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Depression among Elderly Attending Primary Health Care Centers in Bahrain: Towards a Policy for Detection and Intervention

A Thesis Submitted in Partial Fulfillment of the Requirements for the Master's Degree in Health Policy and Population Studies

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Dedication

This work is dedicated to my parents whose prayers have blessed me all through my life. Also; it is dedicated to my family, my husband and my children, the angels who tolerated me, supported me and in fact helped me during the phase of data entry.

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First, my thanks are for the Ministry of Health which gave me the opportunity to enroll in this program. My sincere thanks go for my supervisor, Dr Khaldoon AlRoomi, for his great assistance and wise guidance during the long supervision period. A special appreciation goes to Prof. Randah Hamada for her enthusiasm in maintaining this program. I should also thank Prof. Neil Grant for his help during the initial phase of my thesis. I also acknowledge the assistance of Mr. Emad Masuadi and Mr. Mohammed Obaidat in the analysis of data. Special thanks to Mrs. Huda Abbas who helped me in data collection. I wish really to thank also my family for their endless support. Lastly, I thank all the people who facilitated my work and also for the participants who were kind enough to give me part of their time and patience.

Abstract

Objectives: To estimate the prevalence of depression and the sociodemographic characteristics and disease status associated with it among Bahraini elderly attending the local health centers.

Methods: A cross-sectional study of Bahraini persons aged 60 years and older attending the local health centers was conducted during the period from July to August 2006.One health center was randomly selected from each of the four geographical regions of Bahrain. The study was conducted in the four selected primary health centers. A structured questionnaire was developed and completed during an interview with the elderly subjects. The questionnaire assessed the elderly sociodemographic characteristics and disease status. The shorter version of the Geriatric Depression Scale GDS-15 was used to screen for depression among the study participants.

Results: The study population comprised of 270 Bahraini elderly subjects. Men constituted 46% of the study sample while women constituted 54%. The mean age for male participants was 68.65 ± 6.3 and the mean age for females was 68.36 ± 7.More than half of women (52%) compared to 8.9% of men were widowed; this difference was significant (P = 0.000).Many subjects (53%) were Illiterate (can't read or write). Illiteracy was found to be higher among women (68.5%) than among men (34.7%) and the

difference in the educational achievement between men and women was highly significant (P = 0.000).The majority of the elderly (83%) were living with their spouses or children. Only 7.5% of them were living alone. Very few of the participants (1.5%) didn't have a stable source of income .Furthermore, most of the elderly participants (65.2%) were dependent economically on others and only 9.6% of them were still working. Most of the elderly (84%) were socially active mainly by attending religious places and social gatherings. Many elderly (79.6%) were providing support to their family. There was a high prevalence of chronic diseases among the participants (91.5%).Half of the participants reported having hypertension or diabetes. Most elderly (82%) were taking at least one type of regular medication.

The prevalence of depression among the participants was estimated to be 41.5%.The mean depressive score for men was 3.67 ± 3.07 and for women it was 5.86 ± 3.62.Severe depressive symptoms were reported by 3.2% of men and by 7.5% of women. The risk of depression was significantly more among women than among men with an odds ratio (OR) of 4.3 (95% CI = 2.54-7.32).Depressive symptoms were significantly related to widowhood and divorced status (P = 0.000).Subjects who were illiterate or had low level of education reported more depressive symptoms (P=0.041).Socially isolated elderly were more prone to have depression (P = 0.006).Elderly subjects who were providing support to their family reported significantly less depressive symptoms (P = 0.002).Past history of psychiatric problems was found to be significantly associated with depression (P = 0.017).The presence of chronic disease was also significantly associated with depression (P = 0.014).The following chronic diseases were significantly associated with more depressive symptoms:

hypertension (P = 0.012), heart disease (P = 0.017), chronic joints problem(P = 0.000), chronic ear disease (P = 0.048),and chronic eye disease (P = 0.000).

These risk factors remained highly significant even after adjusting for other variables in the multiple logistic regression model: female sex (P=0.007), widowed or divorced states (P = 0.042), social isolation (P=0.007), and the presence of eye disease (P = 0.000) or joint problem (P = 0.000).

Conclusion: Depressive symptoms are highly prevalent among Bahraini elderly attending the local health centers. Family physicians should be trained to screen for and to manage depression in highly susceptible groups

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Abbreviations

Activities of daily living (ADL)

Cardiovascular system (CVS)

Coronary heart disease (CHD)

Diagnostic statistical manual (DSM)

Disability adjusted life years (DALY)

Economic and Social Commission for Western Asia (ESCWA)

Geriatric depression scale (GDS)

Healthy life expectancy (HALE)

Instrumental activities of daily living (IADL)

International classification of diseases (ICD)

Non-communicable diseases (NCD)

Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat (DESA)

The International Classification of Diseases (ICD)

United Nations (UN)

World Health Organization (WHO)

World Health Report (WHR)

Chapter 1

Introduction

1.1 World Ageing

Definition of ageing

Ageing has biological and chronological definitions. In its efforts to accurately define ageing, WHO stresses the importance of strictly separating the concept of "ageing process" from "the process of ageing". WHO refers to the "ageing process" or normal ageing as "the universal biological changes that occur with age and are unaffected by disease and environmental influences". This definition clearly illustrates that not all conditions occurring in old age are necessarily age-related conditions and not all age related changes are necessarily bad outcomes. On the other hand, WHO refers to "the process of ageing" as a process which "is strongly influenced by the effects of environmental, lifestyle and disease states that, in turn, are related to or change with ageing but are not due to ageing". Based on these definitions, WHO adopted the "active-ageing concept" which defines ageing as the 'process of growing older without growing old through the maintenance of physical, social, and spiritual activities throughout a lifetime'.

The chronological definition of ageing varies between countries according to the level of development, life expectancy and the retirement age. WHO and United Nations (UN) chronological definition of ageing starts from 60 or 65 years of age or older. Those above 80 are considered the oldest-old.(Men, ageing and health, WHO)

During the last century, there has been a global increase in life expectancy at birth by about 20 years. Life expectancy at age 60 has increased as well, and it is estimated to be 17 years for men and 21 years for women. This

increase is mainly due to the improvement in the economical conditions, education and the application of certain public health measures like immunization, which in turn has lead to a decrease in mortality rate especially among children (World Health Report WHR 2003). The number of population older than 60 years was estimated to be 688 million in 2006 and it is expected to reach 2 billions by 2050. More than half of the elderly population (54%) reside in Asia while 22% are in Europe.(DESA,UN,2006) Older population is expected to be more than younger population.Moreover,population older than 80 years (the oldest old) is expected to increase also from the current 13% to about 20% by the year 2050.It is expected that by the year 2025 the elderly people will constitute more than 20% of the total world population with 80% of those elderly will be living in the developing world. Population sex ratio, which is the number of males per 100 females, is 82/100 women because women have greater life expectancy at birth than men. This ratio is even lower for the oldest old being 55/100 women. Population sex ratio is expected to be even lower in the coming years. Only 48% of women are currently married and most of the rest are widowed while 80% of the current elderly men are married. (DESA, UN, 2006)

The decrease in population sex ratio and the increase in the number of elderly which is more than the increase in the younger population are directly reflected on the potential support ratio (PSR) which is defined as the number of persons 15 to 64 years per persons aged 65 years or older. This ratio is falling from 12 in 1950 to 9 in 2006 and will be 4 in 2050.

However, the participation of the elderly in work force differs between countries according to the economical conditions. It is estimated that 50% of people older than 60 years are still working and economically active

while the number is lower for the more developed countries with better economic conditions being 22%. (DESA, UN, 2006)

The increase in the number of the elderly population varies greatly from one country to another. Generally, it is slower in the developed countries compared to the developing ones. France doubled its elderly from 7% to 14% in 45 years while in Tunisia it took only 15 years (Bagchi and Mahaini, 2000). Also the proportion of elderly population is different: people older than 60 years constitute 24.5% of the population in Italy and 20.8% in the United Kingdom (WHO, 2000), while they constitute 5.65% in Bahrain (Central informatics Center, Bahrain).

The Arab region has passed through the same demographic transition but the onset was relatively more recent. There has been a decline in both the fertility rate and the mortality rate leading to an increase in the older population. People aged 65 years and above in the Arab region have increased from 5.7 million in 1980 to 10.4 million in 2000.This number is expected to increase further to 14 million in 2010 and to be 21.3 million by 2020.The average life expectancy has increased also and projected to increase to 73 years in 2025 and 76 years in 2050.However, there are differences in the Arab countries in this demographic transition according to the rate of improvement in their economical situations. There will be a substantial increase in the aged population in these particular countries: Lebanon, United Arab Emirates, Bahrain, Kuwait and Tunisia.(ESCWA,2007).

WHO has introduced a more valid concept in calculating life expectancy which is" Healthy life expectancy (HALE)".It is not sufficient to live longer .These years should be lived in a good health. HALE is "the number of years a newborn child can expect to live in full health based on the current

mortality rates and the prevalence of health states in the population". For Bahrain, healthy life expectancy is 64.3 years with 10.9% of total life expectancy is lost for males and 13.6% is lost for females (WHR 2004).

The WHO has launched a program on healthy aging advocating all countries to work according to their social and economic resources in order to maintain active Life in older age. WHO states that: "healthy ageing involves every dimension of human Life: physical, mental, social and spiritual." (WHR 2004).

WHO introduced the concept of Active ageing in 1990 and this has made a revolution in our perception of ageing. WHO defined active ageing as "the process of optimizing opportunities for health, participation, and security in order to enhance quality of life as people age" (Kalache, 2000). This definition stresses the importance of health promotion and primary prevention, which should be initiated antenatally and continued throughout the life course. It emphasizes the importance of giving the elderly the opportunity to participate actively in their community, to be autonomous and to have good quality of life.

Elderly people are frequently viewed as a burden on their family and on the society as a whole. However, this view has to be changed given the fact that with the demographic Changes worldwide, the elderly will be a quarter of our population. Part of this burden is caused by the isolation of the elderly from their society and the unwise limitation of their work and productivity. The other important contributing factor to this burden is the

unavailability of certain social and economic facilities for this group compared to those provided to younger age groups.

WHO Brasilia Declaration on ageing (1996) stated that: "healthy older persons are a resource for their families, their Communities and the economy" (WHO, 2000). Elderly people provide valuable economic and social services although these are not usually appreciated or even utilized.

Worldwide aging has drawn the attention of public health personnel in the recent years and active healthy aging is now an important issue in public health. There is now increasing awareness about the importance of health promotion and planning for social and health care facilities for the elderly. Epidemiology is also taking now active part in the study of aging in order to gain more knowledge about the multiple risk factors affecting the health of the elderly (Fired , 2000).This knowledge will be utilized for earlier prevention and better planning of services.

1.2 Study background

Ageing is a worldwide phenomenon but its progression in this part of the world is rapid thanks to the improvement in the economic and population health status. This in turn has lead to a decrease in the death rate and to an appreciable increase in life expectancy at birth. (World Health Report WHR 2004).

This will be accompanied by increasing demand on health and social services. Restructuring of the health system is required to provide quality health care services for the present elderly and to adopt a life- course approach to prepare the new generations for a healthy active aging.

Planning for these services requires the establishment of a national database describing our elderly situation and identifying their needs. Research addressing the elderly health conditions, prevalent diseases and various disabilities among them is scarce.

Besides the prevalent physical diseases, several studies worldwide have shown that mental illnesses also increase with ageing and depression is so common among elderly people (Beekman, Copeland and Prince, 1999).It is aggravated by the chronic physical diseases and disabilities the elderly usually have. Depression, in turn, worsens the course of physical illness and interferes with treatment. It increases the elderly utilization of health services (Hebrman , Patrick , diehr , Martin , fleck , Simon , and Buesching,2002), increases the burden on the caregiver(Langa,Valenstein, and Mark,2004), and decreases the elderly self- satisfaction and quality of life(Hebrman et al, 2002). It may, however, predispose to many physical illnesses and increase the elderly mortality. (Unützer, Patrick, Marmon, Simon, and Katon, 2002).

Several risk factors predispose the elderly for depression and most of these factors have been identified. Among the factors which were found to be strongly correlated with depression are: being a female, low education, low income, poor social relationships and having chronic diseases. (Beekman et al 1999). These risk factors can be easily identified and screening for depression can be applied to certain groups with these risk factors. Many depressed elderly usually respond to treatment. Besides psychotherapy, there are now safer antidepressants with fewer side effects. (Bartels, Dums, Oxman, Schneider, Areán, Alexopoulos, and Jeste,2002). However, still there are many barriers interfering with the detection and treatment of this

condition by family physicians. Among the Proposed barriers are: lack of training in geriatric psychiatry, short consultation time available for each patient, the absence of a clear guide -line and the need for a practical and simple screening test.

In Bahrain, the magnitude of depression among elderly people is not known.

So this study was carried out to detect how common depression is among Bahraini elderly people. This information is certainly needed to set a basis for developing a strategy or a guideline to screen for and manage depression among the elderly attending primary health centers. This will increase the recognition of the cases and the early initiation of treatment. The strategy also will aim to increase the capability of the physicians to recognize depression and to manage it confidently by providing them with the needed training courses.

1.3 Demographic characteristics of elderly in Bahrain

In most recent census (2001) revealed that Bahrain has a total population of 650,604 of whom 405,667 were Bahraini nationals. Those above 60 constituted 5.66% of the total population: 34.8% of them were between 60 and 64 years, 24.96% between 65 and 69 years, 19.5% between 70 and 74, 10.9% between 75 and 79 and 9.78% were above 85 years. Males constituted 48.8% of the total elderly while females constituted 51.2 %.(Central informatics Center. Bahrain) The estimated life expectancy at birth for Bahrainis has risen from 72.9 in 1999 to 73.8 in 2004 for both sexes: 70.4 for males and 75.3 for females. Life expectancy at birth will increase further and it is expected to reach 78.4 years by 2025:77 years for males and 80.5 years for females. By 2050, life expectancy at birth will be 80.8 years: 79.2 years for males and 82.9 years for females (DESA, UN, 2006).The crude birth rate is 21.1 per 1000 population and the total fertility rate is 2.6 per woman. The infant mortality rate is among the lowest in the world being 9.5 per 1000 live births. The crude death rate continues to be low and almost constant since 1998 being 3.1 per 1000 population (Bahrain Health statistics, 2004). Population projection for Bahrain is showing a sharp increase in the percentage of the total elderly population. It is estimated that the size of the elderly population will grow to reach 14.2 % of the total Bahraini population by the year 2025, and 24.3% by the year 2050 which means that the elderly population will grow to over 5 times the current population. Population older than 80 years will also increase from 0.4% in 2005 to 0.8% in 2025 and will be 4.9% of the total population by the year 2050. The population sex ratio, which is defined as the number of males per 100 females, is expected to decrease from 134.4 in the year 2005, to 128 in

2025 and will be 119.3 in 2050. Accordingly, the dependency ratio for old age is increasing from 4 in the year 2005 to 12 in 2025 and will reach 29 by the year 2050 (DESA, UN, 2006) . This steady and sharp growth among this age group needs parallel increase in the services provided to them. The health care system should monitor the situation carefully and anticipate the demand on the health services imposed by such a growth in order to plan for appropriate services. Cardiovascular disease and neoplasm are the top leading causes of death among Bahrainis: 69% and 37.2% respectively of the total causes of death (Bahrain Health statistics, 2004). This percentage is expected to rise in view of the fact that the size of the population over 60 years of age is increasing. Appropriate screening programs and early preventive measures should be initiated to control this problem.

1.4 Available services for elderly in Bahrain:

The services provided to elderly in Bahrain can be divided into:

A. services provided through Ministry of social affairs:

National Bank of Bahrain home for the elderly (opened in 1985) and **Muharraq social welfare** center (opened in 1995): both of them provide social, health, psychological, residential and recreational care for both sexes. They provide permanent, intermittent or temporary care according to the elderly need.

The **mobile unit for the elderly** started in 1994. Every unit is a team consisting of a social worker, a nurse and a rehabilitation assistant .The unit delivers its services to the needed elderly at their houses. It provides different services such as: personal hygiene, medical tests, physiotherapy, family guidance and many other important services .They usually visit the elderly twice a week.

Older person's services unit provides the older persons with various equipments and financial help.

B.Services provided by the Ministry of health:

Health care is provided freely to all Bahrainis. Most elderly live with their own families. Elderly health care services can be divided into: community services and institutional services. The community health care services are provided usually by the family physicians in the local health centers and the home care is provided by the community nurses.

WHO has launched an age-friendly primary health care program. The program aims at sensitizing the primary health care personnel to the

growing needs of the elderly population. It also aims at making the service accessible, adaptive and more responsive to the elderly needs.

The role of the family physician is vital as he/she provides continuous care for all the family members including the elderly in their own community. He is the first to encounter the acute illness and usually the one who manages the chronic diseases. Moreover, he provides health education for the elderly in order to promote their health and prevent diseases. If the elderly is not able to attend the health center, community health nurses visit the elderly home regularly to do simple clinical investigation, to supply him with his medications and to do dressing if needed.

The family physician also refers the elderly to the secondary care clinics or to the accident and emergency department for admission if needed. Admission usually takes place in the different specialty wards according to the elderly condition. Unfortunately, the main admitting hospital (Salmaniya medical complex) does not have a geriatric department. Some elderly may stay for months in the hospital only for mobility problem or unavailable support at home. These elderly usually occupy needed beds for acute conditions and cause shortage of beds and increase medical service costs. Some of them are shifted to the nursing home if beds are available and the others usually wait for longer period. The institutional care is usually provided by the nursing homes and the residential homes. A nursing home provides medical and paramedical care for the chronically ill- people while a residential home is usually a house helping the elderly with his daily activities.

Elderly care unit opened in 1973 with a capacity of 131 beds. It provides health and social services mainly for sick and disabled elderly.

The psychogeriatric unit provides services to the demented and other elderly with psychiatric problems.

C.The national committee for the elderly

It was established in 1984 according to a decree issued by the Minister of Labour and Social Affairs. The committee has members representing both the governmental and non- governmental parties .It formulates the national strategy for the elderly. It also coordinates the activities provided through different channels. It carries out programs related to the elderly needs. It helps the elderly by providing them with the needed equipments. The committee is conducting workshops and other teaching programs to raise the awareness of the professionals and the public to the elderly needs.Al Juthoor is a yearly bulletin issued by the committee and it covers topics related mainly to the elderly. Each year, the committee coordinates the celebration of the International day of the elderly.

D.Services provided through non-governmental organizations

Several non-governmental organizations and societies provide social and medical services to the needed elderly. They provide day- care facilities for the elderly. During their stay, they are provided with educative programs and helped to develop certain skills. They also perform their hobbies and leisure activities .Among them is Uco Parents Care Center which was opened in 1994 in Hidd.AL-Manar for parents care is another non-governmental day care center which was opened in 2002. (Ministry of Labor and Social affairs report-Bahrain, 2003).

1.5 Statement of the problem:

It is known that mental health problems are common among old people. (Beekman et al 1999). Depression is the commonest mental health condition among this age group and it is usually associated with significant morbidity and increase mortality. (Unützer et al 2002).

This increase in mortality is associated with even the subclinical forms of depression. However, a potential gap still exists in our information about the magnitude of this condition and its risk factors among Bahraini elderly.

Thus, studies are needed to assess the prevalence of this health problem, which is expected to be common and to have a major impact on the patient, the caregiver and on the health and social care systems as a whole. Risk factors associated with this condition should be also identified in order to apply a screening program for high risk groups. Studies evaluating the prevalence of this condition are important to guide a policy aiming to early recognition and better management by adopting the appropriate screening tests and developing appropriate treatment guidelines. Also data obtained are the base-line for planning better health and social services.

1.6 Relevance of the problem to the health system and fields of application:

1. Depression among elderly is a major public health problem, which needs early identification and treatment.
2. Management of depression will improve the overall health status of the elderly and will decrease the burden on the caregiver.
3. Provision of data on the prevalence of depression among Bahraini elderly is certainly needed to plan for appropriate primary and secondary mental health services and to develop the needed human resources.
4. If effective treatment is applied appropriately and timely, this will alleviate the suffering of the elderly by reducing their disabilities and psychosomatic symptoms. This in turn will lead to overall decrease in the utilization of health care services.
5. The provision of early treatment will certainly decrease the risk of suicide and excess mortality associated with late-onset depression.
6. Treated elderly will be more satisfied about their life and will increase their active participation and productivity in the family and community.
7. The study will highlight the most important risk factors for depression among elderly and this will aid in developing strategies for primary prevention and in applying suitable measures to promote mental health of the elderly people.
8. Data are needed to allocate the limited resources for the most effective services, to evaluate the current services and to formulate new health policies for better elderly health care.

9. These data can also be utilized to modify the national strategy for elderly care accordingly.
10. Data on the most common mental health conditions are needed to plan for screening programs, to develop health promotion programs and to reinforce the concept of life- course approach in order to decrease the prevalence of these chronic conditions.
11. Knowing the magnitude of depression among elderly will help in planning not only the health services but also the suitable social and rehabilitative services.
12. Data on the socioeconomic status of the elderly is needed in order to direct and prioritize the needed social and economic assistance.
13. Data about leisure time activities, hobbies and creative activities will help to direct the elderly towards better utilization of their capabilities and to enforce the active role of the elderly in his family and community.

1.7 Research Questions:

1. What is the magnitude of depression among Bahraini elderly attending the primary health centers?
2. What are the sociodemographic characteristics and disease status of those elderly diagnosed to have depression?

1.8 Research Hypotheses:

1. Depression is a common mental health condition among Bahraini elderly.
2. Certain sociodemographic factors and disease status are associated with depression among elderly persons.

1.9 Objectives:

1. To estimate the prevalence of depression among Bahraini elderly attending primary health care services.
2. To compare the sociodemographic characteristics and disease status of those elderly who have been diagnosed as having depression with those who have not.

1.10 Aims:

1. To provide information on the magnitude of depression and its determinants among Bahraini elderly attending the primary health centers.
2. Such information will hopefully help in applying timely medical and social interventions to combat this problem and

to improve the medical and mental status of elderly in Bahrain.

Chapter 2

Literature review

2.1 Definition of depression

The International Classification of Diseases ICD -10 is usually used to classify the different types of depression according to the presenting symptoms.

The depressed patient usually suffers from low mood and reduced activity, disturbed sleep, loss of interest, reduced concentration, tiredness and poor appetite and weight loss. The patient also has low self-confidence with guilt feelings. This state is usually persistent .The number and type of symptoms and their severity determines the classification of depression according to type and severity. (WHO, ICD-10, version 2007)

2.2 Scales used to screen for depression

Several scales are also being used to diagnose depression. These screening scales give indication to the possibility of depression but do not diagnose it. Higher scores in any of these scales warrant a diagnostic interview to establish the diagnosis of depression by the ICD-10,DSM- IV or other diagnostic criteria.

The Beck Depression Inventory has 21 items with a score of more than 10 indicates the possibility of depression. The Center for Epidemiological Studies Depression Scale (CES-D) has 20 items with sensitivity of 92% and a specificity of 87% above a score of 15.The Zung Depression Rating Scale has also 20 items with a sensitivity of 97%.

The Geriatric Depression Scale GDS-30 was developed from the GDS-100.When comparing GDS-30 with the Hamilton Rating Scale for Depression (HRS-D) and the Zung Self-Rating Depression Scale (SDS) the researchers found them all to be internally consistent. They recommended GDS to be used to screen for depression among elderly subjects because it is a reliable and valid instrument (Yesavage , Brink , Rose , Lum , Huang , Adey ,and Leirer ,1982) .

Kieffer and Reese (2002) made a meta-analytic review of 338 studies to examine the reliability of GDS and to produce a (reliability generalization) which is a new analytical procedure. They calculated a reliability generalization score of 0.848 and found that the reliability of GDS is predicted by the number of items in the score, and the size and the nature of the studied population. They also recommended the use of GDS to screen for depression.

The Geriatric Depression Scale GDS was developed essentially to screen for depression among elderly people. It consists of positive and negative items. The items are answered simply by yes or no. It diagnoses depression on the basis of symptom reporting over the past one-week period.

The Geriatric Depression Scale 30 (GDS-30) has 30 items with a sensitivity of 80% and a specificity of 100% above a score of 13.It takes about 10-15 minutes to complete this scale. A shorter version GDS-15 has been developed from the longer scale. It has 15 items and it takes shorter time to complete it (5-10 minutes).It has a sensitivity of 92% to 97% and a Specificity of 54.8% to 81% for a score above five (Sharp, and Lipsky ,2002) (Birrer and Vemuri ,2004) .A systematic review to assess the validity of both GDS-30 and GDS-15 was carried out. It found that GDS-30 has a

sensitivity of 0.753, and a specificity of 0.770.For GDS-15 the sensitivity was 0.805, and the specificity was 0.750 (Wancata, Alexandrowicz, Marquart, Weiss, and Friedrich, 2006).

A study compared the effectiveness of GDS-15 with the ICD-10 criteria to measure depression. It found that GDS-15 have good sensitivity but low specificity using cutoff score of 3 (Arthur , Jagger , Lindesay , Graham , and Clarke , 1999).

Further shorter GDS scales (GDS-5 and GDS-4) have been validated.Pomeroy, Clark, and Philp (2001) examined the validity of GDS-4 in diagnosing depression among elderly subjects attending a rehabilitation center and found it to be similar to that of longer scales GDS-30 and GDS-15.

An Australian study reported the prevalence of depressive symptoms among their community sample to be 53.3%.The study also examined the validity of both GDS-5 and GDS-4.It concluded that: GDS-5 had a sensitivity of 88.8% and specificity of 74.3% and GDS-4 had a sensitivity of 83.7% and specificity of 85.7% and they used the GDS-15 for comparison (Nguyen, Inderjeeth, Tang, Barnabas, and Merriam, 2006).

2.3 Late –onset depression

This term is applied when major or minor depression is first diagnosed after the age of 60 years. There are many clinical manifestations distinguishing this form of depression from the early onset form. Patients are usually more apathic, have cognitive deficits and memory dysfunction. Also, abnormalities in medial temporal lobe were manifested on magnetic resonance imaging of these patients. The other distinguishing feature is the high risk of recurrence of depression among this age group. (http://www.surgeongeneral.gov/library/mentalhealth/chapter5/sec3.html)

2.4 Subsyndromal depression

Many elderly people, however, have only some of the depressive symptoms and can't be diagnosed to have major depression according to the standard crieteria.This "subsyndromal" form of depression is now called minor depression. Although it is a milder form of depression, it has serious medical and economical impact. It affects 8-20% of community –resident elderly.

(http://www.surgeongeneral.gov/library/mentalhealth/chapter5/sec3.html)

Researchers think that older people usually are at increase risk of minor depression because they do not usually express their feelings and alternatively they have more somatisation.Inpatient and institutionalized elderly are particularly at increase risk of minor depression. This risk was

demonstrated by several studies to increase sharply by increasing age and by having multiple physical diseases (Tannock and Katona, 1995).

A study done in Netherlands reported the prevalence of minor depression to be 12.9% with different risk factors from major depression. It viewed minor depression as a "reaction" to stresses of daily life (Beekman, Deeg, Tilburg, Smit, Hooijer and Tilburg, 1995).

2.5 Course of depression

Several studies pointed out that depression in old age usually runs a chronic course and has a high rate of relapse. In addition, it carries a bad prognosis and increases the risk of mortality.

A meta-analysis study showed that after a period of 24 months, 33% of depressed elderly were cured, 33% were still depressed and 21% died. The determinants for poor outcome as derived from this review were: the presence of Physical diseases, and having disability or cognitive decline. Increase severity of depression was found also to predict poor outcome (Cole, Bellavance, and Mansour, 1999).

A group of researchers followed up a cohort of depressed elderly over 3 years to study the course of depression in them. They reported a high mortality rate of 30.2% in concordance with the figures reported by other studies. They attributed the high mortality to be due to the combined effect of physical diseases and depression. The study found that 34.9% of the studied subjects were still depressed after the three-year period. This figure combines both the subjects who were having persistent and relapsed form of

depression. Interestingly the researchers discovered that subjects in this group were treated less adequately than those who recovered.

Almost a quarter of the subjects (24.5%) developed other mental illnesses. Only 10.4% of the subjects recovered at the end of the study period. The study established the following risk factors as associated with poor prognosis: Physical diseases, having a family history of depression and bereavement. On the other hand, the study found that treatment with antidepressants carried better prognosis. The researchers concluded by stressing the fact that depression among elderly is usually a chronic disease and have a poor prognosis .They recommended the provision of antidepressants to control this disease (Denihan, Kirby, Bruce, Cunningham, Coakley, and Lawlor, 2000).

Other researchers followed up a cohort of depressed elderly attending the primary care for one year. They found that 57% of their depressed subjects were still having active disease after this period. Physical illness was found to be the major predictor for the persistence of depressive symptoms. They found also that the severity of depression, in turn, was a predictor for impaired social functioning (Lyness, Caine, King, Conwell, Duberstein, and Cox, 2002).

The Longitudinal Aging Study Amsterdam is a well-known large prospective community-based study aimed at exploring the status of older people in the Netherlands over a period of 10 years. One of its objectives was to follow a cohort of depressed elderly over this long period reflecting a true life-course study. The study arrived to similar conclusion as other studies did. It found that only 23% of their cohort experienced remission by the end of the period. Almost a third of them (32%) continued to have chronic depression .From the remaining, 12% had remissions with relapses

and 32% had intermittent disease (Beekman, Geerlings; Deeg, Smit, Schoevers, de Beurs, Braam, Penninx, and Tilburg, 2002).

2.6 Treatment of depression

As the number of older people is growing worldwide, the magnitude of their mental problems is growing but at a faster rate comprising a challenge to the health care system. Despite this impending problem, the health care system is still not responding appropriately to it. Many depressive elderly are still suffering being not identified. However, even if identified, they don't receive the appropriate treatment prolonging their suffering even longer.

There are now varieties of safe and effective therapeutic approaches to treat depression.

A group of researchers made an exhaustive review of the meta-analysis, article reviews and the expert consensus statements since the year 2001. They tried to provide evidence - based guidelines for the most effective treatment for old age mental problems. The review provided evidence for the effectiveness of antidepressants in treating depression. It mentioned that more than half of depressed elderly started on antidepressants usually responded by a reduction in 50% of their symptoms. Regarding the preferred treatment, some studies didn't report a difference between the selective serotonin reuptake inhibitors (SSRIs) and the tricyclic antidepressants. However, others reported that the SSRIs should be considered the first line treatment in view of the adverse effects of tricyclic antidepressants. The review also recommended the introduction of both antidepressants and psychotherapy as a treatment for geriatric depression.

Moreover, the review suggested a modification in the health care system to respond to this problem. It recommended that the treatment should be community-based with more involvement of primary care system.Also; the

treating team should be multidisciplinary to provide comprehensive services. The involvement of the depressed elderly in their treatment should be encouraged for better outcome. (Bartels et al, 2002)

Another systematic review concluded that the application of both antidepressants and psychotherapy was the most effective form of therapy for minor and moderate depression but the response rate was moderate. It also concluded that selective serotonin reuptake inhibitors were as effective as heterocyclic drugs (McCusker, Cole, Keller, Bellavance, and Berard, 1998).

Several studies supported the introduction of special interventional programs for effective management of depression.

A study revealed that patients who received interventional care had earlier remission than those who received the usual care. It pointed out ,however, that anxiety and physical disability interfere with and delay remission (Alexopoulos, ,Katz, Bruce , Heo ,Ten Have ,Raue , Bogner ,Schulberg ,Mulsant ,and Reynolds,2005).

Another intervention study using an exercise program to treat depressed elderly over 16 weeks found a slow but significant improvement and recommended this method of therapy to be an alternative to antidepressants although it attributed the response to be partly due to the social involvement among the group (Blumenthal, Babyak, Moore, Craighead, Herman, Khatri, Waugh, Napolitano, Forman, Appelbaum, Doraiswamy, and Krishnan, 1999).

A longitudinal community-based study reported that the risk of prevalent and incident depression among its participants was strongly lower among

those elderly who were on a regular exercise program. It concluded that exercise is a protective measure against depression even after adjustment for the other important risk factors (Strawbridge, Deleger, Roberts and Kaplan, 2002).

2.7 Prevalence of depression

There is a considerable debate regarding the prevalence of depression among elderly people. The wide variation in the reported figures reflects the multiplicity of the criteria and the scales used to diagnose depression. It also reflects the effect of the setting in which the elderly was interviewed. Studies using DSM criteria reported a decrease in the prevalence of depression with ageing. On the other hand, the longitudinal study of the Baltimore Epidemiologic Catchment Area showed that the incidence of depression peaks at the fourth and the sixth decades.

