities**

The ability to extend one's environment and participate in the wider community depends to a great extent on communication and transportation facilities. Communication is facilitated by the telephone, on which most adults depend a great deal. However, the loss of mobility through lack of suitable transportation can be a serious setback to an older adult who has been used to the convenience of personal automobile. For older adults, driving is more than a necessary; it is a measure of their freedom. Transportation is often a problem for non-driving older adults in rural areas that have little public transportation, as well as for many of those residing in urban and suburban communities. Whenever food stores, doctor's offices, banks, and other shops

and facilities are not near residences, problems of transportation can arise. On the other hand, to depend on other people to take one from place to place can restrict the life space and lifestyle of an elderly person. This is particularly true in the case of the elderly poor, who, because of lack of money for transportation or the unavailability of public transportation in their area, may become isolated and lonely. Old adults who are impaired by disease or disability have special difficulties in getting from place to place, particularly when they do not drive and public transportation is scarce and costly. Even when public buses and trains are available, the high steps, sudden stops, and starts, and rapidly closing doors have higher steps, sudden stops and starts, and rapidly closing doors are often nerve-rattling and unsafe (Aiken, 2001).

### **2.3.2 Environmental problems**

Research suggests that those elderly living in richer cities are generally more affected by air pollution than elderly living in poorer cities, because residents of these richer cities had greater chronic exposure to air pollution during urban economic development (Sun & Gu, 2008). Zeng and colleagues also found lower rates of physical disability among the rural elderly, supporting the claim that air pollution has a greater effect on elderly health in urban areas. Elderly residents living in richer cities are affected more by air pollution than are their counterparts in poorer cities (Sun & Gu, 2008). This is contrary to what has been documented in contemporary Western societies, where residents living in poorer communities or neighborhoods are found to be more affected by air pollution because of more exposure and higher susceptibility to air pollution (O'Neill et al., 2003). Air pollution has also been linked to hospital admissions for respiratory diseases and may be contributory to variations in health outcomes (Ko et al., 2007).

Natural disasters, such as floods, earthquakes and hurricanes have major effect on the mental health of the people involved, most of whom live in developing countries but the capacity to take care of these problems is extremely limited (WHO, 2001). The common mental disorders are anxiety, depression, and posttraumatic stress syndrome (PTSD), and suicide. Most of the studies in common mental disorders like anxiety and depression were conducted in developed and Western countries like Australia, Poland, UK and USA and few from developing countries like Bangladesh

(Abraham et al., 1976; Bennet, 1970; Bokszczanin, 2002; Price, 1978; Melick, 1978; Logue, 1980 and 1981; Ollendick & Hoffmann, 1982; Powell & Penick, 1983; Phifer et al., 1988; Tobin & Ollenburger, 1996; Ginexi, 2000; Durkin et al., 1993).

Most of these studies found that flood exposure was associated with significant increase in depression of flood victims. There are limited evidences on PTSD (Norris et al., 2002). Damage to the infrastructure also reduces the access to mental health services, both for existing patients with mental health disorders and for those with new conditions (Wang et al., 2008). The level of depression depends on type of flooding as well (Hayes et al., 2009).

### **2.3.3 Community development programs**

It was mentioned in the study by Soommaht et al., (2009) that community organizations are important factors in the success of public policies that will help successful development of elderly care. Government and community organizations worked to formulate policies and providing funds to run different kind of community development programs. Community activities give opportunity to older people to participate and help them to understand their values in the society, gives scope of social networking. The communication with other people reduces their stress and depression.

## **2.4 Theoretical perspectives**

There are several theoretical models of how contextual characteristics could affect mental health (Wandersman & Nation, 1998).

*Engle's bio-psycho-social model (1977)* considers biological, psychological and social factors. Here psychological and social factors are also vital in determining whether and when patients with biochemical abnormality of a disease come to view themselves or be viewed by others as sick.

According to *Brufenbrenner's ecological systems theory (1979)*, mentioned by McLaren & Hawe (2005) the individual health is affected by multiple level of influences like micro-system (setting in which an individual lives), meso-system

(relations between microsystems), exo-system (experiences in social system), macro-system (attitudes of the culture) and chrono-system (transitions over the life course).

*Lawton's ecological theory (Lawton & Nahemow, 1973)* said that aging represents a complex blending of physiological, behavioral, social, and environmental changes that occur at both the level of the individual and at the level of the wider community. An ecological model is based on the assumption that patterns of health and well-being are affected by a dynamic interplay among biologic, behavioral, and environmental factors, an interplay that unfolds throughout the life course of individuals, families, and communities (Satariano, 2006) This model also assumes that age, gender, race, ethnicity, and socioeconomic differences shape the context in which individuals function, and therefore directly and indirectly influence health risks and resources.

Satariano (2006) mentioned about the Lawton's ecological model (1982). This model is especially relevant because it treats health outcomes as a function of the interaction of the person and the environment. Specifically, the model considers personal characteristics as competencies (e.g., monetary resources) and environmental characteristics as press (e.g., poverty), or having buoying effects (e.g., social services). If these elements are out of balance (e.g., when competence is low and press is high), negative affect is likely. From the ecological perspective, health is not the simple sum of exposure to noxious or beneficial stimuli, but rather an interactive function of person-environment fit.

The environmental stress model connects aspects of the physical environment and individual mental health outcomes, as moderated by successful and unsuccessful coping (Baum et al., 1981; Wandersman et al., 1983). The neighborhood disorder model suggests that social incivilities (e.g., public drunkenness, street harassment) and physical incivilities (e.g., abandoned buildings, dilapidated housing) affect crime rates and fear of crime (Taylor et al., 1985).

Kawachi & Berkman (2003) found that Shaw and McKay (1942) proposed theory of social disorganization. They constructed a general framework for understanding how community processes relate to a wide range of outcomes, including health. They also found another study conducted by Faris and Dunham in 1939 which applied the concept of social disorganization to mental health and found high rates of

mental disorder in Chicago areas characterized by social disorganization and isolation. According to Kawachi & Berkman both 'Shaw and McKay' and 'Faris and Dunham' observed that high rates of adverse outcomes persist in the same communities over time despite the movement of different population groups through them

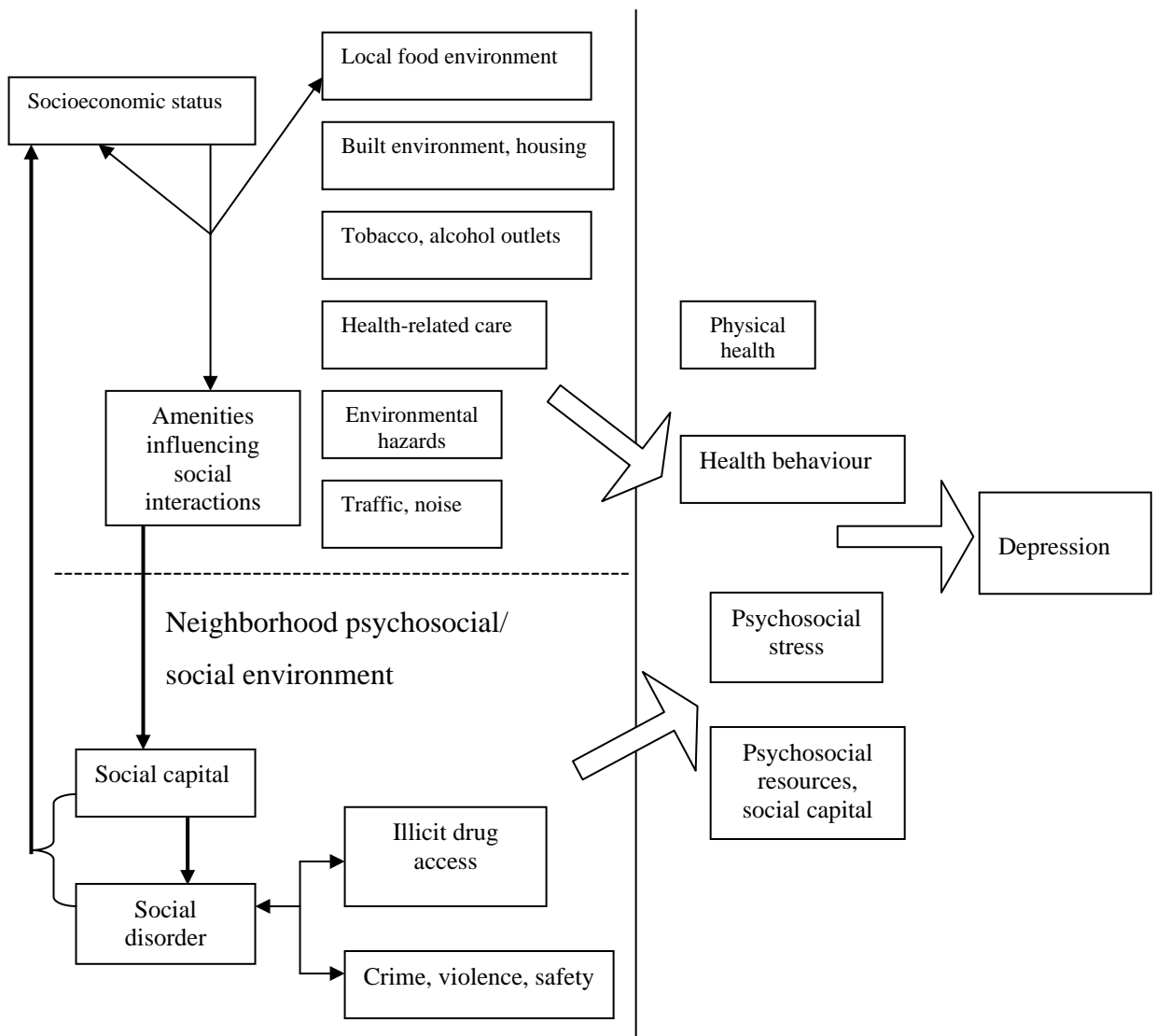
Coleman (1990) defined social capital as a resource stemming from the structure of social relationships, which in turn facilitate the achievement of specific goals. Such resources, be they actual or potential, are often linked to durable social networks. Later the theory of social capital addressed the social processes like social cohesion, spatial diffusion, support networks, and informal social control in a more vigorous manner than did the early Chicago school focus on disorganization. Kawachi & Berkman (2003) found that Putman defined social capital more broadly to include not only networks themselves but also shared norms and mutual trust which facilitate coordination and cooperation for mutual benefit. Kim (2008) described social capital and social disorder as integral elements of the psychosocial/social environments of neighborhoods and possess multiple pathways to individual levels and risks of depression.

Sampson et al. (1997) proposed collective efficacy theory. It is the linkage of mutual trust and shared expectations for intervening on behalf of the common good that defines the neighborhood context. Sampson et al (1999) viewed social capital as referring to the resources or potential inherent in social networks, whereas collective efficacy is a task-specific construct that refers to shared expectations and mutual engagement by residents in local social control. Recent work in the structural tradition emphasizes collective efficacy theory (Cagney et al., 2005) which has identified informal social control and social cohesion as mechanisms that link well-being to neighborhood structural factors, such as socioeconomic disadvantage. As Cagney (2005) observed this orientation points to two key attributes of neighborhoods - poverty and residential stability. These investigators also noted that affluence may be additionally important in generating a cohesive and trusting environment, a proposition substantiated by their empirical findings.

Kim (2008) proposed a framework on relations between key neighborhood characteristics and adult depression. He showed key constructs relevant to his systematic review at the neighborhood and individual levels and the interrelations.

He broadly categorized neighborhood environment into material/physical and psychosocial/ social environments. Neighborhood SES, which is the neighborhood-level analog of individual SES and is typically operationalized as an aggregate (e.g., census tract-level) measure of residential income, education, and /or occupational status, is most closely linked to the material/physical environment. This includes the local food environment (e.g., density of supermarkets and grocery stores), the built environment (e.g., bicycle lanes, green spaces, housing/buildings), the presence of tobacco and alcohol vendors (e.g., tobacco outlets, liquor stores), the availability of health-related care (e.g., physicians, pharmacies), and the presence of amenities promoting social interactions (e.g., cafe's, community centers, museums).

In turn, these conditions may affect health behaviors and thereby individual physical health and levels of psychosocial stress, and ultimately influence individual risk of depression. Kim (2008) showed relations between key neighborhood characteristics and adult depression. In figure 2.5 double-headed dash arrows indicate conceptually related constructs/indicators. All of the neighborhood constructs shown were explored in relation to individual depression across studies included in the systematic review. In two studies investigators examined potential mediation of the effects of neighborhood socio-economic/physical environment on depression by social capital/social disorder. No studies investigated individual-level behavioral and /or psychosocial pathways mediating neighborhood effects on depression.



**Figure 2.5: Relations between key neighborhood characteristics and adult depression.**

Source: Kim, 2008

## 2.5 Individual characteristics and depression

**2.5.1 Age:** Increasing age is one of the important predictor for old age depression (Sukhatunga, 1999; Wongpakaran, 2008; Grammatikopoulos & Koutentakis, 2010). Several cross-age studies have reported that the prevalence of depression is lower in old age than earlier in life, but it is possible that these studies were flawed by the failure of researchers to allow for differences in the way clinically significant depressive conditions present or are reported by older persons (Snowdon,

2002). But there was no consistent pattern across studies for age differences in the occurrence of anxiety, depression or distress. The most common trend found was for an initial rise across age groups, followed by a drop. Possible factors are decreased emotional responsiveness with age, increased emotional control and psychological immunization to stressful experiences (Jorm, 2000). Another study found that overall distress and anxiety decreases with age, whereas depressive symptoms significantly and consistently increase with age. This pattern was found may be the subjects were all cancer patients (Nelson et al., 2009).

Perhaps depression in the Western world will affect half the population during their lifetime, and have incidence peaks in the young and the very old. TI<sup>32</sup> are the two groups in the population who are most likely to have their depression unrecognized, and the two groups in which treatment with antidepressants or cognitive-behavioural therapy is problematic (Andrews et al., 2005). In a study done in US found that percentages of severe depression increased with age (Aiken, 2001).

**2.5.2 Gender:** The global literature on aging and depression reports greater prevalence of depressive symptoms among female than male (Tiedt, 2010). Depression is associated with a higher mortality in older men than in older women. This is true for the depression syndrome generally considered to be 'milder' than that do meet the criteria for major depressive disorder. A cross-sectional study conducted in the urban area of Malaysia found the difference between prevalence of depression among male and female elderly and it was higher among female in a significant level (Sherina et al., 2005). Another study done among the poor elderly of Mexico found the prevalence of depression was 35% for male and 50% for female (Bojorquez-Chapela et al., 2009). In Chiang Mai province of Thailand Wangtongkum et al. (2008) found the variation in depression between male and female elderly. Pakistani older females reported higher level of depression compare to older males (Taqui et al., 2007). But earlier a study done by Wilhelm & Parker (1989) did not find any gender difference of prevalence of depression in a follow up study. One study found the gender differentials of depression has the effect on the mortality in late life (Schoevers et al., 2000). The most common psychological disturbance among women throughout the

adult life span, certainly the one of most interest to scholars and researchers, is and has been depression (Gannon, 1999).

**2.5.3 Marital status:** Marital status affects the mental health of people in late life in different ways. Suffering from depression is one of them. The prevalence of depression was found to be significantly higher in the elderly who were single (never married), widowed, divorced or separated. Several studies have found these as risk factors for depression in the elderly (Taqui et al., 2007; Beekman et al., 1995; Jones et al., 2003; Minicuci et al., 2002, Husain et al., 2000).

This situation could be explained such as the people who remain single lack children and spousal support at old age. Elderly who had lost their spouse were suffering from a higher rate of depression could be explained by the fact that late life support by the partner is of importance to their psychological health. Dependence of the elderly on their spouse increases as they age. Death of a spouse renders them vulnerable to mental stress. Indeed, widowhood has been found to be strongly associated with depression in several instances (Zisook et al., 1994, Turvey et al., 1999). Circumstances which lead to divorce or separation, especially if it occurs at a late stage, can lead to adjustment problems, which may manifest as depressive symptoms. A study showed that marital disruption was associated with a higher prevalence of major depression in both men and women (Bruce & Kim, 1992). Life-events hence are much more unbearable, especially at an old age. Such factors may inevitably lead to psychological stress and depression.

**2.5.4 Education:** Educational attainment is an important factor to develop depression among elderly population. Several studies in developed and developing countries have reported that low education is associated with old age depression (Beekman et al, 1994; McCall et al., 2002; Bhagwanjee et al., 1998; Abolfotouh et al., 2001; Taqui et al., 2010, Mumford et al., 2000). A separate analysis with the same group of population found that the low educated elderly had the highest level of education compare to those who had secondary education (Darawuttimaprakorn & Pungung, 2009).

A low level of education makes it difficult for an older individual to accomplish certain tasks satisfactorily for examples consultation with doctors, filling out forms in English and managing house hold finances. The elderly who face such problems are at a greater risk of suffering from depression. Taqui et al. (2010) mentioned that the problem may be compounded if these low educated elderly are residing in a nuclear family system. They are generally dependent on family members and relatives for the above mentioned chores. If there are no family members to take care of these issues, as in a nuclear family system, it could contribute to depression in the elderly.

**2.5.5 Employment:** The association of unemployment and depressive symptoms of elderly has been extensively studied. Studies have revealed that unemployment can give rise to reduced hope and financial problem, which in turn contribute to depression (Taqui et al., Stankunas et al., 2006; Shah et al., 1997; Frese et al., 1987). As populations stop working, they lose not only the economic but also the social and psychological benefits of activity and purpose (WHO, 1999). Ageing and employment, ideally have an inverse relationship, with global statistics indicating a mean retirement from employment at the age of 61- 62 years (Age, 2001). This is not entirely representative of a country like Thailand, where low socio-economic resources per household compel the aged to continue working. Although the formal retirement age in Thailand is 60, some special services judiciary services and universities and individual companies allot retirement ages as per requirement. Even for an urban setting, limited or no retirement benefits (gratuity, provident funds) press the elderly for seeking yet another job, non-availability of which renders them stressed and under financial burden. Such a scenario serves as a nidus for depression at this age, which is supported by our finding that unemployed/ retired subjects were twice more likely to suffer from depression than those who were employed. While there are health benefits of an early retirement in some parts of the world, these benefits do not always adequately cover the increasing medical costs that accompany age (WHO, 1999).

**2.5.6 Physical health:** Older adults, as a population group, are at high risk of physical impairment (Kelley-Moore & Schumacher, 2006). Many studies in developed and developing countries found that physical factors are important predictors of depression at old age. Different physical factors can affect the mental health like disability, ill health or chronic disease. Self assessed health also can affect the mental health. Beside physical health serious life event as an external factor might be important predictor for the mental health (Sukhatunga, 1999).

**Infirmity:** Chronic disorders are long standing conditions, such as arthritis, hypertension, diabetes, cancer, stroke, and heart disease. Acute illness are more common among young people, but older people are more susceptible to chronic disorders. Both the number and severity of chronic disorders are not merely the results of ageing, but often have their origin in childhood and early adulthood and in lifelong habits. Majority of the older people have one or more chronic conditions and many suffer from multiple physical disorders that restrict their activities (Aiken, 2001).

The number of older adults is increasing every year (US Census Bureau, 2004). As the population grows older and life expectancies increases, it becomes even more important to identify factors that reduce the incidence of chronic illnesses of middle and later adulthood and aid in coping. One of the most critical factor is social support and social network which have positive effects on the health and well-being of adults of all ages (Randol, 2007). Social support has been described as the communication of being loved, respected, valued, and esteemed, as well as the mutual obligation of participating in an interpersonal network that provides assistance and aid to the members (Randol, 2007).

**Disability:** Disabilities is an umbrella term, covering impairments, activity limitations, and participation restrictions. An impairment is a problem in body function or structure; an activity limitation is a difficulty encountered by an individual in executing a task or action; while a participation restriction is a problem experienced by an individual in involvement in life situations. Thus disability is a complex

phenomenon, reflecting an interaction between features of a person's body and features of the society in which he or she lives (WHO, 2011).

Disability is an important predictor for old age depression (Blazer, 2003; Jitapunkul, et al., 2003). For oldest old group disability becomes more important predictor of mortality compare to chronic disease (Lee et al., 2008). In some situation depression recurs and associated with increasing disability over time. Without treatment, depression has the tendency to assume a chronic course, to recur, and to be associated with increasing disability over time (WHO, 2010). The risk of getting depression is 10 to 25 per cent for older women, 5 to 12 per cent for older men but it is 25 to 33 per cent among older adults with chronic disease (Morewitz & Goldstein, 2007).

**Self assessed health:** Self assessed health is an important measurement for the elderly people's mental and physical health (Yiengprugsawan et al., 2009; Jylha, 2009; Huisman, 2007, Damien et al, 1999). Widely used measures of self-assessed health status is a single question asking patients to rate their overall health on a scale from excellent to very poor or very good to very bad (Fayers & Sprangers, 2002). Psychological symptoms were found significant among the Thai elderly who perceived their health as poor (Haseen et al., 2010).

