

# Compare Between Personal Factors & Healthcare Service Needs after Becoming Senior Citizens

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**Abstract:** This study aimed to find a health service provision guideline from objective study and comparison between personal factors and healthcare service needs after becoming senior citizens in people aged 40 and over but younger than 60 in Songkhla Province. This work was a quantitative study that used T-test and MANOVA for data analysis. The result was that personal factors such as age, monthly income, residence ownership, residence type and occupation led to different healthcare service needs with statistical significance of .05. On the other hand, gender, marital status, number of children and education could not be conclusively tied to healthcare service needs after becoming senior citizens. The aspects of healthcare needs, in order of importance, were (1) Rehabilitation (2) Treatment, (3) Social service, (4) Care and (5) Psychological service.

**Keywords:** 1) Elderly Needs, 2) Healthcare Service, 3) Senior Citizens, 4) Healthcare.

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## Introduction

Estimative information revealed that the world population was aging. 1 in 6 of the world population was entering the aged state (Privor-Dumm, et al, 2021; and United Nations, 2019) due to advances in medical technology and improved self-care (Ritchie & Roser, 2019). It was estimated that by 2050, 20.4% of the world population would be over 60 years old, 24.4% of which would be in Asia (Subaiya & Syamala, 2019). In Thailand, it was found in 2020 at 19.9% of the population (12.6 million people) were senior citizens and it would increase to 32.2% (20.5 million people) in 2040 (Office of the National Social Economic Development Council, 2020). The threefold increase of senior citizens in the next 20 years was a national concern (Chen & Xu, 2020; Araujo de Carvalho, et al., 2017) but at the same time business opportunity especially senior-oriented businesses (Dolores Hurtado & Topa, 2018) that had to plan ahead

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to accommodate the needs, activities and behavior of future senior citizens (Hangsapruet, 2022; Eismann, Verbeij, & Henkens, 2019; and Heckhausen, Wrosch & Schulz, 2019) especially healthcare needs that tended to be very personalized (Moudud-UI-Huq, Sultana Swarna & Sultana, 2021; Eismann, et al, 2019; and Heckhausen, et al, 2019). Healthcare needs of the senior citizen as specified by the Department of Health Service Support (2020) were 1. Care, 2. Treatment, 3. Rehabilitation, 4. Psychological service, 5. Social services (Kemp, Ball, & Perkins, 2019; and Scheunemann, et al., 2020). Study of needs and expectations in order to run senior healthcare business in this work aimed to compare personal factors and healthcare service needs of people aged 40 and over but younger than 60 in Songkhla Province, with emphasis on problems the senior citizens would face, the heart of service which service providers were required to understand and answer with service that could accurately meet the needs and expectations of the target group (Moudud-UI-Huq, et al, 2021; and Marques Lubenow, & Oliveira Silva, 2019). This study focused on people that could prepare for retirement or people aged 40 and over but younger than 60 that could still make preparations for becoming high-quality senior citizens, and were a good opportunity for understanding their needs and expectations of healthcare services as management and business opportunities.

### **Songkhla province and the elderly situation.**

Songkhla is a province in Southern Thailand, a transportation hub connecting both the Gulf of Thailand and Andaman Sea, and a regional commercial center that connects Nakhon Si Thammarat, Trang, Pattalung, Narathiwat, Pattani, Yala, and Satun Provinces and Malaysia. Songkhla Province has the highest population (Songkhla Provincial Administrative Organization, 2020). The number of senior citizens in 2020 were 159,060 and by 2040 it was estimated to increase 2.8 times. Currently there are 34 senior citizen healthcare centers (National Statistical Office, 2019) which is already inadequate in the present and will be even more inadequate for the future (Songkhla Provincial Administrative Organization, 2020). Thus, a management guideline is necessary for relevant sectors to operate and of course more business opportunity for senior citizen healthcare service provider.

### **Elderly Health issues**

Because of rapidly-increasing lifespan and number of the elderly, their livelihood is more in poverty and is followed by physical and mental deterioration (Putri & Ilyas, 2019). Worsening life quality, in some extreme cases, led to suicide (Nguyet Van, et al., 2019). Senior care has become a significant problem for developing countries, in terms of social and family problems (Putri & Ilyas, 2019; and Saengthasirivilai & Skulitsariyaporn, 2017). Aside from age-related health problems, the elderly also need care (Pannarunothai, 2021). Saengthasirivilai & Skulitsariyaporn (2017) found that main problems in senior care were physical degradation, need of close care, economic disadvantages of themselves and their children, lack of time for elderly care, and lack of physical or specialized equipment for elderly care. This means leaving the seniors with capable or specialized personnel is a reasonable choice. Still, the elderly will pay attention to health service accessibility, which is often found problematic and unequal (Pannarunothai, 2021). Other problems included difficulties in the medical service process and method, dignity-conscious elderly care, attention to health, and assistance in medical service (Marques Lubenow, & Oliveira Silva, 2019).

### **Healthcare Service Needs for the elderly**

The elderly expects access to basic healthcare service and facilitator to specialized service for convenience that might vary upon personal factors (Marques Lubenow & Oliveira Silva, 2019). The principles are from

“Watson’s Philosophy and Theory of Transpersonal Caring” by Watson (2008) (Railie, 2018), which is a concept to transform healthcare service into daily life service, one-on-one care by the caretaker or provision of house/hospital. The study specified five aspects:

1. Care, the need of care service consisting of (1) need for daily life and hygiene care (Chatterjee, Chandra Nayak, Mahakud, & Chopra Chatterjee, 2018; and Watson, 2008) (2) need for medical equipment rental service (Watson, 2008) (3) need for ambulance service and caretaking on the way to the hospital (Grünloh, Myreteg, Cajander, & Rexhepi, 2018) (4) 24/7 CCTV services provided by the elderly care organization for immediate assistance and (5) use of technology by the elderly care organization to facilitate care, for example immediate notification in case of fall, accident, etc. (Park, et al., 2017).

2. Nursing or treatment, which consists of (1) acute treatment (Grünloh, et al, 2018; and Park, et al., 2017) (2) chronic treatment, (3) terminal treatment, (4) nutrition therapy (Watson, 2008) and (5) alternative service such as acupuncture (Muangyai, Chanthuma, Prombut, & Yingyuen, 2018).