However, many studies based on different scales reported increase prevalence of depression with increasing age. The reported prevalence ranged from 8-20 % for elderly residing in the community to 17-35 % for elderly interviewed in primary care settings.
(http://www.surgeongeneral.gov/library/mentalhealth/chapter5/sec3.html)

A meta-analysis of community-based studies reported the average prevalence to be 13.5 % (Beekman, Copeland and Prince, 1999). Others reported the prevalence of depression among elderly people to vary with the setting in which the prevalence was measured: from 15% in the general population, 25% in the primary care setting, to more than 30% in those elderly in residential homes (Macdonald,1997).

A Malaysian study reported the prevalence among their elderly to be 7.6% (Sidik, Zulkedli and Mustaqim, 2003). A study done in Hong Kong revealed the incidence to be 11% among males and 14.5% among females and found

that depression was more associated with chronic pain, disability, and less social support (Chi, Yip, Chiu, Chou, Chan, Kwan, Conwell, and Caine,2005).

A community-based study conducted in Taiwan reported a high prevalence of psychiatric disorders of 37.7%, with 15.3% having depressive neurosis and 5.9% having major depression. It found that depression was associated mostly with low education, physical illness and the widowhood (Chong, Tsang, Chen, Tang, Chen, Yeh, Lee, and Lo, 2001).

A Brazilian study (The Bambui Health Ageing Study) used the ICD 10 criteria to diagnose depression among community-dwelling elderly and found a high prevalence of depression among its subjects of 19.2%.It also found a high prevalence of minor depression of 9%.The prevalence in their study didn't show a relation with age or gender (Costa, Barreto, Uchoa, Firmo, Lima-Costa, and Prince, 2007).

A high risk of depressive disorders was found among widows with a low educational level living in the urban community, and among those with physical illnesses.

An Iranian community based study reported that 24% of the study respondents had psychiatric problems including depression and anxiety (Kaldi, 2004).

A comprehensive community- based study done in Jordan showed that 24% of the elderly were found to be depressed. In this study, depression was found to be associated more with increased age, living alone, being a female and having poor functional capacity. Depression in turn was shown to reinforce other disabilities leading to dependence (Youssef, 2005).

A large community-based study done in Saudi Arabia showed that the prevalence of depression among Saudi elderly was 39 % (AL-Shammari

and Al-Subaie, 1999). The study concluded that there was a strong association between depression and the following elderly characteristics: being a female, having poor education, low income and health problems. While another study carried out in Abha city reported the prevalence to be 17.5% but the associated risk factors reported were almost similar to the previous study (Abolfotouh et al., 2001). Similar community study done in Kuwait reported the prevalence their to be 25 % (Al-Baho, 2003).

There are no exact figures reported for the prevalence of depression among Bahraini elderly. However, a study done in one health center in 1996 showed that the prevalence of depression was as high as 23.1%.Females were found to be depressed 2.3 times as males(Al Haddad,2000) . Another study compared the level of disability between the elderly admitted to institution and those cared for at home .It revealed that home-cared elderly were found to be more social, and to have better communication (Al-Nasir and AL-Haddad, 1999).

2.8 Screening for depression

Few depressed elderly are being identified and even fewer receive treatment. Even among those treated, still some are not adequately controlled.

Researchers found that in many countries almost 50% of depression cases are missed in the primary care settings (Möller and Henkel, 2005). A study had pointed out that family physicians detected only 34.9% of severe depression and 27.9% of the other milder forms (Coyne, Schwenk. and

Fechner-Bates, 1995). Researchers also found that from the 27 elderly per thousand, who had depression yearly, 22 consulted their family physician who diagnosed depression in only 5 of them and only 10% of them were referred to a psychiatrist (Cole and Yaffe, 1996).

The problem of under-diagnosis is aggravated by the fact that late life depression presents usually with atypical symptoms such as weight loss, constipation or mental slowing .Also the presenting symptoms of depression may mimic the symptoms of other and many medical conditions that the elderly usually suffer from. The elderly or even the physician, himself, may view these symptoms as age-related complaints. (Macdonald, 1997).

An interesting study tried to explore the beliefs of elderly people from different cultural backgrounds towards the nature and cause of depression. The study concluded that elderly often have "social model" of depression closer to their beliefs and different from the "medical model" that physicians usually have. It advised the health care professionals to use questions that are understood and accepted in order to facilitate the detection of depression (Lawrence, Murray, Banerjee, Turner, Sangha, Byng, Bhugra, Huxley, Tylee, and Macdonald, 1998).

The other important barrier responsible for under-diagnosis is the attitude of the physicians themselves towards the elderly health problems in general and to depression in particular.

A study has shown that depressed elderly were treated differently than younger patients in primary care settings. Older persons with depression were less likely to be asked about suicidal risk or alcohol use than younger depressed patients. Also, they were less likely to be referred to secondary care (Fischer, Solberg, and Heinrich, 2003).

Depression in elderly is usually chronic or relapsing and it carries poor prognosis and several meta-analysis studies support the importance of introducing programs to detect and treat it (Cole et al, 1999).

There is still controversy regarding the introduction of screening for depression in primary care. Some meta-analysis studies advocated the use of screening methods for depression as this will increase the recognition and improve the outcome (Hickie , Davenport, and Ricci, 2002). Other meta-analysis studies didn't support screening and concluded that this will have little effect on recognition and outcome of depression (Gilbody, House, and Sheldon, 2005).

The US preventive task force recommends screening for depression in adults based on evidence from several studies (Pignone , Gaynes , Rushton , Burchell , Orleans , Mulrow,and Ann,2002).

A previous Bahraini study found that there was a high prevalence of psychiatric morbidity among attendees of primary health care especially women, unemployed and those with low educational achievement. This study called for the need to introduce an easy screening test to detect this morbidity (Al-Haddad, Al-Garf, Al-Jowder and Al-Zurba, 1999).

Primary care physicians should be trained on early recognition and on application of clinical guidelines to improve management of depression. In a randomized controlled trial implementing a special intervention model versus usual care for treating depressed elderly, it was observed that the

intervention group had faster rate of cure, and the benefit of treatment lasted for one year after stopping treatment (Hunkeler, Katon, , Tang, Williams, Jr, Kroenke, Lin, Harpole, Arean, Levine, Grypma, and Hargreaves,2006) .

A large study proved that applying a collaborative care management program supervised by a psychiatric was feasible and more effective than the usual care in primary health care (Unützer, Katon, Callahan, Williams, Jr, Hunkeler,Harpole, Hoffing, Della Penna, Noël, Lin,Areán, Hegel,Tang, Belin, Oishi, and Langston,2002).

In another randomized controlled trial conducted in 46 primary care clinics in USA,it was concluded that depressed patients registered in clinics that implemented quality improvement programs for treating depression had better quality of care, better mental health outcomes and were more likely to retain their jobs (Wells, sherbourne , Schoenbaum, duan , Meredith , Unutzer , Carney ,and Rubenstein ,2000). Another randomized controlled trial showed that providing primary care physicians with specific guidelines to manage depression was associated with increased recognition and treatment of late life depression (Callahan, Hendrie , Dittus , brater , Hui, and Tierney,1994) (Harris, Cook, Victor, Rink, Mann, Shah, De Wilde,and Beighton,2003).

A Dutch study pointed out to the importance of introducing prevention programs to decrease the incidence of depression in high risk groups (Smit, Ederveen, Cuijpers, Deeg, and Beekman, 2006).

Other studies recommended the introduction of home-based program to detect depression in elderly people with chronic illnesses who usually are not able to seek medical care (Druss, Rohrbaugh, and Rosenheck, 1999).

2.9 Studied risk factors for depression

The high prevalence of late-age depression and the resultant increase in disabilities and mortality among its victims lead the researchers to explore the causative factors for this disease. Several studies and meta-analytic reviews were devoted to uncover these factors. Knowledge about these factors will certainly aid in developing preventive and screening programs to combat this health problem. The following section gives a review on some of the common studied risk factors.

Depression was found to be more common among women and among the elderly with poor socioeconomic conditions (Beekman et al, 1999). Also bereavement,disability,prior depression were reported to be other risk factors for depression (Cole, and Dendukuri,2003) (Mendes de Leon , Kas ,and Jacobs ,1994) (Kennedy , Kelman , and Thomas,1990).
A large study reported the risk factors for depression in a hierarchy of their importance as follows: illness, disability, isolation, bereavement, and poverty (Kennedy, Kelman, Thomas, Wisniewski, Metz and Bijur, 1989).

The AMSTEL study from Netherlands showed these risk factors to be associated with depression: female sex, being unmarried, impaired instrumental activities of daily living (IADL) and activities of daily living (ADL) and previous history of anxiety or depression (Schoevers , Beekman , Deeg , Jonker , and van Tilburg,2003).

A study done in 1982 showed that depression was associated with lack of satisfaction with life; feelings of loneliness; and interestingly with smoking (Green , Copeland , Dewey , Sharma , Saunders , Davidson , Sullivan , McWilliam ,1992).

The Malaysian study reported that depression was higher among the elderly with chronic illnesses especially ischemic heart disease (Sidik et al, 2003). Also stroke was shown to predispose to depression and post stroke depression was found to increase mortality and decrease the elderly functioning (Ghose , Williams , Swindle ,2005).

An American study found that the risk for depression was significantly higher among those elderly who have less social support, poor health status, drank alcohol heavily, or exercised less than twice a week (Gazmararian, Baker, Parker, Blazer, 2000).

The relation between husband and wife depressive symptoms was also studied and found to be correlated and influenced by gender, race and the couple characteristics (Townsenda, Millera and Guob, 2001).A longitudinal study found that widowed women had more depressive symptoms shortly after the death of their husbands but generally, they have the same risk factors for depression as married women. However, widowed women who have diseases or functional disabilities were more prone to depression (Harlow, Goldberg and Comstock, 1991).

Another longitudinal study identified cancer, heart disease and arthritis as major risk factors for depression in descending order (Polsky, Doshi, Marcus, Oslin, Rothbard, Thomas, Thompson, 2005).

Mood disturbance is common in elderly with Parkinson's disease .Studies have shown that elderly with Parkinson's disease have 2.4 times higher risk developing depression. They found also that the same risk factors for depression in the general population are applying to those patients namely:" female sex, higher age,personal or family history of depression, and comorbid somatic diseases". (Leentjens, 2004)

A study found that about 64% of their participants affected by Parkinson's disease were having depressive symptoms which the study found to be related to the severity of the disease and its duration.Moreover,the study found that about a third of the caregiver were also having depressive symptoms.(Player,1999)

The relation between diabetes and depression was studied in depth by many researchers as both of these diseases are prevalent among elderly people and associated with many complications. Several studies evaluated the risk of depression among elderly with diabetes. Others evaluated the risk in the reverse direction. They studied the risk of diabetes among depressed patients.

A large Canadian study found little evidence that diabetes mellitus type-2 predisposes to depression in patients older than 20 years even after adjustment for age and other risk factors. It attributed the increase risk of depression among diabetics to the major complications of diabetes such as coronary heart disease (CHD) and stroke. However, it concluded that depression is a risk factor for diabetes (Brown, Majumdar, Newman and Johnson, 2006).

On the other hand, another study found that 11-15% of diabetics had depression. Also it pointed out that depressed diabetics usually have more medical symptoms, increased disability, poor compliance to treatment, and increased cardiac risk factors. All of these ultimately will lead to higher medical costs and to higher mortality rate. It added also that the introduction of special intervention program to treat depression among this group proved to be associated with better clinical outcomes and to reduce the net medical cost (Katon, Unützer,Fan,Williams, Schoenbaum, Lin, and Hunkele,2006).

Another Australian community-based study supported these findings as it found that 24% of their diabetics suffered from depression and showed that depression was strongly associated with diabetes in those above 50 years of age. It also found that the effect of diabetes and depression on quality of life was more than additive (Goldney, Phillips,Fisher, and Wilson,2004).

A meta-analysis study concluded that diabetes doubles the risk for depression among adults and especially so among women and among uncontrolled diabetics (Anderson, Freedland, Clouse, and Lustman, 2001).

American researchers studied this risk among elderly living in rural communities. They found that 15.9% of them had depressive symptoms. This association was stronger among females, those with low education, poor social conditions and poor health status (Bell, Smith, Arcury, Snively, Stafford, and Quandt, 2005).

Another study found that the odds of depression among elderly with diabetes is 1.58.It also concluded that elderly with diabetes had higher medical costs even after excluding the cost of mental health services (Finkelstein, Bray, Chen, Larsol, Miller, Tompkins,Keme, and Manderscheid,2003).

Urinary incontinence among elderly people was shown to be also associated with moderate to severe depression (Dugan , Cohen , Bland , Preisser , Davis , Suggs , McGann,2000).

The relationship between depression and stroke was examined by several studies and post-stroke depression is a well-known phenomenon which was approached by several researchers.

A large Korean study concluded that there was a significant correlation between the development of depression and both a previous history of stroke and having a low high-density lipoprotein cholesterol level (Kim, Stewart, Shin, and Yoon, 2004).

A Chinese study supported this fact as it showed that depression was more common in elderly who had stroke especially if stroke was followed by impairment in the activities of daily living (Fuh, Liu, Wang, Liu, and Sang, 1987).

The association between depression and disability was studied thoroughly in many researches and found to be complex and reciprocal.

Bruce (2001) made an extensive effort to review the studies done in this field. The researcher found out that all of the cross-sectional studies done supported the evidence that depression is one of the important risk factor for disability. This relation holds true regardless of the settings of the study being in the community, primary care clinics or the institutions. Evidence from longitudinal community-based studies also supported this finding and proved that elderly with depression will eventually have a decline in functioning and disability. Other longitudinal studies proved the reciprocal association and found that disabled elderly usually end up with depression.

A prospective study carried out over 5 years in Finland showed that chronic or relapsing depression is associated with a subsequent decline in functional abilities. The study reported these factors as predictors for future decline in physical abilities if they were present initially in the depressed patient: physical illness, old age, and low educational level. It recommended the involvement of depressed elderly in exercises that strengthen their activities of daily living (ADL) and instrumental activities of daily living (IADL) (Kivelá and Pahkala,2001) .

Another study assessed the impairment in physical activities among depressed elderly. It found that this impairment in ADL and IADL is associated mostly with these factors: physical illness, old age, the appearance of depression at late age, and the presence of severe form of depression (Steffens, Hays, and Krishnan, 1999).

Other studies showed that depression was more associated with disability than with physical illness, (Braam, Prince,Beekman, Delespaul,Dewey, Geerlings, Kivela ,Lawlor, Meller, Reischies, Roelands, Schoevers, Saz, Skoog, Turrina, Versporten, and Copelan,2005) (Livingston , Watkin , Milne , Manela , and Katona,2000) (Prince, Harwood , Thomas, and Mann ,1998). A study even showed that disease will be a risk factor for depression only when it causes disability (Zeiss, Antonette; Lewinsohn, Peter; Rohde, Paul; Seeley, and John, 1996).

The importance of social factors and the elderly position in the social structure was stressed by many studies and shown to be related to late- life depression as this determines the elderly response to stressors (Cairney and Krause, 2005).

A study examined the effect of social support on depression and concluded that social support interacts with health status in their net effect to produce depression (Phifer, James, Murrell, Stanley, 1986).

A study found that disability is strongly related to depression, and elderly perceived support rather than the actual received support from family members mediates the relationship between disability and depression (Taylor and Lynch,2004).

A study graded the social support deficits into levels and found that there is a strong and graded association between the number of social support deficits and depression (Prince ,Harwood,Blizard , Thomas,and Mann ,1997).

Moreover, social support was found to result in positive response to depression treatment especially in the subsyndromal state (Oxman and Hull, 2001).

The environment and the surroundings in which the elderly is living have a profound impact not only on the development of depression but also on the response to treatment. A study showed that elderly people who lived in a poor environment were more depressed. Also; it found that elderly who had neighbors of similar age group had more social relations and were less depressed (Kubzansky, Subramanian, Kawachi,Fay, Soobader and Berkman,2005).

A study examined the difference in the risk of depression among depressed elderly patients residing in urban and rural areas and found that 8.3% of

rural patients were found to be depressed while 14.0% of urban patients were found so (Friedman, Conwell, and Delavan, 2007).

The link between genetic predisposition and depression was also investigated. However; genetic predisposition was reported to be less important risk factor for depression in elderly than in younger age (Prince et al, 1998).

The effect of race on the prevalence of depression was studied in five different regions in US. The prevalence of depression was found to be higher among adult whites than among blacks in three of the five regions studied even after controlling for age, sex and income (Somervell, Leaf, Weissman, Blazer and Bruce, 1989).

Another community-based study comparing the prevalence of depression among different races in the US found a high prevalence among blacks and Hispanics than among whites. However, after adjusting for sociodemographic and economical factors, Hispanics and whites were found to have similar prevalence while blacks were having lower rates of depression (Dunlop, Song, Lyons, Manheim, and Chang, 2003).

A previous history of psychiatric illness reported to be an important risk factor for late-life depression only for elderly less than 65 years of age (Prince et al, 1998).

A prospective study examined the association between depression and exercise found that elderly who performed regular exercises were less depressed than those who didn't, but the study didn't show that exercise

protects from having future depression (Kritz-Silverstein,Barrett-Connor and Corbeau,2001) .

A comprehensive meta-analysis review of 20 prospective studies revealed the following five factors to be associated significantly with depression: female sex, a history of bereavement or depression, having a sleep problem and disability. The calculated attributable risks for these factors were: 69.4% for bereavement, 57.0% for sleep disturbance, and 56.5% for disability.The meta-analysis also identified these factors as not increasing the risk of depression: older age, low education, unmarried status and having no social support.The review suggested that elderly with these modifiable risk factors should be screened earlier for depression. In addition; it recommended the introduction of community-based interventions to high-risk groups.Counselling and social support also should be provided to these elderly (Cole, and Dendukuri, 2003).

Other researchers studied the association between depression and anemia. They found a higher rate of anemia among depressed subjects with an odds ratio of 1.93.Those elderly with higher depressive scores were more at risk of developing anemia (Onder, Penninx, Cesari, Bandinelli, Lauretani, Bartali, Gori, Pahor and Ferrucci, 2005).

Sleep problems were postulated to be another risk factor for late-age depression.

Japanese researchers examined the association between having sleep disturbance and the development of depression .They discovered a high rate of depression among their subjects (31.3%) and even a higher rate of sleep

disturbance (37.3%). They also found that elderly who had any type of sleep disturbance and for whatever causes were more prone to depression (Sukegawa, Itoga, Seno, Miura, Inagaki, Saito, Uegaki, Miyaoka, Momose, Kasahara, Oshiro, Shimizu, Yasukawa, Mihara, Maeda, Mizuno, Tsubouchi, Inami, and Horiguchi, 2003).

Several researches study the relation between smoking and the development of depression but no conclusive results were demonstrated. A study found that heavy smoking was associated with minor depression. However, no association was found with major depression. It postulated that the relation between smoking and major depression may be indirect and mediated by other factors (Dierker, Avenevoli, Stolar, and Merikangas, 2002).

2.10 Burden of depression

Generally the burden of psychiatric disorders is usually under-estimated especially in this part of the world.

The disability-adjusted life-years (DALY) is a measure introduced to truly calculate the burden of disease based on both the rate of mortality and the level of disability it produces. This measure estimates the burden of even non-fatal diseases such as depression by calculating the amount of disabilities they cause.

The global burden of disease studies (GBD) both GBD 1990 and 2000 stressed the importance of this fact in calculating the disease burden and in directing the intervention strategies.

WHO also introduced the concept of years lived with disability (YLD), which measures the course of the disease and hence the duration of the disability it produces.

In GBD 1990, depressive disorders were the fourth leading cause of disease burden with 3.7% of the total DALYs.Moreover, depressive disorders were the first leading cause of YLD which was 10.7% of the total YLD.

The GBD 2000 reported figures for the incidence of depressive disorders were higher for women being 49 per 100 000 per year than for men being 31 per 100 000 per year.

In the GBD 2000 study, depressive disorders still ranked the fourth among the leading causes of disease burden but with an increase magnitude. The estimated DALYs were 4.46% and YLD were 2.1%.Depression comes only the fourth after perinatal conditions, lower respiratory tract infections and AIDS among the top ten leading causes of disease burden.

However, in the GBD 2000 depression was the seventh leading cause of disease burden for men whereas it was only the fourth for women (Üstün, Ayuso-Mateos, Chatterji, Mathers, and Murray, 2004). This gender difference should be considered in implementing any interventional programs for depression.

The GBD 2000 views depression as a public health priority. It urges policy makers and health professionals to adopt effective measures to reduce the suffering caused by this disease.

There is an epidemiologic transition in disability-adjusted life-years (DALY) in terms of the emergence of non-communicable diseases as the top leading causes of DALY even in the non- developing countries (Murry and Lopez ,1997).

Depression is usually associated with a high economic burden .This burden was calculated in one study to reach the average per capita health care expenditure (Chisholm,diehr, Knapp, Patrick,Treglia,and Simon,2003).

Researchers estimated the economic cost of depression by calculating the direct treatment cost, the mortality cost of suicide predisposed by depression, and the cost of loss of productivity at work caused by depression (Wang, Simon ,and Kessler ,2003).

In UK, the total cost of depression in 2000 was estimated to be 9 billion pounds, of which only 370 million were spent on direct treatment cost (Thomas and Morris, 2003).
In the same year, the cost in USA was 83.1billion dollars: 62% of this cost was attributed to loss of working days, 31% was the direct treatment cost while 7% was attributed to suicide (Greenberg , Kessler , Birnbaum, Leong , Lowe, Berglund , and Corey-Lisle ,2003).

Studies have shown that depressed elderly have greater utilization of health care services and offered more diagnostic tests (Hebrman et al,2002) (Carta, Hardoy, Kovess, Osso and Carpiniello,2003). A study reported that only 29% of depressed elderly were treated. It pointed out also that these patients had more frequent appointments: about two more appointments each year. They also have more laboratory tests, x-rays and scans (Luber, Meyers, Williams-Russo, Hollenberg, DiDomenico, Charlson, and Alexopoulos,2001).
Depressed elderly have higher health care costs and was shown to be true even after adjustment for chronic medical illness (Katon, Lin, Russo,and Unützer ,2003). Another study estimated the medical cost of depressed elderly to be 50% more than non-depressed elderly (Druss et al, 1999).
Also depression was shown to be associated with decrease functional status and poor quality of life (Hebrman et al, 2002). A prospective cohort study

of depressed elderly over 4 years found that these depressed elderly usually have a subsequent decline in their physical abilities and suggested that preventing or treating depression among these patients will certainly prevent this physical decline (Penninx, Guralnik, Ferrucci, Simonsick, Deeg, Wallace, 1998).

A study reported that depressed elderly often over report their functional disabilities and may attribute them to emotional or physical factors. The study recommended that physicians should be aware of this and screen for depression in such occasions (Sinclair , Lyness ,King ,Cox,and Caine ,2001). Another study had shown that improved depression among high utilizers of primary health services lead to decrease disability days (Von korff, Katon, and Lin , 1992).

The Cardiovascular Health Study proved that depression is an independent risk factor for mortality in elderly (Schulz, Beach, Ives; Martire, Ariyo, and Kop, 2000). Another study concluded that depression was associated with increased risk of myocardial infarction (MI) and mortality among this age group (Barefoot and Schroll, 1996). A similar study found that depression was an independent risk factor for coronary heart disease and death among older adults (Ariyo, Haan , Tangen ,2001). However, the Italian longitudinal study on ageing showed that depression carries increase risk for coronary heart disease only in men but increases mortality for both men and women (Marzari, Maggi, Manzato, Destro, Noale, Bianchi, Minicuci, Farchi, Baldereschi, Di Carlo, and Crepaldi, 2005).

A long follow-up study of hypertensive elderly patients found also an association between depression and mortality. This association was more

obvious among males (hazard ratio 2.12) and among younger age groups after adjusting for other cardiovascular risk factors and cognitive decline. The study didn't find any association with antidepressant use. Elderly with major depression were found to be more at risk of dying than elderly with minor form (Abas, Hotopf, Prince, 2002).

However, another study found that mortality was more among older age group, and among men especially with high depressive score. Late age of onset of depression was also associated with mortality among both men and women. Depressed women with vascular risk factors were shown to be more at risk of dying. The study suggested that these vascular risk factors should be controlled (Steffens, Levy, Wagner, McQuoid, Krishnan, and Carroll, 2002).

In a prospective study over 7 years, it was found that elderly people with severe depression had an increase in mortality even after adjustment for other risk factors and this increase in mortality was comparable to that of heart failure (Unützer et al, 2002). A Finnish study supported these findings and found that if depression was coupled with advanced age, male sex, smoking, poor physical health, and reduced functional abilities, the level of mortality will be even higher (Lawrence, Murray,Banerjee,Turner,Sangha,Byng,Bhugra,Huxley, Tylee, and Macdonald ,2006).Another longitudinal study over 10 years found that depression was a strong and independent predictor for earlier mortality (Alexopoulos et al, 2005) .

A longitudinal cohort study conducted in primary care clinics over 2 years found that depression is associated with mortality as much as diabetes and myocardial infarction (MI) even after adjusting for potential confounders (Gallo, Bogner, Morales,Post, Have, and Bruce ,2005).

A study carried out on older Mexican Americans showed that the death rate among depressed elderly was high especially if depression was coupled with diabetes (OR = 3.84), CHD (OR = 4), or stroke (OR = 3). (Black and Markides, 1999).

Moreover, it was found that even minor depression in older men and major depression in both sexes was associated with increase risk of dying (Penninx, Geerlings, Deeg, van Eijk, van Tilburg, Beekman, 1999).

Blazer, Hybels and Pieper (2001) examined the association between depression and mortality among depressed community-residing elderly over a period of three years. The unadjusted odds ratio of the risk of mortality among depressed subjects was found to be 1.98.However, this ratio decreased when some of the factors were examined independently. These conditions were: chronic disease, cognitive and functional impairment, and social support. The researchers concluded that the association between depression and mortality is complex and may involve several risk factors.

Depression was also shown to worsen the course of other chronic illnesses. It was found that elderly diabetics with depression have poor compliance on medications (Kilbourne, Reynolds, Good, Sereika, Justice, and Fine, 2005). Even the subsyndromal symptoms of depression (SSD) is associated with significant disability (Chopra, Zubritsky, Knott, Have, Hadley, Coyne, and Oslin, 2005).

Gatz, Tyas, St. John and Montgomery (2005) studied the association between depression and the development of Alzheimer's disease (AD) and dementia in a community dwelling elderly over 5 years. They found that depression is a significant predictor for AD and dementia. The researchers,

therefore, recommended that depressed elderly should be evaluated regularly for any symptoms of cognitive decline.

The other important attribute for the increase cost of depression is suicide. It is reported that 15% of depressed patients will commit suicide .The suicidal rate is reported to be highest among adolescents and elderly .It is estimated that about one-fifth of all suicides are committed by people over 65 years. Elderly men are more vulnerable than elderly women (Hall,C.W.Hall,and Chapman ,2003). A study done in Finland showed that 91% of elderly who committed suicide in the study were depressed and most of them were having severe depression (Henriksson , Marttunen , Isometsa , Heikkinen , Aro , Kuoppasalmi , and Lonnqvist ,1995).

Another study showed that primary care elderly who committed suicide were having severe depression and depression severity distinguished suicide completers. This study stresses the importance of identifying and treating depression in the primary care settings as this will certainly prevent suicide in late life (Conwell , Lyness , Duberstein , Cox , Seidlitz, DiGiorgio ,and Caine ,2000).

A Japanese interventional study was carried out in order to control the high suicidal rate among their elderly citizens. A major part of their program is to screen for depression and effectively treat it. The risk of committing suicide was considerably decreased by 74% among their female participants. However, the risk of committing suicide didn't change for the males and the researchers attributed this to possible biases in the selection of the study sample or in the application of the intervention program (Oyama , Ono , Watanabe ,Tanaka , Kudoh , Sakashita , Sakamoto , Neichi, Satoh, Nakamura ,and Yoshimura,2006).

The other important reason for increased cost is the added time of informal caregiving.This expense is usually not considered or even evaluated. Studies have shown that depressed elderly received more hours of informal care giving even after adjustment for other chronic conditions (Langa,Valenstein, and Mark,2004).

Chapter 3

Research methodology

3.1 Research design:

A cross-sectional study with group comparison.

3.2 Study population:

Bahraini Elderly persons aged 60 and older attending the health centers.

3.3 Sampling:

3.3.1 Sampling method:

All of the related statistics are based on the Central Informatics Center and Bahrain health statistics report for the year 2006.

The number of Bahraini elderly above 60 years as estimated for the year 2006 was 26,291 constituting 5.7% of the total Bahraini population. Of these, 51.2% were females and 48.8% were males.

The sampling method was multistage stratified and cluster sampling, in which a sample is stratified by regions and clustered by health centers in each region.

There are 20 health centers and two small clinics distributed allover Bahrain. The health centers are grouped into four regions. One health center was chosen randomly from each region. The sample was not stratified by gender as Bahrain has almost equal proportion of elderly males and females. (Appendix 4)

The Health centers selected for the study conduction were:
Jidhafs Health center with elderly population of 2,808,Sheikh Sabah health center with an elderly population of 1,323, Hamad Town Health center with elderly population of 645, Sheikh Salman Health center with elderly population of 1,979.The number of elderly selected from each health center was proportional to the total number of elderly served by that health center. Accordingly, the number assigned for the four selected health centers was: 79 from Sheikh Salman Health center, 53 from Sheikh Sabah Health center, 112 from Jidhafs Health center, and 26 from Hamad Town Health center.
From each health center, every elderly registered was identified and enrolled in the study until the total number assigned for that health center was reached.

3.3.2 Sample size:

The sample size for the elderly subjects was calculated using the program NCSS 2000 based on the prevalence of depression among Bahraini elderly derived from the literature of 23% (Al Haddad, 2000) with a precision of 0.05 and 95% confidence level. The sample size was calculated to be 270.

3.3.3 Inclusion criteria:

Bahraini elderly aged 60 years and older attending the selected health centers during the period of the study.

3.3.4 Exclusion criteria:

Those elderly who refused to be interviewed were excluded.

3.4 Setting:

Four Primary care health centers in Bahrain were randomly chosen for the study of the prevalence of depression among the elderly.

3.5 Study instruments:

The shorter version of **the geriatric depression scale** (GDS-15) was used to screen for depression. It is a-15 item scale derived from the geriatric depression scale GDS-30 which is recommended by the Royal College of General Practitioner to screen for depression in older people in primary care setting (Katona.C. and Katona.P.,1997) (Mullan , Katona , D'Ath , and Katona,1994) (D'Ath , Katona , Mullan, Evans, and Katona .C.,1994). It has 15 questions: 10 positive questions for depression if answered as "yes" and 5 negative questions if answered by "no".

The score range from 0 to 15 .A score more than 5 was set to indicate probable depression. When the cutoff point of 4/5 is used GDS-15 has a sensitivity rate of 92.7% and a specificity rate of 65.2% , and positive and negative predictive values of 82.6% and 83.3% respectively when ICD-10 diagnostic criteria for major depressive episode were used as the 'gold standard'. When compared with DSM-IV diagnostic criteria, GDS has

sensitivity and specificity rates of 97.0% and 54.8% respectively, and positive and negative predictive values of 69.6% and 94.4% respectively (Almeida.O.P.and Almeida.S.A., 1999).

GDS-15 had already been translated to Arabic and validated to be used for Bahraini elderly in a previous study (Al Haddad, 2000). It is also the scale used by physicians in the psychiatric hospital to diagnose elderly depression.

A GDS-score of more than 5 was set to indicate a probable depression. A score of 6-8 indicates mild depression; a score of 9-11 indicates moderate depression while a score of 12-15 indicates severe depression.

A **structured questionnaire** was designed to assess the most important factors associated with depression based on a thorough literature review.

Through the questionnaire information on the following elderly characteristics were identified:

-Sociodemographic characteristics including: estimated age, sex, marital status, level of education, and source of income.

- Living arrangements, social activities (measuring the element of socialization mainly), social and economical support provided by the elderly to his family.

-Past history of depression, and recent bereavement (within six months).

-Chronic health conditions: which included diabetes, hypertension, heart disease, stroke, respiratory diseases, joint symptoms, eye and hearing problems, and dental problems.

