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Revisiting the Conventional Wisdom of Development, Sustainability and Happy Ageing: The Case of Thailand's Data

Euamporn Phijaisanit

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Faculty of Economics, Thammasat University

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Euamporn Phijaisanit²

Abstract

This study revisits the conventional wisdom of development, sustainability and happy ageing. The first part explores the existing research frontier on how happiness proceeds with age and assimilates different notions of happiness which influence public policies and global demands. The second part extracts the statistics from the National Statistical Office's 2021 Survey of the Older Persons in Thailand and presents stylised facts about the characteristics of Thailand's ageing population in connection with the United Nations Sustainable Development Goals (SDGs). The third part examines happiness in older persons using ordered logistic regression. Happiness is represented by the reported scale based on the respondent's own value judgment. The finding reveals that the happiness level significantly reflects socio-economic and health well-being and, thus, can potentially be intervened by political commitment and suitable public policies in concert with the SDGs. Happiness can be considered both as an outcome and a useful success indicator of public policies. However, the criteria for happiness can be very subjective. The public sectors must take precautions against political bias and inefficiency in incorporating old-age happiness into their development agenda. An effective policy coherence, particularly in Non-High- Income Countries (NHICs), requires a thorough understanding of old-age happiness in a more local area-specific context which is an attempt of this study. Policy recommendations from the findings are summoned into four arenas, namely: (i) policy on education and lifelong learning, (ii) policy on income and old-age employment, (iii) policy on healthcare, public services and revenue raising, and (iv) policy on local area disparity.

Keywords: ageing, old-age happiness, sustainable development, public policy, SDGs

JEL classification codes: H53, H54, E65, H75, I18

I. Introduction

By 2035, older persons aged 60 and above will constitute almost 30 percent of Thailand's population. Thailand is taking part alongside the rest of the world in becoming a super-ageing society. Concurrently, Thailand places important emphasis on the achievement of the 2030 Agenda for Sustainable Development. The country has made significant effort across 17 Sustainable Development Goals (SDGs). While ageing has often been explicitly linked to several SDGs, namely; no poverty (SDG1), zero hunger (SDG2), good health and well-being (SDG3), quality education (SDG4), gender equality (SDG5), clean water and sanitation (SDG6), affordable

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² Professor, Faculty of Economics, Thammasat University. E-mail: euamporn@econ.tu.ac.th

and clean energy (SDG7), decent work and economic growth (SDG8), reduced inequalities (SDG10), sustainable cities and communities (SDG11), and peace, justice and strong institutions (SDG16) (HelpAge, 2020), it can, in fact, be affiliated to all the 17 goals in certain ways within a broader framework of dynamic megatrends. In all aspects, older persons tend to be more vulnerable to becoming trapped into hardship circumstances. In Non-High-Income Countries (NHICs), older persons are even more exposed to higher risks. This is because fundamental resources can be scarce and welfare provision on healthcare and basic pensions may be sparse in most developing NHICs.

Recent development policy formulation indicates the importance of individuals' assessments of their own happiness to complement traditional economic and social indicators (Stiglitz et al, 2009; Dolan et al, 2011; Oishi et al 2014). The terms happiness and subjective well-being have often been used interchangeably by authorities and researchers. Nevertheless, happiness, itself, is not all about ageing well. Old-age happiness has many interrelated multidisciplinary components of a good life in later years. This good life in later years is not coincidental. It is the consequence of wise investments on the quality of life in the earlier years. Steptoe (2019) provides at least four reasons why optimising happiness is a desirable society aim. First, happiness does not simply mean the absence of depression or distress. It associates the relationships between health and human function, positive and negative. Second, happiness can be a protective factor for morbidity and mortality. This can impact the societal costs for nourishing quality human resources. Third, happiness relates to various socio-economic factors. Hence, it can gauge the success of public policy. Forth, happiness can be modified to enhance health and well-being of older people. Therefore, a careful study of happiness in older persons would yield essential information and can be beneficial in appraising the impacts of sustainable development policy, not only for the ageing population but also for the young and working-age adults in the long term. More pertinently, understanding the realities of the local area-specific factors, particularly in NHICs, is imperative. This serves as a precaution against the flaws of applying a one-size-fits-all ageing policy.

This study revisits the conventional wisdom of development, sustainability and happy ageing. The first part of the study explores the existing research frontier on how happiness proceeds with age, and assimilates the notions of happiness which influence public policies and global demands. Through global ageing, there are general discourses leading to policy suggestions to attain happy ageing. Most of the happy ageing criteria are derived from the studies originating in High-Income Countries (HICs). In NHICs, however, the situation can be different, taking into consideration the prevailing inequality of opportunities and inadequacy of resources. Thailand is one of the NHICs with no exception to having such conditions. Focusing on a single trajectory of well-being based on textbooks and HICs criteria can, thus, be an impediment. The second part of the study, therefore, investigates Thailand's secondary data on older persons. It re-examines how Thailand's population ageing and happiness pattern compares with those of the international findings. It extracts the statistics from the National Statistical Office's Survey of the Older Persons in 2021 and presents stylised facts about the characteristics of Thailand's ageing population in connection with the United Nations Sustainable Development Goals (SDGs). The third part, then, analyses the factors contributing to the self-scaled happiness of older persons in Thailand using ordered logistic regression. Although the components of happiness can be very diverse, this study does not intend to delve into the debates on defining the term in any particular manner. Instead, happiness is represented by the reported scale based on the respondent's own value judgment. By thoroughly exploiting the existing national-level data and carefully delineating its details can foster

a better understanding of the country's old-age happiness. This would assist in determining a suitable development policy that is relevant to the local area-specific context.

II. Review of the Literature

The selected review of the literature presented in this section is arranged into two parts. The first part portrays what international findings reveal about the patterns of ageing and happiness. The second part assimilates different notions of happy ageing.

II.1 What International Findings reveal about the Patterns of Ageing and Happiness

While there is an internationally inconsistent relationship between age and happiness (Deaton, 2007; Galambos et al, 2020), a large part of the literature in HICs presents evidences of positive association of age and subjective well-being (happiness). Undeniably, there are factors which can adversely affect happiness such as diseases, chronic pains, physical difficulty and income insufficiency. For example, Luchesi et al (2018) conduct a multinomial regression analysis of 263 elderly people in the area of coverage of a family health unit located in the state of São Paulo, Brazil. They evidence that being "not happy" was significantly associated with satisfaction with life, depression, social phobia and age. Other than that, older persons tend to be happier. Several studies reveal that after a low point of happiness around mid-thirties to late forties, happiness increases (Deaton, 2008; Blanchflower and Oswald, 2017; Graham and Pozuelo, 2017). Blanchflower (2021) suggests a U-shaped happiness worldwide. General explanation that supports this presumption of U-shaped happiness is that older persons have more time and experience less stress. Another possible explanation is positive looking in older people. According to Isaacowitz (2012), older adults may be more capable of regulating emotion by diverting from negative material or focusing on positive material. Unlike physical and cognitive impairment, studies find that mental health notably improved with age (Thomas et al, 2016; Karwetzky et al, 2022). Nevertheless, Toshkov (2022) observes that the relationship between age and happiness varies strongly with different levels of relative income. In the lowest decile of income distribution, older persons tend to experience a small increase in happiness level. At the top of the income distribution, average happiness does not vary significantly with age. Similarly, Steptoe et al (2014) asserts that the U-shaped happiness is not a universal pattern. Happiness tend to increase in older age in most HICs. This is not the case for the NHICs, suggesting that old-age happiness reflects some important information about the outcome of the development policy, in particular; the socio-economic and health policies.

