Original Article

The economic burden of depression in psychiatric disorders

Elahe Pourahmadi[1], Amin Adel[2], Shapour Badiee Aval[3], Seyed Javad Hoseini[4], Hosein Ebrahimipour[1], Maliheh Ziaee[5*]

[1] Social Determinants of Health Research Center, Department of Health and Management, School of Health, Mashhad University of Medical Sciences, Mashhad, Iran
[2] School of Public Health, Mashhad University of Medical Sciences, Mashhad, Iran
[3] Department of Acupuncture, School of Traditional Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
[4] Department of Medical Biotechnology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
[5] Department of Community Medicine, School of Medicine, Social Determinants of Health Research Center, Gonabad University of Medical Sciences, Gonabad, Iran
Corresponding author and reprints: Maliheh Ziaee. Department of Community Medicine, School of Medicine, Social Determinants of Health Research Center, Gonabad University of Medical Sciences, Gonabad, Iran.
Email: malihehziaee@gmail.com
Accepted for publication: 22 August 2019

Abstract

Background: Psychiatric disorders are very common, but their economic costs are not calculated transparently, while they are associated with significant economic consequences. This study aimed to investigate the direct and indirect costs of psychiatric disorders in 2017.

Methods: The present cross-sectional study was performed on all psychiatric patients admitted to hospitals in Ibn-e-Sina and Hejazi hospitals of Mashhad (northeastern Iran). According to the International book of ICD10, the medical records of psychiatric patients admitted with the Code of Mental and Behavioral Disorders (F32-F33.9) were first identified and their costs of hospitalization were extracted and investigated from the Hospital Information System. The Top-Down Approach was used to estimate the costs. Descriptive statistics were used to analyze the data.

Results: During the study period, 6896 patients were discharged, of which 1915 (28%) had mood disorders and among the mood patients, 300 (16%) had depression. The highest treatment cost for psychiatric patients was paid by insurance (93%). The average length of stay in the hospital was 23.6 days, and the average cost of each patient was $ 1020. The greatest cost of depression patients is related to hoteling (62%) and doctor's visit (24%).

Conclusion: Policymakers can use technical and operational methods to detect and eliminate the causes of adverse deviations to improve productivity and efficiency. Cost savings by providing healthcare prevention services can reduce the direct costs of hospitals.

Keywords: Depression; Economic Burden; Health Care Costs; Mood Disorders

Cite this article as: Pourahmadi E, Adel A, Badiee Aval S, Hoseini SJ, Ebrahimipour H, Ziaee M. The economic burden of depression in psychiatric disorders. SDH. 2019;5(4):222-230. DOI: https://doi.org/10.22037/sdh.v5i4.28429

Introduction

In the world today, psychiatric disorders are very common, but their economic costs are transparently uncalculated, while they are associated with significant economic consequences (1). Psychiatric diseases are a major group of common diseases that may lead to mental and physical disability in individuals. It is generally accepted that policymakers need to get information not only about the epidemiological indicators of these diseases, such as prevalence and incidence but also about the size of their effects (2). The cost of psychiatric disorders is one of the challenges of healthcare policy (3). The healthcare-related costs for such diseases in the United States were 16% of gross national product in 2006, which reached 20% in 2016 (4). Unlike other psychiatric disorders, indirect costs of psychiatric disorders are higher and more important than direct costs. The indirect costs can result in a shortage of labor, public support payments, less education, and costs associated with outcomes such as homelessness (5). A depressive disorder is expected to be the second cause of the Global Burden of Disease (GBD) by 2020 (6).

The cost of psychiatric disorders is complex, whose measurement is also difficult (7). The study of the economic costs of psychiatric disorders can provide information about the gaps, limitations, and future needs. Unfortunately, no accurate studies have been done in this regard in Africa, Asia, Eastern Europe, and Latin America. The global direct treatment cost for each psychiatric disorder on average is between 1% and 2% of the total national health expenditures (8).

Studies show a considerable variation in estimates of costs, even for similar psychiatric disorders in the same period in a country. This wide variety may be due to differences in the classification of diseases, the definition of cost groups, the characteristics of individuals in the population studied, different sources of information, and differences in the number of discounts. Each study is a way to inform policymakers about the economic consequences of psychiatric disorders (9-11).

