An-Najah National University

Faculty of Graduate Studies

The Relationship between Malnutrition and Selected Age Related Disorders Among Palestinian Older Adults in Long-Term Care Houses

By

Mohammed Eid

Supervisor

Dr. Mohammad Al-Tamimi

This Thesis is Submitted in Partial Fulfilment of the Requirements for the Degree of the Master of Nutrition and Food Technology, Faculty of Graduated Studies, An-Najah National University, Nablus, Palestine.

2021

The Relationship between Malnutrition and Selected Age Related Disorders Among Palestinian Older Adults in Long-Term Care Houses

By

Mohammed Eid

This thesis was defended successfully on 14/9/2021 and approved by:

Defense committee Members	**Signature**
– **Dr. Mohammad Altamimi / Supervisor**	……..
– **Dr. Hazem Agha / External examiner**	……..
– **Dr. Nihal Natour / Internal examiner**	……..

Dedication

First of all, I am deeply grateful to Allah who helped me in completing my project successfully

Days passed from my life and I started it with a step ... and here I am today reaping the fruits of the years of years in which my goal was clear ... and I strive every day to achieve it and reach it no matter how difficult it was...

Today I stand before you ... and here I arrived with a flame of knowledge in my hand ... and I will take great care of it so that it does not go out ... and I thank God first and foremost for having helped me and helped me in that ...

Then I would like to thank the tender heart ... those who were beside me in all the past stages ... who relished suffering ... and a candle was burning to illuminate my path...To my beloved mom

And to the one who taught me to stand ... and how to start the thousand miles by step ... to my right hand ... to the one who taught me to ascend with his eyes watching me ... my father ... to those who held my hand and taught me a letter ... a letter ...

Then, special thanks to my Supervises Dr Mohammad Altamimi , thank you for your direction to make this thesis complete successfully. To my brothers and sisters, to my love , to my friends.

Acknowledgment

Thanks to Allah for supporting me with determination throughout the preparation of this work.

Great thanks to my university

"An-Najah National University "

My high appreciation to my supervisor:

Dr. Mohammad Altamimi

who helped and supported me with his advice.

الاقرار

انا الموقع ادناه مقدمة الرسالة التي تحمل العنوان:

The Relationship between Malnutrition and Selected Age Related Disorders Among Palestinian Older Adults in Long-Term Care Houses

أقر بأن ما اشتملت عليه هذه الرسالة إنما هي نتاج جهدي الخاص، باستثناء ما تمت الاشارة إليه حيثما ورد،وأن هذه الرسالة ككل، أو أي جزء منها لم يقدم من قبل لنيل أي درجة علمية أو بحث لدى أية مؤسسة تعليمية أو بحثية أخرى.

Declaration

The work provided in this thesis, unless otherwise referenced, is the researcher's own work, and has not been submitted elsewhere for any other degree or qualification.

Students Name: **الإسم الطالب: محمد كمال عيد**

Signature: **التوقيع:**

Date: **التاريخ: 2021/9/14**

Table of Contents

List of Tables

List of Figures

List of Appendices

List of Abbreviations

ADL	activity daily living
IADL	Instrumental activity daily living
MOCA	Montreal - Cognitive Assessment
GDS	Geriatric Depression Scale
MNA	Mini nutritional assessment
BMI	Body mass index
CC	Calf circumference
WC	Waist circumference
HC	Hip circumference
WHR	Waist to hip ratio
MUAC	Mid upper arm circumferences
Kcal	Kilo calorie
g/d	Gram per day
RDA	Recommended dietary allowance
MUST	Mini universal screen tool
MNA-SF	Mini nutritional assessment short form
PG-SGA	Patient-Generated Subjective Global Assessment
Pt-Global webtooL	Patient global webtool
interRAI	International Resident Assessment Instrument
ESPEN	European Society of Clinical Nutrition and Metabolism
CONUT	Controlling Nutritional Status
NRS	Nutrition risk screening
TSF	Triceps skinfold thickness
MAC	Mid-arm circumference
MAMC	Mid-arm muscle circumference
MAMA	Mid-arm muscle area
GCI	Group with cognitive impairment
GWCI	Group without cognitive impairment
CMAMA	Corrected mid-arm muscle area
SBP	Systolic blood pressure
DBP	Diastolic blood pressure
FFM	Fat free mass
VFR	Visceral fat rating
BFM	Body fat mass
SMM	Skeletal muscle mass
SMI	Skeletal muscle index
K-MBI	Korean version of the Modified Barthel Index
6MWT	6-minute walking test

CST	Chair stand test
2MST	2 minute step test
ACT	Arm-curl test
TUGT	Time up and go test
CSRT	Chair sit-and-reach test
HGS	Hand grip strength
GS	Gate speed
BST	Back scratch test
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders, fourth edition
CS-GDS	Cornell Scale Geriatric Depression Scale
MMSE	Mini Mental State Examination
DM	Diabetes mellitus
COPD	Chronic obstructive pulmonary disease
CHF	Congestive heart failure
CKF	Chronic kidney failure
CAD	Coronary heart disease
CHF	Congestive heart failure
CVD	cerebrovascular disease
GERD	Gasro esophageal reflux disease
HT	Hypertension

The Relationship between Malnutrition and Selected Age Related Disorders Qmong Palestinian Older Adults in Long-Term Care Houses

By
Mohammed Eid
Supervisor
Dr. Mohammad Altamimi

Abstract

Elderly care homes in Palestine are increasing due to the changes in social life and the nature of modern life commitments. Few studies have addressed the social life of elderly people in long- term care houses. However, elderly Palestinians in care homes suffer from many health issues related to their nutrition. These issues include malnutrition, lack of food intake, weakness, lack of fitness, loss of muscle mass and dependence on others, risk of falling, increased infection with chronic diseases in addition to social isolation and depression. This study aimed to evaluate the nutritional status, cognitive function, physical function and depression. Moreover, relationships between malnutrition and selected age related disorders among Palestinian older adults in long-term care homes will be determined.

The study has followed the cross-sectional design. Demographic characteristics, medical history, assessment of nutritional status (anthropometric measurements, body composition, MNA tools, 24hour record, food satisfaction), functional status assessment (Senior Fitness test and ADL tool), cognitive function assessment (MOCA tool) and depression assessment (GDS tool) were recorded using the corresponding tool for each variable.

A total of 94 participants (men, 25.5%) and (women, 74.5%) were included in the final data analysis. The results revealed that 41.5 % of the participants were at risk of malnutrition, while 8.5 % were malnourished. 35.1 % were with severe impairment ADL and 47.9 % were with moderate impairment ADL. one out of three was with mild depression and 12.8% were moderately to severely depressed. The majority (93.6 %) had cognitive function impairment. It was found that depression was associated with high risk of malnutrition ($P < 0.05$).

Although risk of malnutrition was less common among the study sample, it was associated with psychological status. Therefore, it is essential to provide psychological support for Palestinian older adults in long-term care houses. These findings are important to design strategic program and awareness plans targeting the stakeholders in the long-term care facilities to improve the residents' nutritional and psychological status.

Chapter One

Introduction

Chapter One

Introduction

1.1 Background

Worldwide, the number of elderly people is increasing due to the increased life span. It is expected that By 2030, 1 in 6 people in the world will be aged 60 years or over. At this time the share of the population aged 60 years and over will increase from 1 billion in 2020 to 1.4 billion. By 2050, the world's population of people aged 60 years and older will double (2.1 billion). The number of persons aged 80 years or older is expected to triple between 2020 and 2050 to reach 426 million. (WHO, 2018). In the Arab countries, the number of people has doubled from 173 million in 1980 to 357 million in 2010 and is expected to reach 633 million in 2050, constituting 6.8% of the total population in the world. The percentage of people aged 65 and above in the Arab populations was 3.4% in 1980 (3.6% female, 3.2% male) and is expected to reach 6.7% in 2030 (7.3% female, 6.1% male). The proportion of people aged 80 and above is also, expected to increase from 0.6% in 2010 to 0.9% in 2030. According to the World Population Prospects, in 2010, the total population in Palestine was 4,039,000 persons (1.1% of Arab world) and is projected to reach 9,727,000 persons in 2050 (1.5% of Arab world). (Sibai ,AM., Rizk, A., & Kronfol, KM ,2014).

The Percentage of older adult in Palestine was 4.6% of the total population whereas 5.1% being in the West Bank and 3.9% in Gaza Strip. (PCBS,2017). The Percentage of older people aged 65 and above in Palestine was 2.7% in 2010 and is expected to reach 7.1% in 2050, while the percentage of people, whose age was 80 and above was 0.3% in 2010 and is projected to reach 1.2% in 2050. In Palestine, the life expectancy for individuals has increased from 62.8 years in 1980 to 71.5 years in 2010 for males, and from 66.1 years to 74.8 years for females and is expected to reach 77.2 years for males and 81.0 years for females in 2050 (Sibai ,AM., Rizk, A., & Kronfol, KM ,2014).

Aging is associated with deterioration in the psychological, social, pathological and physiological aspects. (Amarya, S., Singh, K., & Sabharwal, M, 2015). Aging leads to many changes in the body composition, including loss of muscle mass, increase in body fat accumulation, increase in visceral fat and intermuscular fat. Aging is associated with an increased mortality risk and functional decline (Santanasto et al, 2017). Nutrition affects the whole process of aging. Malnutrition is associated with impaired cognitive function, low bone mass, impaired immune function, anemia, impaired muscle function, long stay in hospitals and mortality and the age-related changes relevant to nutrition are osteoporosis, sarcopenia, digestive system dysfunction that limits saliva and gastric acid production, thirst and appetite dysregulation, vision loss, These changes, in addition to other psychological changes, such as a feeling of neglect and a feeling of loneliness, negatively affect dietary habits

and food intake, which can lead to nutrient deficiency and health problems (Amarya, S., Singh, K., & Sabharwal, M, 2015).

Malnutrition is a real problem in elderly people. A variety of poor conditions such as dental hygiene, chronic and acute diseases, impaired cognition, accompanied with multimedication may compromise dietary intake, lead to nutritional deficiencies, and aggravate malnutrition. Consequently, increased incidence of morbidity and mortality are well reported (Ulger et al, 2013).

Malnutrition is a common problem among elderly home residents, which may result from disease or lack of food intake. It is considered one of the most important factors to high mortality rates among elderly in long term care facilities (Bell CL, Lee AS, Tamura BK, 2015). Evaluation of nutritional status for elderly is the first step to detect the prevalence of malnutrition in order to prevent the nutrition- related problems (Ulger et al , 2013).

Malnutrition can be screened by several popular validated tools such as; Mini Nutritional Assessment (MNA), the Nutritional Risk screening 2002 (NRs), and the Malnutrition Universal Screening Tool (MUST), which are recommended by the European Society for Clinical Nutrition and Metabolism (ESPEN) (Diekmann, et al., 2013).

Cognitive impairment is a very common problem in the elderly around the world, as it may cause mild changes that lead to impairment in carrying out activities of daily living and a delay in memory or severe changes such as depression, anxiety, and major disability (Miu, et al., 2016).

Cognitive impairment includes slow in processing speed, declined attention, loss of memory, decrease in the verbal fluency, decrease in the visuospatial abilities and impaired executive functioning (Harada, Love, & Triebel, 2013).

Prevalence of dementia is increase with age. It is also affected by the level of education, smoking and some diseases such as diabetes. (Miu. et al., 2016).

Physical functions decline with age. Physical inactivity leads to many health problems, including impaired cognitive functions, mood changes, social problems, declined cardiovascular health, and compromised immune system. It was recommended to maintain the efficiency of physical functions and increasing physical activity for a later period of life to improve mental functions, reduce the physical disabilities. and reduce the risk of falls in the elderly. It was found that physical functions in elderly were strongly linked with physical activity (Metti, A. L. et al 2018).

Aging is associated with a decline in physiological capabilities, especially in the cardiovascular and musculoskeletal systems. It leads to a decline in maximal aerobic performance, a decrease in cardiac output and oxygen

uptake at the muscle, and a reduction in maximal strength. (Manini, T. M., & Pahor, M. 2009).

1.2 Research problem

Older adults who are resident in long-term care houses, are among the most vulnerable groups to malnutrition. Due to the deterioration in their physiological and mental status they require special care from nursing home administration, attendants and the authorities. In Palestine, there is an increase in the number of long-term care houses for older adults. Therefore, it has become very necessary to study the health status of older adults in long-term care houses, and to determine the prevalence of age- related disorders among them. It is important to highlight that there is obvious gap in the scientific data available about the health status of this group and what are the major age-related disorders that they are facing, moreover, to determine the associated factors that may have an impact on their general health. In this context, this study will be among the first studies that have been conducted in Palestine to study the health status of older adults in long-term care houses.

1.3 Research Objectives

1.3.1 General Objective

To determine the prevalence of malnutrition and its associated age-related disorders among Palestinian older adults in long-term care houses.

1.3.2 Specific Objectives

1. To assess the nutritional status of the elderly in the long-term care houses using MNA tool.
2. To determine the prevalence of cognitive impairment and its association with nutritional status among the study sample using MOCA tool.
3. To determine the functional status and physical fitness status among the study sample using ADL tool and senior fitness test.

1.4 Research hypothesis

1. Malnutrition has considerable prevalence among older adults in long-term care houses.
2. Malnutrition is associated with other age-related disorders.

1.5 Significance of the study

This study will provide important and comprehensive data regarding the nutritional status of Palestinian older adults in long-term care houses in terms of anthropometric measurement, body composition and diet intake. In addition, the study will highlight the relationship between malnutrition and other age-related disorder such as cognitive impairment, depression and level of dependency among the study sample. The results of the study will be used as a resource to future nutritional education programs to enhance the nutritional status, food service, functional status of the older adults at long-term care houses. This study will fill the gap of knowledge about the prevalence of malnutrition, cognitive and functional status of the Palestinian older adults in long-term care houses.

Chapter Two

Literature Review

Chapter Two

Literature Review

2.1 Malnutrition

Malnutrition is a major public health problem that affects people worldwide and occurs as a result of insufficient or excess consumption of food. Malnutrition is divided into 2 main categories. the first is undernutrition which includes wasting, stunting and underweight while, the second is overnutrition which includes overweight and obesity (WHO, 2020).

Malnutrition is associated with many health problems and negative consequences affecting the whole body. Such consequences include: impaired physical function, cardiac output decline, impaired gastrointestinal function (secretion and absorption), impaired immunity, depression and anxiety (Saunders, J., & Smith, T. 2010).

2.1.1 Aging and malnutrition

Aging process is associated with a wide range of changes in body functions including: physical function decline, mental function decline, incidence of disease such as diabetes and osteoarthritis, psychological problem and gradual decline in vision and hearing (WHO, 2018). Geriatric syndromes are negative consequences of aging complication that include frailty, urinary incontinence, falls, delirium and pressure ulcers which increase the risk of disability and death in the elderly (WHO, 2018).

The elderly people are among the groups that most vulnerable to malnutrition (Donini, L. M., et al., 2013). Aging causes negative changes that affect the performance of the digestive system, including: decrease in saliva, decrease in absorption, dysphagia, delay in gastric emptying and peristalsis resulting in malabsorption. So, aging is strongly associated with malnutrition. In addition to aging, there are other factors that increase the elderly being vulnerable to malnutrition such as medication side effects, psychological problems, oral and dental problems, low quality of life and the presence of chronic diseases (Gorji, H. A., et al 2017).

2.1.2 Malnutrition in elderly

Elderly people suffer from social, educational, economic, psychological, and physiological factors that make them more vulnerable to malnutrition. Factors such as widowing, illiteracy and low education level, poverty, depression and anxiety, and poor physical function will exacerbate the burden of malnutrition and usually are associated with prevalence of morbidity and mortality in the elderly (Krishnamoorthy, Y., et al .2018).

Malnutrition in the elderly can be screened by several validated tools such as: Mini Nutritional Assessment – short form (Lilamand, M., et al. 2015), Malnutrition Universal Screening Tool (MUST), Body Mass Index (BMI), percentage of weight loss during the last 3–6 months, mid upper arm muscle circumference (MUAMC), triceps skinfold thickness (TSF) and hand-grip strength (Aukner, C., Eide, H. D., & Iversen, P. O. 2013).

Subjective Global Assessment (PG-SGA), the Pt-Global webtool; and the interRAI (Keller, H., et al. 2019)

MNA is the most common tool that used for screening and assessment the malnutrition in elderly people. The specificity, sensitivity and predictive positive value of MNA for malnutrition evaluation was 98%, 96% and 97% respectively. MNA-SF is also validated tool for malnutrition assessment and to predict the mortality of elderly in the long-term care home residents (Lilamand, M., et al . 2015). Generating the MNA-SF from Full MNA has increased its application and reduced the time required for evaluation. Assessment of nutritional status among nursing home residents is an important step in maintain their health from being deteriorated in the early stages (Diekmann, R., et al. 2013).

2.1.3 Malnutrition prevalence in long-term care houses

Malnutrition is a common problem in the elderly people living in long-term care houses. A good nutritional status can improve the health, function, and enhance the quality of life for residents of long-term care houses (Keller, H., et al. 2019). Despite the progress in industrialized countries, the phenomenon of malnutrition among resident of long-term care houses is still considered an alarming and important issue for both decision makers and researchers. Therefore, many studies were conducted to find out and to assess the prevalence of malnutrition in the elderly (Donini, L. M., et al. 2013). Appendix 1 lists the studies that were conducted to determine the prevalence of malnutrition among residents of long-term care houses.

Malnutrition was reported to be as low as 2.8% among 895 older adults in Spain (Serrano-Urrea, R., & Garcia-Meseguer, M. J. 2013) and was as high as 53.7% in Canada among 638 older adults (Keller, H. et al .2019).

According to anthropometric measurements, the lowest mean of BMI = 24.29 (Kg/m^2) was reported in Iran among 76 older adults (Saghafi-Asl, M., & Vaghef-Mehrabany, E. 2017) while the highest mean of BMI = 34 (Kg/m^2) was reported in Romania among 16 older adults with metabolic syndrome aged 58-89 years (Mocanu, V. 2013).

The lowest mean of CC = 27.4 (cm) was reported in Germany among 17 older adults with BMI<20 aged ≥65 years, while the highest mean of CC = 37.5 (cm) was also reported in the same study among 47 older adult with BMI>30 (Kaiser, R. et al. 2010).

The WC among many studies has ranged between 83.6 (cm) as reported in Germany (17 older adult with BMI<20 aged ≥ 65 years), to 112.6 (cm) as reported in the same study (47 older adult with BMI >30) (Kaiser, R. et al. 2010).

The HC 90.05 (cm) among 76 Iranian older adults (Saghafi-Asl, M., & Vaghef-Mehrabany, E. 2017) to 105 (cm) as reported in Turkish older adults (228, aged ≥ 65 years) (Halil, M. E. L. T. E. M. et al. 2014).

WHR of 0.9 was reported in Spain for adults aged ≥80 (Álvarez Barbosa, F. et al . 2015) while it was 1.01 in Iran (Saghafi-Asl, M., & Vaghef-Mehrabany, E. 2017).

The lowest mean of MUAC = 25.39 (cm) was reported in Bosnia and Herzegovina among 146 older adults aged ≥ 65 years (Pavlovic, J. et al .2019) while the highest mean of MUAC = 28.7 (cm) was reported in Turkey among 228 older adult aged ≥ 65 years (Halil, M. E. L. T. E. M. et al . 2014).

Low body fat percent of 25.8 was reported in Belgian among 211 older adults (Buckinx, F. et al. 2018) while higher body fat percent of 41.5 was reported in Spain among 31 older adults aged ≥ 80 years (Álvarez Barbosa, F. et al. 2015). The range of fat free mass was from 30.7 (kg) in Turkey among 23 older adults aged more than 60 years (Bahat, G. et al. 2010) to 39.6 (kg) in Poland among 12 older adults aged ≥ 80 years (Zarzeczny, R. et al. 2018). On the other hand, Fat mass of 18.5 (kg) was reported among 12 older adults aged ≥ 80 years (Zarzeczny, R. et al. 2018) while higher mean of Fat mass of 25.5 (kg) was reported in 31 male aged 83.6 years (Kimyagarov, S. et al. 2010).

The Basal metabolic rate 1207 (kcal) was reported in 21 older adults aged ≥ 65 years (Kimyagarov, S. et al. 2013).

With regard to food intake, the mean daily energy intake of 1535 ± 413 kcal and a protein intake of 54.2 ± 0.9 g/d were reported in Germany among 350 older adults aged ≥ 65 years (Volkert, D. et al. 2011). In Belgium, the mean daily energy intake of 1552.4±342.1kcal, protein intake of 54.8±10.7g, lipid intake of 64.1±25.5 g and carbohydrate intake of 189.9±51.0 g were reported among 74 older adults aged older than 65 years

(Buckinx, F. et al . 2016). In Spain, a study included 62 older adults aged ≥ 65 years, men obtained 84% (1938.54 kcal/day) of the RDA while women obtained almost 92% (1743.64 kcal/day) and the men obtained 130% of the protein RDA and women obtained 137% of protein RDA (Mila, R. et al .2012). Men obtained 1867 (kcal) and 69 g of protein per day ,while the women obtained 1654(kcal) and 60 g of protein per day was reported in Finland among 375 older adult aged ≥ 60 years. (Vikstedt, T. et al . 2011).

2.2 Age- related disorders

Aging is associated with deterioration in the psychological, pathological, social, and physiological aspects. Physiological changes include: decrease of lean body mass, increase of body fat, physical function impairment, cognitive function impairment. Pathological changes include: increase in the incidence of chronic disease and metabolic disorder. While the psychologicaland social changes include: loneliness, depression and feeling of neglect (Amarya, S., Singh, K., & Sabharwal, M, 2015).

2.2.1 Aging and physical function

Aging leads to impairment of the physical functions which includes; walking speed declines, mobility disability, frailty, falls, incontinence and dependency in activity daily living (ADL) and instrumental activity daily living (IADL) such as bathing, dressing, toileting, feeding, shopping, cooking, and housekeeping (Jaul, E., & Barron, J. 2017).

2.2.1.1 Physical function impairment in the elderly

Physical function impairment in the elderly can be screened by several validated tools such as: ADL Katz index which was used on 2480 elderly individuals aged ≥ 70 years in Belgium. (Vandewoude, M. F. et al. 2019). ADL hierarchical scale was used on 1061 elderly individuals aged ≥ 65 years in Canada (Doupe, M. et al. 2012). ADL Barthel Index (K-MBI) also was used on 395 elderly individuals aged ≥ 65 years in South Korea (Park, Y. H. et al. 2013). Senior fitness test was used on 172 elderly individuals aged ≥ 60 years in Norway. (Langhammer, B., & Stanghelle, J. K. 2011). The common procedure between all tools is to involve the participants in a measurable physical activity that can indicate a level of functionality.

2.2.1.2 Prevalence of physical function impairment in long-term care houses

Physical function impairments such as loss of the strength and endurance, increase the rate of dependency, disability of mobility and falls are more common in nursing home resident (Abizanda, P. et al. 2015). Appendix 2 shows the studies conducted to determine the prevalence of physical function impairments in long-term care houses.

Dependency prevalence (Appendix 2) among older adults was as low as 13% in Switzerland (44,811 older adults aged ≥65 years) (Schumpf, L. F. et al., 2017) and in Lebanon 13.1% was reported among 221 older adults aged ≥60 years (Doumit, J. H., Nasser, R. N., & Hanna, D. R. 2014) while prevalence of dependency was 56.3% as reported in a Swedish study (4831

older adults) (Björk, S. et al., 2016). The variations may depend on the tools, mean age and range of age of participants involved in the studies.

According to senior fitness test (Appendix 2); the lowest mean of chair stand test was 6.9 (times) in Spain among 33 older adults aged ≥70 years (Rezola-Pardo, C. et al. 2019) while Norway has reported the highest mean of chair stand test 16.5 (times) among 96 older adults aged 70-79 years (Langhammer, B., & Stanghelle, J. K. 2011).

For 2-minute step test, a low mean of 81.3(times) was reported among 21 older adults aged 80-89 years and the highest mean was 99.9 (times) among 55 older adult aged 60 – 69 years in a study conducted in Norway (Langhammer, B., & Stanghelle, J. K. 2011).

The lowest mean of time up and go test was reported in Turkey among 711older adults aged ≥65 years as 6.8 (sec) (Halil, M. E. L. T. E. M. et al. 2014). While it was as high as 29.7(sec) in Germany among 85 older adults aged ≥65 years (Kaiser, R. et al .2010).

The lowest mean of Chair sit-and-reach test −12.7 (cm) was reported in Spain among 47 older adult aged ≥70 years. (Arrieta, H. et al .2018). the highest mean of Chair sit-and-reach test 3.6(cm) was reported in Norway among 96 older adult aged 70-79 years, followed by 2.9 (cm) among 55 older adult aged 60 – 69 years in the same study. (Langhammer, B., & Stanghelle, J. K. 2011).

For Back scratch test, the shorter the distance the better the result. A low mean was reported as 21.3 (cm) in Spain among 114 older adults aged ≥70

year (Arrieta, H. et al. 2018) with a highest mean as 7.4 (cm) was reported in Norway among 21 older adults aged 80-89 years. (Langhammer, B., & Stanghelle, J. K. 2011).

Hand grip test also indicates physical functioning. A low mean of 8.2 (kg) was reported in Italy among 122 older adults aged ≥70 years (Landi, F. et al .2012) while a higher mean of hand grip test of 26 (kg) was reported in South Korea among 657 older adults aged 70 -84 years (Kim, S. et al .2018).

For gait speed test the range was between 0.64 (m/s) as reported in Spain among 47 older adults aged ≥70 years (Arrieta, H. et al, 2018) to 1.2 (m/s) as reported in South Korea among 657 older adults aged 70-84 years (Kim, S. et al .2018). On the other hand, the mean of rapid gait speed of 0.85 (m/s) was reported in Spain among 47 older adult aged ≥70 years (Arrieta, H. et al, 2018).