II.2 Notions of Happy Ageing

Global ageing has brought about discourses on how to age “successfully” and, therefore, “happily” in association with the issues of development and sustainability. The trend in the past decade has pursued the so-called mainstream successful and happy ageing across all policy fields, including those with respect to older persons as consumers (UNECE, 2009). This often guides public policy directions as well as global demand in certain directions. It is true that older consumers need specific services, especially those related to health and experiences. However, sometimes these needs can be over-emphasised and over-commercialised in such a way that does not necessarily improve the overall ageing well-being. Stoncikaite (2019) notes that according to

the convention, “as long as older people maintain healthy lifestyles, are vibrant, energetic and enthusiastically participate in social circles and leisure, they are ageing in a correct and expected way.” If these criteria cannot be met, the older persons may be identified as “failing” to age gracefully (therefore, are unhappy) and, thus, some features need to be “corrected” in the perspectives of the policymakers. The conventional wisdom, for the most part, is grounded on the western values, conditional on substantial income level and sufficient social safety net to support the notions.

Most western economies are relatively wealthier and will remain the top “silver economies” in the next decade, while only three countries in Asia will remain in the top ten, namely China, Japan and India (Fengler, 2021). By pursuing and promoting the same conventional wisdom, policy directions in NHICs may overlook the basic lifespan necessities, such as prenatal supports, child care, public health, education and employment supports, which still have not yet been fully provided. In HICs, older persons have considerable purchasing power and relatively satisfactory state pensions, and thus, inequality may not be widely observable. However, in NHICs with existing poverty and inequality, merely focusing on the conventional happy ageing criteria may aggravate further inequality among different segments of the society. Poorer older persons may wish to attain the conventional successful ageing status and strive to go beyond their financial capability. This also creates social and fiscal pressure, not only on the older persons but also on the government to inefficiently divert resources from necessary investment towards unnecessary expenditure. According to White (2015), there are complexities in the definition, measurement and policy implementation of happiness. Measurement that allows meaningful comparison between individuals and groups is difficult. Moreover, happiness index tends to be distorted by political interests and the survey respondents may be strategic in answering the questions (Frey and Gallus, 2012). Although incorporating happiness into policy formulation is important, it is paramount to carefully designate the suitable criteria of happiness in a country and local area-specific manner.

In fact, happy ageing may be defined differently by each individual subject to personal attributes. There is also a number of studies that call for qualitative approach to understand the older persons and allow their voices to be heard. Stoncikaite (2019) questions the conventional successful or happy ageing models and argues that a more inclusive approach to understanding differences in the process of growing older should be considered. This may be based on factors such as one’s value and upbringing as well as social, educational, religious and cultural backgrounds. For instance, a qualitative content analysis from interviews by Wongsala et al (2021) provides older north eastern Thai adults’ perspectives of health, participation and security contributing to better quality of life. Health was viewed as living a peaceful daily life without obstacles. Participation was viewed as maintaining social networks and making merits. Security was viewed as living a well-balanced dependency to the children and sustain traditional value of gratitude between generations. It can be observed that the views do not match exactly with the conventional western criteria. There can be sentimental factors contributing to happiness in older persons. For instance, Kramanon and Gray (2015) find that perceived trust in family care, the number of people with whom it is pleasant to talk and perceived health contribute to elderly happiness in Thailand.

In developing countries, there is also a number of studies and debates on physical activities, productivity and happiness among scholars. Rowe and Kahn (1997) provide an influential notion of successful ageing which circles around three inter-related components, namely, avoidance of disease and disability, engagement with life and high cognitive and physical function. The view

focuses on biomedical aspects of independence, productivity and activity. Accordingly, the activity is considered “productive” if it generates societal value, whether or not there is reimbursement, such as volunteer work. Roy (2019), however, questions whether this set of criteria can be made universal in all the countries. He asserts that productivity need not only be of tangible values, but may also be in the form of “generativity” which relates to sharing the wisdom of life to guide the next generation. According to De Neve et al (2017), although life evaluation differs across countries, being unemployed is miserable not just for the unemployed person but also for employed persons living in areas with high unemployment. Moreover, non-monetary aspects of employment, such as work-life balance and autonomy impact happiness as well. Kieny et al (2022) assess the associations of age with subjective well-being in five NHICs. They find that, when controlling only for gender, there is a negative association of age with evaluative well-being which is in contrast to findings in HICs. This could be because of the difficulties encountered by older adults in low and middle-income countries. When socio-demographic factors are adjusted, there is a positive association of age with both evaluative and emotional well-being. Adverse circumstances such as low income and poor health show negative association with subjective well-being. They argue that even in poor income countries, increasing in age does not necessarily imply low subjective well-being. This substantiates that policies which support income, post-retirement employment and old-age disability can make a difference in promoting well-being and old-age happiness, particularly in NHICs.

III. What the National-level Statistics reveal about Thailand’s Ageing Society

The first part of this section looks into the general attributes of Thailand’s old age population and the interconnection with SDGs. The second part portrays what the national-level statistics reveal about the patterns of ageing and happiness in Thailand.

III. 1 General Attributes of Thailand’s Old Age Population and the Interconnection with SDGs

This study explores the Survey of the Older Persons in 2021 conducted by the National Statistical Office (2022) and related datasets from the same source. According to report, the interview with the older persons aged 50 and above was organised during the period of October – December 2021 in Thailand via video conference. The survey employs stratified two stage sampling randomisation. The sampling consists of 77 provinces, each province is a stratum. Each stratum (except Bangkok) comprises of two sub-strata classifying the administrative areas into “within the municipality (tesabaan)” and “outside the municipality”. There are 5,970 enumeration areas in total. The enumeration areas are the first-stage sampling units. The second-stage sampling units are the private households which totalled 83,880, of which there are 48,960 sample households within the municipality and 34,920 households outside the municipality. The scope of this study restricts the old age population to 60 and above, to be consistent with the current official retirement age in Thailand. After setting the restrictions in this study, the sample size becomes 30,667. The analysis applies sample weights so that the sample can be nationally representative.

As an overview, there are approximately 13.4 million older persons, constituting 19.6 percent of the total population, of which 44.7 percent are male and 55.3 percent are female. They are classified into three age groups, namely, the young elderly (aged 60-69), the middle elderly (aged 70-79) and the old elderly (aged 80 and above). The young elderly accounts for 57.2 percent of the old age population, while the middle elderly and the old elderly make up 29.5 percent and

13.3 percent, respectively. Thailand's old-age dependency ratio, the ratio of population aged 60 and above over the working population (aged 15-59) has risen from 18.1 percent in 2011 to 25.3 percent in 2017 and 30.5 percent in 2021. This means that currently there is one old-age person out of approximately three persons in the population. The ratio is expected to reach 55 percent by the year 2040. To ensure societal well-being, public policy must have a keen foresight to carefully allocate resources among different cohorts in a more efficient, equitable and sustainable manner, pertaining to all the 17 sustainable development goals.

