PREVALENCE AND EXPLORATION OF FACTORS ASSOCIATED WITH INSTRUMENTAL ACTIVITIES OF DAILY LIVING DISABILITY AMONG ELDERLY IN KELANTAN: A MIXED-METHODS STUDY

DR NUR RAIHAN BINTI ISMAIL

UNIVERSITI SAINS MALAYSIA

2022

PREVALENCE AND EXPLORATION OF FACTORS ASSOCIATED WITH INSTRUMENTAL ACTIVITIES OF DAILY LIVING DISABILITY AMONG ELDERLY IN KELANTAN: A MIXED-METHODS STUDY

By

DR NUR RAIHAN BINTI ISMAIL

Dissertation Submitted in Partial Fulfilment of The Requirement for The Degree of Doctor of Public Health (Family Health)

2022

ACKNOWLEDGEMENT

Bismillahirrahmanirrahim.

In the name of Allah, the most compassionate and the most merciful. Salutations be upon His messenger Muhammad (peace be upon him), his family and his companions. Alhamdulillah, with the help and success granted by Allah, I have successfully completed this dissertation.

This work would not have been possible without the encouragement from my supervisor Dr Noor Aman Bin Hamid from Department of Community Medicine, Universiti Sains Malaysia. I am so much grateful for his expertise, patience and kindness in making this research possible.

Many thanks to my co-researchers, Ass. Prof Asrenee binti Ab Razak from Department of Psychiatry, Universiti Sains Malaysia and Dr Anees Binti Abdul Hamid from Primary Care Unit, Kelantan State Health Department, for their continuous support and readiness to help me pursuing this research.

I would like to acknowledge all my colleagues and lecturers in the Department of Community Medicine who involved indirectly in this research project. Most importantly, I wish to thank my loving and supportive husband, Dr Wan Azinuddin Bin Wan Abdullah, my son, Wan Faqihuddin, my parents, and the siblings, indeed their loves and supports are the backbone of my success. My highest gratitude to all of them.

DECLARATION

I, Nur Raihan binti Ismail, declare that the work presented in this thesis is originally mine. The information which has been derived from other sources is clearly indicated in the thesis.

Nur Raihan binti Ismail

Student ID: P-UD 0106/18

Signed on 29th December 2021

LIST OF PAPERS AND CONFERENCES

During my Doctor of Public Health (DrPH) course, the following articles were finally submitted and published in SCOPUS journal and presented at international level. Overall, the thesis comprises the two papers, which corresponds to the study's three specific objectives.

Papers:

Malaysian Applied Biology Journal (Published)

Factors Influencing Instrumental Activities of Daily Living (IADL) Disability Among Elderly Attending Health Clinics in Kelantan

Nur Raihan Ismail[1], Anees Abdul Hamid[2], Asrenee Ab Razak[3], Noor Aman Hamid[1]

Ageing Medicine and Healthcare Journal (In-review)

Prevalence and Exploration of Factors Associated with Instrumental Activities of Daily Living Disability Among Elderly in Kelantan: A Mixed-Methods Study

Nur Raihan Ismail[1], Anees Abdul Hamid[2], Asrenee Ab Razak[3], Noor Aman Hamid[1]

Conference Presentations:

World Conference on Public Health 2020 (WCPH2020) organized by the International Institute of Knowledge Management (TIIKM), Sri Lanka.

Global Health Sciences Conference (GHSC 2020) organized by the Faculty of Health Sciences, UniSZA Terengganu.

The 10th Malaysian Hybrid Conference on Healthy Ageing (MCHA 2021) organized by Malaysian Healthy Ageing Society (MHAS).

TABLE OF CONTENTS

TABLE **PAGE**

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ADL	Activities of Daily Living
Adj. OR	Adjusted odds ratio
CI	Confidence interval
DSSI	Duke Social Support Index
ECAQ	Elderly Cognitive Assessment Questionnaire
GDS	Geriatric Depression Scale
IADL	Instrumental Activities of Daily Living
ICF	International Classification of Functioning, Disability and Health
LR	Likelihood ratio
MBI	Modified Barthel Index
MOH	Ministry of Health
OR	Odds ratio
SPSS	Statistical Package for Social Sciences
SD	Standard deviation
WHO	World Health Organisation

LIST OF SYMBOLS

=	Equal to
≥	More than and equal to
<	Less than
α	Alpha
β	Beta
%	Percentage
Δ	Precision / Delta

LIST OF APPENDICES

ABSTRAK

PREVALENS DAN PENEROKAAN FAKTOR YANG BERKAITAN DENGAN KETIDAKUPAYAAN UNTUK MELAKUKAN AKTIVITI KEHIDUPAN HARIAN DI KALANGAN WARGA EMAS DI KELANTAN: KAJIAN KAEDAH GABUNGAN

Latar belakang: Populasi warga emas seringkali dianggap sebagai populasi yang berisiko tinggi untuk mendapat kecederaan dan penyakit kronik di mana ianya boleh menyumbang kepada peningkatan kadar ketidakupayaan. Peningkatan ketidakupayaan pada usia tua dianggap sebagai satu fenomena sosial dinamik yang berkaitan dengan fisiologi individu, keadaan kesihatan, kedudukan sosio-ekonomi dan persekitaran tempat tinggal. Aktiviti kehidupan harian IADL adalah satu konstruk yang menggambarkan kemampuan individu untuk melakukan aktiviti kompleks. Kajian mengenai IADL di Malaysia masih lagi kurang.

Objektif: Kajian ini bertujuan untuk mengenalpasti faktor-faktor dan menerangkan bagaimana faktor-faktor in boleh menyebabkan ketidakupayaan untuk melakukan aktiviti kehidupan harian IADL di kalangan warga emas yang menghadiri klinik-klinik kesihatan di Kelantan.