-Medication intake: which included the medication used regularly for chronic diseases such as diabetes, hypertension, heart disease, and joint problems.

3.6 Variables:

Definition of variables:

Elderly: The WHO definition for elderly or aged was used. UN uses the age of 60 and over to define older people (WHO). Those above 80 are defined as the oldest old. (Men, ageing and health, WHO)The elderly were defined in this study as people aged 60 years and over as defined by the WHO criteria and as defined by the retirement age for Bahrainis.

These variables were identified for the elderly subjects:

A. ***Independent variables***

These independent variables were derived from the structured questionnaire

-Sociodemographic characteristics: Including estimated age, sex, marital status, level of education, source of income, living arrangements, social activities, social and economical support provided by the elderly to his family.

-The subject also was asked about past history of depression, and recent bereavement.

-Chronic health conditions: which mainly included diabetes, hypertension, heart disease, stroke, respiratory diseases, joint symptoms, eye and hearing problems, dental problems and urinary incontinence.

- Medication intake: which included the medications used regularly for chronic diseases such as diabetes, hypertension, heart disease, joint problems, and psychiatric problems.

B. Dependant variable

The subjects were evaluated for the possibility of depression as the main outcome measure using the Arabic translated form of Geriatric Depression Scale GDS-15.

3.7 Validity and reliability of the study instruments:

A. The study questionnaire

Face validity:

The items included in the study questionnaire were ascertained to be linked and to measure the study objectives.

Content validity:

Moreover, the questions included in the study questionnaire were ensured to cover equally the most important sociodemographic factors and disease status associated with late onset depression.

Both the face and content validity of the study questionnaire were established by the researcher based on a thorough literature review. The content of the study questionnaire was reviewed by two expert faculties working in Arabian Gulf University and some modifications were made according to their judgment.

B.The geriatric depression scale (GDS-15)

The validity and reliability of the GDS-15 scale had already been established for Bahraini elderly in another study.Cronbach's alpha calculated for the scale was 0.76 and Spearman's correlation co-efficient for test re-test analysis was 0.97, $P< 0.01$. (Al Haddad, 2000)

The internal consistency of the GDS-15 scale was again checked using the data from the pilot study and the calculated Cronbach's alpha for it was **0.854** indicating a high inter-item consistency.

The researcher and the other two interviewers applied GDS-15 scale to five elderly subjects separately.The agreement between the three raters was checked using the Intraclass Correlation Coefficient and it was 0.900.

Intraclass Correlation Coefficient

	Intraclass correlation	95% confidence interval	
Single measures	0.750	0.246	0.967
Average measures	0.900	0.495	0.989

3.8 Pilot study

A pilot study had been conducted. Through piloting the appropriateness of the questions and whether they were understood by the elderly subjects were checked. The questionnaire was modified accordingly by removing, modifying or adding questions. The pilot study was conducted in Hamad Town Health Center and included 30 elderly people attending the center.

3.9 Data collection

The study subjects were identified through the medical records and interviewed in a private room in the chosen health center.

A **structured questionnaire** was designed to assess the most important factors associated with depression. The shorter version of **the geriatric depression scale** (GDS-15) (the Arabic translated form) was used to screen for depression. Information was collected by direct interviewing of the study subjects in a private room.

Two staff nurses, one of them works in the geriatric hospital, were trained to give the questionnaire .The study was performed by the researcher and the two staff nurses.

3.10 Study period

The study was conducted during the months of July and August 2006.

3.11 Data Analysis:

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) software, versions 14 and 15. Descriptive statistics including means and standard deviations (SD) were used to describe continuous variables and frequencies were used to describe categorical variables. Chi-square test was used to test the association between each of the sociodemographic variables, health conditions and depression. Odds ratios (OR) were calculated with the 95% confidence intervals (CI) to measure the risk of depression among elderly in relation to the studied risk factors.P-values less than 0.05 were considered statistically significant. Multiple Logistic regression was calculated to determine the most important independent predictors for depression among the studied variables and to control for potential confounding among these variables. Adjusted odds ratio (OR) and

the 95% confidence interval (CI) were calculated for the significant predictors and P-value less than 0.05 was considered statistically significant.

3.12 Ethical considerations:

The research proposal was approved by the research committee of the master program of Health Policy and Population Studies at the Arabian Gulf University, and also was approved by the research committee of the Ministry Of Health. In addition, a permission letter was sent from the Chief of Medical Staff for primary health care to the involved health centers. A verbal consent was taken from the participants in the study before the interview.

Chapter 4

Results and analysis

4.1 Descriptive characteristics of the study sample

4.1.1 Demographic characteristics

This study included 270 Bahraini elderly aged 60 years and above. Women constituted 54% of the subjects and men constituted 46% (Table 1) .The distribution of men and women in different age groups was as follows: 27.4% of men and 34.2% of women were 60-64 years, 32.3% of men and 26.7% of women were 65-69 years, 22.6% of men and 19.9% of women were 70-74 years, and 11.3% of men and 11.6% of women were 75-79 years of age. Similar number of men and women (4.8%) were 80-84 years and 1.6% of men and 1.4% of women were 85-89 years old. Only two of the females (0.7%) and none of the male were above 90 years of age .However, the mean age for both sexes was almost similar: 68.65 years for men and 68.36 years for women with a standard deviation of ± 6.3 and ± 7 respectively. The maximum age for men was 87 while it was 97 for women. (Table 1).

There was a significant difference in the marital status between men and women (P = 0.00). The majority of the men (87.8%) and only 43.8% of the women were currently married. However, more than half of the women (52.1%) and only 8.9% of men were widowed. Only few of the elderly were never married (1.6% of men and 2.1% of women) .Also few of them were divorced or separated (1.6% of men and 2.1% of women). (Table 1)

More than half (53%) of the subjects were illiterate, only 19.6% can read or write, 14.8% had primary education, 4.1% had intermediate education, 6.3% had secondary education and 2.2% achieved higher level of education. However, there was a significant difference in the educational achievement between men and women (P = 0.00).Most of women (68.5%) and only 34.7% of men were illiterate, 18.5% of women and 21% of men can read or write, 23.4% of men had primary education while only 7.5% of the women had, 5.6% of men and 2.7% of women had intermediate education, 11.3% of men had secondary education compared to only 2.1% of women. One woman and five men had higher level of education. (Table 1)

Table 1: Demographic characteristics of participants according to gender

characteristic	Male		female		Total		P-value
Mean age	68.65 ± 6.3		68.36 ± 7.05				
	No	(%)	No	(%)	No	(%)	
sex	124	45.9	146	54.1	270	100	
Age groups(years)							0.72
60-64	34	27.4	50	34.2	84	31.1	
65-69	40	32.3	39	26.7	79	29.3	
70-74	28	22.6	29	19.9	57	21.1	
75-79	14	11.3	17	11.6	31	11.5	
80-84	6	4.8	7	4.8	13	4.8	
≥ 85	2	1.6	4	2.8	6	2.2	
Marital status							0.000
Never married	2	1.6	3	2.1	5	1.9	
married	108	87.8	64	43.8	172	63.9	
widow	11	8.9	76	52.1	87	32.3	
Divorced/separated	2	1.6	3	2.1	5	1.9	
Education							0.000
illiterate	43	34.7	100	68.5	143	53	
Read/write	26	21	27	18.5	53	19.6	
primary	29	23.4	11	7.5	40	14.8	
intermediate	7	5.6	4	2.7	11	4.1	
secondary	14	11.3	3	2.1	7	6.3	
higher	5	4	1	0.7	6	2.2	

4.1.2-Social characteristics

The majority of subjects were living with their spouse and children (44.7%) or with children and grandchildren (38.3%).However,7.5% of them were living alone,1.5% were living with their relatives and only 2 subjects (0.8%) were living with friends. (Table 2) There was no significant difference in the living arrangement between men and women or between different age groups (P = 0.104 and 0.88 respectively).

Few subjects (1.5%) had no source of income (Table 2). Only 9.6% of the elderly reported that their main source of income was from their own current work: 12.9% of men and 6.8% of women. 16.7% received their financial support from their spouse .As expected more women (23.3%) than men (8.9%) received financial help from their spouse (P = 0.002).Of the participants, 25.9% received financial help from their children. Similarly more women (38.4%) than men (11.3%) depended on their children as the main source of income (P = 0.00).A quarter (25.2%) of the elderly reported that their main source of income was from the pension with men being far more than women (40% vs. 12.3%, P = 0.00). Only 17% of the elderly received financial help from the social affairs. More women (22.6%) than men (10.5%) received financial support from the social affairs (P = 0.008). 3% of the subjects received financial help from their relatives and 8.9% reported having help from other sources. (Table 2).

Table 2: Social characteristics of participants according to gender

characteristic	male		female		total		P value
	No.	%	No.	%	No.	%	
Living arrangement							0.104
alone	9	7.3	11	7.7	20	7.5	
With spouse	9	7.3	10	7	19	7.1	
With spouse and children	66	53.2	53	37.3	119	44.7	
With children	38	30.6	64	45.1	102	38.3	
With relatives	2	1.6	2	1.4	4	1.5	
With friends	0	0	2	1.4	2	0.8	
Income							0.869
present	122	98.4	144	98.6	266	98.5	
absent	2	1.6	2	1.4	4	1.5	
Source of Income							
Current work	16	12.9	10	6.8	26	9.6	0.093
spouse	11	8.9	34	23.3	45	16.7	0.002
child	14	11.3	56	38.4	70	25.9	0.003
relative	1	0.8	7	4.8	8	3	0.05
pension	50	40.3	18	12.3	68	25.2	0.000
Social affairs	13	10.5	33	22.6	46	17	0.008
others	19	15.3	5	3.4	24	8.9	0.001

The majority (84%) of the elderly were socially active. Most of them were attending religious places, such as mosques and maatams, (43%) and social gathering (44%).Only 5.2% were attending traditional café and even less (2.6%) were joining clubs. (Table 3) There was no significant difference between the most frequent forms of social activities performed and either the sex of the elderly or the age group.

Many of the participants (79.6%) were providing some help and support for their families. (Table 3)

Providing support declined by increasing age and the difference between providing support to family by different age groups was significant (P = 0.029).However, there was no significant difference in providing family support between men and women (P = 0.11).Many of them were helping in house work (42.6%) and buying house needs (34.8%).However, only 15.6% of the subjects were providing financial help for their families and 8.9% were looking after their grand children.

Table 3: Social characteristics of participants according to gender-continued

characteristic	Male		female		Total		P-value
	No	(%)	No	(%)	No	(%)	
sociodemographic							
Social participation							0.055
present	110	88.7	117	80.1	227	84.1	
absent	14	11.3	29	19.9	43	15.9	
Type of Social participation							
Attending religious places	51	41.1	65	44.5	116	43	0.575
Attending clubs	3	2.4	4	2.7	7	2.6	0.869
Attending traditional café	13	10.5	1	0.7	14	5.2	0.00
Attending social gathering	54	43.5	65	44.5	119	44.1	0.873
others	14	11.3	11	7.5	25	9.3	0.289
Support to family							0.111
present	104	83.9	111	76	215	97.6	
absent	20	16.1	35	24	55	20.4	
Type of support							
Help in house work	21	16.9	94	64.4	115	42.6	0.000
Look after children	4	3.2	20	13.7	24	8.9	0.003
Buying house needs	64	51.6	30	20.5	94	34.8	0.000
Direct financial help	35	28.2	7	4.8	42	15.6	0.000
others	14	11.3	3	2.1	17	6.3	0.002

Bereavement

A close relative death in the previous six months was reported by 36% of the elderly (39.6% of women and 31.9% of men) and the difference in reporting such an event between men and women was not significant (P = 0.19). (Table 4)

4.1.3-Clinical characteristics

Past psychiatric problems

Only 14.68% of the participants were having previous mental health problems. However, more women (20%) than men (8.5%) reported having previous mental problem and this difference was significant (P = 0.009).A history of previous mental problem was not found to differ across the different age groups (P = 0.302). (Table 4)

Table 4: Characteristics of participants according to bereavement and past psychiatric problems

variable	male		female		Total		P value
	No	(%)	No	(%)	No	(%)	
Bereavement							**0.199**
present	**38**	**31.9**	**57**	**39.6**	**95**	**36.1**	
absent	**81**	**68.1**	**87**	**60.4**	**168**	**63.9**	
Past psychiatric history							**0.009**
present	**10**	**8.5**	**27**	**20.1**	**37**	**14.7**	
absent	**108**	**91.5**	**107**	**79.9**	**215**	**85.3**	

Medical problems

The prevalence of chronic diseases (such as diabetes, hypertension, heart disease, stroke, respiratory diseases, joint symptoms, eye and hearing problems, and dental problems) was very high among the participants being 91.5%. There was no significant difference in the occurrence of chronic diseases between men and women (93.2% vs. 89.5%, P = 0.28).Also there was no significant difference in the prevalence of chronic diseases between different age groups (P = 0.92).

Half the participants reported having diabetes and hypertension. However, more women (60.3%) than men (39.5%) were having hypertension (P = 0.001).Also, it was found that more women (58.2%) than men (40.3%) were having diabetes mellitus (P = 0.003).However, no association was found between age and the prevalence of both hypertension and diabetes (P = 0.297 and 0.175 respectively). Also many reported having joint problems (28.9%) and eye disease (25.2%).Similar number (14.4%) were having teeth problem and heart disease, while 8.5% were having ear disease, 3.3% were having incontinence, and 4.4% had stroke. (Table 5)

Drug intake

Most of the elderly were on medications (82%).There was no difference in drug intake between the different age groups or between men and women (P = 0.77 and 0.052 respectively). (Table 5) The drugs reported in decreasing order of intake were: hypoglycemic drugs (47%), antihypertensive drugs (44%), non-steroidal anti-inflammatory drugs (13%), heart medications (8.9%), and lipid lowering agents (8%).Moreover, 21.6% of the elderly reported taking other types of medications. (Table 6)

Table 5: Characteristics of participants according to chronic diseases and drug intake

variable	male		female		Total		P-value
Chronic diseases	**No.**	**%**	**No.**	**%**	**No.**	**%**	**0.286**
present	**111**	**89.5**	**136**	**93.2**	**247**	**91.5**	
absent	**13**	**10.5**	**10**	**6.8**	**23**	**8.5**	
Types of Chronic diseases							
diabetes	**50**	**40.3**	**85**	**58.2**	**135**	**50**	**0.003**
hypertension	**49**	**39.5**	**88**	**60.3**	**137**	**50.7**	**0.001**
Heart disease	**17**	**13.7**	**22**	**15.1**	**39**	**14.4**	**0.752**
Joint problems	**30**	**24.2**	**48**	**32.9**	**78**	**28.9**	**0.117**
stroke	**4**	**3.2**	**8**	**5.5**	**12**	**4.4**	**0.371**
Chronic lung disease	**6**	**4.8**	**10**	**6.8**	**16**	**5.9**	**0.486**
Chronic eye disease	**28**	**22.6**	**40**	**27.4**	**68**	**25.2**	**0.364**
Chronic teeth problem	**7**	**5.6**	**32**	**21.9**	**39**	**14.4**	**0.002**
Chronic ear disease	**9**	**7.3**	**14**	**9.6**	**23**	**8.5**	**0.494**
Urinary Incontinence	**4**	**3.2**	**5**	**3.4**	**9**	**3.3**	**0.928**
Medication intake							**0.052**
yes	**94**	**77**	**125**	**86.2**	**219**	**82**	
No	**28**	**23**	**20**	**13.8**	**48**	**18**	

Table 6: Types of medication intake for chronic diseases

medication	frequency	percent
Oral hypoglycemic drugs and insulin injection	122	47.1
antihypertensive drugs	114	44
heart medications	23	8.9
non-steroidal anti-inflammatory drugs	34	13.1
lipid lowering agents	21	8.1
others*	56	21.6

* Others include: drugs used for heart, lung, thyroid diseases, psychiatric problem, etc

4-2 prevalence of depression

The prevalence of depressive symptoms among the elderly in this study was found to be 41.5 %.(Table 7)

The severity of depression among the participants was distributed as follows: 25.2% were having mild depression, 10.7 % were having moderate depression, and 5.6% were having severe depression.

The mean depression score for men was 3.67 ± 3.07 and for women was 5.86 ± 3.62.

Table 7: Prevalence of depression among participants

Depression status	**Frequency**	**Percent**
depressed	112	41.5
Non - depressed	158	58.5
Total	270	100

4.3 Univariate analysis for the association between depression and the studied risk factors

4.3.1 Gender

Among the subjects, 56.8% of the women and 23.4% of the men were found to be depressed and this difference was statistically significant (P = 0.00). (Table 10) The relative risk for depression was more than four times as high among females as among males (OR = 4.3 and 95% CI = 2.54-7.32). The difference in the severity of depression among men and women was also significant (P = 0.00).Among the subjects :32.2% of women and 16.9% of men were having mild depression, 17% of women and 3.2% of men were having moderate depression, and 7.5% of woman and 3.2% of men were having severe form. (Table 8)

Table 8: Depression status according to gender

	Depression status				**Total**	**P-value**
Sex	**Normal No. (%)**	**Mild No. (%)**	**Moderate No. (%)**	**Severe No. (%)**	**No. (%)**	**0.000**
male	**95(76.6)**	**21(16.9)**	**4(3.2)**	**4(3.2)**	**124(100)**	
female	**63(43.2)**	**47(32.2)**	**25(17.1)**	**11(7.5)**	**146(100)**	
Total	**158(58.5)**	**68(25.2)**	**29(10.7)**	**15(5.6)**	**270(100)**	

4.3.2 Age

The mean ± SD of depression score for different age groups were as follows: 4.21 ± 3.3 for the age group 60-64, 5.34 ± 3.7 for the age group 65-69, 4.98 ± 3.7 for the age group70-74, 5.16 ± 3.4 for the age group 75-79, 4.77 ± 3.7 for the age group 80-84, 5.25 ± 2.36 for the age group 85-89, and 4 ± 1.4 for those older than 90 years old.

The occurrence of depression among different age groups didn't show any significant difference (P = 0.457). (Table 10)

Moreover, the severity of depression did not also vary significantly with age (P = 0.661) .Among the age group 60-64:26.2% were having mild form, 7% were having moderate form, and 3.6% were having severe form of depression. Among the age group 65-69 years: 29% were having mild form, 15.2% were having moderate form, and 6.3% were having severe form. For the group 70-74 years: 15.8% were having mild form, 14% were having moderate form, and 7% were having severe form. For the age group 75-79 years:25.8% were having mild form, 3.2% were having moderate form, and 9.7% were having severe form. Among the group 80-84 years: 30.8% were having mild form, 15.4% were having moderate form and none was having severe form. For the group 85-89 years: 2 subjects were having mild form and for those older than 90 years none was having depression. (Table 9)

Table 9: Depression status according to age categories

	Depression status				Total	P	Mean depression score
Age group	**Normal No. (%)**	**Mild No. (%)**	**Moderate No. (%)**	**Severe No. (%)**		0.66	
60-64	53(63.1)	22(26.2)	6(7.1)	3(3.6)	84(100)		4.21± 3.3
65-69	39(49.4)	23(29.1)	12(15.2)	5(6.3)	79(100)		5.34 ±3.8
70-74	36(63.2)	9(15.8)	8(14)	4(7)	57(100)		4.98 ±3.7
75-79	19(61.3)	8(25.8)	1(3.2)	3(9.7)	31(100)		5.16 ±3.5
80-84	7(53.8)	4(30.8)	2(15.4)	0(.0)	13(100)		4.77 ±3.7
85-89	2(50)	2(50)	0(.0)	0(.0)	4(100)		5.25± 2.4
≥90	2(100)	0(.0)	0(.0)	0(.0)	2(100)		4 ± 1.41
Total	158(58.5)	68(25.2)	29(10.7)	15(5.6)	270(100)		

4.3.3 Marital status

The results showed strong association between depression and the marital status (P = 0.000).Depressive symptoms were present in 65.5% of widowed

subjects, in 60% of divorced or separated subjects, in 40% of those who never married and in only 29% of subjects who were currently married. (Table 10)

4.3.4 Education

There was a significant association between depressive symptoms and the educational achievement (P = 0.041).Depressive symptoms were found to be: 48.3% among the illiterate, 43.4% among those who can read or write, 30% among those with primary education, 36.4% among those with intermediate education, and 23.5% among those with secondary education. No depressive symptoms were found among those who achieved higher levels of education. (Table 10)

4.3.5 Living arrangement

Depressive symptoms were not found to be associated statistically with the living arrangement of the subjects (P = 0.418). They were reported by 50% of those living alone, by 52.6% of those living with their spouse, by 36% of those living with their spouse and children, by 43% of those living with their children and grand children, by 3 subjects living with their relatives and by one elderly living with friends. (Table 10)

Table 10: Univariate association between depression status and **Demographic characteristics**

Demographic characteristics	**Prevalence of depression**		**P-value**
variable	**No**	**(%)**	
sex			**0.000**
Male	**29**	**23.4**	
female	**83**	**56.8**	
Mean depression score			
male	**3.67 ±3.076**		
female	**5.86 ±3.625**		
Age groups(years)			**0.457**
60-64	**31**	**36.9**	
65-69	**40**	**50.6**	
70-74	**21**	**36.8**	
75-79	**12**	**38.7**	
80-84	**6**	**46.2**	
≥ 85	**2**	**50**	
Marital status			**0.000**
Never married	**2**	**40**	
married	**50**	**29.1**	
widow	**57**	**65.5**	
Divorced/separated	**3**	**60**	
Education			**0.041**
illiterate	**69**	**48.3**	
Read/write	**23**	**43.4**	
primary	**12**	**30**	
intermediate	**4**	**36.4**	
secondary	**4**	**23.5**	
higher	**0**	**0**	
Living arrangement			**0.418**
alone	**10**	**50**	
With spouse	**10**	**52.6**	
With spouse and children	**43**	**36.1**	
With children	**44**	**43.1**	
With relatives	**3**	**75**	
With friends	**1**	**50**	

4.3.6 Income

Only four of the elderly were not having any source of income, and all of them were found to be depressed. (Table 11)

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4.3.7 Social activity

Socially active elderly were found to be less depressed (38.3%) than those who were not involved in any social activity (58%) and this difference was significant (P = 0.016). (Table 11) Socially isolated elderly were more than twice as depressed as socially active elderly (OR = 2.23, CI = 1.15-4.3).Furthermore, social participation especially by attending religious places was shown to decrease the depressive symptoms significantly (P = 0.006).Elderly who didn't participate in religious activities were twice as prone to depression as those who did (OR = 2.02, CI = 1.23-3.35).

4.3.8 Providing support to family

It was found that those who were not providing support to their families (60%) were more than twice as depressed as those who were providing support (36.3%) and the difference was significant (P = 0.002,OR= 2.58,CI = 1.4-4.7). (Table 11)

Table 11: Univariate association between depression status and **social characteristics**

Social characteristics	Prevalence of depression		OR	95% confidence interval (CI)		P value
variable	No	(%)		LOWER	UPPER	
Income			2.46	2.13	2.85	0.017
yes	108	40.6				
no	4	100				
Source of Income						
Current work	4	15.4	4.368	1.461	13.054	0.004
spouse	16	35.6	1.349	0.694	2.623	0.377
child	43	61.4	3.02	1.72	5.32	0.000
relative	4	50	1.43	0.36	5.5	0.62
pension	24	35.3	1.415	0.8	2.5	0.231
Social affairs	28	60.9	2.59	1.35	5	0.003
others	4	16.7	3.913	1.299	11.787	0.01
Social participation			2.235	1.152	4.334	0.016
present	87	38.3				
absent	25	58.1				
Type of Social participation						
Attending religious places	37	31.9	2.027	1.227	3.350	0.006
Attending clubs	1	14.3	4.582	0.52	36.91	0.139
Attending traditional cafe	6	42.9	1.06	o.36	3.14	0.915
Attending social gathering	51	42.9	1.1	0.68	1.8	0.684
others	8	32	1.567	0.652	3.77	0.321
Support to family			2.582	1.408	4.736	0.002
present	79	36.7				
absent	33	60				
Type of support						
Help in house work	51	44.3	1.23	0.75	2	0.41
Look after children	8	33.3	1.465	0.604	3.551	0.396
Buying house needs	35	37.2	1.311	0.785	2.191	0.301
Direct financial help	9	21.4	3.02	1.382	6.603	0.004
others	4	23.5	2.42	0.768	7.63	0.121

4.3.9 Bereavement

There was no significant difference in depressive symptoms between those who reported having a close relative death in the previous six months and those who did not (P = 0.2). (Table 12)

4.3.10 History of mental problem

Previous history of mental problem was found to be significantly associated with the presence of current depressive symptoms and clients who reported such a history were more than twice as depressed as those who did not (P = 0.017, OR= 2.3, CI = 1.15 - 4.76). Depression was found in 59.5% of those who reported a history of mental illness and in only 38.6% of those who did not. (Table 12)

Table 12: Univariate association between depression status, bereavement and past psychiatric history

Variable	Prevalence of depression		OR	95% confidence interval (CI)		P value
	No	(%)		LOWER	UPPER	
Bereavement						
present	45	47.4	1.39	0.84	2.3	0.202
absent	66	39.3				
Past psychiatric history						
Present	22	21	2.3	1.15	4.76	0.017
absent	83	38.6				

4.3.11 Medical diseases

The presence of chronic disease was strongly associated with depressive symptoms and this association was statistically significant .Those who had chronic diseases were more than three times as likely to be depressed as those who did not (P = 0.014, OR = 3.6, CI = 1.2-11.1).From those who reported having chronic diseases, 43.7% were found to be depressed and only 17.4% from those who didn't have any disease were depressed. (Table 13)

However, no significant association was found between diabetes and the presence of depressive symptoms (P = 0.084).Among diabetics 46.7% were depressed and among non-diabetics, 36.3% were depressed.
Among those with hypertension, 48.9% were found to be depressed while only 33.8% from those who didn't have hypertension were depressed and the difference was significant. The results showed that hypertensive elderly were almost twice as depressed as those without a history of hypertension (P = 0.012, OR = 1.87, CI = 1.15-3). (Table 13)

From those who reported a history of heart disease, 59% were having depression and 38.5% from those who did not report a history of heart disease was depressed and the association between the presence of heart disease and the reporting of depressive symptoms was found to be significant. Those with heart disease were more than twice as depressed as those without (P = 0.017, OR = 2.25, CI = 1.15-4.59). (Table 13)

Depression was found in 67.6% of those elderly who had chronic eye problems and in only 32.7% of those who did not have and the difference between the two groups was significant. It was found that elderly who reported a history of eye disease were more than four times as depressed as those who did not (P = 0.00, OR= 4.3, CI = 2.4-7.75). (Table 13)

Elderly with chronic teeth problem were more depressed (71.8%) than those without teeth problem (36.4%).They were found to be more than four times prone to be depressed as those who didn't have teeth problem.(P = 0.000,OR = 4.46,CI = 2.1-9.4). (Table 13)

Chronic ear problems if present in the studied subjects were also significantly associated with the reporting of depressive symptoms with an OR of 2.36 (P = 0.048, CI = 0.99-5.68). (Table 13)

Elderly with joint problem was found to be more depressed than those without joint problem (59% VS 34.4%) and the difference was strongly significant. Elderly with joint problem were prone to depression more than twice as those without joint problem (P = 0.00, OR = 2.75, CI = 1.59-4.7). (Table 13)

In this study no significant association was found between depression and stroke (P = 0.07).Also no association was found with the presence of urinary incontinence in the participants. (P = 0.38). (Table 13)

4.3.12 Drug intake

Regular medication intake was not shown to be associated with depression in this study (P = 0.12).It was found that 43.4% from those on medications and 31.3% from those who were not taking any medication were depressed. (Table 13) Furthermore, no association was found between depression and each of the following type of medications used when these medications were analyzed separately: insulin and hypoglycemic drugs (P = 0.056), antihypertensive drugs (P = 0.084), heart medication (P = 0.76), antilipid drugs (P = 0.25) and the non-steroidal anti-inflammatory drugs (P = 0.77).

Table 13: Univariate association between depression status, chronic diseases and medication intake

Variable	Prevalence of depression		OR	95% confidence interval (CI)		P value
	No	(%)		LOWER	UPPER	
Chronic diseases						
Present	108	43.7	3.6	1.2	11.1	0.014
absent	4	17.4				
Types of Chronic diseases						
diabetes	63	46.7	1.54	0.94	2.5	0.084
hypertension	67	48.9	1.87	1.15	3	0.012
Heart disease	23	59	2.25	1.15	4.59	0.017
Joint problems	46	59	2.75	1.59	4.7	0.000
stroke	8	66.7	2.96	0.87	10.1	0.07
Chronic eye disease	46	67.6	4.3	2.4	7.75	0.000
Chronic lung disease	10	62.5	2.48	0.88	7.04	0.079
Chronic teeth problem	28	71.8	4.46	2.1	9.4	0.000
Chronic ear disease	14	60.9	2.36	0.99	5.68	0.048
Urinary incontinence	5	55.6	1.79	0.47	6.85	0.383
Medication intake						
yes	95	43.4	1.69	0.87	3.28	0.122
no	15	31.3				

4.4 Multiple logistic regression models for the independent association between the studied variables and depression

Multiple logistic regression model that included all the studied risk factors and depression status as the dependent variable was set to determine the predictors of depression. In addition, the model was used to estimate the adjusted OR for each of the studied risk factor. The model was estimated using the forward logistic FL method.

From the multiple logistic regression models, the following variables were found as the most important independent risk factors and predictors for depression:

In this study, depressive symptoms were reported less frequently as age increases. (P = 0.049, OR = 0.947, CI = 0.897-1).

Male subjects were found to be significantly less depressed than females. (P = 0.007, OR = 0.335, CI = 0.168-0.754).

Married elderly subjects were found to be significantly less depressed than widowed or divorced subjects (P = 0.042, OR = 0.107, CI = 0.012-0.923).

Participating in social activities by attending religious places was associated significantly with less depressive symptoms (P = 0.007, OR = 0.37, CI = 0.18-0.76).

The presence of joint problem was significantly associated with the occurrence of depression among the studied subjects (P = 0.00.OR = 6.49, CI = 2.43-17.29).

Chronic lung disease was also found to be significantly associated with depression in this study (P = 0.007, OR = 7.72, and CI = 1.74-34.16).

Elderly who reported having chronic eye problems were more depressed than those who didn't and the difference was independently significant. (P = 0.00, OR = 7.14, CI = 2.9-17.54).

The use of non-steroidal anti-inflammatory drugs was found to be also associated with more depressive symptoms. (P = 0.017, OR = 4.3, CI = 1.29-14.34). (Table 14)

Table 14: Multiple logistic regression analysis for risk factors associated with depression

Risk factor	OR	95% CI	P value
age	0.947	0.897-1	0.049
Sex (male)	0.355	0.168-0.754	0.007
Marital status (married)	0.107	0.012-0.923	0.042
Attending religious places	0.370	0.18-0.759	0.007
Chronic lung disease	7.724	1.747-34.156	0.007
Chronic eye disease	7.14	2.907-17.54	0.000
Joint problem	6.489	2.436-17.285	0.000
NSAID intake	4.305	1.292-14.339	0.017

Chapter 5

Discussion and limitations

Discussion

Population projection estimates are showing a shift towards a fast growth of the elderly population in this region in a relatively short time. Despite this, no sufficient resources and efforts are directed in the way of preparing our health system to this growth.Parrallelling this is a deficiency in the research addressing the current situation and estimating the current and the future needs. Few researches were encountered studying the physical health problems among Bahraini elderly. However; the studies addressing the psychological problems among this age group were even much fewer.

Mental health should be valued equally as physical health. Mental health problems should be primarily prevented, screened for and treated, exactly as it is the way for physical diseases. Because these problems if neglected will lead to the same, if not more, suffering and economic burden .This is especially true in late life where the situation is worsened by the compound decrease in available personal and economical resources.

The present study was an attempt to estimate the magnitude of depression among Bahraini elderly and to explore its associated risk factors. As a first step, the study addressed those elderly attending the local health centers. The local health centers are fairly distributed allover Bahrain. They provide good quality and free medical services to all Bahraini citizens. Most of the physicians are well-trained family physicians. The elderly usually first report their symptoms to their family physician in view of the good relationship that develops between them over many visits. Also, early

reporting is facilitated by the easy accessibility of the health centers in time and place as all of the health centers extended their services to include the evening time as well.

Before conducting the study, the elderly attendance rate to one of the health centers was calculated over a period of two weeks. It was estimated to be 5% of the total attendance rate .This figure fairly reflects the true proportion of the elderly to the total Bahraini population.