More than half of the old-age population (approximately 60 percent) in Thailand live in rural areas outside the municipality. Approximately 32.0 percent of the older persons in Thailand live in the northeast while 24.1 percent live in the central region, 22.8 percent live in the north, 11.6 percent live in the south and 9.5 percent live in Bangkok. About 95.3 percent of the old age population are married. The highest formal level of education that the majority of the old age population (74.4 percent) attained is primary level or below. The proportion of female elderly who did not attain formal education is twofold that of the male elderly (9.5 percent and 4.6 percent, respectively). Higher proportion (11.9 percent) of the young elderly attained tertiary level education compared with the middle elderly (6.4 percent) and the old elderly (4.1 percent). Despite the disparity in education between genders, there seems to be an increased opportunity to formal tertiary education in the later cohorts. These issues relate to the committed sustainable development goals of quality education (SDG4) as well as gender equality (SDG5).

In terms of old-age work opportunities and income, there remain rooms for improvements towards the commitment to achieve the sustainable development goals of no poverty (SDG1), zero hunger (SDG2), decent work and economic growth (SDG8), reduced inequality (SDG10), sustainable cities and communities (SDG11) and peace, justice and strong institutions (SDG16). When asked about their work status in the past seven days, approximately 34.7 percent of the total old-age population reported that they are still working, a modest decrease in proportion in comparison with approximately 35.1 percent in 2017 before the global spread of coronavirus. Most of the older workers (64.8 percent) are self-employed and are working in the agricultural, forestry and fishery sectors. The average working hours are 6.2, 5.7 and 5.3 hours per day for the young elderly, middle elderly and old elderly, respectively. The hours have been reduced slightly from 6.5, 5.9 and 5.8 hours per day, respectively, in 2017. According to Bell and Rutherford (2013), based on the UK Labour Force Survey 2012, the desirable hours of work for the older workers range between 7-21 hours per week which, if working five days a week, would at most be approximately 4 hours per day. Despite having observed the decreasing hours of work which may be partly due to the pandemic, the statistics implies that Thai old-age workers are still working more than the desirable hours.

The survey listed several reasons why older persons are still working. This study regroups the reasons into two categories, namely; "work without necessity" (physical capability, making good use of time, etc.) and "work out of necessity" (income needed for family, children, debt, etc.). It is found that almost half of the older working persons work out of necessity. The necessity for making a living implies that existing income and savings are insufficient which makes them susceptible to old-age poverty. This is further evidenced by their self-evaluation of income sufficiency. Based on their self-evaluation without formal monetary benchmark, close to half of the old age population reported income insufficiency, with higher proportion in the rural areas outside the municipality. It is important that the public sector must introduce measures and incentives that encourage the growth of a nationwide ecosystem which supports employment options that accommodate old-age workers. The working condition must also be suitable for their

physical conditions. Simultaneously, this also involves preparing the working-age groups to be capable of working after retirement according to their preferences, whether it be out of necessity or without necessity.

Table 1 Percentage of old-age population by major sources of income

Source of Income	Young Elderly		Middle Elderly		Old Elderly		Total	
	2017	2021	2017	2021	2017	2021	2017	2021
Work	50.10	50.99	17.77	21.57	5.06	5.06	34.25	36.66
Pension, Social Security Fund, Old-age Allowance	17.05	19.65	32.32	33.54	42.83	43.18	25.15	26.62
Interests, Savings and Assets	2.77	1.28	2.14	1.44	1.94	1.30	2.47	1.33
Spouse, Parents, Children, Relatives	30.09	28.08	47.77	43.45	50.16	50.46	38.13	35.38

Source: National Statistical Office (2018, 2022), data processed by the author

Table 2 Percentage of old-age population by satisfaction of state pension system

Satisfaction of Public Pension System	Young Elderly		Middle Elderly		Old Elderly		Total	
	2017	2021	2017	2021	2017	2021	2017	2021
Not Satisfied	10.42	8.87	10.2	6.99	8.5	5.26	10.1	7.87
Satisfied	77.26	78.85	83.43	85.73	85.99	88.84	80.28	82.13
Not Applicable	12.32	12.28	6.37	7.28	5.51	5.90	9.62	10.00

Source: National Statistical Office (2018, 2022), data processed by the author

The average annual income range for more than half of the old-age population is approximately 10,000-50,000 Baht. Table 1 shows the major sources of income by age groups. It can be observed that for most young elderly, the major source of income comes from work. For most of the middle elderly and old elderly, the major sources of income are from the family and state pensions. Comparing the statistics in 2017 with that of 2021, it is to be noted that there is an increasing reliance on income from work and pensions in all age groups. This puts further stress on the urgent call for concrete old-age employment and income policy dialogue. In 2021, approximately 82.1 percent of the old-age population are satisfied with the state pensions, an increase from 80.3 percent in 2017. It can be observed that the old elderly has higher proportion of satisfied persons (Table 2). *Ceteris paribus*, in the view of the administrators of old-age income security, the almost 2 percent increased proportion of satisfied elderly may suggest certain degree of success. Given the aforementioned increasing old-age dependency ratio, with potentially fewer grown-up children contributing to the sources of income, the government must prepare for measures to compensate the future shortfalls of decreasing working-age population. In terms of savings, approximately half of the older persons have some savings, with an average savings range of approximately 25,000 – 100,000 Baht. Most of the older persons or their spouse (84.3 percent) own an accommodation, while 12.6 percent and 3.1 percent live in an accommodation owned by their family and relatives, and others, respectively.

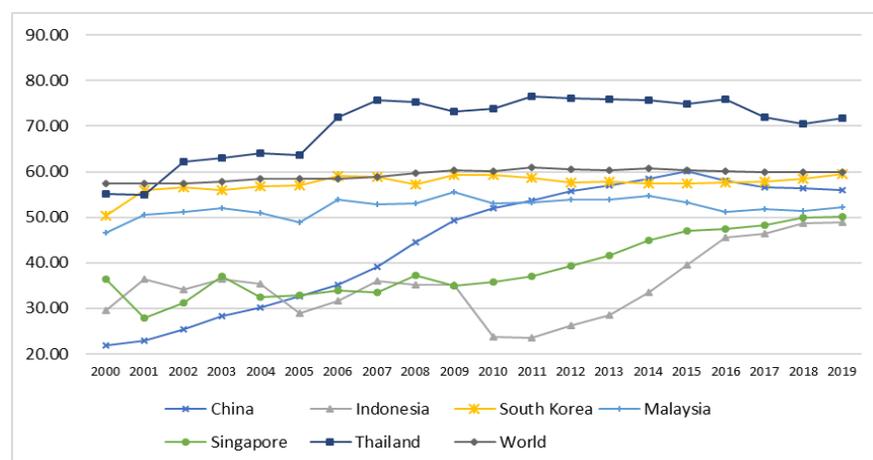
Table 3 Percentage of old-age population by sources of healthcare services utilisation during the last 12 months