2.2.2 Aging and depression

Depression increases with advanced age, characterized by accelerated aging and associated with comorbid medical and chronic conditions such as atherosclerosis, heart disease, hypertension, stroke, osteoporosis, immune impairments (e.g., immune-senescence), obesity, metabolic syndrome, insulin resistance and type 2 diabetes, cognitive decline, and dementia (including Alzheimer's disease) (Wolkowitz, O. M., Reus, V. I., & Mellon, S. H. 2011).

2.2.2.1 Depression in elderly

Depression in the elderly can be screened by several validated tools such as: Cornell Scale which was used in Norway on 902 older adults (Barca, M. L. et al. 201). Depression Rating Scale was used on 4156 older adults in 8 countries (Onder, G. et al. 2012). Goldberg depression scale was used on 114 older adults aged ≥70 years (Arrieta, H. et al. 2018). The Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV) criteria was used in Singapore on 375 older adults aged ≥ 55 years. (Tiong,W.,et al . 2013). Fifteen-item Geriatric Depression Scale (GDS) was used in Epirus on 170 older adults aged > 60 years (Patra P. et al. 2017). Thirty-item Geriatric Depression Scale (GDS) was used in Jordan on 220 nursing home residents aged 28-100 years. (Almomani, F. M. et al. 2014).

2.2.2.2 Prevalence of depression in long-term care houses

Depression and anxiety symptoms is very common problem in nursing homes residents (Drageset, J., Eide, G. E., & Ranhoff, A. H. 2012). Depression prevalence for adults over age 85 is double the rate seen at age 70–74 and more common among institutionalized older adults and those with disabilities (Jaul, E., & Barron, J. 2017). Forty-eight percent of residents in Ohio nursing homes were depressed (Morley, J. E. 2010). Table 1 shows the studies that conducted to determine the prevalence of depression in nursing homes residents. The lowest prevalence of depression of 21.1% was reported in Singapore among 375 older adults aged ≥55 years (Tiong,W.,et al . 2013), while the highest prevalence of depression of

90.2% was reported in Iran among 244 older adult aged ≥60 years (Nazemi, L. et al. 2013).

Table 1: Summary of the studies on Depression prevalence in long-term care houses

#	Author/ year	Country	Subject age	Sample size	Depression assessment tool	Depression prevalence
1	Barca, M. L.et al. (2010)	Norway	mean age of 85.3	902	Cornell Scale	11% -mild depression 10.3% -moderate to severe depression
2	Onder, G. et al. (2012)	8 countries	Mean age was above 80 years	4156	Depression Rating Scale	32%
3	Li, Z., Jeon etal .(2015)	Sydney, New South Wales and Brisbane, Queensland, Australia	Mean age was 84.72	65	GDS-30	59.9%
				66	GDS-15	43.9%
				67	GDS-10	62.7%
				65	GDS-8	43.1%
				64	GDS-4	54.7%
				76	CS-GDS-30	30.3%
				76	CS-GDS-15	34.2%
4	Arrieta, H. et al. (2018)		aged ≥70 years	114	Goldberg depression scale	25% of the participants had a 50% chance of having a clinically important disturbance of depression .
5	Tiong,W.,et al . (2013)	Singapore	aged ≥55 years	375	the Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV) criteria,	21.1%- overall prevalence for depression.
6	Patra P. et al.	Epirus	aged >60	170	15-item Geriatric	62.9% -no depression.

	(2017)		years		Depression Scale	30.6% -moderate depression. 6.5% -severe depression. Therefore, in total 37.1% of the residents suffered by depression.
7	Nazemi, L. et al. (2013)	Iran	aged ≥60 years	244	15-item Geriatric Depression Scale	(9.8%) of the elderly were not depressed, the rest had some degree of depression; 50.0% mild, 29.5% moderate and 10.7% severe
8	Almomani, F. M. et al. (2014)	Jordan	28-100	220	30-item Geriatric Depression Scale	40..5%-normal 59.5%- depression
9	Nogueira, D., & Reis, E. (2013).	Portugal	average age of 82 ± 10 years	266	15-item Geriatric Depression Scale	22.4%-Without depression signs 30.9%-With depression signs
10	Madeira, T. et al (2019)	Portugal	aged ≥65 years	1186	15-item Geriatric Depression Scale	60·4 % of women and 37·2) % of men had symptoms of depression
11	Park, Y. H. et al. (2013)	South korea	aged ≥65 years	395	15-item Geriatric Depression Scale	18.2%-normal 49.8%-Mild depressed 32%-Severe depressed

Abbreviations: GDS = Geriatric Depression Scale, DSM-IV = Diagnostic and Statistical Manual.

2.2.3 Aging and cognitive function impairment

Aging leads to impairment of the cognitive functions which includes mild memory loss, word-finding difficulty, and slower processing speed, dementia increases with advanced age and the dementia prevalence may rise from 47 million in 2015 to 131 million in 2050 however, normal cognitive aging does not lead to dementia. (Jaul, E., & Barron, J. 2017).

2.2.3.1 Cognitive function impairment in elderly

Cognitive function in the elderly can be screened by several validated tools such as: MOCA which was used in Jordan on 182 older adults aged ≥ 60 years (Hayajneh, A.A.etal .2020). MMSE was used in Jordan on 220 older adult aged 82-100 years. (Almomani, F. M. et al . 2014). Cognitive performance scale was used in Minnesota on 13,107 older adults. (Abrahamson,K. et al . 2012). Cognitive Function Scale was used on 941,077 older adults of long stay and 2,066,580 older adults of new admissions. (Thomas, K. S. et al. 2017).

2.2.3.2 Prevalence of cognitive function impairment in long-term care houses

The lowest prevalence of cognitive impairment of 5.7% (moderately severely impaired) was reported in Minnesota among 13107 older adults. (Abrahamson,K. et al . 2012), while the highest prevalence of 87.4% (Mild cognitive impairment) was reported in Jordan among 182 older adult aged ≥60 years. (Hayajneh, A.A.etal .2020) as shown in Table 2.

Table 2: prevalence of cognitive function impairment in long-term care houses

#	Author/ year	Country	Subject age	Sample size	Cognitive function assessment tool	Cognitive function impairment prevalence
1	Hayajneh, A.A.etal .(2020)	Jordan	≥60 years	182	MOCA	87.4%Mild cognitive impairment 12.6% Moderate cognitive impairment
2	Nogueira, D., & Reis, E. (2013).	Portugal	average age of 82 ± 10 years	266	Mini Mental State examination	44.9%-Cognitive impairment 43.8%-No cognitive impairment
3	Almomani, F. M. et al . (2014)	jordan	28-100	220	Mini Mental State examination	47.7%- impaired 52.3%- not impaired
4	Khater, M. S., & Abouelezz, N. F. (2011)	egypt	≥60 years	120	MOCA & MMSE	Mild cognitive impairment was identified in 46 (38.3%) of the participants.
5	Matusik, P. et al . (2012)	Province of Małopolska	≥ 55 years	86	MMSE	26.7%-Moderate cognitive impairment 55.8%-severe cognitive impairment
6	Frändin, K. et al . (2016)	Sweden, Norway, Denmark	over 64 years;	129 in intervention group and 112 in control group	MMSE	Median (range)-19 (0-29) in intervention group Median (range)-19 (0-30) in control group
7	Madeira, T. et	Portugal	≥ 65 years	1185	MMSE	45.7%-impaired cognitive function

	al (2019)					
8	Abrahamson,K . et al . (2012)	Minnesota		13,107	Cognitive performance scale;	18.6% of the sample was cognitively intact, 16.0% borderline impaired, 22.1% mildly impaired, 37.6% moderately impaired, and 5.7% moderately severely impaired
9	Park, Y. H. et al . (2013)	South Korea	≥ 65 years	395	the modified Mini Mental State Examination Korean	76.9%-Moderate to severe cognitive impairment 8.9%-Mild cognitive impairment 14.2%-Normal cognitive impairment
10	Thomas, K. S. et al . (2017)			N=941,077) for long stay new admissions (N=2,066,580)	Cognitive Function Scale	For Long stay 28% cognitively intact, 22% were mildly impaired, 33% were moderately impaired, and 17% were severely impaired. For the admission cohort, the CFS noted 56% as cognitively intact, 23% as mildly impaired, 17% as moderately impaired, and 4% as severely impaired

Abbreviations: MOCA = Montreal - Cognitive Assessment, MMSE = Mini Mental State Examination.

2.3 Aging and chronic diseases

Aging is associated with an increase incidence of chronic diseases that include: cardiovascular disease, hypertension, osteoarthritis, cancer, diabetes mellitus, osteoporosis and multiple chronic conditions (Jaul, E., & Barron, J. 2017).

2.3.1 Chronic diseases in elderly

Older people suffer from many health problems and an increased incidence of chronic diseases, which increase with age and are associated with mobility restriction, affect the emotional status and decrease the quality of life (Öztürk, A. et al. 2011). The prevalence of chronic diseases is high among women and rural areas, where stroke, cancer, chronic obstructive pulmonary disease and myocardial infarction are among the most common diseases in the elderly. Three quarters of the elderly suffer from at least one chronic disease (Wang, L. M., et al. 2019).

2.3.2 Prevalence of chronic diseases in long-term care houses

Table 3 shows that the lowest prevalence of hypertension (30.1%) was reported in China among 329 older adults aged ≥70 years (Yang, M. et al .2018), while the highest prevalence of 66.8% was reported in Portugal among 541old adults (Madeira, T. et al 2019).

Prevalence of diabetes of 10% was reported in China among 329 old adults aged ≥70 years (Yang, M. et al .2018), while it was 31.6% as reported in Portugal among 562 older adult (Madeira, T. et al 2019).

Stroke also was reported in older adults with 7.7% in France among 638 older adult aged ≥60 years (Lilamand, M. et al. 2015) to 17% in China among 329 older adult aged ≥70 years (Yang, M. et al .2018).

The lowest prevalence of COPD was 0% in Turkey among 29 older adult aged ≥65 years. (Duran, S. et al .2019). however, a highest prevalence of 13.1% was reported in China among 329 older adult aged ≥70 years. (Yang, M. et al .2018) .

Cancer prevalence was reported as low as 4% in Italy among 122 older adult aged ≥70 years (Landi, F. et al .2012) while it was 12.6% as reported in France among 638 older adult aged ≥ 60 years. (Lilamand, M. et al . 2015).

CHF has ranged from 7.4% as reported in Turkey among 257 older adult aged over 60 years. (Sahin, S. et al . 2016) to 34% as reported in China among 329 older adult aged ≥70 years. (Yang, M. et al .2018).

One out of three older adults was reported to have arthritis (33%) as in United state among 11788 older adult aged ≥65 years (Moore, K. L. et al .2012) and (35.1 %) as reported in Portugal among 562 older adult (Madeira, T. et al 2019).

Dementia was reported to highly affects older adults with 35.3% was reported in France among 638 older adult aged ≥60 years. (Lilamand, M. et al . 2015) and a higher prevalence of 51% was reported in United State among 11788 older adult aged ≥65 years (Moore, K. L. et al .2012).

Table 3: Prevalence of chronic diseases in long-term care houses

#	Author/ year	Country	Subject age	Sample size	Chronic disease history
1	Landi, F. et al .(2012)	italy	≥70 years	122	11%-Hip fracture (in the past month) 24%-Cerebrovascular diseases 62%-Hypertension 16%-Congestive heart failure 11%-Chronic obstructive pulmonary disease 4%- cancer 16%- diabetes 45%- Osteoarthritis
2	Halil, M. E. L. T. E. M. et al . (2014)	Turkey	≥65 years	228	59.6%-Hypertension 19%-Diabetes mellitus 29.4%-Coronary heart disease 11.8%-Cerebrovascular accident 3.5%-Parkinsonism
3	Madeira, T. et al (2019)	Portugal	≥65 years	551	42.5%-Cardiac disease
				562	31.6%-Type 2 diabetes
				541	66.8%-Hypertension
				513	49.2%-Dyslipidaemia
				539	32.6%-Gastrointestinal disease
				501	35.1%-Arthritis
				503	22.8%-Osteoporosis
4	Sahin, S. et al. (2016)	turkey	Over 60	257	HT (55.6 %)

			years		Alzheimer (23.3 %) DM (17.1 %) COPD (8.6 %) CHF (7.4 %) Parkinson (4.7 %) Depression (4.3 %) CKF (0.4 %) Malignancy (0.4 %) CAD (0.4 %)
5	Vandewoude, M. F. et al . (2019)	Belgian	≥70 years	2480	Cancer -7% Chronic heart failure- 12% COPD -6% Dementia- 43% Depression -15% Diabetes- 18% Fractures-13% Parkinson -6% Rheumatoid arthritis- 5% Stroke- 12%
6	Yang, M. et al .(2018)	china	≥70 years	329	Hypertension -30.1% Ischemic heart disease – 10% CHF – 34% COPD – 13.1% Diabetes – 10%

					Stroke – 17% Cancer – 7.9% Osteoarthritis – 58.1% Parkinson's disease – 9.4%
7	Duran, S. et al .(2019)	turkey	≥ 65 years	29	Diabetes mellitus - 22.7% Hypertension - 54.5% Cardiovascular diseases - 36.4% Cancer -9.1% Chronic obstructive respiratory disease-0% Inflammatory diseases - 31.8% Hormonal disorders – 0% Psychological disorders -9.1% Gastrointestinal diseases -9.1% Neurologic disorders – 0%
8	Lilamand, M. et al . (2015)	france	≥ 60 years	638	Atrial fibrillation -12.3% Heart failure- 26.9 % Coronary heart disease -5.4 % Respiratory disease -9.6% Stroke- 7.7 % Cancer- 12.6 % Diabetes -15.0% Parkinson's disease- 5.9 % Dementia -35.3 %
9	Moore, K. L. et al .(2012)	United state	≥ 65	11,788	The most frequent conditions overall

	were hypertension (55%), dementia (51%), depression (35%), arthritis (33%), diabetes mellitus (24%), GERD (23%), atherosclerosis (21%), CHF (20%), CVD (20%), and anemia (19%).

Abbreviations: HT hypertension, DM diabetes mellitus, COPD chronic obstructive pulmonary disease, CHF congestive heart failure, CKF chronic kidney failure, CAD coronary heart disease, GERD gastroesophageal reflux disease, CHF congestive heart failure, CVD cerebrovascular disease,

Chapter Three

Methodology

Chapter Three

Methodology

3.1 Study Design

The study has followed the descriptive analytical cross-sectional method. The collected data included socio-demographic characteristics, medical history, nutritional status, physical function, cognitive status and activities of daily living.

3.1.1 Sittings

This study was conducted at all residential homes for the elderly in all the governorates of the West Bank (Tulkarm, Jenin, Nablus, Ramallah, Salfit, Jericho, Bethlehem, Jerusalem, Qalqilya, and Tubas).

3.2 Subjects recruitment

All of the long-term care houses in the West Bank were contacted for their official permission to take part of the study. Then, all participants who met the inclusion criteria were invited to join the study. The inclusion criteria included elderly individuals aged 60 years and above with no known mental and terminal illness. Participates who gave verbal consent have joined the study. On the other hand, exclusion criteria included the followings:

I. Subjects who were unable to communicate with the researcher for medical condition or any other reason.

II. An elderly person who refused to participate in the study or didn't give a verbal consent.

III. Presence of an acute illness on the days of data collection.

IV. The period of stay at nursing home was less than 1 month.

3.3 Data collection

The research team members have visited the Long-Term Care Houses in the selected areas and given a verbal short brief about the study to managers and residents before starting the assessment. Data collection and assessment processes didn't interfere with residents' daily activities. The collected data have included: sociodemographic data (age, gender, educational level), medical history (presence of chronic diseases ; diabetes, hypertension, chronic lung disease, osteoporosis, musculoskeletal diseases, coronary heart disease , angina, stroke, cancer, and previous surgery), lifestyle (smoking and eating habits), nutritional status including anthropometric measurement (weight, height, MUAC, WC, HC, CC), Body composition (percentage of body fat), Mini nutritional assessment, and one-day diet record. Cognitive function, psychological status, physical function, and functional status were also recorded.

All participants were treated with care and kindness in appreciation of their health status and were assured that their answers were for research purposes and strictly confidential. Participants were very cooperative with the researchers during data collection.

3.4 Population and sample:

The chosen population has consisted of the Palestinian old adults in long-term care houses. This study was conducted in 11 long-term care houses. Only one center was run by the government while the others were private.

All the geographical areas in the West Bank were covered by the study as follows: the governorates of the northern West Bank (Tulkarem, Jenin, Nablus,Qalqilya and Tubas), the governorates of the central West Bank (Ramallah, Salfit, Jericho and Jerusalem), and the governorates of the southern West Bank (Bethlehem and Hebron) .

3.5 Study Instruments

The study has used a questionnaire (Appendix 3) that has been designed to be simple, easy and clear for researchers and participants. The questionnaire was consisted of the following sections:

3.5.1 General information

Questions regarding the general information included: elderly's name, Long-Term Care Houses name and address, contact number of nursing home, date of the data collection, date of admission. Then, the elderly participants were asked whether they have admitted a previous nursing home (duration and name of that nursing home).

3.5.2 The socio-demographic status:

Questions regarding the socio-demographic status included:

1. Date of birth: This has 2 options (day /month/year or year only).
2. 2.Gender: This has 2 options (male and female).
3. 3.Marital status: This has 4 options (single, married, divorced, widow).
4. 4.Educational level: this has 5 options (primary, secondary, diploma degree, bachelor's degree, no formal education).
5. Number of schooling years: this has 1 option (according to participant).
6. 6.Number of kids: this has 1 option (according to participant).
7. Able to read: This has 2 options (yes and no).
8. Able to write: This has 2 options (yes and no).
9. Able to calculate: This has 2 options (yes and no).

3.5.3 Medical history

Questions regarding medical history included:

1. Do you have Hyper tension? This has 2 options (yes and no).
2. Do you have hypercholesterolemia? This has 2 options (yes and no).
3. Do you have Diabetes? This has 2 options (yes and no).
4. Do you have stroke? This has 2 options (yes and no).
5. Do you have Osteoarthritis / osteoporosis? This has 2 options (yes and no).
6. Do you have Heart disease? This has 2 options (yes and no).
7. Do you have Glaucoma /cataract? This has 2 options (yes and no).

8. Do you have Renal failure? This has 2 options (yes and no).
9. Do you have Asthma? This has 2 options (yes and no).
10. Do you have COPD? This has 2 options (yes and no).
11. Do you have Gout? This has 2 options (yes and no).
12. Do you have Hip fracture? This has 2 options (yes and no).
13. Do you have Constipation? This has 2 options (yes and no).
14. Do you have Gastric ulcer? This has 2 options (yes and no).
15. Do you have cancer? This has 2 options (yes and no).
16. Do you have Vision problems? This has 2 options (yes and no).
17. Do you have Urinary problems? This has 2 options (yes and no).
18. Do you have Difficulty in chewing? This has 2 options (yes and no).
19. Do you have Lack of appetite? This has 2 options (yes and no).
20. Do you have a previous surgical procedure? This has 2 options (yes and no).
21. Do you have falls history?This has 2 options (yes and no).
22. If yes, where is the place of the fall?This has 3 options (In his house, on the street, in nursing home).
23. and what is the date of the fall? this has 2 options (date of falls, I do not remember).
24. are you using denture? This has 2 options (yes and no).
25. Do you smoke? This has 3 options (smoker, previous smoker, non-smoker).
26. if yes, how long is smoking? this has 2 options (The duration of smoking in year, I do not remember).

27. what is the family history of dementia? this has 3 options (yes, no, I don’t know).
28. Blood pressure? (blood pressure measurement by electronic sphygmomanometer (visomat brand type 2).

3.5.4 Nutritional Status Assessment

The nutritional status was assessed using anthropometric measurements, body composition, Mini nutrition assessment tool, dietary intake assessment and self-reported assessment of food sufficiency.

3.5.4.1Anthropometric measurement

The anthropometric measurement included: weight, height, waist circumference (WC), hip circumference (HC), mid upper arm circumference (MUAC), calf circumference (CC) and knee height were used to evaluate the nutritional status of the elderly people according to the standard operation procedure of anthropometric measurement. Prior to the measurement, all equipment's were calibrated. The reading was taken only once, due to the elderly inability to stand for long time except the calf circumference (CC) and hip circumference (HC) was measured 3 times and the highest reading was recorded. Height was measured for people who were able to stand, where the staff were asked to help them to take off the shoes and remove any cover on the head, then the elderly person stood up straight with his/her feet were next to each other, the back to the wall, hands on the sides, breathe normally, look straight ahead, then manually a

cardboard was put on over the participant's head with the level of the wall, then the reading was taken using the tape measure that starts from the ground to the level of the participant's head, and readings were recorded to the nearest 0.1 cm (David, C. N., & Robert, D. L.2013). The body weight of people who were able to stand balanced was measured on the digital scale (Japanese brand, Omron company-HBF-514C TYPE), after taking off the shoes and accessories, placing the feet in the place designated for them on the device, and taking the reading after it was stable, to the nearest 0.1 kg (David, C. N., & Robert, D. L.2013). BMI was calculated for participant whose height and weight were measured according to the standard formula as (body in kilogram divided by height squared in meter (kg/m^2)(Eaton, J. 2005) . BMI was used to assess the nutritional status of adults according to the following cut-off points: Underweight for men and women < 18.5 (kg/m^2), normal weight were 18.5–24.9(kg/m^2), overweight were 25–29.9 (kg/m^2) and obese were >30 (kg/m^2) (Weir, C. B., & Jan, A. 2019).

Waist and hip circumferences were measured using a flexible measuring tape to the nearest 0.1 cm. Initially sites of lower rib and the iliac crest were identified. Each participant was asked to stand up straight, breathe normally, and raise hands up to avoid the tape rolling over them. Waist circumference was measured halfway between the lower ribs and the iliac crest, while hip circumference was measured at the largest circumference around the buttocks (Eaton, J. 2005).The waist-to-hip ratio (WHR) is a value of waist circumference (cm) divided by hip circumference value (cm). WHR used to evaluate the health status for an adult according to the

following cut-off points:a healthy WHR is 0.9 or less in men and 0.85 or less for women. (WHO 2008).

Mid upper arm circumference (MUAC) was measured using a flexible measuring tape to the nearest 0.1 cm. The participant was asked to stand up straight and the reading was taken at the midpoint of the acromion and olecranon processes on the right hand. (Eaton, J. 2005). MUAC was used to identify the subjects with muscle wasting due to malnutrition with the following cut-off points: < 23 cm for men, and < 22cm for women (Chilima, D. M., & Ismail, S. J. 1998).

Calf circumference (CC) was measured using a flexible measuring tape to the nearest 0.1 cm. The participant was asked to sit on a chair and bend his/her leg at a 90-degree angle and record the reading to the widest point where more than one reading is usually taken. (David, C. N., & Robert, D. L.2013). Muscle wasting was defined using the calf circumference cut-off points; < 34 cm for men, and <33 cm for women (Ryoko, K. et al 2014).

Knee height (KH) was measured using a flexible measuring tape to the nearest 0.1 cm.Where the participant bends both the ankle and the knee at a 90-degree angle and then the distance between sole of the foot to the anterior surface of the femoral condyle of the thigh was measured.(Teichtahl, A. J et al 2012). Knee height used to estimation of height in cm for who unable to stand, Where the following standard equation is used (2.02 X kh cm) – (0.04 X age) + 64.19 for men and (1.83 X kh cm) – (0.24 X age) + 84.88 for women .(Berger, M. M., et al 2008).

3.5.4.2 body composition

Body components were measured using bio electric impedance (BIA) (Japanese brand, omron company-HBF-514C TYPE). Initially, the participant's gender,height and age were saved in the device. Then the participants stood on the designated spot with bare feet and no accessories, held the handle of the device and waited for the reading to be stabilized and recorded. The device measured participants body fat percent, muscle mass percent, visceral fat percent, weight, body mass index, metabolic age and basal metabolic rate. Body fat percent was used as a reference for determining obesity-related metabolic risks according to the following cut-off points:aged ≥40 were 34.8% and 46.3% in men and women, respectively(Bawadi, H., et al , 2020)**.**

3.5.4.3 Mini Nutritional Assessment (MNA)

MNA tool was used for geriatric nutritional assessments, which consisted of 18 questions. The questions were divided into four categories; dietary assessment, subjective assessment, global assessment and anthropometric data. The elderly were classified according to their nutritional status into malnourished, at risk of malnutrition and well nourished (Hailemariam, H., Singh, P., & Fekadu, T. 2016). MNA-SF is a valid nutritional screening tool applicable to geriatric health care professionals. MNA-SF had good sensitivity compared to the full MNA. (Kaiser, M. J., et al 2009).

MNA-SF consisted of 6 questions included food intake, involuntary weight loss, mobility, recent psychological stress,memory loss and focus decline

and BMI or calf circumferences in bed-ridden residents.The MNA-SF score ranged between 0 and 14 points and classified the elderly according to their nutritional status with the following cut-off points: normal (12-14 points), at risk (8-11 points), and malnutrition (0-7points) statuses.(Lilamand, M. et al 2015).The nutritional status was evaluated using the validated Arabic version of MNA-SF revised by Nestlé Nutrition Institute (available at www.mna-elderly.com).

3.5.4.4 dietary intake

Dietary intake was assessed using 1 day's diet record. The researcher was present in the homes of the elderly before starting to provide breakfast until the elderly went to sleep and recorded the food consumed by the elderly during this period. This was done for 83 elderly out of 94, due to the researcher's inability to be present in one of the houses at the time of dietary recordings. The food intake was analyzed using meal planning exchange list for traditional dishes in Jordan to estimate the total calories, carbohydrate, protein and fat intake (Bawadi, H. A. 2008). Total calories and protein intake means were compared with the recommended dietary allowance RDA for adult, where the RDA of protein was 56 gm for men and 46 gm for women per day and the RDA of energy was 2300 -2900 kcal/ day for men and 1900- 2200 kcal /day for women per day (NRC ,1989).

3.5.4.5 food sufficiency

Food sufficiency was assessed using self-reported 3 questions: food quantity, food quality and food service.

3.5.5 Physical Function Assessments

The Physical Function will be assessed using activity of daily living (ADL), and senior fitness test.

