

Prevalence of disability in Iranian older adults in Tehran, Iran: A population-based study

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Abstract

Introduction: The increase in the prevalence of disability has serious consequences for elders, their families, and the society in general. The effects of disability on an aging population's health and welfare are important issues in gerontological research. The aim of the present study was to investigate the prevalence of disability in the community-dwelling older adults living in Tehran, Iran.

Methods: In this large population-based cross-sectional study (Urban HEART-2), 15,069 individuals aged ≥ 60 years were selected randomly based on a multistage, cluster sampling in Tehran, Iran, in 2011. All participants were interviewed by trained personnel by means of a standardized questionnaire which asked about prevalence of disability, disability type and socio-demographic variables. The data were analyzed using descriptive statistics and Chi-square test.

Results: Of the total study population, 54.8% ($n = 8,264$) were males. The participants' mean age was 68.93 years ($SD = 7.27$) and the participants' mean of Body Mass Index (BMI) was 26.21 kg/m² ($SD = 4.40$). Based on the results, the overall prevalence of disability was 11%. 'Hearing Loss' (68.3%) and 'Hearing Impairment' (10.4%) were the most prevalent types of disability that occurred in our sample. The majority of the participants were using services of private rehabilitation centers. There were statistically significant differences in terms of age, BMI, and educational background between the group of individuals who reported one or more types of disability and the group of individuals reporting none.

Conclusion: For older adults, disability directly affects daily functioning by restricting physical and social activities, the ability to maintain self-sufficiency, and ultimately the freedom to live a chosen lifestyle. Prevention strategies should focus on reducing the incidence of chronic disease and improving socioeconomic status of older adults.

KEY WORDS: epidemiology; disability evaluation; frail older adults; geriatrics; Urban HEART; Iran.

Riassunto

Introduzione: Un aumento di prevalenza della disabilità ha serie conseguenze per gli anziani, le loro famiglie e la società in generale. Gli effetti della disabilità sulla salute della popolazione anziana e sul welfare sono problemi importanti nella ricerca gerontologica. L'obiettivo del presente studio è stato quello di studiare la prevalenza della disabilità negli anziani che risiedono nelle comunità di Teheran, in Iran.

Metodi: In questo studio trasversale basato su una grande popolazione (Urban HEART-2), 15.069 individui (età ≥ 60) furono selezionati in modo casuale sulla base di un campionamento cluster multifase nella città di Teheran, in Iran, nel 2011. Tutti i partecipanti furono intervistati da personale addestrato attraverso un questionario standardizzato finalizzato ad acquisire informazioni sulla prevalenza della disabilità, le tipologie di disabilità e le variabili socio-demografiche. I dati sono stati analizzati usando statistiche descrittive ed il Test del Chi Quadrato.

Risultati: Il 54.8% ($n = 8.264$) della popolazione dello studio era di sesso maschile. L'età media dei partecipanti era pari a 68,93 anni ($SD = 7.27$) e la media dell'indice di massa corporea (BMI) era di 26,21 kg/m² ($SD = 4.40$). In base ai nostri risultati la prevalenza complessiva di disabilità è stata dell'11%. La perdita di udito (68.3%) e l'indebolimento dell'udito (10.4%) sono state le forme di disabilità con maggiore prevalenza nel nostro campione. La maggior parte dei partecipanti utilizzava i servizi di centri di riabilitazione privati. Sono state rilevate differenze statisticamente significative in termini di età, di BMI e di titolo di studio tra il gruppo di individui con una o più disabilità ed il gruppo di individui senza disabilità.

Conclusione: La disabilità colpisce direttamente il funzionamento quotidiano degli anziani limitando le loro attività fisiche e sociali, la capacità di mantenersi auto-sufficienti e, quindi, di scegliere liberamente il proprio stile di vita. Le strategie di prevenzione dovrebbero concentrarsi sulla riduzione dell'incidenza di malattie croniche e sul miglioramento dello stato socio-economico degli anziani.

TAKE-HOME MESSAGE

In Iran, based on Urban HEART-2 study, the overall prevalence of disability was about 11%, and the most prevalent disability in the elderly was hearing loss. The majority of the participants were using services of private rehabilitation centers. Advanced age, high BMI, and poor education were statistically significant associated with disability.

Competing interests - none declared.