Source of Healthcare Services	Young Elderly		Middle Elderly		Old Elderly		Total	
	2017	2021	2017	2021	2017	2021	2017	2021
None	34.9	6.48	28.17	4.24	24.99	3.73	31.52	5.45
Provided by public sector	61.77	89.16	68.08	90.54	70.69	90.84	64.89	89.79
Provided by private sector	3.33	4.36	3.75	5.23	4.32	5.43	3.59	4.76

Source: National Statistical Office (2018, 2022), data processed by the author

Aside from income and work, public assistance to alleviate disabilities in older persons are crucial elements for intervening happiness and well-being. Table 3 shows the sources of healthcare services received during the last 12 months before the interview. Advancing from young elderly to becoming old elderly witnessed an increased utilisation of healthcare provided by both the public and private sectors. By proportion, however, there is significantly higher incidence of utilisation of healthcare provided by the public sector. Total utilisation of healthcare services provided by the public sector has risen remarkably from 64.9 percent of the elderly population in 2017 to 89.8 percent in 2021. This may be partly owing to the pandemic, which can be considered a shock to the system. The COVID-19 experience should be a lesson to the public health administrator to prepare for such unexpected shocks in the future. Under the current system, the full cost subsidy can be reflected by the increasing share of Thailand’s domestic general government health expenditure as a percentage of total current health expenditure. Figure 1 shows that Thailand’s government health expenditure as a percentage of current health expenditure is relatively high relative to some Asian countries and the world.

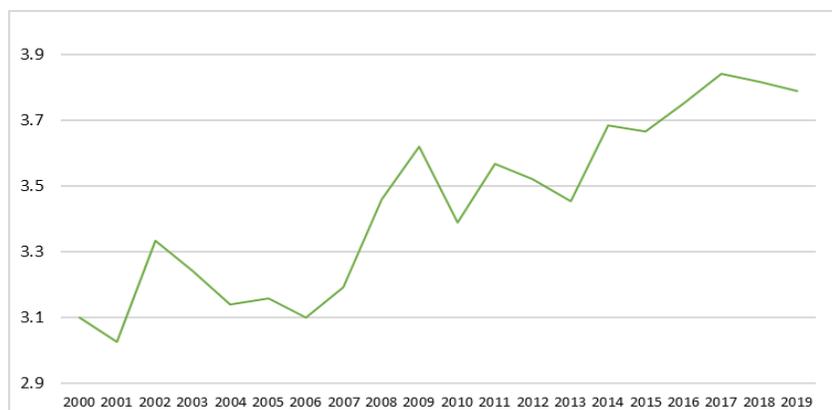
Figure 1. Domestic general government health expenditure as a percentage of current health expenditure in selected Asian countries



Source: World Health Organization Global Health Expenditure database (<http://apps.who.int/nha/database>). The data was retrieved on January 30, 2022.

Under Universal Health Coverage (UHC), all Thai citizens are covered by one of the three public health insurance schemes; namely, the Civil Servant Medical Benefit Scheme (CSBMS) for the government officials, retirees and their dependents, the Social Health Insurance (SHI) for private-sector employees and the Universal Coverage Scheme (UCS) launched in 2022 for the rest of the population. The two explicit goals of UHC were to improve access to health services and protection to avoid financial hardship from out-of-pocket medical spending. This directly relates to the sustainable development goals of no poverty (SDG1), good health and well-being (SDG3) and reduced inequalities (SDG10). It is evidenced that there is a significant reduction of catastrophic health spending from 6 percent in 1996 to 2 percent in 2015. Moreover, impoverishment from the medical bills using national poverty line had fallen from 2.2 percent in 1996 to 0.3 percent in 2015 (Tangcharoensathien et al, 2020). While SHI is financed by tri-partite payroll contributions, equally shared by employee, employer and government, CSBMS and UCS, which covers the largest proportion of the population (75 percent of the total population and 82 percent of the old-age population), are financed solely by the general tax revenue. Furthermore, there is a potential increase in the coverage which currently is consistently under consideration by the public health administration. It can be observed that the majority of the old-age population (92 percent) are satisfied with the public healthcare services (Table 4). Nevertheless, considering the sharp escalation of the current healthcare expenditure (Figure 2), the government cannot disregard the necessity to search for new revenue sources and broaden the tax base to ensure that the politically committed health delivery system is sustainable.

Figure 2. Level of current healthcare expenditure* as a percentage of GDP in Thailand



Source: World Health Organization Global Health Expenditure database (<http://apps.who.int/nha/database>). The data was retrieved on January 30, 2022.

*Estimates of current health expenditures include healthcare goods and services consumed during each year. This indicator does not include capital health expenditures such as buildings, machinery, IT and stocks of vaccines for emergency or outbreaks.

Table 4 Percentage of old-age population by satisfaction of public healthcare services

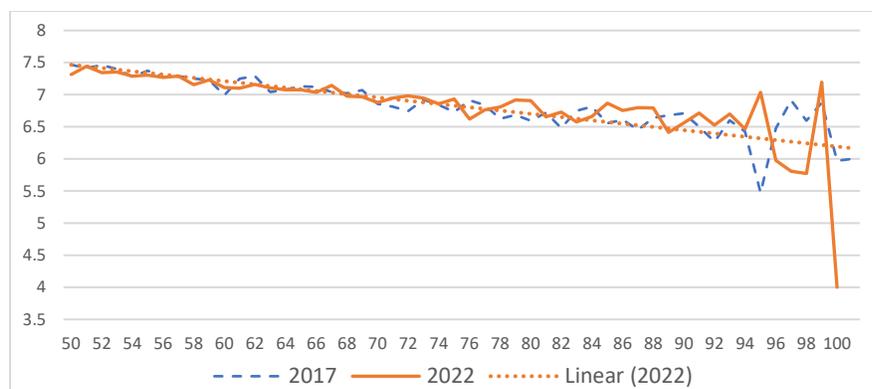
Satisfaction of Public Healthcare Services	Young Elderly		Middle Elderly		Old Elderly		Total	
	2017	2021	2017	2021	2017	2021	2017	2021
Not Satisfied	4.94	4.52	4.54	3.47	3.1	3.27	4.58	4.05
Satisfied	91.74	90.66	92.67	93.36	93.56	93.81	92.26	91.86
Not Applicable	3.31	4.82	2.79	3.17	3.34	2.93	3.16	4.09

Well-being is also often linked to the participative role in the society. The statistics from the survey reveals that there is higher proportion of older persons in the rural areas (72.6 percent) participating in group or volunteer activities in some ways, while only 52.3 percent of those living in the urban areas do. Northeast region has the highest proportion of the old-age population (80.6 percent) participating in community activities while Bangkok has the lowest proportion of 21.6 percent. This must be considered in combination with various intangible factors such as custom, culture and life style preferences.

