



# The Prevalence of Functional Disability and Associated Factors among Older People Attending Primary Health-care Centers in Riyadh City

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## Abstract

**BACKGROUND:** The burden of disability among the older population is increasing as older people grow with significant social and economic negative impacts.

**AIM:** This study examines functional disability and its associated risk factors among older Saudi citizens attending primary health-care centers (PHCCs) in Riyadh city.

**METHODS:** This descriptive cross-sectional study was carried out on 504 older Saudi citizens aged  $\geq 60$  years who attended a PHCC in Riyadh city between December 2019 and May 2020. Interviewer-administered questionnaire was used to assessing the disability in activities of daily living (ADL) and instrumental activities of daily living (IADL) using the Katz Index and Lawton scale.

**RESULTS:** The prevalence of ADL and IADL disability among participants was 24.6% and 58.5%, respectively. Smoking ( $p = 0.019$ ), dyslipidemia ( $p = 0.018$ ), rheumatoid arthritis ( $p = 0.028$ ), history of falls ( $p = 0.014$ ), and an emergency visit ( $p = 0.049$ ) were risk factors associated with ADL disability. Predictors of IADL disability were advanced age ( $p = 0.004$ ), being female ( $p = 0.029$ ), and the need for a caregiver ( $p = 0.000$ ). The need for homecare was positively associated with ADL dependency ( $p = 0.008$ ) and IADL dependency ( $p = 0.003$ ). Furthermore, regular physical activity was a protective factor against ADL functional disabilities ( $p = 0.002$ ) and IADL functional disabilities ( $p = 0.000$ ).

**CONCLUSION:** This study found a high prevalence of ADL and IADL disability among elderly Saudis. Disability was associated with several sociodemographic and health status factors. The findings of this study highlight the priority of effective and targeted preventive interventions for disability.

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## Introduction

Aging is a naturally occurring universal process of all human beings. It includes several changes in an individual's psychological, physical, and health-related capabilities [1]. In 2017, the estimated number of people aged 60 years and older globally was 962 million, approximately 13% of the world population. Furthermore, data show that the number of people aged 60 years and older is growing at a rate of approximately 3% (in-text citation). Projections predict that the number of older persons in the world by 2030 will be 1.4 billion, 2.1 billion by 2050, and could rise to 3.1 billion by 2100 [2]. These trends are expected to occur among the Saudi population, as the percent of the older people population aged 60 and older in the country is projected to increase by 18.4% in 2035 [3]. There are several factors that could be linked to the estimated growth in the Saudi subpopulation. For example, reports

indicate that from 1980 to 2000, the Saudi population experienced an expansion due to national development advancements, high birth rates, and improvements in maternal and child health [4].

Medical researchers and policy-makers have concerns about the aging and increased longevity projections. More people reaching older years in life will more likely result in a higher prevalence of disability [5]. Disability is defined as difficulty or dependency in carrying out activities essential to independent living, such tasks needed for self-care and living independently in a home, and other activities important to one's quality of life [5]. The World Health Organization describes three dimensions of disability: (a) Impairment of body function or structure such as impairments of vision or hearing, dementia, or loss of limbs, (b) activity limitation such as the difficulty of walking, problem-solving, and self-care, and (c) participation restrictions in the community, social, and civil life [6].

Disability is a significant social and economic problem in Saudi Arabia. For example, in 2016, the prevalence rate of any disability among Saudi citizens was 3.3%, and the rate of disability among those 60 years and older was 11% [7]. A more recent report indicates that the population percentage in Saudi Arabia with functional disabilities is estimated at 3.73%. However, according to the national demographic survey, the prevalence of disability is nearly 0.8% of the total Saudi population, approximately 135,000 people. The statistical difference evident in these data reports stems from the conflicting definitions of disability used during the reporting procedures [8].

One reason why a universal definition of disability is difficult to implement could be because the determinants of disability are diverse and vary across different settings. Research on the disability of older persons has identified modifiable risk factors such as geriatric diseases, impairments, functional limitations, unhealthy behaviors, social and environmental obstacles, as well as non-modifiable risk factors including age, gender, and genetics [9]. A disability may lead to extra expenditures for individuals and households. These expenses may relate to general needs (e.g. health care and food), as well as to disability-specific items (e.g. assistive devices, rehabilitation fees, care assistant, and house adaptation) [10].