**2.5.7 Serious life events:** Serious life vents of bereavement presents with certain symptoms like crying, anxiety, agitation, insomnia, loss of appetite, etc. These are similar to depressive disorder, are usually not labeled as a mental disorder, but nevertheless require medical/psychological attention if they persist. If untreated, long term bereavement becomes pathological and can cause a decline in general health and disability. Not only does chronic grief lead to impairments in health and functioning, but it is typically accompanied by suicidal thoughts (Aiken, 2001). Death of spouse or financial problem is commonly experienced serious life events (Jariwala, et al., 2010; Fiske et al., 2003). Older females suffer more of depression from serious life events compare to males (Harsness, et al., 2010).

## **2.6 Household characteristics and depression**

**2.6.1 Living arrangement:** Living arrangement of the older people plays an important role on their mental health. Study conducted in Pakistan has found that the elderly those lived in a nuclear family had higher depression compare to those lived in the joint family system (Taqi et al., 2007). Mason (1992) and Bongaarts (2001) have both suggested that urbanization would lead to nucleation of family systems in developing countries and a decrease in the support of the elderly.

The living environment of a person includes the house, home, apartment or room in which he or she lives, as well as the neighborhood or community where the dwelling unit is located (Aiken, 2001). More over older persons living alone are at greater risk of experiencing social isolation and economic deprivation, and require special support (UN, 2002). These situations could be increased by adult children's migration. Loss of hope and morale as well as memory loss and reduction of physical activity are highly correlated with depression (Morewitz & Goldstein, 2007).

**2.6.2 Migration of children:** Migration of young adults from rural areas is often portrayed in a negative light among observers concerned with the well-being of rural-elderly (Knodel & Saengtienchai, 2007). Work, education and marriage constitute the three major reasons for leaving the parental household and moving elsewhere, with work being by far the most common. Migration of children to urban areas contributes positively to the material well-being of their elderly parents who remain in rural areas. (Knodel & Saengtienchai, 2007; Osaki, 2003). Support from parents to children also provided and most of the time the support is non-monetary form. Financial support of the elderly can still be ensured by children or relatives even if they reside elsewhere (Taqi et al., 2007).

Interaction with adult children including regular visit, face-to-face contact, taking care during illness, are valued and important source of social and emotional contact. But migration of children has certainly reduced these supports to their parents. Though mobile phone is widely available and used by the children but it is not commonly available to the parents. Some parents have conflicted feelings about their children living away (Knodel & Saengtienchai, 2007).

A less common explored area was the consequences of emigration on the mental health of those who stay in the communities of origin (Salgado de Snyder et al., 2007). Though people migrate with the hope of improvement of living conditions but receive the adverse effect on the whole family left-behind particularly education of the children (Farooq & Javed, 2009). The migration of father can create psychological difficulties for children and teenagers (Aguilera-Guzman et al., 2004). Sheehan (1996) found that the people in Ireland who had experienced the emigration of a close friend or relative, showed responses of sadness and grief. Migration also affects the marital relations between couples due to distance (Chee, 2003). Women who were left behind experienced feelings of sorrow and uncertainty about the chances of eventual family reunification (McGuire & Martin, 2007). They experienced partner's migration as a stressful event (Salgado de Snyder, 1996). The stressful life events are associated with depressive symptoms (Kindler et al., 2002). There might be association between partner's migration and women's depressive symptoms (Bojorquez, 2010).

## **2.7 Contextual characteristics in KDSS**

The KDSS has information about the contextual characteristics, collected during baseline survey in 2000. A short description is provided on the contextual characteristics under infrastructure, environmental problems and community development programs.

### **Infrastructure**

*Electricity and water supply:* Of 86 villages, only four villages, all in the upland area, did not have electricity, and three villages were connected to electricity within the last five years. Most villages had been connected to electricity for between 10 and 19 years. In general, villages obtained electricity earlier than a water supply system. From the survey, it was found that there were 10 villages without piped water, i.e. six villages in the plantation area, three villages in the rice area and one village in the mixed economy strata (IPSR, 2001).

*Public telephone, home telephone and cellular phone:* About one-half of surveyed villages had public telephones. The level was especially high in the mixed

economy areas, followed by upland villages, rice growing, semi-urban and plantation villages, respectively. The survey found that some public telephone booths are out of order, including more than half in upland villages. In mixed economy areas, about one fourth of public telephone booths were broken. In total, about 30 per cent of all public telephones could be used. In addition to public telephones, some villages had residents with home telephones, i.e. 36 out of 86 villages. There were more home telephones in semi-urban areas (five in six villages), followed by mixed economy villages, upland villages, rice growing and plantation villages, respectively. Mobile or cellular phones were very popular, about three-fourths of all villages had people who had cellular phones. They were most likely to be used in the mixed economy strata (18 villages), 17 villages in the rice strata, five villages in the semi-urban strata, 14 villages in the plantation strata and 10 villages in the upland strata (IPSR, 2001).

*Roads and transportation:* Roads were the main route of transportation for the villages. Half of the roads were laterite or soil or mix of laterite and asphalt. Roads of six villages in semi-urban area, eight villages in uplands, seven villages in rice strata and four villages in plantation area were made of asphalted or mix of asphalted and paved with concrete. Concrete roads were found in three villages of rice strata and two villages in mixed economy. About half of the villages had access to public buses (IPSR, 2001).

### **Environmental problems**

Environmental problems were reported during the baseline survey of KDSS. Environmental problems especially soil pollution due to use of agricultural chemicals that is chemical fertilizers, insecticides, herbicide was mentioned. Besides this air pollution by bad smell from the polluted water by factory waste, forest destruction for charcoal and furniture was mentioned. Natural disasters like drought and heavy rain were also reported (IPSR, 2001).

### **Community development programs in the villages**

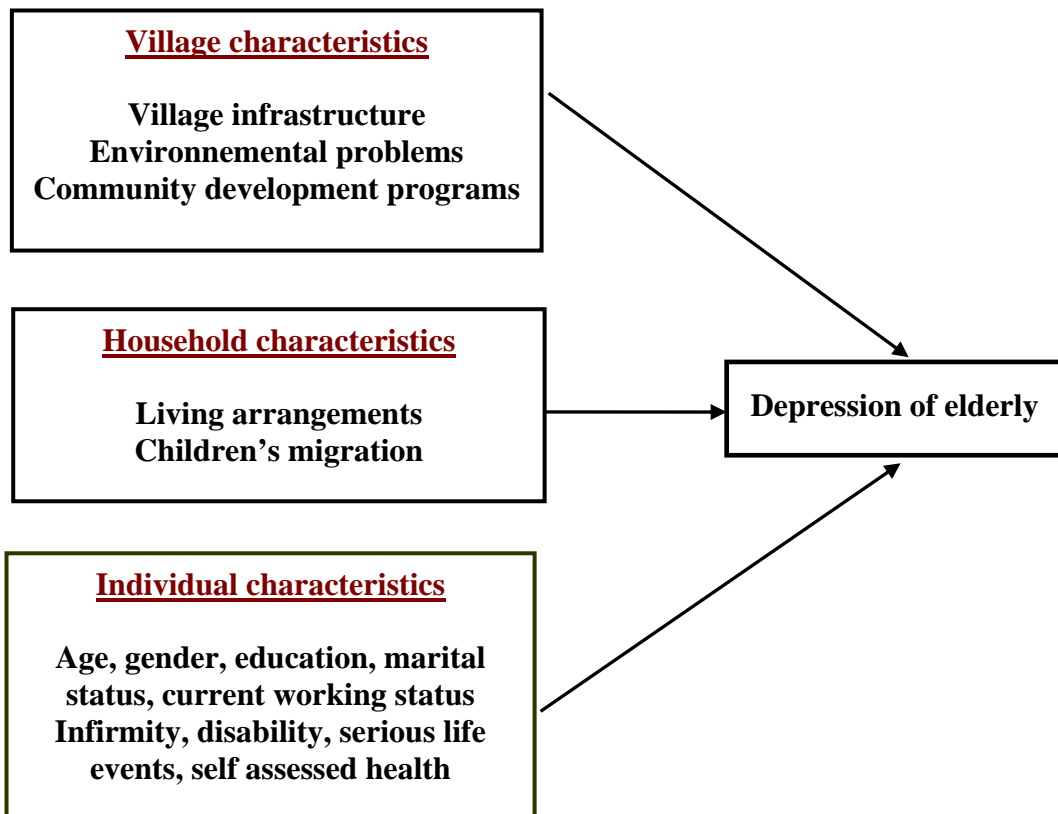
Government had taken different programs for different age groups of population for the improvement of the life of the people living in the community and development of the villages. For example, one hundred thousand baht fund, activated

economic fund, concrete road construction, ageing program, lunch for schoolchildren, occupation promotion, garbage elimination, drug addict free village (IPSR, 2001).

## **2.8 Conceptual framework**

Figure 1.4 graphically summarizes the structure of this study to explain its content and data analysis. As the availability of data allowed, this study utilized the contextual characteristics to examine the effects of those characteristics on elderly people's mental health, especially with regard to depression. Three main types of contextual characteristics in the KDSS area were considered, (1) village infrastructure; (2) environmental problems; and (3) community development programs.

This study will present findings on depression of elderly people living in rural area of KDSS. Then the study will select three important indicators that are available in the village information of the KDSS, namely: (1) village infrastructure, (2) environmental problems; and (3) community development programs as independent variables in the models to determine the effect of contextual characteristics on elderly people's mental health while controlling for the effects of individual and household characteristics. Figure 2.5 shows the conceptual framework.



**Figure 2.6 Conceptual framework**

## 2.9 Hypothesis

The definition and criteria of contextual characteristics or neighborhood characteristics or village characteristics (infrastructure) or build environment vary according to the settings and the population. The context affects the mental health of older people both positively and negatively. Most of the work on mental health of older people and context was done in developed countries after 2005. The studies used different type of scales to measure depression of older people. Usually the scales were validated with the local context. The contextual effects were examined by using different analytical techniques such as multilevel modeling. Despite some theoretical rational for contextual effects on depressive symptoms, the result of the literature in this area are still somewhat mixed, limited and inconclusive. According to Mair (2008) more research is needed in this area.

In the literature review it was found that the contextual characteristics could affect the mental health of elderly people. The effect could be positive or negative. Different scales are used for the measurement of the depression of older people. The characteristics of the context are not fixed. During formulation of the hypothesis three types of contextual characteristics were considered, village infrastructure, environmental problems and community development programs. Based on this proposition the hypothesis for this study was developed as follows:

Older people living in a better contextual environment are less likely to experience depression.

## **CHAPTER III**

### **METHODOLOGY**

This chapter discusses the research methodology used for this study. The methodology is described in two sections. The first section describes the source of data and sampling procedure. The second section explains how each variable used in the analysis was measured. Lastly, the chapter explains how the data is analyzed in order to answer the research question within the scope of the conceptual framework presented in the previous chapter.

#### **3.1 Source of data**

*1. Individual and household information:* This study uses the secondary data of individual and household level, collected by IPSR and Kings College, London, UK during the study on Health and Social Support among Elderly Population living in KDSS, Thailand in the year 2006.

The primary aim of the main study (Abas et al. 2009a) was to study the effect of having children move away. The inclusion criteria were Thai-speaking, aged  $\geq 60$  years and a parent of at least one living child (biological, stepchild or adopted child). As the sample was drawn from a demographic surveillance system that had been in place for 6 years, we had historical data on age. Only 5% of older adults in this rural setting did not have any of the categories of children, which is similar to that found previously in Thailand (Knodel & Chayovan, 1997). For the main study a sampling strategy was adopted based on whether or not older adults had children living with them. The sample size was based on a comparison of prevalence of common mental disorder in those with all children migrated versus those with some children migrated and required a total sample size of 954, given the proportions expected of those exposed and not exposed to having all their children migrate from the district. Around 728 households were approached with at least one adult aged  $\geq 60$

years living with at least one of their children in the same household and 892 households with at least one adult aged  $\geq 60$  years who was not living with at least one of their children in the same household. Then the participant was selected randomly in situations where there was more than one eligible older adult living in the household (Suttajit et al., 2010).

*2. Village information:* The information of villages was used from Migration and Health Survey conducted in KDSS in 2005.

The sample of villages that comprise the Kanchanaburi field site were selected in 2000 by IPSR. Village selection was undertaken using a stratified systematic sample design. The primary sampling units for rural areas were villages and for urban areas were census blocks. The data for sample selection were collected from the Kanchanaburi provincial offices of various ministries concerning the amount of agricultural land in each village, the amount of wet rice crops grown, the amount of plantation crops grown (cassava and sugar cane), the number of adult workers employed industry and the population. The study area of 86 villages and 14 census blocks was divided into five zones which were categorised according to the main occupation of the population and land use patterns. These zones are: 1) urban/semi-urban (industrialized), 2) rice producing, 3) plantations, 4) upland areas, and 5) mixed economy (IPSR, 2001).

### **3.2 Methods**

The individual and household data were used from 'Health and Social Support among Older Adults'. In this study total 1,147 respondents were interviewed from 1,147 households in 90 villages and 13 urban blocks. Of the 1,147 (88%) who agreed to participate, data were complete for 1,104 and incomplete for 43 because the older adult was unwell or cognitively impaired (Abas et al., 2009). Village information was taken from the 'Migration and Health Survey'. The information on 90 villages was available for 1,001 older respondents. The current analysis was limited to 1,001.

### 3.3 Description of variables

To examine the contextual effect on mental health of elderly people, three levels of variables were considered,

*Individual characteristics:*

- (1) Age, gender, educational level, marital status, working status, current occupation,
- (2) Infirmary, disability, serious life events and self-assessed health.

*Household characteristics:*

- (1) Living arrangement of elderly
- (2) Migration of children

*Contextual characteristics:*

- (1) Village infrastructure: Electricity, tap water, cellular phone signal, public telephone and bus route.
- (2) Environmental problems: Air pollution, agriculture chemicals, soil problem, natural disaster and use of forest.
- (3) Community development programs: One hundred thousand baht fund, activated economic fund, concrete road construction and occupational promotion.

### 3.4 Measurement of variables

**Depression:** Depression was measured by using a Thai version of the EURO-D scale questionnaire (Prince, et al., 1999). The EURO-D scale is a structured scale of depressive symptoms designed for detecting depression in older populations. It can be used as a self-administered tool. The questions were read out here. It was found from the developing countries that the EURO-D has a similar factor structure to that in European countries (Prince et al., 2004). Thai mental health professionals, including two non English-speaking locally trained providers, considered that it covered symptoms recognized locally as common in psychological disorders in older adults. A team of bilingual mental health professionals, bilingual social scientists and English psychiatrists did the first translation, paying particular attention to conceptual and semantic equivalence. Eight Thai psychiatrists validated the Thai version of the EURO-D in an out-patient setting against the Thai version of the Mini International Neuropsychiatric Interview, which is a standardized clinical diagnostic interview for

DSM-IV Axis-I disorders (Kittirattanapaiboon & Khamwongpin, 2005). Based on the cut-of point of 5/6, the area under the ROC curve was 0.78 [95% confidence intervals (CI) 0.70–0.85], the kappa was 0.4 and internal consistency for the total scale measured by Cronbach's alpha was 0.72 (Jirapramukpitak et al., 2009). A categorical measure of depression (case/non-case) from the EURO-D scale was used for all analyses based on the cut-off point of 5/6 derived from the Thai validation. (Suttajit et al., 2010).

**Table 3.1 List of questions to measure depression**

<b>Characteristics</b>	<b>Question</b>
Depression	In the last month have you been sad or measurable?
Pessimism	In the last month did you think future looks gloomy?
Wishing to death	In the last month, did it ever get so bad that you felt that you would rather be dead?
Guilt	Do you tend to blame yourself or feel guilty about anything?
Sleep disturbance	Have you had trouble in sleep?
Loss of interest	Have you lost interest in things you normally have interest in?
Irritability	Have you been more irritable or annoyed recently?
Eating	Have you been eating more or less than usual?
Fatigue	In the last month, have you had too little energy to do the things you want to do?
Concentration	Is it difficult for you to concentrate on something you have to do?
Enjoyment	What have you enjoyed doing in the last one month?
Tearfulness	In the last month, have you cried at all?

### **Individual characteristics**

*Age:* Age of the respondent was continuous. The variable was grouped in three categories, 60-69, 70-79 and 80 years and more. The variables were assigned as 60-69 years=1, 70-79 years= 2 and 80 years and more=3.

*Gender* was grouped in male and female. The response categories were assigned as male=0, female=1.

*Educational level:* The variable was continuous. Three categories were made, those who did not go to the school were assigned as 'no education=0, 1-3 years=1, and 4 years or more=2.

*Marital status:* Under marital status the response categories were married, separated, divorced, single and widow. Then it was categorized as married=1, separated/divorced/single=2 and widow=3.

*Working status:* 2 categories were there, working=0 and not working=1.

*Current occupation:* Multiple occupations were reported. A majority of the respondents were involved with agriculture. Three categories were made, agriculture sector=1, non-agriculture sector=2, and not working=3. Non-agriculture sector includes administrator, craft and related work, service worker, technician, plant machine operator, professional and elementary occupations.

*Infirmity:* A modified version of the Burvill physical illness scales (1990) covering the presence of 13 common health problems affecting different systems, including breathlessness, blackouts, arthritis, weakness, hearing difficulties and heart trouble. (For details please see the appendix). Every item has two response options (1=yes, 0=no). A composite index was developed from all 13 responses 'Infirmity index'. The total score was 0-13. Then the index was categorized in three groups. Those who had no or 1 health problems they were assigned as '0-1 infirmity', those had 2-3 infirmity they assigned as '2-3 infirmity' and those had 4 or more infirmity were assigned as '4 or more infirmity'.

*Disability:* The brief version of the World Health Organization's Disability Assessment Schedule was used to rate disability over the past 30 days (Prince, et al., 1998). Domains included understanding and communicating with the world, getting around, self-care, getting along with people, activities and participation in society.

(For details please see the appendix). One item (any difficulty with learning new tasks) was deleted as it was not found relevant for older rural people.

The 'disability' in last 30 days' was assessed by 11 questions. Every question had 4 options: none, mild, severe and extreme/cannot do and had score from 0-3. The total score was 0-33. A composite index called 'disability index' was created. The index was categorized in four groups. Those got 0 score they were grouped as 'no disability', those got score from 1-11, assigned as 'low disability', those got 11-22 scores were grouped under 'medium disability' and those had score 23-33 categorized as 'high disability'.

*Serious life events:* The list of Threatening Experiences in the light of qualitative work (Brugha and Crag, 1990) and following advice from experts in measuring life events in older people. The adaptation included difficulties as well as events, restricting rating of events and difficulties to those remaining severe for over 3 weeks that occurred to the participant, an immediate family member or someone perceived as 'very close', and adding events for example, to do with caring for grandchildren. This study used a short version of the questionnaire in situations where information was collected from an informant if the older adult had apparent significant cognitive impairment or was too unwell to complete a full interview (Abas, et al., 2009a).

Six questions were selected for this study to measure the effect of serious life events which caused difficulty more than 2-3 weeks in the current year. Every item has two response options (1=yes, 0=no). A composite index "Serious Life Event index' was developed from those questions: illness, lack of contact with children, financial problem, accommodation, financial problem, accommodation, health problem of family member and care giver burden. The list of questions was attached in the appendix. The total score was 0-6. Then the index was categorized into three groups. 'no serious life event', '1-2 serious life events' and more than 2 serious life events'.

*Self assessed health (SAH):* The question was asked to the respondents was 'How do you rate your overall health in the past 30 days?' The question had 4 categories of response, good, very good, bad and very bad. The variable was recoded into two

category, Good health=0 and Poor health=1. Good health included good and very good; and poor health included bad and very bad.

### **Household characteristics**

*Living arrangement:* The information on living arrangement of the respondent was collected from the list of household members and the relationship of the household members and the elderly. For this study the responses were categorized as (1) live with spouse, children, children in law and other; (2) live with spouse and grandchildren; (3) live with spouse; (4) live with grandchildren; and (5) live alone.

*Children's migration:* The respondent's children living status was asked. Here the 'children' was defined as biological child or adopted child or step child. The children were defined as 'migrant' if they were living out of household or village for at least 1 month. They were divided into three categories, no children migrated from household or village, some children migrated from household or village, and all children migrated from household or village.

### **Contextual characteristics**

(1) Village infrastructure: Electricity, tap water, public telephone, cellular phone signal, bus route and factory. Every item has two response options (1=yes, 0=no).

(2) Environmental problems: Natural disaster, soil pollution, agriculture chemicals, environmental problems, air pollution, and use of forest. Every item has two response options (1=yes, 0=no).

(3) Community development programs: One hundred thousand baht fund, activated economic fund, concrete road construction and occupational promotion. Every item has two response options (1=yes, 0=no).

## **3.5 Unit of analysis**

The unit of analysis is individual elderly people living in the households of KDSS rural area.

