

# Prevalence of depression among Iranian elderly: a systematic review and meta-analysis of observational studies

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## Abstract

**Background:** Depression is a common mental disorder that affects a significant portion of older adults. In Iran, there is limited information on the prevalence of depression among this population. This systematic review and meta-analysis aimed to determine the pooled prevalence of depression among Iranian elderly individuals.

**Objectives:** To conduct a systematic review and meta-analysis of observational studies examining the prevalence of depression among Iranian elderly people.

**Methods:** We searched various electronic databases, including SID, MagIran, PubMed, Scopus, ScienceDirect, Web of Science, and Google Scholar, for articles published from January 2000 to December 2022. The keywords "senile depression," "geriatric depression," "elderly," "depression," "depressive disorder," and "Iran" or any combination of these terms were used. Two writers worked separately on data extraction and quality evaluation.

**Results:** Twenty-four studies met our inclusion criteria, yielding an overall prevalence rate of depression among Iranian elderly individuals of 53.7% (95% CI: 43.1-64.4). Gender subgroup analysis revealed that the prevalence of depression was significantly higher in women (50%, 95% CI: 42.3-69.7) compared to men (42.2%, 95% CI: 28.2-56.3). Furthermore, we found a statistically significant association between the sample size of the studies and the prevalence of depression ( $p = 0.009$ ).

**Conclusion:** Our study suggests that depression is a major public health concern among Iranian elderly individuals. These findings underscore the need for further research into the underlying factors contributing to depression in this population and the development of effective interventions to address it.

**Keywords:** Depression, Prevalence, Elderly, Iran, Meta-analysis.

## Introduction

Old age is an unavoidable phase of life when individuals become both biologically and socially dependent. The elderly population in developing and developed nations continues to grow, and it has been projected that by 2050, it will increase to 16.1%.<sup>1</sup> According to a 2011 census in Iran, the elderly population accounted for over eight percent of the Iranian population, and it has been estimated that in forty years, the growth of the elderly population in Iran will surpass the global average growth rate of the elderly population.<sup>2,3</sup>

Elderly individuals experience numerous losses throughout their lifetime, making them more susceptible to psychological disorders.<sup>4</sup> Depression is a common mental disorder among the elderly and frequently goes undetected.<sup>5,6</sup> Geriatric depression has a poor prognosis, with only about one-third of patients recovering from it, and it is often associated with various factors such as adverse life events, chronic physical diseases, genetic predisposition, personality traits, sleep disorders, and socioeconomic status.<sup>7,8</sup> Depression can lead to an increase in disability and mortality in older adults.<sup>9</sup> Depressive mood, lack of interest in daily activities, decreased energy levels, feelings of guilt, low self-esteem, sleep disturbances, appetite changes, and difficulty concentrating are some of the most common symptoms of depression.<sup>10</sup>

Depression is associated with several negative consequences and complications. By causing a decline in healthy behaviors, such as a tendency towards alcohol, smoking, poor diet, inactive lifestyle, sleep disorder, and poor medication adherence, depression can put the health of individuals at risk, particularly among the elderly.<sup>11</sup>

Furthermore, the presence of depression in combination with co-existing chronic medical conditions has been shown to increase hospitalization rates, healthcare resource utilization, and, consequently, a significant economic burden.<sup>12</sup> The prevalence of depression among older adults is often underestimated. This is due to the fact that the elderly is less likely to report their depressed mood and suicidal thoughts when compared with younger individuals.<sup>13</sup> The prevalence of depression in Iran varies significantly, ranging from as low as 22% to as high as 93.3% in various studies,<sup>14,15</sup> with some investigations

showing that over half of the elderly population in Iran suffers from depression, despite contradictory findings in other studies.<sup>16-18</sup>

With the growing global elderly population, identifying and treating depression in this age group has become increasingly important. While there are various instruments for assessing depression in older adults, the Geriatric Depression Scale (GBS) is specifically designed to evaluate depression in this demographic.

## Objectives

Due to the significance of geriatric depression and the varying reports on its prevalence in Iran, the current study adopts a systematic approach to determine the prevalence of depression among the Iranian elderly population using the Geriatric Depression Scale (GBS). The goal is to provide policymakers with the necessary information to allocate appropriate healthcare resources to address this issue.

## Methods

In this systematic review and meta-analysis, the prevalence of depression among the Iranian elderly was evaluated according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement. The protocol of the present study has been registered in the International Prospective Register of Systematic Reviews (PROSPERO) under registration number CRD42017065426.

## Search strategy

In this study, multiple national and international databases were searched, including Scientific Information Databases (SID), MagIran, and international websites such as ScienceDirect, Web of Science, Google Scholar, PubMed, and Scopus. Keywords used in the search included "senile depression," "geriatric depression," "elderly," "depression," "depressive disorder," and "Iran" and all their possible combinations. The Farsi equivalents of these keywords were used for the Farsi sites. Eligible articles were also reviewed to gain access to additional articles.