Limited research has been conducted on the prevalence of functional disability among older persons in the Kingdom of Saudi Arabia (KSA). Most of the research efforts on disability among the Saudi population have focused on disabled children [8].

The aim of the current study, therefore, is to examine the prevalence of functional disability in activities of daily living (ADL), instrumental activities of daily living (IADL), and associated risk factors among older people attending primary health-care centers (PHCCs) in Riyadh City, Saudi Arabia.

## Methods

### *Study design and participants*

A descriptive cross-sectional study was conducted between December 2019 and May 2020. Participants included Saudi older people  $\geq 60$  years who attended in PHCCs in Riyadh city during data collection and agreed to participate in the study. Sample exclusion criteria included individuals that were  $< 60$  years of age, non-Saudi, had no file in PHCCs in Riyadh City, refused to participate in the study, anyone who was unable to give consent, and those unable to understand and answer the questions. The sample size was calculated using the formula of calculation of the cross-sectional

study sample size [11]. The investigators assumed the prevalence rate of disability among Saudi citizens those 60 years and older was 11 % (7), at a 95% confidence level (CI) and 3% margin of error. The total estimated sample size was  $n = 504$ .

### *Study settings*

The capital of Saudi Arabia, Riyadh, is in the center of the KSA with an occupation of 1800 km<sup>2</sup> [12]. According to the United Nations estimation, the population of Riyadh was 6,907,000 people in 2018 [13]. The city is divided into five geographical sectors: Western, Southern, Middle, Northern, and Eastern. The PHCCs are an important issue across all five sectors. A total of 135 PHCCs are sponsored by the Ministry of Health. For this study, the sample included 25 PHCCs that implemented older people health-care programs distributed over all five geographical regions. The investigators consecutively selected the first 20 patients from each center during the selected interview days.

### *Data collection and variables definition*

Data were collected using a questionnaire designed by the researchers. The questionnaire was translated forward to Arabic and backward to English by a professional translator. The questionnaire was self-administered with the help of an interviewer. When the participant was unable to complete the questionnaire on their own, a caregiver aided in the process. A pilot study was undertaken using the Arabic version of the questionnaire. Nine participants were recruited (clarity, time consumed, and different responses). Their results were not included in the study. The questionnaire was divided into two main categories: (a) Sociodemographic characteristics and health status, and (b) basic ADL and IADL.

### *Sociodemographic characteristics and health status*

The general section of the questionnaire collected data on participant demographics including age, sex, education, employment, marital status, and the number of persons living with him/her. Furthermore, data on participant health status were also collected by the questionnaire. Participants provided information on the following topics: Having a caregiver, type of caregiver, smoking, diet, exercise, body mass index (BMI), medical history of hypertension, diabetes mellitus, dyslipidemia, rheumatoid arthritis, stroke, heart disease, cancer, history of falls and fractures in the past 12 months, history of emergency department visits, homecare, and hospitalization in the past 3 months.

### Basic ADL and IADL

The Katz index was used to characterize basic ADLs (i.e. bathing, dressing, eating, toileting, and making bed-wheelchair transfers), whereas the Lawton and Brody scale was used to characterize IADLs (i.e. using the phone, going to distant places, shopping, preparing meals, doing household chores, managing money, taking drugs, and handling small objects). A score of 0 (when no performing the correspondent activity) or 1 (when performing the correspondent activity) was attributed to each item. If none of the ADL/IADL activities were impaired, the individual was classified as "independent;" if one or two activities were impaired, he or she was classified as "moderately dependent;" and finally, "severely dependent" refers to older people who had three or more activities impaired [14], [15]. The reliability of the Katz index has been well documented. Furthermore, it has an adequate and acceptable validity in assessing basic ADL [16], [17], [18]. Furthermore, the Lawton and Brody scale has been previously used to test for IADL screening [19], [20].