3.5.5.1 Activity of daily living

The ADL was evaluated using the validated Arabic version of ADL (Nasser & Doumit, 2009). The index ranks adequacy of performance in the six functions of bathing, dressing, toileting, transferring, continency, and feeding. Participants answered with yes or no for each question to determine the level of dependency in each of the six functions. The subjects were classified with the following cut-off points: A score of 6 indicates full function; 4 indicates moderate impairment; and 2 or less indicates severe functional impairment. (Shelkey, M., & Wallace, M. 1999).

3.5.5.2 Senior fitness test

Senior fitness test included: Hand grip test, Thirty-second chair stand test, Two-minute step test, Timed Up and Go test, Set and reach test, Back scratch test, Gate speed test and Rapid gate test.

Hand grip test was used to assess the physical function in the elderly, which measured the strength of the lower body.Hand grip was measured using the Digital Hand Dynamometer (brand CAMRY,MODEL :EH101). Each participant was asked to hold the handle of the device and press as hard as possible using the dominant hand at their pace. The measurement was taken twice and the strongest reading was recorded to the nearest (0.1kg). (Bautmans, I., et al, 2007). Hand grip was used to identify the subjects with muscle weakness with the following cut-off points:Men <30 kg and Women <20 kg (Cruz-Jentoft, A. J., 2010).

The 30-second chair stand test (30-s CST) was used for further assessment of physical function of the elderly. It measures the strength of the lower body.The test consisted of the participant sitting on the chair with his/her back straight and after giving him/her the starting signal, the participant will stand up completely, sit back and repeat this as many times as possible within a 30-second time frame. Whereas, the used chair was the same for all participants. The number of standings and sitting during 30 seconds was recorded (Millor, N., et al 2013).

Two-minute step test measures the aerobic endurance. The participant was asked to raise his/her knee to a point midway between the patella and iliac crest. The result is the number of full steps completed in 2 minutes (Milanović, Z., et al .2013).

The Timed Up and Go test (3- meter TUG) measures the balance and mobility deficit. While the participant was sitting on a chair, was asked to stand and walk a distance of 3 meters, then turn around, walk back and sit

on the chair. The time spent by participant was measured. In the real situation the researcher mistakenly, asked the participants to walk a distance of 6 meters instead of 3 meters, so the results were recorded for 6-meter TUG, instead (Bohannon, R. W, 2006).

Set and reach test measures the flexibility of the lower body.The participant was asked to sit on the edge of the chair, extend his/her right leg forward, bend his/her left leg, then extend his/her fingers and touch the top of his/her toes. The distance between the fingers and toes was measured in centimeters. The negative sign was given if the fingers do not touch the toes and the positive sign if the fingers reach the toes. (Milanović, Z., et al .2013)

Back scratch test measures the flexibility of the upper body. The participant was asked to raise his/her right hand over his/her right shoulder and roll his/her left hand behind his/her back and lift it so that the fingers of the hands touch each other and the more flexible side of the participant was used for evaluation.The negative sign was given if the fingers of both hands didn't touch each other and the positive sign if the fingers of both hands reach each other (Milanović, Z., et al .2013).

Gate speed test evaluates the deterioration due to chronic disease. The participant was asked to stand and then walk a distance of 6 meters, at a normal pace, where the time taken to walk is measured to the nearest (0.1 second) (Kim, H. J., 2016). Gate speed was used to identify the subjects with slowness with the following cut-off points:

Men: Height ≤ 173 cm ≥ 7 s (GS < 0.65 m/s) and Height > 173 cm ≥ 6 s (GS < 0.76 m/s)

Women: Height ≤ 159 cm ≥ 7 s (GS < 0.65 m/s) and Height > 159 cm ≥ 6 s (GS < 0.76 m/s) (Cruz-Jentoft, A. J., 2010)

Rapid gate test evaluates the general health and skeletal muscle mass. The participant was asked to stand and then walk a distance of 6 meters, at a maximum pace, where the time taken to walk was measured to the nearest (0.1 second). (Kim, H. J., 2016).

3.5.6 Cognitive Function and Depression Assessments

Cognitive function was assessed using Montreal cognitive assessment (MOCA). This scale could be used as a screening test for cognitive loss or as a brief bedside cognitive assessment (Koski L. 2013). The MOCA is a brief cognitive screen comprising 30 scorable items that assess 8 different cognitive domains: attention and concentration, executive functions, memory, language, visuoconstructional skills, conceptual thinking, calculations, and orientation. The MOCA score ranges between 0 and 30 points and classifies the elderly according to their cognitive status with the following cut-off points: cognitive impairment was < 26, normal was ≥ 26. The scale is usually administered in 10 minutes. In this study, time was not taken into consideration due to the health status, educational level and low mental abilities of the elderly. (Smith, T., Gildeh, N., & Holmes, C. 2007).

The Geriatric Depression Scale (GDS) was used to assess the depression among older people. The GDS was designed in an easy and simple way, so

it can be self-administered. Geriatric Scale for Depression 15-item (GDS-15) was used rather than the original scale with 30 items. The GDS-15 score ranges between 0 and 15 points and classifies the elderly according to the following cut-off points: normal (0-4 points), mild depression (5-9 points), and moderate to severe depression (10 or more points) (Conradsson, M., et al 2013).

3.6 Statistical analysis

Data entry were done using Software Statistical Package for Social Sciences version 23 (SPSS) after coding the questionnaire. Descriptive statistics (Frequencies and percentage) were used to describe the main features of a collection of data in quantitative terms and construct the needed tables to answer the research questions. The level of significance was set to $P \leq 0.05$, and confidence interval CI=95%. fisher test was used to determine the association between malnutrition and categorical variables while one-way ANOVA test was used to determine the relationship between malnutrition and other continuous variables.

3.7 Ethical Considerations

Ethical approval will be applied to the IRB (Internal Review Board) at An-Najah National University. (Appendix 4)

Chapter Four

Results

Chapter Four

Results

The purpose of this chapter was to determine the prevalence of malnutrition and the relationship between Malnutrition and age related disorders among Palestinian old adults in long-term care houses. This section presents the results for the participants' socio-demographic status, medical history, anthropometric measurements and body composition, nutritional status (mini nutritional assessments, dietary intake, food satisfaction of meal pattern and meal composition, functional status (activity of daily living, senior fitness test), mental health and cognitive status.

4.1 Subjects Recruitment.

Table 6 shows the subjects' distribution according to their Long-Term Care Houses and governorate. The total number of residents in 11 houses was 258. Ninety four participants were included (36.4%) and 164 (63.6%) residents were excluded because they haven't met the inculsion criteria.

A total of 24 (25.5%) men and 70 (74.5%) women were included in the final analysis.

Table 7 shows the period of residence in months for subjects according to gender. Men have recorded 41.96±36.38 month (mean + SD) compared with 40.34±61.65 month for women. There was no significant difference in residence period according to gender.

Table 4: Subjects recruitment

#	city	Name of house	Total resident	Recruited resident
1	Tulkarem	Dar al Kawthar association for the care of the elderly and people with special needs	13	3
2	Tulkarem	Biet- Elajdad house association for the care of the elderly and people with special needs	25	7
3	Jenin	Elderly house charitable society	20	10
4	Nablus	Cultural social charitable society- house of love and harmony	19	9
5	Nablus	The elderly home of the Palestine red crescent society	18	5
6	Salfit	Al-wafa association for elderly care	13	3
7	Ramallah	Al – Rafah villa	17	4
8	Ramallah	Arab women union society – Al - Bireh	17	11
9	Ramallah	Arab women union society- Ramallah	33	9
10	Beitlahem	Saint Nicholas house for elderly	34	22
11	Jericho	Biet- Elajdad house for elderly caring	49	11
		total	258	94

Table 5: Subjects residential period in months according to gender.

parameter	Men (n)	Men (Mean±SD)	Women (n)	Women (Mean±SD)	Total (n)	Total (Mean±SD)	P value
Residence period in months	24	41.96±36.38	70	40.34±61.65	94	40.75±56.11	0.104

4.2.1 Socio demographic characteristics

The age distribution was as follows: 20 participants (21.3%) aged 60-70 years,43 (45.7%) aged 70-80 years and 31 (33%) aged 80 years and above as shown in Table 8. The majority of the participants were single (44.7%); had primary education level (39.4%); able to read (60.6%); able to write (62.8%); able to calculate (67%). Men had a significantly higher percent of education, ability to read, ability to write, and ability to calculate compared

to women ($p<0.05$) also, men had a higher mean + SD of year of schooling (11.82±4.5) than women (8.8±4.38). While, women had higher means of age, number of kids and percent of being single or widow compared to men.

Table 6: Subjects' characteristics according to gender [presented as number (%)]

parameter	Men (n=24)	(%)	Women (n=70)	(%)	Total (n=94)	(%)	P value
age							
60-70 year	10	41.7	10	14.3	20	21.3	
70-80 year	10	41.7	33	47.1	43	45.7	*0.014
80 and more	4	16.7	27	38.6	31	33	
Marital Status							
Single	10	41.7	32	45.7	42	44.7	
Married	7	29.2	4	5.7	11	11.7	**0.001
Divorced	5	20.8	7	10	12	12.8	
Widow	2	8.3	27	38.6	29	30.9	
Level of Education							
No Formal Education	2	8.3	29	41.4	31	33	
Primary School	10	41.7	27	38.6	37	39.4	**0.001
Secondary School	6	25	9	12.9	15	16	
Diploma	0	0	3	4.3	3	3.2	
University degree	6	25	2	2.9	8	8.5	
Ability to read							
Yes	21	87.5	36	51.4	57	60.6	**0.002
no	3	12.5	34	48.6	37	39.4	
Ability to write							
Yes	22	91.7	37	52.9	59	62.8	**0.001
No	2	8.3	33	47.1	35	37.2	
Ability to calculate							
Yes	22	91.7	41	58.6	63	67	**0.002
no	2	8.3	29	41.4	31	33	

parameter	Men (n)	Men (Mean±SD)	Women (n)	Women (Mean± SD)	Total (n)	Total (Mean ±SD)	P value
Num	12	3.33±1.23	19	4.15±1.6	31	3.83±1	0.85

ber of kids						.50	
Year of schooling	17	11.82±4.5	32	8.8±4.38	49	9.85±4.61	0.06

significant (P<0.05), ns= not significant (P > 0.05)* p<0.05, ** p<0.01

4.2.2 Medical history

As shown in Table 9, men had a significantly higher smoking habit than women (p<0.05). Woman had a significantly higher osteoarthritis/ osteoporosis and presence of falls history (p<0.05) than men. The incidence of stroke, asthma and difficulty in chewing in men was higher than in woman while, the incidence of hypertension, Hip fracture, urinary problem, gastric ulcer and using denture in woman was higher than in men. The incidence of gout in woman (11.4%) was also,higher than in men (0%).

Table 7: Health profile of subjects according to gender [presented as number (%)]

parameter	Men (n=24)	(%)	Women (n=70)	(%)	Total (n=94)	(%)	P value
Glucoma							
yes	6	25	23	32.9	29	30.9	0.61
no	18	75	47	67.1	65	69.1	
Hypertension							
yes	12	50	44	62.9	56	59.6	0.33
no	12	50	26	37.1	38	40.4	
Hypercholesteremia							
yes	8	33.3	25	35.7	33	35.1	1.000
no	16	66.7	45	64.3	61	64.9	
Diabetes							
yes	6	25	21	30	27	28.7	0.79
no	18	75	49	70	67	71.3	
Stroke							
yes	11	45.8	15	21.4	26	27.7	*0.03
no	13	54.2	55	78.6	68	72.3	
Osteoarthiritis/osteoprosis							**0.00
Yes	5	20.8	40	57.1	45	47.9	

no	19	79.2	30	42.9	49	52.1	
Heart disease							
Yes	4	16.7	13	18.6	17	18.1	1.00
no	20	83.3	57	81.4	77	81.9	
Renal failure							
yes	2	8.3	6	8.6	8	8.5	1.00
no	22	91.7	64	91.4	86	91.5	
Asthma							
yes	4	16.7	5	7.1	9	9.6	0.22
no	20	83.3	65	92.9	85	90.4	
Chronic obstruction pulmonary disease							
Yes	2	8.3	3	4.3	5	5.3	0.59
no	22	91.7	67	95.7	89	94.7	
Gout							
Yes	0	0	8	11.4	8	8.5	0.10
no	24	100	62	88.6	86	91.5	
Hip fracture							
yes	1	4.2	13	18.6	14	14.9	0.10
no	23	95.8	57	81.4	80	85.1	
Chronic constipation							
yes	2	8.3	5	7.1	7	7.4	1.00
no	22	91.7	65	92.9	87	92.6	
Gastric ulcer							
yes	1	4.2	10	14.3	11	11.7	0.27
No	23	95.8	60	85.7	83	88.3	
parameter	**Men (n=24)**	**(%)**	**Women (n=70)**	**(%)**	**Total (n=94)**	**(%)**	**P value**
Cancer							
yes	1	4.2	4	5.7	5	5.3	1.00
no	23	95.8	66	94.3	89	94.7	
Vision problem							
Yes	13	54.2	30	42.9	43	45.7	0.35
no	11	45.8	40	57.1	51	54.3	
Urinary problem							
yes	6	25	32	45.7	38	40.4	0.09
no	18	75	38	54.3	56	59.6	
Difficulty in chewing							
yes	6	25	6	8.6	12	12.8	0.07
No	18	75	64	91.4	82	87.2	
Lack of appetite							
yes	4	16.7	10	14.3	14	14.9	0.74
no	20	83.3	60	85.7	80	85.1	
Previous surgical procedure							
yes	11	45.8	41	58.6	52	55.3	0.34
no	13	54.2	29	41.4	42	44.7	
Using denture							0.08

yes	5	20.8	29	41.4	34	36.2	
no	19	79.2	41	58.6	60	63.8	
Smoking							
smoker	12	50	7	10	19	20.2	**0.00
Previous smoker	7	29.2	6	8.6	13	13.8	
Non smoker	5	20.8	57	81.4	62	66	
Presence of falls history							
yes	10	41.7	50	71.4	60	63.8	**0.01
no	14	58.3	20	28.6	34	36.2	
Family history of dementia							
yes	2	8.3	4	5.7	6	6.4	0.64
No	22	91.7	65	92.9	87	92.6	
Parameter	**Men (n=22)**		**Women (n=69)**		**Total (n=91)**		**P value**
Systolic blood pressure							0.97
Mean± SD	25.61±135.13		24.01±131.08		±24.32132.06		
Diastolic blood pressure							0.45
Mean± SD	74.18±19.94		72.59±14.81		72.97±16.09		
Pulse							0.57
Mean± SD	72.40±14.89		79.14±15.36		77.51±15.44		

significant (P<0.05), ns= not significant (P > 0.05) * p<0.05, ** p<0.01

4.2.3Nutritional status

Table 10 shows that there was no significant difference between men and women in terms of body mass index, mid upper arm circumferences, waist circumferences, hip circumferences, calf circumferences, knee height, waist: hip ratio, visceral fat, body fat percent, muscle mass percent and basal metabolic rate. The mean + SD of BMI was 26.71±7.93 (kg/m^2) for men and 29.63±8.47 (kg/m^2) for woman. Figure 1 shows that 20.8% of the men and 14.3% of the women were normal weight. Only 12.5 % of men and 10% of the women were overweight, 16.7% of men and 17.1 % of woman were obese and 8.3 % of men were underweight while there was no woman in the underweight category. Figure 2 shows 20.8% of men and 14.3% of women were normal waist to hip ratio, 58.3% of men and 50% of

women were at high health risk. Figure 3 shows 41.7% of men and 28.6% of women are within the normal range of body fat percentage, 8.3% of men and 8.6% of women are at risk of metabolic disease. Figure 4.1 and Figure 4.2 shows muscle wasting percentage according to gender based on MUAC and CC. According to MUAC was 16.7% in men and 2.9% in women. With regards to CC, muscle wasting was higher in men (50%) as compared with women (38.6%); however, this difference was not significant, ($p>0.05$). Figure 5 shows that 4.2% of men and 10% of women were malnourished, 41.7% of men and 41.4% of women were at risk of malnutrition and 45.8% of men and 45.7% of women were normal. Table 11 shows that Men had a higher mean + SD of total MNA (11.40 ± 2.01) than women (10.76 ± 2.36 o);however, this difference was not significant, ($p>0.05$). According to MNA1, 85.1% of the total sample had no changes in appetite or food intake in the last three months, and only 4.3% had a severe decrease in their appetite.According to MNA2, 63.8% of the total sample had no weight loss in the last three months, and only 13.8% had a severe weight loss. According to MNA3, 37.2 % of the total sample were able to move completely with men have 66.7% while women have 27.1%. Also, 30.9% of the participants can move a little inside their rooms while 31.9% cannot move at all as they were bedridden with 37.1%% in women 16.7% in men. This difference was significant ($p>0.05$). According to MNA4,25.5% of the total sample have suffered from psychological problems in the last three months. According to MNA5, 2.1 % of the total sample suffered from a severe memory decline in the last three months,

only 13.8% had a slight memory decline and 84% had no change in memory. According to MNA6, 23.4 % of the total sample had <30 cm of calf circumferences and 72.3% had ≥ 30 cm of calf circumference.

Table 12 shows the macronutrient consumption of participant according to their gender. The mean+ SD of men's daily consumption of energy, protein, carbohydrates and fats were (1819.6 Kcal ±483.35),(63.6 gm ±18.29),(253.5 gm ± 57.44),(62.11 gm ±24.94), respectively while for women they were (1424.13 Kcal ±409.75), (48.6 gm ±16.74) , (192.6 gm ± 56.3), (51.89 gm ±20.81) respectively. The amount of daily protein consumed by men and women matches the RDA, however, there was a big difference between the amount of calories consumed and the RDA for men and women.There was not a significant difference between men and women in terms of the amount of calories, protein and carbohydrates consumed.Table 13 shows that 97.9% of the sample used to eat the food on time, 63.8% have eaten the fruits after a meal, 73.4% haven't had meals from outside the home, 72.3 % prefer to eat the meals with the group, 86.2% were satisfied with the food quantity, 83% were satisfied with the food quality, and 90.4% were satisfied with the food services.

Table 8: anthropometric measurements and body composition for the participant according to gender (presented in mean ± SD)

parameter	Men (n)	Women (n)	Total (n)	P value
BMI (kg /m ^{2})	26.71±7.93	29.63±8.47	28.68±8.32	1.00
number	14	29	43	
Mid upper arm circumferences (cm)	27.77±5.15	28.77±6	28.52±5.79	0.42
number	22	67	89	
Waist circumferences (cm)	95.05±18.99	96.46±15.98	96.04±16.78	0.74
number	19	45	64	
Hip circumferences (cm)	99.73±16.16	±13.74 106.19	±14.66 104.30	0.66
number	19	46	65	
Calf circumferences (cm)	33.45±5.61	34.97±5.88	34.59±5.82	0.98
number	22	67	89	
Knee height (cm)	40.5±4.82	39.28±5.55	39.59±5.38	0.68
number	22	64	86	
Waist : Hip ratio	0.9488±0.06	0.9072±0.07	±0.07460 0.9196	1.00
number	19	45	64	
Body fat percent	32.56±4.09	40.65±9.10	35.13±12.32	1.00
number	12	26	38	
Muscle mass percent	32.56±4.09	24.42±3.03	26.99±5.09	1.00
number	12	26	38	
Visceral fat percent	12.25±7.25	11.57±4.41	11.78±5.37	0.69
number	12	26	38	
BMR Kcal/day	270.5 1554.8±	±210.1 1300.3	±262.40 1380.7	1.00
number	12	26	38	

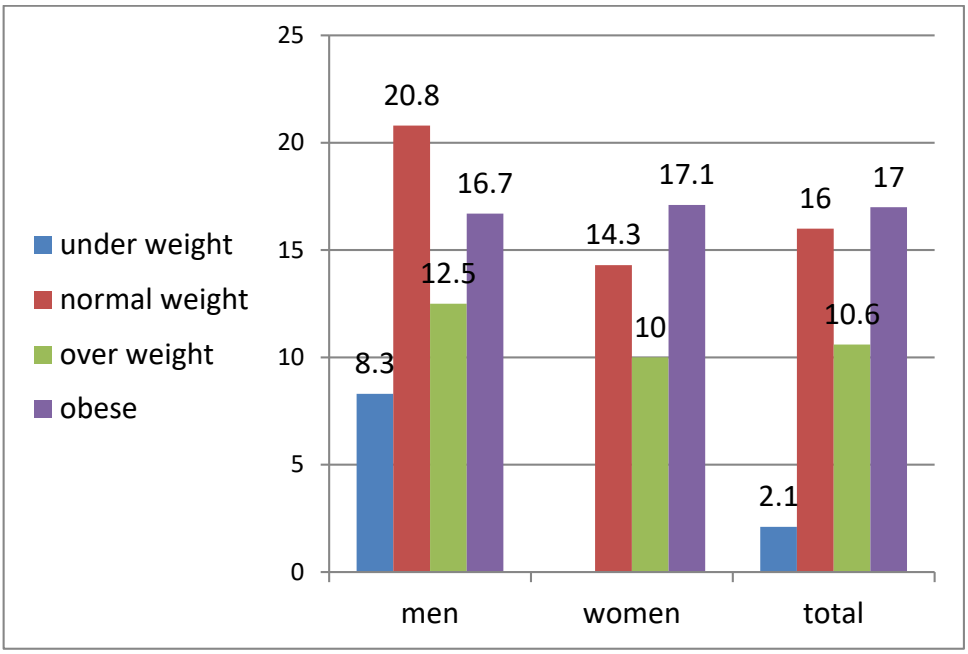


Figure 4.1: BMI classifications of subjects according to gender

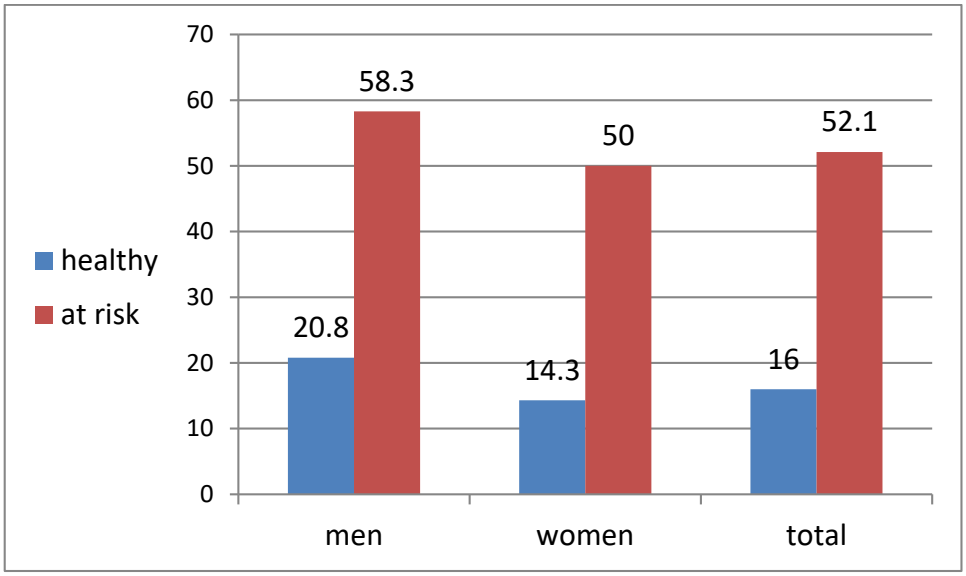


Figure 4.2: WAIST: HIP RATIO classifications of subjects according to gender

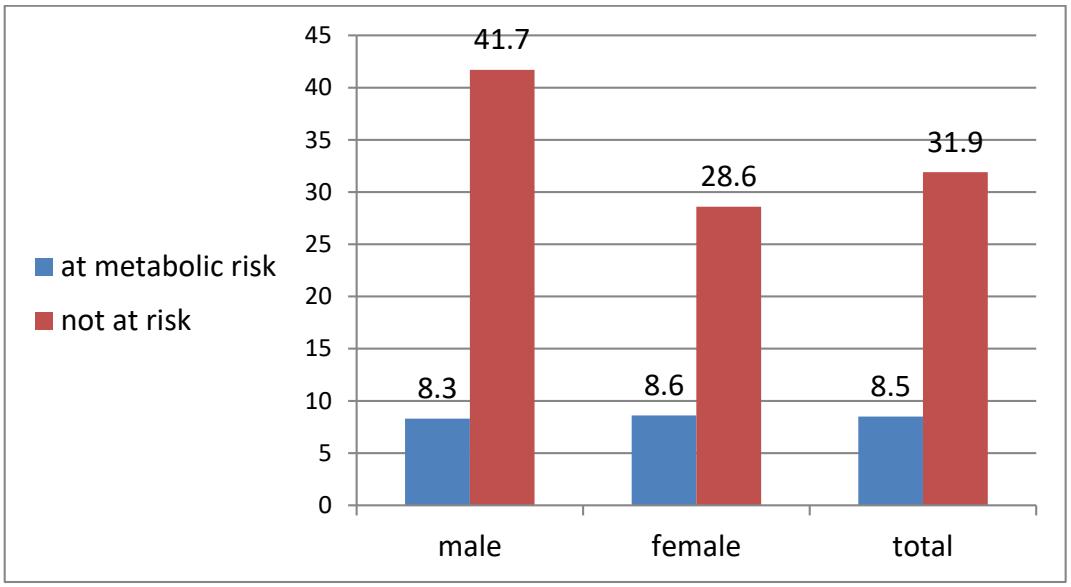


Figure 4.3: body fat percentage classifications of subjects according to gender

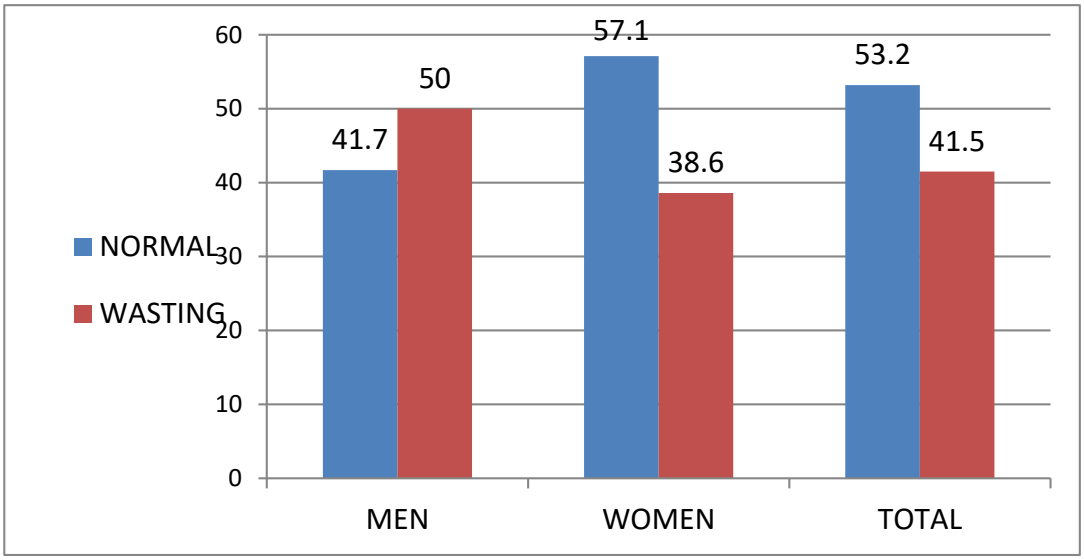


Figure 4.4: Muscle wasting status based on calf circumfernces according to gender