III.2 What the National-level Statistics reveal about the Patterns of Ageing and Happiness in Thailand

Deterioration of physical health as well as socio-economic impacts can affect mental well-being in some ways. A quick bird's eye view of a static relationship between age and happiness in the Thai older persons in 2017 and 2021 does not suggest a U-shaped curve as indicated by most findings in HICs. Although the components of happiness can be very diverse, this study has no intention to delve into the debates on defining the term in any particular manner. Instead, happiness is represented by the reported scale based on the respondent's own value judgment. According to Helliwell et al (2021), life evaluations provide the most information and captures the quality of life in a more complete and stable way than emotional reports based on daily experiences. In the survey, older persons were asked to self-evaluate their level of happiness during the past three months. The scale range consists of: *lowest level of happiness* (0-2), *low level of happiness* (3-4), *moderate level of happiness* (5-6), *high level of happiness* (7-8) and *highest level of happiness* (9-10). This study aggregates the scale into three levels, consisting of *low level* (0-4), *moderate level* (5-6), and *high level* (7-10). When tabulated, the statistics show that approximately 64.4 percent of the older persons reported high happiness level, while 32.9 percent and 2.7 percent reported moderate and low happiness level, respectively. The higher proportion of the elderly seems likely to become relatively unhappier as ageing progresses from young elderly to becoming old elderly (Table 5). Higher proportion of older persons living within the municipality have high happiness level when compared with those living outside the municipality. This implies that living environment within the municipality provides a more conducive atmosphere to happy ageing than living outside the municipality. The local government can play an important role in narrowing this urban-rural development gap.

Figure 3 The relationship between the level of self-evaluated happiness and age in 2017 and 2022



Source: National Statistical Office (2018, 2022), data processed and illustrated by the author

Table 5 Percentage of old-age population by levels of self-evaluated happiness classified by age group

Level of Happiness	Young Elderly		Middle Elderly		Old Elderly		Total	
	2017	2021	2017	2021	2017	2021	2017	2021
Low	2.4	2.06	4.03	3.10	4.86	4.51	3.22	2.67
Moderate	27.64	29.80	36.55	36.25	40.98	39.62	32.1	32.93
High	69.95	68.14	59.42	60.65	54.16	55.87	64.68	64.41

Source: National Statistical Office (2018, 2021), data processed by the author

Table 6 Percentage of old-age population by levels of self-evaluated happiness classified by highest level of education attainment

Level of Happiness	Primary Level or Below	Secondary Level	Tertiary Level or Above
Low	2.91	2.28	0.80
Moderate	35.94	23.21	14.46
High	61.15	74.51	84.74

Source: National Statistical Office (2022), data processed by the author

Table 7 Percentage of old-age population by levels of self-evaluated happiness classified by work status

Level of Happiness	Not Working	Working
Low	3.57	1.21
Moderate	34.42	30.50
High	62.01	68.29

Source: National Statistical Office (2022), data processed by the author

Table 8 Percentage of old-age population by levels of self-evaluated happiness classified by income level

Level of Happiness	Below 10,000 Baht	10,000-49,999 Baht	50,000-99,999 Baht	Above 100,000 Baht
Low	4.91	3.67	1.67	1.09
Moderate	39.11	38.42	30.09	23.30
High	55.98	57.91	68.24	75.61

Source: National Statistical Office (2022), data processed by the author

Table 9 Percentage of old-age population by levels of self-evaluated happiness classified by self-evaluated income sufficiency

Level of Happiness	Not Sufficient	Sufficient
Low	4.48	1.28
Moderate	43.09	25.13
High	52.43	73.59

Source: National Statistical Office (2022), data processed by the author

Table 10 Percentage of old-age population by levels of self-evaluated happiness classified by satisfaction of public healthcare services

Level of Happiness	Not Satisfied	Satisfied	Not Applicable
Low	4.84	2.51	3.87
Moderate	36.75	32.95	28.70
High	58.42	64.54	67.43

Source: National Statistical Office (2022), data processed by the author

Table 11 Percentage of old-age population by levels of self-evaluated happiness classified by satisfaction of state pensions system

Level of Happiness	Not Satisfied	Satisfied	Not Applicable
Low	5.63	2.43	2.26
Moderate	37.16	34.16	19.39
High	57.21	63.41	78.35

Source: National Statistical Office (2022), data processed by the author

Table 12 Percentage of old-age population by levels of self-evaluated happiness classified by participation in community activities

Level of Happiness	Not Participate	Participate
Low	2.85	2.02
Moderate	33.18	32.08
High	63.97	65.89

Source: National Statistical Office (2022), data processed by the author

From Tables 6-12, it is notable that certain attributes contribute to a larger percentage of high-level happiness in older persons. These attributes include higher level of education attainment, having working status, high income level, income sufficiency, being satisfied with public healthcare services and state pensions system, and participating in community or volunteer activities. In Tables 10 and 11, it is to be noted that the group classified as “Not Applicable” to public provisions has higher percentage of high-level happy persons. This group may represent

the healthy and high-income elderly, opting for private facilities and, in some cases, are ineligible to receive state provisions.

IV. Methodology

Having mapped out the statistics of the older persons in Thailand from the inside-out, the study goes on to conduct the ordered logistic regression. As mentioned in the earlier section, the regression employs data from the Survey of the Older Persons in 2021 in National Statistical Office (2022). The scope of this study restricts the old age population to 60 and above, to be consistent with the current official retirement age in Thailand. The dependent variable y is classified into 3 levels of happiness, consisting of *low level* (1), *moderate level* (2), and *high level* (3). The independent variable names, related SDGs and their descriptions are shown in Table 13. The independent variables are grouped into three dimensions, namely (1) general attributes: age, sex, area (within municipality, outside municipality), region and marital status; (2) socio-economic status variables: highest level of education attained, work status, reason for still working, the most important source of income, income level, sufficiency of income for living, savings and home ownership; and (3) supportive factors variables: healthcare services utilisation, satisfaction of public pensions system, satisfaction of public services and participation in community activities. A model in its general form is $y_i^* = \beta'x_i + \varepsilon_i$, where y_i^* = dependent variable (level of happiness), x_i = independent variables, β' = coefficient, ε_i = error terms.

Table 13 Independent variable names, related SDGs and description

Variable	Variable Name	Related SDGs*	Description, reference group = 0
x1	Age group		0=60-69 (young elderly), 1=70-79 (middle elderly), 2= 80 and above (old elderly)
x2	Sex	5, 10	0=male, 1=female
x3	Area	10	0=within municipality, 1=outside municipality
x4	Region	10	0=Bangkok, 1=Central, 2=East, 3=Northeast, 4=West, 5=North, 6=South
x5	Marital status		0=single, 1=married and live together, 2=married and live apart, 3=widow, divorced, separated and others
x6	Highest education level attained	4	0= primary level or below, 1= secondary level, 2= tertiary level or above
x7	Work or not in the last 7 days	5, 8	0=not working, 1= working
x8	Income sufficiency	1	0=not sufficient 1=sufficient
x9	Most important source of income for living	1	0=income from work, 1=state or social security pensions, income from other national welfare provisions, 2=savings, 3=family
x10	Average annual income in cash and in-kind	1, 2	0=below 10,000 Baht, 1=10,000-49,999 Baht, 2=50,000-99,999 Baht, 3=100,000 Baht or above
x11	Savings	1	0=none, 1= below 25,000 Baht, 2=25,000-99,999 Baht, 3=100,000-999,999 Baht, 4 = 1,000,000 Baht or above
x12	Home ownership	1	0=owned by elderly or spouse, 1=owned by family or relatives, 2= owned by others
x13	Healthcare utilisation during the last 12 months	3	0=not accessible 1=state provision, 2=private provision
X14	Satisfaction of public pension system	1, 10	0=not satisfied, 1=satisfied, 2=not applicable
X15	Satisfaction of public services	11, 16	0=not satisfied, 1=satisfied, 2=not applicable
X16	Participation community or volunteer activities	11, 16	0=not participate, 1=participate