According to a report by the Director-General of the World Health Organization, the governments were first requested to submit their strategic plans and decisions to make positive changes in the admission and treatment of psychiatric disorders (12, 13). According to the report, some psychiatric disorders can be prevented and most psychiatric and behavioral disorders can be successfully treated with low cost (14, 15). Despite the chronic and prolonged nature of some psychiatric disorders, people can start their productive lives with appropriate treatment. Up to 60% of people with depression can recover with a combination of antidepressants and psychotherapy (16).

At present, more than 33% of countries account for less than 1% of their total health budgets, and 33% only allocate 1% of their budgets to mental health (2, 17, 18).

In more than half of the world, there is a psychiatrist per ten thousand people, and there is a hospital bed in 40% of the countries per ten thousand people. Currently, over 40% of countries have no mental health policies, and about 25% of countries do not have mental health laws (19).

The present study aimed at estimating the economic burden of depression in Northeastern Iran based on economic evidence.

Methods

The present descriptive and cross-sectional study was performed in all psychiatric patients over 15 years of age admitted to hospitals affiliated to Mashhad University of Medical Sciences, Iran (from March 2016 to February 2017).

According to the International Book of ICD 10, the medical records of psychiatric patients admitted with the Code of Mental and Behavioral Disorders (F32-F33.9) were

first identified and their information was extracted and investigated from the Hospital Information system.

The mean cost per patient was calculated based on the identification code to reach the costs of hospitalized patients. Ibn-e-Sina and Hejazi hospitals are the eastern referral center with 700 hospital beds consisting of wards including medical laboratory, male and female pediatrics, electroshock, women's education, men's education, women's emergency, men's emergency, veterans, men's substance abuse, Hejazi women's ward, Hejazi men's ward, men's and women's nursing department, substance abuse, emergency departments, imaging, and speech-language pathology. The hospital receives globally a general and specific budget from the Ministry of Health and Medical Education of the Islamic Republic of Iran to cover costs. The web address of www.medcare.gov.com was used to ensure the accuracy of the information being investigated to identify the amount of funding allocated to these hospitals. The patient costs socially were calculated as the direct treatment costs on the indirect costs. The calculation was performed by the direct costs of all cases registered in the medical records (visits, consulting visits, hoteling, pharmaceutical products, physiotherapy and other costs such as labs, radiology, etc.) and the indirect costs (absenteeism and reduced productivity due to hospitalization and recovery period). The Top-Down Approach was used to estimate the costs (20). The reason for using this method is to reduce the recalculation in the estimation of indirect costs. If there were no details of cost information in the records, the above method would apply for costs. In indirect costing, although the results may not reflect the true epidemiological conditions, it prevents the recounting of patients.

In this research, the types of direct medical expenditures were calculated using the information in the patient records. The number of referrals was considered in all records including laboratory, anesthesia, operating room, surgeon, nursing services, medicine, consumables, hoteling, visitation and counseling and other expenditures (physiotherapy, ultrasound, pathology, radiology, CT scan, EEG, ECG, and other medical procedures) to calculate the direct costs. The indirect costs due to depression were calculated using available economical methods. The cost of missing working days due to depression per patient was obtained by multiplying the number of missing working days due to the illness in one year for one patient in the mean daily income of the person in 2016. The number of missing working days due to depression in one year was 23.6 days, and the mean daily income of each Iranian in 2016 was determined to be 195500 Rials. Given the varying value of different currencies and the fact that the price of a product varies according to the economic conditions in different countries, there was a need for a criterion that can be used to compare different countries and services. To solve this problem, the equivalent of one $ PPPUS to the Iranian Rials was calculated according to the statistics extracted from the website of World Health Organization (WHO) and World Bank in 2011(21). This way was used to convert the Iranian Rials to $ PPPUS in all stages of the present study. The cost of depression-related disability per patient in the first half of 2016 was obtained by multiplying the percentage of depression-related disability in a person's Gross Domestic Product (GDP) during the year of 2016 ($GDP per capita, PPP (current international) (22). This method is called the partial factor productivity calculation that refers to the ratio of total outputs to a subset of inputs. For example, output per man-hour (labor productivity) or net interest income per Rial of assets (capital productivity) and so on. The mean percentage of depression-related disability was calculated to be 2.28%. The Iranian one's GDP in one year was calculated to e 19964 $PPP. Descriptive statistics (frequency, percentage, mean and standard deviation) were used to analyze the data.

