



UNIVERSITI PUTRA MALAYSIA

***PREDICTORS OF FRAILTY SYNDROME AMONG COMMUNITY-
DWELLING
ELDERLY IN KUALA NERUS, TERENGGANU***

NUR HAFIZAH BINTI AB. AZIZ

FPSK(M) 2018 43



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By

NUR HAFIZAH BINTI AB. AZIZ

**Thesis Submitted to the School of Graduate Studies,
Universiti Putra Malaysia, in Fulfilment of the Requirements for the
Degree of Master of Science**

March 2017

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in
fulfilment of the requirement for the degree of Master of Science

PREDICTORS OF FRAILTY SYNDROME AMONG COMMUNITY-DWELLING ELDERLY IN KUALA NERUS, TERENGGANU

By

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March 2017

Chair : Siti Nur 'Asyura binti Adznam, PhD
Faculty : Medicine and Health Sciences

Poor health outcomes including frailty syndrome is common among the elderly as they aged. Characterized by decreasing physiological reserves, frailty syndrome is associated with increased risk of disability, morbidity and mortality. The aims of this study were to determine the prevalence of frailty syndrome and their associations with socio-demographic and socioeconomic status, psychosocial factors, functional factors and anthropometric indicators among community-dwelling elderly in Kuala Nerus. A cross-sectional study of 279 elderly respondents, with 90% of response-rate; consisted of 118 (42.3%) male and 161 (57.7%) female were randomly selected and interviewed. Data collection was conducted by using a set of questionnaire containing information about socio-demographic and socioeconomic status, psychosocial factors, functional assessments, anthropometric measurements and frailty syndrome assessments. Psychosocial factors was assessed by questionnaires adapted from validated SF-36 and questionnaires on social relationship and participation. Cognitive status was assessed by Elderly Cognitive Assessment Questionnaire (ECAQ). Functional status was assessed by Activity Daily Living (ADL) Instrumental Activity of Daily Living (IADL) and Elderly Mobility Scale (EMS) questionnaires. The anthropometric indicators measured were Body Mass Index (BMI), body parts circumferences, total body fat and Skeletal Muscle Index (SMI). Frailty syndrome was characterized by using validated Fried's (2001) phenotype. Majority (60.2%) of the respondents were classified as young-old elderly (60-74 years old), with mean age 73.3 ± 6.1 years old. Most respondents were living with others (82.4%), have no spouse (51.3%), had formal education (58.8%), unemployed (83.5%), had low income, which was below RM500 (43.7%), lived in a small household size (66.3%) and depended on others for financial dependency (78.5%). Majority of respondents participated frequently in leisure activities (79.6%), feast (66.3%) and religious activities; prayed together in mosque (57.7%), *tahlil* recitation (55.6%) and religious talk (58.1%). There was 88.2% respondents with no depression. About 18.6% of respondents had

cognitive impairment, dependent in mobility (5.0%), had difficulties to perform ADL (87.5%) and IADL (70.6%). Majority of the respondents (48.7%) have normal BMI and have low risk of muscle wasting. The prevalence of frailty syndrome was 18.3%.

In bivariate analysis, the factors associated with frailty syndrome were advanced age, unmarried, illiteracy, unemployed, lack of social relationship with siblings and relatives, lower participation in leisure activities, feast, *gotong-royong* and religious activities, cognitive impairment, mobility dependent, difficulties in performing ADL and IADL tasks, lower body mass index, middle-upper arm circumference, calf circumference, body fat and lean body mass. In multivariate analysis by binary logistic regression, unmarried [odds ratio (OR): 3.87; 95% confidence interval (CI): 1.008 - 14.878], lower scores of Physical Component Scale (PCS) [OR: 0.93; 95% CI: 0.886 – 0.967], difficulties in performing ADL tasks [OR: 0.18; CI: 0.044 – 0.773] and lower body mass index [OR: 0.697; 95% CI: 0.530 – 0.916] were significantly associated with frailty syndrome. The characteristics and predictors of frailty syndrome among elderly population gave an overview that can be used as the baseline data on frailty syndrome for the intervention program to minimize the worse effects of frailty syndrome.