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INTRODUCTION

Today, the people live for a longer time in average that in every other moment of the history. Global life expectancy (LE) has increased from 64.5 years in 1990 to 71.7 years in 2016 [1]. In 2011, World Report on Disability has showed that more than one billion people experience disability worldwide [2]. However, few data are available on the prevalence of disability in low-income countries, particularly among older people [3]. Physical disability results primarily from chronic diseases and is highly prevalent in older adults [4]. Physical functioning is a core element of health-related quality of life and predicts further functional decline, morbidity, health services use, and death [5]. There is a long research tradition of measuring functional disability as an indicator of health, especially among older adults [6, 7]. Compared with unimpaired individuals, people with impaired mobility have a 2-fold increased risk of falling, institutionalization, and death and 4-5 times higher risk of functional dependence [8, 9]. Additionally, impaired mobility may cause loss of autonomy. It can be accompanied by pain with an increased burden on social networks, and experience of poorer quality of life. It can lead to a higher likelihood of depression and social isolation [10–12]. Measures of physical function have been developed over the last 40 years to characterize health status, predict prognosis besides present and future health services needs, and for program evaluation [13]. While many population-based studies on functional disability in older adults have been conducted in more developed Western countries with different trends, few studies on less developed countries have been reported. However, they are limited to province-level surveys [14–17]. Adib-Hajbaghery measured the prevalence of disability in older adults of Kashan and reported the severity of disability among the studied subjects to be 37.1% mild, 38.6% moderate, 20.0% severe and 4.3% extreme [14, 18]. In 2015, Tanjani et al. demonstrated that the prevalence of mobility impairment and physical functioning limitation was 63% among older adults in five provinces

of Iran [17]. In 2011, the number of Iranian aged 60 years and older was about 6,200,000 [19]. By 2020, the population aged 60 years and older will increase and account for 20% of the total population [20]. Using a large, unique, and nationally representative sample of the non-institutionalized Iranian elder population, the present study addresses some of these research gaps. We aimed to investigate the prevalence and type of disability among older adults. We also explored socio-demographic correlates of functional disability.

MATERIAL AND METHODS

Design and Participants

The second round of 'Urban Health Equity Assessment and Response Tool' ('Urban HEART-2') survey was a large cross-sectional study that was conducted in Tehran, in the fall of 2011 [21]. Tehran, the capital of Iran, is the largest and the most populated city in Iran. The population at the time of the present study was about 8.2 millions of people. The city has a large area of about 613 km², and is divided administratively into 22 districts [22]. Urban HEART was originally developed by the WHO Kobe Centre (WKC: WHO Centre for Health Development) as 'a user-friendly guide for local and national officials to identify health inequities and planning actions to reduce them' [23].

Sampling design

A multistage cluster sampling was applied to collect data in 22 districts and 368 neighborhoods of Tehran. Comprehensive map of Tehran in 2011 separated by the districts and neighborhoods was selected as the sampling frame. 22 districts of the municipality and 368 neighborhoods were considered as strata in the first stage and the second stage, respectively, and each block was treated as one cluster. A two-dimensional systematic sampling method was used to select blocks in each neighborhood using Geographic Information System (GIS) maps. The total sample size was 34,116 households covering 118,542 individuals of all ages. After excluding par-

ticipants aged < 60 years, the analysis was performed on data of the remaining 15,069 individuals aged \geq 60 years. Participants were visited at their houses by interviewers who had been trained during a two-day workshop prior to data gathering. The aims of the survey were explained to participants that were able to withdraw at any time during the interview. Interviews were scheduled to meet the requirements and conditions of the respondents, and the respondents were assured that the collected information would be kept confidential [21]. The study was approved by the Ethics Committee of Iran University of Medical Sciences (IUMS) in November 2010.

Instruments

The Disability Questionnaire included a statement about the type of disability: blindness, visual impairment, hearing loss, hearing impairment, speech and language impairments, hand amputation / impairment, foot amputation / impairment, trunk impairment (i.e. pectus carinatum / excavatum), and mental impairment (i.e. intellectual disability, learning disabilities). The questionnaire also included a question about the type of rehabilitation services used: public, charity or private. This questionnaire was reviewed by experts and its face and content validity was established by a panel of national experts from various disciplines [24]. In addition to the Disability Questionnaire, a questionnaire including socio-demographic characteristics such as age, gender, marital status, education level, occupation, and Body Mass Index (BMI) was completed by the participants. BMI was calculated as weight / height² (kg/m²).