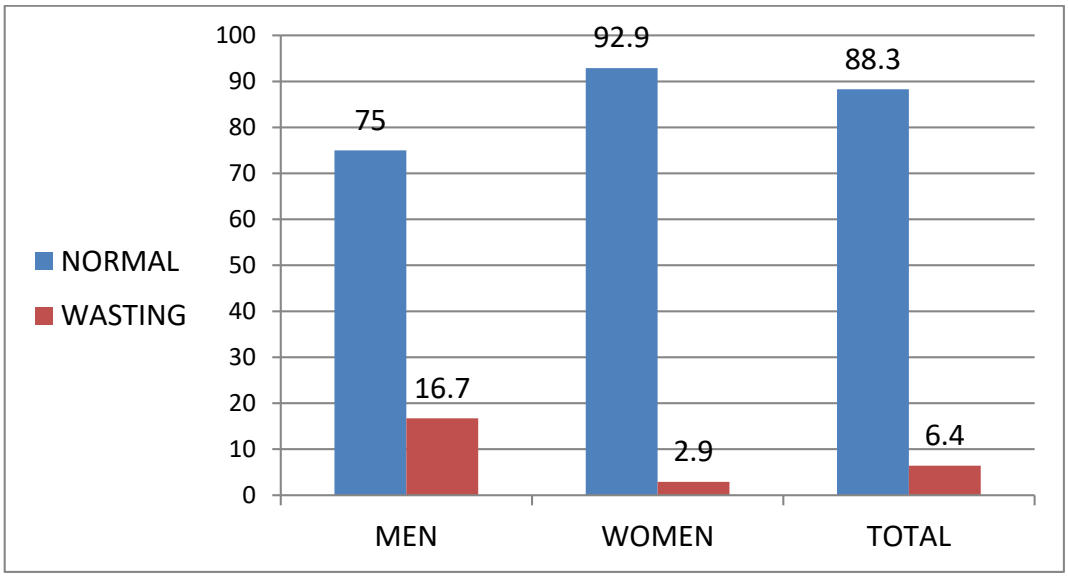


Figure 4.5: Muscle wasting status based on MUAC according to gender

Table 9: MNA assessment for the participant according to gender (presented in mean ± SD)

parameter	Men (n)		Women (n)		Total (n)		P value
Total MNA	11.40±2.01		10.76±2.36		10.92±2.28		0.94
number	22		68		90		
parameter	**Men (n)**	**Men (%)**	**Women (n)**	**Women (%)**	**Total (n)**	**Total (%)**	**P value**
MNA1							
severe decrease	2	8.33	2	2.9	4	4.3	0.05
Moderate decrease	5	20.83	5	7.1	10	10.6	
No change	17	70.83	63	90	80	85.1	
MNA 2							
weight loss greater than 3 kg	2	8.33	11	15.71	13	13.8	0.76
Does not know			1	1.42	1	1.1	
weight loss between 1 and 3 kg	5	20.83	15	21.42	20	21.3	
No weight loss	17	70.83	43	61.42	60	63.8	
MNA 3							
Bed or chair bound	4	16.7	26	37.1	30	31.9	**0.00
Able to get out of bed	4	16.7	25	35.7	29	30.9	
Goes out	16	66.7	19	27.1	35	37.2	
MNA 4							
YES	5	20.8	19	27.1	24	25.5	0.60
NO	19	79.2	51	72.9	70	74.5	

MNA 5							
Severe dementia		16.7	2	2.9	2	2.1	0.85
Mild dementia	4	83.3	9	12.9	13	13.8	
No problem	20		59	84.3	79	84	
MNA 6							
<30	8	33.3	14	20	22	23.4	0.15
≥30	14	58.3	54	77.1	68	72.3	

significant (P<0.05), ns= not significant (P > 0.05) * p<0.05, ** p<0.01

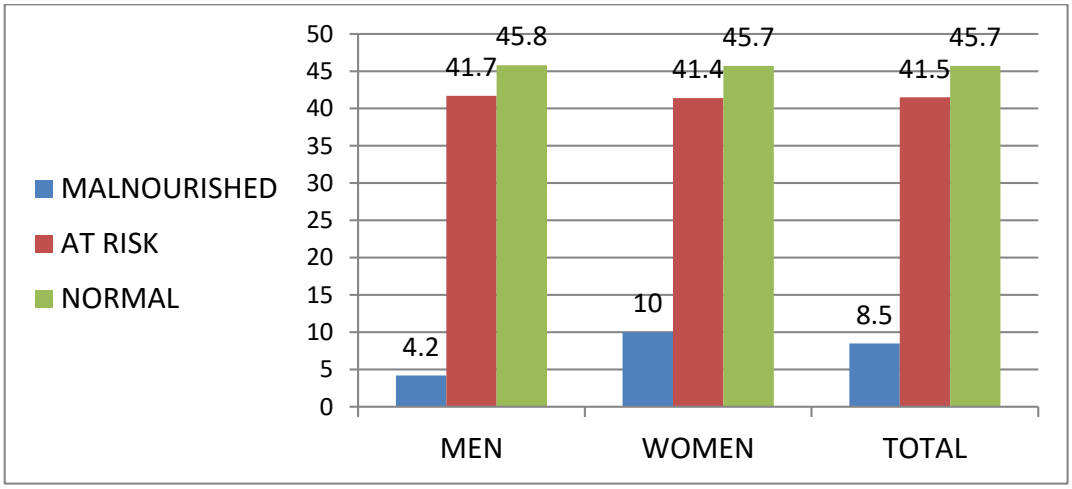


Figure 4.5: MNA classifications of subjects according to gender

Table 10: Dietary intake for the participant according to gender (presented in mean ± SD)

parameter	RDA	Men (n=18)	RDA	Women (n=64)	Total (n=82)	P value
Calories (kcal/ day)	2300	1819.6±483.35	1900	1424.13±409.75	1510.94±454.69	0.66
Protein (g/day)	63	±18.29 63.6	50	48.6±16.74	51.9±18.09	0.47
Carbohydrate (g/day)		±57.44 253.5	192.6±56.3		206±61.6	0.45
fat(g/day)		±24.94 62.11	51.89±20.81		54.13±22.03	0.52

Table 11: Food satisfaction of meal pattern and meal composition

parameter	Men (n)	Men (%)	Women (n)	Women (%)	Total (n)	Total (%)	P value
Time of fruit eating							0.99
Before the meal	4	16.7	10	14.3	14	14.9	
During the			1	1.4	1	1.1	

meal							
After the meal	17	70.8	43	61.4	60	63.8	
Not detected			2	2.9	2	2.1	
Before and after the meal	3	12.5	11	15.7	14	14.9	
During and after the meal			1	1.4	1	1.1	
Any way			2	2.9	2	2.1	
Time of meal eating							0.44
On time	23	95.8	69	98.6	92	97.9	
After a period of time	1	4.2	1	1.4	2	2.1	
The eating meal from outside of home							0.06
yes	14	58.3	55	78.6	25	26.6	
no	10	41.7	15	21.4	69	73.4	
Food satisfaction of quantity							0.30
yes	19	79.2	62	88.6	81	86.2	
no	5	20.8	8	11.4	13	13.8	
Food satisfaction of quality							0.54
yes	19	79.2	59	84.3	78	83	
no	5	20.8	11	15.7	16	17	
Food satisfaction of service							0.68
yes	21	87.5	64	91.4	85	90.4	
no	3	12.5	6	8.6	9	9.6	
Eating the food alone or with group ?							0.06
alone	3	12.5	23	32.9	26	27.7	
With group	21	87.5	47	67.1	68	72.3	

4.2.4 Functional status of the participant

Table 14 shows the results of senior fitness test and ADL for participants according to gender. The means + SD of the Two-Minute Step test,Chair Stand test, Time-up and go test, Rapid Gate test, Gate Speed test, Hand Grip test,Set and reach test,Back scratch test and Activity of dependency level were (25.59 n ± 50.52), (5.13 n ± 3.09), (25.04 sec ± 17.92), (10.09 m/s ± 6.74), (7.22 m/s ± 5.84), (19.39 kg ± 7.97), (-10.53 cm ± 17.43), (- 32.81cm ± 11.28), (2.08 ± 1.90) for men respectively and (8.56n ± 27.74) , (3.38n ± 3.36), (39.69sec ±44.74), (16.43m/s±20), (11.95m/s

±12.95), (10.95 kg ±4.49), (-10.40 cm ±17.07), (-33.94 cm± 14.30), (2.97±1.93) for women respectively. There were only significant differences in Two-Minute Step and Chair Stand tests. Figure 6 shows that 50% of men and 17.1% of women had normal gate speed, 25% of men and 41.4% had slowness, while Figure 7 shows that 4.2% of men and 2.9 % of women had normal handgrip, 87.5% of men and 94.3% of women had weakness. Figure 8 shows that 20.8% of men and 40% of women had severe functional impairments, 54.2% of men and 45.7% of women had moderate impairments and 25% of men and 14.3% of women had full function.

Table 12: Physical status of participants according to gender (presented as mean ± SD)

parameter	**Men**	**Women**	**Total**	**P value**
Two-Minute step test(times)	25.59±50.52	8.56±27.74	12.91±35.45	*0.04
number	22	64	86	
Chair stand test(times)	5.13±3.09	3.38±3.36	3.84±3.37	*0.04
number	22	62	84	
6m-Time up and go(second)	25.04±17.92	39.69±44.74	35.85±39.93	0.27
number	22	62	84	
6-m Rapid gate(m/s)	10.09±6.74	16.43±20	14.73±17.64	0.11
number	22	60	82	
6-m Gate speed(m/s)	±5.218.83	±12.1717.48	10.68±11.64	0.32
number	18	41	82	
Hand grip strength(kg)	19.39±7.97	10.95±4.49	13.01±6.59	0.26
number	22	68	90	
Set and reach test (cm)	10.53±17.437 -	-10.40 ±17.077	10.43±17.051 -	0.40
number	19	58	77	
Back scratch	32.81±11.285	-33.94±14.308	-	0.66

test (cm)	-		33.58±13.310	
number	16	34	50	
Activity of dependency level	2.08±1.90	2.97±1.93	2.74±1.95	0.48
Number	24	70	94	

significant (P<0.05), ns= not significant (P > 0.05)* p<0.05, ** p<0.01

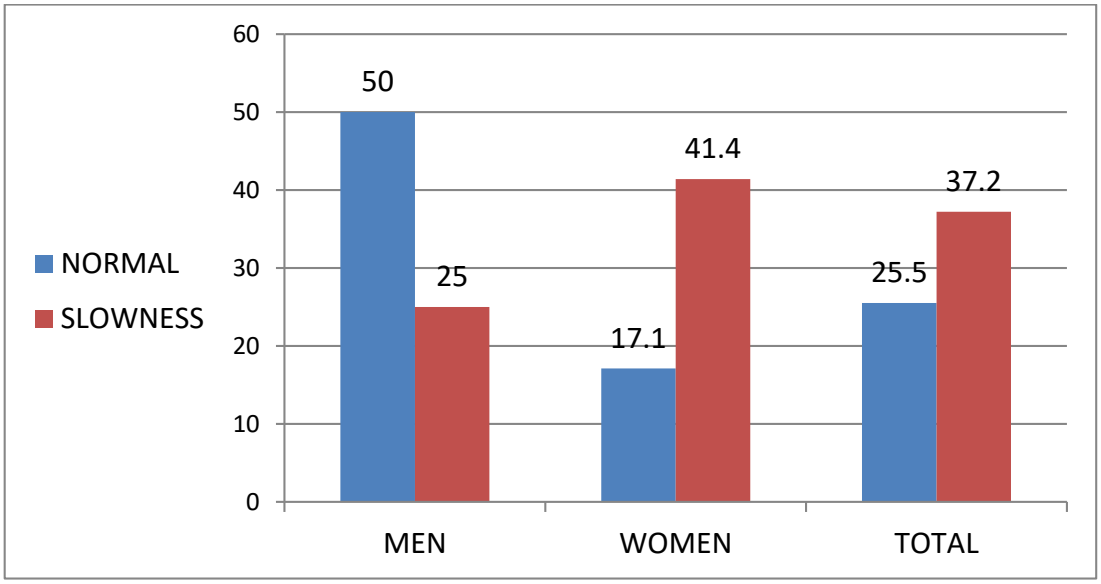


Figure 4.6: Prevalence of slowness among the participant according to gender

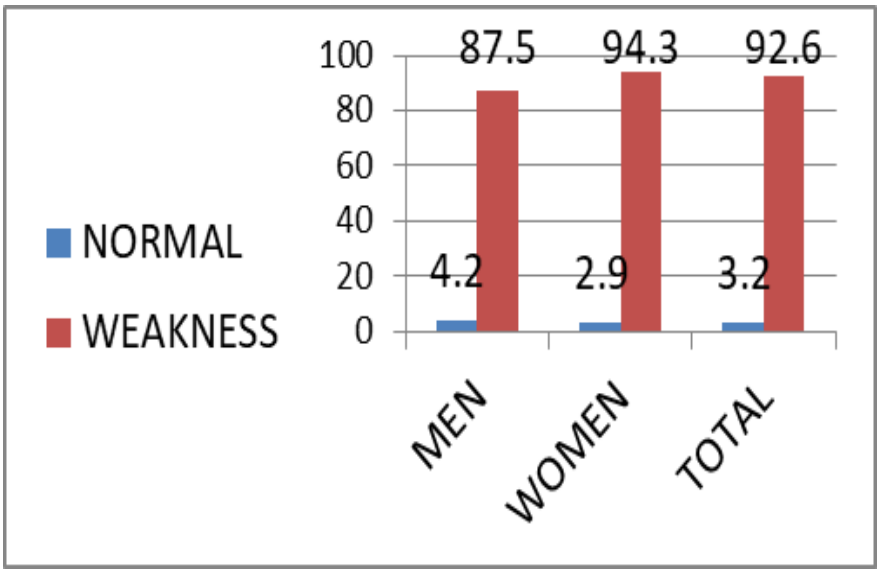


Figure 4.7: Prevalence of weakness among the participant according to gender

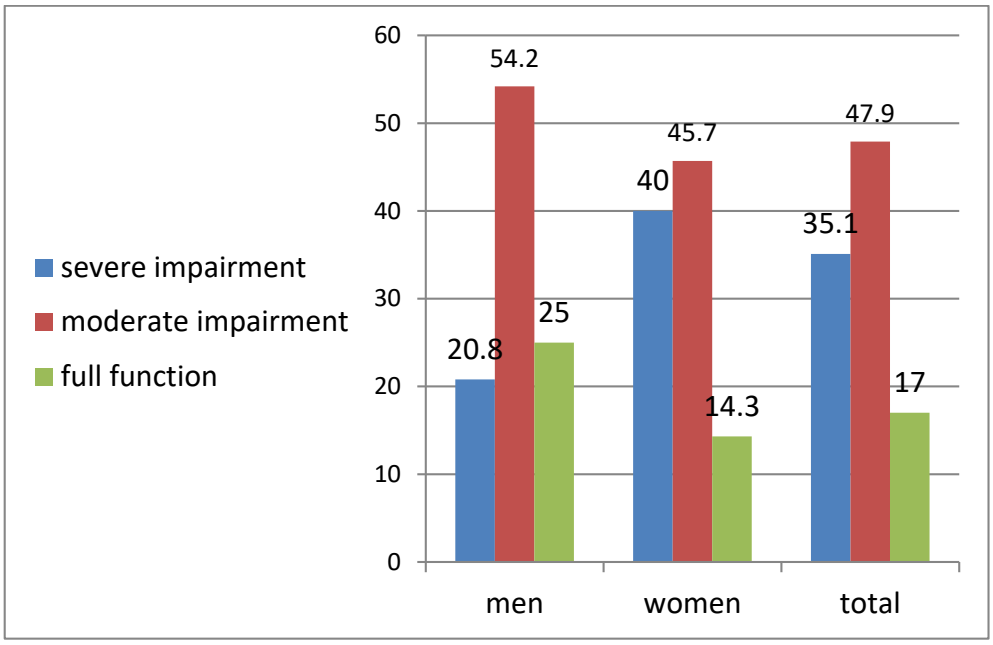


Figure 4.8: ADL classification according to gender

4.2.5 Mental health and cognitive status

Table 15 shows the mean+ SD of geriatric depression scale for men was 5±3.97 and for women was 4.89±3.28, and the means + SD of Montreal cognitive assessment were 16.91±7.10 and 12.27±6.39 for men and women, respectively. Figure 9 shows that 58.3 % of men and 51.4% of women had a normal GDS, while 20.8% of men and 37.1 % of women had mild depression and 20.8% of men and 10% of women were moderately to severely depressed. Figure 10 shows that 12.5 % of men and 4.3% of women had a normal cognitive function, while 87.5% of men and 95.7 % of women had cognitive impairment.

Table 13: Mental health and cognitive status for participant according to gender (presented as mean ± SD)

parameter	Men (n)	Women (n)	Total (n)	P value
Geriatric depression scale	5±3.97	4.89±3.28	4.92±3.45	0.424
number	24	69	93	
Montreal cognitive assessment	16.91±7.10	12.27±6.39	13.45±6.85	0.136
number	24	70	94	

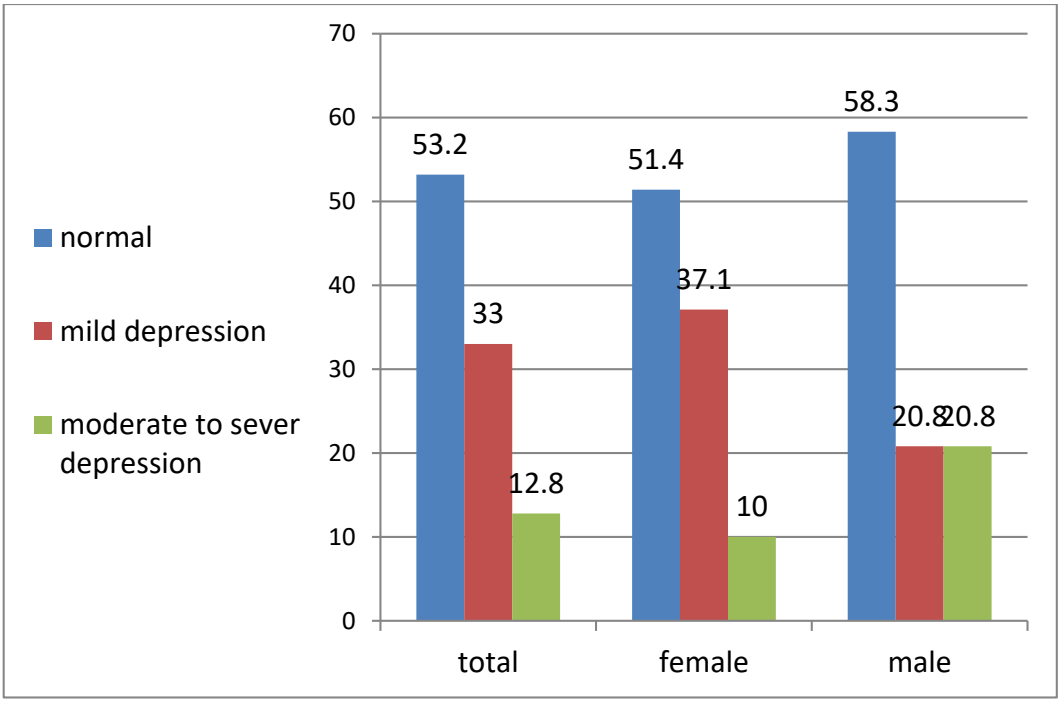


Figure 4.9: geriatric depression scale classification according to gender

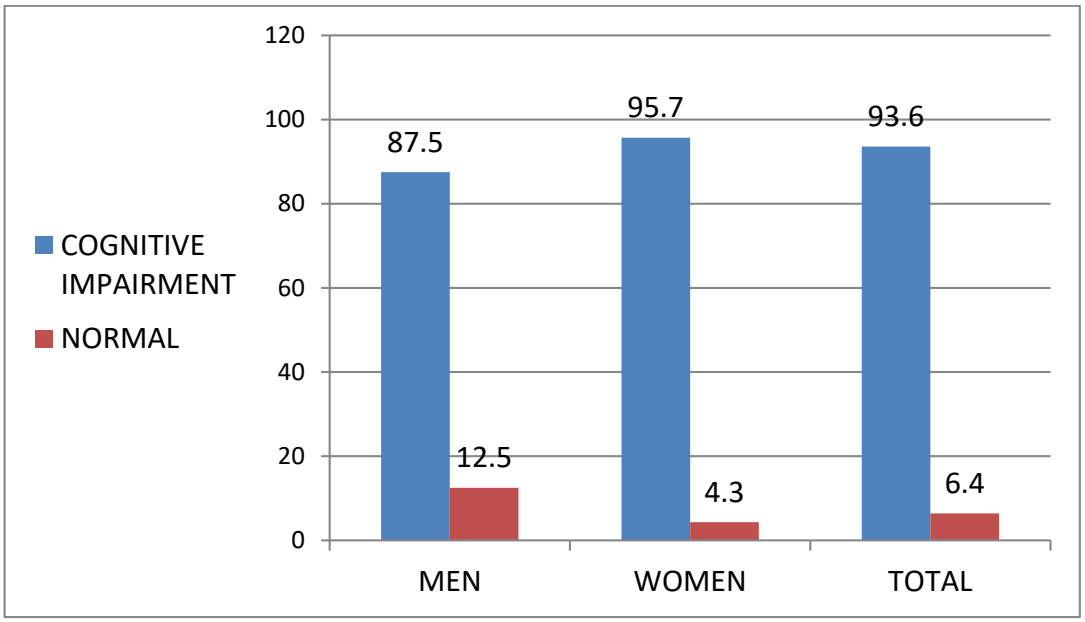


Figure 4.10: MOCA classification according to gender

4.2.6 Relationship between malnutrition and other variables

According to MNA, Table 14 shows that the malnutrition was significantly associated with the depression ($p < 0.05$) and there was no significant association between malnutrition and cognitive function, and physical status.

According to MNA, Table 15 shows that there was no significant association between malnutrition and Socio demographic characteristics.

Table 14: Cognitive status, Depression, functional status and physical status according to MNA categories

Factor	Well - nourished n= 43	At risk of malnutrition n= 39	Malnourished n= 8	p-value
MOCA	12.4±6.7	13.9±6.6	12.3±7.02	0.566
GDS	3.4±2.3	5.6±3.5	7.8±4.6	*0.000
ADL	2.4±1.9	2.9±2.07	3.1±1.8	0.403

*Significant, $p < 0.05$ using one-way ANOVA test.

Abbreviations: MNA: Mini Nutritional Assessment, GDS: Geriatric Depression Scale 15, MOCA: Montreal cognitive assessment, ADL: Activity of Daily Living, GS =gate speed, HG = hand grip.

Table 15: participants Socio demographic characteristics according to MNA categories [presented as number (%)]

parameter	Well-nourished		At risk of Malnutrition		Malnourished		P value
	n	(%)	n	(%)	n	(%)	
age							
60-70 year	12	63.1	6	31.5	1	5.2	0.11
70-80 year	19	47.5	17	42.5	4	10	
80 and more	12	38.7	16	51.6	3	9.6	
gender							
male	11	50	10	45.4	1	4.5	0.64
female	32	47	29	42.6	7	10.2	
Marital Status							
Single	22	55	14	35	4	10	0.59
Married	2	18.1	8	72.7	1	9	
Divorced	6	54.5	5	45.4	0	0	
Widow	13	46.4	12	42.8	3	10.7	
Level of Education							
No Formal Education	17	54.8	11	35.4	3	9.6	0.44
Primary School	16	47	15	44.1	3	8.8	
Secondary School	4	26.6	10	66.6	1	6.6	
Diploma	3	100	0	0	0	0	
University degree	3	42.8	3	42.8	1	14.2	
Ability to read							
Yes	24	45.2	25	47.1	4	7.5	0.73
no	19	51.3	14	37.8	4	10.8	
Ability to write							
Yes	24	43.6	27	49	4	7.2	0.51
No	19	54.2	12	34.2	4	11.4	
Ability to calculate							
Yes	27	45.7	28	47.4	4	6.7	0.85
no	16	51.6	11	35.4	4	12.9	

Number of kids							
0	30	50	24	40	6	10	0.50
1-3	8	61.5	4	30.7	1	7.6	
4-5	4	28.5	9	64.2	1	7.1	
6 and more	1	33.3	2	66.6	0	0	
Year of schooling							
0	25	58.1	14	32.5	4	9.3	0.19
1-5	4	50	3	37.5	1	12.5	
5-10	4	28.5	9	64.2	1	7.1	
11-12	4	28.5	9	64.2	1	7.1	
13 and more	6	54.5	4	36.3	1	9	

*Significant, $p < 0.05$ using Kendall tau-b test.