3. Rehabilitation Services: needs in this aspect cover (1) physical therapy, (2) rehabilitation service (Kappen, Mirza-Babaei, & Nacke, 2019) (3) recreational service (Watson, 2008) (4) Anti-aging service (5), Thai massage service, (6) correct and appropriate exercise guidance (Intarit, et al, 2020)

4. Psychological services: covering needs of psychological services (Nguyet Van, et al., 2019; and Pannarunothai, 2021) such as (1) religious services (Watson, 2008) (2) musical therapy (Boonrod, 2019) (3) robotic therapy, and (4) mental health and social consulting (Wuttinant, 2020)

5. Social services: covering social needs such as (1) social activities (Watson, 2008) (2) vacation and (3) funeral process (Peeraphan & Phasunon, 2020; Department of Elderly Affairs, 2021; and Kemp, et al, 2019).

### **Opportunities for Health service for the elderly**

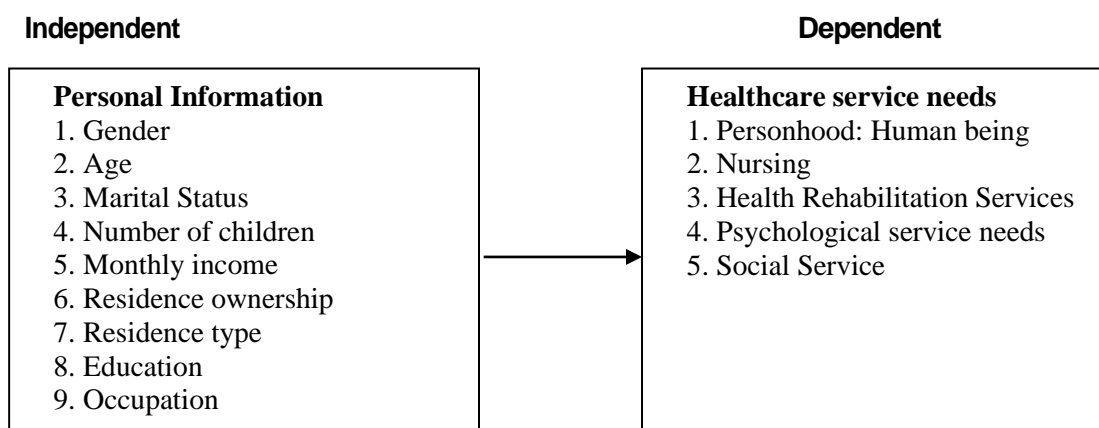
Increasing pressure on the healthcare industry, along with supply/demand imbalance and increasing number of the elderly, despite limited supply and increasing demand, could be a business opportunity (Moudud-UI-Huq, et al, 2021), The elderly healthcare center became a service business that could meet the needs, thus it has received much interest and is on rapid expansion. This opportunity is considered to be related with the elderly, while could be done continuously even before one becomes the elderly themselves. Services related with self-care, recreation, self-development, service presentation in the context of retirement can be presented depending on the type of business (Eismann, et al., 2019). Chatterjee, et al (2018) found that health expense was an issue, as despite availability of basic care from the government, well-off senior citizens tended to select the better services. Health service could be deemed a service business that must be conscious of service quality, satisfaction, trust and expectation of future service. These factors could use as a guideline for business development, and result of this study could be used in decision making for elderly health service entrepreneurs (Saengthasirivilai & Skulitsariyaporn, 2017).

### **Personal Information and healthcare service for the elderly**

Personal factors used in this study to understand the elderly and current elderly healthcare services Chatterjee, et al., (2018); Saengthasirivilai & Skulitsariyaporn (2017); and Putri & Ilyas, 2019; and Hornby-Turner, Peel, & Hubbard (2017); found that differences in personal factors such as Gender, Age Marital Status, Number of children, Monthly income, Education, and Occupation, would result in different healthcare service needs, concurring with Kemp, et al. (2019) which found that Residence ownership and Residence type had effect on healthcare service needs of the elderly. Thus, a hypothesis could be made:

***H<sub>0</sub>: Different personal factors do not lead to differences in healthcare service needs of the elderly.***

From the literature review, personal factors or information affect the needs and selection of healthcare service, resulting in the concept and quantitative research as follows.



**Figure 1** Research framework.

**Research method**

**Population and sample:**

The population used in this study was 408,239 people aged over 40 years old but younger than 60 (National Statistical Office, 2019), in agreement with the 2nd National Plan on the Elderly 2002-2021. The sample size, for finite population with .05 error using Yamane’s formula, was 410 (Yamane, 1973). The sample group was selected by simple random sampling.

**Research tools:**

The questionnaire consisted of two parts (1) Personal information which had nine multiple-choice questions asking for gender, age, marital status, number of children, monthly income, residence ownership, residence type, education and occupation, and (2) Healthcare service needs after becoming senior citizens which had 23 questions covering the five aspects: 1) Care (five questions) 2) Treatment (five question), 3. Health Rehabilitation Services (six questions), 4. Psychological service needs (four questions), 5. Social Service (three questions).

**Data collection & analysis:**

Primary data was obtained by requesting assistance from the local authorities in data collection from the sample group. Secondary data was obtained from relevant concepts, theories, research works and provincial registration. The data was later used to build a tool to examine the research concept and collect data.

**Data analysis:**

Data analysis was done on the computer program SPSS Ver 23.0 (Licence). Following statistical methods were used in data analysis: 1) the questionnaire’s reliability was tested by Cronbach’s Alpha Coefficient (Cronbach, 1990) (2) descriptive statistics such as frequency, mean, percentage, and standard deviation, (3) Inferential statistics such as T-Test and MANOVA were used for hypothesis test. (Hair et al., 2014) MANOVA was found useful when relationship between at least one independent and dependent factor co-existed with factors in the senior citizens’ healthcare service (Pambid, Vicente & Noroña, 2021).

**Research result:****Personal information:**

Study on the sample group of 410 people aged 40 years and over but younger than 60 in Songkhla Province showed that most were female (53.7%), aged between 55 and 60 years old (33.70%), married (61.20%) having 1-2 children (51.20%) having monthly income between 15,001 and 30,000 baht (35.40%), were residence owners (63.20%), living in detached house (48.50%), having at least a bachelor's degree (46.80%) and were employed in private companies (23.70%).

**Healthcare service needs:**

Healthcare service needs of people aged 40 years and over but younger than 60 in Songkhla Province regarding Care, Treatment, Health Rehabilitation Services, Psychological service needs and Social Service as Table 1.