### 3.6 Method of analysis

Various techniques of analyses are used in this study, including univariate, bivariate, and multivariate analyses. The dependent variable is in the form of binary outcome. Binary logistic regression and multilevel regression techniques were applied to analyze the effect of contextual characteristics on depression of elderly. This statistical method provides an analytical framework to address the nature of hierarchical data and the condition that outcome variable is hypothesized to be influenced simultaneously by various factors from different levels. Therefore, it is of interest in taking account of the variability associated with each level of hierarchy. More detailed explanations of this technique is provided in the next section. Linear mixed-effect models with maximum likelihood estimation are employed in this study (*xtmixed* command with *mle* option in STATA). This model is called Multilevel Regression.

### 3.7 Multilevel analysis

The term multilevel analysis is used in the field of demography, education and sociology to describe an analytical approach that allows simultaneous examination of the effects of group-level and individual-level variables on individual-level outcomes. Over the past few years, interest in the use of multilevel analysis to investigate public health problems has grown.

#### 3.7.1 Rationale for use of multilevel analysis

In explaining the occurrence of a given phenomenon, researchers can appeal to different types of theories, which may be more or less relevant depending on the particular questions being approached.

- a. In the simplest approach, the outcome at one level is explained by independent variables that apply to the same level. This is explained by independent variables that apply to the same level. It is commonly used in epidemiology. Individual-level outcomes are explained in terms of individual-level variables and group-level outcomes are explained in terms of group-level inferences.

- b. In a second approach, the outcome at one level is explained in terms of variables defined at a lower level. Here differences in disease rates across groups are explained in terms of the characteristics of individuals composing the groups.
- c. A third approach is used to explain the outcome at one level as a function of variables defined at a higher level, for example, when an individual-level outcome is explained exclusively as a function of the attributes of the group to which individuals belong.
- d. A fourth approach is to explain variation in the dependent variable at one level as a function of variables defined at variable levels, plus interactions within and between levels. Multilevel analysis is one methodology that can be used to approximate the latter situation.

### **3.7.2 Difference from other techniques**

- (a) it allows the simultaneous examination of the effects of group-level and individual-level predictors
- (b) the non-independence of observations within groups is counted for
- (c) groups or contexts are not treated as unrelated, but are seen as coming from a larger population of groups
- (d) both inter-individual and inter-group variation can be examined (as well as the contributions of individual-level and group-level variables to these variations). Thus, multilevel analysis allows researchers to deal with the micro-level of individuals and the macro level of groups or contexts simultaneously.

### **3.7.3 Other applications of multilevel models**

Multilevel models can be used in longitudinal data analysis, for multivariate responses, in the analysis of repeat cross-sectional surveys and in the examination of geographic variations in rates. Other applications include the examination of interviewers effects and meta-analysis. Another important application of multilevel models is their use to obtain improved estimates of parameters for a given group (for example, estimates of within group regression coefficients or rates for a particular group) by combining information from the group itself with information

from all other groups investigated. Over the past few years, multilevel models have been used in public health to examine the independent and interacting effects of group-level and individual-level factors on health outcomes. The groups or contexts investigated using multilevel analysis have included countries, states, regions, neighborhoods or communities, schools, families, workplaces, and health care providers.

One objective of the use of multilevel analysis in the investigation of neighborhood effects has been to simultaneously examine between-neighborhood and within-neighborhood variability in outcomes and the degree to which between-neighborhood variability is accounted for by neighborhood-level and individual level variables. Another related objective of the use of multilevel analysis in the investigation of neighborhood effects has been to estimate associations of neighborhood characteristics with individual-level outcomes after adjustment for individual-level confounders.

The advent of multilevel analysis as a statistical tool has undoubtedly stimulated research into the neighborhood determinants of health. However, its use also highlights some of the challenges faced by researchers. Results of research on neighborhood effects and health using multilevel models have been rather mixed (Diez-Rouz, 2000; Atkins, 2005; Snijders & Bosker, 1999; Rebe-Hesketh & Skrondal, 2005).

## **CHAPTER IV**

### **FINDINGS**

First, the characteristics of the sample are presented. Then the bivariate and multivariate results were described.

#### **4.1 Description of the sample**

##### **4.1.1 Individual characteristics**

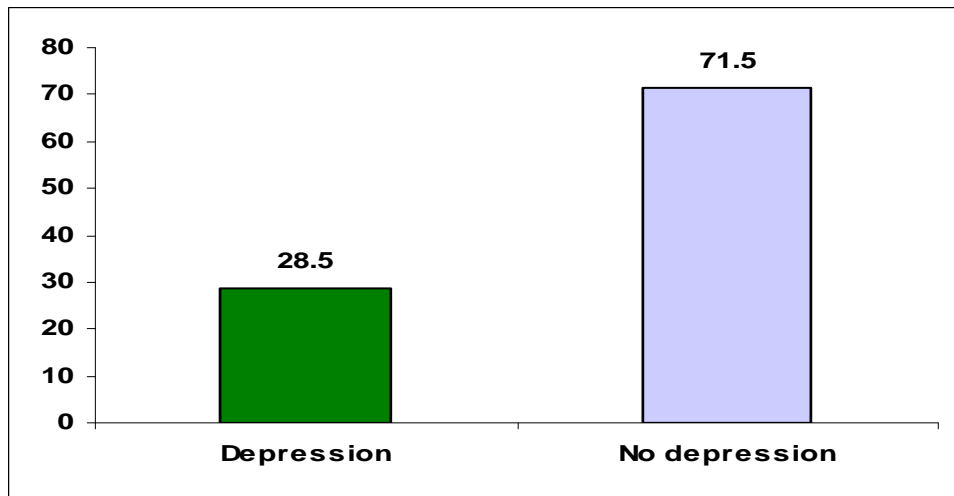
Here the socio-demographic characteristics of the respondents are presented. The age is presented in three groups. More than half of the respondents (54.4%) were from 60-69 years of age group and around one-tenth (9.8%) were 80 years and above. Majority of the sample were females (55.5%) compare to males (45.5%). Educational status is presented by three groups. More than half of the respondents had 4 years or more schooling but around one-third had no schooling. Marital status was grouped in three categories. Majority of them (54.3%) were married and 40 per cent were widow but around 5 per cent were single/separated or divorced.

The main occupation of the respondents was agriculture (32.4%) and almost half of the respondents (48.8%) were not working. Majority of the respondents' current occupation was agriculture and nearly one-fifth had other occupation other than agriculture (Table 4.1).

The twelve questions which were asked to assess the depression of the respondents were presented by items. To measure the prevalence of the overall score was computed. The total score was 0-12. Then the total score was categorized in two groups. Those who received score from 0-5 they were classified as having no depression and those who got score 6-12, they were assigned as having depression. The overall prevalence of depression was 28.5 per cent (Figure 4.1).

**Table 4.1 Socio-demographic characteristics of elderly people in rural KDSS, Thailand, 2006**

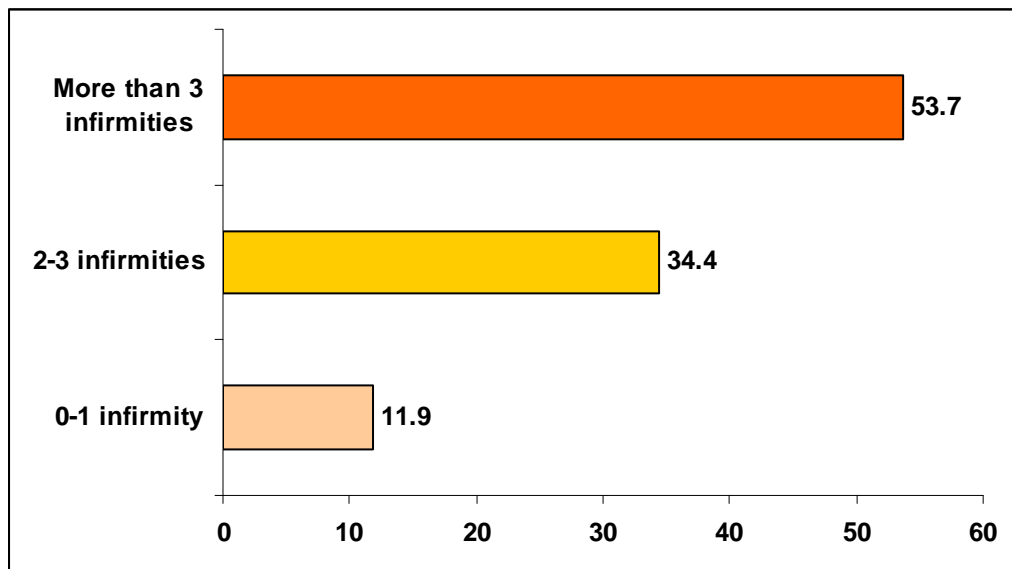
<b>Characteristics</b>	<b>N</b>	<b>%</b>
<b>Age</b>		
60-69 years	545	54.4
70-79 years	358	35.8
80 years and above	98	9.8
<b>Gender</b>		
Male	445	44.5
Female	556	55.5
<b>Education</b>		
No schooling	305	30.5
1-3 years	160	16.0
4 years (primary) and more schooling	536	53.5
<b>Marital status</b>		
Married	547	54.6
Widow	401	40.1
Single/Separated/divorced	53	5.3
<b>Working status</b>		
Working	523	52.2
Not working	478	47.8
<b>Current occupation</b>		
Agriculture	330	33.0
Non-agriculture	193	19.3
Not working	478	47.7
<b>Total</b>	<b>1,001</b>	<b>100.0</b>



**Figure 4.1 Prevalence of depression among elderly people in rural KDSS, Thailand, 2006 (n=1,001)**

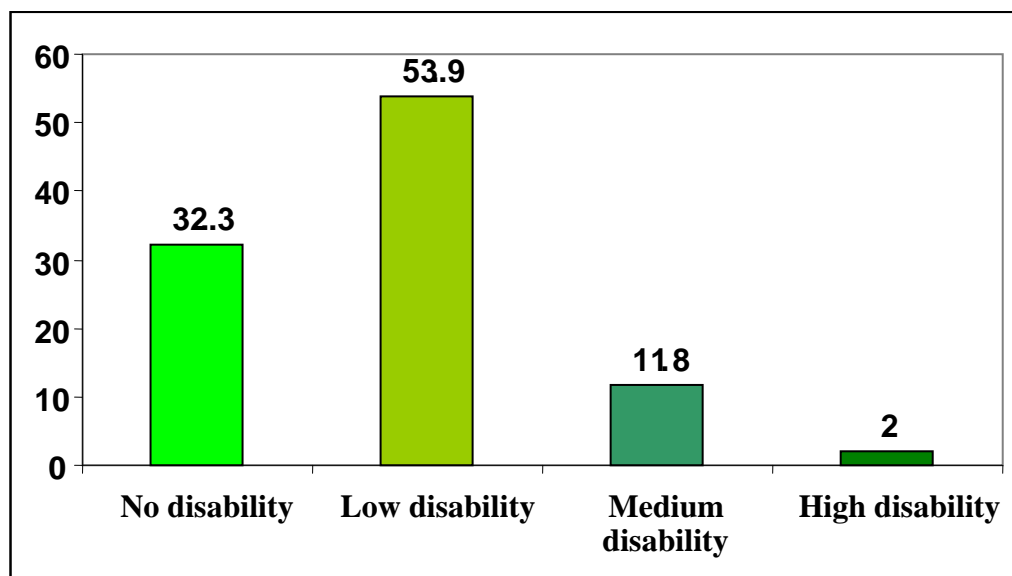
Total score for depression: 0-12, Depression: 6-12, No depression: 0-5

To examine the prevalence of number of infirmity the 13 illnesses were regrouped in three categories. Majority of the respondents had more than 3 infirmities or health problems and around 12 per cent respondents had no or only one illness (Figure 4.2).



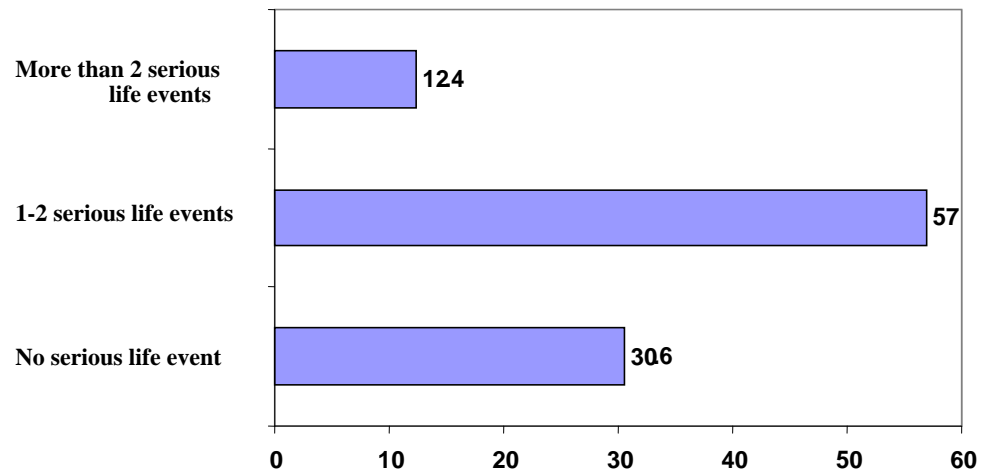
**Figure 4.2 Infirmity among elderly people in rural KDSS, Thailand, 2006, (n=1,001)**

To examine the prevalence of number of disability the symptoms of disability were regrouped in four categories. Around one-third of the respondents reported that they had no disability and 13.5 per cent had medium or high disability in last 30 days (Figure 4.3).



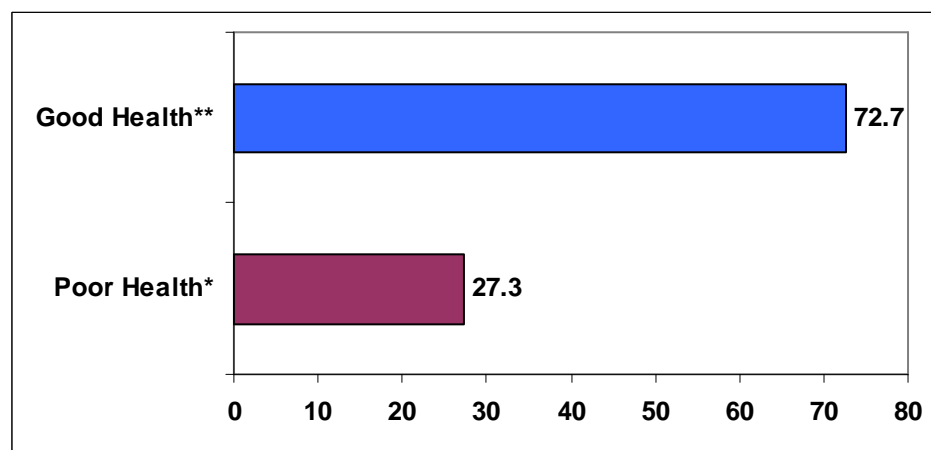
**Figure 4.3 Disability among elderly people in rural KDSS, Thailand, 2006, (n=1,001)**

Six questions were asked to know about the serious life events occurred in the life of respondents in past one year and from which they suffered at least for 2-3 weeks. The questions were related to own health, communication, conflict, financial problem, accommodation and care giving. Later the responses were categorized into three groups. Nearly 60 per cent respondents had 1-2 serious life events in last year from which they suffered from more than 2-3 weeks. It seems the serious life event is not an uncommon event in elderly people's life (Figure 4.4).



**Figure 4.4 Serious life events among elderly people in rural KDSS, Thailand, 2006, (n=1,001)**

More than 70 per cent respondents assessed their health as good and rest said they had poor health (Figure 4.5).



**Figure 4.5 Self assessed health of elderly people in rural KDSS, Thailand, 2006, (n=1,001)**

#### 4.1.2 Household characteristics

Almost one-fourth (25.6%) of the elderly respondents were living with their spouse, children and children in laws; or with children and children in laws (27.8%). Around 19 per cent lived with spouse only and 13 per cent lived with grandchildren only. Majority of the households (65.4%) have children living with them and around one-fourth household all children have migrated outside household or village (Table 4.3).

**Table 4.2 Living arrangement of elderly people and their children's migration status in rural KDSS, Thailand, 2006**

Characteristics	N	%
<b>Living arrangement of older</b>		
1. Live with spouse, children, children in law and other	256	25.6
2. Live with spouse and grandchildren	99	9.9
3. Live with spouse	193	19.3
4. Live with children and children in law and other	278	27.8
5. Live with grandchildren	45	4.5
6. Live alone	130	13.0
<b>Children's migration</b>		
1. All in household or village	108	10.8
2. Some in household or village and some migrated from household and village	666	66.5
3. All migrated outside household or village	227	22.7
<b>Total</b>	<b>1,001</b>	<b>100.0</b>

### 4.1.3 Contextual characteristics

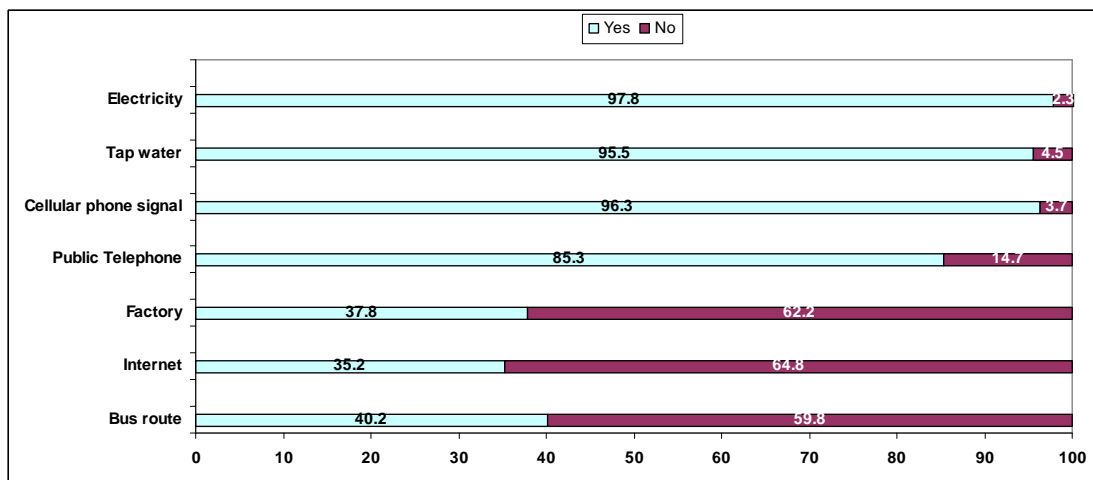
First, overall contextual characteristics were presented. Most of the villages had electricity, tap water, public telephone and cellular phone signals (table 4.3). Majority of the villages did not have bus route and factories in their villages. Around 15 per cent did not have access to the telephone (Figure 4.6).

**Table 4.3 Contextual characteristics of villages (n=90)**

Characteristics	Yes	No	Total
	n(%)	n(%)	N(%)
<b>Infrastructure facilities</b>			
Electricity	87 (96.7)	3 (3.3)	90 (100.0)
Tap water	85 (94.4)	5 (5.6)	90 (100.0)
Factory (including OTOP)	31 (34.4)	59 (65.6)	90 (100.0)
Public Telephone	71 (78.9)	19 (21.1)	90 (100.0)
Cellular phone signals	85 (94.4)	5 (5.6)	90 (100.0)
Internet	27 (30.0)	61 (67.8)	90 (100.0)
Bus route passes from other villages	32 (35.6)	58 (64.4)	90 (100.0)
<b>Environment al problems in last 5 years</b>			
Natural disasters	66 (73.3)	26.7)	90 (100.0)
Soil pollution	41 (45.6)	49 (54.4)	90 (100.0)
Sick from agriculture chemicals	22 (24.4)	68 (75.6)	90 (100.0)
Environmental problems	16 (17.8)	74 (82.2)	90 (100.0)
Air pollution	8 (8.9)	82 (91.1)	90 (100.0)
Use of forest	64 (71.1)	26 (28.9)	90 (100.0)
<b>Community development programs in last 1 year</b>			
One hundred thousand baht fund	76 (84.4)	14 (15.6)	90 (100.0)
Activated economic fund	21 (23.3)	69 (76.7)	90 (100.0)
Concrete road construction	36 (40.0)	54 (60.0)	90 (100.0)

### Infrastructure facilities

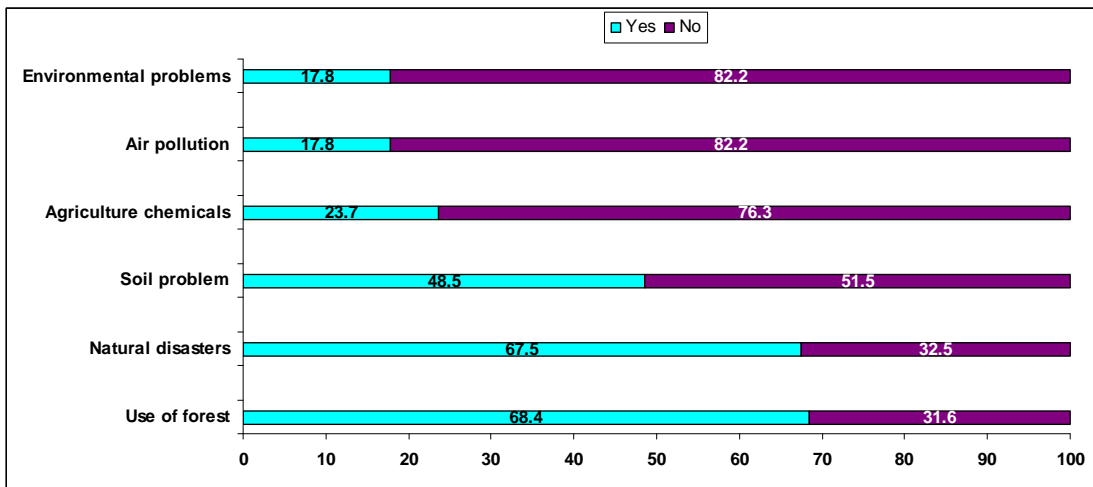
Selected contextual characteristics were presented by respondents. Most of the respondents living in the villages which had electricity, tap water, public telephone and cellular phone signals. Majority of the villagers did not have bus route passes from other villages and factories in their villages. Around 15 per cent did not have access to the public telephone (Figure 4.6).