Kaedah: Ini adalah kajian kaedah gabungan yang dilakukan antara Januari 2020 hingga Ogos 2021. Kajian bentuk dua fasa ini dimulakan dengan kajian kuantitatif, diikuti dengan temubual kualitatif menggunakan pendekatan fenomenologi. Fasa pertama kajian ini menggunakan kajian keratan rentas untuk mengenalpasti status ketidakupayaan melakukan IADL dan faktor-faktor yang berkaitan dengan

menggunakan borang soal selidik *Lawton IADL scale, Elderly Cognitive Assessment Questionnaire (ECAQ), Geriatric Depression Scale (GDS)* dan *Duke Social Support Index (DSSI).* Kajian kuantitatif ini melibatkan 248 sampel yang dipilih secara rawak dari 12 klinik kesihatan di Kelantan. Status ketidakupayaan melakukan IADL didefinisikan sebagai kesukaran melakukan sekurang-kurangnya satu daripada lapan aktiviti dalam soal selidik *Lawton IADL scale.* Analisa *Multiple logistic regression (MLR)* dilakukan untuk menilai faktor-faktor yang mempengaruhi ketidakupayaan untuk melakukan IADL. Kajian kualitatif menggunakan temu ramah mendalam, bertujuan meneroka faktor-faktor yang mempengaruhi ketidakupayaan melakukan IADL di kalangan warga emas yang mempunyai status ketidakupaayan yang telah dikenalpasti melalui kajian fasa pertama. Responden adalah 16 sampel yang dipilih secara teknik pengambilan sampel bertujuan. Temu ramah ditranskripsikan setiap patah perkataan, dan data dianalisa menggunakan analisis tematik.

Keputusan: Daripada 248 warga emas, 36.3% daripadanya telah mempunyai status ketidakupayaan melakukan aktiviti kehidupan harian IADL. Faktor yang mempengaruhi ketidakupayaan melakukan aktivi kehidupan harian IADL adalah, kumpulan umur 70 tahun ke atas (Adj.OR 3.52; 95% CI: 1.85, 6.69, p <0.001), tidak berkahwin / bujang (Adj.OR 2.37; 95% CI: 1.25, 4.49, p=0.008), tidak mempunyai pendidikan formal (Adj.OR 4.03; 95% CI: 1.64, 9.88, p=0.002), tahap pendapatan rendah (Adj.OR 2.37; 95 % CI: 1.11, 5.07, p=0.026) dan mereka yang melaporkan status kesihatan diri yang teruk (Adj.OR 2.53; 95% CI: 1.31, 4.89, p=0.006). Lima tema telah dikenalpasti dari kajian fasa dua. Ia adalah masalah yang berkaitan dengan

usia, sokongan sosial yang rendah, budaya dan karakter individu, pencapaian pendidikan yang rendah, dan cabaran kewangan.

***Kesimpulan*:** Penemuan kajian ini telah menjelaskan keperluan menambahbaik strategi dalam mempromosi kesihatan dan kesejahteraan kepada warga emas. Polisi seharusnya bertujuan untuk mengurangkan beban komplikasi penyakit kronik. Dasar perlindungan sosial universal yang adil harus tersedia untuk semua warga emas.

KATA KUNCI:

Ageing, Disability, Factors, IADL, Lawton scale

ABSTRACT

PREVALENCE AND EXPLORATION OF FACTORS ASSOCIATED WITH INSTRUMENTAL ACTIVITIES OF DAILY LIVING DISABILITY AMONG ELDERLY IN KELANTAN: A MIXED-METHODS STUDY

Background: Population ageing has been associated with as a higher burden of diseases, injury and chronic illness in which contributes to the higher disability rates. The development of disability in old age is regarded as a dynamic social phenomenon that relates to individual physiological, health conditions, socio-economic position as well as environment in which people live. Instrumental activities of daily living (IADL) is a construct which describes the functional ability to perform complex activities. Studies on IADL in Malaysia are still lacking.

Objective: This study aimed to determine the factors associated with, and further explain how these factors contribute to IADL disability among elderly attending health clinics in Kelantan.

Methodology: This was a mixed-methods study, with sequential explanatory design conducted between January 2020 to August 2021. The two-phase design began with a quantitative cross-sectional health survey, followed by qualitative interviews using phenomenology approach. The survey study identified the disabled IADL status and the related factors using Lawton IADL scale, Elderly Cognitive Assessment Questionnaire (ECAQ), Geriatric Depression Scale (GDS) and Duke Social Support Index (DSSI). This quantitative study included 248 randomly selected samples from 12 health clinics in Kelantan, Malaysia. Disabled IADL status was defined as having

difficulty performing at least one out of eight activities in Lawton IADL scale. Multiple logistic regression (MLR) was performed to assess factors influencing IADL disability. The qualitative study used in-depth interview, exploring the factors associated with IADL disability among those who have disabled IADL status identified from the health survey. The 16 respondents were purposively selected, a subset from the phase one study. The interviews were transcribed per verbatim, and the data were analysed using thematic analysis.

Results: Out of 248 elderly people, 36.3% of them had disabled IADL status. The factors influencing IADL disability were, age group 70 years old and above (Adj. OR 3.52; 95% CI: 1.85, 6.69, p-value<0.001), being unmarried (Adj. OR 2.37; 95% CI: 1.25, 4.49, p-value=0.008), no formal education (Adj. OR 4.03; 95% CI: 1.64, 9.88, p-value=0.002), low level of income (Adj. OR 2.37; 95% CI: 1.11, 5.07, p-value=0.026) and those who reported fair or poor self-rated health status (Adj. OR 2.53; 95% CI: 1.31, 4.89, p-value=0.006). Five themes emerged from phase two study. These were age-related problems, social support, culture and individual character, poor educational attainment, and financial challenges.

Conclusion: This study findings underlined the need to improve strategies in promoting health and wellbeing of our elderly. Policies should aim to reduce the burden of complication of chronic diseases. An equitable universal social protection policy should be available for all elderly.