Table 1. Characteristics of the study population

		Female		Male		Total	
		Mean	SD	Mean	SD	Mean	SD
Age (year)		39.6	13.8	41.9	13	41.2	13.3
		N	%	N	%	N	%
Gender		93	31%	207	69%	300	100%
Residential region	Urban	63	68%	176	85%	239	80%
	Rural	30	32%	31	15%	61	20%
Type of Insurance	Uninsured	0	0%	3	1%	3	1%
	Armed forces insurance	5	5%	14	7%	19	6%
	Social security insurance	17	18%	40	19%	57	19%
	Health service insurance	71	76%	150	72%	221	74%

Table 2. Expenditures in depressive and recurrent depressive disorders

Disorders		Depressive episode		recurrent depressive disorders		Total	
LOS (day)		Mean	SD	Mean	SD	Mean	SD
		25.2	16.9	23.3	16.5	23.6	16.6
		N	%	N	%	N	%
Number of patient		55	18%	245	82%	300	100%
Per Capita expenditure $ PPP	Para clinic services	27	2%	20	2%	21	2%
	Surgeon	68	6%	39	4%	44	4%
	Medicine & Disposable medical instruments	15	1%	14	1%	14	1%
	Physiotherapy	7	1%	5	0%	5	0%
	Hoteling	664	60%	630	63%	636	62%
	Visits	284	26%	240	24%	248	24%
	Advices and consultancy	22	2%	20	2%	20	2%
	Others	21	2%	33	3%	31	3%
	Total	1,109	100%	1,001	100%	1,020	100%

Table 3. Direct and indirect costs in depressive disorders

Direct costs	Per Capita	%	Sources
Para clinic services	27*	2.4	HIS**
Surgeon	68	6.1	HIS
Medicine & Disposable medical instruments	15	1.4	HIS
Physiotherapy	7	0.6	HIS
Hoteling	664	59.9	HIS
Visits	284	25.6	HIS
Advices and consultancy	22	2.0	HIS
Others	21	1.9	HIS
Total	1,109	100	HIS
Indirect costs			
Absenteeism from work	99	17.9	HIS
reduced productivity at work	454	82.1	WHO***
Total	553	100	

*(PPP$)

**Hospital Information System(HIS) of Hospital Affiliated with Mashhad University of Medical Sciences (MUMS):

*** World Health Organization, Department of Mental Health and Substance Dependence

Results

During the study period, 6896 patients were discharged from Ibn-e-Sina and Hejazi hospitals in Mashhad, of which 1915 (28%) had mood disorders and among the mood patients, 300 (16%) had depression.

After implementing the health promotion plan from 2014, the patients receive a health insurance subsidy that reduces the out-of-pocket expenditures of hospitalized patients. Also, deductible payments are granted to mentally ill patients on the credit line 30323 financed through the Ministry of Health and Medical Education. Also, some of these funds are provided by the charity or the hospital. Out of total psychiatric patients (with and without insurance) in this study, out-of-pocket spending was 2% (47,783 of 2,023,992 $PPP) and the government's share, including the health insurance subsidy, deductible payments, and credit line, would be 5%