* no poverty (SDG1), zero hunger (SDG2), good health and well-being (SDG3), quality education (SDG4), gender equality (SDG5), decent work and economic growth (SDG8), reduced inequalities (SDG10), sustainable cities and communities (SDG11) and peace, justice and strong institutions (SDG16)

The relationship between the variables are statistically tested. Table 14 reports the Pearson’s chi-squared test, showing the association between dependent and independent variables. All of the independent variables are statistically significant to happiness at the 99 percent confidence level. The Pearson’s correlation shows that the multicollinearity problem does not exist (Table 1A in the appendix). The independent variables do not exhibit relationship with each other. The Goodness of Fit Test considers the Pseudo R-square, the Log Likelihood and the Likelihood Ratio (LR) Chi-square test. Regression analysis with multivariate ordered logistic model by Maximum Likelihood Estimator (MLE) is processed by Stata, where the value of variable = 0 is the reference group. In the results, the coefficient (β) is in the form of log odds. The odds ratio indicates the likelihood of the level of happiness equal to the odds ratio times of the reference group.

Table 14 Pearson’s chi-square

Variable	Pearson's chi-square	Prob.
x1	423.3758***	0.0000
x2	11.1234***	0.0000
x3	45.0967***	0.0000
x4	350.0386***	0.0000
x5	197.1751***	0.0000
x6	827.7511***	0.0000
x7	294.3180***	0.0000
x8	1700***	0.0000
x9	293.7964***	0.0000
x10	1200****	0.0000
x11	935.4094***	0.0000
x12	41.5103***	0.0000
x13	123.0974***	0.0000
X14	529.5315***	0.0000
X15	22.0311***	0.0000
x16	24.1***	0.0000

Note. *** Significant at the 0.001 level

V. Results and Discussion

Table 15 reports the results of the ordered logistic regression. The number of observations is 30,667. The Likelihood Ratio Chi-Squared test with a value of 2916.33 (p-value=0.0000) shows that the model fits the data as compared with the null. The Pseudo R-Square is 0.059. Except for gender and marital status, the rest of the variables are statistically significant at 90 to 99 percent confidence interval. The coefficients are in log odds and can interpreted as follows. Considering the age group, being a middle elderly decreases the log odds of reporting happiness level by 0.25 points compared with the young elderly, holding other variables constant. When interpreted by

the odds ratio, it can be interpreted that the middle elderly is 22 percent $[(0.78 - 1) \times 100]$ less likely to be as happy as the young elderly. In other words, the middle elderly tends to be 0.78 times as happy as the young elderly. It is more convenient to interpret the results expressed in odd ratios. Therefore, the remaining of the variables will be explained by the odd ratios. Consecutively, the old elderly is 37 $[(0.63 - 1) \times 100]$ percent less likely to be as happy as the young elderly, *ceteris paribus*.

Table 15 Ordered logistic regression coefficients and odds ratio

Variable Description	x	Coef. (β)	Odds Ratio	Std. Err.	z	P>z	[95% Conf. Interval]	
Age group, ref=Young Elderly								
Middle Elderly	1	-0.2520	0.7772	0.0232	-8.4300	0.0000	0.7330 0.8241	
Old Elderly	2	-0.4627	0.6296	0.0272	-10.7100	0.0000	0.5785 0.6852	
Sex, ref=male								
Area, ref=within municipality	x3	-0.0633	0.9387	0.0244	-2.4300	0.0150	0.8920 0.9878	
Region, ref= Bangkok								
Central	1	0.4349	1.5448	0.1286	5.2200	0.0000	1.3122 1.8187	
North	2	0.3599	1.4331	0.1207	4.2700	0.0000	1.2151 1.6903	
Northeast	3	0.0965	1.1013	0.0923	1.1500	0.2500	0.9345 1.2979	
South	4	0.5645	1.7586	0.1529	6.4900	0.0000	1.4831 2.0853	
Marital, ref=single								
	1	0.0846	1.0883	0.0712	1.2900	0.1960	0.9574 1.2372	
	2	0.0756	1.0785	0.1037	0.7900	0.4310	0.8934 1.3021	
	3	-0.0500	0.9512	0.0625	-0.7600	0.4470	0.8362 1.0821	
Highest education level attained, ref= Primary level or below								
Secondary level	1	0.4222	1.5253	0.0819	7.8700	0.0000	1.3729 1.6944	
Vocational level and above	2	0.6781	1.9701	0.1472	9.0700	0.0000	1.7017 2.2808	
Work or not in the last 7 days, ref=not working								
Income sufficiency, ref= not sufficient	x8	0.7244	2.0635	0.0560	26.7100	0.0000	1.9566 2.1761	
Most important source of income for living, ref = income from work								
Pension, social security fund, old-age allowance	1	-0.0552	0.9463	0.0538	-0.9700	0.3320	0.8465 1.0579	
Interests, savings and assets	2	-0.4136	0.6613	0.0937	-2.9200	0.0040	0.5010 0.8729	
Spouse, parents, children, relatives	3	-0.0267	0.9737	0.0511	-0.5100	0.6110	0.8785 1.0791	
Annual average income in cash and in kind, ref = below 10,000 Baht								
10,000-49,999 Baht	1	0.0884	1.0924	0.0506	1.9100	0.0570	0.9975 1.1962	
50,000-99,999 Baht	2	0.2713	1.3116	0.0700	5.0900	0.0000	1.1814 1.4562	
1,000,000 Baht and above	3	0.3406	1.4058	0.0864	5.5400	0.0000	1.2462 1.5858	
Savings, ref=none								
Below 25,000 Baht	1	0.1085	1.1146	0.0405	2.9800	0.0030	1.0379 1.1969	
25,000-99,999 Baht	2	0.1739	1.1899	0.0399	5.1900	0.0000	1.1143 1.2707	
100,000-999,999 Baht	3	0.3655	1.4412	0.0600	8.7900	0.0000	1.3284 1.5636	
1,000,000 Baht and above	4	0.8591	2.3610	0.3334	6.0800	0.0000	1.7902 3.1139	