Keywords: Frailty syndrome, elderly, psychosocial, functional, anthropometric.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
sebagai memenuhi keperluan untuk ijazah Sarjana Sains

PREDIKTOR SINDROM KELEMAHAN DALAM KALANGAN KOMUNITI WARGA TUA DI KUALA NERUS, TERENGGANU

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Tahap kesihatan yang rendah termasuk sindrom kelemahan (*frailty*) merupakan perkara yang tidak asing lagi dalam kalangan warga tua, seiring dengan faktor penuaan seseorang. Sindrom kelemahan dikaitkan dengan kemerosotan fungsi fisiologi, seterusnya mengakibatkan peningkatan risiko ketidakmampuan, penyakit dan kematian. Tujuan kajian ini adalah untuk menentukan prevalens sindrom kelemahan dan perkaitannya dengan status sosio-demografi dan sosioekonomi, faktor psikososial, kefungsiian dan indikator antropometrik dalam kalangan warga tua yang hidup bermasyarakat di Kuala Nerus. Satu kajian keratan rentas dengan kadar maklum balas setinggi 90% telah dilakukan terhadap 279 peserta warga tua, terdiri daripada 118 (42.3%) orang lelaki dan 161 (57.7%) orang wanita yang dipilih secara rawak dan ditemu bual. Pengumpulan data dilakukan melalui soalan kaji selidik yang mengandungi maklumat tentang status sosio-demografi dan sosioekonomi, penilaian psikososial, penilaian kefungsiian, pengukuran antropometrik dan penilaian sindrom kelemahan. Status psikososial dinilai melalui kaji selidik yang diadaptasikan daripada SF-36 disahkan dan kaji selidik tentang hubungan dan penglibatan sosial. Status kognitif dinilai melalui Soalan Kaji Selidik Penilaian Kognitif Warga Tua (ECAQ). Status kefungsiian dinilai melalui soalan kaji selidik Aktiviti Kehidupan Harian (ADL), Aktiviti Instrumental Kehidupan Harian (IADL) dan Skala Mobility Warga Tua (EMS). Indikator antropometrik yang diukur ialah Indeks Jisim Tubuh (BMI), ukur lilit tubuh, jumlah lemak tubuh dan Indeks Otot Skeletal (SMI). Sindrom kelemahan dikenal pasti dengan menggunakan fenotip Fried (2001). Majoriti (60.2%) responden merupakan warga tua yang lebih muda, iaitu berumur 60 hingga 74 tahun, dengan taburan min umur 73.3 ± 6.1 tahun. Kebanyakan responden tinggal bersama orang lain (82.4%), tidak mempunyai pasangan (51.3%), mempunyai pendidikan formal (58.8%), tidak bekerja (83.5%), mempunyai pendapatan rendah sebanyak RM500 ke bawah (43.7%), mempunyai isi rumah yang kecil (66.3%) dan bergantung pada orang lain untuk sumber kewangan (78.5%). Majoriti responden kerap menyertai aktiviti

senggang (79.6%), kenduri (66.3%) dan aktiviti keagamaan; solat berjemaah di masjid (57.7%), tahlil (55.6%) dan ceramah agama (58.1%). Didapati 88.2% responden tidak mempunyai masalah kemurungan. Kira-kira 18.6% responden mempunyai masalah kognitif, memerlukan bantuan untuk bergerak (5.0%), mengalami kesukaran untuk menjalankan ADL (87.5%) dan IADL (70.6%). Majoriti responden (48.7%) mempunyai BMI yang normal dan berisiko rendah untuk kehilangan otot. Prevalens sindrom kelemahan dalam kajian ini adalah 18.3%.