**Figure 4.6 Infrastructure facilities in KDSS villages, Thailand, by respondents in 2005 (n=1,001)**

### Environmental problems

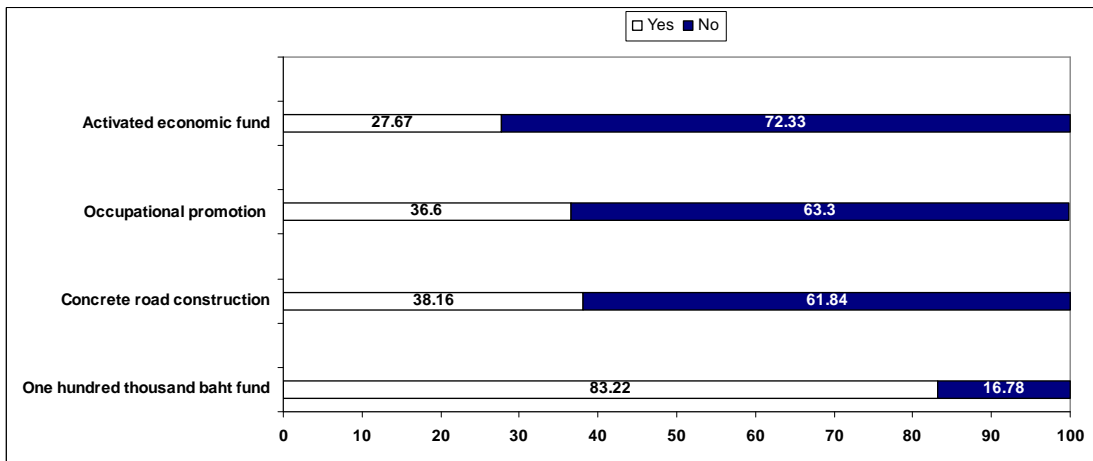
Here selected environmental problems were presented by respondents. The villagers experienced different type of environmental problems in last 5 years. More than two-third of the respondents are from the villages which had natural disasters and nearly half of them are from the villages which had problems. Majority of people are from the villages that use forest. Nearly one-fourth villages had flood and agriculture chemicals problems. Around 18 per cent villagers lived in the villages which had air pollution and soil problems (Figure 4.7).



**Figure 4.7 Environmental problems in the KDSS villages, Thailand by respondents in 2005 (n=1,001)**

**Community development programs**

The majority of the villagers had community development programs in their villages for last 1 year. One-fourth of the villagers had projects on activated economic fund, concrete road construction and occupational promotion (Figure 4.8).



**Figure 4.8 Community development programs in the KDSS villages, Thailand by respondents in 2005 (n=1,001)**

## 4.2 Bivariate analyses

In bivariate analysis, depression had highly significant association (p value: 0.001) with age, gender, education, marital status, working status, current occupation, infirmity, disability, serious life events and self-assessed health. The oldest old had higher proportion of depression compare to younger old. Female had higher proportion of depression compare to male. Those had no schooling or less than 4 years of schooling, had more depression compare to those had 4 years and more schooling. Widow and separated/divorced/single respondents had higher proportion of depression compare to married. The working respondents and those who worked in the agriculture sector had less depression compare to not working and working in non-agriculture sector. The respondents who had more than 3 infirmity or health problems and medium or high disability had higher proportion of depression compare to those had no or less infirmity and disability. The respondents who assessed their health as bad had very high depression compare to those who rated their health as good (Table 4.4).

**Table 4.4 Depression of elderly people with individual characteristics in rural KDSS, Thailand, 2006**

		Depression	Total
<b>Age***</b>	60-69 years	22.4	545 (100.0)
	70-79 years	34.6	358 (100.0)
	80 years and above	39.8	98 (100.0)
<b>Gender***</b>	Male	19.3	445 (100.0)
	Female	35.8	556 (100.0)
<b>Education***</b>	No schooling	37.7	305 (100.0)
	1-3 years schooling	31.9	160 (100.0)
	4 years (primary) and more	22.2	536 (100.0)

\*\*\*p value: <0.00

**Table 4.4 Depression of elderly people with individual characteristics in rural KDSS, Thailand, 2006 (cont.)**

		<b>Depression</b>	<b>Total</b>
<b>Marital status***</b>	Married	22.1	547 (100.0)
	Widow	36.2	401 (100.0)
	Separated/divorced/singe	35.8	53 (100.0)
<b>Working status***</b>	Working	22.2	523 (100.0)
	Not working	35.4	478 (100.0)
<b>Current occupation***</b>	Agriculture sector	18.2	330 (100.0)
	Non-Agriculture sector	29.0	193 (100.0)
	Not working	35.4	478 (100.0)
<b>Impairment***</b>	0-1 impairment	5.9	119 (100.0)
	2-3 impairments	18.3	344 (100.0)
	More than 3 impairments	40.0	538 (100.0)
<b>Disability***</b>	No disability	9.3	323 (100.0)
	Low disability	32.2	540 (100.0)
	Medium disability	57.6	118 (100.0)
	High disability	65.0	20 (100.0)
<b>Serious life events in last 1 year***</b>	No serious life event	13.1	306 (100.0)
	1-2 serious life events	30.3	571 (100.0)
	More than 2 serious life events	58.1	124 (100.0)
<b>Self assessed health***</b>	Good Health	17.8	729 (100.0)
	Bad health	57.0	272 (100.0)
<b>Total</b>			<b>1,001 (100.0)</b>

\*\*\*p value: <0.001

The depression varied according to the living arrangement of the respondents and living arrangement had significant association. Those who lived with grandchildren, with children and alone, had higher proportion of depression compare to other types of living arrangement. Under individual characteristics children living

status was analyzed. The children's living arrangement did not vary much on the depression of elderly. The chi square test was not significant (Table 4.4).

**Table 4.5 Depression of elderly people with living arrangement and children's migration status in rural KDSS, Thailand, 2006**

<b>Characteristics</b>	<b>Depression</b>	<b>Total</b>
<b>Living arrangement**</b>	With spouse, children and children in laws	21.6 255 (100.0)
	With spouse and grandchildren	35.5 273 (100.0)
	With spouse	23.4 197 (100.0)
	With children and children in laws	25.7 101 (100.0)
	With grandchildren	46.7 45 (100.0)
	Alone	30.8 130 (100.0)
<b>Children's migration</b>	None migrated from household or village	24.1 108 (100.0)
	Some in household or village and some migrated from household or village	30.6 666 (100.0)
	All outside household or village	24.2 227 (100.0)
<b>Total</b>		<b>1,001 (100.0)</b>

The respondents of the villages had slightly higher percentage of depression who did not have telephone, cellular signals, internet and factory in the village compare to those elderly who had these infrastructure facilities in their village. The difference did not have significant association with chi square test (Table 4.6).

**Table 4.6 Depression of elderly people with selected infrastructure facilities of KDSS villages, Thailand, 2006**

<b>Characteristics</b>		<b>Depression</b>	<b>Total</b>
Public telephone	Yes	28.5	243 (28.5)
	No	28.6	147 (100.0)
Bus route from other villages	Yes	29.4	402 (100.0)
	No	27.9	599 (100.0)
Factory	Yes	27.8	378 (100.0)
	No	28.9	623 (100.0)
Electricity	Yes	28.5	978 (100.0)
	No	26.1	23 (100.0)
Tap water	Yes	29.0	956 (100.0)
	No	17.8	45 (100.0)
Cell phone signals	Yes	28.2	964 (100.0)
	No	35.1	37 (100.0)
Internet	Yes	27.2	335 (100.0)
	No	30.0	616 (100.0)
<b>Total</b>			<b>1,001 (100.0)</b>

The villagers who had natural disasters, soil pollution, agriculture chemicals and forest use in last 5 years had more depression compare to the villagers who did not have these problems. The association was not significant (Table 4.7).

**Table 4.7 Depression of elderly people with selected environmental problems of KDSS villages, Thailand, 2006**

<b>Variables</b>		<b>Depression</b>	<b>Total</b>
Natural disaster	Yes	30.0	676 (100.0)
	No	25.2	325 (100.0)
Soil pollution	Yes	30.7	485 (100.0)
	No	26.4	516 (100.0)
Agriculture chemicals	Yes	31.6	237 (100.0)
	No	27.5	764 (100.0)
Environment problems	Yes	26.4	178 (100.0)
	No	28.9	823 (100.0)
Air pollution	Yes	26.4	178 (100.0)
	No	28.9	823 (100.0)
Forest use	Yes	29.2	685 (100.0)
	No	26.9	316 (100.0)
<b>Total</b>			<b>1,001 (100.0)</b>

The respondents of the villages who did not have one hundred thousand baht project, occupation promotion and garbage elimination project, had higher proportion of depression compare to those had these projects in their villages. The difference was not significant (Table 4.8).

**Table 4.8 Depression of elderly people with selected community development programs in KDSS villages, Thailand, 2006**

<b>Variables</b>		<b>Depression</b>	<b>Total</b>
One hundred thousand baht project	Yes	28.0	833 (100.0)
	No	31.0	168 (100.0)
Village economic fund	Yes	30.3	724 (100.0)
	No	27.8	724 (100.0)
Road construction	Yes	28.8	383 (28.5)
	No	28.3	619 (100.0)
Occupation promotion	Yes	27.2	367 (100.0)
	No	29.2	634 (100.0)
<b>Total</b>			<b>1,001 (100.0)</b>

### 4.3 Logistic regression

It is important to examine the correlation coefficients between the independent variables so that the sign of high collinearity or multicollinearity, especially the important variables that may affect the result, can be detected. Thus, Pearson correlation analyses was done among the individual variables, age, sex, education, marital status, working status, occupation, infirmity, disability, serious life events and self assessed health to investigate correlation and collinearity. The result of the Pearson correlation analysis in Table 4.9 shows that working status and occupation is highly correlated ( $r=.891, p<.01$ ). Disability and self assessed health is also highly correlated ( $r=.506, p<.01$ ). Overall, there was no sign of collinearity among other independent variables above 0.5. All these independent variables were included in the binary logistic regression model except ‘current occupation’ and ‘self assessed health’. Working status was chosen for the multivariate analysis because working status has direct effect on mental health of elderly people. But current occupation may give less information. Beside this disability variable was kept for the multivariate analysis but self-assessed health was dropped. Disability is a direct measurement of the physical condition of the people whereas self-assessed health is an indirect and perception based measurement.

**Table 4.9 Matrix of Pearson Correlation Coefficients between 10 Independent Variables**

No.	Variables	1	2	3	4	5
1	Age	1	0.91**	-.272**	.230**	-.419**
2	Sex		1	-.284**	.362**	-.183**
3	Education			1	-.183**	-.179**
4	Marital status				1	-.214***
5	Working status					1
6	Occupation					
7	Ill health					
8	Disability					
9	Serious life event					
10	Self assessed health					

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

**Table 4.9 Matrix of Pearson Correlation Coefficients between 10 Independent Variables (cont.)**

No.	Variables	6	7	8	9	10
1	Age	-.374**	.128**	.305**	-.053	.120**
2	Sex	-.114**	.180**	.243**	.035	.126**
3	Education	.146**	-.204**	-.200**	-.070*	-.159**
4	Marital status	-.128***	.144**	.152**	-.070*	-.159**
5	Working status	.891**	-.150**	-.317**	.003	-.167**
6	Occupation	1	-.136**	-.260**	.025	-.142**
7	Infirmity		1	.376**	.154**	.363**
8	Disability			1	.238**	.506**
9	Serious life event				1	.198**
10	Self assessed health					1

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

After testing the correlation then the multivariate analysis was done for depression and individual characteristics. The results of binary logistic regression found that infirmity, disability and serious life events had significant effect on depression of the respondent. Physical health played an important role for these respondents' mental health. Those who had 4 or more infirmity, they were 2.08 times more likely to have depression compare to those who had no or only 1 infirmity. This indicates that the multiple diseases are strong risk factor for the depression at late age. Disability was another strong predictor of the depression. It should be mentioned here that those who had medium disability, had the chance of depression 3.12 times more compare to those who had no disability. Serious life is another major factor for the respondents. Those who had 3 or more serious life events they had the depression 5.25 times more compare to those who had no serious life vent in last year (Table 4.10).

**Table 4.10 Adjusted odds ratio (OR) of depression among older people by selected individual characteristics in KDSS, Thailand in 2006**

Variable		Odds ratio	Std. Err.	Sig. level
Age	60-69 years (ref)	1.00		
	70-79 years	0.96	0.2652639	0.891
	80 years and above	5.06	5.327	0.122
Gender	Male (ref)	1.00		
	Female	1.43	0.4106525	0.206
Education	Primary or more (ref)	1.00		
	1-3 years	2.17	0.9855232	0.087
	No schooling	1.31	0.4107729	0.384
Marital status	Married (ref)	1.00		
	Widow	0.88	0.2692485	0.694
	Separated/divorced	2.11	1.593958	0.319
Work	Working (ref)	1.00		
	Not working	0.76	0.2112423	0.324
Infirmitly	0-1 (ref)	1.00		
	2-3	1.02	0.3236875	0.933
	4+	2.08	0.7473537	0.041
Disability	No disability (ref)	1.00		
	Low disability	1.25	0.3489871	0.416
	Medium disability	3.12	1.3924	0.011
	High disability	3.81	4.008688	0.203
Serious life events	No serious life evens	1.00		
	1-2	1.50	0.3744883	0.098
	3 +	5.25	3.941786	0.027

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N1=1001, Pseudo R square=0.1255, Sig. =0.0000

#### 4.4 Multilevel analysis

##### 4.4.1 Individual and household model (Level I)

Variables related to individual characteristics and variables corresponding to the household characteristics were included in Pearson correlation analysis in order to examine the high collinearity or multicollinearity among these 10 independent variables. The results of this Pearson correlation analysis reveal that most variables are significantly related to each other but no high correlation was observed (Table 4.10).

The individual characteristics and household characteristics were included in the level I of multilevel modeling. In the level I, multilevel regression was done to examine the impact of household characteristics and controlling the individual characteristics. The level I multilevel model considers the individuals nested within household. This model examines the impact of living arrangement of the elderly people and their children's migration on depression of elderly controlling individual characteristics of elderly.

**Table 4.11 Matrix of Pearson Correlation Coefficients between 10 Independent Variables**

No.	Variables	1	2	3	4	5	6
1	Age	1	0.91**	-.272**	.230**	-.419**	.128**
2	Sex		1	-.284**	.362**	-.183**	.180**
3	Education			1	-.183**	-.179**	-.204**
4	Marital status				1	-.214***	.144**
5	Working status					1	-.150**
6	Infirmity						1
7	Disability						
8	Serious life event						
9	Living arrangement						
10	Children's migration						

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

**Table 4.11 Matrix of Pearson Correlation Coefficients between 10 Independent Variables (cont.)**

No.	Variables	7	8	9	10
1	Age	.305**	-.053	.020	-.156**
2	Sex	.243**	.035	.183**	-.121**
3	Education	-.200**	-.070*	-.039**	.148**
4	Marital status	.152**	-.039*	.105**	-.084**
5	Working status	-.317**	.003	-.127**	.105**
6	Infirmity	.376**	.154**	.070*	-.025
7	Disability	1	.238**	.015	-.061
8	Serious life event		1	.019	.007
9	Living arrangement			1	-.090
10	Children's migration				1

The results of multilevel analysis in level I found that living with grandchildren was positively related with the depression of the elderly people. Elderly who lived with their grandchildren had higher probability of having depression compare (1.09,  $p < 0.05$ ) to those elderly who lived with their spouse, children and grand children. Besides living with grand children; infirmity, disability and serious life events were significant. Physical health was still very vital for the elderly respondents regardless of their household characteristics. All three variables kept their effect on depression with high significance level ( $p < 0.000$ ) compare to those who had no infirmity, no disability or no serious life events and played an important role for these respondents' mental health. Additionally gender was significant in this model. The female gender and the depression had positive relationship (0.38,  $p < 0.05$ ). But children's migration did not affect significantly the mental health of their parents (Table 4.12).

**Table 4.12 Effect of individual and household characteristics on depression of elderly people in rural KDSS, Thailand, 2006**

Variable		Coefficients	Std. Err.	Sig. level
Age	60-69` years	Ref		
	70-79 years	0.12	0.2887278	0.466
	80 years and above	-.06	0.2887278	0.832
Gender	Male	Ref		
	Female	0.38	0.1712336	0.026
Education	Primary or more	Ref.		
	1-3 years	0.26	0.2134085	0.229
	No schooling			
Marital status	Married	Ref		
	Widow	0.17	0.2215418	0.430
	Separated/divorced	0.53	0.3591947	0.133
Work	Working	Ref		
	Not working	-0.02	0.1682472	0.898
Infirmity	0-1	Ref		
	2-3	0.40	0.2499571	0.103
	4+	1.21	0.252777	0.000
Disability	No disability (ref)	Ref		
	Low disability	0.74	0.193059	0.000
	Medium disability	1.85	0.2182034	0.000
	High disability	3.54	0.3238562	0.000
Serious life events	No serious life events	Ref		
	1-2	0.78	0.1654692	0.000
	3+	2.06	0.2558986	0.000
Living arrangement	With spouse, children and children in laws	Ref		
	With spouse and grandchildren	0.52	0.281255	0.063
	With spouse	0.14	0.2287786	0.534
	With children and children in laws	0.34	0.2367509	0.140
	With grandchildren	1.09	0.401904	0.007
	Alone	0.42	0.2859576	0.137
	None migrated	Ref		
Children's migration	Some migrated	0.24	0.2389877	0.298
	All migrated	-0.11	0.2842539	0.675

N1=1,001, N2=1,001, Wald chi2=661.14, DF=23, Sig. =0.0000

#### 4.4.2 Individual, household and village model (Level 2)

Pearson correlation analysis was performed to identify potential collinearity among the 23 independent variables from individual, household, and village. The results in table 4.13 shows that there is high colinearity between air pollution and environmental problem. The variable 'air pollution' was dropped during multilevel analysis.

