

## ***Mobility limitation in the older Thais: Gender and geographical differences in health expectancies***

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### **Introduction**

Thailand's population has aged as a result of the demographic transition [1]. As a consequence of declining mortality, life expectancy at birth of the Thai population has risen continuously [2,3]. Longer life expectancy and the increase in non-communicable diseases have raised a question of the quality of years lived. Health expectancy is an index of population health, representing the increasing focus on quality of life lived rather than on the quantity as measured by life expectancy [4]. Basically, health expectancies are the combination of life expectancy with health concepts, which make it possible to calculate years lived in different states of health [4]. The most appropriate framework to elucidate more detailed health measures for the older population is the disablement process [5].

Most studies of health expectancies in Asian countries have concentrated on disability rather than earlier stages in the chain of disablement process, and on a single health measure [6]. In Thailand estimates have been made of years with self-care disability [7-9], mobility disability [9], and in different states of perceived health [10] at older ages. Regardless of the underlying health measure, gender differences in the Thai population have consistently shown longer life but more years in poor health for females than males.

Mobility is one of the most basic important functions for independent living in the old age. Limitation in mobility is closely related to further functional decline and disability, which consequently increases in dependency [11,12]. Mobility restriction also adversely affects social and psychological aspects of older adults' life [13,14]. According to models of the disablement process, this measure of functioning is independent of the environment requirements and role expectations [5], and therefore provides better understanding of the underlying health of the population. Nevertheless, estimates of years lived with mobility limitations have been little studied in the Thai population. This study therefore uses the most recent Thai national data from 2009 to estimate years of life at older ages in different states of mobility limitation, and examines gender and regional differences in these health expectancies.

### **Methods**

#### *Data*

Mortality data was drawn from the Thai vital registration system, the most important source of mortality data. Data on mobility performance were drawn from the fourth Thai National Health Examination Survey (NHES IV) in 2009. The NHES IV is a cross-sectional survey using stratified multi-stage sampling of the Thai population to yield nationally and regionally representative samples. The sampling method has been described elsewhere [15]. The present study focused on 9,210 participants aged 60 years and older (95% response rate). Information on participants was collected through a variety of methods, including a face-to-

face interview, functional tests, physical examinations, and laboratory tests. The NHES IV was approved by the Ethical Review Committee for Research in Human Subjects, Ministry of Public Health. All participants provided written informed consent.

### *Health measures*

In this study, mobility performance is measured by using two functions; (i) walking at least 400 metres and (ii) going up or down a flight of 10 stairs. Participants are defined as having mobility limitation if they report inability to do at least one of these two functions without human assistances or technical aids. In the NHES IV, participants were asked to report their actual performance to do these tasks rather than to judge their capacity.

### *Statistical methods*

Health expectancies were calculated by Sullivan's method [16,17]. The first step was to calculate the period life tables, for males and females in the country and in each region, from the age- and sex-specific death rates which required some adjustment in (i) the number of deaths (for unknown age of death and under-registration) and (ii) the age- and sex-specific death rates for the very old. Overall, and age- and sex-specific percent completeness of death registration obtained from other reports [18-20] was applied to adjust the number of deaths for under-registration. The Coale-Kisker method [21] was employed to estimate age- and sex-specific death rates for those aged 80 years and older as the values were too low when calculated directly. This method assumes the declining rate of increase in mortality rates at very old ages. Then, the age- and sex-specific prevalence of mobility limitation for the country and each region was applied to divide the number of person years lived in the given age interval (from a period life table) into years lived with and without mobility limitations. As health expectancies are subject to sampling variation from the health surveys, their variance was calculated and z-statistics were used to test differences in health expectancies following established methods [16].

## **Results**

Life expectancy and years of life in different states of mobility limitation by age and genders are shown in table 1. Females had longer life expectancy than males at every age, with the gaps between females and males ranging from 3.5 years at age 60 to 1.5 years at age 80. However, females lived significantly fewer years free of mobility limitation ( $p < 0.001$ ) at all ages, with the gaps ranging from 3.2 years at age 60 to 1.7 years at age 80, and they lived significantly more years with limitation than males ( $p < 0.001$ ). Indeed, females spent twice as many years with mobility limitation as males did at age 60, 65, and 70 years. It was noticeable that years lived with mobility limitation were remarkably constant at approximately 4.5 years in males across age. However, this pattern was not found in females as years lived with the condition decreased with age at a slower pace than life expectancy.