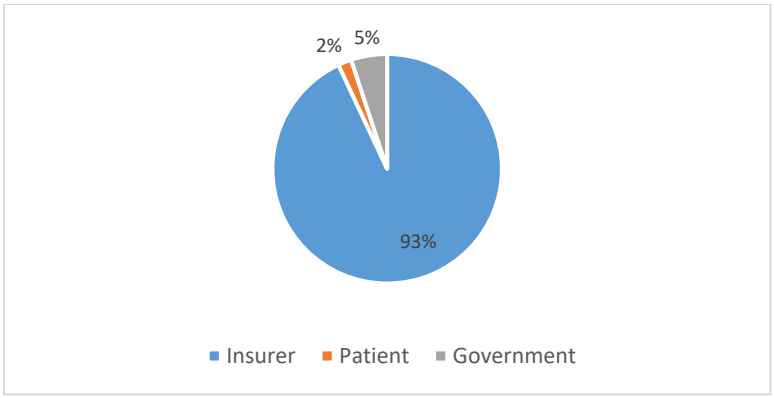

Figure1. Treatment cost for psychiatric patients (6896 patients)

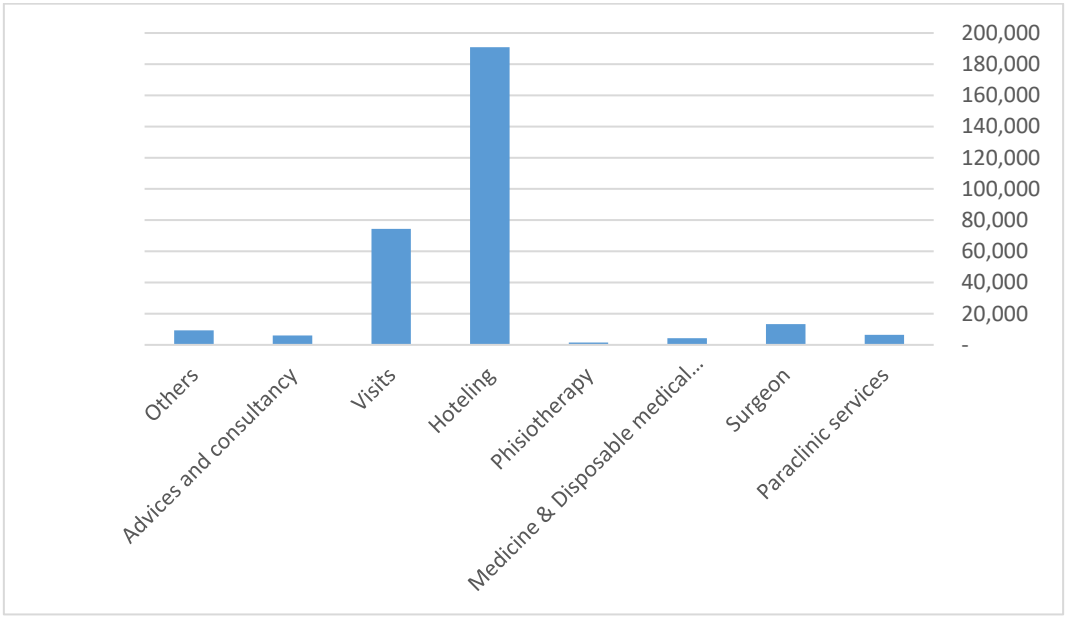

Figure2. Expenditures in depressive and recurrent depressive disorders ($PPP)

(120,012 of 2,023,992 $PPP). The highest treatment cost for psychiatric patients is paid by insurance (93%) (2,191,787 of 2,023,992 $PPP). (Figure1)

The average length of stay in the hospital was 23.6 days, and the average cost of each patient was $1020. The greatest cost of depression patients is related to hoteling (62%) (636 of 1020) and doctor's visit (24%) (248 of 1020). (Table2)

Discussion

The results of this study showed that out-of-pocket spending was 2%, insurance spending was 5%, and state spending was 93% among those attending this hospital affiliated to Mashhad University of Medical Sciences. In a study in Korea, the total cost of 430 patients with depression was $4049 million, out-of-pocket spending was 26% of total expenditures ($40.7 million) and 68% of direct costs. In Major Depressive Disorder (MMD), during the 2005 and 2010 surveys in the United States, 45% of the total cost and a total of 33% were direct costs per person (3). In this regard, we can point to the success of the national health promotion plan in Iran in reducing out-of-pocket spending.