**Table 4.13 Matrix of Pearson Correlation Coefficients between 23 Independent Variables**

No.	Variables	1	2	3	4	5	6	7
1	Age	1	0.91**	-.272**	.230**	-.419**	.128**	.305**
2	Sex		1	-.284**	.362**	-.183**	.180**	.243**
3	Education			1	-.183**	-.179**	-.204**	-.200**
4	Marital status				1	-.214**	.144**	.152**
5	Working status					1	-.150**	-.317**
6	Infirmity						1	.376**
7	Disability							1
8	Serious life event							
9	Living arrangement							
10	Children's migration							
11	Public telephone							
12	Factory							
13	Bus route							
14	Use of forest							
15	Natural disasters							
16	Soil pollution							
17	Agriculture chemical							
18	Air pollution							
19	Environmental problems							
20	100 thousand baht project							
21	Road construction							
22	Village economic fund							
23	Occupation promotion							

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

**Table 4.13 Matrix of Pearson Correlation Coefficients between 23 Independent Variables (cont.)**

No.	Variables	8	9	10	11	11	13
1	Age	-	.020	-	-.032	.018	-.067*
		.053**		.156**			
2	Sex	.035	.183**	-	.038	.017	-.016
				.121**			
3	Education	-.070*	-.039	.148**	-.007	.041	-
							.131**
4	Marital status	-.039	.105*	-.084	.021	.043	.025
5	Working status	.003	-.127	.105**	-.024	.002	-.035
6	Infirmity	.154**	.070*	-.025	.002	.050	.014
7	Disability	.238**	.015	-.061	.003	.019	-.055
8	Serious life event	1	.019	.007	.019	-.007	.019
9	Living arrangement		1	-	.041	.038	-.008
				.090**			
10	Children's migration			1	-.018	.026	.021
11	Public telephone				1	-	-.076*
						.018**	
12	Factory					1	-.107
13	Bus route						1
14	Use of forest						
15	Natural disasters						
16	Soil pollution						
17	Agriculture chemical						
18	Air pollution						
19	Environmental problems						
20	100 thousand baht project						
21	Road construction						
22	Village economic fund						
23	Occupation promotion						

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

**Table 4.13 Matrix of Pearson Correlation Coefficients between 23 Independent Variables (cont.)**

No.	Variables	15	16	17	18	19	20
1	Age	-.033	.006	.065	-.001	.010	.010
2	Sex	-.032	-.045	.010	.030	.006	.006
3	Education	-.058	-.031	.002	.001	.062	.062
4	Marital status	-.039	-.030	.005	.027	-.027	-.027
5	Working status	.091**	.063*	.018	.029	.000	.000
6	Infirmity	.035	.046	.081*	.040	-.028	-.028
7	Disability	-.026	-.001	.034	-.027	.024	.024
8	Serious life event	.026	.067**	-.018	-.022	.022	.022
9	Living arrangement	-	-.006	.035	.031	.004	.004
		.105**					
10	Children's migration	.014	-.016	-.076	-.017	-.061	-.061
11	Public telephone	-.136	-.288	-.095	-	.001	.001
					.227**		
12	Factory	.201**	-.032	.185**	.143**	-.007	-.007
13	Bus route	.221	.001	.085**	.138**	-	-.151
						.151**	
14	Use of forest	1	.048	.005	.045	.024	.024
15	Natural disasters		1	.305**	.050	.083**	.083**
16	Soil pollution			1	.353**	.072*	.072*
17	Agriculture chemical				1	-.050	-.001
18	Air pollution					1	1.000*
							*
19	Environmental problems						1
20	100 thousand baht project						
21	Road construction						
22	Village economic fund						
23	Occupation promotion						

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

**Table 4.13 Matrix of Pearson Correlation Coefficients between 23 Independent Variables (cont.)**

No.	Variables	21	22	23	24
1	Age	.060	-.032	-.004	-.035
2	Sex	-.041	-.017	-.022	-.008
3	Education	.045	-.007	.053	-.018
4	Marital status	-.031	.016	.016	.018
5	Working status	.031	.031	.028	-.086**
6	Infirmity	.036	-.074*	.039	.022
7	Disability	.018	-.051	.033	-.002
8	Serious life event	.036	.057	.030	.048
9	Living arrangement	-.041	-.007	-.037	.083**
10	Children's migration	-.052	.002	.008	.049
11	Public telephone	.176**	.123**	.231**	-.018
12	Factory	-.075*	-.001	.274	.207**
13	Bus route	-.017	.184**	-.201**	.259**
14	Use of forest	.172**	.109**	.026	-.054
15	Natural disasters	.025	-.215**	.133**	-.128
16	Soil pollution	.232**	-.293	.079*	.063*
17	Agriculture chemical	-.001	-.123**	.091**	.137**
18	Air pollution	.020	-.032	.080*	.112*
19	Environmental problems	.020	-.032	.080*	.112**
20	100 thousand baht project	1	-.043	.278**	-.119**
21	Road construction		1	-.169**	.034
22	Village economic fund			1	-.003
23	Occupation promotion				1

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

At second level, contextual characteristics were included in the model so that their effect on depression could be examined by controlling individual and household factors. The contextual characteristics were represented by three groups of variables, infrastructure facilities (public telephone, factory and bus route), environmental problems (use of forest, soil pollution, agriculture chemicals, air pollution and environmental problems) and community development programs (one hundred thousand baht project, road construction, village economic fund and occupation promotion). Beside this the individual and household variables were controlled as well. The results from the multilevel regression model shows that (Table

4.14) contextual characteristics did not significantly affect depression of the respondents. Rather, individual characteristics like gender, infirmity, disability, serious life events were significantly affecting the depression in positive direction. Interestingly among the household characteristics living with grandchildren had significant effect. Additionally in level II model living with spouse and grand children also had positively significant effect on the mental health of the respondent. Results of this final model demonstrated that individual and household characteristics remain significant to influence the mental health but contextual characteristics were not statistically significant.

The models were also run by group variables. The first model was run with all the independent variables. The second model was run with independent variables except contextual characteristics. Then the value of Wald chi square was compared. The results were not shown here but assessment of significance of group variables were done.

**Table 4.14 Effect of contextual characteristics on depression of elderly people in rural KDSS, Thailand, 2006**

Variable		Coefficients	Std. Err.	Sig. level
Age	60-69 years	Ref		
	70-79 years	0.15	0.1743595	0.365
	80 years and above	-0.00	0.290797	0.986
Gender	Male	Ref		
	Female	0.38	0.1721205	0.026
Education	Primary or more	Ref		
	1-3 years	0.24	0.2161654	0.249
	No schooling	0.01	0.1868392	0.953
Marital status	Married	Ref		
	Widow	0.17	0.2218023	0.419
	Separated/divorced	0.57	0.3587649	0.108
Work	Working	Ref		
	Not working	-0.07	0.1703959	0.676
Infirmity	0-1	Ref		
	2-3	0.42	0.2504117	0.091
	4+	1.18	0.2541758	0.000

**Table 4.14 Effect of contextual characteristics on depression of elderly people in rural KDSS, Thailand, 2006 (cont.)**

Variable		Coefficients	Std. Err.	Sig. level
Disability	No disability (ref)	Ref		
	Low disability	0.77	0.1938572	0.000
	Medium disability	1.91	0.218758	0.000
	High disability	3.60	0.3265222	0.000
Serious life events	No serious life events	Ref		
	1-2	0.75	0.1664246	0.000
	3+	2.03	0.2591277	0.000
Living arrangement	With spouse, children and children in laws	Ref		
	With spouse and grandchildren	0.58	0.2830472	0.039
	With spouse	0.14	0.2286014	0.517
	With children and children in laws	0.37	0.2370692	0.115
	With grandchildren	1.05	0.4028394	0.009
Alone	0.39	0.2862478	0.167	
Migrant child	No one migrated	Ref		
	Some migrated	0.17	0.2413216	0.459
	All migrated	-0.14	0.2871344	0.622
Infrastructure	Telephone	0.27	0.266997	0.297
	Factory	-0.24	0.1983122	0.222
	Bus route	0.18	0.1855083	0.307
Natural environment	Forest use	0.23	0.1934379	0.234
	Natural disasters	0.33	0.210893	0.107
	Soil pollution	0.04	0.2040019	0.807
	Agricultural chemicals	0.31	0.2180838	0.152
	Environmental problems	-0.30	0.2254267	0.174
Community development programs	100 thousand baht project	-0.20	0.2596416	0.428
	Road construction	0.14	.1831971	0.435
	Village economic fund	0.11	.2239803	0.615
	Occupation promotion	-0.23	.1853116	0.198

N1= 1001, N2=1001, N3=88, Wald ch2=572.84, DF=34,, Sig. =0.000

## **CHAPTER V**

### **DISCUSSION, CONCLUSION and RECOMMENDATION**

#### **Discussion**

Thai society is characterized by a hierarchical tradition in which people occupy differently ranked social positions. Social relationships are maintained by superiority and inferiority. Older Thais are given high status that demands care, respect and obedience (Choowattanapakorn, 1999). The Thai family traditionally takes primary responsibility for older members. Widespread norms support filial obligations to parents, and government policy is geared towards reinforcing family responsibility for older persons (Knodel et al., 1995). Parents also typically feel a continuing obligation to ensure their children's well-being, and intergenerational exchanges of support and services remain pervasive (Knodel et al., 2000, 2005). Living arrangements are closely intertwined with this system of support exchanges. Majority of older Thais either live with or very near at least one adult child (Ding, 2004). Nevertheless, co-residence has declined moderately during the previous two decades (Knodel et al., 2005). An overall tendency exists to live with a married daughter rather than a married son, especially in the northeast. This pattern is much weaker in the central region and modestly reversed in Bangkok. More importantly, Thais are relatively flexible in this matter (Knodel et al., 1992). Traditionally children inherit equally, although the one who stays with the parents commonly gains the house and, perhaps, an extra share of the land (Knodel & Saengtienchai, 2007).

Kinship in Thailand has been strongly accepted for its benefits, especially where migration takes place. The formal and informal kinship system in Thai society is mainly shown in the form of neighborhood and plays a critical role as supporter and care giver for family members such as through taking care of a baby and helping in required household business (Ritcher et al., 1997). In Thailand living with or nearby adult children, typically in a stem-family configuration, is a predominant pattern that establishes family support (Cowgill, 1968, 1972, Gray et al., 2008). Childlessness is

not a common limitation for such arrangements since only about 5 per cent of current Thai elders do not have living children.

The research on contextual characteristics on older adult's health is limited (Yen et al., 2009). The systematic review on depression and neighborhood characteristics done by Kim (2008), found that contextual characteristics like infrastructure facilities are less explored area to examine the depression and the results were mixed or less supportive. This finding matches with the present study results. Recently few studies started to examine the relationship of mental health and the community characteristics like deteriorating or poorly maintained roads or buildings (Galea et al., 2005). Mair et al. (2008) also found that among the structural features the studies on the effect of infrastructure on depression is limited. They also mentioned that there are limited theories to explain about how contextual characteristics might influence depression.

The infrastructure facilities like electricity, water supply, road, public telephone, cellular phone signal is available almost most of the part of Thailand. In last 20 years the infrastructure development was very fast. For example, in 1990 89.7 per cent household had electricity and in 2001 it was increased to 98.5 per cent households (Thailand Development Indicator, 2003). This could be the reason that this study did not find significant effect of infrastructure facilities on elderly people's mental health. The elderly of Thailand are living within such an infrastructure where they do not have to suffer much for less facility. The respondents of this study were confined to a specific age group that is older age group. They lived in a community where facilities were better compare to the facilities for example for the Mexican Americans (Ostir et al., 2003). But Yen et al. (2009) said that elderly people could be more influenced by their neighborhood and their mobility could be limited.

Good public transportation, employment training or placement programs were all identified as highly important programs for the mental well-being of the elderly in the qualitative study of O'Compo et al. (2009). The present study did not find significant effect of construction of road or occupational promotion to affect the mental health of the respondents. These type of characteristics has been examined by Kubzansky et al. (2005) and not found strongly related with depression among the elderly. For example, traffic stress was identified as one of the important predictors for

depression of the elderly people living in urban areas of USA (Gee et al., 2004) but here the people living in KDSS did not face that problem.

Currently the focus of environment includes climate change (McLaren & Hawe, 2005) and growing evidences are there that the environmental problems affect the mental health of the people. This study did not find any significant effect of environmental problems on the depression of elderly. The environmental problems like natural disaster or soil pollution might not be so severe in this particular study area. It was found in other studies that if the natural calamities like flood, earth quake, wild fire, storm, cyclone occur suddenly and if the loss is severe it may create immediate mental health problem specially depression. For example, van Griensven et al. (2006) and Thienkrua et al. (2006) found that depression was very high among the people after the tsunami. Another cause of less depression among the elderly of this study could be that the elderly people are used to with these environmental problems as they might already experienced and they can adjust themselves with these situations.

The community development programs taken by the Thai Government in the rural area have a wide range and focus is multidimensional. There are some specific programs which could relate with the mental health of the elderly people. The study done by O'Compo et al. (2009) mentioned about the crisis intervention programs and affordable programs for the adults as necessary human and social services. The 100 thousand baht village fund or occupational promotion could be the example of the crisis intervention programs for the vulnerable group of the elderly people. The community development programs were not significant in this study. But here the focus of the study was not to examine the impact of these programs on the elderly mental health. So, it is not possible to comment on the impact of these programs for elderly people. There are studies which showed that the community development programs have significant effect on the working age population's life by creating job opportunity and education.

The result of present study can be explained by three major theories Engle's bio-psycho-social model (1977), Brufenbrenner's ecological systems theory (1979) mentioned by McLaren & Hawe (2005) and Lawton's ecological theory (1973) mentioned by (Satariano, 2006). In this study the contextual characteristics were not strong enough to affect elderly people's depression state. Rather respondent's

biochemical factors like infirmity, disability and psychological factor like serious life events significantly affected their mental state. But Marotti et al. (2000) found that when people age the mobility limitations occur and they become more dependent on the neighborhood services or amenities. The dependency to the neighborhood services also depends upon the availability and accessibility of the services in that particular community. In this study the effect of exo-system was examined on respondent's mental health. Here we found that micro and meso-systems affected the mental health but not the exo-system. That means elderly people's depression in this study was affected by their individual settings like their gender and health; and living arrangement at household rather than the contextual characteristics. The findings of this study can be explained by *Lawton's ecological theory*. Here the respondent's gender and health has shaped his/her mental health. Context was not the major players in this particular situation.

This study found that infirmity, disability, serious life events were significant predictors for depression. It is known that the life expectancy at birth in Thailand has increased from 58.0 years for males and 63.8 years for females in 1975 (NSO, 1997) to 69.5 for males and 76.3 for females in 2010 (IPSR, 2010). There is association with infirmity and depression. This study findings support other studies done in the context of elderly mental health and infirmity (Rajkumar et al., 2009; Shah & Hoxey, 2001). As age increases the physical health become weak and disease appears. As the life expectancy has increased, the people are suffering from noncommunicable diseases or life style diseases. These diseases often cause significant level of depression at old age. Recent data shows that proportion of people suffering from chronic diseases and disability is increasing in Thailand. According to National Health Statistics the leading burden of disease in Thai population has been shifting to non-communicable diseases (Aekplakorn, 2010). For example, majority of the diabetic patients in Thailand were female and most of them were older people (IPSR, THPF, NHCO, 2010; Thanerat, et al., 2009). Thai females are living longer compare to males and have chronic diseases (Soonthorndhada, et al., 2008). Chronic disease can affect the mental health and aggravate depression. Other studies also found that majority of the older people have one or more chronic conditions and many suffer from multiple physical disorders that restrict their activities (Aiken, 2001; Marengoni, et al., 2008). Older people may suffer

from depression after stroke, heart disease and diabetes (Glamcevski, et al., 2002; Fiske & Mohr, 1987).

This study found that mild, moderate and severe disability had the significant effect on mental health of elderly. A separate analysis conducted by Suttajit et al. (2010) from this project found that disability was a strong predictor when it was examined with social support. Disability was also identified as a significant predictor for the elderly depression in both developed and developing countries (Merikangas et al., 2007; Gureje et al., 2008). Elderly people may have depression due to conflict with children, own ill health, illness of the family member or burden of taking care of family members. Elderly people could have these kind of serious life events. Sometimes they are not physically and mentally strong enough to cope with the stressed situation. Due to sudden event like financial problem or death of the partner may cause short term depression but after the problem is solved or improved, the depression may decrease. In some situations depression may recur if proper treatment and counseling is not given.

In Thailand, the main sources of caregivers are middle aged female children of the elderly. The role compatibility of working and care giving allows the caregivers to be simultaneously involved in work as well as the elderly care. Grandchildren remain the second largest source for providing care to the elderly (Ding, 2004). Old people's ill health and disability affected their mental health significantly. Under Second National Plan for Older Persons in Thailand one of the important activities is promoting health for elderly. This includes ensuring the quality of life of the elderly, promotion and support of the elderly integration and participation in their respective clubs (Jitapunkul & Wivatvanit, 2009). May be they did not have regular health check up or assistance to perform daily activities. These may affect them mentally more than the other factors. To reduce infirmity or disability the intervention programs should involve the family members.

We found that female gender was one of the significant predictor of having depression compare to male gender. Other studies also found that the female elderly had more depression compare to the male elderly (Sherina et al., 2005; Wangthongkum et al., 2008). Marriage is a common phenomenon in the Thai society. Marriage gives the social and economic protection for both male and female in the

Thai context. In the past specially for the females the marriage was more vital compare to males. Because many of them were illiterate or less educated and their labour force participation was less compare to present time (Soonthorthondhada et al., 2008). The life event like widowhood, separation or divorce affects elderly people. Sometimes they face economic problem after the death of the partner or marriage dissolution. Some elderly may become very lonely due to the lack of company.

Living arrangement is an important predictor for the elderly people's mental and physical well being worldwide. Thailand is not an exception. The interesting finding from this study is that the elderly people are having significant depression if they live only with grandchildren; or with spouse and grand children compare to the respondents who live with spouse, children and grandchildren. Living with grandchildren was also identified as significant predictor of depression by Dharawuttimaprakorn & Punpuing (2010). Working age populations are moving in Bangkok and other big cities mainly for job. Sometimes it is not possible for the young parents to bring their children with them in the cities due to economic reason or heavy workload. As an alternative the children are kept with their grand parents in the place of origin. Out of affection and responsibility to the children the elderly people might take the responsibility of the grand children to ensure the smooth working environment for their children in the urban areas or other places far from home. But living with grandchildren may aggravate the depression of these elderly people. The reasons could be that the grand parents could feel pressure due to financial problem to take care of them. There might be a generation gap with the young people specially with the adolescent aged grandchildren. Or if the grand child is very young in age it may create difficulty for them to take care properly if other people are not at home to help them. Even the spouse is at home still the elderly felt significant depression to live with grand children.

Initially one assumption was that the elderly Thais who are living alone might have higher and significant level of depression due to loneliness. Qin et al. (2008) found that children's migration increases elderly people's risk of living alone. But the result of this study shows that living alone was not significant cause for their depression. This shows the changing context of the Thai society. The western studies

showed that the elderly who are living alone may be healthy and not poor. They can lead their life smoothly without assistance from other people and enjoy more independence and freedom compare to living with children or other people at household level. Sometimes even the elderly people live alone at their household but the children may live very near to them. They can talk and meet frequently. Working age children's migration is not uncommon in Thai community any more. The children's principal cause of migration is employment. In deferent studies it was found that the children send remittances to their parents. As long as they send remittances children's migration is seen as successful household strategy of migration. The previous analysis from this study supports this finding (Abas et al., 2009a, Gray et al., 2008).

Age and educational status was not significant for the depression of the respondents of this study. For example, age was not significant risk factor. This phenomenon could be explained by the explanation of Jorm (2000), decreased emotional responsiveness with age, increased emotional control and psychological immunization to stressful experiences. Though there are studies which found age is an important risk factor for the depression in old age (Heun & Hein, 2005). Working status was not a significant predictor for depression of the elderly in KDSS though other studies mentioned that the physical inactivity is linked with quality of life, morbidity and mortality (Sumic et al., 2007). Employment was found as significant predictor for depression in one study conducted in Britain by Weich et al. (2003). But that study was done at the electoral ward level and the authors mentioned that there was variation of prevalence among the wards. This may be unlikely among the KDSS villages.

Initially the theoretical explanation of the phenomenon of depression of elderly and the contextual characteristics were given by Lawton's Ecological Model. But we found that the findings of this study could also be explained by Engel's Bio-socio-psychological model. Here the individual characteristics or biological factors played the main role to affect the depression of elderly people. But the contextual factors had weak effect. The variables on social or community factor had less effect on elderly. Rather their physical health and living arrangement was significantly important. This

could be as the infrastructure facilities at rural areas in Thailand is better compare to the developing countries in Asia or African region.

The infrastructure facilities were not significant. May be elderly people did not feel much problem in transportation and the road communication was better. Any health facility is within 30 minutes reach. Thailand is comparatively less disaster prone country compare to the South Asian countries like Bangladesh or India. But in recent years Thailand had experienced the natural disasters like tsunami, flood or earthquake.

### **Limitations of the study**

This study was conducted in KDSS of Kanchanaburi province. We did not have a chance to compare the results of the elderly people living in the KDSS area with the elderly people living in the big cities or other provinces of Thailand. There may be variations on the effect of contextual characteristics on the mental health in those cities. We have used a set of contextual characteristics to examine the effect on mental health. As it was mentioned earlier that the contextual characteristics vary with context and are, may be different type of contextual characteristics could give different results.

### **Conclusion**

The objective of this study was to examine the contextual effect on mental health of elderly people living in the rural area of the Kanchanaburi Demographic Surveillance System, Thailand. The analysis was conducted among 60 years and more people. The depression was measured by using a Thai validated EURO-D scale. This scale has 12 questions. The study was conducted in the year 2006.

This study found that more than half of the respondents were from 60-69 years of age group and around one-tenth were 80 years and above. Majority of the sample were females. More than half of the respondents had 4 years or more schooling and around one-third had no schooling. Majority of them were married and 40 per cent were widow. The main occupation of the respondents was agriculture and almost half

of them were not working. Majority of the respondents had more than 3 infirmities or health problems, around 14 per cent had medium or high disability in last 30 days. Nearly 60 per cent respondents had 1-2 serious life events in last year from which they suffered from more than 2-3 weeks. More than 70 per cent respondents assessed their health as good and rest said they had poor health. Almost one-fourth of the elderly respondents were living with their spouse, children and children in laws. Around 13 per cent lived with grandchildren only. Majority of the households (65.4%) have children living with them and around one-fourth household all children have migrated outside household or village.