Bagi analisis *bivariate*, faktor yang berkait dengan sindrom kelemahan ialah umur yang lebih tua, tidak berkahwin, tidak mempunyai pendidikan formal, tidak bekerja, kurang perhubungan dengan adik-beradik dan saudara-mara, kurang menyertai aktiviti senggang, kenduri, gotong-royong, dan aktiviti keagamaan, masalah kognitif, mempunyai masalah dalam pergerakan, dalam melaksanakan ADL dan IADL, mempunyai indeks jisim tubuh yang rendah, ukurlilit lengan dan betis yang rendah, lemak tubuh yang rendah dan jisim tubuh yang rendah. Dalam analisis *multivariate*, melalui analisis *Binary Logistic Regression*, status tidak berkahwin atau tiada pasangan [odds ratio (OR): 3.87; 95% Confidence Interval (CI): 1.008 - 14.878], skor skala komponen fizikal yang rendah (PCS) [OR: 0.93; 95% CI: 0.886 - 0.967], kesulitan dalam menjalankan aktiviti kehidupan harian (ADL) [OR: 0.18; CI: 0.044 - 0.773] dan jisim indeks tubuh yang rendah [OR: 0.697; 95% CI: 0.530 - 0.916] adalah faktor yang signifikan dikaitkan dengan sindrom kelemahan. Ciri-ciri dan prediktor sindrom kelemahan di kalangan warga tua memberi gambaran keseluruhan tentang sindrom kelemahan dan dapat digunakan sebagai data asas bagi program intervensi bagi mengurangkan kesan buruk sindrom kelemahan ini.

Kata kunci: Sindrom kelemahan, warga tua, psikososial, kefungsiian, antropometrik.

ACKNOWLEDGEMENTS

There were many individuals involved in completing this thesis. Firstly, I would like to express my sincere gratitude to my main supervisor, Dr. Siti Nur 'Asyura binti Adznam, for the continuous guidance, supports and helps in facilitating the completion of this thesis. There are a lot of things I have learnt from Dr. 'Asyura. A special thanks also goes to my co-supervisors, Associate Prof. Dr Chan Yoke Mun and Dr. Zuriati binti Ibrahim for the given guidance of the process.

Special thanks to my course-mate, Fairus Asma binti Mohd Hamidin who was always there for providing invaluable helps, comments and opinions; members of postgraduate students for their kindness and for encouraging me along the journey of study; also my friends who helped in the data collections.

Sincere gratitude to the individuals of Department of Statistic (Kuala Terengganu) which included District Officer, *Penghulu Mukim* and staffs who gave their cooperation in sharing the study location and the lists of elderly population in Kuala Terengganu. To the Head of Village and Head of Community (JKKK), also many thanks to them for their helps in finding the houses of respondents; and to the respondents involved in this study, special appreciation for their cooperation.

Last but not the least; I owe more than thanks to my family members, which includes my supportive husband, Mohd Faez bin Bachok, my beloved parents, Ab. Aziz bin Mamat and Suhainiah binti Mohd @ Abdul Ghani; my parents-in-laws, Bachok bin Othman and Salasiah binti Yusop, my siblings and siblings in-laws. They were all waited for me to finish this challenging journey patiently. Their supports, times and cooperation, I appreciated too much. To those contributors I have neglected to mention here, please accept my apologies. I am indebted to all indeed

I certify that a Thesis Examination Committee has met on 17 March 2017 to conduct the final examination of Nur Hafizah binti Ab. Aziz on her thesis entitled "Predictors of the frailty syndrome among community-dwelling elderly in Kuala Nerus, Terengganu" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Master of Science.

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CHAPTER 1

INTRODUCTION

1.1 Background

Population ageing nowadays is one of the current global challenges, where ageing is associated with the consequences that gives an impact to every aspects of life (Gutierrez-Robledo, 2002). Globally, people aged 65 and older in 2015 were estimated to be 8.5 percent of the total population, and is projected to increase 12.0 percent by 2030 and 16.7 percent of the total world population by 2050 (He et al., 2016). The most number of rapid aging was reported in Asia. The similar increasing trend of population aging was also observed in Malaysia, which senior citizens aged 60 years and above were projected to increase from 9 percent to 15 percent of the total population (National Statistics Department, 2015).