Therefore, the study may reflect in part some aspects of the current situation regarding the prevalence of depression among Bahraini elderly.

The study revealed many important results some of them were agreeing with the results of other studies in this field and some results were not.

5.1 Prevalence of depression

This study reported the prevalence of depression among Bahraini elderly attending the local health centers to be 41.5%.

It is difficult to comment on this figure as most of the local and regional studies encountered were carried out in the community settings or using different scales.

However, a Bahraini study found a high prevalence of psychiatric morbidity among primary health care attendees older than 16 years old. The reported prevalence was 45% .The study found that the risk of psychiatric morbidity increases among women 50-59 years old, among unemployed, divorced or widowed subjects, and among those with low level of education. The study commented that women visited the health centers more frequently than men did (Al-Haddad et al, 1999).

There was only one study encountered on the prevalence of depression among Bahraini elderly attending the local health centers.However,this study was conducted in only one local health center and it was conducted in 1996.It reported the prevalence to be 23%.The mean GDS-15 score was 1.4 for males and 3.4 for females (Al Hadad,2000). There was a considerable difference in the mean GDS-15 score reported by the current study being 3.67 ± 3.07 for men and 5.86 ± 3.62 for women.

The reported figures from Saudi Arabia for the prevalence of depression among community dwelling elderly ranged from 17.5% in the Abha study to as high as 39% in a large community-based study involving all regions of the country (Abolfotouh et al,2001) (AL-Shammari et al,1999). In Kuwait

the reported prevalence was 25% (Al-Baho, 2003).A comprehensive community-based study in Jordan reported a similar prevalence rate to that reported for Kuwait (24.3%) (Youssef, 2005).

The figures reported from other studies worldwide varied considerably. This variation may be explained by the variety of the scales and diagnostic criteria used to diagnose depression or by the settings in which the studies were carried out. When the DSM criteria was used, the prevalence rate of depression was found by a meta-analysis review to be 5%.However, the prevalence of depressive symptoms when estimated by the available various scales was reported to reach 15% in the community settings and the rates in the primary care settings were reported to be even higher (Gallo and Lebowitz, 1999).

Some studies reported the prevalence in primary care setting to be 17-35% while others reported the prevalence to be 25% (Macdonald, 1997).

A large community-based survey was done to assess the prevalence of depression across five European countries (the European Outcome of Depression International Network (ODIN) study).It reported a high overall prevalence of depression of 8.56%.The reported prevalence for females were higher than for males (10 % vs. 6.6%) (Ayuso-mateos, Vázquez-barquero, Dowrick,Ville Lehtinen, Dalgard,Casey, Wilkinson, Lasa, Page, Dunn, and Wilkinson,2001).

Other researchers reported the prevalence of depression among the elderly in the community from the Liverpool MRC-ALPHA Study to be 10% (Saunders, Copeland, Dewey, Gilmore,Larkin, Phaterpekar and Scott ,1993).

Marwijk et al (1994) conducted a study in the Netherlands to assess the prevalence of depression among elderly patients attending the primary health care centers. They used several scales and diagnostic interview. They reported a rate of 11-29% when the depression scales were used as instruments .However; they reported a prevalence of 17% by the diagnostic interview.

Another study done in the Netherlands reported a close figure to the prevalence reported by the previous study there being 14.9% with no association with sex or age (Beekman et al, 1995).

A similar study was done among community dwelling Finns elderly. However, they used the DSM-III criteria to measure the prevalence of depression among their subjects. The overall reported prevalence was 16.5%, with 14.4% for men and 17.9% for women. The study didn't find any association with sex (Pahkala, Kesti,Köngäs-Saviaro,Laippala and Kivelä,1995).

Djernes (2006) made a review of all studies conducted since 1993 to assess the prevalence of depression among elderly Caucasians. The review revealed a high prevalence rate.The reported prevalence of major depression was 0.9% to 9.4% in the community and 14% to 42% in institutions.

Another meta-analysis review of community- based studies reported the average prevalence of depression to be 13.5 % (Beekman et al, 1999).

The comparatively higher prevalence rate reported by this study may reflect partly the true figure for Bahrain. However, many factors related mainly to the study methodology should be considered as potential sources for bias in interpreting this figure. This bias may be explained by the over representation of females in this study as 54% of the study population were women. It is known that the prevalence of depression among women is higher than among men. Women usually attend the local health centers more frequently than men. However, it should be considered that population estimates for Bahrain in 2006 showed that males constituted 48.8% of the total elderly while females constituted 51.2%.So,the sex ratio of the study sample closely resembles the sex ratio of the overall elderly population in Bahrain (Central informatics Center,Bahrain).

It may also be explained by the fact that depressed elderly in general have higher utilization of health care services and consequently more depressed elderly had been included in the study population as it was health center-based study.

The difference in depression prevalence also may be attributed to the wide differences in the social and cultural factors between these countries and Bahrain.

Despite the above-mentioned sources for bias in this study regarding the estimation of the prevalence of depression among Bahraini elderly, the reported figure should be interpreted carefully as it may reflect the real prevalence in the community. In fact the prevalence among those who are bed-ridden and unable to come to the health centers is expected to be even higher.

There have been substantial social and economical changes in the Bahraini community making this vulnerable group more prone to develop depression. This and other previous studies revealed a high prevalence of chronic diseases among our elderly such as diabetes, hypertension and osteoarthritis. These diseases are known to have considerable impact on the elderly physical and psychological well-being and affect considerably his overall abilities. The shift in the structure of families towards the nuclear rather than the extended type deprived the elderly from the usual integrated and supporting social network. The wide enrollment of females in work force also left the elderly with out this valuable and caring resource. The financial problems facing many Bahraini families had even more impact on this dependent group. The revolution in the information technology produced a new language leading to a wide gap between the new and old generations, isolating the elderly and making the communication between generations more difficult.

5.2 Risk factors for depression

Cole et al (2003) made a review of several studies from 1967 until 2001 in order to assess the risk factors of depression among community residing elderly. They derived five main risk factors, which were associated significantly with depression. These risk factors were: being a female, history of bereavement and depression, having sleep problem and disability. They identified three factors (having sleep problem, disability and a history of bereavement) which can be modified. They recommended that depressed elderly with these factors should be screened for depression and offered supportive measures. The calculated attributable risks were 69.4% for bereavement, 57.0% for sleep disturbance, and 56.5% for disability.

Sneed, Kasen, and Cohen (2006) in their recently published study followed up a group of women in different age groups to assess the difference in risk factors for depression in these age groups. They concluded that physical health problems rather than psychosocial problems were important predictors for late-life depression.

5.2.1 Sociodemographic correlation with depression

Gender difference

The study showed that the relative risk for depression was more than four times as high among females as among males (OR = 4.3 and 95% CI = 2.54-7.32).This relationship remained highly significant even after controlling for other risk factors in the multiple logistic regression model. In the model it was found that the prevalence of depression among males was significantly lower than among females. (P =0.007, OR = 0.335, CI = 0.168-0.754).

The severity of depression was also found to be more in women. The mean depression score for men was 3.67 ± 3.07 while for women it was 5.86 ± 3.62.

Many encountered studies demonstrated this significant difference in the prevalence of depression among men and women. Several researches were devoted to examine this gender difference .Many factors seem to interact and to potentiate the effect of each other in producing this difference. The interaction between the biological, environmental and cultural factors is certainly an important determinant for this observed difference.

The previous Bahraini study found that elderly women were more than twice at risk to have depression as men (Al Haddad, 2000). The other studies from Saudi Arabia and Jordan came out with similar results (Abolfotouh et al, 2001) (AL-Shammari et al, 1999) (Youssef, 2005).

Cole et al (2003) in their review of the risk factors for depression among community elderly confirmed this finding and reported female gender to be one of the five identified risk factors for geriatric depression.

Another comprehensive review of prospective and prevalence studies showed that women were at higher risk of depression than men (Gallo and Lebowitz, 1999).

An Italian community-based study reported the prevalence to be 58% in women and 34% in men .Women were found to be more at risk of depression than men with an Odds ratio of 1.63 after adjusting for confounders such as physical and cognitive problems. The study attributed this difference to causes related to culture or to gender differences in life style (Dunlop et al, 2003).
Another study attributed this gender difference to that men usually forget their symptoms. Also, women visit their physician earlier and more frequent (Dobler-Mikola, 1984).

Piccinelli and Wilkinson (2000) made a thorough review of several studies examining the possible causative factors for the gender difference in the prevalence of depression. The researchers divided these factors into

"artefactual" and "genuine" factors. The following "artefactual" factors were postulated by different studies but no definite conclusions were drawn up:

1-They postulated a "threshold" for depressive symptoms which is lower among females. Therefore, females report symptoms earlier and more frequent.

2-Females may have different presenting symptoms as they often have changes in appetite and sleep and more often report somatic symptoms. This fact may affect their response to different scale used to screen for depression.

3-Some studies reported that males usually don't recall their symptoms but this review didn't demonstrate this. Females still have more depressive symptoms even if interviewed shortly after they developed them, which may cancel the recall bias.

4- Some studies attributed the high prevalence to the fact that females usually have chronic form of depression and more frequent relapses than males whiles others attributed it to the fact that women have a higher rate of earlier onset depression.

5-The review reported contradictory results regarding the frequency and the timing of reporting of depressive symptoms between both sexes. Some reported that females usually express their symptoms earlier and more frequent while other studies didn't report this difference.

6-The review also introduced the concept of "depression spectrum" which suggested that women usually manifest their stress as depression while men manifest it in the form of alcoholism and drug abuse.

The authors then explained thoroughly the investigated "genuine" risk factors, which may explain partly the gender difference:

1-Females usually have more traumatic events in their childhood.
2-Also, females are more prone to have early onset depression, which is usually chronic and associated with anxiety.
3-The pivot role played by women worldwide in caring for their family and children exerts additional stress on them.
4-Studies also explained the gender difference in the prevalence of depression by the fact that women usually have less coping to stressful life events than men.
The review also examined the possibility of hormonal factors, which may explain this difference. It concluded that the etiological factors responsible for the gender difference in case of depression still are not fully understood and the biological and genetic factors alone certainly don't explain this difference.

A Spanish community study also examined the difference in the prevalence of depression between elderly males and females. Zunzunegui et al (1998) found a higher prevalence of depression among their female participants than among males (46% vs. 19.6%) with an odds ratio of 3.4.However, no significant difference was found in the distribution of the studied risk factors between both sexes. So, the study concluded that this high prevalence among females may be due to their stressful role in the community.

The Amsterdam Study of the Elderly (AMSTEL) is a large prospective community study involving multiple sub-studies that address elderly health and social aspects. As part of this study, the researchers investigated the association between depression and gender with mortality. They followed up a sample of elderly for six years. They reported the prevalence of depression to be 12.9% and it was 2.4 times more prevalent among women than men. The study also reported a high mortality rate associated with depression especially among men and among those with severe depression. However, the study found that mortality was significantly higher among men than among women with milder form of depression (Schoevers, Beekman,Van Tilburg, Deeg,Jonker,Geerlings,and Penninx,2000).

The reported high prevalence of depression among females in this study can now be explained in view of all the above-mentioned postulations.

There was a relatively higher presentation of females in this study (54% VS 46%) and this may explain their higher attendance rate to health services.

Alsayaad et al (2006) reported a generally high attendance rate of elderly to the health centers in Bahrain being 15.6 times/year and did not comment on gender difference in attendance rate.

The life expectancy for Bahraini females is higher than that for males (75.3 vs.70.4 years). (Bahrain health statistics 2004).

The demanding social role of woman in this community exerts a considerable pressure on her physical and mental health. Women tend to have more somatisation and frequent complains about their symptoms than men. On the other hand, the cultural context constrains the man from expressing his feelings and suffering and prevents him from reporting his symptoms.

Age

The association between depression and age was analyzed in two stages.First,the association between the prevalence of depression and the different age groups was tested .Then the mean depression score for the different age groups was compared. There was no association between depression and age using the two analytical methods and so, depression was not found to increase with increasing age. However, by using the multiple logistic regression model, depressive symptoms were found to be reported less frequently with increasing age (P = 0.049, OR = 0.947, CI = 0.897-1).

This was in accordance with other studies including the previous Bahraini study (Al Haddad, 2000).However; many studies stressed the importance of old age as a risk factor for depression including the regional studies carried out in Saudi Arabia and Jordan (Abolfotouh et al, 2001) (AL-Shammari et al, 1999) (Youssef, 2005).

This variation is again due to the method used to diagnose depression. By using the DSM criteria, the prevalence and incidence studies revealed that the prevalence was found to decrease with age. The Baltimore Epidemiologic Catchment Area (ECA) study also supported this fact but pointed out to the fact that while the rate of major depression declined with ageing, the other depressive syndromes increased. It also found that depression peaks in the fourth and sixth decade. However, when depression was diagnosed using depression scales, multiple studies found that depressive symptoms increased with age, among them were the Finnish

studies (Gallo and Lebowitz, 1999) (Pahkala et al, 1995). Furthermore, many other studies found that the prevalence rate of depression is noticed to increase over the years (Gallo and Lebowitz, 1999). The absence of association between age and the prevalence of depressive symptoms in this study could have been affected by several factors. The study was not community-based so older people who could not attend the health center will not be included. The reported age in this study was taken from the identification card and it may not be the actual age but rather the estimated age. The mean age for the study sample was in the "young old" range and was similar for male and females being 68.65.Since depression carries a high mortality rate, many depressed elderly may have died and this was postulated by several researchers. The other important reason could be due to decrease frequency of reporting of depressive symptoms by the older people themselves.

Level of education

Being illiterate or having low educational achievement was shown to have strong association with depression.

A meta-analysis review revealed that elderly people who achieved education less than high school were at a greater risk of depression (Gallo and Lebowitz, 1999).

Also Pahkala et al (1995) in their study among Finns elderly found a strong association between low level of education and depression. However; they found this association to be true only for men and no association was found for women.

In this study, more than half of the subjects (53%) were illiterate and another 19.6% can only read or write. However, the educational achievement was significantly more for men than for women (P = 0.00). This difference could be explained by the fact that education in Bahrain started late for girls and many families were not allowing their girls to go to school due to old cultural misbelieve. In addition, those who were illiterate or could only read or write had significantly more depressive symptoms than those who attained higher levels of education (P = 0.041) .This may be because that those with higher level of education usually have better financial income, broader scope of thinking and better understanding of their selves and of their surroundings.

The Abha study emphasized the association between depression and illiteracy and found that the lack of education was responsible for 80.5% of the variance in the depression score. The other Saudi study found also that poor education was related strongly to depression in their subjects (P = 0.001). (Abolfotouh et al, 2001) (AL-Shammari et al, 1999).

Marital status

Having a stable and intimate marital relationship is certainly one of the pillars for mental health well-being. Later in life, this fact is magnified. With years the marital relationship is strengthened. The older person usually has less contacts and narrow social network. In addition, his physical abilities weaken and his needs increase. All of these factors reinforce the marital relationship and make it the basic source for security and support in these difficult years. Losing this support by death or divorce devoid the

elderly from this ultimate resource and makes him more vulnerable to the adverse effects of any stressful life event.

Based on a thorough review of the literature, several prospective studies showed that widowhood increased the risk of depression (Gallo and Lebowitz, 1999).

A Finnish study supported this finding and found that depression was associated with widowhood (Pahkala et al, 1995).

A prospective study showed that depressive symptoms usually increase in severity among widows in the first year after the death of their spouse and returned to the baseline level after this period. Those widows who are between 65-74 years continued to have symptoms longer after the one-year period and were at risk of developing chronic symptoms. This increase in depressive symptoms was present even after adjusting for socioeconomic and health conditions (Mendes de Leon et al, 1994).

Markides and Farrell (1985) studied the effect of marital status on depressive symptoms among three generations of Mexican Americans. The study reported a higher rate of depression among female participants and widowed or divorced subjects than among men and married subjects. On the other hand, the study didn't reveal any significant effect of the marital status on the rate of depression among older subjects. They explained this finding by the "place" of the elderly in their culture and by the higher rate of divorce among the young participants.

In this study, more than half of the women (52%) were widowed and the majority of men (87.8%) were currently married and the difference in the

marital status between the two sexes was significant (P = 0.00). This could be explained by the fact that Bahraini men usually marry after the death of their wives while the women usually do not because of cultural constraint. This fact in turn may explain the higher prevalence of depression among females as more than half of them were widowed. The increase in widowed cases among the females could be due to the fact that males have lower life expectancy at birth than females.However,this may not apply well to Bahrain as the difference in life expectancy between males and females is not large (72.1 vs.76.3 years) (Bahrain Health statistics 2004). Moreover, the mean age for both sexes in this study was almost similar (68.65 ± 6.3 years for men and 68.36 ± 7 years for women).

The study also showed a strong association between depression and the marital status (P = 0.00).The results of the multiple logistic regression model confirmed this independent association and found that married elderly subjects were found to be significantly less depressed than widowed or divorced subjects (P = 0.042,OR = 0.107,CI = 0.012-0.923).

This was in accordance with the results of the above-mentioned international and regional studies.

Abolfotouh et al (2001) in the Abha study reported that unmarried elderly in their study were 2.8 times more prone to depression than the married elderly.Al-Shammari et al (1999) in the other Saudi study supported these findings and found a strong association between depression and being widowed or divorced.

Living arrangement

There has been a substantial change in the structure of the Bahraini family. The married siblings usually leave their parents and go to live in the newly built cities that are far away from the parents. However, despite these changes many siblings continue to have their old parents and grandparents to live with them. The results of this study clearly demonstrated this. Most of the study subjects (83%) were living with their spouse, children, and grandchildren. Only 7.5% of them were living alone. No significant association was found between the elderly living arrangements and the reporting of depressive symptoms (P = 0.418).

However, other studies stressed the importance of loneliness as an important risk factor for depression. Abolfotouh et al (2001) found out that elderly people living alone were prone to develop depression twice as those living with their siblings. Al-Shammari et al (1999) found that elderly subjects living in rural areas with poor housing conditions were at significant risk of developing depression. Moreover, the study raised a very important issue evolving in the Gulf countries. Many families leave their dependent elderly in a separate room being assisted by a foreign housemaid. The housemaid usually comes from a remote culture and has different language .This will lead to difficulty in communication and to social isolation of the elderly. The study revealed that elderly subjects living in a separate room were significantly at risk of developing depression than those living with others in a common room.

A group of researchers followed a group of elderly over one year to study the association between the quality of accommodation and the development

of depression. After one year they found that those with poor accommodation were more than three times at risk of depression than those with better accommodation (OR = 3.3). (Stewart, Prince, Harwood, Whitley, and Mann, 2002).

A follow-up study in Bangladesh conducted on a group of elderly people over a period of 8 years to examine the effect of house hold structure and co-residents on the elderly mortality. The study found that being the head of the household reduced the elderly mortality. It also found that the presence of a spouse significantly reduced the mortality of elderly men. Moreover, the study found that the presence of sons with the elderly also significantly reduced the mortality but specifically so for women (Rahman, 1999).

Social participation

Most of the elderly in this study were socially active. This in part might be because most of the subjects were mobile and did not have severe disabilities. It may be also due to the relatively younger age of the subjects. Involvement in social activities was not found to differ significantly between men and women or between different age groups. Many subjects were attending religious places (43%) and social gathering (44%). Few of them were attending traditional café (5.2%) or clubs (2.6%). This could be due to the movement of many elderly from their old homes, where they used to attend the traditional café there, to live with their children in the new towns. It could also reflect the absence of places such as clubs or associations specific for the elderly to encourage their participation in creational activities.

A strong association was found between being involved in social activities and having depression (P = 0.016).Socially isolated elderly were more than twice prone to be depressed as socially active subjects (OR = 2.23, CI = 1.15-4.3).Again the cause and effect relationship between depression and social engagement can not be concluded because the study is cross-sectional.

Interestingly, the study found that participating in social activities by attending religious places was associated significantly with less depressive symptoms and the association remained significant even after adjusting for other variables in the multiple logistic regression model (P = 0.007, adjusted OR = 0.37,CI = 0.18-0.76).

An interesting recently published study examined the effect of participation in religious activities on the development of depression. Those elderly who attended religious places regularly were shown to have less suicidal tendency and emotional problems. They were also having less depressive scores. No difference was observed between participation in religious activities and the frequency of service utilization (Chen, Cheal, McDonel Herr, Zubritsky, and Levkoff, 2007).

Other researchers in Taiwan studied also the relationship between depression and participation in religious activities. They found the prevalence of depression among their elderly to be 24.8% and it was associated with female sex,single status,physical diseases and low income.The study found that those elderly who did not attend religious places were more than twice at risk of developing depression than those

who attended (OR 2.7) .(Hahn, Mei-Yang, Ming-Jen Yang , Shih ,and Lo ,2004).

Another study examined the impact of social engagement on depressive symptoms. It found that engagement in social activities were associated with less depressive syndromes even after controlling for other risk factors (Glass ,Mendes De Leon, Bassuk, and Berkman ,2006).

Several other studies investigated the effect of social engagement on cognitive function which is known to be impaired by depression.

A study assessed the effect of participating in social activities on cognitive functions in a longitudinal community-based study. The study found that participating in social activities conferred a protective effect against cognitive decline. The study further identified that social participation in the community conferred even more protection than engagement in familial social activities. The researchers attributed this protection to the continuous mental stimulation of the elderly by such a social involvement and by the protective effect of this involvement against depression (Glei, Landau, Goldman, Chuang, Rodríguez and Weinstein, 2005).

Kono, Kai, Sakato and Rubenstein (2004) went further to examine longitudinally the relationship between the frequency of going outdoors by the elderly throughout the week and the risk of developing depression, and impairment of functional and intellectual abilities. The study found at baseline that elderly who were going outdoors more frequently were less depressed and had better functional abilities. On further follow up, there

was a significant decline in functional and intellectual activities among those who were going out doors less frequently.

Bassuk, Glass, and Berkman (1999) assessed comprehensively the social engagement of a cohort of community-residing elderly over many years to examine its effect on cognitive functions. They found that elderly who had less engagement socially were more at risk of developing cognitive decline and this risk increased over time. The risk of cognitive decline persisted even after controlling for other important risk factors such as depression.

Unfortunately, the present study did not address the availability of social support for the elderly in difficult situations such as during an acute illness. The presence of caring and loving social contacts certainly secures the individual needs especially in difficult situations and in the dependency states as it is the case in old age.
A Japanese study demonstrated that the absence of social support for the elderly significantly increased the risk of depression (koizumi, Awata, Kuriyama, Ohmori,Hozawa, Seki,Matsuoka, and Tsuji ,2005).

Source of income

Among the studied subjects, only four were not having a source of income and all of them were found to be depressed. However, the majority of the subjects were dependent on others financially .Only 9.6% of the study subjects were currently working despite the fact that the mean age of the subjects was only 68.65 years and most of them were mobile. This indicates

that the full potential capabilities of these elderly have not been utilized rendering them financially dependent on others.

Furthermore, the financial situations for female subjects were even worse. Only 6.8% of them were currently working and 12.3% were depending on their social pension as their financial resource. The rest of the female subjects were totally dependent economically on others. They received financial help from their husbands (23.3%), from their children (38.4%) or from the Ministry of social affairs (40%).

Almost a quarter of the subjects received their financial support from their children reflecting the strong social network that is still present in some families.

The Ministry Of Work and Social affairs provided financial support to only 17% of the subjects. This implies the need to a governmental scheme to ensure financial security at old age.

The economic insecurity casts its shadow on the physical and certainly on the mental wellbeing of these subjects.

Unfortunately, the study inquired only about the source of income. It did not inquire about the amount of this income or if the elderly received it on a regular basis. Moreover, the study did not examine if the subjects were satisfied with the amount of income they received. Certainly if these factors were addressed in the study, the association with depression would be more apparent.

Mendes De Leon et al (1994) explored in their longitudinal study the effect of financial strain on the development of depression among community-living elderly people. The study found a strong association between having financial strain and depression after controlling for other associated factors.

On further follow up over three years, financial strain was found to increase the depressive score but mainly among men.

A group of researchers studied the effect of socioeconomic factors on the prevalence of depression among primary care attendees in different general practices (The Hampshire Depression Project).However; the study included all age groups. The prevalence rate reported was ranging from 2.4% to 13.7%.The study revealed that poor socioeconomic conditions and unemployment especially, among men, were associated significantly with the diagnosis of depression among their sample. These factors were also predictors for disease chronicity.The researchers recommended the adoption of public strategies to decrease the rate of unemployment and to improve the environmental situations in order to decrease the prevalence of depression.(Ostler, Thompson,Kinmonth,Peveler, Stevens .L. and Stevens .A., 2001).

Providing support to family

Despite their age, the majority of the subjects (79.6%) were still providing valuable services and economical supports to their families. There was no difference in providing such support between men and women .Naturally, providing support to the family was shown to decrease by increasing age (P = 0.029).Also, the study found that elderly subjects who were not providing any kind of support to their family were more than twice as likely to be depressed as those who were providing (P = 0.002,OR = 2.58,CI = 1.4-4.7).The cause and effect relationship between depression and providing support to the family can not be ascertained as this study was cross-sectional.

A study showed that the extent of participation of the elderly in different activities affected their cognitive and intellectual functioning (Christensen, korten, Jorm, Henderson, Scott, and Mackinnon, 1996).

5.2.2 Bereavement

Losing a spouse, a child or any close relative or a friend is certainly a painful experience. This is especially true for elderly people because of the strong relationship developed over the year with these persons and because of the already fewer social contacts available around the aged person.

Several studies stressed the importance of losing a close person on the development of depression. A review found that a loss of close social contacts was among the significant predictors for subsequent depression beside being a female and having physical diseases. (Gallo and, Rabins, 1999)

Bereavement was not only found to increase the risk of depression but also to interfere with recovery.A follow-up study of depressed elderly over three years revealed that depressed elderly who experienced bereavement had poor prognosis. (Denihan et al, 2000).

In their systematic review, Cole and Dendukuri (2003) identified bereavement as one of the five significant risk factors for late age depression. The calculated attributable risk for this factor alone was 69.4% .They classified bereavement as a "modifiable" risk factor Elderly with such a history should be subjected to screening for depression and offered psychological counseling. Adjustment of this factor will certainly decrease the risk of depression owing to its large attribution to the risk of developing depression.

McHorney and Mor (2006) studied the modulating factors for the association between bereavement and the subsequent development of depression in a large prospective study. They found that having physical or mental diseases were predictors for depression after bereavement. Others reported consanguinity and patient age to be other important risk factors. The study also revealed that the utilization of health care services also increased after bereavement and attributed this to the possibility of increasing somatisation after bereavement. The study recommended the

introduction of supportive measures to this group to decrease the health care costs.

In this study, no significant association was found between the recent death of a close relative and developing depressive symptoms (P = 0.2).This finding may be due to the strong relationship that is still present between the elderly and their families which compensate for the loss of the loved person. Also, it may be due to the strong religious beliefs in faith held by these elderly.

5.2.3 Previous psychiatric morbidity

The association between current depression state and a history of psychiatric problems, especially depression, was examined in many studies and literature reviews but the results were not conclusive.

Piccinelli and Wilkinson (2000) in their thorough meta-analytic review discussed this relation. They revealed that a history of depression especially in childhood and adolescence is a risk factor for future depression.Moreover; it causes more relapses and increases the chronicity of the disease. They also found that anxiety usually precedes early onset depression more frequently than late onset form.

Van Ojen , Hooijer, Jonker , Lindeboom , and van Tilburg (1995) examined the association between the current status of depression and any history of psychiatric illness in the past. The study was conducted in the community settings. The majority of depressed subjects (78%) didn't report any history of psychiatric illness. However, it was found that depressed elderly who were younger than 65 years old reported more often a past history of psychiatric illness and among these subjects the risk of depression was

found to double. The study also revealed an inverse relationship between having a history of psychiatric illness and the elderly age. The study explained this finding by the fact that depression usually lead to a high mortality rate. It concluded that a past history of psychiatric illness is a predictor for depression in late life and this relationship was stronger before the age of 65.

On the contrary, Cole and Dendukuri (2003) in their review identified "prior depression" as one important and significant risk factor for geriatric depression.

In the present study, only 14.7% of the study subjects had a history of psychiatric problem. However, more women than men reported such a history and the difference in reporting between both sexes was significant (P = 0.009).Furthermore, reporting a history of psychiatric problem was found to be significantly associated with the presence of current depressive symptoms. (P = 0.017)

5.2.4 Medical morbidity

Several studies demonstrated the substantial impact of the multiple chronic physical diseases, which accompany aging, on their psychological wellbeing. Their psychological symptoms, in turn, worsen the course of these diseases and limit their control. Thereafter, the additive effects of both these physical and psychological problems considerably compromise the abilities of the elderly people, affect their quality of life, and eventually accelerate their death.

A group of scientists tackled this association from different angles. They conducted a very important study examining the effect of depression, sociodemographic factors and physical diseases on quality of life, physical functioning, mental functioning, and disability. They found that the severity of depression was associated with poor quality of life, impaired mental and physical abilities, and increase level of disability. This association holds true even after adjusting for the sociodemographic factors and physical diseases. Furthermore, the study found that depression contributed more than physical diseases to the previously mentioned four health domains. They recommended giving similar weight in identification and treatment of both physical diseases and depression, as treating depression will certainly enhance the quality of the elderly life even if the other medical diseases were still present (Noël, Williams, Unützer, Worchel, Lee, Cornell, Katon, L Harpole, and Hunkeler,2004).

Black, Goodwin and Markides (1998) studied the association between the presence of physical diseases among older Mexican Americans and the development of depression. They found the following diseases to be strongly associated with and predicted depression: diabetes with OR of 1.25, arthritis with OR of 1.42, urinary incontinence with OR of 1.94. The highest risk for depression was reported for those elderly with the following conditions: bowel incontinence with OR of 2.28, kidney disease with OR of 3.11, and ulcers with OR of 2.56.

Cole et al (1999) made a comprehensive systematic review of community and primary care studies. The review demonstrated that geriatric depression is a chronic disease with bad outcome. Moreover, physical diseases, if present, usually predict poor prognosis.

In a prospective study , patients were followed up ,over one year, after they had developed physical illnesses to examine the effect of having physical illness on the prevalence of depression .At the end of the study , more than third of them (38.3%) developed depression. The development of depression in these patients was predicted by the presence of several factors at baseline among them were older age, smoking and poor health (de Jonge, Kempen, Sanderman, Ranchor, Jaarsveld, van Sonderen, Scaf-Klomp, Weening, Slaets, and Ormel, 2006).

Joshi, Kumar and Avasthi (2003) assessed the morbidity profile of elderly people in North India and the associated disability and mental problems. They found a mean number of morbidities of 6.1 among their participants. The commonest morbidities reported by the study were: hypertension, osteoarthritis, lung disease, cataract, and anaemia.Disabilty and mental symptoms were directly proportional to the number of diseases. These diseases were found to be associated with disability and mental symptoms: hypertension, osteoarthritis, anemia and eye problems.

Blay, Andreoli, Dewey, and Gastal (2007) reported a high prevalence of painful conditions of 76% among the elderly in their study. They found that the presence of painful conditions significantly predisposed the elderly to psychiatric problems.

Many studies reported a high prevalence of chronic diseases among the elderly.Sidik et al (2003) reported the prevalence among their subjects to be 57.4%.Al Baho (2003) reported that 59% of studied elderly in Kuwait were having two or more medical diseases.Youssef (2005) reported a higher

prevalence of chronic diseases among the Jordanian elderly of 74.4%. Women were having more diseases than men.

The present study also revealed a high prevalence of chronic diseases among the subjects (91.5%).There was no significant difference in the prevalence of chronic diseases between men and women or between different age groups. Part of this very high prevalence of chronic diseases may be attributed to the fact that the study was conducted in the health centers where most of these elderly are visiting for follow up of their diseases or to refill their medication.

The prevalence of diabetes mellitus and hypertension was found to be significantly higher among women than among men (P = 0.003 and P = 0.001 respectively).

Despite the fact that this study was health center-based, several studies pointed to the increasing prevalence of non-communicable diseases NCD among the Bahraini population going in line with the epidemiological shift in the nature of prevalent diseases in all of the developing countries. Moreover, the prevalence of these diseases is expected to be even higher in the older population.

In concordance with the previous studies, this study showed that reporting a history of chronic disease was strongly associated with depressive symptoms (P = 0.014, OR = 3.6, and CI = 1.2-11.1).The high prevalence of chronic diseases among the study subject and this strong association between depression and chronic diseases may explain the high prevalence rate of depression reported by this study.