Majority of the villages did not have bus route and factories in their villages. Around 15 per cent did not have access to the telephone. Most of the respondents living in the villages which had electricity, tap water, public telephone and cellular phone signals. Majority of the villagers did not have bus route passes from other villages and factories in their villages. The villagers experienced different type of environmental problems in last 5 years. More than two-third of the respondents were from the villages which had natural disasters and nearly half of them were from the villages which had problems. Majority of people were from the villages that use forest. Nearly one-fourth villages had flood and agriculture chemicals problems. Around 18 per cent villagers lived in the villages which had air pollution and soil problems. The majority of the villagers had community development programs in their villages for last 1 year. One-fourth of the villagers had projects on activated economic fund, concrete road construction and occupational promotion.

The study found in bivariate analysis that depression had highly significant association ( $p$  value: 0.001) with age, gender, education, marital status, working status, current occupation, infirmity, disability, serious life events and self-assessed health. The oldest old had higher proportion of depression compare to younger old. Female had higher proportion of depression compare to male. Those had no schooling or less than 4 years of schooling, had more depression compare to those had 4 years and more schooling. Widow and separated/divorced/single respondents had higher proportion of depression compare to married. The working respondents and those who worked in the agriculture sector had less depression compare to not working and working in non-agriculture sector. The respondents who had more than 3 infirmity or health problems

and medium or high disability had higher proportion of depression compare to those had no or less infirmity and disability. The respondents who assessed their health as bad had very high depression compare to those who rated their health as good. The depression varied according to the living arrangement of the respondents and living arrangement had significant association. Those who lived with grandchildren, with children and alone, had higher proportion of depression compare to other types of living arrangement.

The respondents of the villages had slightly higher percentage of depression who did not have public telephone, cellular signals, internet and factory in the village compare to those elderly who had these infrastructure facilities in their village. The difference did not have significant association with chi square test. The villagers who had natural disasters, soil pollution, agriculture chemicals and forest use in last 5 years had more depression compare to the villagers who did not have these problems. The association was not significant. The respondents of the villages who did not have one hundred thousand baht project, occupation promotion and garbage elimination project, had higher proportion of depression compare to those had these projects in their villages. The difference was not significant.

In logistic regression we found infirmity, disability and serious life events had significant effect on depression of the respondent. Those who had 4 or more infirmity, they were 2.08 times more likely to have depression compare to those who had no or only 1 infirmity. Those who had medium disability, had the chance of depression 3.12 times more compare to those who had no disability. Those who had 3 or more serious life events they had the depression 5.25 times more compare to those who had no serious life vent in last year.

In multilevel analysis the results of level I found that living with grandchildren was positively related with the depression of the elderly people. Elderly who lived with their grandchildren had higher probability of having depression compare (1.09,  $p < 0.05$ ) to those elderly who lived with their spouse, children and grand children. Besides living with grand children; infirmity, disability and serious life events were significant. All three variables kept their effect on depression with high significance level ( $p < 0.000$ ) compare to those who had no infirmity, no disability or no serious life events. Additionally gender was significant in this first level model.

The female gender and the depression had positive relationship (0.38,  $p < 0.05$ ). But children's migration was not significant.

At second level, contextual characteristics were included in the model. The contextual characteristics were represented by three groups of variables, village infrastructure (public telephone, factory and bus route), environmental problems (use of forest, natural disaster, soil pollution, agriculture chemicals and environmental problems) and community development programs (one hundred thousand baht project, road construction, village economic fund and occupation promotion). Beside this the individual and household variables were controlled. The results show that contextual characteristics did not significantly affect depression of the respondents. Rather, individual characteristics female gender, infirmity, disability, serious life events were significantly affecting the depression in positive direction. Interestingly among the household characteristics living with grandchildren had significant effect. Additionally in level II model living with spouse and grand children also had positively significant effect on the mental health of the respondent. Results of this final model demonstrated that individual and household characteristics remain significant to influence the mental health but contextual characteristics were not statistically significant.

#### Summary of the findings

1. Contextual characteristics did not affect significantly the depression of the elderly people living in the rural KDSS, Thailand.
2. Individual characteristics like female gender, infirmity, disability and serious life events significantly affected the depression of the elderly people living in rural KDSS, Thailand.
3. Household characteristic like living with only grand children and living with spouse and grand children significantly affected depression of the elderly people living in rural KDSS, Thailand.

## **Recommendation**

Further research is needed to examine the contextual effect on mental health of elderly people with other type of group variables like community socio-economic status. Comparison between older people living in rural and urban areas could be examined. But rural and urban comparable variables should be chosen carefully. Specific research is required to define the contextual characteristics in the context of the Thailand. The KDSS questionnaire can include new questions for elderly people to monitor their mental health beside their physical health.

Programs for elderly people should aim to prevent and provide services to the elderly people with depression who has physical illness and disability. These programs should also include community counseling support for example after a traumatic life event occurred in an elderly people's life. But this kind of intervention needs further research.

A mechanism is necessary from the Government and community organizations to provide support for those elderly people who are living only with their grandchildren. The quantitative information gives the information that the elderly people are more prone to have depression if they live only with grandchildren. This finding needs further explanation through qualitative research.

## REFERENCES

- Abas, M., Punpuing, S., Jirapramupitak, T., Guest, P., Tangchonlatip, K., Leese, M., & Price, M. (2009a). Rural-urban migration and depression in ageing family members left behind. *The British Journal of Psychiatry*, 194, 1-7.
- Abas, M., Punpuing, S., Jirapramupitak, T., Tangchonlatip, K., & Leese, M. (2009b). Psychological wellbeing, physical impairments and rural aging in a developing country setting. *Health and Quality of Life Outcomes*, 7, 66.
- Abolfotouh, M. A., Daffallah, A. A., Khan, M. Y., Khattab, M. S., & Abdulmoneim, I. (2001). Psychosocial assessment of geriatric subjects in Abha City, Saudi Arabia. *Eastern Mediterranean Health Journal*, 7(3), 481-491.
- Abrahams, M. J., Price, J., Whitlock, F. A., Williams G. (1976). The Brisbane floods, January 1974: their impact on health. *The Medical Journal of Australia*, 2, 936-939.
- Aekplakorn, W. (2010). Non-Communicable Diseases in Urban Communities. *Siriraj Medical Journal*, 62, 36-38.
- Age, R. (2001). Retirement age declines again in 1990s. *Monthly Labor Review*:13.
- Aguilera-Guzman, R. M., Salgado de Snyder, V. N., Romero, M., & Medina-Mora, M. E. (2004). Parental absence and international migration: stressors and compensators associated with the mental health of Mexican teenagers of rural origin. *Adolescence*, 39, 711-723.
- Aiken, L. R. (2001). Aging and later life. Growing old in modern society. Charles C. Thomas Publisher Ltd. Springfield, Illinois, USA.
- Aldwin, C. M., & Gilmer, D. F. (2004). Health, illness and optimal aging. Biological and psychological perspectives. Sage Publications.
- Andrews, G., Poulton., R., & Skoog, I. (2005). Lifetime risk of depression: restricted to a minority or waiting for most? *The British Journal of Psychiatry*, 187, 495-496.

- Atkins, D. C. (2005). Using multilevel models to analyze couple and family treatment data: basic and advanced issues. *Journal of Family Psychology*, 19, 98-110.
- Baum, A., Singer, J. E., & Baum, C. S. (1981). Stress and the environment. *Journal of Social Issues*, 37, 4-35.
- Beekman, A. T., Deeg, D. J., Tilburg, v. T., Smit, J. H., Hooijer, C., & Tilburg, v. W. (1995). Major and minor depression in later life: a study of prevalence and risk factors. *Journal of Affective Disorders*, 36(1-2), 65-75.
- Bennet, G. (1970). Bristol floods 1968. Controlled survey of effects on health of local community disaster. *British Medical Journal*, 3, 454-458.
- Berke, E. M., Gottlieb, L. M., Moundon, A. V., Larson, E. B. (2007). Protective association between neighborhood walkability and depression in older men. *Journal of the American Geriatrics Society*, 55, 526-33.
- Bhagwanjee, A., Parekh, A., Paruk, Z., Petersen, I., & Subedar, H. (1998). Prevalence of minor psychiatric disorders in an adult African rural community in South Africa. *Psychological Medicine*, 28(5), 1137-1147.
- Blazer, D.G. (2003). Depression in Late Life: Review and Commentary. *Medical Sciences*, 58A(3), 249-265
- Bojorquez-Chapela, I., Villalobos-Daniel, V. E., Manrique-Espinoza, B. S., Tellez-Rojo, M. M., & Salinas-Rodríguez, A. (2009). Depressive symptoms among poor older adults in Mexico: prevalence and associated factors. *Pan American Journal of Public Health*, 26(1), 70-77.
- Bokszczanin, A. (2002). Long-term negative psychological effects of a flood on adolescents. *Polish Psychological Bulletin*, 33, 55-61.
- Bond, J., Peace, S., Dittmann-Kohli, F., & Westerhof, G. (2007) Ageing in society. 3rd Edition. Sage Publications. London.
- Bonder, B. R., & Bello-Haas, V. (2009). Functional performance in older adults. F A Davis Company. Philadelphia.
- Bongaarts, J. (2001). Household size and composition in the developing world. Population Council.
- Borrell, L. N., Diez Roux, A.V., Rose, K., Catelliar, D., Clark, B. L. (2004). Neighborhood characteristics and mortality in the atherosclerosis risk in communities study. *International Journal of Epidemiology*, 33(2), 398-407.

- Bojorquiez, I., Saldago de Snyder, N., & Casique, I. (2010). International migration of partner, autonomy and depressives symptoms among women from a Mexican rural area. *International Journal of Social Psychiatry*, 55(4), 306-321.
- Bruce, M. L., & Kim, K. M. (1992). Differences in the effects of divorce on major depression in men and women. *American Journal of Psychiatry*, 149(7), 914-917.
- Brugha, T. S. & Cragg, D. (1990). The List of Threatening Experiences: the reliability and validity of a brief life events questionnaire *Acta Psychiatrica Scandinavica*, 77-81.
- Burns, A., Lawlor, B., & Craig, S. (2002). Rating scales in old age psychiatry. *British Journal of Psychiatry*, 180, 161-167.
- Burvill, P. W., Mowry, B. & Hall, W. D. (1990). Quantification of Physical Illness in Psychiatric Research in the Elderly. *International Journal of Geriatric Psychiatry*, 5, 161-70.
- Cagney, K. A., Browning, C. R., & Wen, M. (2005). Racial disparities in self-rated health at older ages: what differences does the neighborhood make? *Journal of Gerontology: Social Sciences*, 60B, S181-S190.
- Carvalhais, S. M. M., Lima-Costa, M. F., Peixoto, S. V., Firmo, J. O. A., Castro-Costa, E., & Uchoa, E. (2008). The influence of socio-economic conditions on the prevalence of depressive symptoms and its covariates in an elderly population with slight income difference: the BAMBUI health and aging study. *International Journal of Social Psychiatry*, 54, 447-456.
- Castro-Costa, E., Dewey, M., Stewart, R., Banerjee, S., Huppert, F., Mendonca-Lima, C., Bula, C., Reisches, F., Wancata, J., Ritchie, K., Tsolaki, M., Mateos, R, & Prince, M. (2008). Ascertainig late-life depressive symptoms in Europe: an evaluation of the survey version of the EURO-D scale in 10 nations. The SHARE Project. *International Journal of Methods in Psychiatric Research*, 17(1), 12-29.
- Chayovan, N. (2000). Policy implications for old age economic support of changes in Thailand's age structure: a new challenge. Paper presented at IUSSP/APN meeting on age structural transitions and policy implications, Phuket, Thailand, 8-10 November.

- Chee, M., W., L. (2003). Migrating for the children: Taiwanese American women in transnational families: In *Wife or Worker? Asian Women and Migration* (Eds. N. Piper and M Roces). Lanham: M.D. Rowman and Littlefield, USA. 137-156.
- Cheng, S., Phillips, D. R., & Chan, A. C. M. (2009). Asia-Pacific Region. In *The International Handbook on Aging. Current research and developments.* Edited by Palmore, E.B., Whittington, F., & Kunkel, S. 3<sup>rd</sup> edition. Prager. IPSR.
- Choowattanapakorn, T. (1999). The social situation in Thailand: the impact on elderly people. *International Journal of Nursing Practice*, 5, 95-99.
- Cowgill, D. O. (1968). The social life of the aged in Thailand. *The Gerontologist*, 8, 159–163.
- Cowgill, D. O. (1972). The role and status of the aged in Thailand. In D. O. Cowgill & L. D. Holmes (Eds.), *Aging and Modernization*, pp. 91–101. New York: Appleton-Century-Crofts.
- Crowell, B. A. Jr., George, L. K., Blazer, D., & Landerman, R. (1986). Psychological risk factors and urban/rural differences in the prevalence of major depression. *The British Journal of Psychiatry*, 149, 307-314.
- Damian, J., Ruigomez, A., Pastor, V., & Martin-Moreno, J. M. (1999). Determinants of self assessed health among Spanish older people living at home. *Journal of Epidemiology & Community Health*, 53, 412-416.
- Dajpratham, P., Udompanturak, S., Karawek, J. (2007). Factors Associated with Functional Improvement at Discharge in Stroke Rehabilitation. *Siriraj Medical Journal*, 59, 222-225.
- Desai, K. M., Chang, T., Wang, H., Banigesh, A., Dhar, A., Liu, J., Untereiner, A., & Lingyun, W. (2010). Oxidative stress and aging: Is methylglyoxal the hidden enemy? *Canadian Journal of Physiology and Pharmacology*, 88, 273-284.
- Dharawuttimaprakorn, N., & Punpuing, S. (2010). Living arrangements and elderly depression: Kanchanaburi DSS, Thailand. Paper presented in Population Association of America, 2010 Annual Meeting in Dallas, Texas, April 15-17, 2010.

- Diez-Roux A. V. (2000). Multilevel analysis in public health research. *Annu. Rev. Public Health*, 21,171–92.
- Ding, S. (2004). The rural elderly support in China and Thailand. *Geriatrics and Gerontology International*, 4, s56-s59.
- Durkin, M. S., Khan, N., Davidson, L. L., Zaman, S. S., & Stein, Z. A. (1993). The effects of a natural disaster on child behaviour: evidence for posttraumatic stress. *American Journal of Public Health*, 83, 1549-1553.
- Engle, G. L. (1977). The need for a new medical model: a challenge for Biomedicine. *Science, New Series*, 196 (4286), 129-136.
- Farooq, M., & Javed, Z.H. (2009). The impact of international migration on migrants' families left behind in the rural area of Pakistan. *Pakistan Journal of Agriculture Science*, 46(4), 233-239.
- Fayers, P. M., & Sprangers, M. A. G. (2002). Understanding self-assessed health. *The Lancet*, 359,187-188.
- Fiske, A., Wetherell, J. L. & Gatz, M. (2003). Depressive Symptoms and Aging: The Effects of Illness and Non-health Related Events. *Journal of Gerontology:Psychological Sciences*, 58,320–28.
- Folstein, M. F., Folstein, S. E., McHugh, P. R. (1975). Mini-mental state: A practical method for grading the cognitive state of patients for the clinician. *Journal of Psychiatric Research*, 2, 189-198.
- Frese, M., & Mohr, G. (1987). Prolonged unemployment and depression in older workers: a longitudinal study of intervening variables. *Social Science Medicine*, 1987, 25(2), 173-178.
- Galia, S., Ahen, J., Rudenstine, S., Wallace1, Z., & Vlahov, D. (2005). Urban built environment and depression: a multilevel analysis. *Journal of Epidemiology & Community Health*, 59, 822-7.
- Gannon, L. R. (1999). Women and ageing. Women and psychology. Transcending the myths. Routledge, London and New York.
- Gee, G. C., & Takeuchi, D. T. (2004). Traffic stress, vehicular burden and well-being: a multilevel analysis. *Social Science Medicine*, 59, 405-14.
- Grammatikopoulos, I., & Koutentakis, C. (2010). Social activity and participation as

- determinants of anxiety and depression among elderly in primary care. *Annals of General Psychiatry*, 9, 137.
- Gray, R., S., Rukumnuaykit, p., Kittisuksathit, S., & Thongthai, V. Inner happiness among \thai elderly. *Journal of Cultural Gerontology*, 23, 211-224.
- Gray, R., & Chamrathirong, A. (2009). Thailand. In *The International Handbook on Aging: Current research and developments*. 3<sup>rd</sup> edition. Edited by Palmore, E. B., Whittington, F. J., Kunkel, S. Praeger.
- Ginexi, E., M., Weihs, K., Simmens, S. J., & Hoyt, D. R. (2000). Natural disaster and depression: a prospective investigation of reactions to the 1993 midwest floods. *American Journal of Community Psychology*, 28, 495-518.
- Glamcevski, M. T., McArthur, L. C., Chong, H. T. and Tan, C. T. (2002). Factors associated with post-stroke depression, a Malaysian study. *Neurological Journal of Southeast Asia*, 7, 9-12.
- Gureje, O., Ademola, A., & Olley, B. O. (2008). Depression and disability: Comparisons with common physical conditions in the Ibadan study of Ageing. *Journal of the American Geriatrics Society*, 56(11): 2033-8.
- Hamilton, M. (1960). A rating scale for depression. *Journal of Neurology, Neurosurgery and Psychiatry*, 23, 56-62.
- Harsness, K. L., Alavi, N., Monroe, S. M., Slavich, G. M., Gotlob, I. H., et al, (2010). Gender Differences in Life Events Prior to Onset of Major Depressive Disorder: The Moderating Effect of Age. *American Psychological Association*, 1-13.
- Haseen, F., Adhikari, R., & Soonthorndhada, K. (2010). Self-assessed health among Thai elderly. *BMC Geriatrics*, 0:30.
- Haseen, F., & Punpuing, S. (2010). Impact of ageing on migration in Asia. *Panorama. Insights into Asian and European Affairs. Ageing and Politics. Consequences for Asia and Europe*. Knorad Adenauer Stiftung.
- Hayes, J., Mason J., Brown, F., & Mather, R. (2009). Floods in 2007 and older adult services: lessons learnt. *Psychiatric Bulletin*, 33, 332-336.
- Hengrasmee, P., Padungstut, P., & Boriboonthirunarn, D. (2004). Depression among gynecologic cancer patients at Siriraj hospital: prevalence and associated factors. *Journal of the Medical Association of Thailand*, 87(Suppl 3): S74-9.

- Heun, R. & Hein, S. (2005). Risk factors of major depression in the elderly. *European Psychiatry*, 20(3), 199-204.
- Hooyman, N., & Kiyak, H. A. (1996). *Social Gerontology. A Multidisciplinary Perspective*. 4th edition. Allyn and Becon. IPSR
- Hooyman, N., & Kiyak, H. A. (2009). *Social Gerontology. A multidisciplinary perspective*. 8th edition. Pearson.
- Husain, N., Creed, F., & Tomenson, B. (2000). Depression and social stress in Pakistan. *Psychological Medicine*, 30(2), 395-402
- Huisman, M., Lenthe, v. F., & Mackenbach, J. (2007). The predictive ability of self assessed health for mortality in different educational groups. *International Journal of Epidemiology*, 36(6), 1207-1213.
- Institute for Population and Social Research. (2001). Report of baseline survey. (2000). Kanchanaburi Project. Institute for Population and Social Research, Mahidol University, Nakhon Pathom, Thailand.
- Institute for Population and Social Research. (2006). Mahidol University Population Projections for Thailand, 2005-2025. Nakhon Pathom, Thailand: Institute for Population and Social Research, Mahidol University.
- Institute for Population and Social Research. (2010). Mahidol University Population Gazette. Nakhon Pathom, Thailand: Institute for Population and Social Research, Mahidol University.
- Institute for Population and Social Research, Thai Health Promotion Foundation and The National Statistical Office. (2010). Thai Health. Capitalism in crisis: opportunity for society?
- Jackson, L., Langille, L., Lyons, R., Hughes, J., Hughes, J., Martin, D., & Winstnaley, V. (2009). Does moving from a high-poverty to lower neighborhood improve mental health? A realist review of 'Moving to opportunity'. *Health & Place*, 15, 961-970.
- Jariwala, V., Bansal, R. K., Patel, S. & Tamakuwala, B. A Study of Depression among Aged in Surat City. (2010). *National Journal of Community Medicine* 1:47-49.
- Jirapramukpitak, T., Darawuttimaprakorn, N., Punpuing, S. & Abas, M. (2009). Validation and factor structure of the Thai version of the EURO-D scale

- for depression among older psychiatric patients. *Aging & Mental Health*, 13(6), 899–904.
- Jitapunkul, S., Kuanusont, C., & Phoolcharoen, W. (2003). Disability-free life expectancy of elderly people in a population undergoing demographic and epidemiologic transition. *Age and Ageing*, 32, 401–405.
- Jitapunkul, S., & Wivatvanit. (2009). National policies and programs for the ageing population in Thailand. *Ageing International*, 33, 62-74.
- Jorm, A. F. (2000). Does old age reduce the risk of anxiety and depression? A review of epidemiological studies across the adult life span. *Psychological Medicine*, 30(1), 11-22.
- Jones, R. N., Marcantonio, E. R., & Rabinowitz, T. (2003). Prevalence and correlates of recognized depression in U.S. nursing homes. *Journal of the American Geriatrics Society*, 51(10), 1404-1409.
- Jylhä, M. (2009). What is self-rated health and why does it predict mortality? Towards a unified conceptual model. *Social Science Medicine*, 69(3), 307-316.
- Kanchanatawan, B., Jitapunkul, S., Supapitiporn, S., & Chansirikarnjana, S. (2006). Validity of Clock Drawing Test (CDT), Scoring by Chula Clock-Drawing scoring system (CCSS) in screening dementia among Thai elderly in community. *Journal of the Medical Association of Thailand*, 89(8), 1150-1156.
- Kawachi, I., & Berkman, L. F. (2003). *Neighborhood-level context and health: lessons from sociology in Neighborhoods and health*. Oxford University Press. New York.
- Kelley-Moore, J. A., Schumacher, J. G., Kahana E., & Kahana, B. (2006). When Do Older Adults Become "Disabled"? Social and health antecedents of perceived disability in a panel study of the oldest old. *Journal of Health and Social Behavior*, 47(6), 126-141.
- Kesler, R. C., & Ustun, T. B. (2008). *The WHO World mental Health Surveys*. Cambridge University Press. IPSR
- Kespichayawattana, J., & Jitapunkul, S. (2009). Health and health care system for older persons. *Ageing International*, 33, 28-49.