### Data management and analysis

Data were analyzed using the Statistical Package for the Social Sciences software version 22.0. Descriptive analysis was conducted using frequencies, percentages, mean, and standard deviation to describe the sociodemographic characteristics, health status, Katz index, and Lawton and Brody scale. The prevalence of ADL and IADL disabilities was stratified by sociodemographic and health status factors, and the Chi-square test ( $\chi^2$ ) was used to measure the association between functional disabilities with independent variables. Third, a binary logistic regression model was performed to identify different factors predicting ADL and IADL disabilities. Odds ratio and 95% CI were obtained from logistic regression models.  $p < 0.05$  was considered statistically significant (two-sided tests).

### Ethical consideration

Institution review board approval was obtained from King Fahad Medical City, Ministry of Health. Informed written consents in Arabic were obtained from all participants. The study objectives were clarified to them. To assure anonymity, participant's names and file numbers were not collected.

## Results

### Sociodemographic characteristics and health status

Among the 504 participants, 280 (55.6%) were female and 224 (44.4%) were male. Their mean

age was  $68.6 \pm 7.5$  years. The majority of them were illiterate 221 (43.8%). Only 34 (6.7%) were employed and many did not work 283 (56.2%) or were retired 187 (37.1%). Nearly two-thirds of subjects were married 350 (69.4%), while one-third were either single, divorced, or widowed. More than half of the participants were living with husbands/wives with children 314 (62.3%), and 127 (25.2%) were living with relatives and their children. The median number of people who lived with older people was  $5 \pm 3$  persons. Many of the participants had a caregiver (308 out of 504; 61.1%). Approximately half of the participants had a family member as their caregiver (258 out of 504; 51.2%), and only 37 participants (7.3%) were overseen by a paid caregiver. Near four-fifths of the participants (409 out of 504; 81.2%) did not smoke, 65 (12.9%) were ex-smokers, and 30 (6%) were active smokers. The majority of the subjects, 467 out of 504 (92.7%), did not follow diets, and 346 (68.7%) did not perform a regular exercise routine. The mean BMI of subjects was  $29.8 \pm 5.3$  kg/m<sup>2</sup>.

This study examined the prevalence of the most common chronic disease among the sampled participants. Most of subjects were diagnosed with hypertension 351 (69.6%) followed by diabetes mellitus 342 (67.9%). Half of subjects (253 out of 504; 50.2%) had dyslipidemia. Furthermore, the following diseases were respectively noted: Rheumatoid arthritis (96; 19%), heart-disease (58; 11.5%), stroke (13; 2.6%), and cancer (6; 1.2%).

Out of the total subjects, 60 (11.9%) reported a history of falls during the past year, and 8 (1.6%) had a fracture during the same period. There were 75 participants (14.9%) that visited emergency, 22 (4.4%) needed homecare, and 42 (8.3%) were hospitalized. Findings on sociodemographic characteristics and health status are displayed in Tables 1 and 2.

### ADL disability

Most of the study subjects who attended PHCCs in Riyadh city were independents 75.4%. Oppositely, the overall prevalence of ADL disability among the participants was 24.6%, as presented in Table 3. Furthermore, the prevalence of ADL moderate disability was 18.5%, while severe disability was 6.2%. In particular, the most affected function was transferring (13.5%), followed by continence (12.3%), dressing (8.1%), bathing (7.1%), toileting (4.6%), and feeding (3.6%).

The univariate analysis of sociodemographic data and health status with ADL, as shown in Table 4, showed that the subjects aged 68 years and older were more likely to had disabilities than younger ones ( $p = 0.001$ ), illiterate than educated ( $p = 0.026$ ), unmarried than married ( $p = 0.017$ ), who had a caregiver than have not ( $p = 0.004$ ), who had a paid caregiver versus a family member ( $p = 0.008$ ), ex-smoker ( $p =$