Tables 2 and 3 show life expectancy and years of life in different states of mobility limitation at age 60 by regions, along with the between region rankings. Significant differences were evident between the regions having the most and the least years lived without and with mobility limitation. The pattern of regional differences in years lived free of mobility limitation was consistent across genders, with the Central ranked the highest and the North East ranked the lowest. However, differences in years lived with mobility limitation varied between genders, with Bangkok ranked the lowest for males and the Central ranked

the lowest for females, while the North East ranked the highest for males and the South ranked the highest for females.

## Conclusion

This study adds knowledge of gender and regional inequalities in health expectancy in the older Thai population using a measure of mobility limitation. The findings suggest that females' longer lives are not necessarily free of mobility limitations and the gender gaps of life years with mobility restriction are profound by middle old age. Similarly, health expectancies show little relationship to life expectancy across regions. Both males and females in the Central region experienced the most years free of mobility limitations while males and females in the North East region ranked amongst the worst. Health expectancy measured by mobility limitation has important policy implications, and a deeper analysis of reasons for these differences will help the development of age-friendly infrastructures.

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**Table 1** Life expectancy and number of years lived with and without mobility limitation at age 60, 65, 70, 75, and 80 by gender in Thailand, 2009 (95% CIs in parentheses)

	Males	Females
Age 60		
Life expectancy	19.13	22.58
Years lived		
Free of mobility limitation	14.40 (14.14-14.65)	11.18 (10.85-11.51)
With mobility limitation	4.73 (4.48-4.98)	11.40 (11.07-11.73)
Age 65		
Life expectancy	15.86	18.78
Years lived		
Free of mobility limitation	11.18 (10.92-11.45)	8.26 (7.94-8.59)
With mobility limitation	4.67 (4.41-4.94)	10.52 (10.19-10.84)
Age 70		
Life expectancy	12.92	15.31
Years lived		
Free of mobility limitation	8.31 (8.02-8.59)	5.66 (5.33-5.98)
With mobility limitation	4.61 (4.32-4.90)	9.65 (9.33-9.98)
Age 75		
Life expectancy	10.47	12.32
Years lived		
Free of mobility limitation	5.90 (5.58-6.23)	3.78 (3.44-4.11)
With mobility limitation	4.56 (4.24-4.89)	8.54 (8.21-8.87)
Age 80		
Life expectancy	8.6	10.08
Years lived		
Free of mobility limitation	4.01 (3.61-4.34)	2.28 (1.91-2.65)
With mobility limitation	4.59 (4.19-4.99)	7.80 (7.43-8.18)

**Table 2** Life expectancy and number of years lived in different states of mobility limitation at age 60 for Thai males by regions, 2009 (95% CI) [rank between regions, 1=lowest, 5=highest]

Regions	Life expectancy	Number of years lived	
		Free of mobility limitation	With mobility limitation
Bangkok	18.71 [1]	15.45 (14.62-16.27) [4]	3.27 (2.44-4.09) [1]
Central	19.38 [4]	16.06 (15.56-16.55) [5]	3.32 (2.83-3.82) [2]
North	18.82 [2]	13.91 (13.40-14.43) [2]	4.90 (4.39-5.42) [3]
North East	18.90 [3]	12.85 (12.31-13.39) [1]	6.05 (5.51-6.59) [5]
South	19.97 [5]	14.93 (14.36-15.49) [3]	5.05 (4.48-5.62) [4]

**Table 3** Life expectancy and number of years lived in different states of mobility limitation at age 60 for Thai females by regions, 2009 (95%CI) [rank between regions, 1=lowest, 5=highest]

Regions	Life expectancy	Number of years lived	
		Free of mobility limitation	With mobility limitation
Bangkok	22.87 [3]	12.94 (11.77-14.11) [4]	9.94 (8.77-11.11) [2]
Central	23.10 [4]	13.44 (12.71-14.16) [5]	9.67 (8.94-10.39) [1]
North	21.74 [1]	10.83 (10.19-11.48) [2]	10.91 (10.26-11.55) [3]
North East	21.86 [2]	9.06 (8.40-9.71) [1]	12.81 (12.15-13.46) [4]
South	24.58 [5]	11.75 (11.01-12.49) [3]	12.83 (12.09-13.56) [5]