Table 1 summarizes the mean, standard deviation and the level of opinions on the need for health services of people aged 40 years and over but less than 60 years old in Songkhla Province

Healthcare service needs	Rating		Rating	Rank
	Mean	SD		
<b>Care</b>				
1.1 Everyday life and hygiene service	3.52	1.20	High	4
1.2 Medical equipment rental service	3.37	1.21	Moderate	5
1.3 Ambulance service and caretaking service during hospital visits	3.61	1.14	High	3
1.4 24/7 caretaking.	3.66	1.10	High	2
1.5 Use of technology in caretaking.	3.92	1.04	High	1
<b>Total Care</b>	<b>3.62</b>	<b>1.01</b>	<b>High</b>	<b>4</b>
<b>Treatment</b>				
2.1 Acute treatment	3.88	1.05	High	1
2.2 Chronic treatment	3.72	1.11	High	3
2.3 Terminal treatment	3.71	1.17	High	4
2.4 Nutrition therapy	3.82	1.07	High	2
2.5 Alternative treatment such as acupuncture	3.66	1.09	High	5
<b>Total Treatment</b>	<b>3.76</b>	<b>.98</b>	<b>High</b>	<b>2</b>
<b>Health Rehabilitation Services</b>				
3.1 Physical therapy services	3.87	1.06	High	3
3.2 Recreational services	3.83	1.03	High	4
3.3 Rehabilitation services	3.81	1.08	High	5
3.4 Anti-aging services	3.80	1.08	High	6
3.5 Thai massage services	4.02	.97	High	2
3.6 Exercise consulting service	4.07	.98	High	1
<b>Total Health Rehabilitation Services</b>	<b>3.90</b>	<b>.91</b>	<b>High</b>	<b>1</b>
<b>Psychological service needs</b>				
4.1 Religious services	3.76	1.00	High	1
4.2 Musical therapy	3.75	1.00	High	2
4.3 Robotic therapy	3.22	1.17	Moderate	4
4.4 Mental health counselling	3.51	1.1	High	3

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Total psychological services	<b>3.56</b>	<b>.91</b>	<b>High</b>	<b>5</b>
Social Service				
5.1 Social activities	3.67	1.01	High	2
5.2 Vacation	3.81	.96	High	1
5.3 Funeral services	3.53	1.21	High	3
Total social service	<b>3.67</b>	<b>.88</b>	<b>High</b>	<b>3</b>

According to Table 1. The sample group rated the Health Rehabilitation Services the highest, followed by treatment, social service, care and psychological service respectively. 1) Rehabilitation services overall had high rating (mean = 3.90), with the highest-rated sub-factors being (1) Exercise consulting service, (2) Thai massage services, (3) Physical therapy, (4) recreational services, (5) rehabilitation services, and (6) anti-aging services). 2) treatment had overall had high rating (mean = 3.76), with the highest-rated sub-factors being (1) acute treatment, (2) nutritional therapy, (3) chronic treatment, (4) terminal treatment, (5) alternative treatment such as acupuncture. 3) Social service had overall had high rating (mean = 3.67), with the highest-rated sub-factors being (1) vacation, (2) musical therapy, (3) funeral service. 4) care had overall had high rating (mean = 3.62), with the highest-rated sub-factors being (1) Use of technology in caretaking, (2) 24/7 caretaking, (3) Ambulance service and caretaking service during hospital visits, (4) Everyday life and hygiene service and (5) Medical equipment rental service. 5) Psychological services overall had high rating (mean = 3.56), with the highest-rated sub-factors being (1) religious service, (2) musical therapy, (3) Mental health counselling, (4) Robotic therapy.

### Hypothesis test:

Different personal factors do not lead to differences in healthcare service needs of people aged 40 years and over but younger than 60 in Songkhla Province after becoming senior citizens. Result of sub-hypotheses test is shown below:

**H1: Different gender do not lead to differences in healthcare service needs after becoming senior citizens.**

Table 2 MANOVA test of Sex.

Box's Test of Equality of Covariance Matrices		Levene's Test of Equality of Error Variances				
Box's M	19.666	F	df1	df2	Sig.	
F	1.294	Care	3.789	1	408	.052
df1	15	Treatment	1.430	1	408	.232
df2	640328.096	Rehabilitation	.892	1	408	.345
Sig.	.196	Psychological service	4.762	1	408	.030
		Social service	3.500	1	408	.062
Multivariable Test: Sex		Hypothesis				
	Value	F	df	Error df	Sig.	
Pillai's Trace	.011	.893	5.000	404.000	.485	
Wilks' Lambda	.989	.893	5.000	404.000	.485	
Hotelling's Trace	.011	.893	5.000	404.000	.485	
Roy's Largest Root	.011	.893	5.000	404.000	.485	

Note \*p-value < .05, \*\*p-value < .01

The preliminary MANOVA test revealed that the homogeneity of covariance using Box's M test (Box's M = 19.666, F = 1.294, p < .196) showing the covariance matrix did not have any statistically significant difference (Wilks' Lambda = .989, F = .893, P = .485). On the other hand, Levene's Test of Equality of Error Variances did not find any significant error variance of the dependent variable in care, treatment, rehabilitation, and social, but error variance was found in psychological service. The multivariable test did not find any statistical significance with Sig = .485 in all tests (Wanichbancha, 2019). Thus, the MANOVA could be used (but extra care needed for psychological service factor). Still the MANOVA Multivariable Test could not conclude statistical significance of gender. (Pillai's Trace, Wilks' Lambda, Hotelling's Trace, & Roy's Largest Root Sig = .485) (H1: Rejected Ho) Thus it could not be concluded that difference gender would lead to different healthcare needs.

**H2: Difference in age does not result in different healthcare needs.**

Table 3 MANOVA test of Age.

Box's Test of Equality of Covariance Matrices		Levene's Test of Equality of Error Variances				
Box's M	69.790		F	df1	df2	Sig.
F	1.515	Care	1.926	3	406	.125
df1	45	Treatment	4.450	3	406	.004
df2	320933.225	Rehabilitation	2.762	3	406	.042
Sig.	.014	Psychological service	.709	3	406	.547
		Social service	.675	3	406	.568

Note \*p-value < .05, \*\*p-value < .01

Table 4 Multivariate Tests for Health Perception and Mental Health by Intensity levels of Leisure walking

Intercept	Value	F	Hypothesis	df	Error df	Sig.	Multivariate η <sup>2</sup>
Pillai's Trace	.955	1689.363	5.000		402.000	.000	.955
Wilks' Lambda	.045	1689.363	5.000		402.000	.000	.955
Hotelling's Trace	21.012	1689.363	5.000		402.000	.000	.955
Roy's Largest Root	21.012	1689.363	5.000		402.000	.000	.955
Age	Value	F	Hypothesis	df	Error df	Sig.	Multivariate η <sup>2</sup>
Pillai's Trace	.101	2.816	15.000		1212.000	.000	.034
Wilks' Lambda	.901	2.844	15.000		1110.146	.000	.034
Hotelling's Trace	.107	2.867	15.000		1202.000	.000	.035
Roy's Largest Root	.077	6.210	5.000		404.000	.000	.071