KEYWORDS:

Ageing, Disability, Factors, IADL, Lawton scale

CHAPTER 1

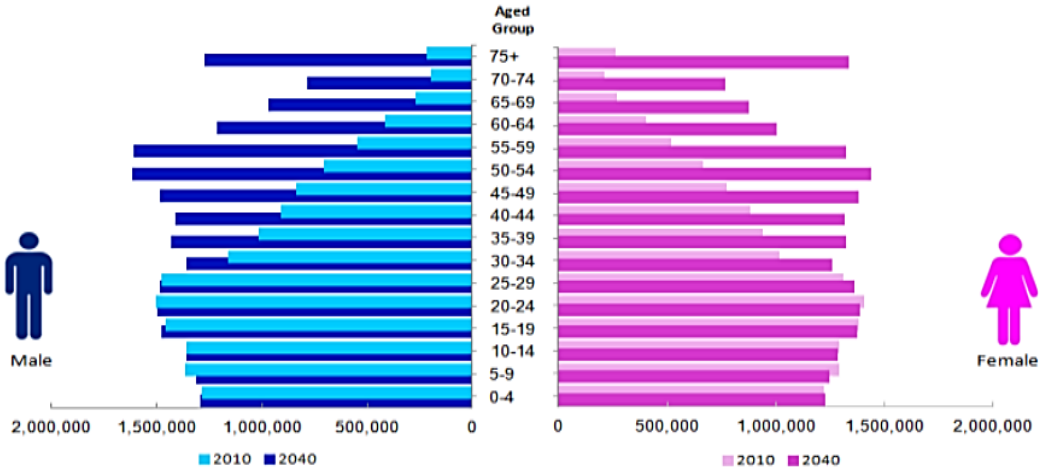
INTRODUCTION

1.1 Introduction

1.1.1 Ageing and Disability

Population ageing is one of the primary dilemmas of this century. The world's population today is heading towards an ageing society. Elderly was defined chronologically as those aged 60 years old and above (World Health Organization, 2015). Annually there is a rise in the share of the elderly population. The proportion of the older people is estimated to double from 12% in 2015 to 22% in 2050 (World Health Organization, 2018). An ageing population is taking place in all countries of the world including Malaysia. The number of individuals aged over 60 years old in Malaysia has expanded progressively since the 1970s, and the number is predicted to be threefold higher in 2040 from 2.0 million today to more than 6.0 million (Wan Ibrahim *et al.*, 2017). In Malaysia, the decline in fertility and mortality as well as improvement in life expectancy were stated to be responsible for the ageing of the population by the year 2040 (United Nations, 2017). Life expectancy at birth has increased from 61.6 in 1970 to 74.7 in 2016 following improved access to health care facilities, good nutritional status as well as better sanitation and living environment (Wan Ibrahim *et al.*, 2017). The shift in the age structure of Malaysian society has led to the transition of population pyramid as shown in Figure 1.1. This pyramid shows

the demographic transition from a broad-based pyramid shape with high number of children population to a more columnar shape with increased number of middle-age and elderly group (Wan Ibrahim *et al.*, 2017).



Sources: Population & Housing Census Peninsular Malaysia 1957/Population & Housing Census Malaysia 1970/Population Projections Malaysia 2010 - 2040

Figure 1.1: Malaysian Population Pyramid. Copyright 2017 by Wan Ibrahim *et al.*

An important part of this demographic shift in the population structure is the development of chronic illnesses and disability. Population ageing is a universal phenomenon, and this topic remarkably needs for more focused research on disability and its determinants. Ageing carries with it a higher disability rate because of the health risk load across a lifespan of disease, injury, and chronic illness (United Nations, 2019). The onset of disability accounts for a large portion of demand for existing health care services among the elderly. Disability is defined as a dynamic interaction between individuals with impairments, attitudinal and environmental obstacles which prevent their maximum participation in the society (World Health Organization, 2011). Determinants of disability are heterogeneous and differ across

various settings. Functional disability creates dependency on others in which elderly people require helps from families and the community. When this is unsuccessful, admission to long-term care facilities is the only solution (Dintrans, 2019). Therefore, it is very crucial for elderly to maintain independence in daily activities.

1.1.2 Disability Models

There were several theoretical models that have been developed with the aim to explain an association between ageing and decline in physiological systems that may result in functional disability among older people. The two most common theoretical models of disablement were Nagi disablement model and WHO's International Classification of Functioning, Disability and Health. (ICF) (Manini, 2011). The Nagi disablement model and WHO ICF model represent a series of connected frameworks which describe the outcomes of an individual health condition on his or her activities and on the lively participation of that individual in a community. These models give better understanding of the ageing and disability concepts, facilitating knowledge and understanding the terms used and supporting their applicability in research, public policies, and clinical practices.

The Nagi disablement model was introduced by Saad Nagi in year 1965, a sociologist who observed an unclear and confusing concept of disability and its contributing factors (Nagi, 1965; Nagi, 1979). Nagi disablement model is a theoretical model, widely used in medical research and also acknowledged by many healthcare practitioners (Snyder *et al.*, 2008). Throughout his hard works, Nagi eventually recognized the importance of the environment including family and community factors

in affecting disability. Nagi created this model based on four components: the active pathology, impairment, functional limitation, and disability (Jette *et al.*, 1997). Figure 1.2 illustrates further the Nagi disablement model.