Variable Description	x	Coef. (β)	Odds Ratio	Std. Err.	z	P>z	[95% Conf. Interval]
Home ownership, ref=owned by elderly or spouse	x12						
owned by family or relatives	1	0.0880	1.0919	0.0432	2.2200	0.0260	1.0105 1.1800
owned by others	2	-0.2906	0.7478	0.0560	-3.8800	0.0000	0.6458 0.8659
Healthcare during the last 12 months, ref = not accessible	x13						
provided by public sector	1	0.3378	1.4019	0.0865	5.4800	0.0000	1.2423 1.5820
provided by private sector	2	0.5162	1.6756	0.1501	5.7600	0.0000	1.4058 1.9974
Satisfaction of public pension system, ref=not satisfied	x14						
Satisfied	1	0.1405	1.1508	0.0628	2.5700	0.0100	1.0340 1.2808
Not applicable	2	0.1486	1.1602	0.0912	1.8900	0.0590	0.9944 1.3535
Satisfaction of public services, ref=not satisfied	x15						
Satisfied	1	0.1671	1.1818	0.0904	2.1800	0.0290	1.0172 1.3731
Not applicable	2	0.2091	1.2326	0.0966	2.6700	0.0080	1.0571 1.4374
Participation in community or volunteer activities, ref = not participate	x16	0.1427267	1.1534	0.0318	5.1700	0.0000	1.0927 1.2176
/cut1		-2.180082	-2.1801	0.1541			-2.4821 -1.8781
/cut2		1.042105	1.0421	0.1507			0.7467 1.3375

Source: National Statistical Office (2021), data processed by the author

Other variables constant, males are 8.6 percent more likely to be happier than females. The elderly living outside the municipality is 6 percent less likely to be as happy as those living within municipality. The ordered logistic regression analysis also shows statistical significance of the regional variables at the 99 percent confidence interval, except for the northeast region. The happiness levels of elderly living in other regions are about 1.4 to 1.7 times of those living in Bangkok. This suggests that not only urban-rural gap but also regional disparity do exist. Considering the related goals of SDG3, SDG11 and SDG16, there is policy space for development. Public sector may consider implementing local schemes bidding to the local area-specific attributes of the older persons to increase their happiness level. For example, subject to infrastructure constraints (proper walkways, footpaths, elevators, etc.), the elderly living outside the municipality may not be able to perform their daily tasks conveniently in comparison with those living within the municipality. Relative to other regions, without substantial financial endowment, a current city life in Bangkok, which lacks old-age friendly infrastructure, may be more uncomfortable for the elderly with mobility problem or disability.

In terms of socio-economic attributes, elderly who attained tertiary level of education or above tend to be almost 2 times happier than those who completed at most primary school level. In relation to SDG4, lifelong learning for the elderly should be promoted through various market incentives such as tax refunds for employers who encourage post-retirement training skills for their employees. Elderly whose most important source of income for a living comes from interests, savings and assets are 34 percent less likely to be as happy as the elderly whose major source of income comes from work. The elderly who works is 14 percent more likely to be happier than the elderly who do not work. It is found that elderly with income of 10,000 Baht or more tend to be 9-40 percent more likely to be happier than those with income below 10,000 Baht. This is in

accordance with savings. Those with some amount of savings tend to be 1.11-2.36 times happier than those without a savings. The elderly with income sufficiency tends to be 2.06 times happier than those without income sufficiency. Those whose accommodation is owned by others tend to be approximately 25 percent less likely to be as happy as those who own a home. The findings pinpoint the significance of income sufficiency and security to the happiness of the older persons.

In terms of supporting factors, the happiness level of the elderly receiving public healthcare services is 1.4 times of those who are unable to access any healthcare services. Meanwhile, the level of those who receive private healthcare services is 1.7 times of the same reference group. As for satisfaction of public services, those who are satisfied are 1.18 times happier than those who are not satisfied. Elderly who do not use public services which might have been the healthy or high-income groups are 1.23 times happier than those who are not satisfied. Moreover, those satisfied with the public pensions system are more likely to be 15 percent happier than those who are not satisfied. Lastly, those who participated in group or volunteer activities in some ways are 1.15 times happier than those who did not participate. In accordance with SDG3, SDG11, SDG16, this implies the significance of public services that accommodates the well-being of the elderly. In addition to medical facilities, other factors related to health, such as fitness areas and the infrastructure that facilitates activities for maintaining good health need to be improved. The same concern also applies to the working-age population which will become the next generation old-age group.

VII. Conclusion and Policy Recommendations

This study revisits the conventional wisdom of development, sustainability and happy ageing. It explores the existing research frontier on how happiness proceeds with age and touch upon different notions of happiness which influence public policies and global demands. It, then, thoroughly delineates the national-level data of the 2021 Survey of The Older Persons in Thailand as stylised facts from the inside-out perspective. It conducts ordered logistic regression analysis of the old-age happiness. This paper contributes to the finding that shows statistical significance of the attributes which foster the old-age happiness. Happiness can be considered both as an outcome and a useful success indicator of public policies. Consequently, it asserts that happiness can potentially be intervened by political commitment and suitable public policies in concert with the SDGs. However, this assertion has some reservations. Measurement that allows meaningful comparison between individuals and groups is difficult. The criteria for happiness can be very subjective. The public sectors must, therefore, take precautions against political bias and inefficiency in incorporating old-age happiness into their development agenda. To achieve an effective policy coherence, particularly in the case of NHIC like Thailand, requires a thorough understanding of old-age happiness in a more local area-specific context, which is an attempt of this study.

To this end, policy recommendations from the findings of this study are summoned into four arenas, namely: (i) policy on education and lifelong learning (SDG4, SDG5, SDG10), (ii) policy on income and old-age employment (SDG1, SDG2, SDG5, SG8, SDG10), (iii) policy on healthcare, public services and revenue raising (SDG3, SDG10, SDG11, SDG16) and (iv) policy on local area disparity (SDG10, SDG11, SDG16).

(i) *Policy on education and lifelong learning.* The finding shows that education attainment can have a significant impact on the happiness level of the older persons. Recall that being educated is the consequence of lifelong investment and devotions of public and private resources.

Education policy is a long-term policy. Unfortunately, the accomplishment of education policy cannot happen overnight to accommodate the short-term political agenda. Therefore, it is important that policymakers are well equipped with the appropriate foresights. Following the spread of COVID-19, there has been tremendous learning loss caused by the onsite school closures. Studies suggest that learning loss was much higher among students with lower socio-economic status in all groups of countries (Moscoviz and Evans, 2022). Concurrently, Vandeweyer et al (2021) indicate that in Thailand, there are large skills shortages along with qualification and field-of-study mismatches. Hence, the current situation is that a very huge proportion of school children and working-age population are deprived of fundamental skills and are, therefore, unprepared for a world with dynamic megatrends. This will be a future time bomb when they eventually become old and the difficulty awaits will be multiple-fold of that faced by the current old-age groups. There will be less young supporting workers than there are now. There will be low cumulative reserves in the retirement and pension funds, depleted during the preceding generations. Their lack of necessary skills will disqualify them from post-retirement work. Considering this scenario, education policy should be viewed in a more holistic approach. Public sectors must be more supportive of the opportunities for compulsory basic education. Lifelong education is very crucial and should be accessible to all in every cohort. It helps avoid cumulative disadvantages which can become exacerbated later on in life. Delayed intervention in lifelong learning would be costly and ineffective. Therefore, education and lifelong learning should be appraised as an urgent policy in the sustainable development agenda of the ageing society.