Note \*p-value < .05, \*\*p-value < .01

The MANOVA test revealed the homogeneity of covariance using Box's M test (Box's M = 69.790, F = 1.515, p < .014) that had statistical significance in order to use Pillai's Trace in place of Wilks' Lambda due to stronger statistics (Tabachnick & Fidell, 2001; Kim, et al., 2016; and Areum, Junhyoung, & Jaehyun, 2021) Pillai Trace = .101, F = 2.816, p = .000, multivariate η<sup>2</sup> = .035 while Levene's Test of Equality of Error Variances found error variance of some dependent variables (treatment and rehabilitation) but not

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psychological service, care and social service. Thus, the MANOVA test showed significant difference of healthcare needs if age was different (H2: Accepted Ho). Result of Dunnett T3 Post-hoc Test of care, treatment, rehabilitation, psychological service and social service is shown Table 5.

Table 5 Result of univariate test of age and healthcare service comparison.

Dependent Value	Sum of Squares	df	Mean Square	F	p	Partial Eta Squar	Observed Power	Dunnett T3
1. Care	20.137	3	6.712	6.736	.000**	.047	.975	4>1,2,3
2. Treatment	17.459	3	5.820	6.208	.000**	.044	.963	4,1>2,3
3. Rehabilitation	9.236	3	3.079	3.739	.011	.027	.808	4>3
4. Psychological service	9.594	3	3.198	3.879	.009	.028	.824	.
5. Social Service	9.000	3	3.000	3.891	.009	.028	.825	4>3

Note: \*p-value < .05, \*\*p-value < .01

1 = Aged 40-45 years, 2= Aged >45-50 years, 3= >50-55 years, and 4= >55-60years

The Dunnett T3 Post-hoc test result table showed that healthcare needs after becoming senior citizens are different if age are different with statistical significance, showing that healthcare needs of people aged between 55 and 60 years had more needs related with care. On the other hand, treatment was needed the most by people aged between 55 and 60 years and 40 and 45 years (F = 6.208, P = .000). Rehabilitation (F = 3.739, P = .011) and social services (F = 3.000, P = .009) were needed the most by those aged between 55 and 60, compared to those aged between 50 and 55 years. Psychological service (F = 3.198, P = .009) has differences in needs but could not be clearly identified between the age groups.

### **H3: Different status does not lead to differences in healthcare needs.**

Table 6 MANOVA test of Status.

Box's Test of Equality of Covariance Matrices						
Box's M	66.508		F	df1	df2	Sig.
F	2.160	Care	.334	2	407	.716
df1	30	Treatment	.622	2	407	.538
df2	111942.432	Rehabilitation	1.425	2	407	.242
Sig.	.000	Psychological service	2.386	2	407	.093
		Social service	3.032	2	407	.049

Note: \*p-value < .05, \*\*p-value < .01

Table 7 Multivariate Tests for Status and healthcare service needs after becoming senior citizens

Intercept	Value	F	Hypothesis df	Error df	Sig.	Multivariate $\eta^2$
Pillai's Trace	.938	1209.476	5.000	403.000	.000	.938
Wilks' Lambda	.062	1209.476	5.000	403.000	.000	.938
Hotelling's Trace	15.006	1209.476	5.000	403.000	.000	.938
Roy's Largest Root	15.006	1209.476	5.000	403.000	.000	.938
Status	Value	F	Hypothesis df	Error df	Sig.	Multivariate $\eta^2$



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Pillai's Trace	.027	1.092	10.000	808.000	.365	.013
Wilks' Lambda	.973	1.092	10.000	806.000	.365	.013
Hotelling's Trace	.027	1.092	10.000	804.000	.365	.013
Roy's Largest Root	.022	1.741	5.000	404.000	.124	.021

Note: \*p-value < .05, \*\*p-value < .01

The MANOVA test showed that the homogeneity of covariance using Box's M test (Box's M = 66.508, F = 2.160, p < .000) that had statistical significance in order to use Pillai's Trace in place of Wilks' Lambda due to stronger statistics (Pillai Trace = .027, F = 1.092, p = .365, multivariate  $\eta^2 = .013$ ). The Levene's Test of Equality of Error Variances found significant error variance of a dependent factor (social service) but not care, treatment, rehabilitation, and psychological. The MANOVA Test showed that different marital status could not be conclusively proven to affect healthcare service needs after becoming senior citizens (H3: *Rejected Ho*)

**H4: Amount of Child: Number of children did not affect healthcare service needs after becoming senior citizens.**

Table 8 MANOVA test of Amount of Child.

Box's Test of Equality of Levene's Test of Equality of Error Variances Covariance Matrices						
Box's M	48.182		F	df1	df2	Sig.
F	1.571	Care	.045	2	407	.956
df1	30	Treatment	.661	2	407	.517
df2	171553.901	Rehabilitation	1.263	2	407	.284
Sig.	.024	Psychological service	2.106	2	407	.123
		Social service	1.310	2	407	.271

Note: \*p-value < .05, \*\*p-value < .01

Table 9 Multivariate Tests for Amount of Child and Healthcare service needs after becoming senior citizens

Intercept	Value	F	Hypothesis df	Error df	Sig.	Multivariate $\eta^2$
Pillai's Trace	.944	1369.204	5.000	403.000	.000	.944
Wilks' Lambda	.056	1369.204	5.000	403.000	.000	.944
Hotelling's Trace	16.988	1369.204	5.000	403.000	.000	.944
Roy's Largest Root	16.988	1369.204	5.000	403.000	.000	.944
Amount of Child	Value	F	Hypothesis df	Error df	Sig.	Multivariate $\eta^2$
Pillai's Trace	.020	.831	10.000	808.000	.598	.010
Wilks' Lambda	.980	.831	10.000	806.000	.598	.010
Hotelling's Trace	.021	.831	10.000	804.000	.599	.010
Roy's Largest Root	.017	1.397	5.000	404.000	.224	.017

Note: \*p-value < .05, \*\*p-value < .01

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Despite the statistical significance of the homogeneity of covariance using Box's M test (Box's M = 48.182, F = 1.571, p < .024), the Levene's Test of Equality of Error Variances did not find any error variance of all dependent. The MANOVA test could use Pillai's Trace = .027, F = 1.092, p = .365, multivariate  $\eta^2 = .010$ . MANOVA Test showed that different number of children could not be conclusively proven to affect healthcare service needs after becoming senior citizens (H4: Rejected Ho)

### **H5: Different income bracket of senior citizens does not affect Healthcare service needs after becoming senior citizens**

Table 10 MANOVA test of Income.