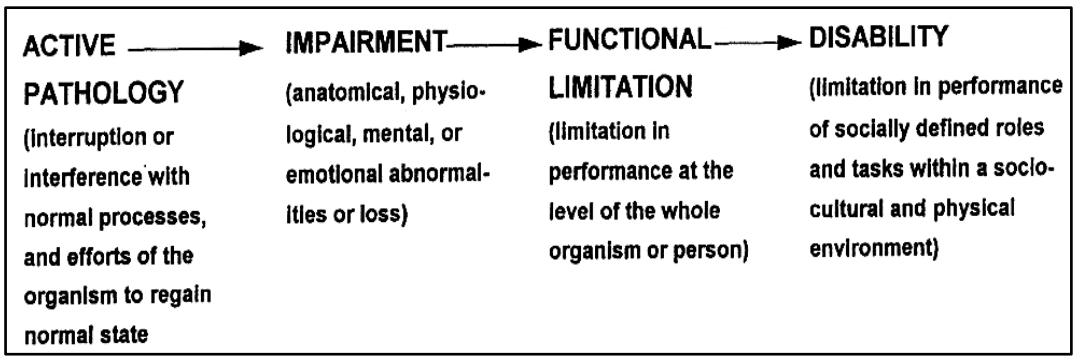


Figure 1.2: The Nagi disablement model. Copyright 1997 by Jette *et al.*

Nagi disablement model explicitly views the concept of disability as an outcome of interaction between persons and their environment. Active pathology is defined as the interference of normal processes which lead to an existence of abnormalities in the body. The abnormal processes may involve the changes at the biochemical or physiological components which are resulted from degenerative process, traumatic injury, infection, and chronic diseases. These changes begin slowly at the cellular level, affecting the normal physiological function in one's body and finally progress into the development of age-related diseases (Altman, 2016). Examples of the active pathology in elderly people are osteoarthritis, stroke, and Alzheimer's disease. Impairment is defined as changes in pathology that have evolved to a next level, causing failures to certain body systems. These may include abnormality in the anatomical, physiological, mental, or emotional dysfunctions. Impairment can occur at the level of primary setting, but they may also take place in secondary setting, either

delayed or immediately. For instance, diabetes mellitus has its primary impact on the metabolic system, but it can also give impacts on the cardiovascular, renal, neurological, and other systems (Jette, 2009). Functional limitation is the restriction in individual's basic performance and daily activities either physically or mentally (Altman, 2016). The common physical limitation is the inability to walk and climb stairs for example due to osteoarthritis, difficulty to communicate with others due to stroke, having visual impairment and so on. While the mental restriction includes cognitive impairment and emotional disturbance such as poor insight and disorientation, short-term memory loss, intelligible speech, and negative affect. Somehow, the functional limitations will eventually progress into disability phase. This is the phase where an individual can no longer perform their activities of daily living independently and need to depend on others for assistance. Disability is described as restriction in performance of socially defined roles and tasks within the environment due to a health or physical problem (Jette, 2009)

Functioning is a fundamental element in individuals experiencing or likely to experience disability. Within this context, the International Classification of Functioning, Disability and Health (ICF) was introduced in May 2001 by the World Health Assembly as a recognized model for disability (Karlsson and Gustafsson, 2021). This model comprises of two elements, each with two components. Part one is termed as functioning and disability, consists of body functions and structures as well as activity and participation. While part two is termed contextual factors, entails environmental and personal factors. Figure 1.3 illustrates further the ICF model (World Health Organization, 2002). This model conceptualizes an individual's level

of functioning as a dynamic interaction between personal experience of body functions and structures impairment, participation restrictions and activity limitations in interaction with a health condition, environmental and personal factors (Kostanjsek, 2011). This model is widely used for disability classification and health-related illness and is also employed for policy formulation in healthcare sector (Madden and Bundy, 2019)

WHO ICF model is a biopsychosocial model of disability because it was built on an integration of the social and medical models of disability. In the view of social model, disability is a socially created problem which does not point to a specific individual, but the way society is organised. Hence, it demands a political response because the problem is formed within the disorderly social environment. The main objective is to remove the barriers restricting life choices for disabled people. On the other hand, medical model regards disability as a characteristic of an individual, completely affected by disease, trauma, or other health conditions, which only can be ‘fixed’ or treated by medical care provided by healthcare professionals. This model only observes problem with the individual and not looking at what the individual actually needs (World Health Organization, 2011).

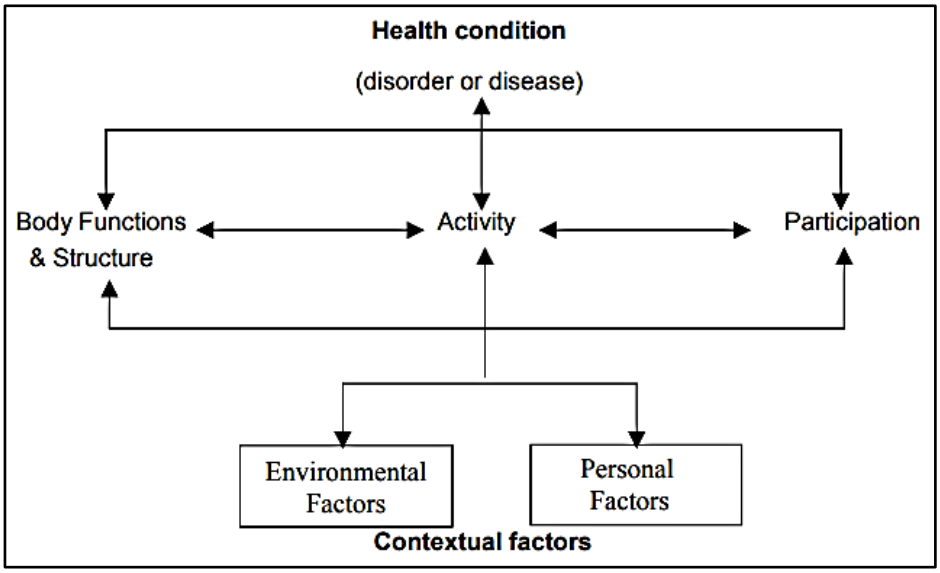


Figure 1.3: The WHO International Classification of Functioning, Disability and Health (ICF). Copyright 2002 by World Health Organization.