Statistical analysis

The statistical software SPSS 20.0 (IBM Inc., Chicago, IL) was used for all statistical analyses. The descriptive measures were mean, standard deviation, percentages and frequencies. Chi-square test was used to analyze the relationship between variables. The significance level was 0.05. Map was created by using ArcGIS 10.2.

RESULTS

A total of 15,069 older adults, 8,264 (54.8%) males and 6,805 (45.2%) females, were included in this analysis. The mean age of the participants was 68.93 years ($SD = 7.27$) and the mean of BMI was 26.21 kg/m² ($SD = 4.40$). Table 1 shows the demographic characteristics of the older participants.

Based on the results, the overall prevalence of disability in the sample was about 11% ($n = 1,653$). As shown in Table 2, the most prevalent disability in elderly was hearing loss (68.3%, $n = 1,127$) and the majority of them were using services of private rehabilitation centers. Prevalence of each disability among older adults and frequency of utilization of different rehabilitation services are shown in Table 2.

Figure 1 shows the prevalence of disability in the elders within all 22 districts of Tehran, classified on the basis of five homogeneous clusters. Prevalence of disability varied very widely among districts, from 2.2% (districts 5) to 24.7% (districts 21).

Finally, participants were divided into two groups according to self-reported disability status: 1) those reporting none, and 2) those reporting one or more types of disability. Chi-squared analyses (Table 3) revealed that there were statistically significant differences between these two groups in terms of age ($\chi^2(3) = 34.07, P < .001$), BMI ($\chi^2(3) = 14.73, P = 0.002$) and educational background ($\chi^2(5) = 39.50, P < .001$).

DISCUSSION

Aging may be defined as a progressive, generalized decline of function, resulting in the loss of adaptive response to stress and a growing risk of age-related diseases [25]. The purpose of the current study was to determine the prevalence of disability in the community-dwelling older adults of Tehran, Iran. To the best of author's knowledge, in Iran this is the first report on this subject based on a large population-based survey (Urban HEART-2) [21, 24]. Consistent with findings by Turhanoğlu et al. [26], we found that the overall prevalence of disability in the older

adults was about 11%. Disability and underlying physical, cognitive, and sensory limitations are not inevitable consequences of aging [27]. In a study conducted in the US, approximately 20% of older US adults had chronic disabilities, 7%-8% had severe cognitive impairments, nearly one-third of them had mobility limitations, 20% had vision problems, and 33% had hearing impairments [28]. The second major finding of our research was that the most prevalent disability in our study population was the 'hearing loss'. This finding is consistent with studies by Wandera et al. in Uganda [29] and Cruickshanks et al. in United States [30]. According to Magilvy, hearing loss ranks second only to arthritis among the most common chronic diseases for older people [31]. Berg et al. stated that hearing loss ranks among the 15 most prevalent chronic conditions in Americans aged 65 and older [32]. According to a recent WHO report, approximately one-third of persons over 65 years are affected by disabling hearing loss and more than half of the adults with disabling hearing loss are 65 years or older. However, disabling hearing loss is unequally distributed across the world. In adults of 65 years and older its prevalence decreases exponentially as income increases and is the highest in Sub-Saharan Africa, South Asia, Asia Pacific. Therefore, in low and middle income countries, hearing loss is approximately double that of high income countries [33]. Our results indicate that there is a statistically significant relationship between old age and disability. This finding confirms trends of the 'Study on global AGEing and adult health' (SAGE Wave 1) performed in China, Ghana, India, Mexico, Russia and South Africa [34]. Therefore, consistent with Ostir et al. [35], Di Carlo et al. [36] and Ostchega et al. [37], the likelihood of living affected by a chronic disease causing further disability or more severe loss of functioning increases with age. Moreover, consistent with studies conducted by Ostir et al. in United States [35], Hairi et al. in Malaysia [38] and Abdulraheem et al. in Nigeria [39], our research indicates that the disability rates in population are higher

among groups with lower educational level. Indeed, poor education is often associated with lower income and poverty, lower standards of living, unhealthy lifestyle behaviors, unhealthy diet and less frequent use of health and medical care services [40]. Finally, consistent with the findings of the present study, several authors such as Backholer et al. in a meta-analysis [41], Connolly et al. in the Irish Longitudinal Study on Ageing (TILDA) [42], and Al Snih S et al. in a study in developing countries, where access to rehabilitation services and treatment programs may be limited (Latin America and the Caribbean) [43] found a statistically significant positive association between BMI and prevalence of disability.