Parallel with the ageing challenges, frailty should be considered as an issue to be concerned among the elderly. The older adults' population are most vulnerable to frailty, since this syndrome is highly associated with the increasing of age. Frailty syndrome in elderly is not a new phenomenon. In previous three decades, the term frail elderly was used for older people who are vulnerable to adverse effects. Frailty is currently considered as a geriatric biological syndrome, characterized by decreased physiological reserves, which is associated with increased risk of disability and high vulnerability to poor health outcomes, such as falls, hospitalization, institutionalization and death (Fairhall et al., 2011; Klein et al., 2005 & Bergman et al., 2007). Frailty is not synonymous with comorbidity or disability. Comorbidity could be an etiologic risk factor, and disability is an outcome for frailty. To date, frailty syndrome is broadly defined. However, currently the definition of frailty proposed by Fried et al. (2001), which has been validated in the Cardiovascular Health Study (CHS) was mostly used by researchers. Fried et al. (2001) proposed a physical phenotype, which defines frailty syndrome as a combination of weakness, exhaustion, lack of activity, weight loss/underweight and slow walking speed. All these five components are related to each other in the cycle of frailty.

Functional decline, disability, and frailty are common geriatric conditions involving multiple organ systems and are associated with a high prevalence as the increasing of age (Topinkova, 2008; Ng et al., 2006). Frailty is related to multidimensional factors, which a lot of literatures have reported the contributing factors, including low-socio-demographic and low socioeconomic status (Curcio et al., 2014; Alvarado et al., 2008), low contact with people (Mhaoláin et al., 2012; Woo et al., 2005), absence of social support (Woo et al., 2005), participation in religious activities (Reid-Arndt, et al., 2011), having depressive symptoms (Kang et al., 2016), having cognitive impairment (Robertson et al.,

2014; Ávila-Funes et al., 2011), having difficulties in daily activities (Curcio et al., 2014; Guillely et al., 2008), and low muscle strength (Cooper et al., 2012; Lang et al., 2009).

Frailty is more prevalent among elderly women and those with a lower socioeconomic status. Using the phenotype definition, prevalence of frailty increased from 16% in those aged between 80–84 to 26% in those aged 85 and above (Cigolle et al., 2009). As women aged, their lean mass and strength decreased abruptly; therefore, women that loses the lean body mass due to aging process are prone to have frailty. From the psychosocial aspects, social isolation, feelings of loneliness, and lack of energy (Cheng et al., 2008) are associated with high risk of frailty and might cause social disability (Markle-Reid and Browne, 2003). Frail elders also reported to be associated with having low levels of social support and self-reported lack of help (Buttery et al., 2015). Religious participation is believed to reduce psychological distress and improve spiritual coping, social support, or a more generalized and positive belief system (Maselko & Kubzansky, 2006). Thus, the participation in religious activities appears to decrease the risk of getting frailty. Depression is associated with the greater odds of frailty in the multivariate analyses (Vaughan et al., 2015; Sanchez-Garcia et al., 2014; Pegorari & Tavares, 2014). Neuroendocrine dysregulation might be a common underlying mechanism of both late-life depression and frailty (Vaughan et al., 2015).

Due to the central features of frailty syndrome that included weakness, decreased endurance, and slowed performances, it is considered as a precursor to disability. Frail elderly are mostly vulnerable to compromising with a functional decline. Based on a cohort study, there was a progression from the low normal cognitive function at first assessment to the impaired cognitive function at second assessment and was associated with an elevated risk of losing independence in the 6 Activity Daily Living (ADL) domains.