A health condition is addressed to the disease, disorder, trauma or injury and may also contain other situations, such as stress and ageing. Body functions are described as the physiological and psychological functions of body systems and the body structures include the anatomical part of the body for example the organs, limbs and their components. Dysfunctional of body system (i.e., limited range of movement, muscle fatigue, and pain) or substantial damage of body structures (i.e., joint deformity) are described as impairments. Participation in the ICF model refers to the individual's involvement in everyday situations and in society. People may have activity limitations (i.e., limitations in dressing, preparing meals etc) and experience participation restriction (i.e., limitations in leisure activity and social recreation) if they have trouble to carry out daily tasks and to mingle with the society (Kostanjsek, 2011; World Health Organization, 2011).

The environmental factors consist of the physical, social and attitudinal environment in which people live. These are external factors which are not within their control, and they can serve both as facilitators or barriers for the individual's functioning. These factors range from physical factors (i.e., living arrangement, access to healthcare services, climate) to social factors (i.e., attitudes, organizations, and regulations). Personal factors are described as the background of an individual's life which are not include the components of health condition. These may involve sex, age, race, marital status, and educational level. These personal factors differ from person to person, thereby make up one as a unique individual. Activity is described as a performance of task or action by an individual (World Health Organization, 2011). Both environmental and personal factors may pose effect on individuals' body functions and can influence their activities execution and participation. The ICF model has gathered all these elements affecting human functioning into a comprehensive framework involve psychological, environmental, biological and social factors (Dame *et al.*, 2020)

Among these two models, the WHO ICF model will be employed in the present study to describe disability and its associated factors. There are few beneficial aspects of employing WHO ICF model in ageing research (Dame *et al.*, 2020). ICF model is structured to support a systematic research approach for deeper grasp on disability in various settings and cultures. At the most basic level, this model is using distinct language and terms in approaching disability. The components are framed in a neutral way so that it can represent either positive or negative aspects of the components (Chan *et al.*, 2009). Besides, this model also offers a holistic approach in describing disability

through evaluation into all domains influencing functioning. The concept of participation in ICF model provides a broader view in recognizing societal and environmental factors on disability manifestation. It is indeed very important to appraise these factors because an active participation in the level of society can enhance a higher social support, thus provide a healthy environment, and further minimize disability occurrence (Ptyushkin *et al.*, 2011). WHO ICF model was constructed by a worldwide consensus and has been well-employed by many countries especially for ageing research (Jette, 2009). ICF model is suitable to be applied in rehabilitation medicine and ageing research because it is a comprehensible, and practical framework for evaluating disability (Madden and Bundy, 2019).

1.1.3 Dimensions of Disability

Significant losses in functioning are evaluated through the measurement of activities of daily living (ADL) and instrumental activities of daily living (IADL) (World Health Organization, 2015). ADL entails physical movement and the basic personal care actions which are routinely done on everyday basis, related to self-hygiene and health for example eating, bathing, dressing, ambulating etc (Mlinac and Feng, 2016). Stroke is the most established cause of ADL impairment, where the patient presented with different degree of disability affecting movement limitation and functional impairment. ADL is assessed by the Modified Barthel Index (MBI) which comprises score range from 0 to100. Individual who has lower score means he or she is less independent compared to those with higher score of MBI. The MBI covers 10 domains of ADL includes grooming, toilet transfer, bathing, feeding, dressing, stair climbing,

bed or chair transfers, bowel and bladder control, and ambulating (Quinn *et al.*, 2011). MBI is the easiest to be employed, reliable, well-formed and has been acknowledged by many researchers worldwide.

IADL are the more complex activities of daily living that allow a person to live independently in the society and they are not necessarily performed daily (Institute for Public Health, 2018). The measurement of instrumental activities consists of individual's ability to do eight activities; shopping, using telephone, housekeeping food preparation, laundry, ability to handle finance, responsibility for own medications and using transportation. IADL is classically measured by the Lawton and Brody Instrumental Activities of Daily Living Scale which indicates score of less than eight as dependent in IADL (Lawton *et al.*, 1969). IADL are activities that are not necessary for survival but do aid elderly in living their life to the best. IADL refer to tasks requiring adequate capacity to make mindful decisions as IADL dependencies reflect significant functional impairments. Older people require a maximum cognitive demand for successful task completion and ability to successfully perform IADL symbolizes a terrific interaction between elderly with their environment (Gold, 2012). The repeated failure in performing IADL is generally a precursor for assisted living either at own home or require admission to long term care facility. Therefore, by recognizing particular factors influencing IADL disability would intensify elderly care by targeting persons at risk of, or suffering, functional impairment.

1.1.4 The Burden of IADL

Over the last few years, IADL disability rates were reported as ranging from 34% to 82% (Institute for Public Health, 2018; Loh *et al.*, 2005; Veerapu *et al.*, 2016; Zayas *et al.*, 2013). A study in America reported 49% of older American Indians elderly had difficulty with one or more IADLs (Schure *et al.*, 2014). An earlier study conducted in New York noted a higher prevalence of IADL disability which was 81.6% among non-institutionalized Puerto Rican elderly aged 70 years and above. The prevalence was relatively high could be due to the involvement of older group of elderly as their study subjects (Zayas *et al.*, 2013). A population-based study among the elderly in Spain revealed 40.1% had disability in IADL (Graciani *et al.*, 2004). Another study from the Spanish National Health Surveys reported a higher prevalence of IADL disability among women as compared to men in all surveys, to be 29.6%, the highest recorded in NHS 2006 (Palacios-Cena *et al.*, 2012). Recent cross-sectional study conducted among community dwelling elderly in the same country found 31.9% had IADL disability (Carmona-Torres *et al.*, 2019). In that study, the researchers also reported activities of performing severe housework (34%) and going shopping (14.6%) were the largest domains affected.