CONCLUSION

In Iran, based on the 'Urban HEART-2' study, the overall prevalence of disability was about 11%, and the most prevalent type of disability, in elderly of our study population, was hearing loss. Majority of the participants were using services of private rehabilitation centers. Finally, consistent with the literature, in our research there were statistically significant differences in terms of age, BMI, and educational background between the group of individuals who reported one or more types of disability and the group of individuals reporting none. Increases in the prevalence of disability have serious consequences for elders, their families, and society in general. For older adults, disability directly affects daily functioning by restricting physical activity, ability to maintain self-sufficiency, and ultimately the freedom to live a chosen lifestyle. Prevention strategies should focus on reducing the incidence of chronic diseases and improving socioeconomic status of older adults.

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Table 1. Characteristics of the older adults ($n = 15,069$).

Variable	N = 15,069		
	N	%	
Age	60-69	8848	58.7
	70-79	4666	31
	80-89	1479	9.8
	≥ 90	76	0.5
Marital Status	Single	192	1.3
	Married	11899	79
	Divorced	143	0.9
	Widow	2835	18.8
Education	Illiterate	4069	27
	Elementary	3198	21.2
	Guidance school	2353	15.6
	High school	1186	7.9
	Diploma	2131	14.1
Occupation	Academic	2132	14.2
	Employed	2163	14.4
	Housekeeper	4982	33.1
	Retired	7179	47.7
BMI	Unemployed	745	4.8
	< 20	313	2.1
	20-25	6505	43.2
	25-30	5825	38.6
	> 30	2426	16.1

Table 2. Prevalence of disability and utilizing rehabilitation services in the study population.

Type	<i>N</i> = 1,653	
	<i>N</i>	%
Hearing loss	1127	68.3
Hearing impairment	171	10.4
Lower limb impairment	99	6
Visual impairment	74	4.5
Upper limb impairment	43	2.6
Trunk impairment	39	2.4
Blindness	33	2
Mental impairment	28	1.7
Speech and language impairments	15	0.9
Lower limb amputation	14	0.8
Upper limb amputation	10	0.6

Services	Yes		No	
	<i>N</i>	%	<i>N</i>	%
Public	313	18.9	1340	81.1
Charity	23	1.4	1630	98.6
Private	429	26	1224	74

Figure 1. Prevalence of disability in respondents within all 22 districts of Tehran.

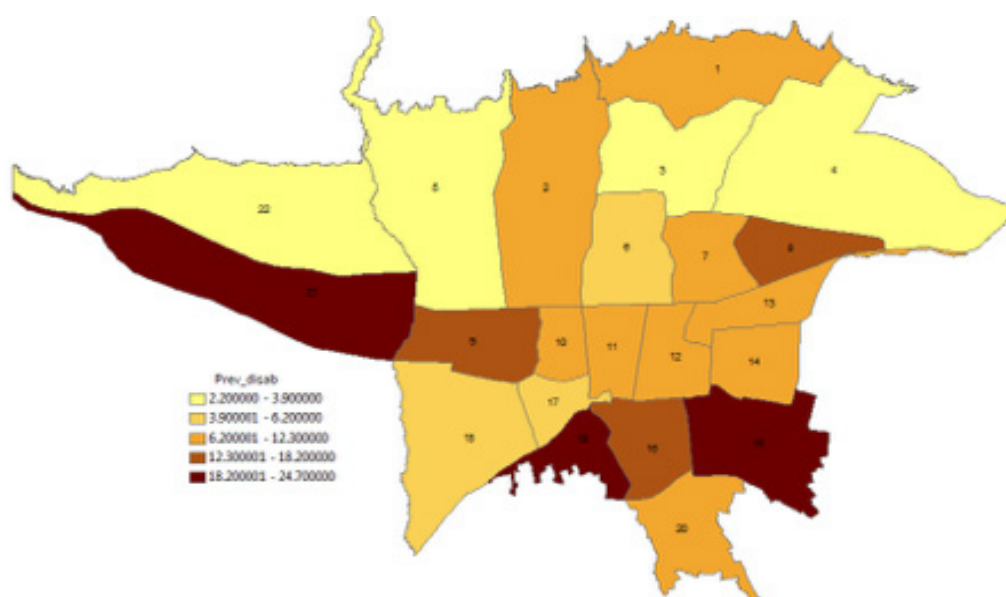


Table 2. Prevalence of disability and utilizing rehabilitation services in the study population.