The cost of treatment in patients with depression accounted for 0.44% of total health care expenditure in the whole country of Korea in 2005 (3). The results of a study in Asian countries showed that households with a favorable economic

situation in developing countries spend a high proportion of their income on health expenditure (23).

The results of the study showed that an average of $1020 (PPP) is spent to treat each patient with depressive symptoms among those referring to Mashhad University of Medical Sciences. The results of a systematic review by reviewing 24 articles from 1996-2013 showed that the mean annual cost per patient varies from $1,000 to $2,500. This cost has been higher in patients who are resistant to treatment (1). In a study in Korea in 2005, the mean direct cost per patient was $273 per annum, which could be due to the growth in the prices of services provided in these years. In a study during 2005 and 2010 in the United States, the prevalence of Major Depressive Disorder (MDD) and related treatment costs had been increased significantly (an increase from 216 million to 228 million), with an economic burden of $173.2 billion in 2005 and $ 173.2 billion in 2010. There has been a 21% increase in this period. The treatment cost per MDD patient in 2005 was $5707, which reached $5,988 in 2010 (5% increase) (24). In a study conducted in Germany (2012), the mean annual cost per person was €458.9 of which 43.9% dedicatedto hospitalized patients. The mean annual cost for attending a hospital was €8782 (±7680) per person (4). In another study conducted on 556 patients with depression in Sweden (2013), the financial burden of depression in Sweden was estimated at around 8 billion a year. In this study, the mean direct cost (per person per year) was €3,561 for mild depression, €9,744 for moderate depression, and € 16,240 for severe depression. In a study in Sweden, the costs of 10430 patients with depression were evaluated and an estimated annual cost per patient was €17279. The hospitalization cost per day was € 585 (25). The reason for the difference in the estimated cost of this study with our research is the study duration, as the mean duration of hospitalization was 23.6 days in our study.

In a study in Korea, the direct costs were estimated at 4.2% of total costs. In a study in the United States between 2007 and 2009, the direct costs per patient fell slightly during these years (£487 to £436), respectively. In people with relapse (compared to other cases), the costs were three times higher. In people with severe depression, the costs were twice as high as moderate disease and five times higher than those with mild depression (3).

According to reports from the World Health Organization, one out of four people suffers from psychiatric disorders while not using the available treatment. (16). In a study on depression-related costs in Europe in 28 countries with a population of 496 million, it has been shown that there were 21 million people with depression. The total cost of depression in Europe in 2004 was €118 billion. The direct costs were €42 billion (10). The prevalence of psychiatric disorders was reported to be 14% in Europe in 2006 (26). According to the WHO, 12.4% of the YLD in 2012 was due to psychiatric disorders. In the present study, there was no possibility of estimating this prevalence due to research limitations.

The depression affects not only the quality of life, the productivity of individuals, but also unemployment, and the reduction of financial success (4). In this study, the cost of productivity reduction was $PPP 454 and the cost of absenteeism was $PPP 99, accounting for 33.3% of the total expenditures.

In a study in Korea, the indirect costs accounted for 95.8% of total costs. In this study, the indirect costs included the calculation of adverse effects, lost years due to death, reduced productivity, and absenteeism (3). In a Swedish study on 10,000 cases of psychiatric disorders (2006-2008), the indirect costs accounted for 88.2% of total expenditures, calculated using a human capital approach and a decline in labor productivity (25).

In the present study, in the cost-related items, the greatest cost of patients with depression was associated with hoteling

(62%) and physician visits (24%), and the lowest cost was related to physiotherapy. The cost of drugs included 1% of the total direct costs. In a study in the United States (2010), drug costs (41%) and outpatient expenses (30.7%) had the highest share in the costs. The cost of admission to severe illnesses accounted for three-quarters of the total cost and, on average, half of the cost (2, 7). In a study in Sweden on ten thousand patients with psychiatric disorders, hoteling costs of 6%, and drug costs of 1.5% were identified as of total costs (direct and indirect) (25).

In addition, the regression analysis conducted in the study of European countries showed that the number of hospitalization days, psychiatric visitation, disability insurance, missing working days were associated with the total cost of the disease. (27).