**Table 1: Sociodemographic characteristics of participants**

Factor	Level	n	%
Age	Mean ± SD	68.61 ± 7.545	
	<68years	268	53.2
	≥68 years	236	46.8
Sex	Male	224	44.4
	Female	280	55.6
Education	Illiterate	221	43.8
	Read and write	88	17.5
	Primary	54	10.7
	Intermediate	36	7.1
	Secondary	42	8.3
	University	56	11.1
Employment	Postgraduate	7	1.4
	Employed	34	6.7
	Not work	283	56.2
	Retired	187	37.1
Marital status	Single	3	0.6
	Married	350	69.4
	Divorced	21	4.2
Living with	Widowed	130	25.8
	Husband/wife	42	8.3
	Husband/wife with children	314	62.3
	Relatives	127	25.2
Number of persons living with him/her	Alone	18	3.6
	Others	3	0.6
	<5	243	48.2
Having a caregiver	≥5	261	51.8
	No	196	38.9
Type of caregiver	Yes	308	61.1
	Family member	258	51.2
	Paid caregiver	37	7.3

0.026), and who were inactive than who did regular exercise ( $p = 0.001$ ). Moreover, the disability associated with hypertension ( $p = 0.040$ ), dyslipidemia ( $p = 0.001$ ), rheumatoid arthritis ( $p < 0.001$ ), stroke ( $p = 0.005$ ), history of fracture ( $p = 0.025$ ), history of falls in the past 12 months, emergency visits, homecare, and hospitalization in the past 3 months ( $p < 0.001$ ) for all.

**Table 2: Lifestyle and health characteristics of participants**

Factor	Level	n	%
Smoking	No	409	81.2
	Yes	30	6.0
	Ex-smoker	65	12.9
Diet	No	467	92.7
	Yes	37	7.3
Exercise	No	346	68.7
	Yes	158	31.3
Body mass index (kg/m <sup>2</sup> )	<30	282	56.0
	≥30	222	44.0
Hypertension	No	153	30.4
	Yes	351	69.6
Diabetes mellitus	No	162	32.1
	Yes	342	67.9
Dyslipidemia	No	251	49.8
	Yes	253	50.2
Rheumatoid arthritis	No	408	81.0
	Yes	96	19.0
Stroke	No	491	97.4
	Yes	13	2.6
Heart disease	No	446	88.5
	Yes	58	11.5
Cancer	No	498	98.8
	Yes	6	1.2
History of falls in the past 12 months	No	444	88.1
	Yes	60	11.9
History of fracture in the past 12 months	No	496	98.4
	Yes	8	1.6
Emergency visits in the past 3 months	No	429	85.1
	Yes	75	14.9
Homecare in the past 3 months	No	482	95.6
	Yes	22	4.4
Hospitalization in the past 3 months	No	462	91.7
	Yes	42	8.3

The logistic regression model showed that ADL disability was significantly associated with smokers

**Table 3: Assessment of ADL/IADL disability**

	ADL disability		IADL disability	
	n	%	n	%
Independent	380	75.4	209	41.5
Moderate disability	93	18.5	195	38.7
Severe disability	31	6.2	100	19.8

ADL: Activities of daily living, IADL: Instrumental activities of daily living.