A recent study by Ćwirlej-Sozańska *et al.* (2018) among senior citizens living in non-urban of south-eastern regions of Poland discovered 43.2% had at least one problem with IADL. At least half of the elderly over 60 years old in South India were presented with IADL disability (Veerapu *et al.*, 2016). Nourhashémi *et al.* (2001) reported 32.1% of community dwelling elderly women in France had disability in at least one IADL

item. A national level study namely The Health and Retirement Study (HRS), in United States found 20.0% of the population-weighted analytic sample aged 65 and older had at least one IADL limitation (Henning-Smith *et al.*, 2017). A study operated at 15 districts in China demonstrated significant reduction in the prevalence of disabled IADL status among the participants after 9 years of study completion (Liang *et al.*, 2017). Researchers believed this could be due to the improvement in living conditions and better access to healthcare services over time.

The local national health survey in Malaysia, the National Health and Morbidity Survey Elderly 2018 reported 42.9% of our elderly were IADL dependent (Institute for Public Health, 2018). Ismail *et al.* (2016) reported the prevalence of IADL disability for community-dwelling elderly in Kuala Pilah, Malaysia, aged 60 years and more was 32.7%. Previously, a small scale study performed in Klinik Kesihatan Batu 9, Ulu Langat, Selangor, showed IADL dependency were present among 33.5% of elderly aged over 60 years old (Loh *et al.*, 2005). Murat *et al.* (2019) found 58.1% of the respondents had IADL disability in Gombak district, Selangor.

1.1.5 Sociodemographic Factors Associated with IADL Disability

Age

There are many studies worldwide have discovered the significant of sociodemographic factors in association with IADL disability among elderly (Arias-Merino *et al.*, 2012; Connolly *et al.*, 2017; Storeng *et al.*, 2018). Many studies reported IADL disabilities increase with age. The pathophysiology effect of age on IADL disability has long been instituted (Arias-Merino *et al.*, 2012; Connolly *et al.*, 2017). As the ageing population is growing in the coming years, the burden of ADL and IADL are also expected to be risen. it is expected that the burden of ADL and IADL will also increase. Ageing is a natural process in human being where they are at risk to develop many ill-health conditions especially cardiovascular disease, malignancy and neurodegenerative disease, hence lead to a greater risk of disability (Niccoli and Partridge, 2012). Ćwirlej-Sozańska *et al.* (2018) reported growing old was poorly associated with the independence in IADL. They found almost two-fold increase in experiencing IADL difficulty for those who were 76 years old and above when compared to the younger elderly.

Sex

Being a female elderly was found to exhibit higher risk of developing functional impairment compared to male elderly. Female has a comparatively long-life expectancy than male, thus greater risk of disability at older age. The burden of multiple comorbidities and chronic illnesses continues to rise with age and could negatively impact on their IADL dependency (Graciani *et al.*, 2004; Kim *et al.*, 2012).

A longitudinal study by Alexandre *et al.* (2014) reported higher incidence of IADL disability among female elderly, with the incidence density of IADL disability of 44.7/1,000 person/years. The higher incidence of IADL disability was explained by the boundless social vulnerability and the presence of chronic diseases among the female elderly. Another study also reported female were more at risk to have limitation in IADL than male counterpart because they lived longer than men, thus they reported more illnesses (Murtagh and Hubert, 2004). They were more affected with higher burden of musculoskeletal, neurodegenerative, and psychological illness as they experienced longer life expectancy and these illnesses had significantly reduced their IADL functions.

Marital Status

Debate on the effect of marital status on the IADL disability was described in few studies (Arias-Merino *et al.*, 2012; Connolly *et al.*, 2017). The study of the Irish longitudinal study on ageing (TILDA) reported those who separated or divorce were five times more susceptible to acquire IADL difficulty compared to married elderly (Connolly *et al.*, 2017). Studies done in China and Mexico showed IADL dependency was significantly associated with being unmarried or had no partner (Arias-Merino *et al.*, 2012; Liang *et al.*, 2017). A possible explanation is that being unmarried or single is related to poor social and family support, thus lead to limitation in performing IADL functions (Feng *et al.*, 2013).

Living Arrangement

Living arrangement may influence IADL dependency. Studies reported elderly living at home with others either with a spouse or any other family members were more susceptible to be dependent in IADL (Connolly *et al.*, 2017; Otero *et al.*, 2003). This could be explained by adequacy of supports they already have in place, hence lead to higher levels of dependency. Another study reported that unmarried elderly living with children had a greater risk for disabled IADL status but those who were living alone did not display worst IADL outcome (Wang *et al.*, 2013). Those who were living alone appeared to be more self-determined to take care of themselves when nobody was around. In contrast to the elderly living with children, they possibly became more dependent on their children which might not indicate their true IADL disability but more of getting help to do IADL functions. Some of them have already become dependent on IADL hence living with their children is easier for them to get help in IADL tasks. In Asian culture, many old parents do live with their children because younger generations considered it was their duties to care for their older parents. The act of living together may support the provision of care for older parents but indirectly upsurge the dependency on the children (Abalos *et al.*, 2018).

Educational Status

Few studies also reported having low or primary education can increase likelihood to have IADL disability (Arias-Merino *et al.*, 2012; Graciani *et al.*, 2004; Palacios-Cena *et al.*, 2012). A study among non-institutionalized elderly in China described educational status as a strong factor for decline in IADL function although after the

adjustment for other factors such as age, gender, living arrangements and urban–rural area of residence (Beydoun and Popkin, 2005). Elderly people who were illiterate or did not attain a formal education had 5.58 odds of becoming disabled IADL status (95% CI: 2.85, 10.89) as compared to those who had secondary and tertiary educational status.

Similar to a study conducted in Brazil also reported that elderly with no formal education has double the chance of developing total or partial IADL dependence (95% CI: 1.3, 4.7) (Brigola *et al.*, 2019). Instrumental daily activities require higher level of cognitive function. The older adults with illiteracy or low educational status were facing difficulties in financial management and experiencing problems to perform complex activities with high cognition. managing finance or performing other more complex cognitive functions. Without adequate knowledge and literacy, they were at risk to face difficulty managing own medications or even finding and dialling numbers from a mobile phone (Carmona-Torres *et al.*, 2019; Park and Lee, 2017). Lacking formal education could also create barriers in communication, in which later would affect engagement in IADL functions at home or in the community (Brigola *et al.*, 2019).