- Ketumarn, P. (2010). Mental health problems in urban setting. *Siriraj Medical Journal*, 62(1), 29-31.
- Kim, D. (2008). Blues from the neighborhood? Neighborhood characteristics and depression. *Epidemiologic Reviews*, 30(1), 01-117(17).
- Kindler, K. S., Gardner, C. O. & Prescott, C. A. (2002) Toward a comprehensive developmental model for major depression in women. *American Journal of Psychiatry*, 159, 1133–1145.
- Kinsella, K., & Philips, D. (2005). “Global Ageing: The Challenge of Success”, *Population Bulletin*, 60(1).
- Kinsella, K., & He, W. (2009). An Aging World: 2008. International Population Reports. US Department of Health and Human Services, National Institutes of Health, National Institute on Aging and US Department of Commerce, Economics and Statistics Administration, US Census Bureau.
- Knodel, J., Chamrathirong, A., & Debavalya, N. (1987). Thailand’s Reproductive Revolution. A Badger Reprint. The University of Wisconsin Press.
- Knodel, J., Chayoman, N., & Siriborn, S. (1992). The familial support system of Thai elderly: an overview. *Asia-Pacific Population Journal*, 7, 105-126.
- Knodel, J., Saengtienchai, C., & Sittitrai, W. (1995). The living arrangements of elderly in Thailand: views of the populace. *Journal of Cross-Cultural Gerontology*, 10, 79–111.
- Knodel, J., Friedman, J., Anh, T. S., & Cuong, B. T. (2000). Intergenerational exchanges in Vietnam: Family size, sex composition, and the location of children. *Population Studies*, 54, 89-104.
- Knodel, J., Chayovan, N., Mithranon, P., Amornsirisomboon, P., & Arunraksombat, S. (2005). Thailand’s older population: social and economic support as assessed in 2002. PSC Research Report 05-471. Population Studies Center: Ann Arbor, MI.
- Knodel, J., & Saengtienchai, C. (2007). Rural parents with urban children: social and economic implications of migration for the rural elderly in Thailand. *Population Space and Place*, 13, 193-210.
- Knodel, J., & Chayovan, N. (2009). Intergenerational relationships and family care and support for Thai elderly. *Ageing International*, 33, 15-27.

- Ko, F. W., Tam, W., Wong, T. W., Chan, D. P., Tung, A. H., Lai, C. K., Hui, D. S. (2007). Temporal relationship between air pollutants and hospital admissions for chronic obstructive pulmonary disease in Hong Kong. *Thorax*, 62, 780-785. 5(1), e8775.
- Kruger, D. J., Reischl, T. M., & Gee, G. C. (2007). Neighborhood social conditions mediate the association between physical deterioration and mental health. *American Journal of Community Psychology*, 40, 261-271.
- Kubzansky, L. D., Subramanian, S. V., Kawachi, I., Fay, M., E., Soobader, M., & Berkman, L. F. (2005). Neighborhood contextual influences on depressive symptoms in the elderly. *American Journal of Epidemiology*, 162(3), 253-60.
- Larraga, L., Saz, P., Dewey, D. E., Marcos, G., & Lobo, A. (2006). Validation of the Spanish version of the EURO-D scale: an instrument for detecting depression in older people. *International Journal of Geriatric Psychiatry*, 21(12), 1199 -1205.
- Lee, M. (2008). Neighborhood residential segregation and mental health among Hispanic Americans in Chicago. Paper presented at the Annual Meeting of the American Sociological Association. Sheraton, Boston and the Boston Marriott Copley place, Boston, USA.
- Logue, J. N., & Hansen, H. (1980). A case-control study of hypertensive women in post-disaster community: Wyoming Valley, Pennsylvania. *Journal of Human Stress*, 6, 28 - 34.
- Logue, J. N., Melick, M. E., & Struening, E. L. (1981). A study of health and mental health status following a major natural disaster. *Res Community Mental Health*, 2, 217-74.
- Magnus, G. (2009). The age of aging. John Wiley & Sons (Asia) Pte. Ltd.
- Mahidol University. (2010) Population *gazette* 2010. Institute for Population and Social Research, Mahidol University. Nakhon Pathom, Thailand.
- Mair, C., Rouz, A. V. D., & Galea, S. (2008). Are neighborhood characteristics associated with depressive symptoms? A review of evidence. *Journal of Epidemiology & Community Health Community Health*, 62, 940-946.

- Marengoni, A., Winbland, B., Karp, A., Fratiglioni, L. (2008). Prevalence of Chronic Diseases and Multimorbidity among the Elderly Population with Sweden. *American Journal of Public Health*, 98(7), 1198-1200.
- Marotti, R., A., Leon, D. C. F. M., Glass, T. A., Williams, C. S., Cooney, L. M. Jr., & Berkman, L. F. (2000). Consequences of driving cessation: decreased out-of-home activity levels. *J Gerontol B Psychol Sci Soc*, 55(6), S334-340.
- Mason, K. O. (1992). Family change and support of the elderly in Asia: what do we know? *Asia Pac Popul J*, 7(3), 13-32.
- McCall, N. T., Parks, P., Smith, K., Pope, G., & Griggs, M. (2002). The prevalence of major depression or dysthymia among aged Medicare Fee for service beneficiaries. *Int J Geriatr Psychiatry*, 17(6), 557-565.
- McGuire, S., & Martin, K. (2007). Fractured migrant families: paradoxes of hope and devastation. *Family & Community Health*, 30, 178-188.
- McLaren, L., & Hawe, P. (2005). Ecological perspectives in health research. *Journal of Epidemiology and Community Health*, 59, 6-14.
- Melick, M. E. (1978). Self-reported effects of a natural disaster on the health and well-being of working class males. *Crisis Intervention*, 9, 12-31.
- Merikangas, K. R., Ames, M., Cui, L., Stang, P. E., Ustun, T. B., Korff, M. V., & Kessler, R. C. (2007). The impact of comorbidity of mental and physical conditions on role disability in the US adult household population. *Archives of General Psychiatry*, 64, 1180-1188.
- Minicuci, N., Maggi, S., Pavan, M., Enzi, G., & Crepaldi, G. (2002). Prevalence rate and correlates of depressive symptoms in older individuals: the Veneto Study. *Journal of Gerontology Medical Sciences*, 57(3), M155-161.
- Ministry of Social development and family Security. (2007). Thailand's implementation of the Shanghai implementation Strategy (SIS) and the Madrid International Plan of Action on Ageing (MIPAA) 2007. Thailand.
- Montgomery, S. A. & Asberg, N. (1979). A new depression scale designed to be sensitive to change. *British Journal of Psychiatry*, 134, 382-389.
- Moody, R. H. (2010). Ageing. Concepts and Controversies. 6th edition. Pine Forge Press. Thousands Oks.

- Morgan, L., & Kunkel, S. (1998). *Aging the social context*. Pine Forge Press. Thousand Oaks, Calif.
- Morgan, L., & Kunkel, S. (2001). *Aging the social context*. 2<sup>nd</sup> edition. Pine Forge Press. Thousand Oaks, Calif.
- Morewitz, S. J., & Goldstein, M. L. (2007). *Aging and chronic disorders*. Springer.
- Mumford, D. B., Minhas, F. A., Akhtar, I., Akhter, S., Mubbashar, M. H. (2000). Stress and psychiatric disorder in urban Rawalpindi. Community survey. *British Journal of Psychiatry*, 177, 557-562.
- Muangpaisan, W., & Assantachai, P. (2009). Health and ill health in the older population. *Siriraj Medical Journal*, 61, 230-232.
- Muangpaisan., W. (2010). *Siriraj Medical Journal*, 59(5), 264-266.
- Mumford, D. B., Minhas, F. A., Akhtar, I., Akhter, S., & Mubbashar, M. H. (2000). Stress and Psychiatric Disorder in Urban Rawalpindi. Community Survey. *British Journal of Psychiatry*, 177, 557-562.
- National Statistical Office. (1980). *Population and Housing Census*. Thailand: National Statistical Office, Office of the Prime Minister.
- National Statistical Office. (1997). *Report on the 1995-1996 survey of population change*, Bangkok, Thailand: National Statistical Office.
- \_\_\_\_\_ (1960). *Population and Housing Census*. Thailand: National Statistical Office, Office of the Prime Minister.
- \_\_\_\_\_ (1970). *Population and Housing Census*. Thailand: National Statistical Office, Office of the Prime Minister.
- \_\_\_\_\_ (1980). *Population and Housing Census*. Thailand: National Statistical Office, Office of the Prime Minister.
- \_\_\_\_\_ (1990). *Population and Housing Census*. Thailand: National Statistical Office, Office of the Prime Minister.
- \_\_\_\_\_ (2000). *Population and Housing Census*. Thailand: National Statistical Office, Office of the Prime Minister.
- Nevid, J. S., Rathus, S. A., & Greene, B. (1999). *Abnormal psychology: in a changing world*. 4<sup>th</sup> edition. USA, Prentice-Hall, Inc.

- Nelson, C. J., Weinberger, M. I., Balk, E., Holland, J., Breitbart, W., & Roth, A. J. (2009). The chronology of distress, anxiety, and depression in older prostate cancer patients. *The Oncologist*, 14, 891–899.
- Nidhinandana, S., Chinvarun, Y., Sithinamsuwan, P., Udommongkol, C., Suwantamee, J., Wongmek, W., Suphakasem, S., Prachuabmoh, V., & Mithranon, P. (2007). Prevalence of depression among Epileptic patients at Phramongkutklo hospital. *Journal of Medical Association of Thailand*, 90 (1), 32-36.
- Norris, F. H., Kaniasty, K., Conrad, M. L., Inman, G. L. & Murphy, A. D. (2002). Placing age differences in cultural context: a comparison of the effects of age on PTSD after disasters in the United States, Mexico, and Poland. *Journal of Clinical Geropsychology*, 8, 153–173.
- Neugarten, B., L. (1996). *The meanings of age*. The University of Chicago Press, Ltd., London.
- O'Compo, P., Salmon, C., & Burke, J. (2009). Neighborhoods and mental well-being: What are the pathways? *Health & Place*, 15, 56-68.
- Ollendick, D. G., & Hoffmann, M. (1982). Assessment of psychological reactions in disaster victims. *Journal of Community Psychology*. 10, 157–67.
- O'Neill, M. J., Kawachi, I., Levy, J. I., Cohen, A., J., Gouveia, N., Wilkinson, P., Fletcher, T., Cifuentes, L., & Schwartz, J. (2003). Health, wealth, and air pollution: Advancing theory and methods. *Environmental Health Perspective*, 111(16), 1861-1870.
- Osaki, K. (2003). Migrant remittances in Thailand: Economic necessity or social norm? *Journal of Population Research*. 20(2), 203-222.
- Ostir, G. V., Eschbach, K., Markides, K. S. et al. (2003). Neighborhood composition and depressive symptoms among older Mexiacan Americans. *Journal of Epidemiol Community Health*, 57, 987-92.
- Phabphal, K., Sattawatcharawanich, S., Sathirapunya, P., & Limapichart, K. (2007). Anxiety and depression in Thai epileptic patients. *Journal of the Medical Association of Thailand*, 90, 2010-2025.

- Phifer, J. F., Kaniasty, K. Z., & Norris, F. H. (1988). The impact of natural disaster on the health of older adults: a multi-wave prospective study. *Journal of Health Social Behaviour*, 29, 65–78.
- Powell, B. J., & Penick, E. C. (1983). Psychological distress following a natural disaster: a one-year follow-up of 98 flood victims. *Journal of Community Psychology*, 11, 269–276.
- Prachuabmoh, V., & Mithranon, P. (2003). Below-replacement fertility in Thailand and its policy implications. *Journal of Population Research*, 20(1), 35-50.
- Price, J. (1978). Some age-related effects of the 1974 Brisbane floods. *Australia and New Zealand Journal of Psychiatry*, 12, 55–58.
- Prince, M. J., Harwood, R. H., Thomas, A. & Mann, A. H. (1998). A Prospective Population based Cohort Study of the Effects of Disablement and Social milieu on the Onset and Maintenance of Late-life Depression. The Gospel Oak Project VII. *Psychological Medicine*, 28, 337–350
- Prince, M. J., Reischies, F., Beekman, A. T., Fuhrer, R., Jonker, C., Kivela, S. L., Lawlor, B. A., Lobo, A., Magnusson, H., Fichter, M., van Oyen, H., Roelands, M., Skoog, I., Turrina, C., & Copeland, J. R. (1999). Development of the EURO-D scale-a European Union initiative to compare symptoms of depression in 14 European centres. *The British Journal of Psychiatry*, 174, 330-338.
- Prince, M., Acosta, D., Chiu, H., Copeland, J., Dewey, M., et al. (2004). Effects of Education and Culture on the Validity of the Geriatric Mental State and its AGE-CAT Algorithm. *British Journal of Psychiatry* 186:429.
- Probst, J. C., Laditka, S. B., Harun, M. N., Powell, M. P., & Baxley, E. G. (2006). Rural-urban differences in depression prevalence: implications for family medicine. *Family Medicine*, 38(9), 653-660.
- Qin, M., Punpuing, S., guest, P., & Prasartkul., P. (2008). Labour migration and change in older people's living arrangements: the case of Knachanaburi Demographic Surveillance System (KDSS), Thailand. *Population, Space and Place*. 14, 419-432.

- Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, 1(3), 385-401.
- Randal, L. O. (2007). *Aging and the Elderly*. Psychology, Sociology and Health. Noa Science Publishers, Inc. New York.
- Rajkumar, A. P., Thangadurai, P., Senthilkumar, P., Gayathri, K., Prince, M., & Jacob, K. S. (2009). Nature, prevalence and factors associated with depression among the elderly in a rural south Indian community. *International Psychogeriatrics*, 21(2), 372-378.
- Rebe-Heskelth, S., & Skrondal, A. (2005). *Multilevel and longitudinal modelling using Stata*. A Stata Press Publication. StataCorp LP, College Station, Texas.
- Ritcher, K., Guest, P., Boonchalaski, W., Piriathamwong, N., & Nimfa, O. B. (1997). *Migration and the rural family: sources and support and strain in a mobile society*. Nakohn Pathom: Institute for Population and Social Research, Mahidol University, IPSR. Publication no. 190.
- Riekse, R. J., & Holstege, H. (1996). Mental abilities and mental health. IN *Growing Older in America*. The Mc-Graw-Hill Companies, Inc.
- Ross, R., Zeller, R., Srisaeng, P., Yimmee, S., Somchid, S., & Sawatphanit, W. (2005). Depression, stress, emotional support, and self-esteem among baccalaureate nursing students in Thailand. *International Journal of Nursing Education Scholarship*, 2(1), 1-15.
- Ross, R., Sawatphanit W., & Zeller, R. (2009). Depressive symptoms among HIV-positive pregnant women in Thailand. *Journal of Nursing Scholarship*, 41(4), 344-350.
- Salgado de Snyder, V. N., Bojorquez, I., Gonzalez, T. & Infante, C. (2007) *Migración México-Estados Unidos: Consecuencias Para la Salud*. Cuernavaca: Instituto Nacional de Salud Pública.
- Samson, R. J., Raudenbush, S., W., & Earls, F. (1997). Neighborhoods and violent crime; A multilevel study of collective efficacy. *Science*, 277, 918-924.
- Sarafino, E. P. (1994.). *Health psychology, biopsychosocial interaction*. 2nd edition. USA, John Wiley and Sons, Inc.

- Satariano, W. A. (2006). Aging, health and the environment: an ecological model, Epidemiology of Aging. In *An Ecological Approach*. Jones and Bartlett Publishers, Sudbury, Massachusetts. pp: 39-84.
- Schaie, K. W., & Abeles, R. P. (2008). Social structures and ageing individuals. Continuing challenges. Springer Publishing Company.
- Schoevers, R. A., Beekman, A. T. F., Vantilburg, W, Deeg, D. J. H., Jonker, C., Geerlings, M. I., & Penninx, B. W. J. H. (2000). Association of depression and gender with mortality in old age: Results from the Amsterdam study of the elderly (AMSTEL). *The British Journal of Psychiatry*, 177, 336-342.
- Shah, A., Herbert, R., Lewis, S., Mahendran, R., Platt, J., & Bhattacharyya, B. (1997). Screening for depression among acutely ill geriatric inpatients with a short Geriatric Depression Scale. *Age Ageing*, 26(3), 217-221.
- Shah, A., & Hoxey, K. (2001). Depression in acutely medically ill elderly inpatients: prevalence, correlates and longitudinal stability. *International Journal of Methods in Psychiatric Research*, 10(3), 147-156.
- Sheehan, E. (1997). The social psychological consequences of emigration from Ireland for those who stay. *Irish Journal of Psychology*, 17, 13-22.
- Sherina, M., Rampal, L. S., Aini, M., & Norhidayati, H. M. (2005). The prevalence of depression among elderly in an urban area of Selangor, Malaysia. *The International Medical Journal*, 4(2), 57-62.
- Shives, L. R. (1994). Basic concepts of psychiatric-mental health nursing. 3rd edition. USA, J. B. Lippincott Company.
- Shulman, K., Shedietsky, R., & Silver, I. (1986). The challenge of time: clock drawing and cognitive function in the elderly. *International Journal of Geriatric Psychiatry*, 1, 135-140.
- Silpakit, O., Silpakit, C., & Pukdeenaul, P. (2007). Comparison study of cognitive impairment screening tools: CDT, IQCODE vs MMSE. *Siriraj Medical Journal*, 59, 361-363.
- Snijders, T. A. B. & Bosker, R. J. (1999). Multilevel analysis. An introduction to basic and advanced multilevel modeling. Sage Publications. London, Thousand Oaks. New Delhi.