Box's Test of Equality of Levene's Test of Equality of Error Variances Covariance Matrices						
Box's M	97.167		F	df1	df2	Sig.
F	1.554	Care	4.801	4	405	.001
df1	60	Treatment	6.339	4	405	.000
df2	57213.743	Rehabilitation	3.630	4	405	.006
Sig.	.004	Psychological service	4.710	4	405	.001
		Social service	4.201	4	405	.002

Note: \*p-value < .05, \*\*p-value < .01

The homogeneity of covariance using Box's M test (Box's M = 97.167, F = 1.554, p < .004) that has statistical significance. The Levene's Test of Equality of Error Variances found error variance of all dependent factors. The MANOVA test could use Pillai's Trace and result of which was shown below.

Table 11 Multivariate Tests for Income and Healthcare service needs after becoming senior citizens

Intercept	Value	F	Hypothesis df	Error df	Sig.	Multivariate $\eta^2$
Pillai's Trace	.934	1141.981	5.000	401.000	.000	.934
Wilks' Lambda	.066	1141.981	5.000	401.000	.000	.934
Hotelling's Trace	14.239	1141.981	5.000	401.000	.000	.934
Roy's Largest Root	14.239	1141.981	5.000	401.000	.000	.934
Income	Value	F	Hypothesis df	Error df	Sig.	Multivariate $\eta^2$
Pillai's Trace	.143	3.002	20.000	1616.000	.000	.036
Wilks' Lambda	.862	3.048	20.000	1330.916	.000	.036
Hotelling's Trace	.154	3.078	20.000	1598.000	.000	.037
Roy's Largest Root	.099	7.983c	5.000	404.000	.000	.090

Note: \*p-value < .05, \*\*p-value < .01

The Pillai's Trace = .143, F = 3.002, p = .000, multivariate  $\eta^2 = .036$  was used and The MANOVA test showed that different income bracket would lead to different healthcare service needs after becoming senior citizens. s (H5: Accepted Ho). The Homogeneous Subsets Test of income bracket and care, treatment, rehabilitation, psychological and social services was shown in the following tables.

Table 12 Univariate test of income bracket and healthcare service comparison

Dependent Value	Sum of	df	Mean	F	p	Partial	Observed	Homogeneous
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	Squares		Square		Eta Square	Power	Subsets	
1. Care	29.740	4	7.435	7.623	.000	.070	.997	1,4,5 & 4,5,2,3
2. Treatment	23.073	4	6.419	6.982	.000	.065	.995	4,1,5,2 & 1,5,2,3
3. Rehabilitation	23.948	4	5.987	7.588	.000	.070	.997	1,5,4 & 4,2,3
4. Psychological service	19.645	4	4.911	6.126	.000	.057	.987	1,5 & 5,4,3 & 4,3,2
5. Social Service	11.523	4	2.832	3.692	.006	.035	.882	1,5,4,3 & 5,4,3,2

Note: \*p-value < .05, \*\*p-value < .01

1 = < 15,000 THB, 2 = 15,000 – 30,000, 3 = 30,001 – 50,000, 4 = 50,001 – 100,000 and 5 = > 100,001

The MANOVA Test revealed that different income bracket could lead to difference in healthcare service needs after becoming senior citizens with statistical significance. The Homogeneous Subsets Test could group care-related needs ( $F = 7.623$ ,  $p = .000$ ) into two groups (1,4,5 & 4,5,2,3), also treatment ( $F = 6.982$ ,  $p = .000$ ) into two groups (4,1,5,2 & 1,5,2,3), rehabilitation ( $F = 7.588$ ,  $p = .000$ ) into two groups (1,5,4 & 4,2,3), psychological service ( $F = 6.126$ ,  $p = .000$ ) into three groups (1,5 & 5,4,3 & 4,3,2) and social service ( $F = 3.692$ ,  $p = .000$ ) into two groups (1,5,4,3 & 5,4,3,2).

**H6: House Holding: Different residence ownership does not affect healthcare service needs after becoming senior citizens.**

Table 13 MANOVA test of House Holding.

Box's Test of Equality of Levene's Test of Equality of Error Variances						
Covariance Matrices						
Box's M	125.968		F	df1	df2	Sig.
F	4.092	Care	2.112	2	407	.122
df1	30	Treatment	5.413	2	407	.005
df2	138475.516	Rehabilitation	1.529	2	407	.218
Sig.	.000	Psychological service	5.087	2	407	.007
		Social service	1.577	2	407	.208

Note: \*p-value < .05, \*\*p-value < .01

The homogeneity of covariance test was done using Box's M test (Box's M = 125.968,  $F = 4.092$ ,  $p < .000$ ) that had statistical significance. The Levene's Test of Equality of Error Variances found error variance in dependent variables such as treatment and psychological service. The MANOVA test could Pillai's Trace as shown in the following tables.

Table 14 Multivariate Tests for House Holding and Healthcare service needs after becoming senior citizens

Intercept	Value	F	Hypothesis df	Error df	Sig.	Multivariate $\eta^2$
Pillai's Trace	.941	1276.693	5.000	403.000	.000	.941
Wilks' Lambda	.059	1276.693	5.000	403.000	.000	.941
Hotelling's Trace	15.840	1276.693	5.000	403.000	.000	.941
Roy's Largest Root	15.840	1276.693	5.000	403.000	.000	.941

**Compare Between Personal Factors & Healthcare Service Needs after Becoming Senior Citizens**

House Holding	Value	F	Hypothesis df	Error df	Sig.	Multivariate $\eta^2$
Pillai's Trace	.057	2.370	10.000	808.000	.009	.028
Wilks' Lambda	.944	2.373b	10.000	806.000	.009	.029
Hotelling's Trace	.059	2.376	10.000	804.000	.009	.029
Roy's Largest Root	.045	3.614c	5.000	404.000	.003	.043

Note: \*p-value < .05, \*\*p-value < .01

According to the table above, Pillai's Trace = .057, F = 2.370, p = .009, multivariate  $\eta^2$  = .028. The MANOVA Test showed that different type of residence ownership led to different Healthcare service needs after becoming senior citizens (H6: Accepted  $H_0$ ). Result of the Homogeneous Subsets Test of residence ownership and care, treatment, rehabilitation, psychological service and social service is shown below.