(2) *Policy on income and old-age employment.* Considering the socio-economic attributes, the findings reveal that high income, high savings, working, having major source of income from work, working without necessity, and home ownership contribute to higher level of happiness. Frequent public advice to the population which encourages savings for old-age seems to be platitudes. In the reality of most development countries, existing welfare provisions are inadequate to make workers burden-free from out-of-pocket expenditure in supporting all their dependents. Therefore, it is very difficult to save if a large part of an average salary worker's life-time income must be allocated to supporting the older and the younger dependents in the household. Hence, to improve the opportunities to save to become a happier elderly later in life, the social welfare system should sufficiently support the dependents. The hard truth is that Thailand is not wealthy enough to provide such adequate state provision. Despite the nationwide population coverage, the living allowance and existing pensions are insufficient for making a living. Hence, promoting work and working environment, and developing the capability to work for the older workers would be one of the practical and honest solutions. Decent workplace is important for the elderly, whether be it for active ageing or as a source of necessary income for living. In practice, it is also possible that age-diverse workplaces may encounter ageism. The government must begin with removing restrictions and promoting flexible options. Aside from the regulatory framework, cooperation with the social partners in managing prejudice and discrimination towards the older workers constitute an important part of the good management code of practice. Moreover, decent working condition and training opportunities throughout the careers must be strengthened. As mentioned in the education policy discussion, life-course learning helps avoid cumulative disadvantages that could later impose detrimental effect on low-income old-age life.

(3) *Policy on healthcare, public services and revenue raising.* In terms of supporting factor attributes, being healthy, satisfaction of public services, and group or volunteer participation have important impact on happiness. Thailand has a wide coverage of UHC, making healthcare accessible to all Thai citizens. This is in line with the sustainable development goals, particularly,

of good health and well-being and reduced inequality. However, as the current healthcare expenditure has an increasing trend, the government needs to broaden the tax base and revenue sources to ensure that the politically committed health delivery system and public services are sustainable. Nevertheless, the public authority must keep in mind that, given the universal welfare schemes and the country's large informal sector, there can exist horizontal inequity in the net welfare benefits between workers in the formal and informal sectors. For example, at the same level of taxable income, a worker in the formal sector pays income tax and social security contribution (which is another form of tax) while the other worker who has unreported earning does not have to pay income tax or social security contribution but benefits from UHC. When considering the increase in direct tax rates, tax policy must take precautions against punishing the existing small proportion of direct tax payers in the formal sector and discourage them from moving to the informal sector. Moreover, the new generations of workers have a strong preference for independent and freelance work. This will further erode future regular income tax revenue and the public sector must search for new revenue sources. The world's changing dynamics definitely demands new innovations in public finance since relying on primitive conventional fiscal tools may no longer suffice.

(4) *Policy on local area disparity.* The finding shows that older persons living outside the municipality or living in Bangkok is less likely to be as happy as those living within the municipality or living in other regions. The disparity between within versus outside municipality, and between Bangkok versus other regions suggests that spatial policy gaps exist. Public sector may consider implementing local schemes bidding to the local area-specific attributes of the older persons to increase their happiness level. For example, subject to infrastructure constraints (proper walkways, footpaths, elevators, etc.), the elderly living outside the municipality may not be able to carry out their daily tasks conveniently in comparison with those living within the municipality. Relative to other regions, without being well-to-do enough, a current city life in Bangkok, which lacks old-age friendly infrastructure, can be more uncomfortable for the elderly with mobility problem or disability. Hence, the old-age-friendly infrastructure and ecosystem must be accommodative, paying more attention to the local area-specific needs. Given the fiscal constraint on the part of the government, collaboration with the private sector through conducive market incentives, attractive tax schemes and professionally managed revolving funds to enhance these features have the potential to generate overall positive externalities to the economy. If well-designed, a market-driven ageing support model can be self-funded, efficient and government budget-saving. The political, administrative and fiscal decentralisation must play an important role in addressing the local area disparity. Currently, it seems that decentralisation is decentralised in function but remains highly centralised in authority. The government must be reminded that strong local institutions are compulsory requirements for the success of sustainable development policies.

VIII. Limitations of the Study

As with other studies, this study is not without limitations. First, due to the unavailability of alternative national-level data, self-evaluation during the last three months before the interview may be relatively short-term to represent life satisfaction. Consideration of a longer period of time, at least three years, to reflect the overall well-being of life should increase accuracy. Second, in tracing the pattern of ageing and happiness, homogeneity assumption implies that the variance between age groups is relatively even. In other word, it is implicitly assumed that all groups have

similar variation between them. The nature of the existing survey does not keep track of the same individual. Nevertheless, given the existing data, it can give us an idea of how our ageing society progresses. In the long term, however, availability of a longitudinal survey which examine the same individuals over a period of time would be very beneficial for a more specific policy analysis.

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Appendix

Table 1A Pearson's correlation

	x1	x2	x3	x4	x5	x6	x7	x8	x9	x10	x11	x12	x13	x14	x15	x16
x1	1.0000															
x2	0.0168*	1.0000														
x3	0.0078	-0.0185*	1.0000													
x4	-0.0002	-0.0157*	0.0590*	1.0000												
x5	0.2299*	0.2370*	-0.0124*	0.0027	1.0000											
x6	-0.1256*	-0.0850*	-0.1898*	-0.0865*	-0.1073*	1.0000										
x7	-0.3412*	-0.1759*	0.0546*	0.0432*	-0.1887*	-0.0967*	1.0000									
x8	0.0496*	-0.0124*	-0.0462*	-0.0444*	-0.0003	0.2096*	0.0062	1.0000								
x9	0.2500*	0.2028*	-0.0252*	-0.0386*	0.1871*	-0.0849*	-0.6541*	0.0594*	1.0000							
x10	-0.2190*	-0.1378*	-0.1026*	-0.0884*	-0.1218*	0.3966*	0.3103*	0.2860*	-0.2546*	1.0000						
x11	-0.0786*	-0.0439*	-0.0911*	-0.0279*	-0.0829*	0.3255*	0.0830*	0.2654*	-0.0930*	0.3837*	1.0000					
x12	0.0566*	0.0669*	-0.1056*	-0.0987*	0.1207*	-0.0093	-0.0521*	-0.0341*	0.0438*	-0.0372*	-0.1059*	1.0000				
x13	0.0376*	0.0113*	-0.0266*	0.0332*	0.0037	0.0645*	-0.0340*	0.0699*	0.0252*	0.0401*	0.0783*	-0.0445*	1.0000			
x14	-0.0596*	-0.0516*	-0.0898*	-0.0063	-0.0601*	0.4696*	-0.0771*	0.1999*	-0.0709*	0.2938*	0.2355*	-0.0402*	0.0329*	1.0000		
x15	0.0485*	0.0220*	0.0325*	-0.0350*	0.0165*	-0.0340*	-0.0289*	0.0075	0.0204*	-0.0220*	-0.0251*	0.0028	-0.0383*	0.0186*	1.0000	
x16	-0.0685*	-0.0316*	0.0427*	0.0880*	-0.0254*	-0.0244*	0.0622*	-0.0062	-0.0542*	-0.0210*	0.0293*	-0.1003*	0.0309*	0.0058	-0.0832*	1.0000

* Significant at the 0.05 level