Chapter Five

Discussion

Chapter Five

Discussion

Palestinian older adults in long-term care houses in the West bank were found to have low malnutrition status, high physical function impairment, high prevalence of depression and very high prevalence of cognitive function impairment. As these results are considered usual for the elderly community who suffers from many physiological problem such as chronic diseases, food pickiness, poor appetite, physical problem such as: dependence on others in the activities of daily life, lack of physical activity, psychological disorders such as: feeling lonely, depression , and social problems such as: divorce, widowing , lack of social activity, in addition to cognitive problems accompanied with high rate of illiteracy and the low level of education.

5.1 Prevalence of malnutrition among the Palestinian older adults in long-term care houses in west bank

Malnutrition can be a consequence or a cause of health deterioration in the elderly. It is very important parameter that may determine the long-term health and well-being. Also, the number of admissions to hospitals and the period of stay can be influenced by the individual's level of nutrition (Age UK, 2021).

Malnutrition in Palestinian elderly people, was expected to be high due to physical and physiological reasons, however, 1 out of 12 has suffered from

malnutrition. Both developing and developed countries have reported variable prevalence of malnutrition. There was no specific trend to draw between countries, for example in the Mediterranean area where elderly people traditionally adhere to rich nutritional sources, malnutrition ranged between 2.8% in Spain to 11.9% in Turkey and 3.2% in Lebanon and 4.8% in Portugal, while in the Western European countries elderly malnutrition was higher as in Belgium it reached 14% and the Netherlands has recorded 11.7%. Malnutrition was estimated to affect 1 in every 10 adults over 65 years in the UK (Age UK, 2021).

It was reported that in the US, the incidence of malnutrition ranges from 12% to 50% among the hospitalized elderly population and from 23% to 60% among institutionalized older adults (Evans, C .2005). Malnutrition in elderly is a multifactorial disease that may be affected by physiological, pathological, social and psychological factors (Evans, C .2005).

Therefore, malnutrition should be assessed routinely by home-care management and should be intervened upon. For example, antidepressant and medications that cause anorexia and loss of appetite should be avoided or minimized. On the other hand, food preparations that take into account texture, flavor and tastes that are suitable to elderly should be recommended to enhance their feeding. Regular meals with social atmosphere also may promote the elderly intake of a wide choice of food. Dense food with both protein and energy can be helpful especially with those having loss of appetite. Malnutrition was reported to be more in people with dysphagia, so blending may be a good choice for these people.

Malnutrition shouldn’t be looked at as inevitable consequences of aging, moreover, closer monitoring of elderly health status is essential to slowdown frailty (BDA,2020).

Variations among different countries can be due to the difference between sittings, context, population studied (≥60 years), and the instruments used to assess nutritional status (Madeira, T. et al 2019). In this study the percentage of residents classified as malnourished was lower than the percentage found in some studies. This also, can be explained due to the inclusion and exclusion criteria used in this study. Individuals who severely ill, blind, deaf and/or demented were excluded (Serrano-Urrea, R., & Garcia-Meseguer, M. J. 2013).

In the current study BMI values were similar to that reported from different countries, Turkey, Spain, Poland, South Korea and France (Halil, M. E. L. T. E. M. et al. 2014, Arrieta, H. et al. 2020, Zarzeczny, R. et al. 2018, Kim, S. et al .2018, Jésus, P. et al .2012). This trend in such a group of elderly is expected as nutritional status was reported to be poor. However, BMI alone is not enough to address the problem of nutritional status. The MNA is considering several factors that contribute to malnutrition other than BMI to assess the nutritional status. In fact, there has been much controversy in the scientific community with respect to the use of BMI and the most adequate cut-offs, especially for older adults. First, there are limitations to accurately measure weight and height among older persons, given functional limitations to correctly stand by her/ himself, as well as due to shrinkage and vertebral collapse. In these cases, the possible bias

introduced by use of alternative measures might counteract the misclassification of malnutrition due to direct measurements errors, Second, BMI does not capture changes in body weight or body composition (Madeira, T. et al .2019)

In elderly people, BMI was associated with mortality rate. It was found that mortality has increased in all BMI categories below 25 and has moderately increased in obese individuals (Kvamme, JM. et al. 2014).

The same study found that overweight individuals (BMI 25–29.9) had the lowest mortality in a U-shape pattern (Kvamme, JM. et al. 2014). Similarly, a study has found that higher BMI was associated with lower mortality rate in 5200 men and women aged 65 and older (Liu, XC. et al .2020). Therefore, BMI as a predictor to health status in elderly should be accompanied with other measures, for example a study has reported that WC to BMI ratio can be a predictor of obesity and mortality in a J-shape pattern (Corrada, MM.et al. 2006). More importantly, in this context is the body weight change. As found by a cohort study with 23 years of follow-up, people who lost weight later in life were at high risk of mortality regardless to initial BMI and obesity was a risk of mortality only in people under 75 years of age (Corrada, MM.et al. 2006). Similar findings were reported by Barraho et al., (2010) who investigated the relationship between BMI and mortality. A total of 3,646 French community dwellers aged 65 years and older were found to have high risk of mortality if they have a BMI less than 22 and low risk if they were overweight or obese (Berraho, M. et al 2010).

The low food intake is described as a multi-factorial problem and in the current study the only single marker that was significantly associated with all functional impairments. both depression, dementia and physical impairment are regarded contributing factors to low food intake, and in accordance with our findings a previous study showed that low energy and nutrient intakes in an elderly community population were also related to frailty. (Stange, I.et al .2013). Inadequate intake of micronutrients certainly has contributed to the malnutrition of these elderly people. The low energy and low nutrient intake observed in this study has been a result of many factors. These factors were changes in physical, psychological and physiological status such as, changes in body composition, sensation in gastrointestinal tract, changes in fluid and electrolyte regulation due to chronic illnesses, social isolation, widowhood, depression and low economic level. (Saeidlou, S. N. et al. 2011).

The study showed the associations between malnutrition according to the MNA-SF classification, and both the presence of a swallowing problem and appetite loss. The impairment of swallowing function can have devastating health implications. These include not only aspiration pneumonia, but also malnutrition and dehydration, as well as changes in health status, including an increased need for care provision, especially for older adults. In fact, a recent large cross-sectional survey of geriatric wards of hospitals showed that swallowing difficulties were strongly associated with malnutrition. How appetite control changes with age remains to be elucidated, but a loss of appetite is frequently observed with aging; in a

phenomenon called the “anorexia of aging”, the physiological reductions in appetite and food intake accompany normal aging or occur as a consequence of various diseases. Appetite loss and subsequent reduced oral intake are followed of course by weight loss and nutritional impairment. However, it should be noted that despite the exclusion of these conditions that are directly linked to reduced energy intake, the accumulation of geriatric conditions (six items) is associated with poor nutritional status in dependent elderly. (Hirose, T. et al .2014).

Both physiological changes associated with ageing and pathology-related factors may cause oral health problems that possibly influence food choices and lead to reduced food intake. (Madeira, T. et al .2019)

In the current study the mean + SD of energy consumption are 1510.94 kcal ± 454.69 which was not far from those values reported in other country. for example, 1535 kcal ± 413 in Germany. (Volkert, D. et al. 2011). 1552.4kcal±342.1 in Belgium. (Buckinx, F. et al. 2016). The mean + SD of protein consumption are 51.9g/d ± 18.09 which was not far from those values reported in other country. for example, 54.2 g/d± 0.9 in Germany. (Volkert, D. et al. 2011). 54.8g/d±10.7 in Belgium. (Buckinx, F. et al. 2016). The low consumption of energy can be explained by lack of appetite. This could be due to physiological changes related to aging, multiple medications and/or sedentary lifestyle, Environmental factors may also be involved in this loss of appetite (i.e. schedules of the meals, noise and brightness of the lunchroom,). Attitudes and beliefs of nursing staff may also influence food intake. (Buckinx, F. et al. 2016).

5.2 Prevalence of physical function impairment the Palestinian older adults in long-term care houses in west bank

The Prevalence of physical function impairment was high among the Palestinian older adults in long-term care houses in The West bank. This was expected for the elderly group, as they depend on others to help them with one or more activities of daily life. Many of the elderly were considered bedridden or wheelchair-confined, in addition to the low physical activity as they do not exercise. On the other side, psychological problems play an important role in that they do not want to participate in sports activities. however, the dependency prevalence was 35.1% among the Palestinian older adults in long-term care houses in the West bank. dependency ranged between 32.9% in south korea to 43.8% in Canada with Belgian (35%) in the middle. And this variation can be explained by the differences in the definition of "low ADL dependence." (Doupe, M. et al. 2012). And using different tools for assessment the ADL. (Björk, S.,2016). The high prevalence of ADL can be explained by the effect of imbalanced diet, low nutritional status, exchanging their home situation for a nursing home and low physical activity. (Vandewoude, M. F. et al. 2019). Also by the effect of impaired cognition, incontinence, depression and sensory deficits (hearing and visual). (Bürge, E., von Gunten, A., & Berchtold, A. .2013). Functional impairment was common and not only associated with low MNA scores but also with low BMI, weight loss and low food intake that are risk factors negatively impacting health, cog nition and life expectancy in the aged population. (Stange, I.et al .2013)

5.3 Prevalence of cognitive function impairment the Palestinian older adults in long-term care houses in west bank

The Prevalence of cognitive function impairment were very high among Palestinian older adults in long-term care houses in west bank, and this is considered much higher than other countries, due to the interest of this group in activities other than education, such as agriculture for men and housework for women, where education was marginalized in their time, their lack of interest in reading and writing and their preoccupation with their health status, in addition to their psychological state, which drives them to abandon their hobbies related to learning ,however, The cognitive impairment prevalence was 93.6% among Palestinian older adults in long-term care houses in west bank, The cognitive function impairment ranged 38.3 % in Egypt to 76.9% in south korea with Portugal (44.9%) 47.7% in and Jordan 47.7% in the middle . The high prevalence can be explained by the effect of advanced age, female gender, illiteracy, altered nutritional status and depression. (Khater, M. S., & Abouelezz, N. F. 2011).

5.4 Prevalence of depression the Palestinian older adults in long-term care houses in west bank

The Prevalence of depression were moderate among the Palestinian older adults in long-term care houses in west bank, and this is considered normal for the elderly group compared to other countries due to their sadness over their current health condition, leaving their homes, neglect of their children, not feeling happy in care homes because of the lack of services and privacy

they want in addition to not carrying out any community activities in Care homes. The depression symptoms prevalence was 45.8 % among the Palestinian older adults in long-term care houses in west bank. The prevalence of depression symptoms ranged from 21.3% in Norway to 90.2% in iran with Epirus (37.1%) , Australia (43.9%) , jordan (59.5%) and south korea (81.8%) in the middle .The high prevalence can be explained by the effect of advanced age , low level of education , being single (without children) , lack of visits and family support and lack of activities carried out by the elderly outside the nursing home.(Patra P. et al. 2017).and poor quality of food that due to ate less then increase the prevalence of depression.(Nazemi, L. et al . 2013).

5.5 Association of malnutrition with cognitive function

This study showed no relationship between malnutrition and impaired cognitive function. This finding is contradicts with other previous study that was correlated between Malnutrition and cognitive function. (Madeira, T. et al .2019) and (Badrasawi, M. et al . 2019). The results support that a low cognitive status is associated with malnutrition, which lead to loss of appetite or indifference to food. These individuals may also forget to eat or not be able to prepare their meals or feed themselves. (Madeira, T. et al .2019). Many of the studies investigating the relationships between cognition and nutritional status focus on nutritional deficiencies as a consequence of dementia or cognitive decline. For instance, cognitive decline might impair the ability or desire to eat. progressive dementing

process characterizes by Weight loss and changed eating behavior, and uncontrolled weight loss is almost inevitable in the latter stages. (Hirose, T.et al .2014).

The difference between current study and the previous study that was conducted in Palestine (Badrasawi, M. et al. 2019). is that the current study used the MOCA tool to assess cognitive functions, while the previous study used the Mini Mental Status Examination (MMSE) tool.in addition to the previous study dealt with fewer homes for the elderly (7 homes) , while the current study dealt with a larger number of homes for the elderly (11 homes) , and the age group that was accepted in the study is the older adult aged ≥ 60 years, while people under the age of 60 were accepted in the previous study, This leads to a discrepancy in the results due to the acceptance of people under the age of 60 years, so the current study more specialized and comprehensive.

5.6 Association of malnutrition with depression

This study showed a significant relationship between Malnutrition and depression. This finding corresponds to many previous studies. (Madeira, T., et al. 2019). and (Badrasawi, M. et al. 2019). Lack of appetite may be a mediating factor explaining the high risk of malnutrition among depressed persons, due to deterioration of social networks, as well as increased concentrations of serotonin and corticotropin-releasing factor. (Madeira, T., et al. 2019). depression, impaired function and poor oral intake have been consistently associated with weight loss, low BMI or poor nutrition status.

In a study conducted in Italian nursing homes, malnourished participants had more severe cognitive impairment, were more depressed and had lower scores in activities of daily living and physical performance (representing worse functional status) in comparison to their well-nourished counterparts. (Madeira, T., et al. 2019).

5.7 Association of malnutrition with dependency

This study showed no relationship between malnutrition and dependency. This finding is contradicts with other previous study That was correlated between Malnutrition and dependency. (Stange, I.,et al . 2013) and (Badrasawi, M. et al. 2019). The results support that a loss of mobility and a worse ADL score are more common in the malnourished nursing home residents. There is growing evidence of a causal relationship between an imbalanced diet, either in deficit or excess, and a reduced general functional performance of the body, particularly in older people. Therefore, a low nutritional status may accelerate the transformation of frailty into disability, and eventually result in individuals exchanging their home situation for a nursing home. In addition, loss of dependency may cause further impairment of the nutritional status. This vicious circle of events is supported by the higher prevalence of dependence and malnutrition in nursing homes as observed by us and others. (Vandewoude, M. F.et al. 2019)

The difference between current study and the previous study that was conducted in Palestine (Badrasawi, M. et al. 2019). is that the previous

study dealt with fewer homes for the elderly (7 homes) , while the current study dealt with a larger number of homes for the elderly (11 homes) , and the age group that was accepted in the study is the older adult aged ≥ 60 years, while people under the age of 60 were accepted in the previous study, This leads to a discrepancy in the results due to the acceptance of people under the age of 60 years, so the current study more specialized and comprehensive.

Chapter Six

Conclusions, Limitations and Recommendations

Chapter Six

Conclusions, Limitations and Recommendations

6.1 Conclusions

Malnutrition was less common among the study participants compared to other studies. depression was associated with high risk of malnutrition, and there is no relationship between malnutrition, physical function impairment and cognitive function impairment. Food satisfaction are high, slowness, weakness and wasting prevalence was highly among the participants

1. Malnutrition is low in the study results compared to other studies, however, nearly half of the participants at risk
2. Malnutrition is highly or significantly associated with psychological status of the participant.
3. Cognitive functioning was highly impaired among the participants.
4. Dependency prevalence was highly among the participants, and this is considered normal for the elderly group compared to other countries
5. Wasting prevalence was highly impaired among the participants.
6. Depression prevalence was highly among the participants, and this is considered normal for the elderly group compared to other countries

Malnutrition is not significantly associated with physical status and cognitive status of the participant.

6.2 Limitations

The study has encountered some limitation during the data collection stage such as:

1- Participants who were physically unable to stand have affected the accuracy of the measurements.
2- It was difficult to explain the questionnaire to the elderly due to their poor senses (hearing and sight) in addition to their poor cognitive abilities.
3- Data collection has taken longer time due to the lack of staff to assist in taking the measurements and recording figures.
4. The lockdown due to Covid-19 that hugely affected the travelling between governorates and made home management more restrictive upon entry of the researcher.
5. The home administration provides meals in a quantity greater than the usual amount to make the elderly consume an amount that covers their needs in 24 Hours record.

6.3 Recommendations

This study can draw the following recommendations:

6.3.1 Recommendations for ministries

1. Licensing

   Issuing laws and instructions for granting licenses to homes for the elderly after availability of supportive and suitable vacancies for residents, which include:

   1. Employing a nutritionist in every home for the elderly to follow up on feeding the elderly appropriately.
   2. Employing a counselor in every home to provide psychological support to the elderly, which leads to reducing the severity of depression.
   3. Employing an occupational therapist in every home to provide functional support for the elderly, which leads to less dependence on others.
   4. Provide training for the staff to ensure the quality of services provided to the residents.
   5. Monitoring, follow-up, periodic and inspection visits to these homes.

6.3.2 Recommendations for managing homes for the elderly

1. Designing a program of sports activities to maintain physical fitness and increase physical activity for the elderly.

2. Doing social and recreational activities to reduce boredom and depression in the elderly.
3. Hiring a chef in the kitchen to serve food better to motivate the elderly to eat and not rely on people who are not experienced in cooking.
4. Designing some activities that help improve the mental abilities of the elderly, such as teaching them to read and write, to reduce the rate of illiteracy.

Raising awareness among the elderly about malnutrition and its impact on health by holding educational workshops.

6.3.3 Recommendations for Further Research

Conduct studies in the field of the elderly to find the most reliable tools for assessing malnutrition, depression, impaired mental function and impaired physical function.

References

1. World Health Organization (2018), Ageing and health, Retrieved https://www.who.int/news-room/fact-sheets/detail/ageing-and-health.
2. Sibai AM, Rizk A, Kronfol KM (2014). Ageing in the Arab Region: Trends, Implications and Policy options. The United Nations Population Fund (UNFPA), Economic and Social Commission of Western Asia (ESCWA) and the Center for Studies on Aging (CSA). Beirut, Lebanon.
3. Amarya, S., Singh, K., & Sabharwal, M. (2015). Changes during aging and their association with malnutrition. Journal of Clinical Gerontology and Geriatrics, 6(3), 78-84.
4. Santanasto, A. J., Goodpaster, B. H., Kritchevsky, S. B., Miljkovic, I., Satterfield, S., Schwartz, A. V., ... & Newman, A. B. (2017). Body composition remodeling and mortality: the health aging and body composition study. *The Journals of Gerontology: Series A*, *72*(4), 513-519.
5. Ulger, Z., Halil, M. E. L. T. E. M., Cankurtaran, M. U. S. T. A. F. A., Yavuz, B. B., Yesil, Y. U. S. U. F., Kuyumcu, M. E., ... & Ariogul, S. (2013). Malnutrition in Turkish nursing homes: a correlate of short term mortality. *The journal of nutrition, health & aging*, *17*(4), 305-309.
6. Bell CL, Lee AS, Tamura BK. Malnutrition in the nursing home. Curr Opin Clin Nutr Metab Care. 2015;18(1):17-23. doi:10.1097/MCO.0000000000000130
7. Diekmann, R., Winning, K., Uter, W., Kaiser, M. J., Sieber, C. C., Volkert, D., & Bauer, J. M. (2013). Screening for malnutrition among

nursing home residents—a comparative analysis of the Mini Nutritional Assessment, the Nutritional Risk Screening, and the Malnutrition Universal Screening Tool. The journal of nutrition, health & aging, 17(4), 326-331.

8. Miu, J., Negin, J., Salinas-Rodriguez, A., Manrique-Espinoza, B., Sosa-Ortiz, A. L., Cumming, R., & Kowal, P. (2016). Factors associated with cognitive function in older adults in Mexico. Global health action, 9(1), 30747.
9. Harada, C. N., Love, M. C. N., & Triebel, K. L. (2013). Normal cognitive aging. Clinics in geriatric medicine, 29(4), 737-752.
10. Metti, A. L., Best, J. R., Shaaban, C. E., Ganguli, M., & Rosano, C. (2018). Longitudinal changes in physical function and physical activity in older adults. Age and ageing, 47(4), 558-564.
11. Manini, T. M., & Pahor, M. (2009). Physical activity and maintaining physical function in older adults. British journal of sports medicine, 43(1), 28-31.
12. PCBS. (2017). On the occasion of the international population day in PCBS (Ed.).
13. WORLD HEALTH ORGANIZATION (2020), Malnutrition , RETRIEVED https://www.who.int/news-room/q-a-detail/malnutrition .
14. Saunders, J., & Smith, T. (2010). Malnutrition: causes and consequences. Clinical Medicine, 10(6), 624.

15. Amarya, S., Singh, K., & Sabharwal, M. (2015). Changes during aging and their association with malnutrition. Journal of Clinical Gerontology and Geriatrics, 6(3), 78-84.
16. Donini, L. M., Scardella, P., Piombo, L., Neri, B., Asprino, R., Proietti, A. R., ... & Morrone, A. (2013). Malnutrition in elderly: social and economic determinants. The journal of nutrition, health & aging, 17(1), 9-15.
17. Gorji, H. A., Alikhani, M., Mohseni, M., Moradi-Joo, M., Ziaiifar, H., & Moosavi, A. (2017). The prevalence of malnutrition in Iranian elderly: a review article. Iranian Journal of Public Health, 46(12), 1603.
18. Krishnamoorthy, Y., Vijayageetha, M., Kumar, S. G., Rajaa, S., & Rehman, T. (2018). Prevalence of malnutrition and its associated factors among elderly population in rural Puducherry using mini-nutritional assessment questionnaire. Journal of family medicine and primary care, 7(6), 1429.
19. Lilamand, M., Kelaiditi, E., Demougeot, L., Rolland, Y., Vellas, B., & Cesari, M. (2015). The Mini Nutritional Assessment-Short Form and mortality in nursing home residents—Results from the INCUR study. The journal of nutrition, health & aging, 19(4), 383-388.
20. Aukner, C., Eide, H. D., & Iversen, P. O. (2013). Nutritional status among older residents with dementia in open versus special care units in municipal nursing homes: an observational study. BMC geriatrics, 13(1), 1-7.

21. Keller, H., Vucea, V., Slaughter, S. E., Jager-Wittenaar, H., Lengyel, C., Ottery, F. D., & Carrier, N. (2019). Prevalence of malnutrition or risk in residents in long term care: comparison of four tools. Journal of nutrition in gerontology and geriatrics, 38(4), 329-344.

22. Diekmann, R., Winning, K., Uter, W., Kaiser, M. J., Sieber, C. C., Volkert, D., & Bauer, J. M. (2013). Screening for malnutrition among nursing home residents—a comparative analysis of the Mini Nutritional Assessment, the Nutritional Risk Screening, and the Malnutrition Universal Screening Tool. The journal of nutrition, health & aging, 17(4), 326-331.

23. Donini, L. M., Neri, B., De Chiara, S., Poggiogalle, E., & Muscaritoli, M. (2013). Nutritional care in a nursing home in Italy. PloS one, 8(2), e55804.

24. Carryer, J., Weststrate, J., Yeung, P., Rodgers, V., Towers, A., & Jones, M. (2017). Prevalence of key care indicators of pressure injuries, incontinence, malnutrition, and falls among older adults living in nursing homes in New Zealand. *Research in nursing & health*, *40*(6), 555-563.

25. Bonaccorsi, G. (2014). Assessment of the risk of malnutrition in nursing homes by alternative or direct anthropometric measurements.

26. Jésus, P., Desport, J. C., Massoulard, A., Villemonteix, C., Baptiste, A., Gindre-Poulvelarie, L., ... & Preux, P. M. (2012). Nutritional assessment and follow-up of residents with and without dementia in nursing homes in the Limousin region of France: a health network initiative. *The journal of nutrition, health & aging*, *16*(5), 504-508.

27. Rose, A., Thimme, A., Halfar, C., Nehen, H. G., & Rübben, H. (2013). Severity of urinary incontinence of nursing home residents correlates with malnutrition, dementia and loss of mobility. *Urologia internationalis*, *91*(2), 165-169.

28. Vandewoude, M. F., van Wijngaarden, J. P., De Maesschalck, L., Luiking, Y. C., & Van Gossum, A. (2019). The prevalence and health burden of malnutrition in Belgian older people in the community or residing in nursing homes: results of the NutriAction II study. Aging clinical and experimental research, 31(2), 175-183.

29. Hirose, T., Hasegawa, J., Izawa, S., Enoki, H., Suzuki, Y., & Kuzuya, M. (2014). Accumulation of geriatric conditions is associated with poor nutritional status in dependent older people living in the community and in nursing homes. *Geriatrics & gerontology international*, *14*(1), 198-205.

30. Sahin, S., Tasar, P. T., Simsek, H., Çiçek, Z., Eskiizmirli, H., Aykar, F. S., ... & Akcicek, F. (2016). Prevalence of anemia and malnutrition and their association in elderly nursing home residents. *Aging clinical and experimental research*, *28*(5), 857-862.

31. Doumit, J. H., Nasser, R. N., & Hanna, D. R. (2014). Nutritional and health status among nursing home residents in Lebanon: comparison across gender in a national cross sectional study. BMC Public Health, 14(1), 1-11.

32. Bonaccorsi, G., Collini, F., Castagnoli, M., Di Bari, M., Cavallini, M. C., Zaffarana, N., ... & Lorini, C. (2015). A cross-sectional survey to

investigate the quality of care in Tuscan (Italy) nursing homes: the structural, process and outcome indicators of nutritional care. *BMC health services research*, *15*(1), 1-10.

33. Madeira, T., Peixoto-Plácido, C., Sousa-Santos, N., Santos, O., Alarcão, V., Goulão, B., ... & Clara, J. G. (2019). Malnutrition among older adults living in Portuguese nursing homes: the PEN-3S study. Public health nutrition, 22(3), 486-497.
34. Stange, I., Poeschl, K., Stehle, P., Sieber, C. C., & Volkert, D. (2013). Screening for malnutrition in nursing home residents: comparison of different risk markers and their association to functional impairment. *The journal of nutrition, health & aging*, *17*(4), 357-363.
35. Saarela, R. K., Soini, H., Hiltunen, K., Muurinen, S., Suominen, M., & Pitkala, K. (2014). Dentition status, malnutrition and mortality among older service housing residents. The journal of nutrition, health & aging, 18(1), 34-38.
36. Keller, H., Vucea, V., Slaughter, S. E., Jager-Wittenaar, H., Lengyel, C., Ottery, F. D., & Carrier, N. (2019). Prevalence of malnutrition or risk in residents in long term care: comparison of four tools. *Journal of nutrition in gerontology and geriatrics*, *38*(4), 329-344.
37. Aukner, C., Eide, H. D., & Iversen, P. O. (2013). Nutritional status among older residents with dementia in open versus special care units in municipal nursing homes: an observational study. *BMC geriatrics*, *13*(1), 1-7.