Table 15 Univariate test of residence ownership and healthcare service needs

Dependent Value	Sum of Squares	df	Mean Square	F	p	Partial Eta Squared	Observed Power	Homogeneous Subsets
1. Care	16.182	2	8.091	8.060	.000	.038	.957	1,2 & 2,3
2. Treatment	11.978	2	5.989	6.314	.002	.030	.897	-
3. Rehabilitation	4.152	2	2.076	2.490	.084	.012	.499	-
4. Psychological service	1.694	2	.847	1.006	.367	.005	.225	-
5. Social Service	6.162	2	3.081	3.971	.020	.019	.711	-

Note: \*p-value < .05, \*\*p-value < .01

1 = Own residence, 2 = Tenant and 3 = Living with relatives

The MANOVA Test showed that different type of residence ownership led to different Healthcare service needs after becoming senior citizens with statistical significance. The Homogeneous Subsets Test could group needs related with care (F = 8.060, p = .000) into two groups (1,2 & 2,3), along with treatment (F = 5.989, p = .002) and social service (F = 3.971, p = .020) that had statistical significance. There was inadequate information to conclude whether rehabilitation and psychological needs would affect Healthcare service needs after becoming senior citizens.

**H7: Different residence type does not affect Healthcare service needs after becoming senior citizens**

Table 16 MANOVA test of Residence type.

Box's Test of Equality of Levene's Test of Equality of Error Variances						
Covariance Matrices						
Box's M	160.798		F	df1	df2	Sig.
F	3.411	Care	8.909	3	406	.000
df1	45	Treatment	10.264	3	406	.000
df2	32487.192	Rehabilitation	5.341	3	406	.001
Sig.	.000	Psychological service	4.151	3	406	.006
		Social service	1.797	3	406	.147

Note: \*p-value < .05, \*\*p-value < .01

Testing of difference in residence type was done using the homogeneity of covariance using Box's M test (Box's M = 160.798,  $F = 3.4112$ ,  $p < .000$ ) that had statistical significance. The Levene's Test of Equality of Error Variances found significant error variance of dependent variables such as care, treatment, rehabilitation and psychological service, while no significance was found in social service. The MANOVA test used Pillai's Trace and result is shown below.

Table 17 Multivariate Tests for Residence type and Healthcare service needs after becoming senior citizens

Intercept	Value	F	Hypothesis df	Error df	Sig.	Multivariate $\eta^2$
Pillai's Trace	.917	887.662	5.000	402.000	.000	.917
Wilks' Lambda	.083	887.662	5.000	402.000	.000	.917
Hotelling's Trace	11.041	887.662	5.000	402.000	.000	.917
Roy's Largest Root	11.041	887.662	5.000	402.000	.000	.917
Residence type	Value	F	Hypothesis df	Error df	Sig.	Multivariate $\eta^2$
Pillai's Trace	.103	2.878	15.000	1212.000	.000	.034
Wilks' Lambda	.899	2.913	15.000	1110.146	.000	.035
Hotelling's Trace	.110	2.943	15.000	1202.000	.000	.035
Roy's Largest Root	.085	6.833c	5.000	404.000	.000	.078

Note: \*p-value < .05, \*\*p-value < .01

According to the table above, Pillai's Trace = .103,  $F = 2.878$ ,  $p = .000$ , multivariate  $\eta^2 = .034$ . The MANOVA Test showed that different residence type led to different Healthcare service needs after becoming senior citizens ( $H_7$ : Accepted  $H_0$ ). The Homogeneous Subsets Test in testing of residence type and care, treatment, rehabilitation, psychological service and social service is shown below.

Table 18 Univariate test of residence type and healthcare service needs

Dependent Value	Sum of Squares	df	Mean Square	F	p	Partial Eta Squared	Observed Power	Homogeneous Subsets
1. Care	32.057	3	10.686	11.048	.000	.075	.999	4,1 & 1,3,2
2. Treatment	21.608	3	7.203	7.769	.000	.054	.989	4,1 & 1,3,2
3. Rehabilitation	12.523	3	4.174	5.120	.002	.036	.921	4,1,3 & 1,3,2
4. Psychological service	8.756	3	2.919	3.531	.015	.025	.783	4,1 & 1,2,3
5. Social Service	10.317	3	3.439	4.480	.004	.032	.879	4,1 & 1,3,2

Note: \*p-value < .05, \*\*p-value < .01

1 = Detached house, 2 = Townhouse, 3 = Flat/condominium and 4 = Rented room

The MANOVA Test showed that different type of residence led to different Healthcare service needs after becoming senior citizens with statistical significance. The Homogeneous Subsets Test could group needs related with care ( $F = 11.048$ ,  $p = .000$ ), treatment ( $F = 7.769$ ,  $p = .002$ ), psychological service ( $F = 3.531$ ,  $p = .015$ ) and social service ( $F = 4.480$ ,  $p = .004$ ), into two groups for each (4,1 & 1,3,2). Rehabilitation ( $F = 5.120$ ,  $p = .002$ ) could also be grouped in two. (4,1,3 & 1,3,2) with statistical significance. The groups had clear distinction, one for rented flat (4) and detached house (1), and detached house (1), townhouse (2) and flat/condominium (3).

**H8: Different education does not affect Healthcare service needs after becoming senior citizens**

Table 19 MANOVA test of Education.

<b>Box's Test of Equality of Levene's Test of Equality of Error Variances</b>						
<b>Covariance Matrices</b>						
Box's M	83.289		F	df1	df2	Sig.
F	1.798	Care	5.736	3	406	.001
df1	45	Treatment	2.583	3	406	.053
df2	133887.218	Rehabilitation	2.736	3	406	.043
Sig.	.001	Psychological service	4.165	3	406	.006
		Social service	3.297	3	406	.020

Note: \*p-value < .05, \*\*p-value < .01

According to the test of education with the homogeneity of covariance using Box's M test (Box's M = 83.289, F = 1.798, p < .001) that had statistical significance, the Levene's Test of Equality of Error Variances found significant error variance of dependent variables such as care, rehabilitation, psychological service and social service, while significant error variance in treatment was not found. The MANOVA test could use Pillai's Trace as shown below.