On the other hand, unintentional weight loss is one of the key components of frailty. Frailty was most prevalent among those with BMI less than 20 (Hubbard et al., 2010). Decrease in skeletal muscle mass and increase of body fat are consequences of aging process beginning at about 45 years of age. Sarcopenia or as being referred as loss of skeletal muscle below a critical threshold may lead to physical disability and impairment in functional. Skeletal muscle mass gradually declines. In addition, advanced skeletal muscle loss may affect the quality of life, the need for supportive services, and ultimately the need for a long-term care. Therefore, sarcopenia is considered as a significant public health problem (Janssen et al., 2002).

Knowing that frailty syndrome is associated with multiple factors beyond the physical problems, this study aims to investigate the association between the socio-demographic and socioeconomic status, psychosocial factors, functional factors, and anthropometric indicators with frailty syndrome. Understanding the multifaceted factors related to frailty syndrome enables the elaboration of

prevention and intervention actions in elderly populations, thus, simultaneously acting on multiple factors may be more effective than those based on a single criterion.

1.2 Problem statement

As the elderly population grows, frailty syndrome has been increasingly recognized as a major concern. Based on the previous studies, prevalence of frailty syndrome in the community dwelling varied among the population, research setting and definition, ranging from 4.0% to 59.1% (Collard, et al., 2012). The evolution of frailty among elderly nowadays should be addressed since it can lead to a high vulnerability in the population, leading to adverse health outcomes, including mortality, institutionalization, falls, and hospitalization (Fried et al. 2001) These adverse outcomes may lead to individual and societal adverse consequences, such as dependency. Frailty syndrome is a dynamic process and related with many underlying factors, which differs among populations.

Generally, frailty syndrome is highly related with a negative impact towards older adults as it can cause reduction to the physiologic reserve and resistance to stressors, which in turn affecting the functionality and the quality of life. Low socioeconomic status, such as low level of education and low income were reported to be associated with frailty syndrome. Low SEP not only makes people vulnerable to acquiring some limitations but also to accumulate them to the point where they are likely to be inhibiting (Gjonça et al., 2009). Elderlies who have difficulties or are unable to perform activities might restrict their social involvement, thus, might influence their quality life (Woo et al., 2005). On the other hand, elderlies who are likely to isolate and not participate in communities or religious activities would decrease their self-esteem, which can result in indication of depression. Older adults with depressive symptoms would restrict their activities and eventually, may lead to frailty (Mezuk et al., 2012).

Physical and cognitive function decline as people aged and were found to be associated with frailty syndrome (Robertson et al., 2014). Social support has been thought to inhibit cognitive decline in the elderly (Crooks et al., 2008). Decreasing in cognitive function may lead to functional loss and consequently to physical dependency (Lang et al., 2009b). Functional disability is considered to be the precursor to frailty syndrome since the physical phenotype of frailty includes slow walk, weakness, and physical inactivity. Lower body mass index is an indicator to recognize frail elderly where weight loss is a key component for frailty (Hubbard et al., 2010). Muscle wasting is common among elderly and is known as sarcopenia. Sarcopenia is a feature for frailty syndrome and has been associated with the functional decline that leads to disability (Morley, 2008).

Frailty among elderly should be an important agenda among the older population in Malaysia. There were very little studies on frailty syndrome among Malaysian

senior citizens, which were not widely discussed in various settings and factors, thus, the association of the factors was still limited and not clearly revealed. As frailty is a progressive condition that begins with a preclinical stage, there are opportunities for early detection and prevention. Thus, requires several approaches that would mainly focus on the modifiable individual and the environmental risk factors.

Aging phenomenon has gained the attention in Malaysia since this country was estimated to be an aging nation for the coming years. Frailty syndrome is an alarming geriatric syndrome nowadays because of its adverse societal impact, such as hospitalization, institutionalization, morbidity, and mortality. It is a dynamic process and also potentially be reversible if detected at an early stage (Fried et al., 2001). Thus, early detection of some modifiable risk factors might be an important issue for early interventions at primary setting. This study intended to be an initial work on frailty syndrome and its association with the socio-demographic and socioeconomic status, psychosocial status, functional factors and anthropometric indicators among the Malay elders in Malaysia that enables the basis knowledge for the future interventions among the targeted groups.