38. Lilamand, M., Kelaiditi, E., Demougeot, L., Rolland, Y., Vellas, B., & Cesari, M. (2015). The Mini Nutritional Assessment-Short Form and mortality in nursing home residents—Results from the INCUR study. *The journal of nutrition, health & aging*, *19*(4), 383-388.

39. Donini, L. M., Neri, B., De Chiara, S., Poggiogalle, E., & Muscaritoli, M. (2013). Nutritional care in a nursing home in Italy. *PloS one*, *8*(2), e55804.

40. Sánchez, B. L., París, A. S., Nogueras, J. P., & Oliver, A. S. (2017). Disability and its influence in nutritional assessment tools in elderly people living in nursing homes. *Nutricion hospitalaria*, *34*(5), 1080-1088.

41. Törmä, J., Winblad, U., Cederholm, T., & Saletti, A. (2013). Does undernutrition still prevail among nursing home residents?. *Clinical Nutrition*, *32*(4), 562-568.

42. Ulger, Z., Halil, M. E. L. T. E. M., Cankurtaran, M. U. S. T. A. F. A., Yavuz, B. B., Yesil, Y. U. S. U. F., Kuyumcu, M. E., ... & Ariogul, S. (2013). Malnutrition in Turkish nursing homes: a correlate of short term mortality. *The journal of nutrition, health & aging*, *17*(4), 305-309.

43. Diekmann, R., Winning, K., Uter, W., Kaiser, M. J., Sieber, C. C., Volkert, D., & Bauer, J. M. (2013). Screening for malnutrition among nursing home residents—a comparative analysis of the Mini Nutritional Assessment, the Nutritional Risk Screening, and the Malnutrition Universal Screening Tool. *The journal of nutrition, health & aging*, *17*(4), 326-331.

44. Kaiser, M. J., Bauer, J. M., Rämsch, C., Uter, W., Guigoz, Y., Cederholm, T., ... & Mini Nutritional Assessment International Group. (2010). Frequency of malnutrition in older adults: a multinational perspective using the mini nutritional assessment. *Journal of the American Geriatrics Society*, *58*(9), 1734-1738.

45. Serrano-Urrea, R., & Garcia-Meseguer, M. J. (2013). Malnutrition in an elderly population without cognitive impairment living in nursing homes in Spain: study of prevalence using the Mini Nutritional Assessment test. *Gerontology*, *59*(6), 490-498.

46. Cankurtaran, M., Saka, B., Sahin, S., Varlı, M., Doventas, A., Yavuz, B. B., ... & Ariogul, S. (2013). Turkish nursing homes and care homes nutritional status assessment project (THN-malnutrition). *European Geriatric Medicine*, *4*(5), 329-334.

47. Saeidlou, S. N., Merdol, T. K., Mikaili, P., & Bektaş, Y. (2011). ASSESSMENT OF THE NUTRITIONAL STATUS AND AFFECTING FACTORS OF ELDERLY PEOPLE LIVING AT SIX NURSING HOME IN URMIA, IRAN. *International Journal of Academic Research*, *3*(1).

48. Santomauro, F., Olimpi, N., Baggiani, L., Comodo, N., Mantero, S., & Bonaccorsi, G. (2011). Bioelectrical impedance vector analysis and mini nutritional assessment in elderly nursing home residents. *The journal of nutrition, health & aging*, *15*(3), 163-167.

49. Verbrugghe, M., Beeckman, D., Van Hecke, A., Vanderwee, K., Van Herck, K., Clays, E., ... & Verhaeghe, S. (2013). Malnutrition and

associated factors in nursing home residents: A cross-sectional, multi-centre study. *Clinical nutrition*, *32*(3), 438-443.

50. Bolmsjö, B. B., Jakobsson, U., Mölstad, S., Östgren, C. J., & Midlöv, P. (2015). The nutritional situation in Swedish nursing homes–a longitudinal study. *Archives of gerontology and geriatrics*, *60*(1), 128-133.
51. Khongar, P. D., Sadata, S. Z., Shab-Bidar, S., & Neyestanib, T. R. (2015). Relationships between mini nutritional assessment and functional status in elderly Iranian people living in nursing homes. *Journal of Nutritional Sciences and Dietetics*, 149-156.
52. Huppertz, V. A., van der Putten, G. J., Halfens, R. J., Schols, J. M., & de Groot, L. C. (2017). Association between malnutrition and oral health in Dutch nursing home residents: Results of the LPZ Study. *Journal of the American Medical Directors Association*, *18*(11), 948-954.
53. Nazemi, L., Skoog, I., Karlsson, I., Hosseini, S., Mohammadi, M. R., Hosseini, M., ... & Baikpour, M. (2015). Malnutrition, prevalence and relation to some risk factors among elderly residents of nursing homes in Tehran, Iran. *Iranian journal of public health*, *44*(2), 218.
54. Saka, B., Ozkaya, H., Karisik, E., Akin, S. İ. B. E. L., Akpinar, T. S., Tufan, F., ... & Karan, M. A. (2016). Malnutrition and sarcopenia are associated with increased mortality rate in nursing home residents: A prospective study. *European Geriatric Medicine*, *7*(3), 232-238.
55. Kamo, T., Takayama, K., Ishii, H., Suzuki, K., Eguchi, K., & Nishida, Y. (2017). Coexisting severe frailty and malnutrition predict mortality

among the oldest old in nursing homes: A 1-year prospective study. *Archives of gerontology and geriatrics*, *70*, 99-104.

56. Fakhar, M. R. E., & Zand, S. (2013). Nutritional status and associated factors in elderly residents in nursing homes. *Payesh (Health Monitor)*, *12*(2), 143-149.
57. Papparotto, C., Bidoli, E., & Palese, A. (2013). Risk factors associated with malnutrition in older adults living in Italian nursing homes: a cross-sectional study. *Research in gerontological nursing*, *6*(3), 187-197.
58. BOSTANI, K. Z., & Bokaie, M. (2015). Nutritional status and related factors in elderly nursing home residents.
59. Arjuna, T., Luscombe-Marsh, N. D., Lange, K., Kang, A. C., Hickman, P., Edwards, C., ... & Soenen, S. (2016). Bodyweight and nutritional-status changes in South Australian nursing-home residents. *The J of Nur Home Res Sci*, *2*(3), 97-103.
60. Salminen, K. S., Suominen, M. H., Soini, H., Kautiainen, H., Savikko, N., Saarela, R. K. T., ... & Pitkala, K. H. (2019). Associations between nutritional status and health-related quality of life among long-term care residents in Helsinki. *The journal of nutrition, health & aging*, *23*(5), 474-478.
61. Fougère, B., Kelaiditi, E., Hoogendijk, E. O., Demougeot, L., Duboué, M., Vellas, B., & Cesari, M. (2016). Frailty index and quality of life in nursing home residents: results from INCUR study. Journals of Gerontology Series A: Biomedical Sciences and Medical Sciences, 71(3), 420-424.

62. López-Contreras, M. J., Torralba, C., Zamora, S., & Pérez-Llamas, F. (2012). Nutrition and prevalence of undernutrition assessed by different diagnostic criteria in nursing homes for elderly people. Journal of human nutrition and dietetics, 25(3), 239-246.

63. Carryer, J., Weststrate, J., Yeung, P., Rodgers, V., Towers, A., & Jones, M. (2017). Prevalence of key care indicators of pressure injuries, incontinence, malnutrition, and falls among older adults living in nursing homes in New Zealand. Research in nursing & health, 40(6), 555-563.

64. Dybicz, S. B., Thompson, S., Molotsky, S., & Stuart, B. (2011). Prevalence of diabetes and the burden of comorbid conditions among elderly nursing home residents. The American journal of geriatric pharmacotherapy, 9(4), 212-223.

65. Jésus, P., Desport, J. C., Massoulard, A., Villemonteix, C., Baptiste, A., Gindre-Poulvelarie, L., ... & Preux, P. M. (2012). Nutritional assessment and follow-up of residents with and without dementia in nursing homes in the Limousin region of France: a health network initiative. The journal of nutrition, health & aging, 16(5), 504-508.

66. Vandewoude, M. F., van Wijngaarden, J. P., De Maesschalck, L., Luiking, Y. C., & Van Gossum, A. (2019). The prevalence and health burden of malnutrition in Belgian older people in the community or residing in nursing homes: results of the NutriAction II study. Aging clinical and experimental research, 31(2), 175-183.

67. Doumit, J. H., Nasser, R. N., & Hanna, D. R. (2014). Nutritional and health status among nursing home residents in Lebanon: comparison

across gender in a national cross sectional study. BMC Public Health, 14(1), 1-11.

68. Diekmann, R., Winning, K., Uter, W., Kaiser, M. J., Sieber, C. C., Volkert, D., & Bauer, J. M. (2013). Screening for malnutrition among nursing home residents—a comparative analysis of the Mini Nutritional Assessment, the Nutritional Risk Screening, and the Malnutrition Universal Screening Tool. The journal of nutrition, health & aging, 17(4), 326-331.
69. Törmä, J., Winblad, U., Cederholm, T., & Saletti, A. (2013). Does undernutrition still prevail among nursing home residents?. Clinical Nutrition, 32(4), 562-568.
70. Halil, M. E. L. T. E. M., Ulger, Z., Varlı, M., Döventaş, A., Oztürk, G. B., Kuyumcu, M. E., ... & Arıoğul, S. (2014). Sarcopenia assessment project in the nursing homes in Turkey. European journal of clinical nutrition, 68(6), 690-694.
71. Saka, B., Ozkaya, H., Karisik, E., Akin, S. İ. B. E. L., Akpinar, T. S., Tufan, F., ... & Karan, M. A. (2016). Malnutrition and sarcopenia are associated with increased mortality rate in nursing home residents: A prospective study. European Geriatric Medicine, 7(3), 232-238.
72. Kaiser, R., Winning, K., Uter, W., Volkert, D., Lesser, S., Stehle, P., ... & Bauer, J. M. (2010). Functionality and mortality in obese nursing home residents: an example of ‘risk factor paradox’?. Journal of the American Medical Directors Association, 11(6), 428-435.

73. Arrieta, H., Rezola-Pardo, C., Kortajarena, M., Hervás, G., Gil, J., Yanguas, J. J., ... & Rodriguez-Larrad, A. (2020). The impact of physical exercise on cognitive and affective functions and serum levels of brain-derived neurotrophic factor in nursing home residents: A randomized controlled trial. Maturitas, 131, 72-77.

74. Kim, S., Kim, M., Lee, Y., Kim, B., Yoon, T. Y., & Won, C. W. (2018). Calf circumference as a simple screening marker for diagnosing sarcopenia in older Korean adults: the Korean frailty and aging cohort study (KFACS). Journal of Korean medical science, 33(20).

75. Mocanu, V. (2013). Vitamin D deficiency and metabolic syndrome among nursing home residents. Acta Endocrinologica (Bucharest), 9(1), 53–61. doi:10.4183/aeb.2013.53

76. Marmeleira,J., Ferreira,S., & Raimundo,A.(2017). Physical activity and physical fitness of nursing home residents with cognitive impairment: A pilot study. Experimental Gerontology 100 , 63–69

77. Pavlovic, J., Racic, M., Ivkovic, N., & Jatic, Z. (2019). Comparison of nutritional status between nursing home residents and community dwelling older adults: a cross-sectional study from Bosnia and Herzegovina. Materia socio-medica, 31(1), 19.

78. Saghafi-Asl, M., & Vaghef-Mehrabany, E. (2017). Comprehensive comparison of malnutrition and its associated factors between nursing home and community dwelling elderly: A case-control study from Northwestern Iran. Clinical nutrition ESPEN, 21, 51-58.

79. Zarzeczny, R., Nawrat-Szołtysik, A., Polak, A., Manasar, A., Maliszewski, J., Kiełtyka, A., ... & Wajdman, A. (2018). The relationship between selected body fatness indices and the level of blood interleukin-6 in female nursing home residents aged 80+ years without inflammation: A pilot study. Experimental gerontology, 108, 240-246.

80. Álvarez Barbosa, F., del Pozo-Cruz, B., del Pozo-Cruz, J., Alfonso-Rosa, R. M., Sañudo Corrales, B., & Rogers, M. E. (2015). Factors Associated with the Risk of Falls of Nursing Home Residents Aged 80 or Older. Rehabilitation Nursing, 41(1), 16–25.

81. Zarzeczny, R., Nawrat-Szołtysik, A., Polak, A., Manasar, A., Maliszewski, J., Kiełtyka, A., ... & Wajdman, A. (2018). The relationship between selected body fatness indices and the level of blood interleukin-6 in female nursing home residents aged 80+ years without inflammation: A pilot study. Experimental gerontology, 108, 240-246.

82. Landi, F., Liperoti, R., Fusco, D., Mastropaolo, S., Quattrociocchi, D., Proia, A., ... & Onder, G. (2012). Prevalence and risk factors of sarcopenia among nursing home older residents. Journals of Gerontology Series A: Biomedical Sciences and Medical Sciences, 67(1), 48-55.

83. Kimyagarov, S., Klid, R., Levenkrohn, S., Fleissig, Y., Kopel, B., Arad, M., & Adunsky, A. (2010). Body mass index (BMI), body composition and mortality of nursing home elderly residents. Archives of gerontology and geriatrics, 51(2), 227-230.

84. Kimyagarov, S., Turgeman, D., Fleissig, Y., Klid, R., Kopel, B., & Adunsky, A. (2013). Percutaneous endoscopic gastrostomy (PEG) tube

feeding of nursing home residents is not associated with improved body composition parameters. The journal of nutrition, health & aging, 17(2), 162-165.

85. Bahat, G., Saka, B., Tufan, F., Akin, S., Sivrikaya, S., Yucel, N., ... & Karan, M. A. (2010). Prevalence of sarcopenia and its association with functional and nutritional status among male residents in a nursing home in Turkey. The Aging Male, 13(3), 211-214.
86. Henwood, T., Hassan, B., Swinton, P., Senior, H., & Keogh, J. (2017). Consequences of sarcopenia among nursing home residents at long-term follow-up. Geriatric Nursing, 38(5), 406-411.
87. Buckinx, F., Croisier, J.-L., Reginster, J.-Y., Lenaerts, C., Brunois, T., Rygaert, X., … Bruyère, O. (2018). Prediction of the Incidence of Falls and Deaths Among Elderly Nursing Home Residents: The SENIOR Study. Journal of the American Medical Directors Association, 19(1), 18–24
88. Volkert, D., Pauly, L., Stehle, P., & Sieber, C. C. (2011). Prevalence of malnutrition in orally and tube-fed elderly nursing home residents in Germany and its relation to health complaints and dietary intake. Gastroenterology research and practice, 2011.
89. Buckinx, F., Allepaerts, S., Paquot, N., Reginster, J. Y., de Cock, C., Petermans, J., & Bruyère, O. (2016). Energy and nutrient content of food served and consumed by nursing home residents. The Journal of Nutrition, Health & Aging, 21(6), 727–732.

90. Mila, R., Abellana, R., Padro, L., Basulto, J., & Farran, A. (2012). High consumption foods and their influence on energy and protein intake in institutionalized older adults. The journal of nutrition, health & aging, 16(2), 115-122.

91. Vikstedt, T., Suominen, M. H., Joki, A., Muurinen, S., Soini, H., & Pitkälä, K. H. (2011). Nutritional status, energy, protein, and micronutrient intake of older service house residents. Journal of the American Medical Directors Association, 12(4), 302-307.

92. Jaul, E., & Barron, J. (2017). Age-related diseases and clinical and public health implications for the 85 years old and over population. Frontiers in public health, 5, 335.

93. Abizanda, P., López, M. D., García, V. P., de Dios Estrella, J., da Silva González, Á., Vilardell, N. B., & Torres, K. A. (2015). Effects of an oral nutritional supplementation plus physical exercise intervention on the physical function, nutritional status, and quality of life in frail institutionalized older adults: the ACTIVNES study. Journal of the American Medical Directors Association, 16(5), 439-e9.

94. Onder, G., Carpenter, I., Finne-Soveri, H., Gindin, J., Frijters, D., Henrard, J. C., ... & Bernabei, R. (2012). Assessment of nursing home residents in Europe: the Services and Health for Elderly in Long TERm care (SHELTER) study. *BMC health services research*, *12*(1), 1-10.

95. Doupe, M., John, P. S., Chateau, D., Strang, D., Smele, S., Bozat-Emre, S., ... & Dik, N. (2012). Profiling the multidimensional needs of new

nursing home residents: evidence to support planning. *Journal of the American Medical Directors Association*, *13*(5), 487-e9.

96. Bürge, E., von Gunten, A., & Berchtold, A. (2013). Factors favoring a degradation or an improvement in activities of daily living (ADL) performance among nursing home (NH) residents: a survival analysis. Archives of gerontology and geriatrics, 56(1), 250-257.
97. Schumpf, L. F., Theill, N., Scheiner, D. A., Fink, D., Riese, F., & Betschart, C. (2017). Urinary incontinence and its association with functional physical and cognitive health among female nursing home residents in Switzerland. BMC geriatrics, 17(1), 1-8.
98. Björk, S., Juthberg, C., Lindkvist, M., Wimo, A., Sandman, P. O., Winblad, B., & Edvardsson, D. (2016). Exploring the prevalence and variance of cognitive impairment, pain, neuropsychiatric symptoms and ADL dependency among persons living in nursing homes; a cross-sectional study. BMC geriatrics, 16(1), 1-8.
99. Auer, S. R., Höfler, M., Linsmayer, E., Beránková, A., Prieschl, D., Ratajczak, P., ... & Holmerová, I. (2018). Cross-sectional study of prevalence of dementia, behavioural symptoms, mobility, pain and other health parameters in nursing homes in Austria and the Czech Republic: results from the DEMDATA project. BMC geriatrics, 18(1), 1-13.
100. Nakazawa, A., Nakamura, K., Kitamura, K., & Yoshizawa, Y. (2012). Association between activities of daily living and mortality among institutionalized elderly adults in Japan. Journal of Epidemiology, 22(6), 501-507.

101. Nogueira, D., & Reis, E. (2013). Swallowing disorders in nursing home residents: how can the problem be explained?. Clinical interventions in aging, 8, 221.

102. Wetzels, R. B., Zuidema, S. U., de Jonghe, J. F., Verhey, F. R. J., & Koopmans, R. T. C. M. (2010). Determinants of quality of life in nursing home residents with dementia. Dementia and geriatric cognitive disorders, 29(3), 189-197.

103. Park, Y. H., Han, H. R., Oh, B. M., Lee, J., Park, J. A., Yu, S. J., & Chang, H. (2013). Prevalence and associated factors of dysphagia in nursing home residents. Geriatric Nursing, 34(3), 212-217

104. Langhammer, B., & Stanghelle, J. K. (2011). Functional fitness in elderly Norwegians measured with the Senior Fitness Test. Advances in Physiotherapy, 13(4), 137-144 .

105. Arrieta, H., Rezola-Pardo, C., Zarrazquin, I., Echeverria, I., Yanguas, J. J., Iturburu, M., … Irazusta, J. (2018). A multicomponent exercise program improves physical function in long-term nursing home residents: A randomized controlled trial. Experimental Gerontology, 103, 94–100.

106. Arrieta, H., Rezola-Pardo, C., Echeverria, I., Iturburu, M., Gil, S. M., Yanguas, J. J., ... & Rodriguez-Larrad, A. (2018). Physical activity and fitness are associated with verbal memory, quality of life and depression among nursing home residents: preliminary data of a randomized controlled trial. BMC geriatrics, 18(1), 1-13.

107. Rezola-Pardo, C., Arrieta, H., Gil, S. M., Zarrazquin, I., Yanguas, J. J., López, M. A., ... & Rodriguez-Larrad, A. (2019). Comparison between multicomponent and simultaneous dual-task exercise interventions in long-term nursing home residents: the Ageing-ONDUAL-TASK randomized controlled study. Age and ageing, 48(6), 817-823.

108. Pavlovic, J., Racic, M., Ivkovic, N., & Jatic, Z. (2019). Comparison of nutritional status between nursing home residents and community dwelling older adults: a cross-sectional study from Bosnia and Herzegovina. Materia socio-medica, 31(1), 19.

109. Wolkowitz, O. M., Reus, V. I., & Mellon, S. H. (2011). Of sound mind and body: depression, disease, and accelerated aging. Dialogues in clinical neuroscience, 13(1), 25.

110. Drageset, J., Eide, G. E., & Ranhoff, A. H. (2012). Anxiety and depression among nursing home residents without cognitive impairment. Scandinavian Journal of Caring Sciences, 27(4), 872–881. doi:10.1111/j.1471-6712.2012.01095.x

111. Morley, J. E. (2010). Depression in nursing home residents. Journal of the American Medical Directors Association, 11(5), 301-303.

112. Barca, M. L., Engedal, K., Laks, J., & Selbaek, G. (2010). A 12 months follow-up study of depression among nursing-home patients in Norway. Journal of Affective Disorders, 120(1-3), 141-148.

113. 113- Carpenter, I., Finne-Soveri, H., Gindin, J., Frijters, D., Henrard, J. C., ... & Bernabei, R. (2012). Assessment of nursing home residents in

Europe: the Services and Health for Elderly in Long TERm care (SHELTER) study. BMC health services research, 12(1), 1-10.

114. Li, Z., Jeon, Y. H., Low, L. F., Chenoweth, L., O'Connor, D. W., Beattie, E., & Brodaty, H. (2015). Validity of the geriatric depression scale and the collateral source version of the geriatric depression scale in nursing homes. International psychogeriatrics, 27(9), 1495.
115. Tiong,W., Yap,P., Koh,G.C.H., Fong .N.P.,& Nan Luo. (2013). Prevalence and risk factors of depression in the elderly nursing home residents in Singapore. Journal of Aging & Mental Health , 17(6),724-731.
116. Patra ,P., Alikari,V., Fradelos ,C.E., Sachlas,A., Kourakos,M., Gil,R.P.A., Babatsikou,F., Zyga,S., (2017) Assessment of Depression in Elderly. Is Perceived Social Support Related? A Nursing Home Study. In: Vlamos P. (eds) GeNeDis 2016. Advances in Experimental Medicine and Biology, vol 987. Springer, Cham. https://doi.org/10.1007/978-3-319-57379-3_13
117. Nazemi, L., Skoog, I., Karlsson, I., Hosseini, S., Hosseini, M., Hosseinzadeh, M. J., ... & Baikpour, M. (2013). Depression, prevalence and some risk factors in elderly nursing homes in Tehran, Iran. Iranian journal of public health, 42(6), 559.
118. Almomani, F. M., McDowd, J. M., Bani-Issa, W., & Almomani, M. (2014). Health-related quality of life and physical, mental, and cognitive disabilities among nursing home residents in Jordan. Quality of Life Research, 23(1), 155-165.

119. Hayajneh, A.A., Rababa, M., Alghwiri, A.A, Masha'al ,D. (2020) .Factors influencing the deterioration from cognitive decline of normal aging to dementia among nursing home residents. BMC Geriatr 20, 479 .

120. Khater, M. S., & Abouelezz, N. F. (2011). Nutritional status in older adults with mild cognitive impairment living in elderly homes in Cairo, Egypt. The journal of nutrition, health & aging, 15(2), 104-108.

121. Matusik, P., Tomaszewski, K., Chmielowska, K., Nowak, J., Nowak, W., Parnicka, A., ... & Grodzicki, T. (2012). Severe frailty and cognitive impairment are related to higher mortality in 12-month follow-up of nursing home residents. Archives of gerontology and geriatrics, 55(1), 22-24.

122. Frändin, K., Grönstedt, H., Helbostad, J. L., Bergland, A., Andresen, M., Puggaard, L., ... & Hellström, K. (2016). Long-term effects of individually tailored physical training and activity on physical function, well-being and cognition in scandinavian nursing home residents: a randomized controlled trial. Gerontology, 62(6), 571-580.

123. Abrahamson,K., Clark,D., Perkins,A., Arling, G.(2012). Does Cognitive Impairment Influence Quality of Life Among Nursing Home Residents?, The Gerontologist, 52(5) , 632–640.

124. Thomas, K. S., Dosa, D., Wysocki, A., & Mor, V. (2017). The minimum data set 3.0 cognitive function scale. Medical care, 55(9), e68.

125. Landi, F., Liperoti, R., Fusco, D., Mastropaolo, S., Quattrociocchi, D., Proia, A., ... & Onder, G. (2012). Sarcopenia and mortality among older

nursing home residents. Journal of the American Medical Directors Association, 13(2), 121-126.

126. Yang, M., Zhuo, Y., Hu, X., & Xie, L. (2018). Predictive validity of two frailty tools for mortality in Chinese nursing home residents: frailty index based on common laboratory tests (FI-Lab) versus FRAIL-NH. Aging clinical and experimental research, 30(12), 1445-1452.
127. Duran, S., ÖzdinH, S., Gelik, Ö. M., SelHuk, H., & Sönmez, Z. S. (2019). Comparison of Nutritional Habits, Physical Activity Levels and Quality of Life among Normal Cognition Elderly Individuals Living in Nursing Homes or at Their Residence. International Journal of Gerontology, 13(4), 339-343.
128. Moore, K. L., Boscardin, W. J., Steinman, M. A., & Schwartz, J. B. (2012). Age and Sex Variation in Prevalence of Chronic Medical Conditions in Older Residents of US. Nursing Homes. Journal of the American Geriatrics Society, 60(4), 756-764.
129. Öztürk, A., Şimşek, T. T., Yümin, E. T., Sertel, M., & Yümin, M. (2011). The relationship between physical, functional capacity and quality of life (QoL) among elderly people with a chronic disease. Archives of Gerontology and Geriatrics, 53(3), 278–283.
130. Wang, L. M., Chen, Z. H., Zhang, M., Zhao, Z. P., Huang, Z. J., Zhang, X., ... & Zhou, M. G. (2019). Study of the prevalence and disease burden of chronic disease in the elderly in China. Zhonghua liu xing bing xue za zhi= Zhonghua liuxingbingxue zazhi, 40(3), 277-283.