In a study to investigate the global burden of depression, the results showed that the direct calculation of GBD is difficult and along with errors. In 2010, when the MDD was considered a risk factor for suicide, more than 16 million DALYs were caused by the depression in the world.

Besides, 2.9% of DALYs of previous illnesses belonged to MDD. Considering these cases, the total burden of MDD in the world rises from 2.5% to 3.4%, and the total burden of disease increases the incidence of depression from 3% to 3.8%. These cases raise the MDD disease rate in GBD and change from eleventh to eighth. This GBD increased by 37.5% between 1990 and 2010. This is due to population growth and aging. In 2010, depression disorders were identified as an important factor in GBD (8). In the present study, due to the existing limitations, we were unable to identify the burden of depressive disorder in northeastern Iran, so we have just mentioned global reports on this issue. In a study in the United States in the years 2007-2009, age, living in urban areas, unemployment, and family history of illness were introduced as effective factors in spending treatment costs for depression disorders (2).

The cost of care and treatment for patients with psychiatric disorders and depression seems to be associated with the upward trend in the current society of Iran and the world on an ongoing basis. This can be considered as an important concern for the health system of each country. Policymakers can use technical and operational methods to detect and eliminate the causes of adverse deviations to improve productivity and efficiency. Cost savings by providing healthcare prevention services can reduce the direct costs of hospitals. The experience of pioneer countries in this topic can be used. Culture-making or paying more attention to psychiatric disorders can help in the effective use of resources. Despite the high incidence of depressive disorders, these problems are often undiagnosed or treated inappropriately (28). Most patients with depression refer to general practitioners instead of referring to psychiatric clinics, which increases costs and prolongs the course of treatment (19). Despite recent advances in the drug and outpatient treatments of depression, hospitalization is still an essential part of the direct cost of these patients. Missing working days or disability due to illness has led to enormous risk costs. Intangible costs, such as the burden on the family and the quality of life associated with disturbed patients, are common, although it is difficult to calculate the monetary value of these costs (23, 27).

In developing countries and middle-income countries, the underlying cause of higher indirect costs in comparison with direct medical costs is usually due to illness (12). In advanced and developed countries, in recent years, attention to treatment and control of disease complications has led to an increase in direct medical costs compared with indirect costs (28). The reason for the difference in the direct and indirect costs calculated between this research and other studies can be attributed to their constituent components.

Differences in the costs of physician visits, medicines, and tests, which are due to human resources, equipment, and consuming materials, cause a difference in direct costs under various spatial and temporal conditions. The control of indirect costs is one of the most important ways to reduce costs.

Overall, direct medical care costs accounted for 67% of the total cost and indirect costs accounted for 35%. In the total indirect, 18% were Absenteeism from work and 82% were reduced productivity at work. The result showed this cost is 33% of the total per capita GDP per person in Iran (according to World Bank statistics).

Acknowledgement

The researchers would like to thank Mashhad University of Medical Sciences and Ibne-Sina Hospital for supporting this study.

Conflict of interest

Authors declare no conflict of interest.