Individual Monthly Income

Elderly with low income had a greater risk in IADL disability (Otero *et al.*, 2003). This is particularly critical as elderly face a decrease in income during retirement. Another study among Hong Kong Chinese elderly reported occurrence of dependency three years later in life was associated with lower income of less than HK$1000 per month,

with 1.8 odds of having risk of dependency (95% CI: 1.1, 2.9) (Woo *et al.*, 2000). Study also showed poorer health is consistently related to low-income individuals. Elderly with higher income had much lower level of functional limitation. However, insufficient income not just influence the disability but also restrict the access to health resources. This may prevent older people to have a good quality of life due to poor accessibility to healthcare and less integration into social and cultural services (Guerra *et al.*, 2008). Nourhashémi *et al.* (2001) proved elderly with the lowest income had a 1.6 greater risk of presenting IADL incapacity (95% CI: 1.32, 2.12). Researchers found evidence of poor overall mental and physical health status among those with low-income status. They were susceptible to have poor quality of life and uncomfortable living condition which affecting their performance in more complex cognitive functions, hence lead to an acceleration of IADL disability (Huang *et al.*, 2020). In addition, a study done on Health and Retirement Study data in United States, showed that older people who were more affluent had a lower risk of IADL disability even though they were living alone but those who were less affluent had to endure more IADL limitation (Henning-Smith *et al.*, 2017).

1.1.6 Health-related Factors Associated with IADL Disability

Number of Chronic Diseases

In more recent studies, health related factors such as presence of chronic diseases, medications use, cognitive function and depression have been recognized as contributing factors to disabled IADL status. Elderly with more than one chronic disease were reported to develop IADL disability in later life (Connolly *et al.*, 2017;

Ćwirlej-Sozańska *et al.*, 2018). The ageing itself promotes accumulation of diseases in elderly. The most primary causes of disability and mortality worldwide are the age-related diseases such as cardiovascular disease, malignancy, arthritis, and dementia. Poor nutrition, lack of physical activity, excessive alcohol consumption and tobacco use are the well-known modifiable risk factors which contribute for a large portion of the disease burden worldwide (Niccoli and Partridge, 2012). A study done in Korea showed elderly with more than two chronic diseases as indicator of IADL dependency (Adj. OR 3.2, 95% CI: 1.3, 7.5) compared to those with no or had only one chronic disease (Kim *et al.*, 2012). Another study had shown a person with at least two chronic diseases had 1.13 time the odds of having IADL disability compared to a person with no chronic disease (95% CI: 0.89, 1.43) (Graciani *et al.*, 2004). Most reported chronic diseases by the respondents in this study were hypertension, ischemic heart disease, stroke, diabetes, pulmonary disease, cancer, and depression.

Many studies acknowledge elderly people with stroke experienced the highest need for assistance in daily activities (Klijs *et al.*, 2011; Yokota *et al.*, 2015). This is generally because stroke itself is the most disabling condition associated with movement limitation and speech difficulty. Thus, hinder elderly to successfully perform their daily tasks and decrease social contact with society. Marengoni *et al.* (2009) described the disability occurrence was highest among the elderly who has been diagnosed with stroke and mental disorders and lowest among those with cardiovascular diseases. However, a set of combination of disorders or chronic diseases was still the greatest contribution of occurrence of disability. The development of chronic diseases can be prevented with focused interventional

strategies and practical successful-ageing measures throughout the life course process to delay earlier onset of ADL/IADL disability.

Number of Medications

The number of daily-consumed medications was independently associated with IADL disability. Peron *et al.* (2011) analysed the relationship between number of medications use and functional impairment in older people. The narrative review found three out of five studies reported worsening functional status in those who were practising polypharmacy. Jyrkkä *et al.* (2011) explored the relationship between multiple medication use and IADL outcomes in elderly. This study defined polypharmacy as consumption of six or more medications and excessive polypharmacy as having 10 or more drugs. The result showed that excessive polypharmacy was associated with decline in IADL function among the elderly. One cross-sectional inferential study identified the number of medications use as the third strongest factor of difficulty with IADL. Medication use was assessed in terms of the number of different daily consumed medicine and based on patient reporting mechanism. The elderly who took five or more medications had 1.68 odds of having IADL difficulty (95% CI: 1.04, 2.70) as compared to those who took less than five medications (Connolly *et al.*, 2017).

Similar to a study in south-eastern Poland, whereby study findings showed patients who took more than three medications had disability in at least one domain of ADL and IADL compared to those who took less medications (Ćwirlej-Sozańska *et al.*, 2018). Elderly requires higher cognitive function in taking responsibility for own

medications in correct dosages at correct time. Consuming polypharmacy may intrude the cognitive capacity, create confusion, and worsen the IADL function. The added value of a regular simple assessment of number of medication use was considerable to assist older people obtaining medications and taking them as directed.

Self-rated Health Status

Studies also shared evidence on poor self-rated health status was contributing to disabled IADL status (Francisco *et al.*, 2018; Graciani *et al.*, 2004; Palacios-Cena *et al.*, 2012). Self-rated health is a sensitive and reliable predictor for a subjective review of one's health status, consists of overall functional, physical, psychological, and social elements (Wuorela *et al.*, 2020). It is not only regarded as a spontaneous evaluation of one's health status but also is considered as a measure for the individuals to endeavour their targeted health-related goals. This self-rated health status is performed by asking the participants' subjective perception on how they felt about their own state of health as compared to others of the same age. It can be rated as good, fair, or poor health status.