1.3 Research questions

1. What is the prevalence of frailty syndrome among the community-dwelling elderly in Kuala Nerus, Terengganu based on the Fried's frailty phenotype?
2. What are the association between socio-demographic and socioeconomic status, psychosocial status, functional factors and anthropometric indicators with frailty syndrome among the respondents?
3. What are the predictors of frailty syndrome among the respondents?

1.4 Objectives of the study

1.4.1 General Objectives

To determine the prevalence of frailty syndrome and its association with the socio-demographic and socioeconomic status, psychosocial status, functional factors and anthropometric indicators among the community-dwelling elderly in Kuala Nerus, Kuala Terengganu.

1.4.2 Specific Objectives

1. To determine the characteristics of socio-demographic and socioeconomic status, psychosocial status, functional factors, and anthropometric indicators among the respondents.
2. To determine the prevalence of frailty syndrome among the respondents.
3. To determine the association between frailty syndrome with socio-demographic and socioeconomic status, psychosocial status, functional factors, and anthropometric indicators among the respondents.
4. To determine the predictors of frailty syndrome among the respondents.

1.5 Null hypotheses

1. There are no significant associations between the socio-demographic and socioeconomic status, psychosocial status, functional factors, and anthropometric indicators among the respondents.
2. There are no predictors that significantly associated with frailty syndrome among the respondents.

1.6 Significance of the study

This study was conducted to determine the prevalence of frailty syndrome and its association with the socio-demographic, psychosocial, functional factors and anthropometric indicators among the community-dwelling Malay elderly in Kuala Nerus, Terengganu. The adverse outcomes of frailty syndrome included falls, hospitalization, disability, and mortality, which are associated with the negative implications among older adults, thus, affecting their quality of life. The findings from this study will provide knowledge and understanding the predictors that affect the frailty syndrome among elderly from the psychosocial and functional aspects.

The multidimensional factors encountered in this study were socio-demographic and socioeconomic status, psychosocial status, functional factors, and anthropometric indicators in determining their association with frailty syndrome. This study may not manifest the causal relationship between the predictors and frailty syndrome, but would serve the big picture to the researchers about the syndrome.

As the first study about frailty syndrome in rural setting of Malaysia, the outcomes from this study could be used as the baseline data for future researchers in this field. This would help in improving the health care support system and social life among the elderly in Malaysia in the future, thus, can support the implementation

of public health policies and the planning of strategic healthcare actions directed to this population in Malaysia.

Since the aging population is growing faster, frailty has increasingly emerged as an important concept, which results in an increased risk of adverse situations, such as falls, disabilities, institutionalization, and death. The understanding of the interactions between frailty syndrome and several contributing factors might be significant in identifying the modifiable risk factors, suggesting the relevant information to health educators and health practitioner in implementing future planning, interventions and treatments to the targeted groups.

1.7 Conceptual framework

The conceptual framework, as shown in Figure 1.1 demonstrates the relationship of three independent variables with the dependent variable. The three components of independent variables that are potentially associated with frailty syndrome include; (1) Socio-demographic and socioeconomic status, (2) Psychosocial factors, (3) Functional factors, and (4) Anthropometric indicators. Frailty syndrome is the dependent variable in this research, which was assessed by using the Fried's Phenotype (2001) including weight loss, exhaustion, weakness, slowness, and low physical activity. The individual's lifestyle and quality of life would be influenced by the socioeconomic factors, although, they do not act in the pathophysiology of frailty directly.

This current study investigated 24 associated factors that were reported in previous literatures suggesting that frailty syndrome is a multifactorial syndrome by excluding the health-related status and dietary aspects. As related to the socio-economic and socio-demographic status, frailty syndrome was reported to be associated with older age, low level of education and income (Espinoza & Fried, 2007), absence of a partner (Gutiérrez, 2011), and low muscle mass (Doherty, 2003).