**Table 4: Factors associated with ADL/IADL disability (univariate analysis)**

Variables	ADL disability			IADL disability		
	Yes	%	p	Yes	%	p
Age	<68	49	18.3	132	49.3	0.000*
	≥68	75	31.8	163	69.1	
Sex	Male	56	25	92	41.1	0.000*
	Female	68	24.3	203	72.5	
Education	Illiterate	87	28.2	226	73.1	0.000*
	Literate	37	19	69	35.4	
Employment	Employed	7	20.6	9	26.5	0.000*
	Not work	77	27.2	212	74.9	
	Retired	40	32.3	74	39.6	
Marital status	Unmarried	49	31.8	115	74.7	0.000*
	Married	75	21.4	180	51.4	
Living with	Husband/wife	80	22.5	185	52.0	0.000*
	Others	44	29.7	110	74.3	
Number of persons living with him/her	<5	55	22.6	149	61.3	0.257
	≥5	69	26.4	146	55.9	
Having a caregiver	No	34	17.3	70	64.3%	0.000*
	Yes	90	29.2	225	73.1	
Type of caregiver	Family member	72	27.9	197	76.4	0.000*
	Paid caregiver	14	37.8	20	54.1	
Smoking	No	101	24.7	257	62.8	0.000*
	Yes	2	6.7	10	33.3	
	Ex-smoker	21	32.3	28	43.1	
Diet	No	118	25.3	278	59.5	0.150
	Yes	6	16.2	17	45.9	
Exercise	No	101	29.2	244	70.5	0.000*
	Yes	23	14.6	51	32.3	
Body mass index (kg/m <sup>2</sup> )	<30	69	24.5	122	43.3	0.406
	≥30	55	24.8	87	39.2	
Hypertension	No	28	18.3	76	49.7	0.010*
	Yes	96	27.4	219	62.4	
Diabetes mellitus	No	35	21.6	86	53.1	0.107
	Yes	89	26	209	61.1	
Dyslipidemia	No	45	17.9	144	57.4	0.662
	Yes	79	31.2	151	59.7	
Rheumatoid arthritis	No	83	20.3	237	58.1	0.763
	Yes	41	42.7	58	60.4	
Stroke	No	116	23.6	287	58.5	1.000
	Yes	8	61.5	8	61.5	
Heart disease	No	105	23.5	262	58.7	0.899
	Yes	19	32.8	33	56.9	
Cancer	No	123	24.7	289	58	0.044*
	Yes	1	16.7	6	100	
History of falls in the past 12 months	No	95	21.4	257	57.9	0.506
	Yes	29	48.3	38	63.3	
History of fracture in the past 12 months	No	119	24	288	58.1	0.148
	Yes	5	62.5	7	87.5	
Emergency visits in the past 3 months	No	86	20	242	56.4	0.029*
	Yes	38	50.7	53	70.7	
Homecare in the past 3 months	No	109	22.6	275	57.1	0.003*
	Yes	15	68.2	20	90.9	
Hospitalization in the past 3 months	No	102	22.1	271	58.7	0.978
	Yes	22	52.4	24	57.1	

\*P<0.05. ADL: Activities of daily living, IADL: Instrumental activities of daily living.

and ex-smokers, inactive subjects, comorbidity with dyslipidemia or rheumatoid arthritis, history of falls in the past 12 months, and emergency visits and homecare in the past 3 months. The model showed that the hazard of disability development increased by 2.1 times when older people were already smokers



compared with non-smoker ( $p = 0.019$ ). In addition, the hazard of ADL disability decreased by 4% as exercise increases ( $p = 0.002$ ). History of dyslipidemia ( $p = 0.018$ ) and rheumatoid arthritis ( $p = 0.028$ ) was risk factors for disability by 1.7 and 1.8 times, respectively, more than healthy people. The history of falls during the past year that could cause disability to subjects was 2.2 times more than the absence of falls ( $p = 0.014$ ). Emergency visits ( $p = 0.049$ ) and having homecare ( $p = 0.008$ ) in the past 3 months were more disabling by 1.9 and 4.5 times, respectively. The results of the logistic regression are represented in Table 5.

**Table 5: Binary logistic regression for independent factors associated with ADL disability**

	P-value	Exp (B)	95% CI	
			Lower	Upper
Smoking				
Non-smoking		-		
Smoking	0.019	2.160	1.135	4.109
Exercise				
No		-		
Yes	0.002	0.412	0.235	0.721
Dyslipidemia				
No		-		
Yes	0.018	1.763	1.102	2.821
Rheumatoid arthritis				
No		-		
Yes	0.028	1.841	1.067	3.177
History of fall				
No		-		
Yes	0.014	2.223	1.172	4.216
Emergency visit homecare				
No		-		
Yes	0.049	1.891	1.002	3.568
Homecare				
No		-		
Yes	0.008	4.504	1.492	13.595

ADL: Activities of daily living.

### IADL disability

The overall prevalence of IADL disability among the participants was 58.5%. As shown in Table 3, the moderate disability was 38.7% and the severe disability was 19.8%. Furthermore, the most IADL functions were affected was transportation (40.7%), followed by shopping (24.6%), laundry (19.6%), food preparation (19%), housekeeping (14.1%), responsibility for own medications (13.7%), ability to handle finances (8.7%), and ability to use the telephone (3.4%).