Table 20 Multivariate Tests for Education and Healthcare service needs after becoming senior citizens

Intercept	Value	F	Hypothesis	df	Error df	Sig.	Multivariate $\eta^2$
Pillai's Trace	.943	1331.54	5.000	402.000	402.000	.000	.943
Wilks' Lambda	.057	1331.549	5.000	402.000	402.000	.000	.943
Hotelling's Trace	16.562	1331.549	5.000	402.000	402.000	.000	.943
Roy's Largest Root	16.562	1331.549	5.000	402.000	402.000	.000	.943
House Holding	Value	F	Hypothesis	df	Error df	Sig.	Multivariate $\eta^2$
Pillai's Trace	.033	.897	15.000	1212.000	1212.000	.568	.011
Wilks' Lambda	.967	.895	15.000	1110.146	1110.146	.569	.011
Hotelling's Trace	.033	.894	15.000	1202.000	1202.000	.571	.011
Roy's Largest Root	.021	1.682c	5.000	404.000	404.000	.138	.020

Note: \*p-value < .05, \*\*p-value < .01

According to the table, Pillai's Trace = .033, F = .897, p = .568, multivariate  $\eta^2$  = .011. The MANOVA test showed that different education level of the senior citizens could not be conclusively proven to affect Healthcare service needs after becoming senior citizens (H8: Rejected  $H_0$ ).

**H9: Different current occupation does not affect Healthcare service needs after becoming senior citizens.**

Table 21 MANOVA test of Occupation.

<b>Box's Test of Equality of Levene's Test of Equality of Error Variances</b>						
<b>Covariance Matrices</b>						
Box's M	252.440		F	df1	df2	Sig.
F	2.281	Care	3.522	7	402	.001

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df1	105	Treatment	2.502	7	402	.016
df2	72602.711	Rehabilitation	.925	7	402	.487
Sig.	.000	Psychological service	1.399	7	402	.204
		Social service	1.248	7	402	.275

Note: \*p-value < .05, \*\*p-value < .01

According to the occupation test with the homogeneity of covariance using Box's M test (Box's M = 252.440, F = 2.281, p < .000) that had statistical significance, the Levene's Test of Equality of Error Variances found significant error variance of dependent variables such as care and treatment, while the test did not find any significant variance in rehabilitation, psychological service and social service. The MANOVA test used Pillai's Trace and result of which is shown below.

Table 22 Multivariate Tests for Occupation and Healthcare service needs after becoming senior citizens

Intercept	Value	F	Hypothesis	dfError	df	Sig.	Multivariate $\eta^2$
Pillai's Trace	.944	1353.740	5.000	398.000		.000	.944
Wilks' Lambda	.056	1353.740	5.000	398.000		.000	.944
Hotelling's Trace	17.007	1353.740	5.000	398.000		.000	.944
Roy's Largest Root	17.007	1353.740	5.000	398.000		.000	.944
House Holding	Value	F	Hypothesis	dfError	df	Sig.	Multivariate $\eta^2$
Pillai's Trace	.123	1.445	35.000	2010.000		.045	.025
Wilks' Lambda	.882	1.451	35.000	1676.665		.043	.025
Hotelling's Trace	.128	1.455	35.000	1982.000		.042	.025
Roy's Largest Root	.063	3.590c	7.000	402.000		.001	.059

Note: \*p-value < .05, \*\*p-value < .01

According to the table above, Pillai's Trace = .123, F = 1.445, p = .045, multivariate  $\eta^2$  = .025. The MANOVA test analysis showed that different occupation would lead to different Healthcare service needs after becoming senior citizens (H9: Accepted  $H_0$ ). The Homogeneous Subsets Test of occupation and care, rehabilitation, treatment, psychological service and social service is shown below.

Table 23 Univariate test of occupation and healthcare service needs.

Dependent Value	Sum of Squares	df	Mean Square	F	p	Partial Eta Squared	Observed Power	Homogeneous Subsets
1. Care	22.340	7	3.191	3.188	.003	.053	.951	-
2. Treatment	15.637	7	2.234	2.348	.023	.039	.853	-
3. Rehabilitation	8.443	7	1.206	1.447	.185	.025	.612	-
4. Psychological service	9.315	7	1.331	1.597	.135	.027	.664	-
5. Social Service	9.018	7	1.288	1.655	.119	.028	.682	-

Note: \*p-value < .05, \*\*p-value < .01

1 = Civil servant, 2 = State enterprise employee/contractor, 3 = Private employee/contractor, 4 = farmer, 5 = business, 6 = general worker, 7 = Retired civil servant, and 8 = others.

## Compare Between Personal Factors & Healthcare Service Needs after Becoming Senior Citizens

The MANOVA Test showed that different occupation would conclusively lead to different Healthcare service needs after becoming senior citizens with statistical significance. Care ( $F = 3.188, p = .003$ ) and treatment ( $F = 2.348, p = .023$ ) needs could be clearly grouped per the Homogeneous Subsets Test with statistical significance. On the other hand, there was no conclusive information on rehabilitation, psychological service and social service.

### Hypothesis test summary:

Result of effect of different personal factors of senior citizens Healthcare service needs after becoming senior citizens can be concluded and shown below.

Table 24 Summary of MANOVA Test of personal factors and Healthcare service needs after becoming senior citizens

Independent Variable	Hypothesis	Judgement	Remark
Sex	Wilks' Lambda = .989, $F = .893, P = .485$	H1: Rejected Ho	Sex not significant difference Healthcare service needs.
Age	Pillai Trace = .101, $F = 2.816, p = .000$	H2: Accepted Ho	Age range significant difference Healthcare service needs.
Status	Pillai Trace = .027, $F = 1.092, p = .365$	H3: Rejected Ho	Status not significant difference Healthcare service needs.
Amount of child	Pillai's Trace = .027, $F = 1.092, p = .365$	H4: Rejected Ho	Amount of child not significant difference Healthcare service needs.
Income	Pillai's Trace = .143, $F = 3.002, p = .000$	H5: Accepted Ho	Income range significant difference Healthcare service needs.
House Holding	Pillai's Trace = .057, $F = 2.370, p = .009$	H6: Accepted Ho	House Holding significant difference Healthcare service needs.
Residence type	Pillai's Trace = .103, $F = 2.878, p = .000$	H7: Accepted Ho	Residence type significant difference Healthcare service needs.
Education	Pillai's Trace = .033, $F = .897, p = .568$	H8: Rejected Ho	Education not significant difference Healthcare service needs.
Occupation	Pillai's Trace = .123, $F = 1.445, p = .045$	H7: Accepted Ho	Current occupation significant difference Healthcare service needs.

From the MANOVA test, it could be concluded that differences in personal factors did not result in different healthcare service needs with statistical significance. Different personal factors such as Age, Income, House Holding, Residence type, and Occupation did affect healthcare service needs, but factors like Sex, Status, Amount of child, Education could not be conclusively confirmed that they had effect on healthcare service needs after becoming senior citizens with statistical significance of .05.