This study presented several psychosocial factors that might be related with frailty syndrome, such as social relationship and social participation; the quality of life; and depression level. Frail elderly is less likely to be socially active in community activities (Woo et al., 2005), thus compromised their negative health perception (Abu-Bader et al. 2002) and low quality of life (Lin et al., 2011). In particular, the indication of depression is more common among frail elders than the robust elders (Mhaoláin et al., 2012).

Functional factors examined in this study were cognitive function, mobility function, and disability. Low cognitive functioning is an important contributor to disability (Avila-Funes et al., 2011), which is one of the adverse outcomes of frailty syndrome among elderly (Robertson et al., 2014). Weight loss manifested by low body mass index is a key component for frailty syndrome (Fried et al.,

2001) and associated with muscle wasting (Hubbard et al., 2012). Sarcopenia is associated with frailty syndrome by the loss of skeletal muscle and strength that leads to adverse outcomes of frailty, such as physical disability, poor quality of life, and death (Janssen et al., 2002).

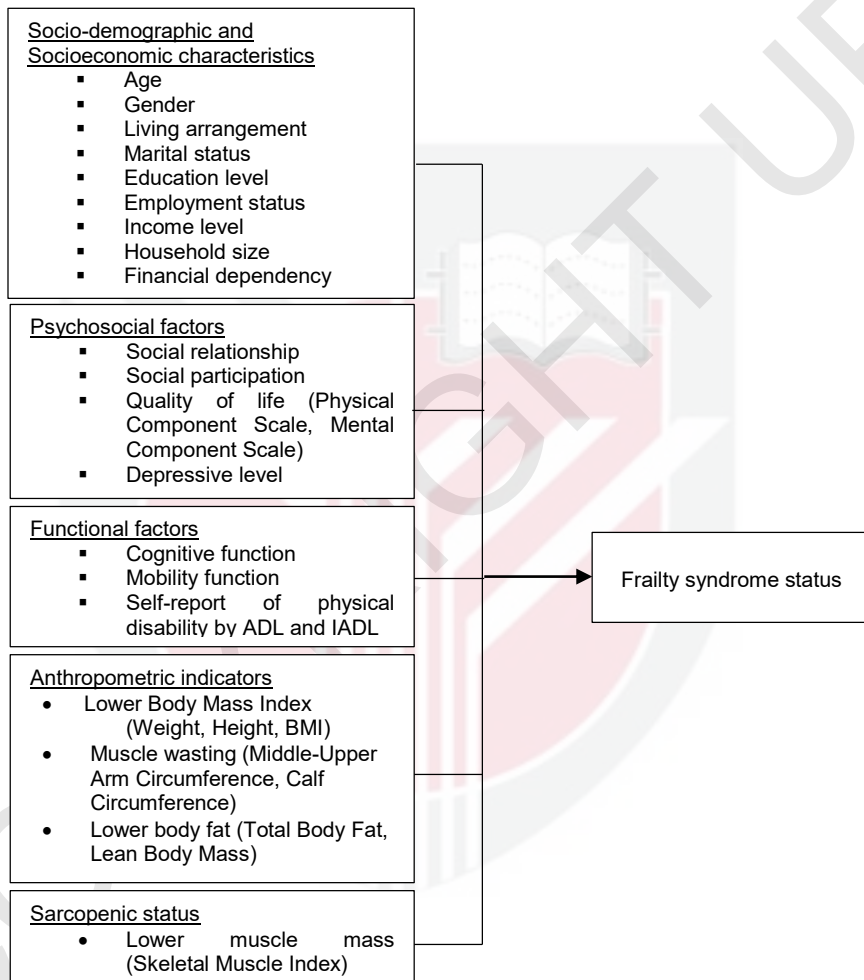


Figure 1.1: Conceptual framework of the study

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