Variables		Total N(%)	Elders without disabilities N(%)	Elders with disabilities N(%)	Comparison across sectors
Age	60-69	8848 (58.7)	7993 (59.6)	855 (51.7)	$\chi^2= 34.078$ df= 3 $P < .001$
	70-79	4666 (31)	4101 (30.6)	565 (34.2)	
	80-89	1479 (9.8)	1257 (9.4)	222 (13.4)	
	≥ 90	76 (0.5)	64 (0.5)	12 (0.7)	
Gender	Male	8264 (54.8)	7330 (54.6)	934 (56.5)	$\chi^2= 1.725$ df= 1 $P = 0.189$
	Female	6805 (45.2)	6085 (45.4)	720 (43.5)	
Marital Status	Single	192 (1.3)	172 (1.3)	20 (1.2)	$\chi^2= 0.814$ df= 3 $P= 0.846$
	Married	11899 (79)	10623 (79.2)	1276 (77.1)	
	Divorced	143 (0.9)	122 (0.9)	21 (1.3)	
	Widow	2835 (18.8)	2498 (18.6)	337 (20.4)	
Education	Illiterate	4069 (27)	3621 (28.0)	448 (27.1)	$\chi^2= 39.505$ df=5 $P < .001$
	Elementary	3198 (21.2)	2800 (20.9)	398 (24.1)	
	Guidance school	2353 (15.6)	2060 (15.4)	293 (17.7)	
	High school	1186 (7.9)	1043 (7.8)	143 (8.6)	
	Diploma	2131 (14.1)	1947 (14.5)	184 (11.1)	
Occupation	Academic	2132 (14.2)	1944 (14.5)	188 (11.4)	$\chi^2= 1.156$ df= 3 $P = 0.625$
	Employed	2163 (14.4)	1959 (14.6)	204 (12.4)	
	Housekeeper	4982 (33.1)	4468 (33.3)	514 (31.1)	
	Retired	7179 (47.7)	6328 (47.2)	851 (51.4)	
BMI	Unemployed	745 (4.8)	660 (5.0)	85 (5.2)	$\chi^2= 14.731$ df= 3 $P = 0.002$
	< 20	313 (2.1)	263 (2.0)	50 (3.0)	
	20-25	6505 (43.2)	5825 (43.4)	680 (41.1)	
	25-30	5825 (38.6)	5194 (38.7)	631 (38.1)	
	> 30	2426 (16.1)	2133 (15.9)	293 (17.7)	