Heart disease

Among the study subjects, 14.4% reported a history of heart disease. There was a strong association between having heart disease and reporting depressive symptoms (P = 0.017).Those who had heart disease were more than twice at risk of developing depression than those who had not (OR = 2.25, CI = 1.15-4.59).

Al Sayyad et al (2005) reported a similar prevalence (15.4%) of CVS diseases among Bahraini elderly.Youssef (2005) also reported a close prevalence rate of 15.7% among the Jordanian elderly.

The association between depression and heart disease was the subject of many researches.

Many researchers investigated the relation between having depression and the subsequent development of heart disease. The results of several studies confirmed this relation even after controlling for other cardiovascular risk factors. However; the exact linking mechanism is still not fully understood. Researchers examined this relation as part of the Longitudinal Aging Study Amsterdam (LASA).They followed up a cohort of cardiac and non-cardiac subjects to assess the effect of depression on the mortality rate among them. They found that depression was associated with increase risk of cardiac mortality in both elderly groups with and without cardiac disease .The risk was higher among those elderly with major depression than among those with minor form (Penninx, Beekman, Honig, Deeg, Schoevers, van Eijk, and van Tilburg, 2001).

A community-based prospective study conducted over four years showed that depression was an independent risk factor for coronary heart disease

(CHD) in people older than 45 years (Rowan, Haas, Campbell, Maclean and Karina, 2005).

The cardiovascular health study conducted by Ariyo et al (2001) assessed a cohort of elderly subjects, who were not having a cardiovascular disease, over a period of 6 years .It examined the association between depression and the risk of coronary heart disease and death among these elderly. The study found a 15% increase in the risk of having CHD and a 29% increase in the risk of death among depressed subjects.

Frasure-Smith and Lespérance (2005) in their systematic literature review concluded that data from the reviewed studies confirmed that depression is a risk factor for having CHD and of worsening of the already existing CHD.

Luukinen, Laippala, and Huikuri (2003) followed up a cohort of community dwelling elderly in Finland to study the effect of depression on sudden cardiac death among elderly over eighty years. They found that the presence of depressive symptoms was a significant predictor of sudden cardiac death among their sample with a hazard ratio of 2.74 183.

Hippisley-Cox, Fielding, and Pringle (1998) conducted a community-based case control study to examine the association between depression and the risk of ischaemic heart disease .The study revealed that depression was a risk factor for ischaemic heart disease in men with an adjusted OR of 2.34.However, depression was not found by the study to be a risk factor for ischaemic heart disease in women.

Pulska, Pahkala, Laippala, and Kivelä (1999) reported from the Ähtäri longitudinal epidemiological research project on the association of chronic

depression and the risk of mortality among elderly people. Their results revealed that depression was a predictor for mortality in old age.

On the other hand, Nicholson, Kuper and Hemingway (2006) in their meta-analysis review concluded that the fact that depression is an independent risk factor for CHD is still not confirmed as the results of many studies were biased by other confounding risk factors.

Other investigators approached the relationship between depression and heart disease but in the reverse direction. They studied whether a cardiac event is a precursor for the development of depression.
Frasure-Smith, Lespérance, and Talajic (1995) followed up patients who had myocardial infarction (MI) since they were admitted to hospital. The follow-up period extended to 18 months. The researchers were trying to examine the relationship between MI and the development of subsequent depression and death. They discovered that patients who developed depression soon after MI and while they were in hospital were at a greater risk of dying especially in the first six months after MI but the risk continued even after 18 months of follow up. The risk of depression was not related to intake of ß-blockers. The researchers also found that patients who were depressed and were having premature ventricular contractions (PVCs) and poor cardiac functions were more at risk. They postulated that the effect of depression on mortality may be mediated by arrhythmia.

On the other hand, researchers reported from the study of Long-Term Intervention With Pravastatin in Ischaemic Disease (LIPID) different results. They did not find any association between depressive symptoms

among those who had a stable coronary artery disease and the subsequent development of any cardiac mortality after controlling for other risk factors (Stewart, North, West, Sharples, Simes, Colquhoun, White and Tonking, 2003).

Diabetes

The present study revealed a high prevalence of diabetes mellitus (DM) among the subjects as half of them were suffering from this disease. More women (58.2%) than men (40.3%) were found to have DM and the difference was significant (P = 0.003).However, no significant association was found between having diabetes and the presence of depressive symptoms (P = 0.084).

Al Sayyad et al (2006) reported the prevalence of diabetes among Bahraini elderly attending the local heath centers to be 39.3%.

Another Bahraini study found that the total prevalence of diabetes among Bahraini women in the age group 60-69 years was 37% (Al-Mahroos and McKeigue 1998). These rates are expected to be even higher among older age groups.

Youssef (2005) reported a lower prevalence of 23.3% among the Jordanian elderly.

The relation between diabetes mellitus and depression had been the subject of many researches and meta-analysis. There was a debate whether diabetes causes depression or not .Many studies even went further to investigate the possibility of depression as a risk factor for developing diabetes.

The majority of the encountered studies reached to a consensus that diabetes is one of the leading factors for depression whether directly through the

biological effect of the disease itself or indirectly through the detrimental sequels of the disease.

A large community study reported that adult patients with type 2 diabetes were found to be more depressed than non-diabetics (17.9 vs. 11.2%; $P < 0.001$).Depression was found to be more common among diabetic women especially if they were overweight, and body weight in these women predicted depression more than diabetes itself (Nichols, and Brown, 2003). Anderson, Freedland, Clouse, and Lustman (2001) made a thorough search through literature in their meta-analysis study. The analysis revealed that diabetes of both types doubles the risk of having depression. This risk increased especially in women and in uncontrolled diabetics. The prevalence was found to be 28.2% among females and 18% among males. Moreover, depressed patients were found to have poor control, to have more complications and to be less compliant on treatment.

Stroke

Only 4.4% of the study subjects reported having a history of stroke. The low prevalence of stroke among the study sample could be due to that elderly patients with stroke usually have disabilities and mobility problems preventing them from accessing the health centers.

In this study no significant association was found between depression and having a stroke ($P = 0.07$).

Al Sayyad et al (2005) reported the prevalence of stroke among Bahraini elderly to be 2.5%.Youssef (2005) reported approximately similar prevalence of cerebrovascular disease of 4% among the Jordanian elderly.

Developing depression after having a stroke is a known phenomenon that was well studied and given the term "post stroke depression".
Ghose et al (2005) assessed post stroke cohort over 3 years. Post stroke depression was found in 5% of their subjects. Furthermore, they found that those elderly who developed depression were most often hospitalized and visited their physicians more frequently increasing the total medical cost.

Researchers studied the association between post stroke depression and the type and site of stroke by doing autopsy to dead patients who had stroke. Surprisingly, no specific brain pathological lesions were seen in those elderly who had depression post stroke compared to those who didn't have .Moreover, there was no difference in the severity of brain vessel arteriosclerosis in both groups. However, post stroke patients who developed depression had earlier mortality. The researchers concluded that the cause of post stroke depression is psychological rather than neurological and it usually carries a bad prognosis (Bozikas, Gold, Kövari, Herrmann, Karavatos, Giannakopoulos, and Bouras, 2005).

Another study reported that elderly people who had a stroke affecting their speech were especially at risk of depression with an odds ratio of 2.16 (Black, Goodwin and Markides, 1998).

Other researchers, however, studied the association between stroke and depression but in the opposite direction .They assessed whether having depression is a risk factor for developing stroke in the future.

Everson, Roberts, Goldberg, and Kaplan (1998) conducted a large prospective community- based study over a long period of 29 years to assess the association between having depression and the risk of dying from stroke. They found that the risk of dying from stroke was significantly associated with having depressive symptoms with a hazard ratio of 1.66.This risk was present even after controlling for other significant risk factors for stroke.

Eye diseases

Eye diseases with reduced vision or total blindness are prevalent and serious conditions facing the elderly population and greatly impairing their abilities. They render them more dependent and increase their risk of falls.

A quarter of the study subject (25.2%) reported a history of chronic eye disease. Depression was found in 67.6% of those elderly who had eye problems and in only 32.7% of those who did not have and the difference between the two groups was significant (P = 0.00).Those who had eye disease were more than four times at risk of having depression than those who did not have (OR = 4.3,CI = 2.4-7.75).

This association remains highly significant even after introducing other factors in the multiple logistic regression model (P = 0.00, OR = 7.14, CI = 2.9-17.54).

This high prevalence of eye diseases among these elderly could be explained partly by the high prevalence of hypertension and diabetes among the study subjects.

Several other studies also emphasized the high prevalence of visual problems among the elderly.Al Baho (2003) reported that 91% of their participants had vision problem. Al Sayyad et al (2005) reported also a high prevalence of visual problems among Bahraini elderly attending the local health centers. Decrease visual activity was found in 54.7% of the elderly, 28.3% were having cataract and 5% were totally blind.

This high prevalence of eye diseases among the sample with its strong association with depression and other disabilities deserves special consideration. There should be more research on the magnitude and type of eye diseases among the elderly. Screening for such serious conditions should be applied in the health centers. Early intervention and referral to an eye specialist should be undertaken for needed cases.

Researchers studied the association between age-related macular degeneration and the subsequent development of depression. They found that those elderly with poor visual acuity and medical diseases were less satisfied with their performance of activities of daily life. Those dissatisfied elderly were more than twice at risk of developing depression within a very short period of only two months. They recommended that these elderly should be early identified and vigorously treated (Rovner, Casten, Hegel, Hauck, and Tasman, 2007).

Other chronic conditions

The prevalence of hypertension was found to be very high among the study subjects. Half of them reported such a history. More women (60.3%) than men (39.5%) were having hypertension and the difference was significant (P = 0.001).As mentioned earlier, this high prevalence could be because the sample was drawn from the health centers where the elderly patients receive treatment for these chronic conditions. The other explanation of this high prevalence is the overall increase in the prevalence of NCD in this part of the world.

Among those with hypertension, 48.9% were fond to be depressed while only 33.8% from those who didn't have hypertension were depressed and the difference was significant (P = 0.012, OR = 1.87, CI = 1.15-3).

Al Sayyad et al (2006) reported also a high prevalence of hypertension among Bahraini elderly of 39.3%.

Another Bahraini study found that the prevalence of hypertension among the age group 60-69 years was also alarming being 43% (Al-Mahroos 2000).

Youssef (2005) also reported approximately similar prevalence of 41.7% among the Jordanian elderly.

In addition, many subjects (28.9%) reported having joint problems. Elderly subjects with joint problems were found to be more than twice as depressed as those without joint problem and the difference was strongly significant (P = 0.00,OR = 2.75,CI = 1.59-4.7).This association remained highly

significant even after introducing other variables in the multiple logistic regression model (P = 0.00.OR = 6.49,CI = 2.43-17.29).

Al Sayyad et al (2006) reported a higher prevalence of joint problem of 58.2% among Bahraini elderly while Youssef (2005) reported a lower prevalence of 36% among the Jordanian elderly.

Joint problem is a frequent and disabling condition among the elderly people. It increases the elderly suffering and dependence. It also increases the medication intake of the elderly and put them at an increase risk of adverse side effects of such medications.

Among the subjects, 14.4% were having teeth problems. Elderly with teeth problems were more depressed (71.8%) than those without teeth problem (36.4%).They were found to be more than four times prone to be depressed as those who didn't have teeth problem.(P = 0.006,OR = 4.46,CI = 2.1-9.4). Teeth problems are often not considered when evaluating the general health of elderly people. Teeth problems interfere with the intake of many nutritious solid foods rendering the elderly deficient of many important vitamins and minerals. This deficiency will predispose the elderly to malnutrition and infections. In addition, special food preparation is needed which put extra effort on the elderly or the caregivers.

Ear problem is another disabling condition at old age leading to isolation of the elderly and to poor communication with others. It was found in 8.5% of the studied subjects. Ear problems in the studied subjects were significantly associated with the reporting of depressive symptoms with an OR of 2.36 (P = 0.048, CI = 0.99-5.68).

Al Sayyad et al (2006) reported a higher prevalence of hearing problem among Bahraini elderly of 40% of whom 10% were completely deaf.

Respiratory disease was reported by only 5.9% of the subjects. However, respiratory disease was found to be an independent risk factor for depression using the multiple logistic regression model (P = 0.007, OR = 7.72, and CI = 1.74-34.16).

Urinary incontinence is another dramatic condition affecting elderly people. It has a detrimental impact on the dignity and the mental and social functioning of affected person. It also imposes a great burden on the caregiver and predisposes the elderly to the risk of physical and psychological abuse. Incontinence has more impact in the Muslim culture due to religious considerations.

Only 3.3% of the studied subjects were having urinary incontinence. Obviously, this low prevalence is mainly because the sample was not drawn from the community.

No association was found between depression and the presence of urinary incontinence in the participants (P = 0.38).

5.2.5 Drug intake

The issue of drug intake deserves a special consideration when reviewing the medical history of elderly patients. The issue is of great importance to the health and safety of these patients as many of them are having multiple chronic conditions needing many medications for control. In addition, many of them are having painful conditions necessitating special medications to control their pain. Furthermore, the physiological changes and the functional decline in many organ systems occurring in late age render the elderly more vulnerable to the adverse effects of medications even at therapeutic doses. Also, the possibility of depressive effects of certain drugs used commonly by the elderly patients should not be forgotten.

Accordingly, enough time should be spent on reviewing the types and frequency of drug intake by elderly patients. In addition, enough time should be spent on explaining the timing of medications and the possible serious side effects.

The present study found that most of the elderly were on medications (82%).There was no difference in drug intake between the different age groups or between men and women (P = 0.77 and 0.052 respectively).The frequency of reported drugs reflects the most prevalent diseases among the study sample namely diabetes, hypertension and joint problems. The drugs reported in decreasing order of intake were: hypoglycemic drugs (47%), antihypertensive drugs (44%), non-steroidal anti-inflammatory drugs (13%), heart medication (8.9%), and lipid lowering agents (0.8%).Moreover, 21.6% of the elderly reported taking other types of medications.

However, Medication intake was not shown to be associated with depression in this study (P = 0.12).It was found that 43.4% from those on

medication and 31.3% from those who were not taking any medication were depressed. Furthermore, no association was found between depression and each of the following type of medications used when these medications were analyzed separately: insulin and hypoglycemic drugs (P = 0.056), antihypertensive drugs (P = 0.084), heart medication (P = 0.76), antilipid drugs (P = 0.25) and the non-steroidal anti-inflammatory drugs (P = 0.77). However, after controlling for other confounders using the multiple logistic regression models, the use of non-steroidal anti-inflammatory drugs was found to be significantly associated with more depressive symptoms. (P = 0.017, OR = 4.3, CI = 1.29-14.34).

In their study, Al Sayyad et al (2006) reported that every elderly included in their study was taking an average of 2.6 drugs each time they visited the health center.Youssef (2005) also reported a higher rate of drug intake by the Jordanian elderly. The reported rate of drug intake was 73.3%.

Scope and limitations

There are some limitations in this study that need to be addressed. However, these limitations should not interfere with the results of the study that depression is prevalent among Bahraini elderly and needs appropriate and prompt management. Moreover, this study should be viewed as a step towards the exploration of one of many important and difficult conditions facing elderly people in Bahrain:

1- Limitations associated with the sampling methodology and the setting of the study: The study was not community-based. Therefore, it did not include those elderly who could not attend the health centers during that period either because of their mobility problems and chronic diseases or because of transportation difficulties. This may limit the extent of generalization of the study results. However; the objective of the study was not to generalize but rather to appreciate the magnitude of depression among the elderly attending the health centers in order to direct the attention towards the early recognition of such a serious condition in the highly susceptible groups. Moreover, choosing the health centers to measure the magnitude of this condition and its associated factors may offer some advantages too. Health centers are fairly distributed all over Bahrain and choosing a health center from the four health regions ensured the inclusion of elderly people from the various regions allover Bahrain. Health services are provided freely to the citizens. Many Bahraini elderly usually use their primary health centers. Therefore, the primary care physician is usually and mostly the first to encounter the symptoms of depression and other medical diseases.
The study identified a high prevalence rate of depression among those elderly attending the health centers. So, logically this rate is expected to be

even higher among those elderly who could not attend the health center for reasons such as chronic diseases or mobility problems.

2-There was a relatively over representation of women in the study sample as 45.9% of the study sample were males and 54.1% were females. However, these figures are reflecting closely the actual representation in the Bahraini population. According to the latest census in 2001, males constituted 48.8% of Bahraini population older than 60 years while females constituted 51.2%.

3- Information on medical diseases, drug intake and past psychiatric problems were obtained by direct questioning of the subjects. However, this information was not verified by reviewing the medical file of the participants.

Chapter 6

Conclusion, policy implications

And recommendations

6.1 Conclusion

This study explored a major public health problem facing the elderly population. It adds extra burden to the already suffering group, further reducing their limited abilities and worsening their quality of life. The focus on the prevalent physical health conditions and the alteration of symptomatology of depression in later life are obstacles impeding the recognition and treatment of this condition. The present health care system is favoring secondary care as the principal source of treatment for this disorder. This further interferes with the accessibility of the treatment services.

Despite the above-mentioned limitations associated with this study, it was a step on the way to assess the magnitude of this important condition. It calls for further community-based and representative studies to gain clear insight on this problem from its natural settings. It also calls for further studies of this condition among Bahraini elderly in hospitals and institutions.

This study revealed a high prevalence of depressive symptoms among Bahraini elderly attending the local health centers. There was a clear gender difference in the preponderance of depressive symptoms. Elderly females were more than four times prone to have depressive symptoms compared to men. More females than males were widowed. The marital status had a great impact on the reporting of depressive symptoms. Widowed and divorced subjects had considerably more symptoms. More than half of the

subjects were illiterate with the majority being females. There was a strong association between depression and educational achievement. Those who were illiterate or had low level of education were at increase risk of depression. Most of the elderly were living with their spouse or children reflecting the intact familial relationship that is enforced by the religion and culture. No association was found between the elderly living arrangement and depression status. Most of the subjects, mostly women, were not economically active and they were dependent on others for financial help. The subjects were socially active mainly by attending religious places and social gathering. Social activities especially by attending religious places were found to be protective against depression. Most of the elderly were a source of great help and support to their families. Those who were helping their family were significantly less depressed than those who were not. There was no significant association between recent bereavement and depression. Those elderly who had past psychiatric problem had significantly more current depressive symptoms.

The study reported a high prevalence of chronic diseases among the subjects. Half the participants reported having diabetes and hypertension. The prevalence of hypertension and diabetes was considerably more among women than among men. The presence of any chronic disease was significantly associated with more depressive symptoms. The following chronic diseases were specifically more associated with depressive symptoms: hypertension, heart disease, joint problem, teeth problem and eye and ear disease.

The majority of the elderly were on medications most often for their diabetes and hypertension.However, no significant association was found between drug intake and depression.

It is worth mentioning that the risk factors for depression were found to be clustered among the female subjects like widowhood, low level of education, unsecured income and high prevalence of chronic diseases. This clustering of risk factors rather than the gender difference per se may explain the high prevalence of depression among women in this study. This fact emphasizes the need to tackle depression from a gender perspective especially when developing policies and programs to manage this condition.

Furthermore, the studied risk factors and depression as the dependent outcome were entered by a forward method in the multiple logistic regression model .This step was undertaken to control for confounding factors and to determine the predictors for depression among these factors. The following sociodemographic risk factors remained significantly associated with depression even after this adjustment step was taken: younger age, being a female and loss of a spouse through widowhood or divorce. Participating in social activities by attending religious places was found to be associated with a lower rate of depression. The presence of these chronic diseases remained significantly associated with depression in the multiple regression model: joint problem, respiratory disease and eye disease. Interestingly, the use of non-steroidal anti-inflammatory drugs was found to be also associated with more depressive symptoms even after controlling for other risk factors.

So by going through the results of the study, a picture is formed about the situation of Bahraini elderly attending the local health centers and this picture may reflect truly the situation of Bahraini elderly in general.

The results are clearly demonstrating a high rate of illiteracy, financial insecurity and dependence. The prevalence of chronic diseases is extremely high. These socioeconomic and health problems facing this vulnerable sector of the population certainly will have a profound impact on their mental health resulting in the high prevalence of depression demonstrated by this study.Consequently,the current situation of Bahraini elderly warrants further study and analysis. Situational analysis is the base for any policy formulation and decision making. Furthermore, gained information should be disseminated to the involved people in order to raise their awareness regarding the current situation so as to set definite measures to improve it.

It is of paramount importance that the formulated policy anticipates the accelerated growth of the elderly population and directs the health and social services accordingly.

In summary:

- Depression is a prevalent and major public health problem among Bahraini elderly.
- Certain sociodemographic risk factors were found to be significantly associated with depression :
    - Being a female.
    - Loss of a spouse through widowhood or divorce.

- Socially isolated elderly or those who are not providing support to their families.
- Past history of psychiatric problem.
- The presence of chronic diseases.

Policy implications

and recommendations

6.2 Policy implications and recommendations

In view of the findings of this study and other previous studies, it is recommended that a clear policy with definite aims should be implemented to control this problem as follows:

- The policy should encourage research to evaluate the availability and the quality of the current services concerned with this issue and to direct the future changes in these services accordingly.
- The policy also should adopt the WHO recommendation in redirecting the planning of mental health services towards community-based rather than hospital-based services.
- The policy should stress on providing training programs for health care personnel in the field of geriatrics. Special emphasis should be put on training community health nurses and social workers on screening for the most prevalent conditions among this age group.
- In addition, the policy should direct the application of appropriate screening tests for high risk groups especially women, widowed and those with chronic diseases.
- Furthermore, an essential part of the policy is to develop treatment guidelines for the management of this condition emphasizing the need to early initiation by the treating family physicians and the referral for needed cases.

- The policy should encourage the establishment of a multi-disciplinary team involving all the concerned personnel in order to increase the effectiveness of the provided services.
- This policy should be part of a broad national policy to improve the status of Bahraini elderly and to promote their health and social well-being by applying appropriate social and economic interventions.

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Appendices

Appendix 1: Study Questionnaire

1	CPR:									
2	Health Center									
3	Sex	☐ Male				☐ Female				
4	What is your current marital Status?									
	☐ Never married	☐ Married				☐ Widowed				
	☐ Divorced/ Separated									
5	What is your level of education?									
	☐ Illiterate ☐ Read / write				☐ Primary ☐ Intermediate					
	☐ Secondary				☐ Higher					
6	With whom do you live?									
	☐ Alone				☐ With spouse only					
	☐ With spouse and children				☐ With children/grandchildren					
	☐ With relatives	☐ With friend	☐ with others, specify							
7	What is your main source of income?									
	☐ Current work	☐ spouse	☐ Child	☐ Relative						
	☐ Pension	☐ Social affairs	☐ None	☐ Others, specify						
8	What activities do you usually participate in?									
	☐ Attending religious places	☐ Attending clubs								
	☐ Attending traditional café	☐ Attending social gathering								
	☐ None	☐ others, specify								
9	What support do you provide for your family?									
	☐ None	☐ Help in house work	☐ Look after children							
	☐ Buying house needs	☐ Direct financial help	☐ Others specify:							
10	Did any of your close relatives/friends die in the last 6 months?									
	☐Yes	☐No								
11	Have you suffered from any mental or nervous problem before?									
	☐Yes	☐No	If yes, specify:							
12	Do you suffer from?									
	☐ Hypertension	☐ Diabetes								
	☐heart disease	☐ Stroke								
	☐ lung problem	☐ Joint disease								
	☐ Eye problem	☐ Ear problem								
	☐ teeth problem	☐ Urinary incontinence								
	☐ Others specify:									
13.	Are you on regular medications? ☐ Yes ☐ no									

14.	If yes, what type of medications are you using? .....

Appendix 2:
The Geriatric Depression Scale GDS-15

Choose the best answer for how you have felt over the past week:

1. Are you basically satisfied with your life? YES / NO

2. Have you dropped many of your activities and interests? YES / NO

3. Do you feel that your life is empty? YES / NO

4. Do you often get bored? YES / NO

5. Are you in good spirits most of the time? YES / NO

6. Are you afraid that something bad is going to happen to you? YES / NO

7. Do you feel happy most of the time? YES / NO

8. Do you often feel helpless? YES / NO

9. Do you prefer to stay at home, rather than going out and doing new things? YES / NO

10. Do you feel you have more problems with memory than most? YES / NO

11. Do you think it is wonderful to be alive now? YES / NO

12. Do you feel pretty worthless the way you are now? YES / NO

13. Do you feel full of energy? YES / NO

14. Do you feel that your situation is hopeless? YES / NO

15. Do you think that most people are better off than you are? YES / NO

The Geriatric Depression Scale GDS-15(Arabic translation)

1. هل أنت راضى عن حياتك؟ نعم لا

- تشعر بالرضا عن ما أنجزته في حياتك في الماضي والحاضر.

2. هل تركت كثيراً من نشاطاتك وهواياتك؟ نعم لا

- العادات الشخصية مثل الجلوس على القهوة مع الأصدقاء.
- رؤية التلفزيون.
- مطالعة الجرائد.
- أو أي نشاط محبب تركه الشخص.

3. هل تشعر ان حياتك فارغة أو خالية؟ نعم لا

- لا يوجد ما يملأ حياتك.
- تشعر بوحشة داخلية.

4. هل تشعر كثيراً بالملل؟ نعم لا

- (زهقان او متملل).

5. هل روحك المعنوية مرتفعة في معظم الوقت؟ نعم لا

- شعور بالحيوية والسعادة معظم الوقت.
- مستانس معظم الوقت.

6. هل عندك نظرة متشائمة بان شيء سيء سوف يحدث لك؟ نعم لا

- يتوقع الأسوء.
- دائماً يهوجس.
- قلبي يحكى، يودي ويجيب.

7. هل تشعر بالسعادة معظم الوقت؟ نعم لا

8. هل تشعر كثيراً انك لا حول لك ولا قوة؟ نعم لا

- ماتقدر تسوي شيء.

- الأمور تراكمت عليه.

9. هل تفضل البقاء بالبيت بدلاً من ان تخرج لتؤدي اعمالاً جديدة؟ نعم لا

- مشاهدة برامج التلفزيون الجديدة.
- الذهاب الى المأتم – السوق.
- الذهاب ليلاً إلى القهوة.
- ما ابغى اشوف ناس وافضل العزلة.

10. هل تشعر انك تعاني من ضعف في الذاكرة اكثر من الآخرين؟ نعم لا

- تنسى كثيرا اشياء اكثر من المحيطين بك ممن هم في سنك.

11. هل تعتقد ان الحياة تستحق ان نحياها؟ نعم لا

- الحياة زينة او مو زينة.
- مستانس من الدنيا.

12. هل تشعر بإنعدام القيمه؟ نعم لا

- حياتك الماضيه والحاضرة ذهبت هباء.
- تأسف على حياتك.
- حياتك فاضيه.
- ماليها مزيه.

13. هل تشعر بالحيوية والنشاط؟ نعم لا

14. هل تشعر ان وضعك ميئوس منه؟ نعم لا

- لا يوجد أي امل في تحسن ماتشعر به وتحسن ظروفك.
- لا يعني بالسؤال القنوط من رحمة الله.

15. هل تعتقد ان معظم الناس احسن حالاً منك؟ نعم لا

- في الوقت الحالي وخلال الستة اشهر الماضيه انت اقل مما كنت عليه في الماضي.

السؤال ليس له علاقة بالتواضع

Appendix 3

Thesis approval letter

June 4, 2006

Fatima Abdulla Habib
Family Physician
Hamad Town Health Center
Ministry of Health

Ref: Depression among Elderly Bahrainis Attending Primary Health Care Centers in Bahrain: A Study of Prevalence and Practices

Dear Fatima,

I take this opportunity to inform you that the Academic Committee members have approved the Protocol of your study "**Depression among Elderly Bahrainis Attending Primary Health Care Centers in Bahrain: A Study of Prevalence and Practices".**
You can now proceed the data collection phase provided you attain consent from the Ministry of Health.
I wish you all the success and good luck.
Best regards,
Yours sincerely,

Prof. Randah R. Hamadeh
Director
Masters in "Health Policy and Population Studies"

Dr. Khaldoon Al Roomi – Thesis Supervisor CC:
Dr. Fawzi A. Ameen, AUTP, MOH

Appendix 4

Bahraini Elderly Population By Health Center, Age Groups and Sex – 2005

السكان البحرينيين كبار السن (60 سنه فأكثر)حسب المركز الصحي وفئات السن والنوع - 2005

Bahraini Elderly Population By Health Center, Age Groups and Sex - 2005

Health Center / Age Groups		d الجملة Total	 أناث Females	النوع ذكور Males	المركز الصحي / فئات السن	
National Bank of Bahrain	**Total Elderly**	**1,369**	**704**	**665**	الجملة	بنك البحرين الوطني
	60-64	487	241	246	64 - 60	
	65+	882	463	419	+65	
Muharraq	**Total Elderly**	**1,486**	**734**	**753**	الجملة	المحرق
	60-64	535	261	274	64 - 60	
	65+	951	473	479	+65	
Sh. Salman	**Total Elderly**	**1,979**	**1,053**	**926**	الجملة	الشيخ سلمان
	60-64	602	362	240	64 - 60	
	65+	1,377	691	686	+65	
Dair	**Total Elderly**	**866**	**465**	**400**	الجملة	الدير
	60-64	277	167	109	64 - 60	
	65+	589	298	291	+65	
Ibn Sinna	**Total Elderly**	**878**	**483**	**395**	الجملة	ابن سينا
	60-64	246	138	108	64 - 60	
	65+	632	345	287	+65	
Alhoora	**Total Elderly**	**588**	**297**	**291**	الجملة	الحورة
	60-64	177	96	81	64 - 60	
	65+	411	201	210	+65	

Al Naim	Total	1,323	730	592	الجملة	النعيم
	Elderly					
	60-64	364	206	158	64 - 60	
	65+	959	524	434	+65	
Sh. Sabah AlSalem	Total					الشيخ صباح السالم
	Elderly	1,323	653	671	الجملة	
	60-64	446	208	239	64 - 60	
	65+	877	445	432	+65	
Bilad AlKadem	Total					
	Elderly	1,093	571	522	الجملة	البلاد القديم
	60-64	364	210	154	64 - 60	
	65+	729	361	368	+65	
Jidhafs	Total					
	Elderly	2,808	1,439	1,368	الجملة	جدحفص
	60-64	991	538	453	64 - 60	
	65+	1,817	901	915	+65	
Budaiya	Total					
	Elderly	1,818	956	862	الجملة	البديع
	60-64	641	363	278	64 - 60	
	65+	1,177	593	584	+65	
Sitra	Total					
	Elderly	1,690	828	862	الجملة	ستره
	60-64	594	305	290	64 - 60	
	65+	1,096	523	572	+65	
Isa Town	Total					
	Elderly	2,869	1,395	1,474	الجملة	مدينة عيسى
	60-64	1,169	561	608	64 - 60	
	65+	1,700	834	866	+65	
A'Ali	Total					
	Elderly	776	375	400	الجملة	عالي
	60-64	289	132	157	64 - 60	
	65+	487	243	243	+65	
East Riffa	Total					
	Elderly	1,043	529	514	الجملة	الرفاع الشرقي
	60-64	390	198	192	64 - 60	
	65+	653	331	322	+65	
Hamad Kanoo	Total					
	Elderly	1,333	683	650	الجملة	حمد كانو

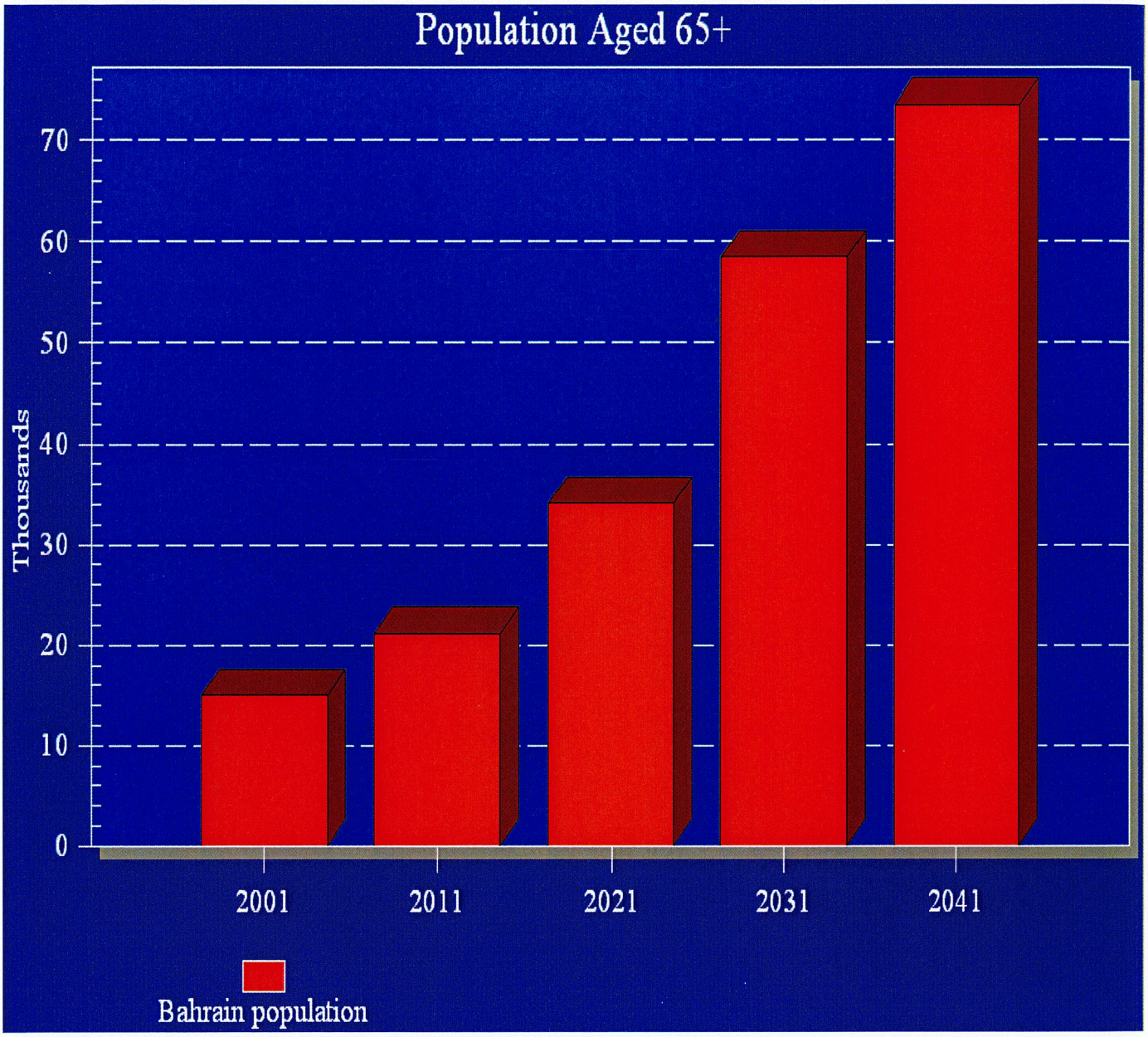
	60-64	508	234	274	64 - 60	
	65+	825	449	376	+65	
Jaw & Askar Clinic	**Total Elderly**	**76**	**38**	**38**	الجملة	عيادة جو وعسكر
	60-64	19	12	7	64 - 60	
	65+	57	26	31	+65	
Kuwait	**Total Elderly**	**849**	**432**	**417**	الجملة	الكويت
	60-64	288	163	125	64 - 60	
	65+	561	269	292	+65	
Zallaq Clinic	**Total Elderly**	**82**	**45**	**37**	الجملة	عيادة الزلاق
	60-64	21	12	9	64 - 60	
	65+	61	33	28	+65	
Hamad Town	**Total Elderly**	**645**	**331**	**313**	الجملة	مدينة حمد
	60-64	257	117	140	64 - 60	
	65+	388	214	173	+65	
Mohammed Jassim Kanoo	**Total Elderly**	**536**	**292**	**244**	الجملة	محمد جاسم كانو
	60-64	198	107	91	64 - 60	
	65+	338	185	153	+65	

Source : Central Informatics Organisation .