- Snowdon, J. (2002). How high is the prevalence of depression in old age? *Revista Brasileira de Psiquiatria*, 24(Supl I), 42-47.
- Soommaht, C., Chantachon, S. & Boonchai, P. (2009). Developing model of Health care for the elderly by community participation in Isan. *The Social Sciences*, 4(5), 439-442.
- Soonthornchaiya, R., & Dancy, B. L. (2006). Perceptions of depression among elderly Thai immigrants. *Issues in Mental Health Nursing*, 27(6), 681- 698.
- Stankunas, M., Kalediene, R., Starkuviene, S., & Kapustinskiene, V. (2006). Duration of unemployment and depression: a cross-sectional survey in Lithuania. *BMC Public Health*, 6, 174.
- Sukhatunga, K., Phattarayuttawat, S., Luckom, M., Chantra, J., Chaiyasit, W., et al. (1999). Depression and dementia in Thai elderly in urban and rural communities. *Siriraj Hospital Gazette*, 51(4), 232-243.
- Sukyng, C., Bhokakul, V., & Udomsubpayakul, U. (2003). An epidemiological study on insomnia in an elderly Thai population. *Journal of Medical Association of Thailand*, 86(4), 316-324.
- Sumic, A., Michael, Y. L., Carlson, N. E., Howieson, D. B. & Kaye, J. A. (2007). Physical activity and the risk of dementia in oldest old. *Journal of Aging Health*, 19(2), 242-259.
- Sumngern, C., Azeredo, Z., Subgranon, R., Sungvorawongphana, N., & Matos, E. (2010). Happiness among the elderly in communities: A study in senior clubs of Chonburi province, Thailand. *Japan Journal of Nursing Science*, 7, 47-54.
- Sun, R., & Gu, D. (2008). Air pollution, economic development of communities, and health status among the elderly in urban China. *American Journal of Epidemiology*, 168, 1311–1318.
- Suttajit, S., Punpuing, S., Jirapramukpitak, T., Tangchonlatip, K., Darawuttimaprakorn, N., Stewart, D, M. E., Prince, M., & Abas, M. A. (2010). Impairment, disability, social support and depression among older parents in rural Thailand. *Psychological Medicine*, 40(10), 1711-1721.
- Taylor, R. B., Shumaker, S. A., & Gottgredson, S. D. (1985). Neighborhood-level links between physical features and local sentiments: Deterioration, fear of

- crime, and confidence. *Journal of Architectural Planning and Research*, 2, 261-275.
- Taqi, A. M., Itrat, A., Qidwai, W., & Qadri, Z. (2007) Depression in the elderly: does family system play a role? A cross-sectional study. *BMC Psychiatry*, 7, 57.
- Thailand Development Indicators, 2003. [http://web.nso.go.th/eng/THA\\_Indicat/THA\\_Indicat2003.pdf](http://web.nso.go.th/eng/THA_Indicat/THA_Indicat2003.pdf)
- Thasanee, C. (2003). Country report on environmental indicators in Thailand. Monitoring and Evaluation Division, Office of Natural Resources and Environmental Policy and Planning. [http://www.inece.org/indicators/proceedings/04o\\_thailand.pdf](http://www.inece.org/indicators/proceedings/04o_thailand.pdf)
- Thaweboon, T., & Peachpansri, S. (1999). Depression of the elderly Bangkok Aged Clubs. *Thai Journal of Nursing*, 48(3), 177-184.
- Thanerat, T., Tangwongchai, S. and Worakul, P. (2009). Prevalence of Depression, Hemoglobin, A1C Level, and Associated factors in Outpatients with Type-2 Diabetes. *Asian Biomedicine*, 3(4):383-390.
- Thailand Development Indicator. (2003).
- Thienkrua, W., Cardozo, B. L., Chakkraband, M. L. S., Guadamuz, T.E., Pengjuntr, W., Tantipiwatanaskul, P., Sakornsatian, S., Ekassawin, S., Panyayong, B., Varangrat, A., Tappero, J. W., Schreiber, M., Griensven, F. v. & for the Thailand post-Tsunami mental health study group (2006). Symptoms of posttraumatic stress disorder and depression among children in Tsunami-affected areas in Southern Thailand. *Journal of the American Medical Association*, 296(5), 549-559.
- Thongtang, O., Sukhatunga, K., Ngamthipwatthana, T., Chulakadabba, V. S., Pooviboonsuk, P., Kooptiwoot, S., & Phattharayuttawat, S. (2002). Prevalence and incidence of depression in the Thai elderly. *Journal of the Medical Association of Thailand*, 85(5), 540-544.
- Tiedt, A. D. (2010). The gender gap in depressive symptoms among Japanese elders: evaluating social support and health as mediating factors. *Journal of Cross-Cultural Gerontology*, DOI:10.1007/s10823-010-9122-x.

- Tobin, G. A., & Ollenburger, J. C. (1996). Predicting levels of postdisaster stress in adults following the 1993 floods in the upper midwest. *Environmental Behaviour*, 28, 340–357.
- Train The Brain Forum Committee (1993). Thai mental state examination (TMSE) geriatric depression scale. *Siriraj Hospital Gazette*. 45 (6), 360-374.
- \_\_\_\_\_ (1994). Thai geriatric depression scale. *Siriraj Hospital Gazette*, 46 (1), 1-9.
- Turvey, C. L., Carney, C., Arndt, S., Wallace, R. B., & Herzog, R. (1999). Conjugal loss and syndromal depression in a sample of elders aged 70 years or older. *American Journal of Psychiatry*, 156(10), 1596-1601.
- United Nations. (UN) (2001). World Population Prospects: The 2000 Revision. 1, comprehensive tables. Department of Economic and Social Affairs. New York.
- United Nations. (2002). Population Ageing. 2002. Population Division, Department of Population and Social Affairs.
- United Nations. (2007). World Population Ageing. 2007. Population Division, Department of Economics and Social Affairs. Population Division.
- United Nations. (2008). World Population Prospects: The 2008 Revision, United Nations Population Division, New York.
- United Nations. (2009). Population ageing and development 2009, United Nations Population Division, New York.
- UNFPA. (2006). Population ageing in Thailand: prognosis and policy response. van Griensven, F., Chakraband, M. L. S., Thienkrua, w., Pengjuntr, W., Gardazo, B. L., Tantipiwatanaskul, p., Mick, P.a., Ekassawin, S., varangrat, A., Gotway, C., Sabin, m., Tappero, J. W. (2006). Mental health problems among adults in Tsunami-affected areas in Southern Thailand. *Journal of the American Medical Association*, 296(5), 537-548.
- US Census Bureau. (2004).
- van Griensven, F., Chakkraband, M. L. S., Thienkrua, W., Pengjuntr, W., Cardozo, B. L., Tantipiwatanaskul, P., Mock, P. A., Ekassawin, S., Varangrat, A., Gotway, C., Sabin, M., & Tappero, J. W. (2006). Mental health problems among adults in Tsunami-affected areas in Southern Thailand. *The Journal of the American Medical Association*, 296(5), 549-559.

- Wacharasindhu, A., & Panyyayong, B. (2002). Psychiatric disorders in Thai school-aged children: I Prevalence. *Journal of Medical Association of Thai*, 85 Suppl 1, S125-36.
- Walters, K., Breeze, E., Wilkinson, P., Price, G. M., Chris, J. Bulpitt, C. J., & Fletcher, A. (2004). Local area deprivation and urban-rural differences in anxiety and depression among people older than 75 years in Britain. *American Journal of Public Health*, 94(10), 1768-1774.
- Wandersman, A., & Nation, M. (1998). Psychological contributions to understanding toxicity, resilience, and interventions. *American Psychologist*, 53, 647-656.
- Wang, P. S., Gruber, M. J., Powers, R. E., Schoenbaum, M., Speier, A. H., Wells, K., B., & Kessler, R. C. (2008). Disruption of existing mental health treatments and failure to initiate new treatment after Hurricane Katrina. *American Journal of Psychiatry*, 165(1), 34-41.
- Wangtongkum, S., Sucharitakul, P., Wongjaroen, S., & Maneechompoo, S. (2008). Prevalence of depression among a population aged over 45 Years in Chiang Mai, Thailand. *Journal of Medical Association of Thailand*, 91(12), 1812-1817.
- Wight, R., Cummings, J. R., Miller-Martinez, D., Karamanga, A. S., Seeman, T. E., & Aneshensel, C. S. (2008). A multilevel analysis of urban neighborhood socio-economic disadvantage and health in late life. *Social Science Medicine*, 66, 862-862.
- Wilson, K. Eyles, J., Ellaway, A., Mccintyre, S., Macdonald L. (2010). Health status and health behaviours in neighborhood; a comparison of Glasgow, Scotland and Hamilton, Canada. *Health & Place*, 16, 331-338.
- Witch, S., Twigg, L., Holt, G., Lewis, G., & Jones, K. (2003). Contextual risk factors for the common ental disorders in Britain: a multilevel investigation of the effects of place. *Journal of epidemiology and Community Health*, 57, 616-621.
- Wong, S. W. S., Lau, C. H. J., Wong, E. M. C., Chung V. C. H. C., Lo, S., Goggins, W., & Griffiths, S. M. (2010). Geographical and household variation in

- health -related quality of life in Hong Kong. *Health & Place*, 16(2), 315-320.
- Wongpakaran, N. (2008). Geriatric Psychiatry Thailand. *Journal of Psychiatric Association of Thailand*, 53 (supplement 1), 39S-46S.
- World Health Organization. (1999). General D: men ageing and health. World Health Organization.
- World Health Organization. (2001). The World Health Report 2001-mental health: new understanding, new hope. Geneva, Switzerland: World Health Organization.
- World Health Organization. (2003). Department of Mental Health and Substance Dependence, Noncommunicable diseases and mental health, World Health Organization, Geneva. Investing in mental health.
- World Health Organization (2004). Global burden of disease.
- World Health Organization. (2010). Mental health development: targeting people with mental health conditions as a vulnerable group. Mental health and poverty project.
- Woo, J., Chan, R., Leung, J., & Wong, M. (2010). Relative contributions of geographic, socioeconomic, and lifestyle factors to quality of life, frailty, and mortality in elderly. *PLoS ONE*.
- Yen, I. H., Michael, U. L., & Perdue, L. (2009). Neighborhood environment in studies of health of older adults. A systematic review. *American Journal of Preventive Medicine*, 37, 455-463.
- Yesavage, J., Brink, T., Rose, T. L., Lum, O., Huang, V., Adey, M., & Leirer, V. O. (1983). Development and validation of a geriatric depression screening scale. *Journal of Psychiatric Research*, 17, 37-49.
- Yiengprugsawan, V., Lim, L. L. Y., Carmichael, G.A., Sidorenko, A., & Sleigh, A.C. (2007). Measuring and decomposing inequity in self-reported morbidity and self-assessed health in Thailand. *International Journal of Equity Health*, 6, 23.
- Zeng, Y., Gu, D., Purser, J. P. T., Hoenig, H., & Christakis, N. (2010). Associations of environmental factors with elderly health and mortality in China. *American Journal of Public Health*, 100(2), 298-304.

- Zisook, S, Shuchter, S. R., Sledge, P. A., Paulus, M., & Judd, L. L. (1994). The spectrum of depressive phenomena after spousal bereavement. *Journal of Clinical Psychiatry*, 55(Suppl), 29-36.

## **APPENDIX**

## Introduction:

**Table 1 Studies conducted on prevalence of depression in Thailand**

Authors	Year	Age group	Study site	Prevalence
Sukhatunga	1999	Elderly	Bangkok, Ranong and Burirum provinces	Urban: 35% Rural: 17-19%
Thaweepoon and Peachpansri	1999	Elderly	4 Aging clubs in Bangkok	27%
Thongtang et al.	2002	Elderly living in the community	Bangkok Noi, Bangkok Yai, Taling Chan, and Bang Plud	12.78%
Hengrasmee et al.	2004	Gynecologic cancer patients	Phramongkutkiao Hospital, Bangkok	13.4%
Ross et al.	2005	Baccalaureate nursing students	Three nursing schools	50.1%
Thienkrua et al.	2006	Children	Displaced and living in camps after tsunami	11%
van Griensven	2006	Displaced adults	Displaced and living in camps after tsunami	30%
Nidhinandana et al.	2007	Epileptic patients	Tertiary level hospital, Bangkok	38.3%
Wangtongkum	2008	Population 45 years and older	Chiangmai	29.2%
Ross et al.	2009	HIV-positive pregnant women	Five hospitals	78%
Kitsumban et al.	2009	Elderly people	Chiangmai	Score: 20.48
Abas et al.	2009	Elderly people	KDSS area, Kanchanaburi	Score: 4.8

**Literature review:****Table 2** Leading causes of burden of disease (DALYs) by WHO South-East Asia Region, 2004

<b>Diseases or injury</b>	<b>DALYs (millions)</b>	<b>Per cent of total DALYs</b>
Lower respiratory infections	28.3	6.4
Diarrhoeal diseases	23.0	5.2
Ischemic heart disease	1.6	4.9
Unipolar depressive disorders	21.6	4.8
Prematurity and low birth weight	18.3	4.1
Neonatal infections and other	14.3	3.2
Birth asphyxia and birth trauma	13.9	3.1
Tuberculosis	12.4	2.8
Road traffic accidents	11.0	2.5
Cerebrovascular disease	9.6	2.2

Ref: WHO, 2010

**Table 3** Leading global causes of years lost due to disability (YLD) by sex, 2004

Male			Female		
Cause	YLD (Millions)	% of total YLD	Cause	YLD (Millions)	% of total YLD
Unipolar depressive disorders	24.3	8.3	Unipolar depressive disorders	<b>41.0</b>	<b>13.4</b>
Alcohol use disorders	19.9	6.8	Refractive errors	14.0	4.6
Hearing loss, adult onset	14.1	4.8	Hearing loss, adult onset	13.3	4.3
Refractive errors	13.8	64.7	Cataracts	9.9	3.2
Schizophrenia	8.3	2.8	Osteoarthritis	9.5	3.1
Cataracts	7.9	2.7	Schizophrenia	8.0	2.6
Bipolar disorder	7.3	2.5	Anemia	7.4	2.4
COPD	6.9	2.4	Bipolar disorder	7.1	2.3
Asthma	6.6	2.2	Birth asphyxia and birth trauma	6.9	2.3
Falls	6.3	2.2	Alzheimer and dementias	5.8	1.9
Refractive errors	13.8	64.7	Cataracts	9.9	3.2

Ref: WHO, 2004

## Results

In descriptive analysis it was found that more than half had disturbance in sleep, nearly half of them had the feeling of pessimism, two-fifth respondents reported to have symptoms of irritability and fatigue, more than one-third of the respondents felt depressed and guilt (Table 4).

**Table 4 Depressive symptoms in last 1month (N=1001)**

Characteristics	Yes n(%)	No n(%)
<b>Depression:</b> you have been sad or miserable?	380 (38.0)	621 (62.0)
<b>Pessimism:</b> do you think future looks gloomy?	481 (48.1)	520 (51.9)
<b>Wishing to death:</b> did it ever so sad that you felt that you had rather be dead?	82 (8.0)	919 (91.8)
<b>Guilt:</b> do you tend to blame yourself or feel guilty about anything?	369 (36.9)	632 (63.1)
<b>Sleep:</b> have you had trouble recently?	572 (57.1)	429 (42.9)
<b>Interest:</b> have you lost interest in things you normally have interest in?	259 (25.9)	742 (74.1)
<b>Irritability:</b> have you been more irritable or annoyed recently?	431 (43.1)	570 (56.9)
<b>Appetite:</b> have you been eating more or less than usual	319 (31.9)	682 (68.1)
<b>Fatigue:</b> have you had too little energy to do the things you want to do?	432 (42.0)	596 (58.0)
<b>Concentration on daily cores:</b> difficult for you to concentrate on something you have to do?	183 (18.3)	818 (81.7)
<b>Enjoyment:</b> enjoyed in last month?	164 (16.5)	837 (83.6)
<b>Tearfulness:</b> have you cried at all?	215 (21.5)	786 (78.5)

There were questions related with physical illness. Respondents reported of having different types of infirmity or health illness in different proportion. The highest proportion of the respondents mentioned about pain (75.8%) and arthritis (74.4%). It is important to mention that half of the respondents had some kind of eye sight problems. More than one-third had complaints of faints and hypertension. Almost every one out of ten respondents mentioned about diabetes and cardiac problem (Table 5).

**Table 5 Current infirmity or health illness (N=1001)**

Characteristics	Yes n(%)	No n(%)
Arthritis or rheumatism	743 (74.2)	258 (25.8)
Eye sight problems	507 (50.6)	494 (49.4)
Deafness	212 (21.2)	789 (78.8)
Persistent cough	85 (8.5)	955 (91.4)
Difficulty in breathing	194 (19.4)	807 (80.6)
Hypertension	358 (35.8)	643 (64.2)
Diabetes	104 (10.4)	897 (89.6)
Cardiac problem	96 (9.6)	905 (90.4)
Faints and blackout	450 (45.0)	551 (55.0)
Gastrointestinal problems	189 (18.9)	812 (81.1)
Paralysis	31 (3.1)	970 (96.9)
Skin problems	71 (7.1)	930 (92.9)
Pain	759 (75.8)	242 (24.2)

To know about the disabilities/ difficulties in last month 12 questions were asked. More than one-fifth of the respondents had extreme or severe problem in standing more than 30 minutes, walking 1 kilometer distance and carrying out daily

activities. Around one-tenth had difficulties in taking care of household responsibilities, joining in community activities and emotional disturbance (Table 6).

**Table 6 Disability (Difficulties/ problems) in last 30 days (N=1001)**

Characteristics	Extreme bad	Severe	Mild	None
	n(%)	n(%)	n(%)	n(%)
Standing for long periods (30 minutes)	<b>89 (8.9)</b>	<b>179 (17.9)</b>	245 (24.5)	488 (48.8)
Taking care of household responsibilities	41 (4.1)	80 (8.0)	244 (24.4)	636 (63.5)
Problem in joining in community services	38 (3.8)	78 (7.8)	179 (17.9)	706 (70.5)
Problems in concentrating for more than 10 minutes	11 (1.1)	34 (3.4)	182 (18.2)	774 (77.3)
Walking 1 km distance	149 (14.9)	193 (19.3)	188 (18.8)	471 (47.1)
Problems washing whole body	17 (1.7)	13 (1.3)	44 (4.4)	927 (92.6)
Problems in getting dress	17 (1.7)	13 (1.3)	40 (4.0)	931 (93.0)
Emotionally affected	20 (2.0)	115 (11.5)	347 (34.7)	519 (51.8)
Difficulty in dealing with people	3(0.3)	30 (3.0)	147 (14.7)	821 (82.0)
Difficulty in chatting with friend and neighbor	3 (0.3)	19 (1.9)	79 (7.9)	900 (89.9)
Difficulty in carrying out daily activities	98 (9.8)	133 (13.3)	207 (20.7)	563 (56.2)

Half of the respondents mentioned the financial problem was a 'serious life events'. Beside that, more than one-fifth respondents mentioned about care giving burden, illness of the family member, own illness as serious life events (Table 7).

**Table 7 Serious life events of respondents in past year (caused difficulty more than 2-3 weeks) (N=1001)**

<b>Characteristics</b>	<b>Yes</b>	<b>No</b>
Own or family member's illness /injury/ disability	200 (20.0)	801 (80.0)
Conflict with family members	72 (7.2)	929 (92.8)
Lack of contact with children	107 (10.7)	894 (89.3)
Children or grand children have serious problems at work or school	47 (4.7)	954 (95.3)
Other serious problems with children or grandchildren	16 (1.6)	984 (98.3)
Children or grand children have other serious problems	16 (1.6)	985 (98.4)
Financial problem	500 (50.0)	501 (50.0)
Employment	92 (9.2)	909 (90.8)
Accommodation	109 (10.9)	892 (89.1)
Health problem of family member	227 (22.7)	774 (77.3)
Care giver burden	284 (28.4)	717 (71.6)
Death of very close person	7 (0.7)	994 (99.3)

**Table 8 Questions on infirmity**

Infirmity	Do you have this problem?
	Response categories
Arthritis or rheumatism	Yes=1, No=0
Eyesight problem	Yes=1, No=0
Hearing difficulty or deafness	Yes=1, No=0
Persistent cough	Yes=1, No=0
Breathlessness, difficulty breathing or asthma	Yes=1, No=0
High blood pressure	Yes=1, No=0
Diabetes	Yes=1, No=0
Heart trouble or angina	Yes=1, No=0
Stomach or intestine problem	Yes=1, No=0
Faints or blackouts	Yes=1, No=0
Paralysis, weakness or lose of one leg or arm	Yes=1, No=0
Skin disorders and such as pressure sores, leg ulcers	Yes=1, No=0
Pain	Yes=1, No=0

**Table 9 Questions on disability**

<b>Difficulties</b>	<b>Response categories</b>
How much difficulty in standing more than 30 minutes?	0 none 1 mild 2 severe 3 extreme
How much difficulty did you have in taking care of your household responsibilities?	0 none 1 mild 2 severe 3 extreme
How much problems did you have in joining the community activities?	0 none 1 mild 2 severe 3 extreme
How much difficulty did you have in concentrating on doing something for 10 minutes	0 none 1 mild 2 severe 3 extreme
How much difficulty did you have in walking a long distance, such as kilometer?	0 none 1 mild 2 severe 3 extreme
How much difficulty did you have in washing your whole body?	0 none 1 mild 2 severe 3 extreme
How much difficulty did you have in getting dress?	0 none 1 mild 2 severe 3 extreme
How much have you been emotionally affected by you health problems?	0 none 1 mild 2 severe 3 extreme
How much difficulty did you have in dealing with people who you are not very close to?	0 none 1 mild 2 severe 3 extreme
How much difficulty did you have in chatting or meeting with your friends or neighbors	0 none 1 mild 2 severe 3 extreme
How much difficulty did you have in carrying out your day to day work and usual activities?	0 none 1 mild 2 severe 3 extreme

**Table 10 Questions on serious life events**

Serous life events	Response categories
Illness, injuries or disability: yours, your partner's, your children's or anyone in your household or close family members	Yes=1, No=0
Lack of contact with children	Yes=1, No=0
Financial problem	Yes=1, No=0
Serious problems with your accommodation, including quality of accommodation or conflicts with landlord or neighbors	Yes=1, No=0
Serious problems getting health care for someone very close to you such as spouse or child, grandchild, sibling, father, mother and including for yourself	Yes=1, No=0
Problems/burdens in having to care for your spouse or someone else (not children or grandchildren)	Yes=1, No=0

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