131. Chilima, D. M., & Ismail, S. J. (1998). Anthropometric characteristics of older people in rural Malawi. European Journal of Clinical Nutrition, 52(9), 643-649.

132. Teichtahl, A. J., Wluka, A. E., Strauss, B. J., Wang, Y., Berry, P., Davies-Tuck, M., & Cicuttini, F. M. (2012). The associations between body and knee height measurements and knee joint structure in an asymptomatic cohort. BMC musculoskeletal disorders, 13(1), 1-7.

133. Berger, M. M., Cayeux, M. C., Schaller, M. D., Soguel, L., Piazza, G., & Chioléro, R. L. (2008). Stature estimation using the knee height determination in critically ill patients. e-SPEN, the European e-Journal of Clinical Nutrition and Metabolism, 3(2), e84-e88.

134. Hailemariam, H., Singh, P., & Fekadu, T. (2016). Evaluation of mini nutrition assessment (MNA) tool among community dwelling elderly in urban community of Hawassa city, Southern Ethiopia. BMC Nutrition, 2(1), 1-6.

135. Kaiser, M. J., Bauer, J. M., Ramsch, C., Uter, W., Guigoz, Y., Cederholm, T., ... & Sieber, C. C. (2009). Validation of the Mini Nutritional Assessment Short-Form (MNA®-SF): A practical tool for identification of nutritional status. JNHA-The Journal of Nutrition, Health and Aging, 13(9), 782-788.

136. Lilamand, M., Kelaiditi, E., Demougeot, L., Rolland, Y., Vellas, B., & Cesari, M. (2015). The Mini Nutritional Assessment-Short Form and mortality in nursing home residents—Results from the INCUR study. The journal of nutrition, health & aging, 19(4), 383-388.

137. Waldron-Perrine, B., Gabel, N. M., Seagly, K., Kraal, A. Z., Pangilinan, P., Spencer, R. J., & Bieliauskas, L. (2019). Montreal Cognitive Assessment as a screening tool: Influence of performance and symptom validity. Neurology: Clinical Practice, 9(2), 101-108.

138. Smith, T., Gildeh, N., & Holmes, C. (2007). The Montreal Cognitive Assessment: validity and utility in a memory clinic setting. The Canadian Journal of Psychiatry, 52(5), 329-332.

139. Conradsson, M., Rosendahl, E., Littbrand, H., Gustafson, Y., Olofsson, B., & Lövheim, H. (2013). Usefulness of the Geriatric Depression Scale 15-item version among very old people with and without cognitive impairment. Aging & mental health, 17(5), 638-645.

140. Millor, N., Lecumberri, P., Gómez, M., Martínez-Ramírez, A., & Izquierdo, M. (2013). An evaluation of the 30-s chair stand test in older adults: frailty detection based on kinematic parameters from a single inertial unit. Journal of neuroengineering and rehabilitation, 10(1), 1-9.

141. Bohannon, R. W. (2006). Reference values for the timed up and go test: a descriptive meta-analysis. Journal of geriatric physical therapy, 29(2), 64-68.

142. Milanović, Z., Pantelić, S., Trajković, N., Sporiš, G., Kostić, R., & James, N. (2013). Age-related decrease in physical activity and functional fitness among elderly men and women. Clinical interventions in aging, 8, 549.

143. Kim, H. J., Park, I., joo Lee, H., & Lee, O. (2016). The reliability and validity of gait speed with different walking pace and distances against

general health, physical function, and chronic disease in aged adults. Journal of exercise nutrition & biochemistry, 20(3), 46.

144. Bautmans, I., Gorus, E., Njemini, R., & Mets, T. (2007). Handgrip performance in relation to self-perceived fatigue, physical functioning and circulating IL-6 in elderly persons without inflammation. BMC geriatrics, 7(1), 1-8.
145. Cruz-Jentoft, A. J., Baeyens, J. P., Bauer, J. M., Boirie, Y., Cederholm, T., Landi, F., ... & Zamboni, M. (2010). Sarcopenia: European consensus on definition and diagnosisReport of the European Working Group on Sarcopenia in Older PeopleA. J. Cruz-Gentoft et al. Age and ageing, 39(4), 412-423.
146. Shelkey, M., & Wallace, M. (1999). Katz index of independence in activities of daily living. Journal of gerontological nursing, 25(3), 8-9.
147. Nasser, R., & Doumit, J. (2009). Validity and reliability of the Arabic version of activities of daily living (ADL). BMC Geriatrics, 9(1), 11.
148. Bawadi, H. A. (2008). Developing a meal-planning exchange list for traditional dishes in jordan. Journal of the American Dietetic Association, 108(5), 840-846.
149. Bawadi, H., Hassan, S., Zadeh, A. S., Sarv, H., Kerkadi, A., Tur, J. A., & Shi, Z. (2020). Age and gender specific cut-off points for body fat parameters among adults in Qatar. Nutrition Journal, 19(1), 1-5.
150. Weir, C. B., & Jan, A. (2019). BMI classification percentile and cut off points. *StatPearls [Internet]*.
151. National Research Council. (1989). Recommended Dietary Allowances.

152. Stange, I., Poeschl, K., Stehle, P., Sieber, C. C., & Volkert, D. (2013). Screening for malnutrition in nursing home residents: comparison of different risk markers and their association to functional impairment. *The journal of nutrition, health & aging*, *17*(4), 357-363.

153. Badrasawi, M., Badrasawi, K., Hamdan, M., & Irshaid, A. A. (2019). Malnutrition and its association with functional, cognitive and psychological status among Palestinian older adults in long-term care houses. *Educational Gerontology*, *45*(12), 708-718.

154. AGE UK (2021), The Malnutrition Task Force, RETRIEVED https://www.ageuk.org.uk/our-impact/programmes/malnutrition-task-force/.

155. Evans, C. (2005). Malnutrition in the elderly: a multifactorial failure to thrive. The Permanente Journal, 9(3), 38.

156. BRITISH DIETITEC ASSOCIATION (2020) , Malnutrition in older people, RETRIEVED

157. https://www.bda.uk.com/resource/malnutrition-in-older-people.html.

158. Kvamme, J. M., Holmen, J., Wilsgaard, T., Florholmen, J., Midthjell, K., & Jacobsen, B. K. (2012). Body mass index and mortality in elderly men and women: the Tromsø and HUNT studies. J epidemiol community health, 66(7), 611-617.

159. Liu, X. C., Huang, Y., Lo, K., Huang, Y. Q., Chen, J. Y., & Feng, Y. Q. (2021). Quotient of Waist Circumference and Body Mass Index: A Valuable Indicator for the High-Risk Phenotype of Obesity. Frontiers in Endocrinology, 12, 611.

160. Corrada, M. M., Kawas, C. H., Mozaffar, F., & Paganini-Hill, A. (2006). Association of body mass index and weight change with all-cause mortality in the elderly. American journal of epidemiology, 163(10), 938-949.

161. Berraho, M., Nejjari, C., Raherison, C., El Achhab, Y., Tachfouti, N., Serhier, Z., ... & Barberger-Gateau, P. (2010). Body mass index, disability, and 13-year mortality in older French adults. Journal of aging and health, 22(1), 68-83.

Appendices

Appendix 1 Summary of the studies on malnutrition prevalence in long-term care houses

#	Author/ year	Country	Subject age	Sample size	malnutrition assessment tool	Malnutrition prevalence
1	Bonaccorsi, G. et al (2014).	italy	>64 years	641	MUST	79.9% at low risk 8.1% at medium risk 12.2% at high risk of malnutrition
2	Jésus, P. et al (2012)	france	>70 years	346	MNA BMI	53.3% were malnourished and 27.4% obese
3	Rose, A.et al (2013)	germany	57-102	81	MNA	25% malnourished 32% well nourished 43% at risk of malnutrition
4	Vandewoude, M. F. et al (2019)	Belgian	>70 years	2480	MNA	14% malnourished 37% well nourished 49% at risk of malnutrition
5	Hirose, T. et al (2014)	japan	65years or older	587	MNA-SF	25.7% malnourished 57.4% at risk of malnutrition 16.8%well nourished
6	Sahin, S., et al (2016)	Turkey	>70 years	257	Full MNA	8.2% malnourished 35.8 % at risk of malnutrition
7	Doumit, J. H., Nasser, R. N., & Hanna, D. R. (2014).	Lebanon	60 years or older	221	MNA	3.2% malnourished 27.6 % at risk of malnutrition
8	Bonaccorsi, G. et al . (2015)	Italy	65 + years	2395	MUST	23.7 % were at high, 11 % at medium, and 65.3 % at low risk for malnutrition

9	Madeira, T. et al (2019)	Portugal	aged 65 years or over)	1186	MNA	4.8% malnourished 38.7 % at risk of malnutrition
10	Stange, I. et al . (2013)	Germany	age >65 years	286	MNA	18.2% malnourished 42 % at risk of malnutrition
11	Saarela, R. K. et al . (2014)	Finland	≥65 years	1475	MNA	13% were malnourished, 65% were at risk for malnutrition, and 22% were well nourished.
12	Keller, H. et al .(2019)	Canada		638	-(MNA-SF)	53.7%
					-(PG-SGA)	44%
					-Pt-Global webtooL	33.4%
					- interRAI	28.9%
13	Aukner, C., Eide, H. D., & Iversen, P. O. (2013).	Oslo-Norway	The mean age was 87.1 ± 6.2 years for women and 81.6 ± 8.0 for men	309	MUST	67% were at low risk, 20% were at medium risk, and 13% were at high risk
14	Lilamand, M. et al .(2015)	France	60 years and older	773	MNA	(25.6%) were normal nutritional , (58.7%) were at risk of malnutrition , (15.7%) were malnourished.
15	Donini, L. M. et al . (2013)	Italy	80.2±10 years	100	MNA	(18%) were normal nutritional , (46%) were at risk of malnutrition , (36%) were malnourished.
16	Sánchez, B. L. et al .(2017)	Spain	older than 60 years	136	-MNA	21.3% were malnourished 55.9% were at risk of malnutrition

				80	-ESPEN	72.5% were at risk of malnutrition 17.5% were malnourished.
				145	-consensus CONUT	67.6% - normal nutritional status, 11.7% - mild malnutrition 20.7% - moderate malnutrition
17	Törmä, J. et al . (2013)	Sweden	86.3 ± 7.7	172	MNA	30% were malnourished 63% as at risk of malnutrition 7% were well-nourished.
18	Ulger, Z. et al . (2013)	Turkey	over 65 years	534	MNA	53.6% -at risk of malnutrition 15.9%- malnourished
19	Diekmann, R. et al .(2013)	Germany	65 years and older	188	MNA	15.4.% - malnourished 57.4% - at risk of malnutrition
				198	NRS	8.6%-Risk of malnutrition 40.9%-Weekly screening
				198	MUST	8.6%-High Risk 7.6%-Medium Risk
20	Kaiser, M. J. et al .(2010)	from 12 countries	81.3 ± 8.3 year for men, 85.1 ± 7.4 year for women	1586	MNA	13.8%- malnourished 53.4%- at risk of malnutrition
21	Serrano-Urrea, R., & Garcia-Meseguer, M. J. (2013).	spain	65 or older	895	MNA	2.8% -malnutrition 37.3%- at risk of malnutrition
22	Cankurtaran, M. et al . (2013)	turkey	≥ 65 years	1708	MNA	49.3- well nourished 38.3% at malnutrition risk, 11.9%- had malnutrition

23	Saeidlou, S. N. et al . (2011)	iran	ages > 65	106	MNA	12.26% were well nourished, 49.06% malnourished 38.68% at risk of malnutrition.
24	Santomauro, F. et al .(2011)	italy	65 or over	463	MNA	23.1% of the women and 20.4% of the males are malnourished , 60.0% and 52.8%,respectively, are at risk for malnutrition.
25	Verbrugghe, M. et al . (2013)	belgium	≥55 years of age.	1188	MNA	38.7% were at risk for malnutrition and 19.4% were malnourished.
26	Bolmsjö, B. B. et al . (2015)	sweden	≥ 65 years	308	MNA	41.6% were well nourished 40.3% were at risk of malnutrition, and 17.7% were malnourished
27	Khongar, P. D. et al . (2015)	iran		245	MNA	35.1% showed normal status while 55.9% have been classified at risk malnutrition and 9% suffered from severe malnutrition
28	Huppertz, V. A. et al .(2017)	Holland	65 or older	3,220 residents,	valid ESPEN definition	11.7% were malnourished
29	Nazemi, L. et al . (2015)	iran	60 years or older	263	MNA	68.82% - at risk of malnutrition, 10.27%- were malnourished 20.9% well nourished
30	Saka, B. et al . (2016)		65 years old or older	402	MNA	56.5% were normal, 24.8% had malnutrition risk and 18.7% had malnutrition

31	Kamo, T. et al . (2017)	japan	aged 85 years and older	160	MNA	53.1% -were malnourished, 42.5% -were at risk of malnutrition, and 4.4% -were well nourished.
32	Fakhar, M. R. E., & Zand, S. (2013).	iran	60 years old or above	199	MNA	19.6% were malnourished 53.3% were at risk of malnutrition 27.1% well nourished
33	Papparotto, C., Bidoli, E., & Palese, A. (2013).	italy		186	MNA	21%- well nourished 43% were at risk of malnutrition, 36% were malnourished.
34	BOSTANI, K. Z., & Bokaie, M. (2015).	iran	60 year or older	385	MNA	13.25% were malnourished ,60% were at risk for Malnutrition 26.75% were well nourished
35	Arjuna, T. et al . (2016)	South australia	55 year or more	1020	MUST	14% - at medium nutritional risk 16%- at high nutritional risk
36	Salminen, K. S. et al . (2019)	Helsinki	65 year or older	3767	MNA	64% were at risk of malnutrition. 18 % were malnourished

37	Park, Y. H. et al . (2013)	South korea	aged 65 years or over	395	body mass index (BMI), the Korean version of Nutrition Screening Initiative checklist, and the mid-arm muscle circumference (MAMC)	According to BMI 47.6%-Underweight 32.9%-Normal 17.5%-Overweight 2%-obese According to NSI 42.8%- Good 18.7%-Moderate risk 38.5%-High risk
38	Fougère, B. et al .(2016)	FRANCE	65 years or older	590	BMI	24.5±5.7
39	López-Contreras, M. J. et al .(2012)	spain	65–96 years	213	BMI (kg m)2	28.3
					TSF(mm)	18.6
					MAC(cm)	29.9
					MAMC (cm)	24.1
					MAMA (cm2)	47.1
					CAMA (cm2)	39.3
40	Carryer, J. et al . (2017)	New Zealand	ages 65 and older	276	BMI	BMI < 18.5)-8% BMI 18.5–24.9)- 46% BMI 25–29.9)-25.4% , BMI > 30) – 14.9%
41	Dybicz, S. B. et al .(2011)	United state	≥65 years,	2317	BMI	<25 -49.8% ≥25 -50.2%

42	Jésus, P. et al .(2012)	france	over 65-years	346	BMI	25.4±6.5	
43	Carryer, J et al (2017)	New Zealand	>65 years	276	BMI	26%	
44	Vandewoude, M. F. et al .(2019)	Belgian	70 years and older	2480	BMI	24.3±5.4	
45	Doumit, J. H., Nasser, R. N., & Hanna, D. R. (2014).	Lebanon	60 year and older	221	BMI	Underweight (<21) -(15.8%) Normal weight (21–24.99) -(31.1%) Overweight (25–29.99) -(33.0%) Obese (≥30) - (20.1%)	
46	Diekmann, R. et al .(2013)	germany	65 years and older	200	BMI CC MAC	BMI < 20 kg/m2- 8.5 % MAC < 23 cm- 9.0% CC < 31 cm- 38.8 %	
47	Törmä, J. et al . (2013)	Sweden	86.3 ± 7.7	172	BMI	BMI <22 -41% BMI 22-27 - 37% BMI >27 -22%	
48	Halil, M. E. L. T. E. M. et al . (2014)	Turkey	65 years and older	228	CC BMI WC HC MUAC	CC (cm) -38.4±6 BMI (kg/m2) - 26.4±5 Waist circumference (cm) - 95±14 Hip circumference (cm) -105±13.6 Upper mid-arm circumference (cm) - 28.7±5.5	
49	Keller, H. et al .(2019)	canada		638	CC	31 cm or less : 35.30% >31 cm 64.70%	
50	Saka, B. et al .(2016)	Europe	65 years old or older	402		MALE (n=203)	FEMAL(n= 199)
					BMI (kg/m2)	25.9±4.7	26.0 ± 7.2
					CC(cm)	34.18±4.46	33.57 ±5.92

					MUAC(cm)	27.3 ± 3.4	26.6 ± 5.2	
51	Kaiser,R. etal . (2010)	Germany	65 years old or older	200		BMI <20 (n=17)	BMI 20-30 (N =136)	BMI >30 (n=47)
					TSF (mm)	10.5±3.8	16.2±5.4	24.0±5.6
					WC (cm)	83.6±7.9	93.6±10.7	112.6±9.2
					CC(cm)	27.4±2.8	31.7±3.9	37.5±5.0
52	Arrieta, H. et al. (2020)	SPAIN	≥70 years old	112		Control group(n=55)	Intervention group (n=57)	
					WHR	0.97 ± 0.08	0.98 ± 0.07	
					BMI	28.2 ± 5.3	28.2 ± 5.1	
					HC	100.1 ± 9.7	100.7 ± 9.8	
					WC	97.6 ± 12.6	98.9 ± 13.6	
53	Kim, S. et al .(2018)	korea	aged 70 to 84 years	657	BMI, kg/m2	24.3 ± 3		
					WC, cm	87.5 ± 8.4		
					CC, cm	33.2 ± 3		
54	Mocanu, V. (2013).	Romania	aged 58-89 years	45	BMI	With Metabolic syndrome (n =16)		Without Metabolic syndrome (n = 29)
						34±6		27±8
					WC	108±6		90±3
55	Marmeleira,J.,	Portugal	65 years or	GCI=48		GCI		GWCI

	Ferreira,S., & Raimundo,A.(2017).		more	GWCI= 22	WC	92.0 (83.3–99.0)	99.0 (94.0–106.0)*
					BMI	25.3 (22.7–28.9)	30.4 (27.6–32.1)
56	Pavlovic, J. et al .(2019)	Bosnia and Herzegovina	65 years or more	146	BMI	25.69 (4.91)	
					WC	92.11 (12.82)	
					HC	97.31 (9.45)	
					CC	29.68 (4.83)	
					MUAC	25.39 (3.09)	
57	Saghafi-Asl, M., & Vaghef-Mehrabany, E. (2017).	IRAN	Age (yrs), Mean (SD) 74.69 (7.92)	76	BMI (Kg/m2)	24.29 (5.95)	
					CC(cm)	30.39 (4.70)	
					WC(cm)	89.11 (12.24)	
					HC(cm)	90.05 (13.13)	
					WHR	1.01 (0.19)	
					SBP (mmHg)	129.97 (28.54)	
					DBP (mmHg)	75.68 (14.64)	
58	Zarzeczny, R. et al. (2018)	Poland	80 years or more	12	BMI [kg/m2	25.3 ± 4.0	
					HC [cm] mean ± SD	102.3 ± 9.1	
					WC [cm] mean ± SD	93.3 ± 10.2	
					WHR mean ± SD	0.91 ± 0.09	

59	Álvarez Barbosa, F. et al. (2015)	Spain	80 or Older	52	BMI	With No Risk of Falls (n= 21)	With Risk of Falls (n= 31)
						27.4 (3.2)	28.9 (5.7)
					WHR	0.9 (0.1)	0.9 (0.1)
					Body fat %	40.5	41.5
60	Zarzeczny, R. et al. (2018)	Poland,	80 or Older	12	% fat	mean ± SD 31.0 ± 8.4	
					Fat mass [kg]	mean ± SD 18.5 ± 6.8	
					FFM [kg]	mean ± SD 39.6 ± 4.5	
					VFR	mean ± SD 10.2 ± 2.4	
61	Landi, F. et al .(2012)	italy	70 years and older	122	Skeletal muscle index, kg/m2	9.9 ± 3.8	
62	Kimyagarov, S. et al. (2010)		Age 83.6 ± 7.8 for male and 85.1± 6.4 for female	82	FFM (kg)	Male (n = 31)	Female (n=47)
						39.5 ± 6.6	35.6 ±5.8
					BFM (kg)	25.5 ± 2.5	24.0 ± 4.3
					SMM (kg)	19.8± 4.7	17.0 ± 4.2
63	Kimyagarov, S. et al. (2013)		65 years and older	21	Fat free mass index (kg/m2)	15.8±2.7	
					Fat mass index (kg/m2)	7.5±4.3	
					Skeletal muscle mass index (kg/m2)	7.5±1.4	
					Basal metabolic rate	1207±152	

64	Bahat, G. et al. (2010)	turkey	>60 years	23	FFM (kg/BSA)	30.7+0.9	
65	Henwood, T. et al. (2017)	(Australia	60 years and older	58	Fat mass (%)	36.0 ± 11.5	
					SMI (kg/m2)	7.2 ± 1.8	
66	Buckinx, F. et al. (2018)	Belgian	84.3 ±8.5 for who have fallen and 81.9 ± 9.4 for who did not fall	565	Body fat (%)	Have Fallen (n = 211)	Did not fall (n = 354)
						25.8 ± 12.7	26.9 ± 12.2
67	Volkert, D. et al. (2011)	germany	at least 65 years old,	350	3-day weighing records	The mean daily energy intake of 1535 ± 413 kcal (6.42 ± 1.72 MJ) and a protein intake of 54.2 ± 0.9 g/d. Expressed per kg BW the residents consumed 25.5 ± 7.3 kcal and 0.89 ± 0.27 g protein.	
68	Buckinx, F. et al. (2016)	Belgium	older than 65 years	74	precise food weighing method, over a 5-day period.	Energy (kcal)	1552.4±342.1
						Protein(g)	54.8±10.7
						Lipid (g)	64.1±25.5
						Carbohydrate (g)	189.9±51.0
69	Mila, R. et al .(2012)	spain	older than 65 years	62	the double-weighing method,	Energy (kcal)	the men obtained 84% (1938.54 kcal/day) of theRDA while women obtained almost 92% (1743.64 kcal/day)

						Protein (g)	among the men, the median consumption exceeded 130% of the RDA while among women it was recorded at 137%	
70	Vikstedt, T. et al. (2011)	Finland	aged 60 years and older	375	detailed food diaries	gender	male	female
						Energy (kcal)	1867	1654
						Protein (g)	69	60

Abbreviations: MUST = mini universal screen tool, MNA =mini nutritional assessment, BMI = body mass index, MNA- SF = mini nutritional assessment short form, PG-SGA = Patient-Generated Subjective Global Assessment, Pt-Global webtool = patient global webtool, interRAI = international Resident Assessment Instrument, ESPEN = European Society of Clinical Nutrition and Metabolism, CONUT = Controlling Nutritional Status, NRS = nutrition risk screening, TSF = triceps skinfold thickness, MAC= mid-arm circumference, MAMC=mid-arm muscle circumference, MAMA= mid-arm muscle area, CAMA = corrected mid-arm muscle area, GCI= group with cognitive impairment, GWCI = group without cognitive impairment, CC = Calf circumference, WC= Waist circumference, HC= Hip circumference, MUAC = mid upper arm circumferences, WHR = Waist to hip ratio, SBP= Systolic blood pressure, DBP= Diastolic blood pressure, FFM = fat free mass, VFR = visceral fat rating, BFM= body fat mass, SMM = skeletal muscle mass, SMI = skeletal muscle index .