المصدر : الجهاز المركزي للمعلومات .

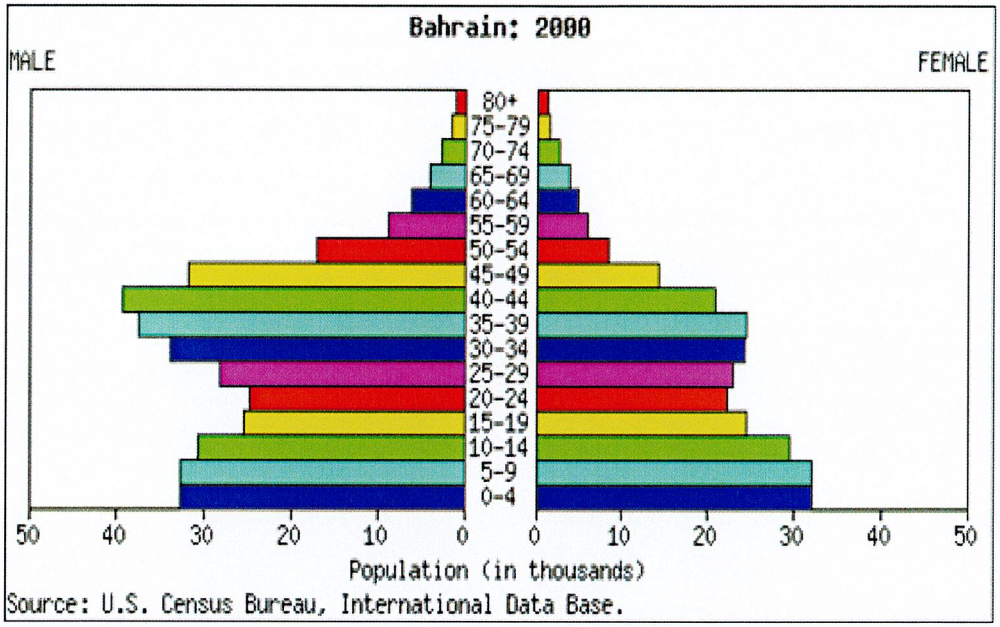
Appendix 5:

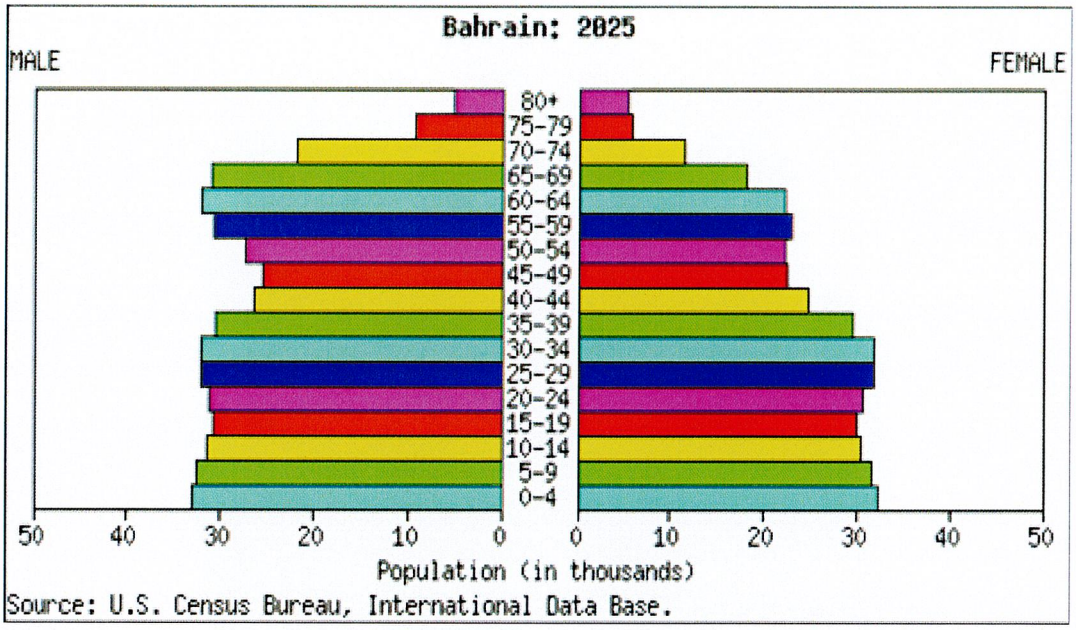
Population projection for Bahraini elderly aged 65 + (2001-2050)

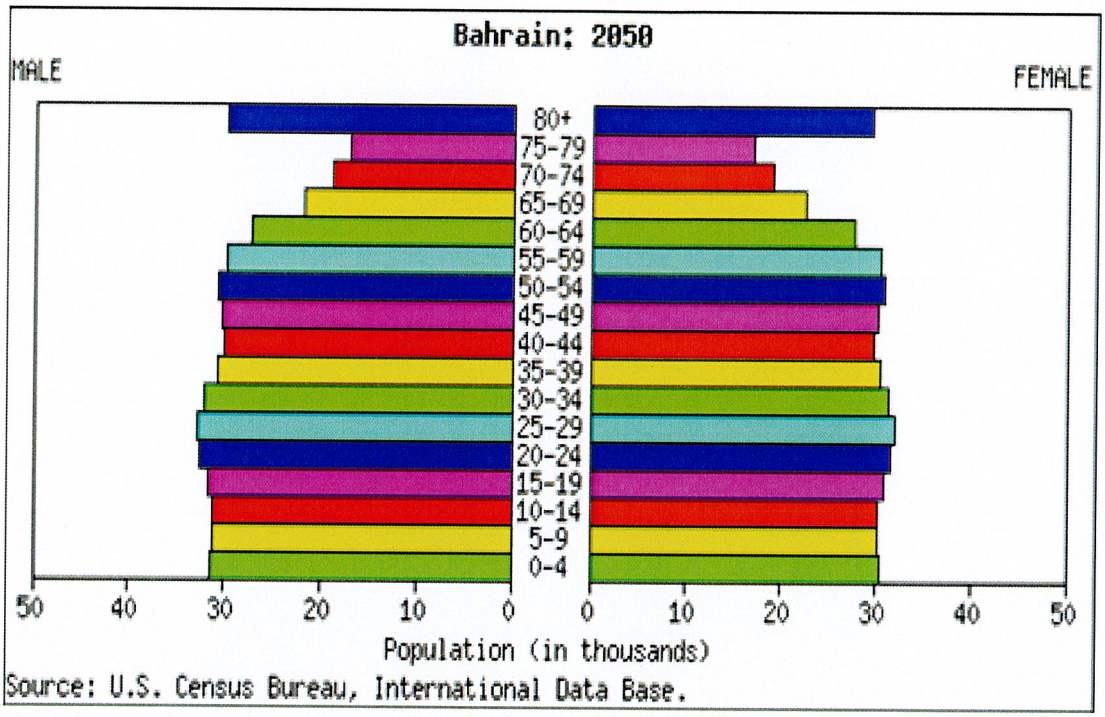

Population Aged 65+
Thousands
70
60
50
40
30
20
10
0
2001
2011
2021
2031
2041
Bahrain population

Appendix 6

Population pyramid for Bahrain: 2000-2025-2050




Bahrain: 2025
MALE
FEMALE
80+
75-79
70-74
65-69
60-64
55-59
50-54
45-49
40-44
35-39
30-34
25-29
20-24
15-19
10-14
5-9
0-4
50
40
30
20
10
0
0
10
20
30
40
50
Population (in thousands)
Source: U.S. Census Bureau, International Data Base.


Bahrain: 2050
MALE
FEMALE
80+
75-79
70-74
65-69
60-64
55-59
50-54
45-49
40-44
35-39
30-34
25-29
20-24
15-19
10-14
5-9
0-4
50
40
30
20
10
0
0
10
20
30
40
50
Population (in thousands)
Source: U.S. Census Bureau, International Data Base.

Appendix 7

Tables and graphs

Descriptive characteristics of age according to sex

	sex			Statistic	Std. Error
age	male	Mean		68.65	.566
		95% Confidence Interval for Mean	Lower Bound	67.52	
			Upper Bound	69.77	
		5% Trimmed Mean		68.28	
		Median		68.00	
		Variance		39.727	
		Std. Deviation		6.303	
		Minimum		60	
		Maximum		87	
		Range		27	
		Interquartile Range		9	
		Skewness		.659	.217
		Kurtosis		.005	.431
	female	Mean		68.36	.584
		95% Confidence Interval for Mean	Lower Bound	67.20	
			Upper Bound	69.51	
		5% Trimmed Mean		67.83	
		Median		67.50	
		Variance		49.817	
		Std. Deviation		7.058	
		Minimum		60	
		Maximum		97	
		Range		37	
		Interquartile Range		10	
		Skewness		1.037	.201
		Kurtosis		1.368	.399

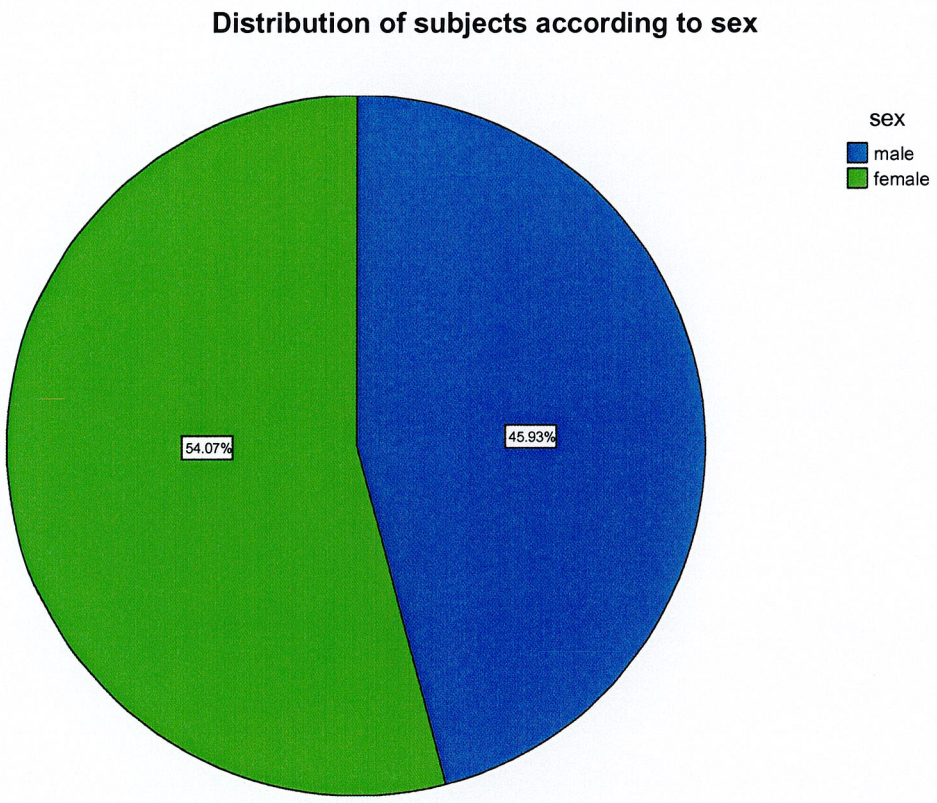
Table (1)

Descriptive analysis of depressive score according to sex

	sex			Statistic	Std. Error
Depressive score	male	Mean		3.67	.276
		95% Confidence Interval for Mean	Lower Bound	3.12	
			Upper Bound	4.22	
		5% Trimmed Mean		3.42	
		Median		3.00	
		Variance		9.459	
		Std. Deviation		3.076	
		Minimum		0	
		Maximum		13	
		Range		13	
		Interquartile Range		4	
		Skewness		1.033	.217
		Kurtosis		.543	.431
	female	Mean		5.86	.300
		95% Confidence Interval for Mean	Lower Bound	5.27	
			Upper Bound	6.46	
		5% Trimmed Mean		5.80	
		Median		6.00	
		Variance		13.140	
		Std. Deviation		3.625	
		Minimum		0	
		Maximum		14	
		Range		14	
		Interquartile Range		5	
		Skewness		.092	.201
		Kurtosis		-.826	.399

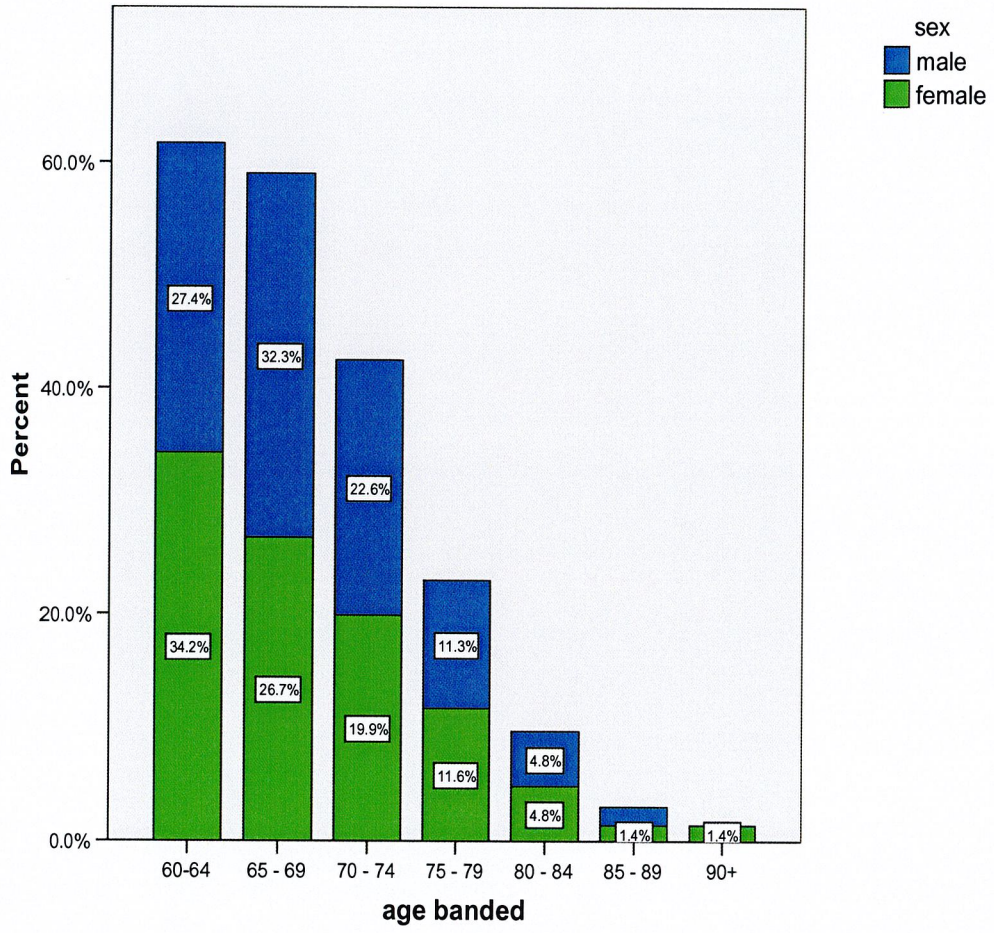
Table (2)

Graph: 1

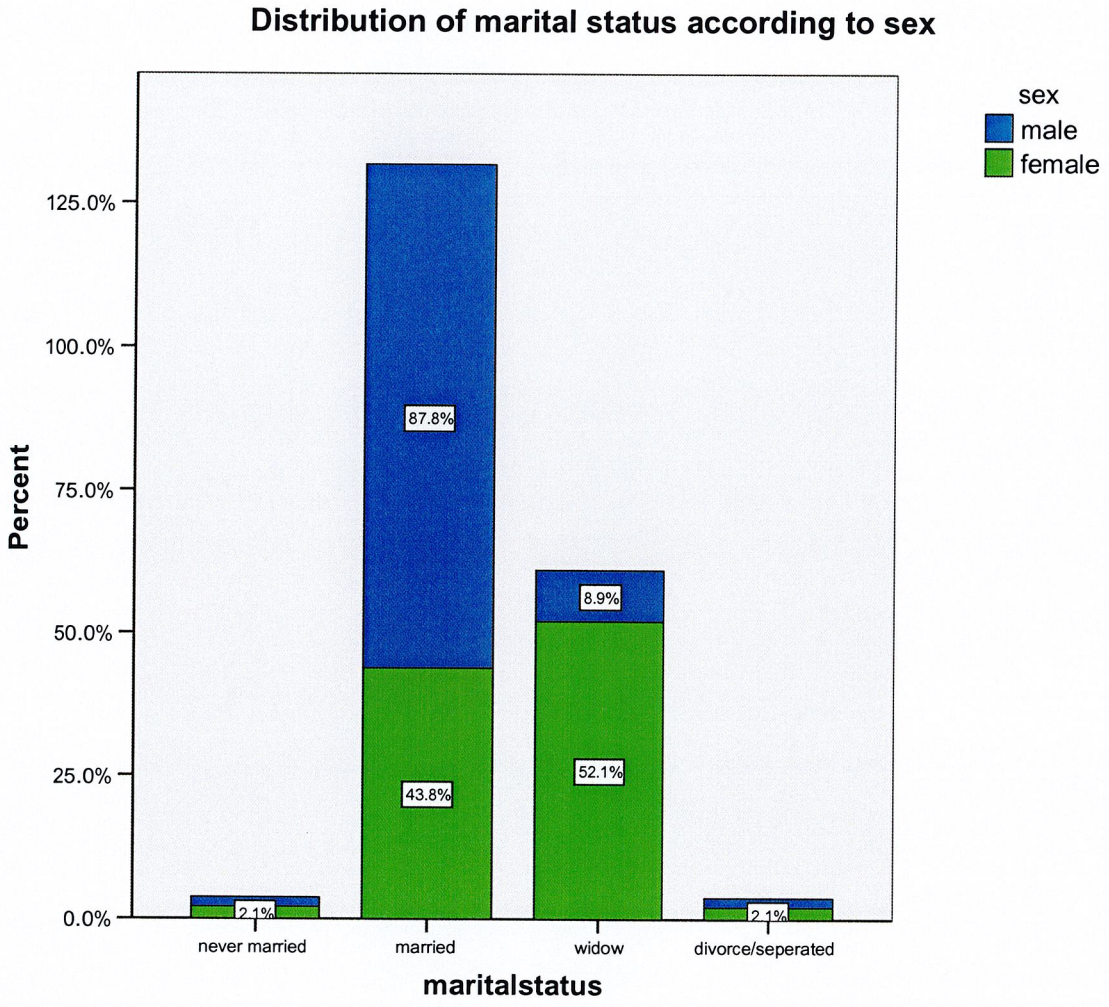

Distribution of subjects according to sex
sex
male
female
45.93%
54.07%

Graph 2

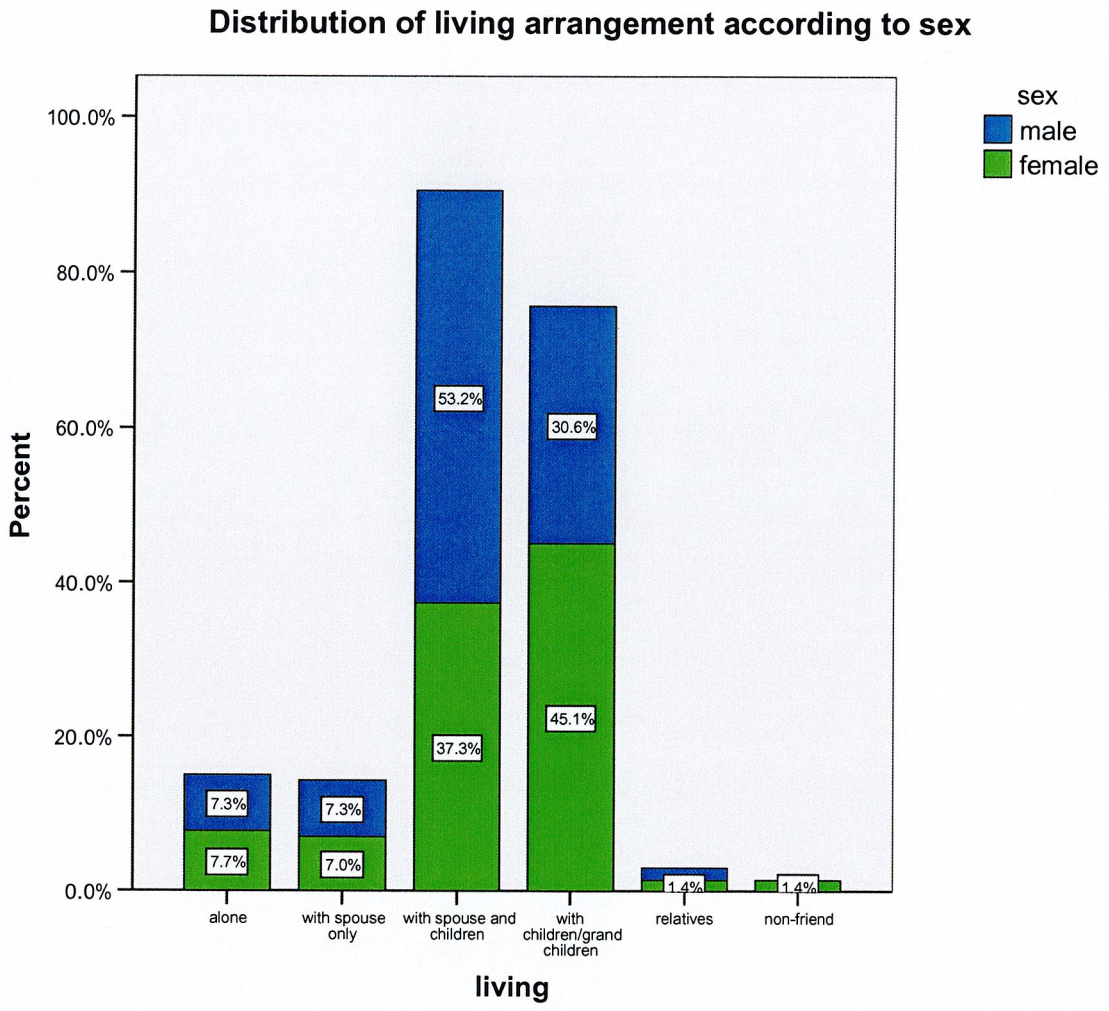
Distribution of age categories according to sex



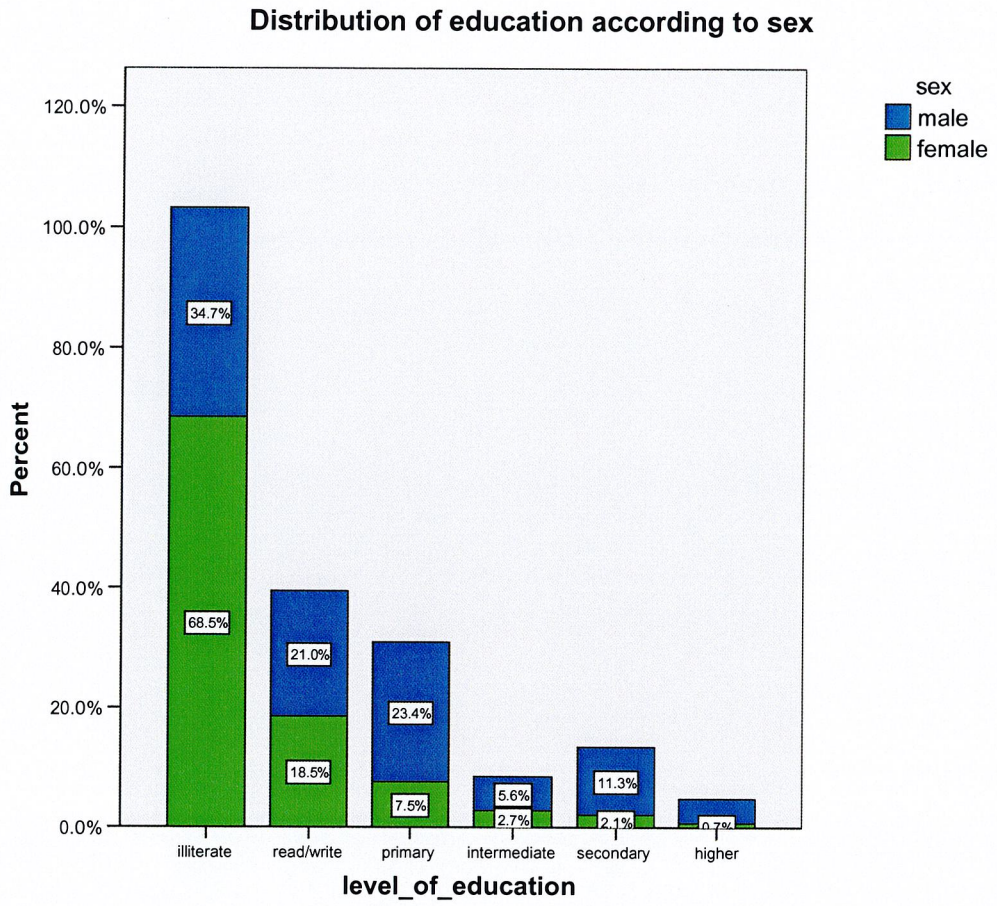
Graph: 3


Distribution of marital status according to sex
sex
male
female
Percent
125.0%
100.0%
75.0%
50.0%
25.0%
0.0%
87.8%
43.8%
8.9%
52.1%
2.1%
2.1%
never married
married
widow
divorce/seperated
maritalstatus

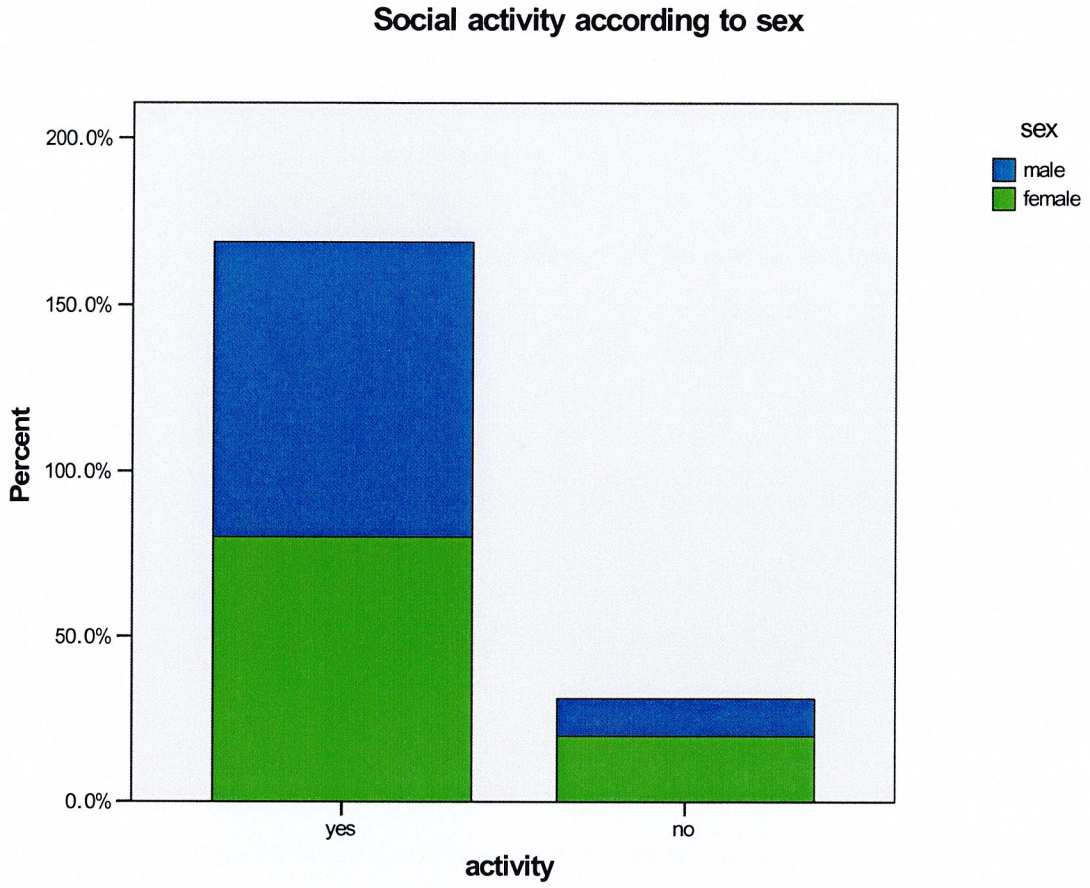
Graph: 4


Distribution of living arrangement according to sex
sex
male
female
Percent
100.0%
80.0%
60.0%
40.0%
20.0%
0.0%
7.3%
7.7%
7.3%
7.0%
53.2%
37.3%
30.6%
45.1%
1.4%
1.4%
alone
with spouse only
with spouse and children
with children/grand children
relatives
non-friend
living