Using the univariate analysis, as shown in Table 4, we found that the IADL disability was significantly ( $P < .001$ ) higher among subjects aged  $\geq 68$  years than younger than 68 years, women than men, uneducated than educated, among non-workers, compare to others, unmarried than married, who was living with other than husband/wife with children, and who had a caregiver and especially a family member. The disability of IADL was more likely higher among inactive participants ( $p < 0.001$ ), hypertensive patients ( $p = 0.010$ ), history of cancer ( $p = 0.044$ ), and history of emergency visits ( $p = 0.029$ ), or homecare in the past 3 months ( $p = 0.003$ ).

Further analysis showed that there were several predictor factors associated with IADL. Based on the data, statistically significant findings were

reported between the occurrence of IADL and advanced age, gender, caregiver status, exercise routine, and independence. As shown in Table 6, participants older than 80 years of age were 3.9 times more likely to have IADL than younger subjects ( $p = 0.004$ ), female participants were 1.8 times more likely than males ( $p = 0.029$ ), those with a caregiver were 2.6 times more likely than those without a caregiver ( $p = 0.000$ ), physically inactive participants were 3 times more likely than with those with exercise routines ( $p = 0.000$ ), and participants that needed homecare were 9.6 times more likely than independent participants ( $p = 0.009$ ).

**Table 6: Binary logistic regression for independent factors associated with IADL disability**

	P-value	Exp (B)	95% confidence level	
			Lower	Upper
Age				
<80 years		-		
$\geq 80$ years	0.004	3.974	1.544	10.230
Sex				
Male		-		
Female	0.029	1.896	1.068	3.368
Having a caregiver				
No		-		
Yes	0.000	2.565	1.595	4.124
Exercise				
No		-		
Yes	0.000	0.329	0.199	0.547
Homecare				
No		-		
Yes	0.009	9.575	1.747	52.487

IADL: Instrumental activities of daily living.

## Discussion

Comorbidity, age-related frailty, and acute illness place older people at increased risk for adverse outcomes and are associated with more rapid declines in health status and a greater likelihood of disability [21].

In the current study, the prevalence of ADL disability among the participants was 24.6%. This finding was higher than a study conducted in 1994 in the Qassim region which estimated ADL prevalence at 12.4% among older people registered in PHCCs [22]. One possible reason for these finding differences might because of the change in sedentary lifestyles among old people during the past few decades. However, the current study found a lower percentage of ADL disability among participants when compared to a study on older individuals in a major hospital in Jeddah. It is important to note that the different settings could play a role in the effect of comorbidity on the patients [23]. Regionally, in the United Arab Emirates, only 5.8% of older people patients who registered in the home-based primary care at Dubai Health Authority were independent [24]. The prevalence of ADL disability in this study was lower than the figure reported by a cross-sectional study. In Tunisia, that was carried out in long-stay long-term care institutions of older persons, as it was found to be 57.3% [5]. Internationally, in Spain, among nursing

home residents, 79.8% were disabled based on the Barthel Index which was a scale designed to measure the performance of 10 ADL functions [25]. The higher figures of ADL disability in Tunisia and Spain were due to different study settings and different tools used in Spain, as older people in long-term care facilities usually suffer from multi-morbidities and dependence. The prevalence of ADL disability in this study was higher than a study in Brazil, as the basic activity disability in the Northeast region was 8.4% resulted from the study which was driven by the National Health Survey [26]. This difference may be related to different study samples as in Brazil it was a national survey while this study targeted PHCCs attendants. In general, there were differences between our findings and other studies because of variation of population characteristics, cultures, and social life. The Saudi older people used to live in their families with their children and grandchildren, hence, the institutions of the older people were not quite common in Saudi Arabia.

Furthermore, this study showed that the prevalence of disability in IADL, either moderate or severe disability, was 58.5%. This finding was compatible with the result of a previous study in Qassim, which found IADL impairment at a rate of 54.4% [22]. Previous scholarship has found high percentages of IADL as well. For example, this study's findings had a lower prevalence than that found among institutionalized Tunisian older people (85.4%) [5]. However, the current study had a higher percentage of IADL than the findings from a study on Brazilian older people (34.2%) [19]. Because IADL included higher-level tasks, its disability used to be higher than disability in ADL functions.