References

1. United Nations Department of Economic and Social Affairs PD. World Population Prospects: The 2015 Revision. New York: United Nations; 2015.
2. World Health Organization. World report on disability: Geneva: World Health Organization; 2011.
3. Sousa RM, Ferri CP, Acosta D, Albanese E, Guerra M, Huang Y, et al. Contribution of chronic diseases to disability in elderly people in countries with low and middle incomes: a 10/66 Dementia Research Group population-based survey. *The Lancet*. 2009;374(9704):1821-30.
4. Fried LP, Bandeen-Roche K, Kasper JD, Guralnik JM. Association of comorbidity with disability in older women: the Women's Health and Aging Study. *J Clin Epidemiol*. 1999;52(1):27-37.
5. Gregg EW, Beckles G, Williamson DF, Leveille SG, Langlois JA, Engelgau MM, et al. Diabetes and physical disability among older US adults. *Diabetes Care*. 2000;23(9):1272-1277.
6. Wu Y, Huang H, Wu B, McCrone S, Lai H-J. Age distribution and risk factors for the onset of severe disability among community-dwelling older adults with functional limitations. *J Appl Gerontol*. 2007;26(3):258-273.
7. Liu J, Chi I, Chen G, Song X, Zheng X. Prevalence and correlates of functional disability in Chinese older adults. *Geriatr Gerontol Int*. 2009;9(3):253-61.
8. Tinetti ME, Inouye SK, Gill TM, Doucette JT. Shared risk factors for falls, incontinence, and functional dependence: unifying the approach to geriatric syndromes. *Jama*. 1995;273(17):1348-1353.
9. Guralnik JM, Simonsick EM, Ferrucci L, Glynn RJ, Berkman LF, Blazer DG, et al. A short physical performance battery assessing lower extremity function: association with self-reported disability and prediction of mortality and nursing home admission. *J Gerontol*. 1994;49(2):M85-M94.
10. Iezzoni L. When walking fails: Mobility problems of adults with chronic conditions. Berkeley: University of California Press; 2003.
11. Gill TM, Allore HG, Hardy SE, Guo Z. The dynamic nature of mobility disability in older persons. *J Am Geriatr Soc*. 2006;54(2):248-254.
12. Fässberg MM, Cheung G, Canetto SS, Erlangsen A, Lapierre S, Lindner R, et al. A systematic review of physical illness, functional disability, and suicidal behaviour among older adults. *Aging & Mental Health*. 2016;20(2):166-94.
13. Katz S. Assessing self-maintenance: activities of daily living, mobility, and instrumental activities of daily living. *J Am Geriatr Soc*. 1983;31(12):721-727.
14. Adib-Hajbaghery M. Evaluation of old-age disability and related factors among an Iranian elderly population. *East Mediterr Health J*. 2011;17(9):671-678.
15. Shahbazi M, Mirkhani M, Hatamizadeh N, Rahgozar M. Assessment of disability in the elderly of Tehran, 2007. *Iran J Ageing*. 2008;3(3-4):84-92.
16. Hosseini SR, Moslehi A, Hamidian SM, Taghian SA. The Relation between Chronic Diseases and Disability in Elderly of Amirkola. *Iran J Ageing*. 2014;9(2):80-87.
17. Tanjani PT, Akbarpour S, Ainy E, Soori H. Socio-demographic risk factors of mobility dysfunction and limitations in physical functioning disability among the elderly in Iran: A nationwide cross sectional survey. *J Pak Med Assoc*. 2015;65(10):1060-1064.
18. Adib-Hajbaghery M, Aghahoseini S. The evaluation of disability and its related factors among the elderly population in Kashan, Iran. *BMC Public Health*. 2007;7(1):1.
19. Statistical Centre of Iran. Population and Housing Census 2011 [Internet]. Tehran, Iran: Statistical Centre of Iran [cited 2016 Oct 14]. Available from: <https://www.amar.org.ir/english/Census-2011>.
20. Rashedi V, Gharib M, Yazdani AA. Social participation and mental health among older adults in Iran. *Iran Rehabil J*. 2014;12(19):9-13.
21. Asadi-Lari M, Vaez-Mahdavi MR, Faghihzadeh S, Cherghian B, Esteghamati A, Farshad AA, et al. Re-