A study reported a positive association between disability on at least one IADL item and poor self-rated health. The elderly women with poor self-rated health status were five times more likely to develop IADL dependence (95% CI: 3.67, 6.89) as compared to those with good self-rated health status (Nourhashémi *et al.*, 2001). In a Norwegian study, Storeng *et al.* (2018) demonstrated elderly with poor self-rated health required assistance to perform one or more IADL domain. They had double the chance to develop IADL disability (Adj. OR 2.3, 95% CI: 1.93, 2.74). Phaswana-Mafuya *et al.*

(2013) identified older men have steadily reported good self-rated health than their female counterparts. Another study by Wu *et al.* (2013) described the evidence connecting the self-rated health and the objective health status characterised by the disease occurrence, abnormalities in laboratory results, and health-related factors. The study showed self-rated health can reflect the objective health status in general population. This supports the use of self-rated health as a simple and reliable subjective indicator of health status throughout the world.

1.1.7 Psychosocial Factor Associated with IADL Disability

Cognitive Function

Cognitive impairment was negatively influenced IADL disability (Connolly *et al.*, 2017; Graciani *et al.*, 2004). Simple cognitive screening test could be performed to detect cognitive changes at early stage. Many studies employed Mini-Mental State Examination (MMSE) to evaluate cognitive decline. However, Kua and Ko (1992) identified MMSE was primarily designed to be used as a screening tool in the West, where most of elderly were more educated. Therefore, they started to create and design a new cognitive screening tool for elderly, derived from MMSE itself, known as Elderly Cognitive Assessment Questionnaire (ECAQ). It was rather shorter than the original MMSE and the sensitivity and specificity of the scale was found to be high and suitable to be used among Asian elderly population.

Arias-Merino *et al.* (2012) have found a higher risk of IADL disability in older Mexican adults if they were suffered from cognitive decline compared to those who have good cognitive function (Adj. OR 5.90, 95% CI: 4.64, 7.49). Older people have

to rely on their cognitive capacity to be able to participate in IADL particularly to carry out executive functioning and memorizing. Therefore, deterioration of cognitive function can negatively affect the IADL dependency (Connolly *et al.*, 2017). Cognitive status also figured to be a valuable indicator to demonstrate the disablement process in ageing population over time (Lee *et al.*, 2005).

Another study in Spain found a person with a deteriorated cognitive status had 2.08 time the odds of having IADL dependency compared to a person with good cognitive status (95% CI: 1.69, 2.56) (Graciani *et al.*, 2004). IADL functions were influenced by impairment in at least one of cognitive domains. A study reported the most impaired cognitive domain affecting IADL functions was on initiation or perseveration (the repetition of a particular response such as a word, phrase, or gesture) which was an aspect of executive dysfunction. The impairment of executive domain can result in the difficulty in preparing meals, shopping, taking responsibility for own medication and handling finance (Kiosses and Alexopoulos, 2005). Thus, early intervention to delay cognitive deficits over life course is crucial to reduce ADL/IADL disability while promoting successful ageing.

Depression

A study done among Norwegian elderly showed that the depression was one of the strongest risk factors in IADL disability (Adj. OR 1.8, 95% CI: 1.4, 2.2) (Storeng *et al.*, 2018). Depression may affect IADL disability indirectly in contrast to the physical impairment which shows more direct effect. It can affect regulation, cognitive and motivational incapacities and disturb social perception of the elderly people (Park and

Jung, 2019). Elderly people with depressive symptoms were more likely to develop earlier onset of IADL disability compared to those without depressive symptoms (Adj. OR 1.05, 95% CI: 1.01, 1.09) (Kong *et al.*, 2019). Researchers found several possible mechanisms linking the symptoms of depression and the onset and progress of functional disability. Somatic depressive symptoms for example prolonged fatigue, pain, sleep disturbance and poor appetite may promote decline of IADL functioning over time. These symptoms may aggravate the onset of disability and will only worsen the elderly body function and affect daily activity (Morin *et al.*, 2020).

In addition, elderly people with depression are more at risk to suffer amplified depressive symptoms and detrimental complications of their comorbidities. They are also less likely to be compliance with treatment regimens and health care follow-up. Left untreated, depression can be devastating for those who have it and may eventually lead to the IADL dependency if the symptoms are not well-monitored. Moreover, depression also can indirectly produce harmful effect via psycho-behavioural mechanism. Depression can build up negative health behaviours such as physical inactivity, poor dietary intake, smoking and alcohol intake, which may result in poor health status and ultimately trigger an early onset of disability (Katon, 2011). Besides, depression can also affect the social component of individual's life. Older people with depressive symptoms may experience social withdrawal, lack of interest in social participation, poor self-esteem, and social isolation. Refusing to mingle with other people along with decreasing physical activity and healthy behaviours may lead to overreporting of disability (Kanamori *et al.*, 2012). Depression and disability have a bidirectional relationship whereby they may underpin one another to yield a negative

impact on physical functioning and precipitate depressive symptoms in individuals (Katon, 2011)

However, there was one study reported a contrast finding. They found there was no significant effect of depressive symptoms on IADL dependence among cognitively normal elderly. But there was a significant combined effect of very early dementia and depressive symptoms on IADL disability as much as 37 times more likely than cognitively normal elderly (95% CI: 5.2–266.1) (De Ronchi *et al.*, 2005). The study finding concluded that by having symptoms of depression alone did not give much significant effect on IADL function but together with very early dementia, there was a huge effect on IADL disability in elderly.

Level of Social Support

Social support has been shown to have a significant link to elderly people health and well-being. Elderly people are vulnerable to have insufficient social support, thus it is essential to evaluate the strength of social support they have received. This can be due to a number of life changing situation, for example, deaths of spouse or friends, retirement, declines in physical health and increased morbidity (Melchiorre *et al.*, 2013). In Brazil, a study conducted by Lino *et al.* (2019) reported that low social support was associated with IADL disability. Elderly who received insufficient emotional support had 5.6 odds of having IADL disability as compared to those who received adequate emotional support. In this study, emotional support is considered as one of the dimensions for social support which derived from Medical Outcomes Study Social Support Scale of Brazilian version.