This study analyzed the factors associated with disability among Saudi older people. With regard to the sex and age of participants, data indicated that the ADL and IADL disabilities were higher among females and people more advanced in age. These findings are supported by similar findings in different geographical regions, including but not limited to, the Qassim region of Saudi Arabia [22], Tunisia [5], Spain [25], Brazil [26], and China [27].

We found that a need for homecare was positively associated with ADL and IADL disabilities. Homecare, defined as "the provision of medical supplies and/or clinical services directly to patients in the community," is generally offered as a pre-hospitalization preventive measure or a post-hospitalization procedure to enable elderly people to live independently as long as possible [28]. The previous study has also suggested that homecare is a risk factor for disability [19].

This study showed that ADL dependency was associated with the history of smoking either among current smokers or ex-smokers. This aligns with a study that found that smokers and ex-smokers in Belgium had a shorter life expectancy and more years

lived with disability compared with non-smokers [29]. Furthermore, a large population-based health survey in Norway showed that smoking and physical inactivity were the most important lifestyle risk factors for needing assistance in ADL [30].

Based on data analysis, regular exercise was a protective factor against both ADL and IADL disabilities. Similar findings indicated that the low level of physical activity was a predisposing factor for developing a disability among individuals aged 60 years or older [23], [31]. This was supported by results of literature systematic reviews and meta-analyses that suggested the association between a sedentary life and physical disability in older adults [32]. It was difficult to make causality inferences in our study. Hence, there was a possibility that physical inactivity might be a result of functional disability. Another systematic review suggested that the older people who were more physically active or who did regular exercise had a lower risk of developing ADL disability [33].

This study found that the medical history of dyslipidemia and rheumatoid arthritis was associated with ADL disability. Dyslipidemia is a major risk factor for cardiovascular diseases, which can cause death and disability [34]. The difficulty in performing ADL among patients with rheumatoid arthritis is well known, and the hallmark feature is persistent symmetric polyarthritis [35]. Further, this study found that a history of falls during the past year was associated with disability in basic activity. The risk of fractures and injuries due to falling can restrict movement and increase dependency on others. This was compatible with a longitudinal study in the United States that concluded that a history of falling was a risk for future ADL dependency [36]. In addition, we found that emergency visits during the past 3 months were associated with increased ADL disability among the participants. Similar to a study conducted in Italy, we suggest that ADL disability increases the risk of emergency room visits but not of hospital admissions [37].

This study has limitations. First, it was difficult to make causal inferences due to the nature of the cross-sectional studies. We used a non-probability sampling method for the difficulty in detecting the targeted total population because the primary health services are provided by many sectors other than the ministry of health. In addition, we focused solely on PHCCs, even though elderly citizens were scattered between primary, secondary, and tertiary health centers. Hence, we may be biased toward slightly independent elderly persons and missed a broad segment of the sub-population. Therefore, the possibility of selection bias should be considered. To the best of the authors' knowledge, this is the first study performed in the city of Riyadh, Saudi Arabia, examining functional disability among elderly citizens attending PHCCs.

## Conclusion

This study found a high prevalence of ADL and IADL disability among Saudi older people in Riyadh city. We concluded that smoking, dyslipidemia, and rheumatoid arthritis, history of falls, and emergency visits were risk factors associated with ADL disability. The predictors of IADL disability were advanced age, being female, and the need for a caregiver. Furthermore, the need for homecare was positively associated with ADL and IADL dependency, and maintaining regular physical activity was a protective factor against functional disabilities.

## Recommendations

Scholars and health-care practitioners should focus on preventive measures that will allow the growing number of elderly people to be independent members of society. Primarily, they should focus on preventing the predisposing factors of chronic diseases and emphasizing healthy habits such as exercise among adults younger than 60 years. Second, additional measures and resources are needed for screening and treating elderly people that are in the early stages of diseases to control the future probability of disabilities incidences. It is important that greater efforts are made to prevent the sequences of disabilities and mitigate the complications that would be caused by chronic diseases.

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