References

1. Mrazek DA, Hornberger JC, Altar CA, Degtiar I. A review of the clinical, economic, and societal burden of treatment-resistant depression: 1996–2013. Psychiatric services. 2014;65(8):977-87.
2. Kleine-Budde K, Müller R, Kawohl W, Bramesfeld A, Moock J, Rössler W. The cost of depression–a cost analysis from a large database. Journal of affective disorders. 2013;147(1-3):137-43.
3. Chang SM, Hong J-P, Cho MJ. Economic burden of depression in South Korea. Social psychiatry and psychiatric epidemiology. 2012;47(5):683-9.
4. Kessler RC. The costs of depression. Psychiatric Clinics. 2012;35(1):1-14.
5. Soliman AM, Yang H, Du EX, Kelkar SS, Winkel C. The direct and indirect costs of uterine fibroid tumors: a systematic review of the literature between 2000 and 2013. American journal of obstetrics and gynecology. 2015;213(2):141-60.
6. Lynch FL, Clarke GN. Estimating the economic burden of depression in children and adolescents. American journal of preventive medicine. 2006;31(6):143-51.
7. Greenberg PE, Kessler RC, Birnbaum HG, Leong SA, Lowe SW, Berglund PA, et al. The economic burden of depression in the United States: how did it change between 1990 and 2000? Journal of clinical psychiatry. 2003;64(12):1465-75.
8. Ferrari AJ, Charlson FJ, Norman RE, Patten SB, Freedman G, Murray CJ, et al. Burden of depressive disorders by country, sex, age, and year: findings from the global burden of disease study 2010. PLoS medicine. 2013;10(11):e1001547.
9. Tomonaga Y, Haettenschwiler J, Hatzinger M, Holsboer-Trachsler E, Rufer M, Hepp U, et al. The economic burden of depression in Switzerland. Pharmacoeconomics. 2013;31(3):237-50.
10. Sobocki P, Jönsson B, Angst J, Rehnberg C. Cost of depression in Europe. Journal of Mental Health Policy and Economics. 2006.
11. Stander MP, Korb FA, de Necker M, de Beer JC, Miller-Janson HE, Moont R. Depression and the Impact on Productivity in the Workplace: Findings from a South African Survey on Depression in the Workplace. Journal of Depression and Anxiety S. 2016;2:1-8.
12. Fisher J, Mello MCd, Patel V, Rahman A, Tran T, Holton S, et al. Prevalence and determinants of common perinatal mental disorders in women in low-and lower-middle-income countries: a systematic review. Bulletin of the World Health Organization. 2012;90:139-49.
13. Organization WH. The world health report 2000: health systems: improving performance: World Health Organization; 2000.
14. Desjarlais R. World mental health: Problems and priorities in low-income countries: Oxford University Press, USA; 1995.
15. Barlow DH. Clinical handbook of psychological disorders: A step-by-step treatment manual: Guilford publications; 2014.
16. Organization WH. Depression and other common mental disorders: global health estimates. 2017.
17. Folland S, Goodman AC, Stano M. The economics of health and health care: Pearson Prentice Hall Upper Saddle River, NJ; 2007.
18. Segal ZV, Williams M, Teasdale J. Mindfulness-based cognitive therapy for depression: Guilford Publications; 2018.
19. Luppa M, Heinrich S, Angermeyer MC, König H-H, Riedel-Heller SG. Cost-of-illness studies of depression: a systematic review. Journal of affective disorders. 2007;98(1-2):29-43.
20. Dagenais S, Caro J, Haldeman S. A systematic review of low back pain cost of illness studies in the United States and internationally. The spine journal. 2008;8(1):8-20.
21. Kavosi Z, Jafari A, Keshtkaran V, Pourahmadi E. Estimating willingness to pay for an improved service delivery to patients referring namazi hospital chemical therapy ward in Iran using contingent valuation. Asian Pacific journal of cancer prevention: APJCP. 2018;19(7):1817.
22. WB. world bank 2016 [Available from: http://www.worldbank.org/en/country/iran/overview.

23. Gwatkin DR, Rutstein S, Johnson K, Suliman E, Wagstaff A, Amouzou A. Socio-economic differences in health, nutrition, and population within developing countries. Washington, DC: World Bank. 2007:287.
24. Greenberg PE, Fournier A-A, Sisitsky T, Pike CT, Kessler RC. The economic burden of adults with major depressive disorder in the United States (2005 and 2010). The Journal of clinical psychiatry. 2015;76(2):155-62.
25. Ekman M, Granström O, Omerov S, Jacob J, Landen M. The societal cost of depression: evidence from 10,000 Swedish patients in psychiatric care. Journal of affective disorders. 2013;150(3):790-7.
26. Bramesfeld A, Grobe T, Schwartz FW. Who is treated, and how, for depression? Social psychiatry and psychiatric epidemiology. 2007;42(9):740-6.
27. Andlin-Sobocki P, Wittchen HU. Cost of affective disorders in Europe. European Journal of Neurology. 2005;12:34-8.
28. Hotopf M. Diagnosis, assessment, and treatment of depression in advanced disease. Psychosocial Issues in Palliative Care: A community based approach for life limiting illness. 2018:149.