Graph: 5

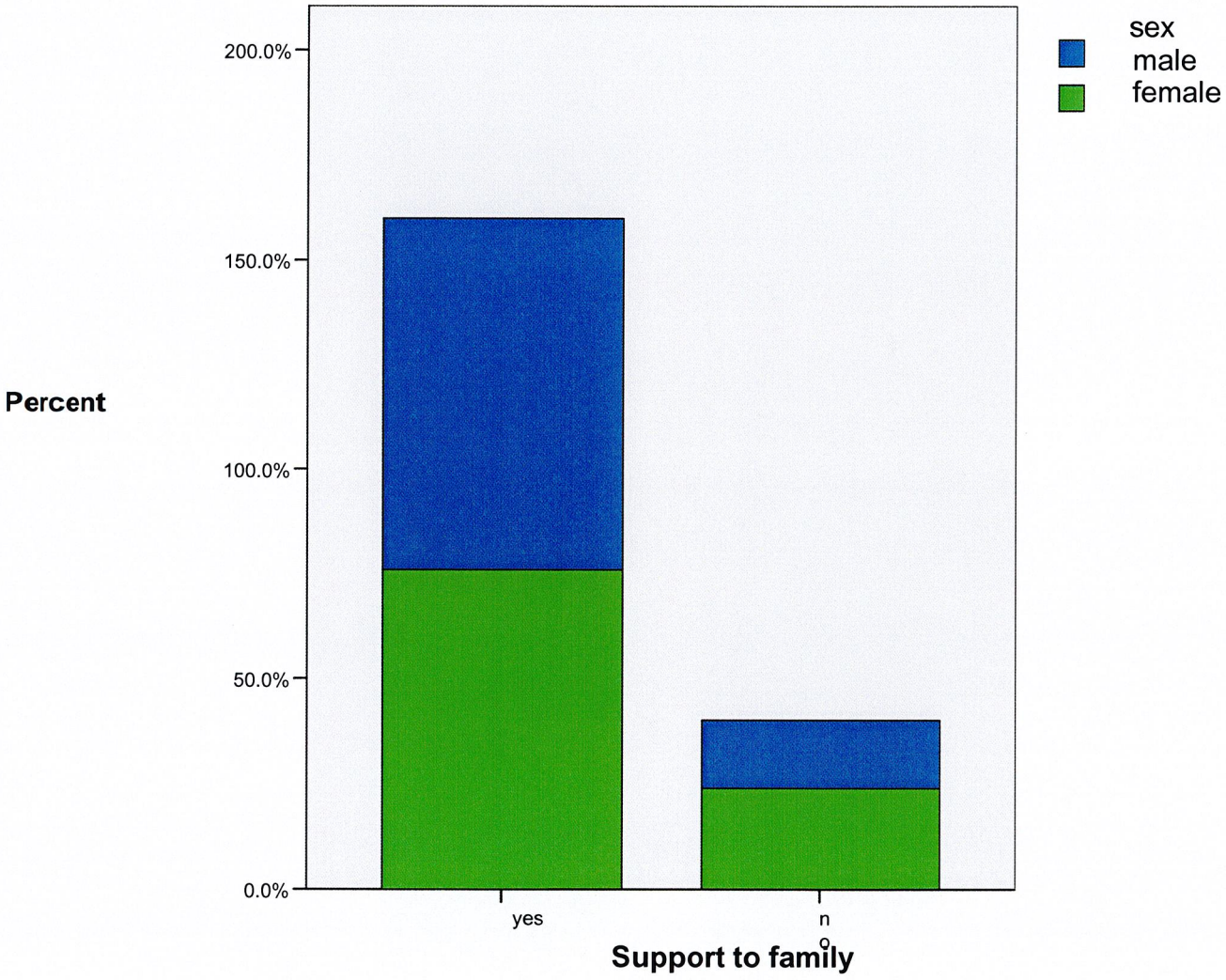

Distribution of education according to sex
sex
male
female
Percent
120.0%
100.0%
80.0%
60.0%
40.0%
20.0%
0.0%
34.7%
68.5%
21.0%
18.5%
23.4%
7.5%
5.6%
2.7%
11.3%
2.1%
illiterate
read/write
primary
intermediate
secondary
higher
level_of_education

Graph: 6


Social activity according to sex
200.0%
150.0%
100.0%
50.0%
0.0%
Percent
yes
no
activity
sex
male
female

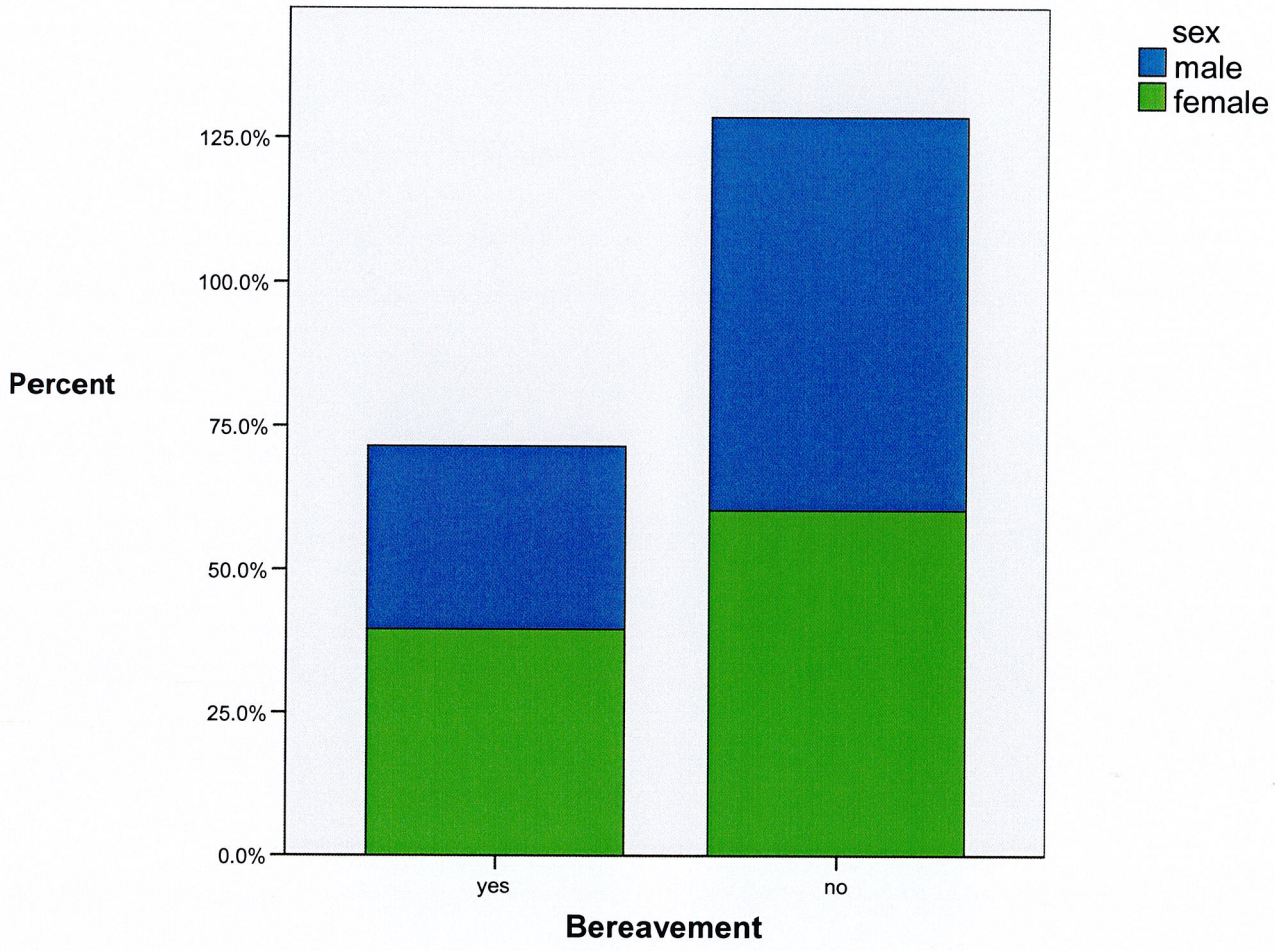
Graph: 7

Distribution of support to family according to sex



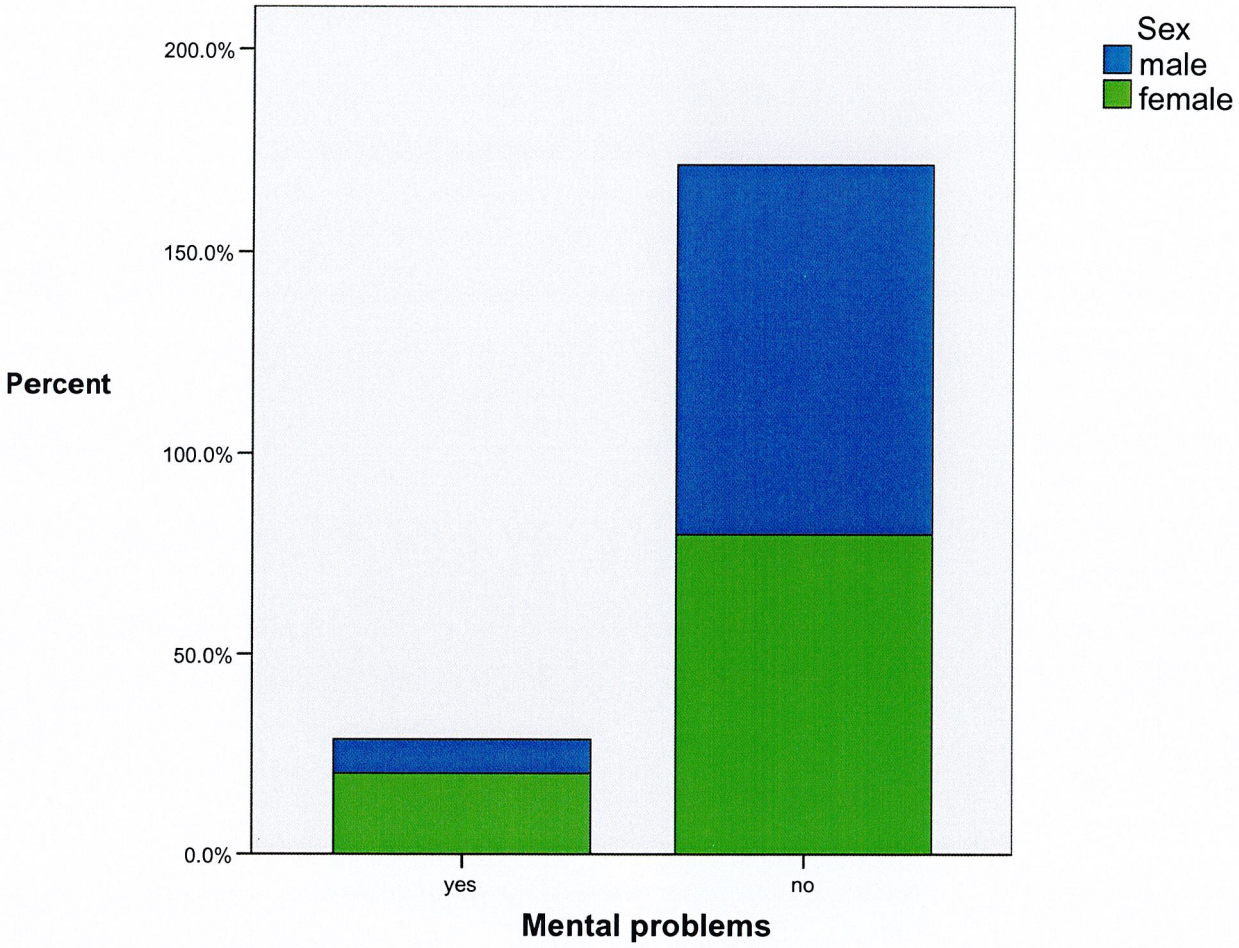
Graph: 8

Bereavement according to sex



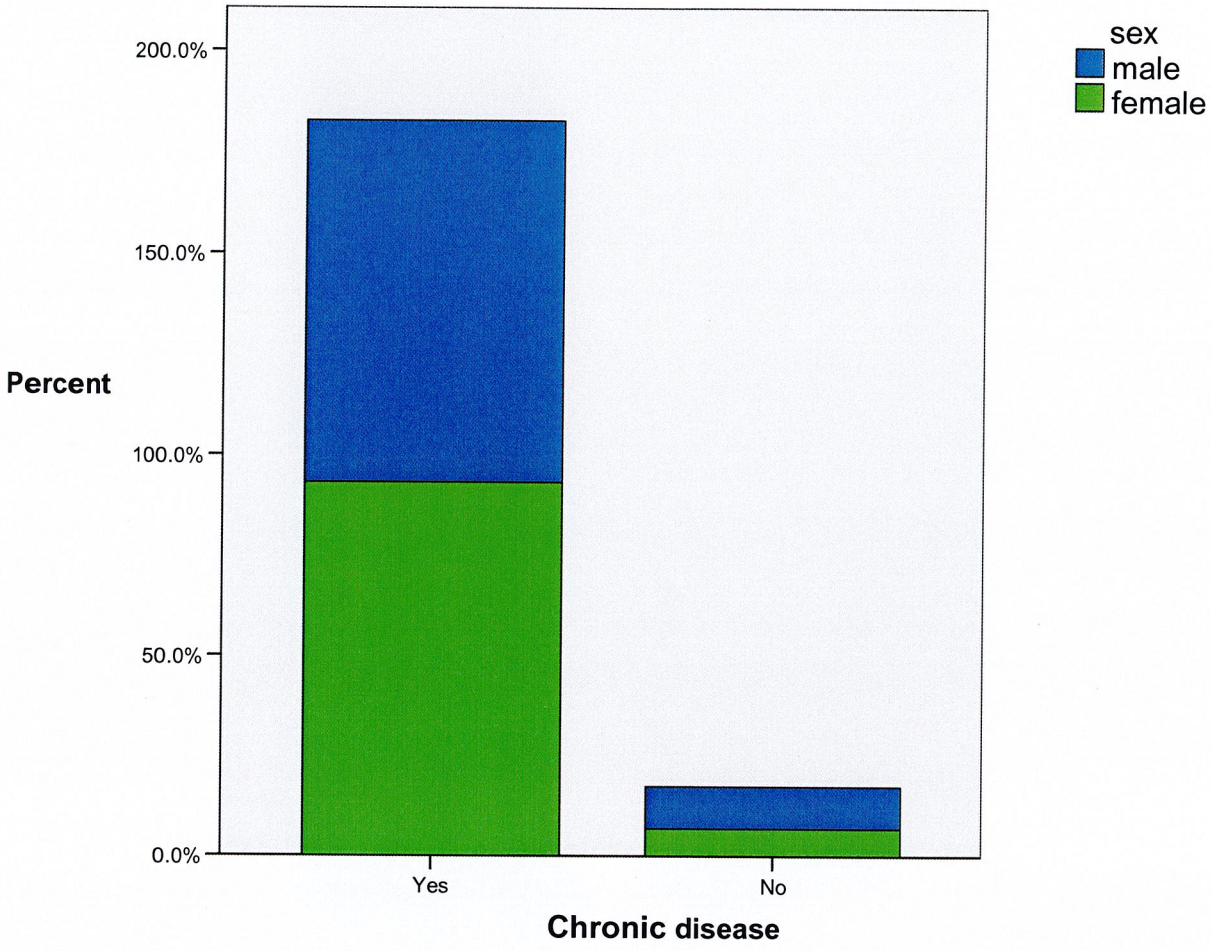
Graph: 9

Distribution of mental problems according to sex



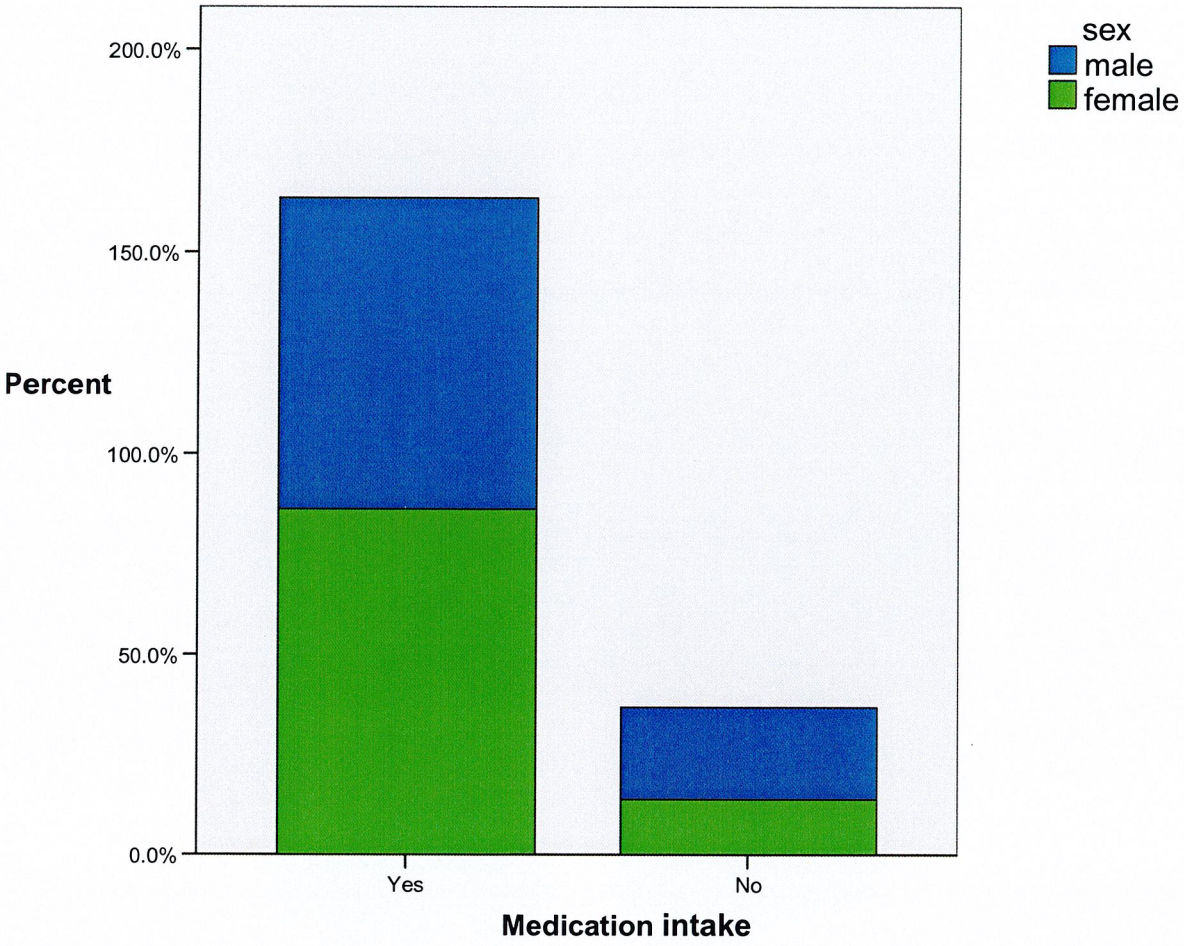
Graph: 10

Distribution of chronic diseases according to sex

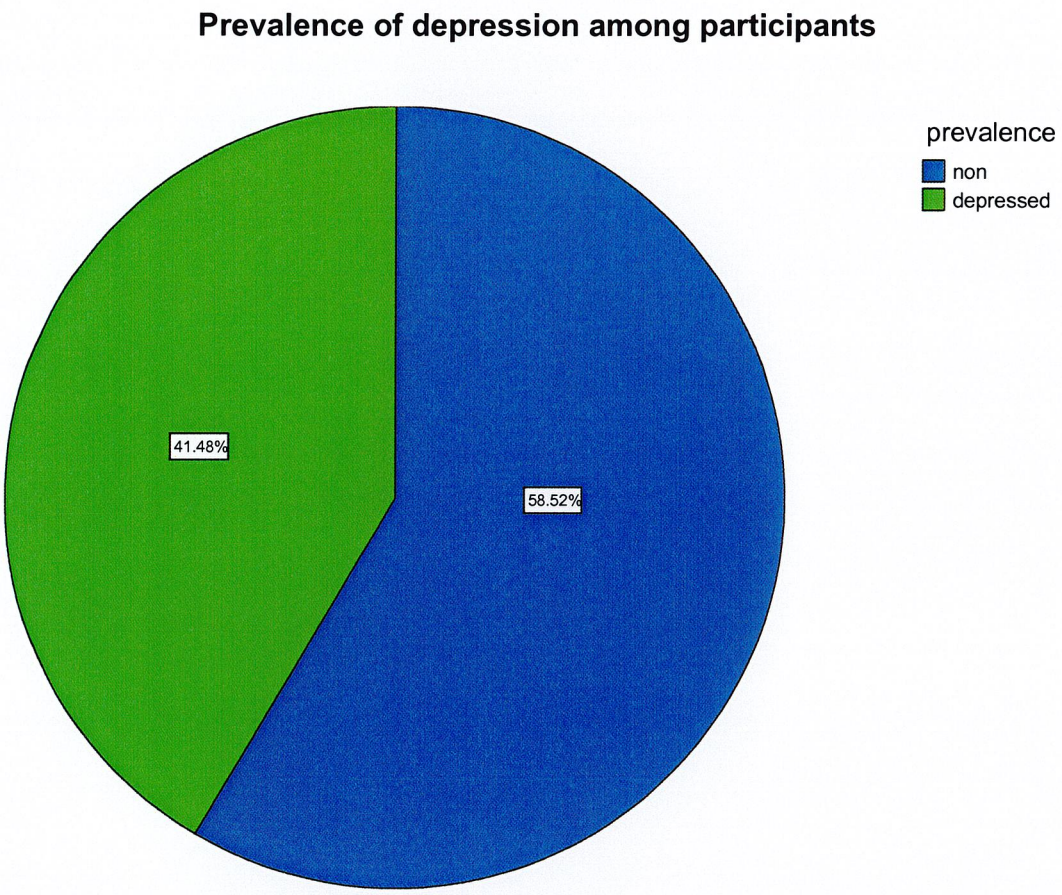


Graph: 11

Medication intake according to sex

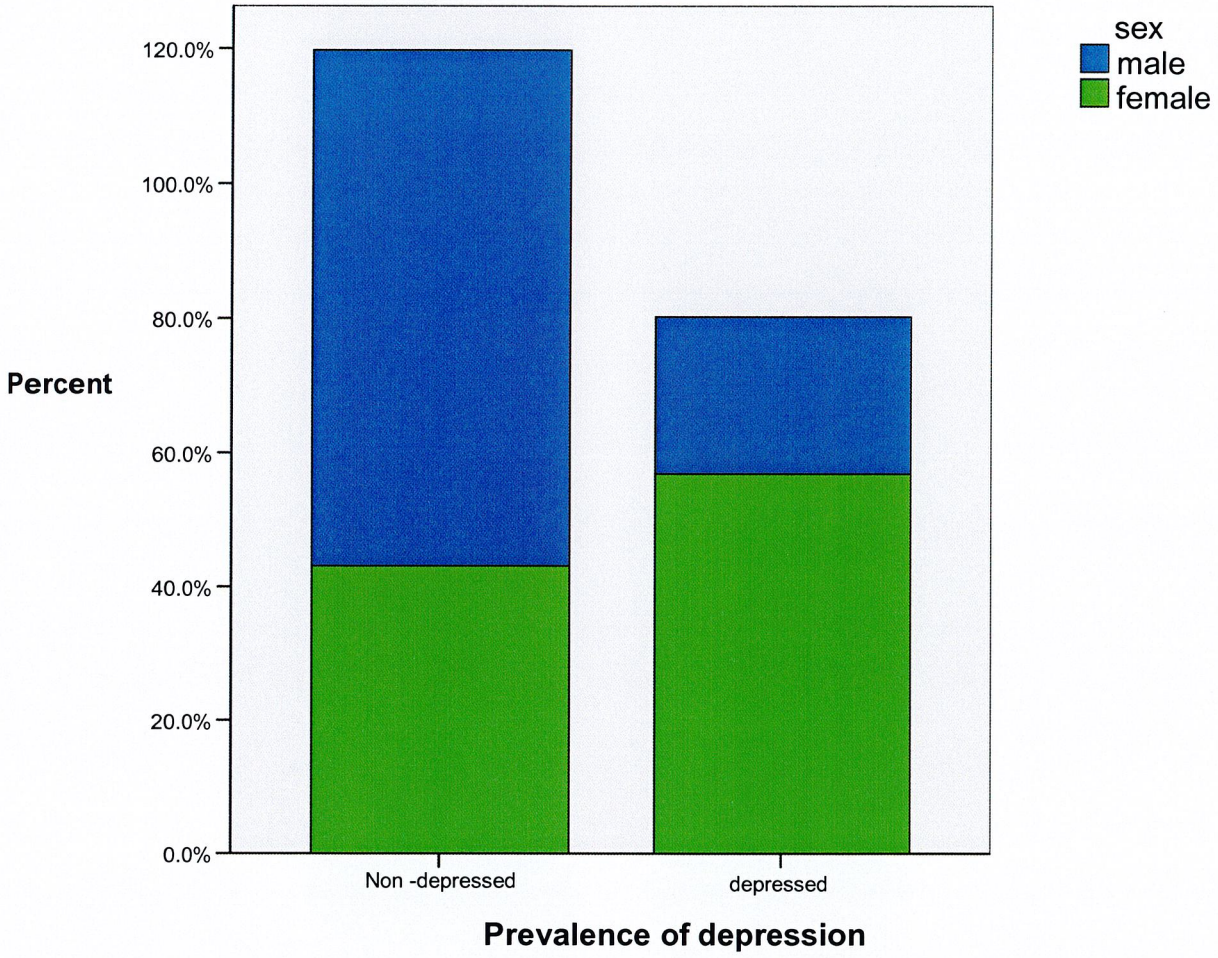


Graph: 12

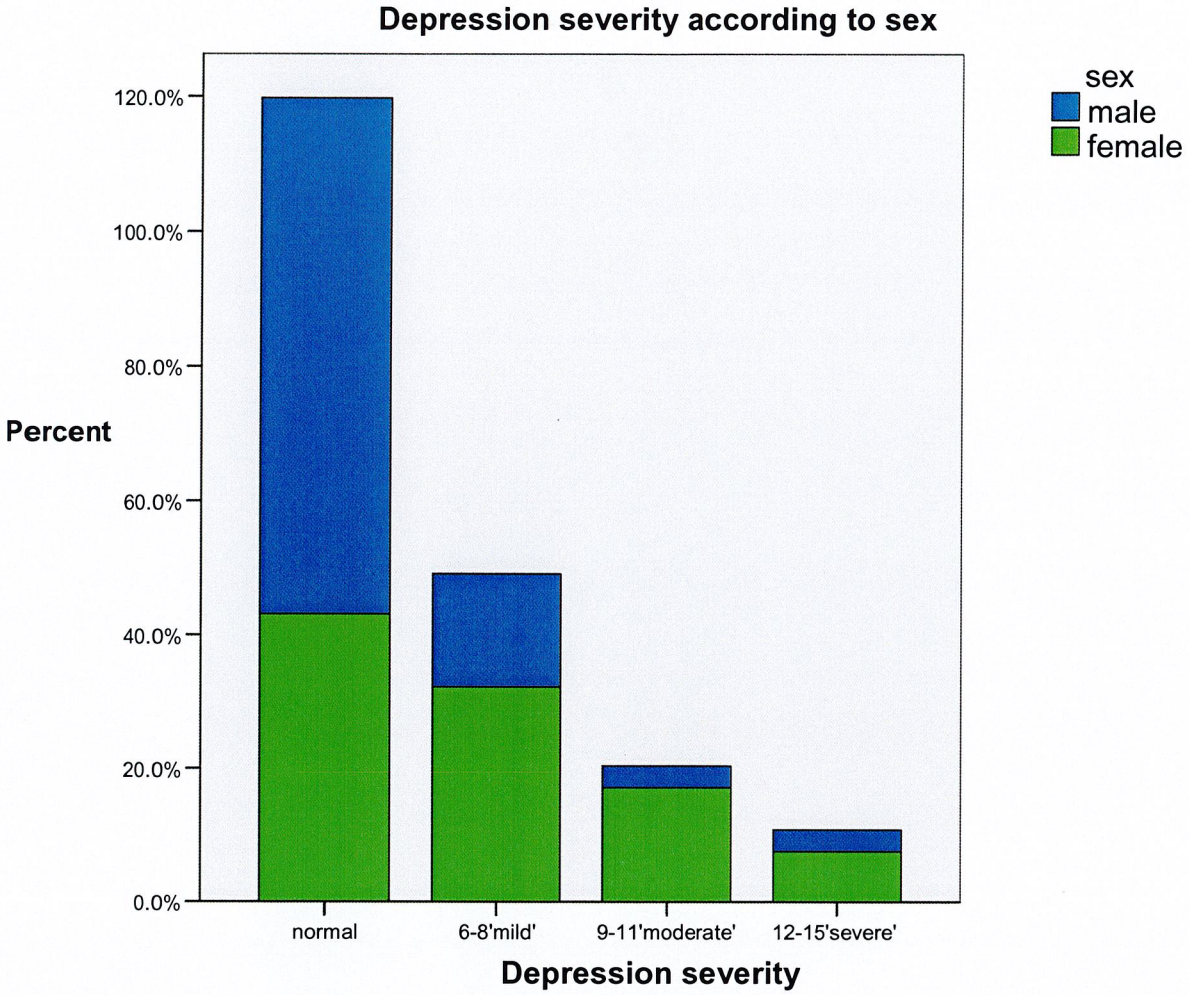

Prevalence of depression among participants
prevalence
non
depressed
41.48%
58.52%

Graph: 13

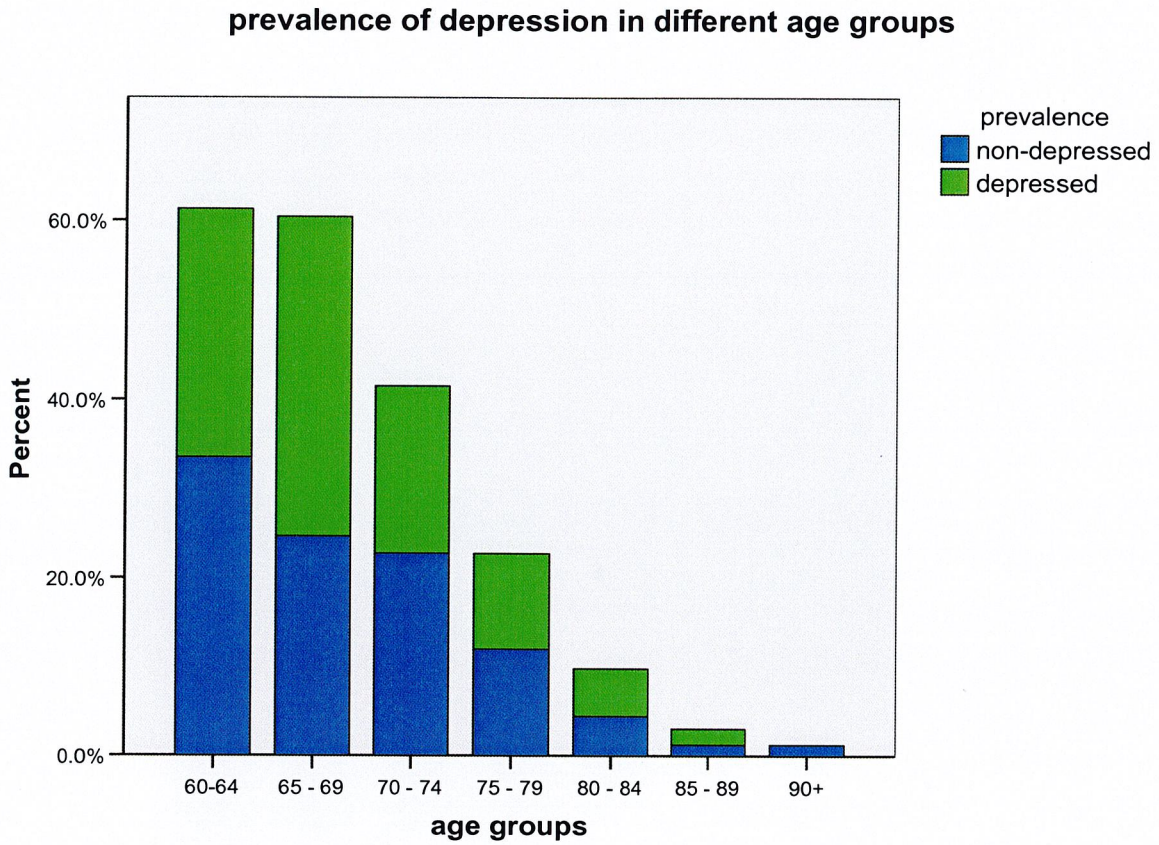
Prevalence of depression according to sex