Comparison of healthcare service management in five aspects: care, treatment, rehabilitation, psychological service and social service could be examined in detail as follows. 1) age had effect on healthcare service needs in terms of treatment, rehabilitation and care respectively, while there was inadequate information to conclude effect on needs of psychological and social services. 2) It was found that income had effect on healthcare service type in terms of rehabilitation, psychological service, social service and care. 3) Residence ownership affected healthcare service needs in terms of rehabilitation and care, but there was inadequate information to conclude healthcare service type or needs of treatment,



psychological service and social service. 4) Residence type affected healthcare service needs in terms of treatment, psychological service and social service with statistical significance, but inadequate information to conclude psychological service. 5) Occupation and healthcare service type was shown to affect healthcare service needs in terms of treatment, care and rehabilitation, but still inadequate information to conclude needs of healthcare service in terms of psychological and social services with statistical significance.

### **Conclusion and discussion**

1) The study could conclude that different personal factors led to different healthcare service needs after becoming senior citizens per the concept of Individualizing health care (Kemp, et al, 2019) (1) Rehabilitation (2) Treatment, (3) Social services, (4), care and (5) psychological services. It was discussed that those becoming senior citizens viewed themselves as getting old and sicker, in addition to having desire for a choice of better service (Chatterjee, et al, 2018). This led to the needs being focused on rehabilitation and treatment, in agreement with the study by Riyakhan, Wongchai & Chaitawittanun (2021). Some contradictions were found, as life quality of senior citizens depend on personal factors. Still, there were more emphasis on social and psychological aspects of the senior citizens than treatment or rehabilitation ((Nguyet Van, et al., 2019; and Pannarunothai, 2021) Due to differences in characteristics of the sample group that already became, or about to become senior citizens. This study proposed that for the establishments there should be service quality, satisfactory service, trustworthiness and consistency with expectation (of future healthcare service) of the senior citizens. The guideline for caretaking of the senior citizens, in terms of healthcare, should have humane treatment, treatment with dignity, attention, politeness and high-quality response to the senior citizens' needs by health specialists, along with diagnosis and medical service referrals.

2) Gender was not found to affect healthcare service needs after becoming senior citizens. This conflicted with the study by Putri & Ilyas (2019) which stated that women had over 1.1 times more healthcare needs than men due to more sensitivity to disease and pain.

3) Age was found to affect healthcare service needs in terms of treatment, rehabilitation and care respectively, while there was inadequate information to conclude age's effect on needs in terms of psychological and social services. This concurred with Jittapraneerat, Hatthirat, Boonkerd & Kanhasing (2020) which found that average healthcare service needs would vary with age. Marques Lubenow, & Oliveira Silva (2019) also found that the senior citizens had feelings toward health problems and also accessibility of medical services. In this case accessibility to medical services was still problematic, unequal and troublesome.

4) Income was found to affect healthcare service needs in terms of treatment, rehabilitation, psychological service, social service and care. This concurred with Chatterjee, et al (2018) which found that due to relationship with medical expense, income was a major factor in selection of healthcare service by the senior citizens, who tended to select services appropriate to their income. Affluent senior citizens would go for better services. Expectation could be made against all aspects, but rehabilitation and treatment were the main concerns due to physical aging and expectation of good treatment (Saengthasirivilai & Skulitsariyaporn, 2017). This resulted from the sample group having daily expenses and expenses from unpredictable external factors.

5) Residence ownership affected healthcare service needs in terms of rehabilitation and care but there was inadequate information to conclude treatment, psychological and social services. This concurred with Saengthasirivilai & Skulitsariyaporn (2017). Different forms of residence ownership, in the case of sample group which mostly rented, led to different healthcare service needs, in terms of rehabilitation and care. This was possibly due to consciousness about not having their own houses, thus healthcare service

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needs after becoming senior citizens would be based on having their own residences, or living with relatives. Pongprasert, & Kittinanyapanya (2021).

6) Residence type affected healthcare service needs with some weight in terms of treatment, rehabilitation, care and social services, but there was inadequate information to conclude psychological services. This concurred with Nguyet Van, et al. (2019), which found that healthcare service needs of people living in rural areas would be limited to basic services. Pongprasert, & Kittinanyapanya (2021) found that healthcare service needs were from familiarity with residence type, but they also did not want to bother the neighbors excessively. Chatterjee, et al (2018) found that having large and financially-stable family would lead to decision to take better healthcare services.

7) Current occupation was found to affect healthcare service needs in terms of treatment, rehabilitation and care, but there was inadequate information to conclude psychological and social services with statistical significance. The sample group members that worked as general workers or artisans had the highest average healthcare service needs after becoming senior citizens, possibly due to lack of work/life balance, lack of time for supplementary work or relax with the family, leading to higher healthcare service needs compared with peers with different occupations. This concurred with Chatterjee, et al (2018) which found that high education and income led to selection of better services. On the other hand, poorer people would choose services appropriate with their wealth.

8) Regarding life quality promotion guideline for the senior citizens, due to their expectations, needs and emphasis on rehabilitation and treatment, the cost would be high. Superior service inevitably came with the cost. On the other hand, preventive preparation with emphasis on maintaining a good health was a good measure. This concurred with Araujo de Carvalho, et al. (2017), which stressed healthcare for the senior citizens instead of treatment, with focus on interventions that could improve physical and mental health of the senior citizens.

9) Regarding senior healthcare service business guideline in Songkhla Province for people aged 40 and over but younger than 60. The research result can be concluded that the different personal characteristics in particularly the future purchasing power for health services such as Income, House Holding, Residentials Type, and current occupation that represents corresponds to the education of Chatterjee, et al (2018) that they would take different services depending on their power and wealth. Wealthier senior citizens would go for better services, while poorer senior citizens would go for public services to save cost. Senior healthcare service needs were also found to vary from region to region. Marques Lubenow, & Oliveira Silva (2019) found a guideline for senior caretaking in terms of healthcare service to present humane and high-quality care that could meet the senior citizens' needs. One thing the senior citizens expected from the healthcare service was ability to be their social representatives, caretakers capable in basic healthcare, accessibility to specialized care, care based on dignity, attention and politeness, and ability to provide diagnosis, or referral to specialists, and medication receiving, all this without complicating the process. This concurred with Pannarunothai (2021) that proposed healthcare service equality. Araujo de Carvalho, et al. (2017) stated that healthcare and social care must be integrated which would have similar expense to normal care, thus giving better return than the traditional care. Still, Kemp, et al. (2019) saw future changes and their impact on healthcare services and suggested that the services should adapt to the changing times.

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