- sponse-oriented measuring inequalities in Tehran: second round of Urban Health Equity Assessment and Response Tool (Urban HEART-2), concepts and framework. *Med J Islam Republic Iran*. 2013;27(4):236-248.
22. Amini H, Taghavi-Shahri SM, Henderson SB, Naddafi K, Nabizadeh R, Yunesian M. Land use regression models to estimate the annual and seasonal spatial variability of sulfur dioxide and particulate matter in Tehran, Iran. *Sci Total Environ*. 2014;488:343-353.
 23. World Health Organization. *Urban Health Equity Assessment and Response Tool (Urban HEART)*. Kobe: WHO Centre for Health Development; 2010.
 24. Asadi-Lari M, Vaez-Mahdavi MR, Faghihzadeh S, Montazeri A, Farshad AA, Kalantari N, et al. The application of urban health equity assessment and response tool (Urban HEART) in Tehran concepts and framework. *Med J Islam Republic Iran*. 2010;24(3):175-185.
 25. Fillit HM, Rockwood K, Woodhouse K. *Brocklehurst's textbook of geriatric medicine and gerontology*. Philadelphia, PA: Elsevier Health Sciences; 2010.
 26. Turhanoglu AD, Saka G, Karabulut Z, Kiliç Ş, Ertem M. Disability and chronic disease prevalence in the individuals aged 55 years or older in Diyarbakir. *Turk J Geriatrics*. 2000;3(4):146-150.
 27. Bell SP, Patel N, Patel N, Sonani R, Badheka A, Forman DE. Care of older adults. *J Geriatric Cardiol*. 2016;13(1):1-7.
 28. Freedman VA, Martin LG, Schoeni RF. Recent trends in disability and functioning among older adults in the United States: a systematic review. *Jama*. 2002;288(24):3137-3146.
 29. Wandera SO, Ntozi J, Kwagala B. Prevalence and correlates of disability among older Ugandans: evidence from the Uganda National Household Survey. *Global Health Action*. 2014;7:25686. doi: 10.3402/gha.v7.25686.
 30. Cruickshanks KJ, Wiley TL, Tweed TS, Klein BE, Klein R, Mares-Perlman JA, et al. Prevalence of hearing loss in older adults in Beaver Dam, Wisconsin the epidemiology of hearing loss study. *Am J Epidemiol*. 1998;148(9):879-886.
 31. Magilvy JK. Experiencing hearing loss in later life: A comparison of deaf and hearing-impaired older women. *Res Nurs Health*. 1985;8(4):347-353.
 32. Berg RL, Cassells JS. *Preventing Disability Related to Sensory Loss in the Older Adult. The Second Fifty Years: Promoting Health and Preventing Disability*. Washington DC: The National Academies Press; 1992.
 33. World Health Organization. *Mortality and Burden of Diseases and Prevention of Blindness and Deafness WHO, 2012. Hearing loss in persons 65 years and older [Internet]*. Geneva: World Health Organization; 2012 [cited 2016 Oct 14]. Available from: http://www.who.int/pbd/deafness/news/GE_65years.pdf.
 34. Biritwum R, Minicuci N, Yawson A, Theou O, Mensah G, Naidoo N, et al. Prevalence of and factors associated with frailty and disability in older adults from China, Ghana, India, Mexico, Russia and South Africa. *Maturitas*. 2016 Sep;91:8-18. doi: 10.1016/j.maturitas.2016.05.012.
 35. Ostir GV, Carlson JE, Black SA, Rudkin L. Disability in older adults 1: prevalence, causes, and consequences. *Behav Med*. 1999;24(4):147-156.
 36. Carlo A, Baldereschi M, Amaducci L, Maggi S, Grigoletto F, Scarlato G, et al. Cognitive impairment without dementia in older people: prevalence, vascular risk factors, impact on disability. *The Italian Longitudinal Study on Aging. J Am Geriatrics Soc*. 2000;48(7):775-782.
 37. Ostchega Y, Harris TB, Hirsch R, Parsons VL, Kington R. The prevalence of functional limitations and disability in older persons in the US: data from the National Health and Nutrition Examination Survey III. *J Am Geriatrics Soc*. 2000;48(9):1132-1135.
 38. Hairi NN, Bulgiba A, Cumming RG, Naganathan V, Mudla I. Prevalence and correlates of physical disability and functional limitation among community dwelling older people in rural Malaysia, a middle income country. *BMC Public Health*. 2010;10(1):1.
 39. Abdulraheem I, Oladipo A, Amodu M. Prevalence and correlates of physical disability and fun-

ctional limitation among elderly rural population in Nigeria. *J Aging Res.* 2011;2011:369894. doi: 10.4061/2011/369894.

40. Koster A, Bosma H, van Groenou MIB, Kempen GI, Penninx BW, van Eijk JT, et al. Explanations of socioeconomic differences in changes in physical function in older adults: results from the Longitudinal Aging Study Amsterdam. *BMC Public Health.* 2006;6(1):1.
41. Backholer K, Wong E, Freak-Poli R, Walls H, Peeters A. Increasing body weight and risk of limitations in activities of daily living: a systematic review and meta-analysis. *Obes Rev.* 2012;13(5):456-468.
42. Connolly D, Garvey J, McKee G. Factors associated with ADL/IADL disability in community dwelling older adults in the Irish longitudinal study on ageing (TILDA). *Disabil Rehabil.* 2016:1-8.
43. Al Snih S, Graham JE, Kuo Y, Goodwin JS, Markides KS, Ottenbacher KJ. Obesity and disability: Relation among older adults living in Latin America and the Caribbean. *Am J Epidemiol.* 2010;171(12):1282-1288.