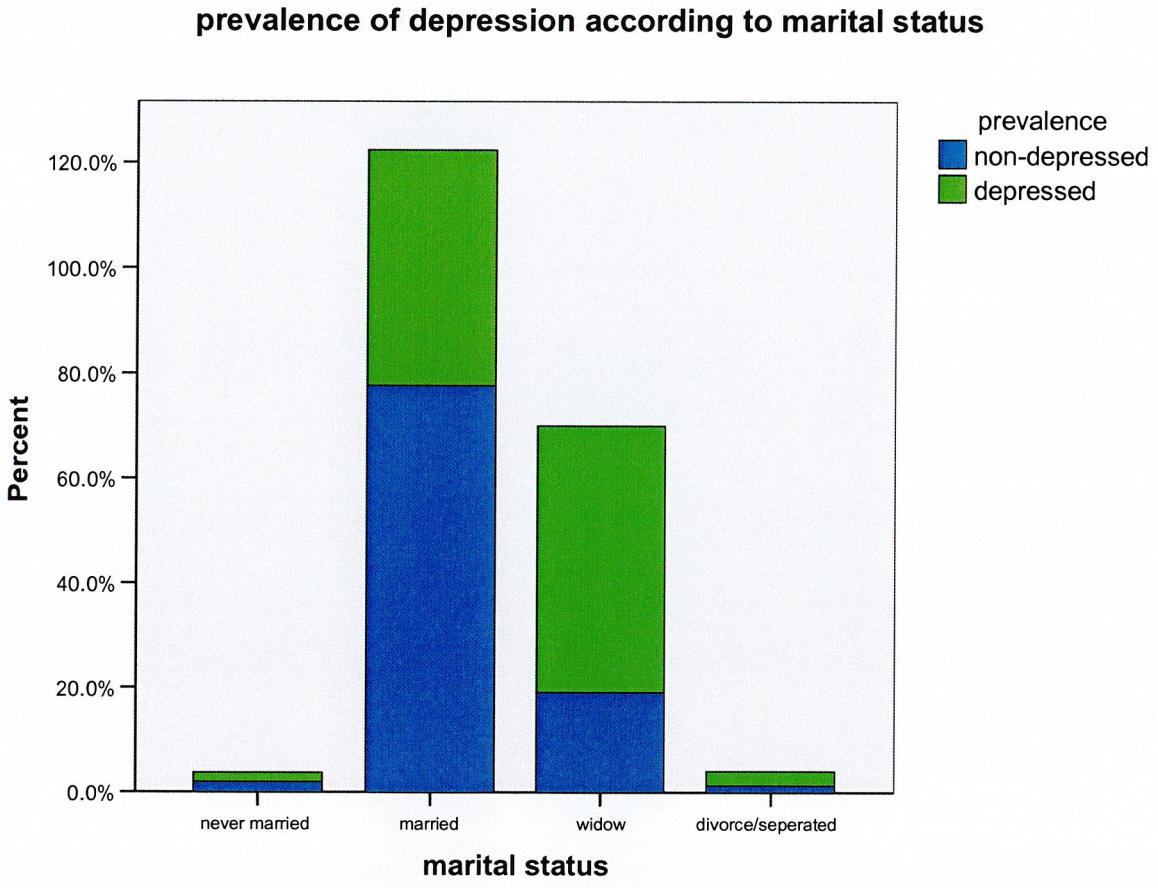
Graph: 14


Depression severity according to sex
sex
male
female
120.0%
100.0%
80.0%
60.0%
40.0%
20.0%
0.0%
Percent
normal
6-8'mild'
9-11'moderate'
12-15'severe'
Depression severity

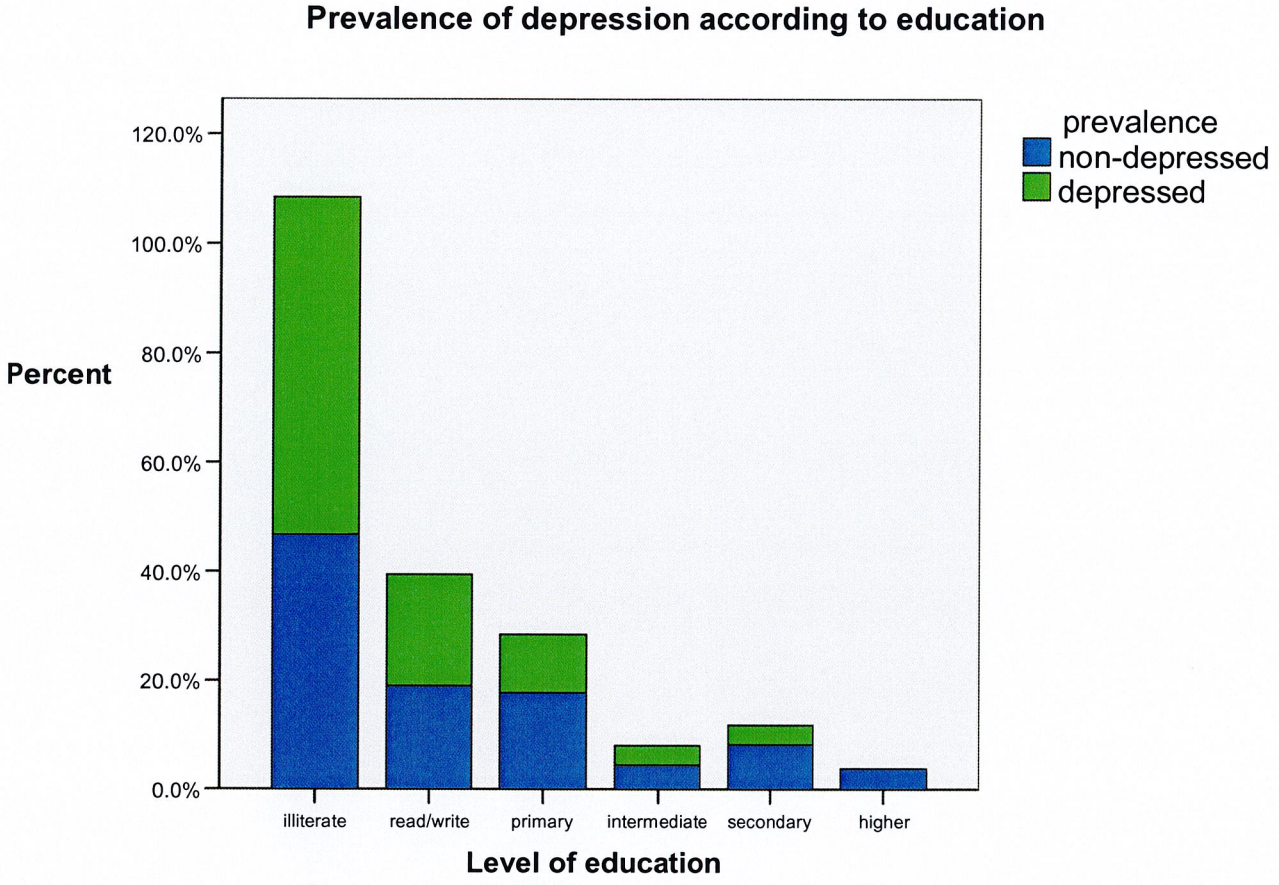
Graph: 15


prevalence of depression in different age groups
prevalence
non-depressed
depressed
Percent
60.0%
40.0%
20.0%
0.0%
60-64
65 - 69
70 - 74
75 - 79
80 - 84
85 - 89
90+
age groups

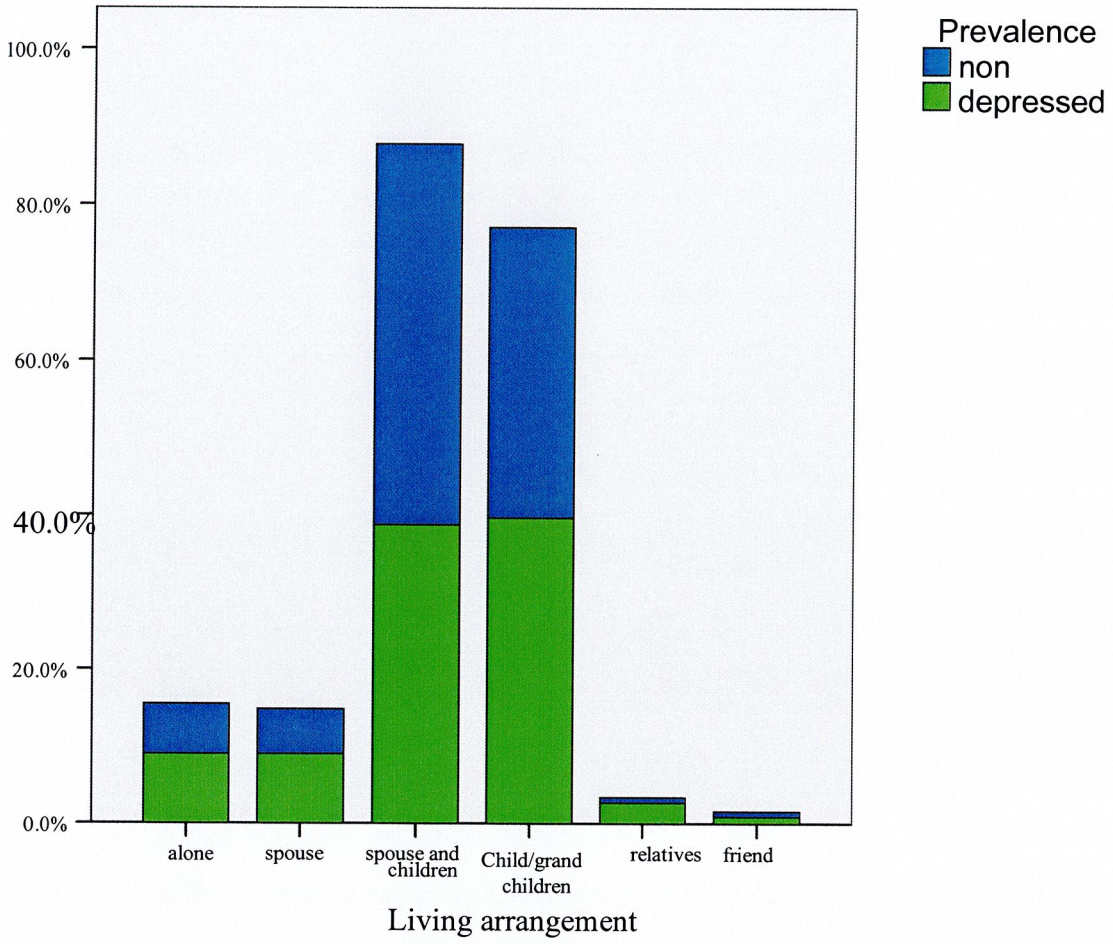
Graph: 16


prevalence of depression according to marital status
prevalence
non-depressed
depressed
120.0%
100.0%
80.0%
60.0%
40.0%
20.0%
0.0%
Percent
never married
married
widow
divorce/seperated
marital status

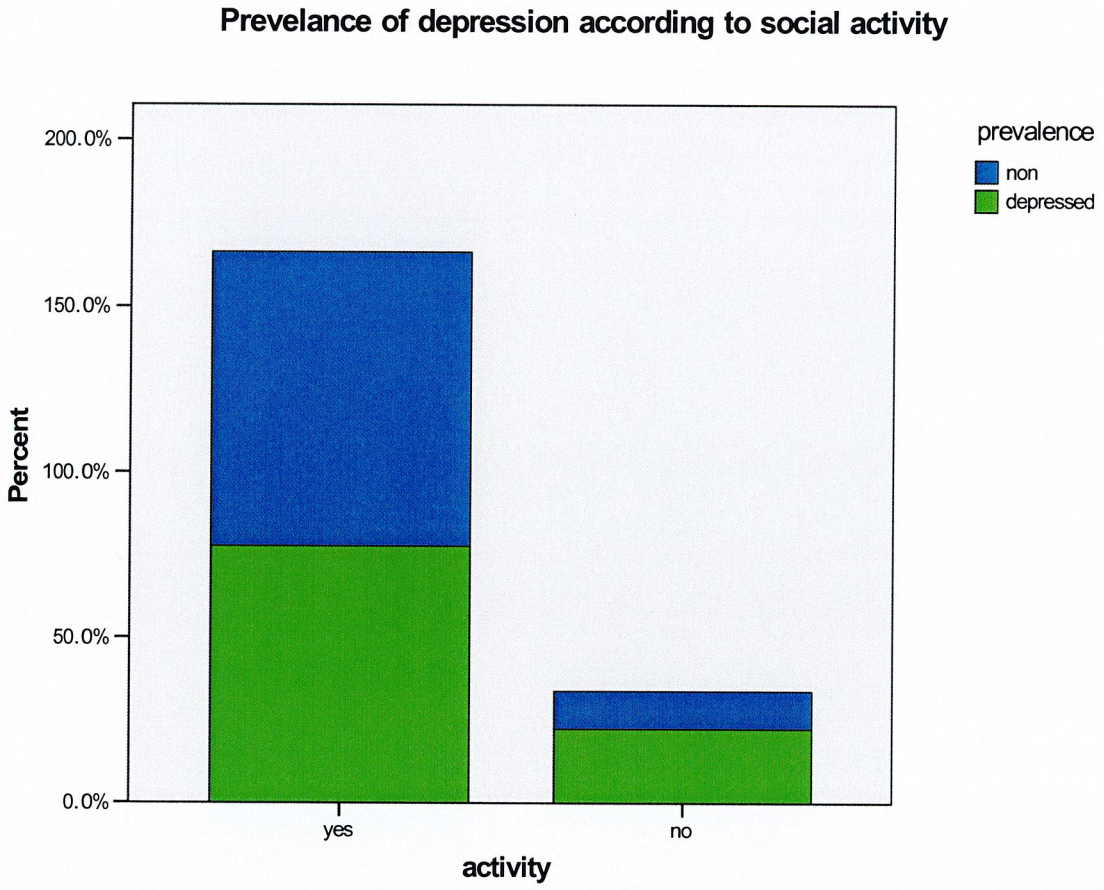
Graph: 17


Prevalence of depression according to education
Percent
120.0%
100.0%
80.0%
60.0%
40.0%
20.0%
0.0%
illiterate
read/write
primary
intermediate
secondary
higher
Level of education
prevalence
non-depressed
depressed

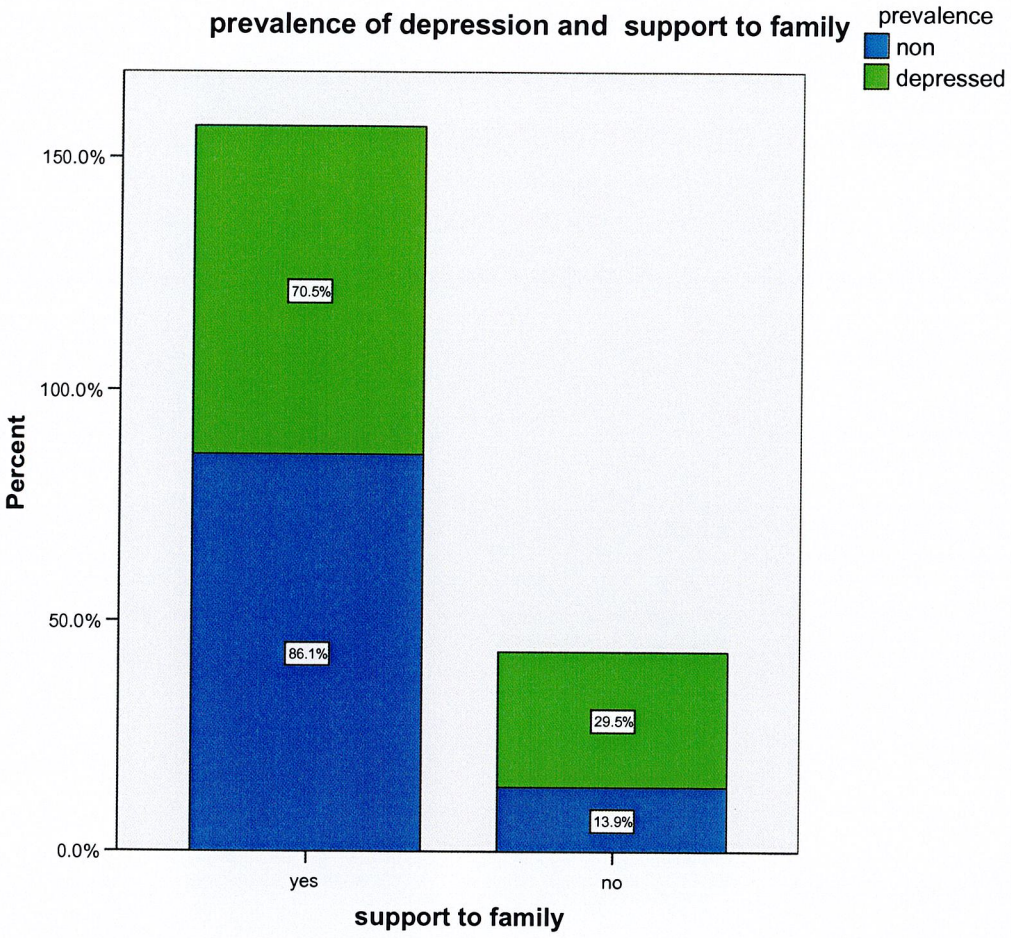
Graph: 18 **Prevalence of depression according to living arrangement**



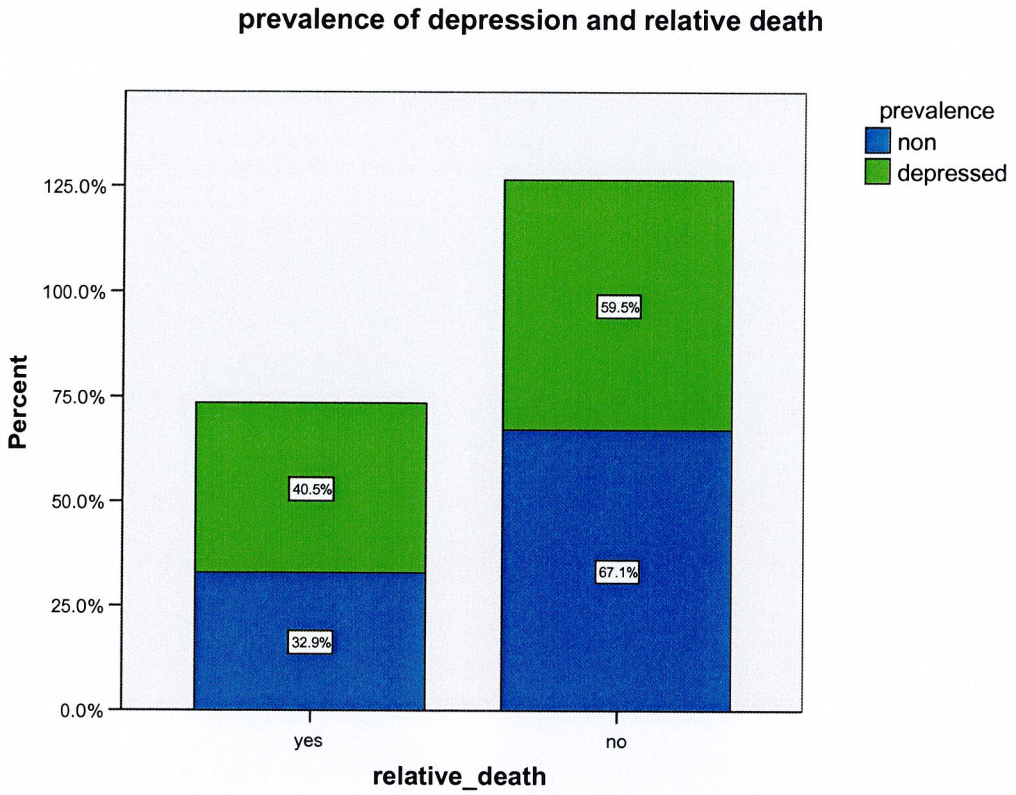
Graph: 19


Prevelance of depression according to social activity
200.0%
150.0%
100.0%
50.0%
0.0%
Percent
yes
no
activity
prevalence
non
depressed

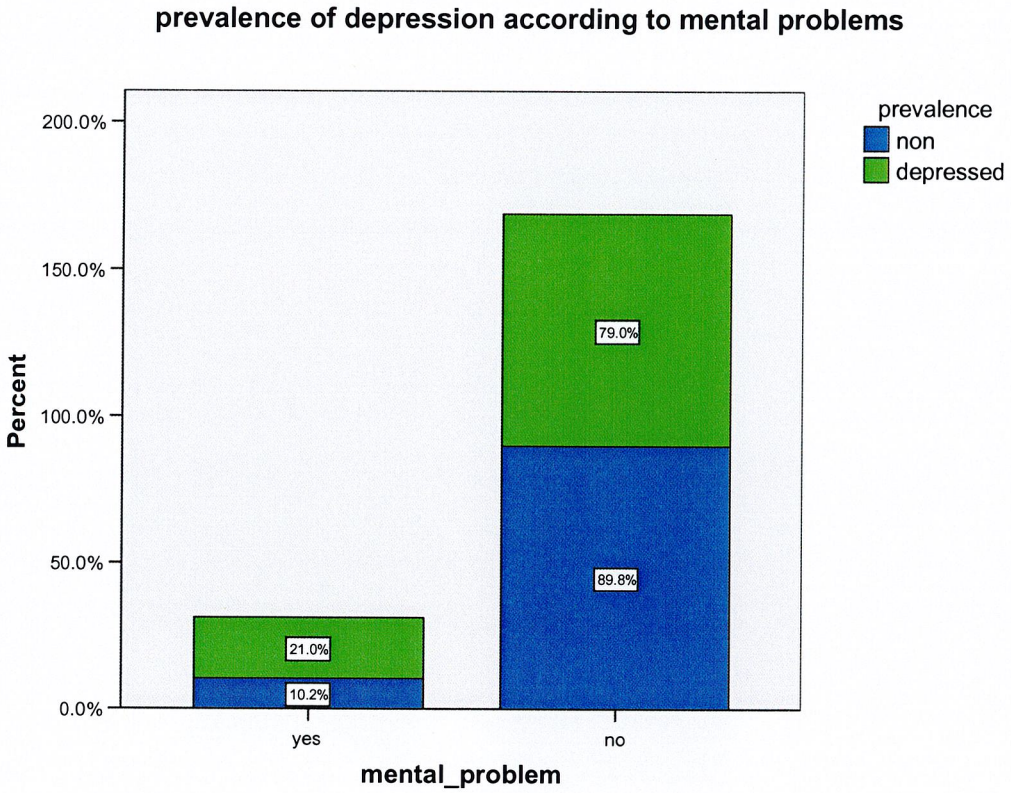
Graph: 20


prevalence of depression and support to family
prevalence
non
depressed
150.0%
100.0%
50.0%
0.0%
Percent
70.5%
86.1%
29.5%
13.9%
yes
no
support to family

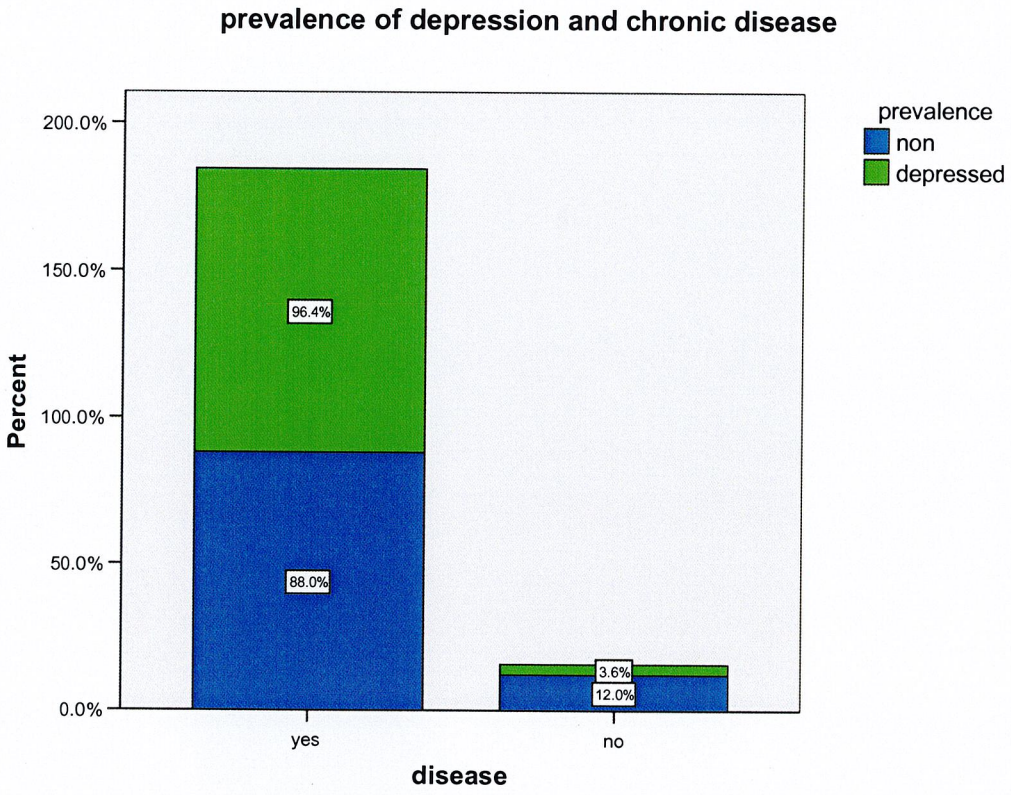
Graph: 21


prevalence of depression and relative death
prevalence
non
depressed
125.0%
100.0%
75.0%
50.0%
25.0%
0.0%
Percent
40.5%
32.9%
59.5%
67.1%
yes
no
relative_death

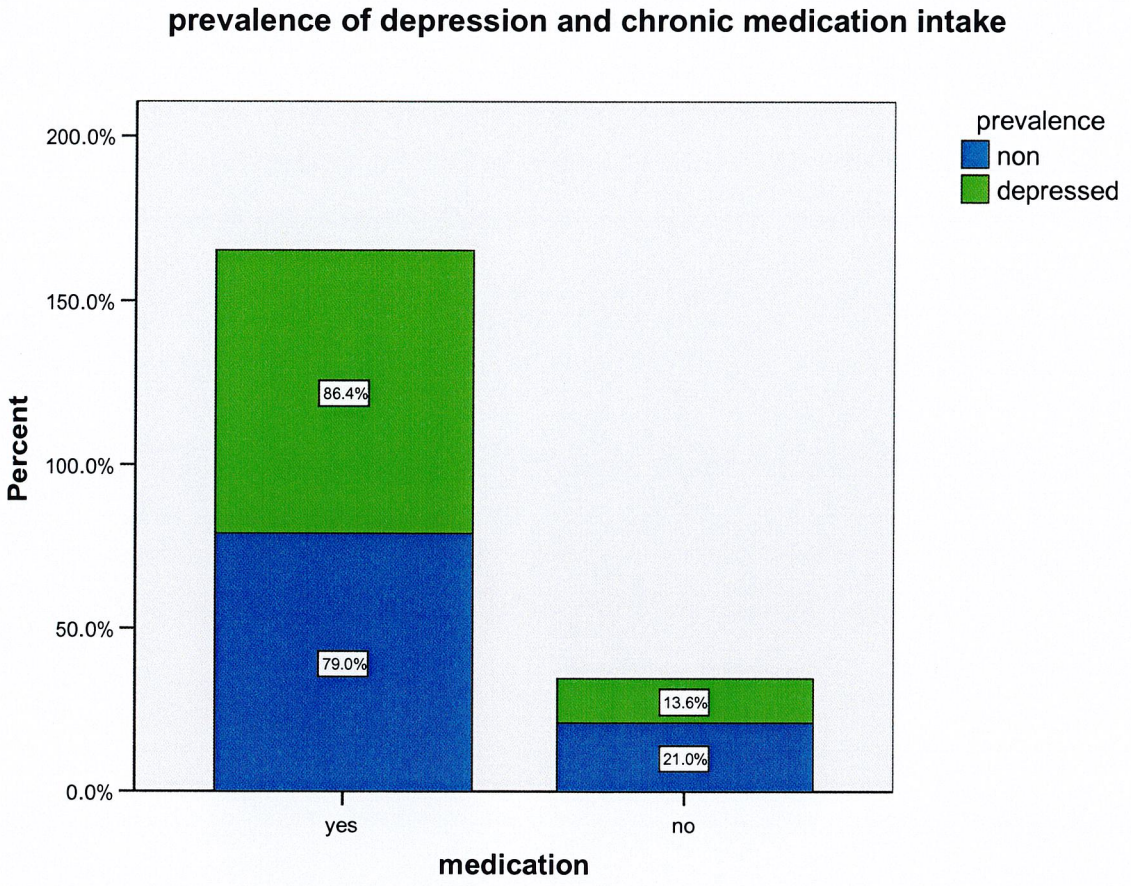
Graph: 22


prevalence of depression according to mental problems
200.0%
150.0%
100.0%
50.0%
0.0%
Percent
79.0%
89.8%
21.0%
10.2%
yes
no
mental_problem
prevalence
non
depressed

Graph: 23


prevalence of depression and chronic disease
200.0%
150.0%
100.0%
50.0%
0.0%
Percent
96.4%
88.0%
3.6%
12.0%
yes
no
disease
prevalence
non
depressed

Graph: 24


prevalence of depression and chronic medication intake
prevalence
non
depressed
200.0%
150.0%
100.0%
50.0%
0.0%
Percent
86.4%
79.0%
13.6%
21.0%
yes
no
medication

Arabic abstract

الخاتمة:

هذه الدراسة وجدت إن أعراض الاكتئاب تنتشر بكثرة بين المسنين المراجعين للمراكز الصحية الاوليه في البحرين لذلك يجب تدريب الأطباء العاملين في هذه المراكز على الاكتشاف المبكر للاكتئاب بين المسنين الأكثر عرضة لذلك ومعالجته.

الخلاصة:

الهدف من الدراسة: تقدير معدل انتشار الاكتئاب بين كبار السن المراجعين للمراكز الصحية الاوليه في مملكه البحرين ومدى ارتباطه بالظروف الاجتماعية والحالة الصحية للمسن.

المنهجية:

هذه دراسة مسحيه أجريت في 4 مراكز صحية اختيرت عشوائيا بمعدل مركز واحد من كل محافظة صحية.وشملت الدراسة المرضى المسنين الذين تبلغ أعمارهم 60 سنه أو أكثر والمترددين على تلك المراكز في الفترة ما بين يوليو وأغسطس 2006 م.

تم إعداد استبيان من قبل الباحث للحصول على معلومات عن الظروف الاجتماعية والحالة الصحية للمسن كما تم قياس درجة الاكتئاب بواسطة مقياس اكتئاب المسنين..GDS-15

النتائج:

أجريت الدراسة على 270 مسن وقد وجد إن معدل انتشار الاكتئاب بينهم 41.5 % وكان أكثر انتشارا بين النساء ، والمسنين الأرامل والمطلقين ، والمسنين الذين يعيشون لوحدهم وبين المسنين الأميين أو ذوي التعليم المنخفض. كما وجد إن أعراض الاكتئاب كانت أكثر شيوعا بين المسنين الذين كانوا يعانون من مشاكل صحية مزمنة خصوصا الضغط، أمراض القلب، أمراض المفاصل، و أمراض العين والإذن.

جامعة الخليج العربي

كلية الطب والعلوم الطبية

برنـــامج السياسات
الصحية والدراسات السكانية

الإكتئاب في كبار السن المراجعين للمراكز الصحية في البحرين: نحو سياسة للتشخيص والعلاج

رسالة مقدمة كجزء من متطلبات الحصول على درجة الماجستير
في السياسات الصحية والدراسات السكانية

إعـــــــداد

فاطمة عبد الله حبيب محمد

بكالوريوس في الطب والجراحة، جامعة الخليج العربي، مملكة البحـــــرين، ١٩٩٠م

إشـــــراف

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جامعة الخليج العربي

مملكـــة البحـــــرين

صفر ١٤٢٩ هـــ

فبراير ٢٠٠٨م