APPENDIX 2 Summary of the studies on physical function impairments prevalence in long-term care houses

#	Author/ year	Country	Subject age	Sample size	ADL assessment tool	Level of Dependency prevalence
1	Vandewoude, M. F. et al. (2019)	Belgian	70 years and older	2480	Katz ADL	35%- fully dependent 19%- full independence
2	Onder, G. et al. (2012)	8 countries	Mean age was above 80 years	4156	ADL hierarchical scale	41.5%- Assistance required 39.8%- Dependent
3	Doupe, M. et al. (2012)	canada	65 year and older	1061	ADL hierarchical scale	28.6%- low ADL 27.5%- Intermediate ADL Dependent 43.8%-HIGH ADL dependent
4	Bürge, E., von Gunten, A., & Berchtold, A. (2013).	Swiss		10199	ADL Hierarchy	20%- Independent 14%- Supervision 16%- Limited 26%- Extensive 1 9%- Extensive 2 13%- Dependent 3%-totally Dependent
5	Schumpf, L. F. et al . (2017)	Switzerland	65 year and older	44’811	ADL Hierarchy	19%- Independent 10.9%- Supervision 19.3%- Limited 25.5%- Extensive 1 12.4%- Extensive 2

						11.4%- Dependent 1.6%-totally Dependent
6	Björk, S. et al. (2016)	Swedish		4831	Katz Index of Independence	56.3 % as being ADL dependent
7	Khongar, P. D. et al. (2015)	iran		245	Katz Index of Independence	Katz score showed that 20.4% absolutely depended on others for all of activities for daily living.
8	Auer, S. R. et al. (2018)	Austria and Czech republic	50-102	1085	Katz Index of Independence	Katz-Index (need for assistance %,

parameter	Austria	Czech Republic
Bathing	78.4%	75.4%
Dressing	69.4%	57.8%
Toileting	53.7%	53%
Transferring	40.4%	45%
Continence	69.6%	71.7%
feeding	21.2%	21.3%

9	Doumit, J. H., Nasser, R. N., & Hanna, D. R. (2014).	lebanon	60 and older	221	(ADL) Arabic version	35.3%-Totally independent 51.6%-Moderate disability 13.1%-Severe disability
10	Nakazawa, A. et al. (2012)	japan	Mean age was 84.3 year	8902	Barthel Index	(26.7%) -(totally dependent), (13.1%) -(independent).
11	Nogueira, D., & Reis, E. (2013).	Portugal	average age of 82 ± 10	266	Barthel index	28.7%- Total dependency 14.3%-Severe dependency

			years.			15.1%-Moderate dependency 12.5%-Mild dependency 16.2%-Minimal dependency 8.8%Independent		
12	Wetzels, R. B. et al. (2010)	Netherlands	average age was 84 years;	288	A hierarchical ADL scale	4.8%-Totally dependent 14.6%-Dependent 5.8%-Extensive 1 35.7%-Extensive 2 8.7%-Limited 14%-Supervision 6.3%-Independent		
13	Park, Y. H. et al. (2013)	South korea	aged 65 years or over	395	Korean version of the Modified Barthel Index (K-MBI	47.6%-Total dependent 32.9%-Severe dependent 17.5%-Moderate dependent 2%-Slight dependent		
14	Langhammer, B., & Stanghelle, J. K. (2011).	norway	60 year and more	172	Chair stand (n)	60 – 69 years(n=55)	70-79 years(n=96)	80-89 years(n=2)
						15.7 (5.0)	16.5 (5.3)	13.1 (2.7)
					Arm curl (n)	15.5 (4.3)	15.4 (3.5)	13.5 (2.5)
					6MWT (m)	612 (89)	604 (81)	535 (131)
					2MST (n)	99.9(23.2)	96.2 (20.2)	81.3 (22.1)
					Chair-sit-and-reach (cm)	2.9 (12.2)	3.6 (12.8)	1.9 (9.9)

					Back scratch (cm)	2.8 (8.9)	4.5 (10.5)	7.4 (11.4)
					2.45-meter up-and-go (s)	4.8 (1.2)	5.0 (1.0)	5.8 (1.4)
15	Arrieta, H. et al .(2018)	spain	aged ≥70 years	92	CST (n of stands)	Control group (n=47)	intervention group (n=45)	
						7.4 ± 4.1	7.6 ± 3.9	
					ACT (n of repetitions)	11.9 ± 4.1	13.1 ± 3.9	
					8-feet TUGT (m/s)	0.38 ± 0.16	0.42 ± 0.19	
					6mWT (m)	217.4 ± 93.8	244.7 ± 96.9	
					CSRT (cm)	−12.7 ± 10.9	−10.5 ± 9.4	
					BST (cm)	−19.6 ± 11.9	−20.5 ± 13.4	
					Gait speed 4 m (m/s)	0.64 ± 0.24	0.66 ± 0.24	
					Hand grip Dominant (kg)	21.6 ± 8.6	21.9 ± 7.8	
					Fast gait speed 4 m (m/s)	0.85 ± 0.34	0.91 ± 0.35	
16	Arrieta, H. et al. (2018)	spain	aged ≥70 years	114	Handgrip (Kg) mean (SD)	21.1 (8.1)		
					Chair stand test (repetitions) mean (SD)	7.6 (3.9)		

					Arm curl test (repetitions) mean (SD)	12.2 (4.3)
					6-min walk test (meter) mean (SD)	230.7 (95.9)
					Chair sit-and-reach test (cm) mean (SD)	−11.8 (9.3)
					Back scratch test (cm) mean (SD)	−21.3 (12.9)
					8-feet up-and-go test (second) mean (SD)	15.4 (9.3)
17	Rezola-Pardo, C. et al. (2019)	spain	aged ≥70 years	33	Chair stand (repetitions in 30 second)	6.9 (4.6)
					Arm curl (repetitions in 30 second)	12.0 (4.9)
					6-minute walking test (min)	267 (118)
					Timed Up and	0.37 (0.15)

					Go test (m s−1)		
18	Pavlovic, J. et al. (2019)	Republic of Srpska	older than 65 years	146	Tinetti test	8.58 (4.02)	
					Go and Up test(sec)	28.42 (8.03)	
					Functional Reach Test	16.20 (6.24)	
					Handgrip strength (right arm)	19.02 (6.85)	
	Landi, F. et al .(2012)	italy	aged 70 years and older	122	Four-meter walking test, m/s	0.14 ± 0.20	
					Hand grip strength, kg	8.2 ± 6.8	
19	Halil, M. E. L. T. E. M. et al. (2014)	turkey	65 years and older	711	get up and go test(sec)	Patients with sarcopenia	Patients without sarcopenia
						6.8±1.2	6.8±1
20	Kim, S. et al .(2018)	korea	70-84	657	HGS, kg	26 ± 7.6	
					GS, m/s	1.2 ± 0.3	
					TUGT, sec	10.7 ± 2.8	
21	Buckinx, F. et al. (2018)	Belgian	aged 83.2 ± 8.99 years	565	Tinetti test (/28)	Have Fallen (n=211)	Did Not Fall (n=354)
						21.1 ± 6.6	23.1 ± 5.7

					TUGT(seconds)	29.2 ± 23.9	23.7 ± 16.2	
					Gait speed (m/s)	0.65 ± 0.32	0.74 ± 0.36	
					Grip strength (kg)	16.7 ± 8.2	20.4 ± 12.8	
22	Kaiser, R. et al .(2010)	germany	65 years and older	164	HGS (kPa)	BMI <20	BMI 20-30	BMI >30
						25.8 ± 18.2	36.3 ± 18.0	46.8 ± 17.4
				85	TUGT, sec	27.8 ± 14.2	29.7 ± 18.1	25.5 ± 15.7

Abbreviations: 6MWT= 6-minute walking test, 2MST= 2minute step test, CST= chair stand test, ACT = arm-curl test, TUGT = time up and go test, CSRT= Chair sit-and-reach test, BST = Back scratch test, HGS= hand grip strength, GS = gate speed.

Appendix 3

Booklet number

Name **الاسم**	
عنوان السكن	
اسم بيت المسنين	
عنوان البيت	
Contact number (house) **رقم تلفون البيت + الجوال**	
Date of data collection	
مدة اقامة المسن في هذا البيت	
هل دخل المسن بيوت للمسنين سابقة ؟	- **نعم** - **لا** **في حال دخل المسن بيوت سابقة ما هي البيوت وكم فترة الاقامة ؟**

SECTION 1 (SOCIO DEMOGRAPHIC DATA)				
تاريخ الولاده Date of birth	**اليوم** day	**الشهر** month	**السنه** year	
الحنس Gender	**ذكر** male		**انثى** female	
الحاله الشخصيه Marital status	**اعزب** single	**متزوج** Married	**مطلق** Divorced	**ارمل** Widow/ widower
مستوي التعليم Educational level	**اساسي** Primary	**ثانوي** Secondary	**دبلوم** Diploma/ degree	No formal education
عدد سنوات الدراسه Years of schooling	_____			
عدد الاولاد ان وجد Number of kids				
القدره على القراءه Able to read	1- **نعم** yes 2- **لا** no			
القدره على الكتابه Able to write	3- **نعم** yes 4- **لا** no			
القدرة على الحسابات	5- **نعم** 6- **لا**			
SECTION 2 MEDICAL HISTORY				

Y: yes N: no	DK: don't know			
Disease	نعم yes	لا No	DK لا اعرف	Period of the disease
Hyper tension ضغط الدم				
Hyper cholesterol ارتفاع الكوليسترول				
Diabetes سكري				
Stroke جلطه دماغيه				
Osteoarthritis / osteoporosis هشاشه عظام او التهابات مفاصل				
Heart disease امراض في القلب				
Glaucoma /cataract امراض في العين				
Renal failure امراض في الكليتين				
Asthma ربو او حساسيه في القصبات				
COPD امراض في الصدر				
Gout (Gout) نقرص				
Hip fracture كسر في الحوض				
Constipation امساك مزمن				
Gastric ulcer قرحه معديه				
Cancer سرطان				
Vision problem مرض في الرؤيه				
Urinary problem مشاكل في التبول				
Difficulty in chewing مشاكل في المضغ				
Lack of appetite فقدان شهيه				

Previous surgical procedures **عمليات جراحيه سابقه**				
Falls history **هل وقعت في السابق ؟** **مكان الوقوع** _____ Place **تاريخ الوقوع** _____ Date				
Using denture **هل تستعمل اسنان صناعيه ؟**			NA	
Smoking **التدخين**	**مدخن** Smoker	**مدخن سابق** X smoker	**غير مدخن** Non smoker	
مده التدخين Duration of smoking	( )	( ) years	--------	
هل يوجد في تاريخ العائله من اصيب بالخرف او فقدان الذاكرخ Family history of dementia				
Blood pressure **قياس ضغط الدم** Systolic Diastolic				
SECTION 3 (NUTRITIONAL STATUS ASSESSMENT)				
Anthropometry				
	Unit	1st reading	2nd reading	Mean
Height **الطول**	Cm			
weight **الوزن**	Kg			
MUAC **محيط منتصف الذراع**	Cm			
Waist circumference **محيط الخصر**	Cm			
Hip circumference **محيط الورك**	Cm			
Calf circumference **محيط منتصف الساق**	Cm			
KNEE HEIGHT	CM			

DIET INTAKE AND DIETARY HABITS		
موعد تناول الفواكه بالنسبة للوجبة الرئيسية ؟	قبل الوجبة الرئيسية ..... أثناء الوجبة الرئيسية ..... بعد الوجبة الرئيسية	
هل تأكل الطعام بموعده ام تتركه فترة من الزمن ؟	بعد فترة من الزمن	
عدد الوجبات التي يتم تناولها خارج البيت ؟		
مدى الشعور بالرضى عن سياسة تقديم الطعام ؟	من حيث الشبع ..... من حيث المذاق والطعم ..... من حيث تعامل الطاقم أثناء تقديم الطعام	
هل تأكل لوحدك ام مع المجموعة ؟	مع المجموعة	لوحدي

Body composition assessment

Body Composition				
	Unit	Results	Normal range	
VISERAL fat	%			
% body fat	%			
Muscle mass	%			
Basal Metabolic rate	Kcal			

Mini Nutritional Assessment (MNA)- ARABIC				
السوال	0	1	2	3
في الشهور الاخيره هل تناقص كميه الطعام الذي تتناوله و فقدت الشهيه للطعام	تناقص شديد في كميه الطعام و الشهيه	تناقص متوسط في كميه الطعام و فقد جزئي للشهيه	لا تغيير في كميه الطعام و لا تغيير على الشهيه	_____
في الشهور الاخيره هل نقص وزنك	نقص كثيرا	لا اعرف	قليلا	لم ينتقص
هل تستطيع الحركه بشكل جيد	مقعد بالسرير او الطرسي	اتحرك قليلا داحل الغرفه	استطيع الحركه خارج البيت	_____

	المتحرك			
هل عانيت من مشاكل نفسيه في الفتران السابقه	**نعم**		**لا**	_____
هل تعاني من نقص في الذاكره و التركيز	**نعم كثير**	**قليلا**	**طبيعي لا تغيير**	_____
BMI OR	<19	19-21	21-23	23
Calf circumference	<31			>31
Score 12-14 : normal 8-11: at risk of malnutrition 0-7: malnourished				

Functional status assessment

Fitness assessment

A) Senior Fitness test	Trial 1	Trial 2	Mean
2-min step test (step)			
Had grip (kg)			
Chair stand test (times)			
Set and reach test (cm)			
Time up and go (sec)			
Back scratch test (cm)			
Gate speed (6m)			
Rapid gate			

Katz Index of Independence in Activities of Daily Living		
الانشطه	**لا تحتاج مساعده فيها** **1**	**تحتاج مساعده فيها** **0**
هل تحتاج مساعده في الاستحمام		
هل تحتاج مساعده في ارتداء ملابسك		
هل تحتاج مساعده في اذهاب للحمام		

هل تحتاج مساعده في الحركه و النتقل		
هل عندك القدره على التحكم بالبول و البراز		
هل تحتاج مساعده في تناول طعامك		

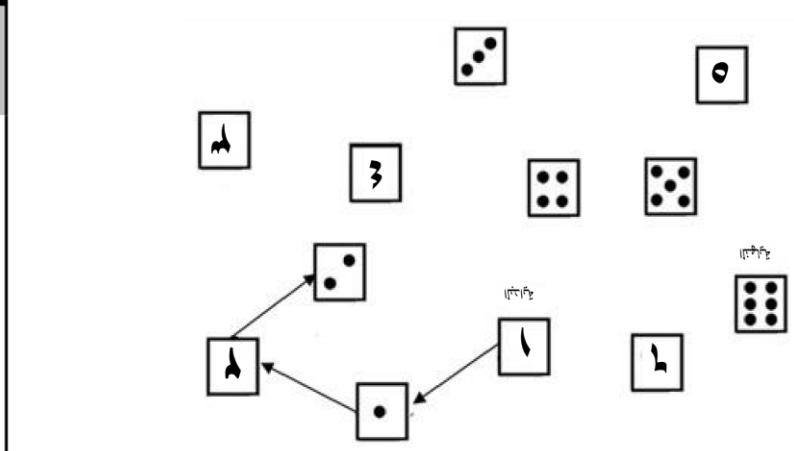
SECTION 8 DEPRESSION AND COGNITIVE FUNCTION ASSESSMENT		
A) Geriatric Depression scale		
1. Are you basically satisfied with your life? **هل انا راضي عن حياتك اساسا؟**	Yes	No
2. Have you dropped many of your activities and interests? **هل تخليت عن كثير من انشطتك و اهتماماتك ؟**	Yes	No
3. Do you feel that your life is empty? **هل تشعر بان حياتك اليوميه فارغه؟**	Yes	No
4. Do you often get bored? **هل تشعر بالملل كثير؟**	Yes	No
5. Are you in good spirits most of the time? **هل انت في روح معنويه طيبه هذه الايام ؟**	Yes	No
6. Are you afraid that something bad is going to happen to you? **هل انت خائف من ان شيئا سيئا سوف يحدث لك هذا الايام ؟**	Yes	No
7. Do you feel happy most of the time? **هل تشعر بالسعاده معظم الوقت ؟**	Yes	No
8. Do you often feel helpless? **هل تشعر بالعجز معظم الوقت؟**	Yes	No
9. Do you prefer to stay at home **هل تفضل البقاء في غرفتك و الجلوس وحدك على الخروج و عمل اشياء جديده؟**	Yes	No
10.Do you feel you have more problems with memory than most? **هل تشعر بان لديك مشكلات في الذاكره اكثر من معظم الناس ؟**	Yes	No
10.Do you think it is wonderful to be alive now? **هل تعتقد ان شي رائع ان تكون حيا الان؟**	Yes	No
11.Do you feel pretty worthless the way you	Yes	No

are now? **هل تشعر كثيرا بانه لاقيمه لك في هذه الحياه؟**		
12.Do you feel full of energy? **هل تشعر بانك ملئ بلطاقه؟**	Yes	No
14. Do you feel that your situation is hopeless? **هل تشعر بان حياتك و موقفك يدعو لليأس ؟**	Yes	No
15. Do you think that most people are better off than you are? **هل تعتقد بان معظم الناس احسن حالا منك ؟**	Yes	No

التقييم المعرفي المتبع في مونتريال-الأساسي (MoCA-B) باللغة العربية

الاسم:	
النوع:	السن:
مستوى الدراسة:	
التاريخ:	الطبيب:

الوظيفة التنفيذية — **العلامات**



وقت البدء _____

(/١)

الذاكرة

قم بمحاولتان حتى لو كانت المحاولة الأولى صحيحة

	وردة	كرسي	يد	أزرق	ملعقة	لا نقاط
المحاولة الأولى						
المحاولة الثانية						

سهولة الكلام اذكر أكبر عدد ممكن من أنواع **الفاكهة** في دقيقة (/٢)

عدد الكلمات

١..... ٢..... ٣..... ٤..... ٥..... ٦.....

٧..... ٨..... ٩..... ١٠..... ١١..... ١٢.....

١٣..... ١٤..... ١٥..... ١٦..... ١٧..... ١٨.....

٢ نقاط اذا كان العدد ١٣ أو أكثر
١ نقطة اذا كان العدد من ٨ - ١٢
٠ نقطة اذا كان العدد ٧ أو أقل

الإهتداء (/٦)

[ ] الوقت (±٢ساعة) [ ] اليوم [ ] الشهر [ ] السنة [ ] المكان [ ] المدينة

الحساب (/٣)

تريد شراء هدية قيمتها ١٣ **جنيه** مصري بإستخدام فئة ١٠ جنيه و ٥ جنيه و ١ جنيه. عدد ٣ طرق مختلفة لدفع قيمة الهدية.
(٣ نقاط للثلاث طرق, نقطتان للطريقتان, نقطة للطريقة الواحدة ,لا نقاط في عدم وجود اجابة صحيحة)

[ ] ١..... [ ] ٢..... [ ] ٣.....

التجريد (/٣)

إذكر أوجه الشبه بين الأتي (مثال: برتقالة – موزة = فاكهة)

[ ] القطار - المركب [ ] الشمال - الجنوب [ ] المزمار - الطبلة

التذكير (/٥)

	وردة	كرسي	يد	أزرق	[ ]
على المريض أن يتذكرالأسماء دون دلائل	[ ]	[ ]	[ ]	[ ]	
الدليل الصنفي	[ ]	[ ]	[ ]	[ ]	[ ]
دليل الخيارات المتعددة	[ ]	[ ]	[ ]	[ ]	[ ]

علامات للتذكر دون دلائل فقط
(١ نقطة لكل إجابة صحيحة)

بصري فراغي (/٣)

تعرف على الأشكال الموجودة بالرسم (يحتسب العد في دقيقة واحدة فقط).
استخدم الورقة المكملة.

مقص	قميص	موزة	أبجورة	شمعة
ساعة	فنجان	ورقة شجر	مفتاح	ملعقة

٣ نقطة اذا كان العدد ٩ - ١٠
٢ نقطة اذا كان العدد من ٦ - ٨
١ نقطة اذا كان العدد من ٤ - ٥
٠ نقطة اذا كان العدد من ٠ – ٣

العدد _____

التسمية (/٤)

تعرف على الحيوانات. استخدم الورقة المكملة. [ ] حمار وحشي [ ] طاووس [ ] نمر [ ] فراشة

الإنتباه (/١)

تعرف على الأرقام الموجودة بالدوائر.
استخدم الورقة المكملة.

١٥٨٣٩٢.٣٩٤.٢١٦٨٧٤٦٧٥

عدد الأخطاء _____
لا نقاط في حال وجود ٢ خطأ أو أكثر

(/٢)

تعرف على الأرقام الموجودة بالدوائر و المربعات.
استخدم الورقة المكملة.

٣٨٥١٣.٢٩٢٠٤٩٧٨٦١٥٧٦٤

١٥٨٣٩٢٠٣٩٤.٢١٦٨٧٤٦٧٥

عدد الأخطاء _____
٢ نقطة في حال ٢ خطأ أو أقل
١ نقطة في حال ٣ أخطاء
٠ نقطة في حال ٤ أخطاء أو أكثر

وقت النهاية _____

المجموع (/٣٠)

أضف نقطة اذا كانت عدد السنين الدراسية <٤ سنوات و أضف نقطة اذا كان غير متعلم

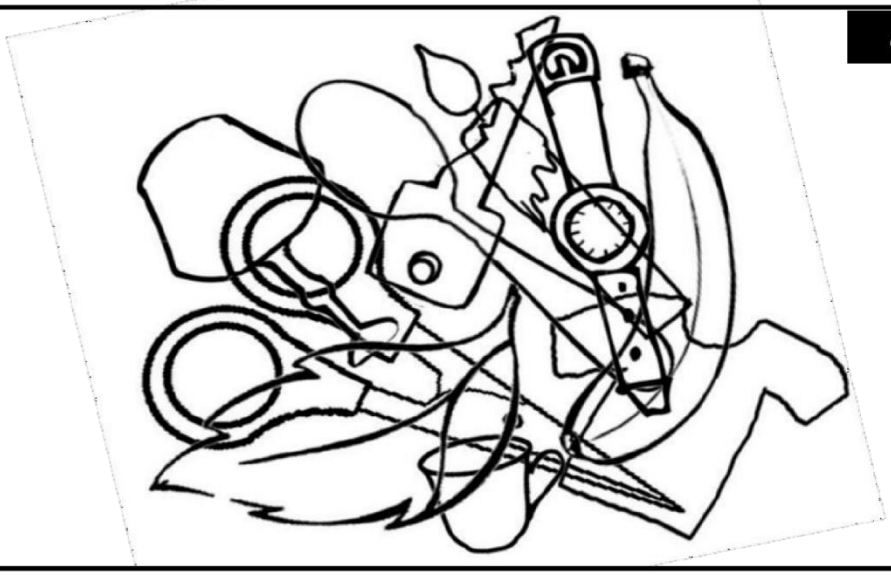
الوقت الكلي: ..... دقائق ..... ثواني

Adapted by: Alia A. Saleh, Rasha S. Alkholy, Ola Ossama
Copyright: Z. Nasreddine MD
Final version: 11/02/2016

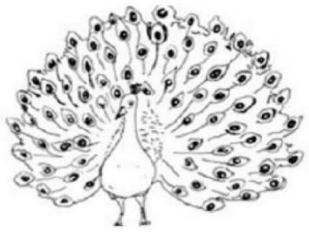
التقييم المعرفي المتبع في مونتريال-الأساسي (MoCA-B)
باللغة العربية

الورقة المكملة

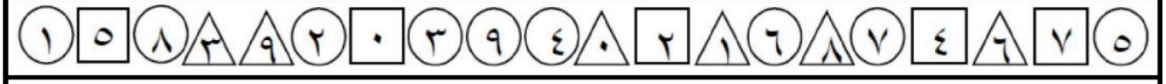
بصري فراغي



التسمية



الإنتباه



24 HOUR RECORD FORM

الوجبة	وصف الوجبة	الكمية المتبقية	ملاحظات
وجبة الفطور			
الوجبة الخفيفة			
وجبة الغداء			
الوجبة الخفيفة			
وجبة العشاء			
وجبات أخرى			

APPENDIX 4: internal review boardform

irb@najah.edu

An-Najah
National University
Health Faculty of medicine&
Sciences
IRB

جامعة النجاح
الوطنية
كلية الطب وعلوم الصحة
لجنة اخلاقيات البحث العلمي

IRB Approval Letter

Study Title:

"Malnutrition, functional status and level of fitness among Palestinian older adults in long term care houses in west bank "

Submitted by:
Mohammed Eid

Supervisors:
Dr. Manal Badrasawi

Date Reviewed:
27th Sep. 2019

Date Approved:
13th Oct . 2019

Your Study titled **"Malnutrition, functional status and level of fitness among Palestinian older adults in long term care houses in west bank"** with archived number (13) Oct.2019 was reviewed by An-Najah National University IRB committee and was approved on 13th Oct . 2019

Hasan Fitian, MD

IRB

IRB Committee Chairman
An-Najah National University

جامعة النجاح الوطنية
كلية الدراسات العليا

العلاقة بين سوء التغذية واضطرابات محددة مرتبطة بالعمر بين كبار المسنين الفلسطينيين في بيوت المسنين

إعداد
محمد عيد

إشراف
د. محمد التميمي

قدمت هذه الأطروحة استكمالاً لمتطلبات الحصول على درجة الماجستير في التغذية وتكنولوجيا الغذاء بكلية الدّراسات العليا، جامعة النجاح الوطنية، نابلس، فلسطين.
2021

العلاقة بين سوء التغذية واضطرابات محددة مرتبطة بالعمر بين كبار المسنين الفلسطينيين في بيوت المسنين

إعداد

محمد عيد

إشراف

د. محمد التميمي

الملخص

تتزايد دور رعاية المسنين في فلسطين بسبب التغيرات في الحياة الاجتماعية وطبيعة المجتمعات الحديثة. القليل من الدراسات تناولت الحياة الاجتماعية لكبار السن في دور الرعاية طويلة الأمد. ومع ذلك، يعاني المسنون الفلسطينيون في دور الرعاية من العديد من المشكلات الصحية المتعلقة بتغذيتهم. وتشمل هذه المشاكل سوء التغذية، وقلة تناول الطعام، والضعف، وقلة اللياقة البدنية، وفقدان كتلة العضلات والاعتماد على الآخرين، وخطر السقوط، وزيادة الإصابة بالأمراض المزمنة بالإضافة إلى العزلة الاجتماعية والاكتئاب. هدفت هذه الدراسة إلى تقييم الحالة التغذوية والوظيفة المعرفية والوظيفة الجسدية والاكتئاب. علاوة على ذلك، سيتم تحديد العلاقات بين سوء التغذية والاضطرابات المرتبطة بالعمر بين كبار السن الفلسطينيين في دور الرعاية طويلة الأجل.

اتبعت الدراسة التصميم المقطعي حيث تم دراسة الخصائص الديموغرافية، التاريخ الطبي، تقييم الحالة التغذوية (القياسات الجسمية، مكونات الجسم ،تقييم سوء التغذية بواسطة اداة MNA، تسجيل الطعام المستهلك خلال 24 ساعة، قياس مدى الرضى عن الطعام)، تقييم الحالة الوظيفية ((senior fitness test,ADL TOOL، تقييم القدرات العقلية (أداة MOCA) وتقييم الاكتئاب (أداة GDS) حيث تم استعمال الادوات المعتمدة لكل متغير.

شملت العينة 94 مشاركًا (رجال، 25.5٪) و(نساء، 74.5٪) في تحليل البيانات النهائي. وكشفت النتائج أن 41.5٪ من المشاركين معرضون لخطر الإصابة بسوء التغذية، بينما كان 8.5٪ يعانون من سوء التغذية. كان 35.1 ٪ يعانون من ضعف شديد ADL و47.9 ٪ يعانون من ضعف متوسط ADL. كان واحد من كل ثلاثة مصابين بالاكتئاب الخفيف و12.8٪ يعانون من

اكتئاب متوسط إلى شديد. الغالبية (93.6 ٪) لديهم ضعف في الوظائف العقلية كما وجد أن الاكتئاب مرتبط بارتفاع مخاطر سوء التغذية (P <0.05).

على الرغم من أن خطر الإصابة بسوء التغذية كان أقل شيوعًا بين عينة الدراسة، إلا أنه كان مرتبطًا بالحالة النفسية. لذلك، من الضروري توفير الدعم النفسي لكبار السن الفلسطينيين في دور الرعاية طويلة الأمد. هذه النتائج مهمة لتصميم برامج استراتيجية وخطط توعية تستهدف أصحاب المصلحة في مرافق الرعاية طويلة الأجل لتحسين الحالة التغذوية والنفسية للسكان.