**Data extraction**

Two separate researchers initially assessed the titles and abstracts of the identified publications for eligibility, resulting in the discovery of eligible articles. Their full texts were then accessed. All studies based on the Geriatric Depression Scale (GDS) questionnaire (a specific tool for measuring depression in the elderly) were included in the analysis. Studies were excluded if they focused on therapeutic interventions to manage depression or could not provide access to the full text. Data were extracted using a standardized extraction tool and included information such as the authors' names, publication years, locations, sample sizes, sample sizes for men and women, and the number of elderly individuals suffering from depression overall and by gender.

**Quality assessment**

The methodological quality of the selected articles was assessed using a standardized instrument that has been employed in both national and international studies.<sup>19,20</sup> This instrument evaluates various aspects of study design, including the type of study, comparison groups, participant demographics, survey questions, and sample size. Each item is assigned a score of 0 to 3, with higher scores indicating better methodological quality. Based on these scores, the articles were categorized into three groups: weak (scores 0–5), moderate (6–10), and strong (10+). In cases where there was a discrepancy between the two reviewers, the corresponding author (RGG), an expert in the field, resolved any disputes through further assessment [Table 1].

**Table-1.** Criteria for rating the methodological quality of included articles

Study Parameter	Rating	Criteria
<b>Study design</b>	3	Longitudinal prospective design
	2	Retrospective or mixed design
	1	Cross-sectional design
	0	Survey of did not report
<b>Participants and recruitment</b>	3	Description of the population, and eligibility criteria for participants, precise details of the recruitment process, accounted for the numbers recruited, and lost follow-up
	2	Minimal description of at least four criteria
	1	Two criteria missing
	0	More than two criteria missing
<b>Comparison group</b>	3	Healthy, age-appropriate comparison
	2	Reference sample
	1	Other comparison group
	0	No comparison group
<b>Number of participants</b>	3	N >100
	2	N=50-100
	1	N<50
	0	Did not report
<b>Instruments</b>	3	Psychometrically sound report of generic or specific resilience measures.
	2	Psychometrically sound report of generic and specific resilience measures.
	1	Self-report generic or specific resilience measures with some psychometric data
	0	Investigator constructed clinical rating of resilience or resilience domains with no psychometric properties

**Statistical analysis**

A random-effects model was employed to compute point estimates and their confidence intervals for the prevalence of depression (DerSimonian and Laird's). These results were presented using a forest plot to visualize heterogeneity. The variance of the prevalence of depression reported in each study was calculated based on

the binomial distribution formula. To assess small study effects and publication bias, a funnel plot and Egger regression test were conducted. Heterogeneity across studies was evaluated using Cochran's Q test. Additionally, variation among the studies due to heterogeneity was assessed using the I2 statistic. Values of 25%, 50%, and 75% indicate low, medium, and high heterogeneity,

respectively, while  $I^2$  values greater than 75% signify significant heterogeneity.<sup>21-23</sup> In addition, the association of depression prevalence with the year of publication, sample size, and mean age of participants was examined using meta-regression test. Subgroup analysis was performed by gender (women/men), geographical region (1 to 5), place of residence (community/nursing home), and article's quality. In order to assess stability, sensitivity analysis was performed by removing studies one by one. The meta-analysis was performed using STATA software, version 12.0.

## Results

In the current study, all relevant studies examining the prevalence of depression among Iranian older adults were included in a systematic review and meta-analysis following PRISMA guidelines. Initially, 1,298 studies were identified, of which 170 met the inclusion criteria and were ultimately analyzed. Some studies had divided their samples into two groups, reporting the prevalence of depression separately for each group. We considered these studies to be two separate analyses, resulting in 24 total groups of participants across 17 studies being included in the analysis.

In this review, 24 studies with a total sample size of 11620 individuals were included in the meta-analysis.<sup>14-18, 24-38</sup> The largest and smallest sample sizes, respectively, belonged to the studies by Majdi et al.,<sup>32</sup> and Davoodi et al.<sup>14</sup> The main characteristics of the selected studies are presented in Figure 1 and Table 2. Overall, the prevalence of depression among the Iranian elderly population was 53.7% (95% CI: 43.1-64.4%) [Figure 2]. Women had a significantly higher prevalence compared to men (56.1% vs. 42.3%). Depression was more prevalent in Region 1 of the nation (provinces of Tehran, Alborz, Qazvin, Mazandaran, Semnan, Golestan, and Qom) than in the other areas (62.1% vs. 39.2%). Additionally, the prevalence of depression was significantly higher in high-quality articles compared to poor-quality articles (63.2% vs. 37.9%) [Table 3].

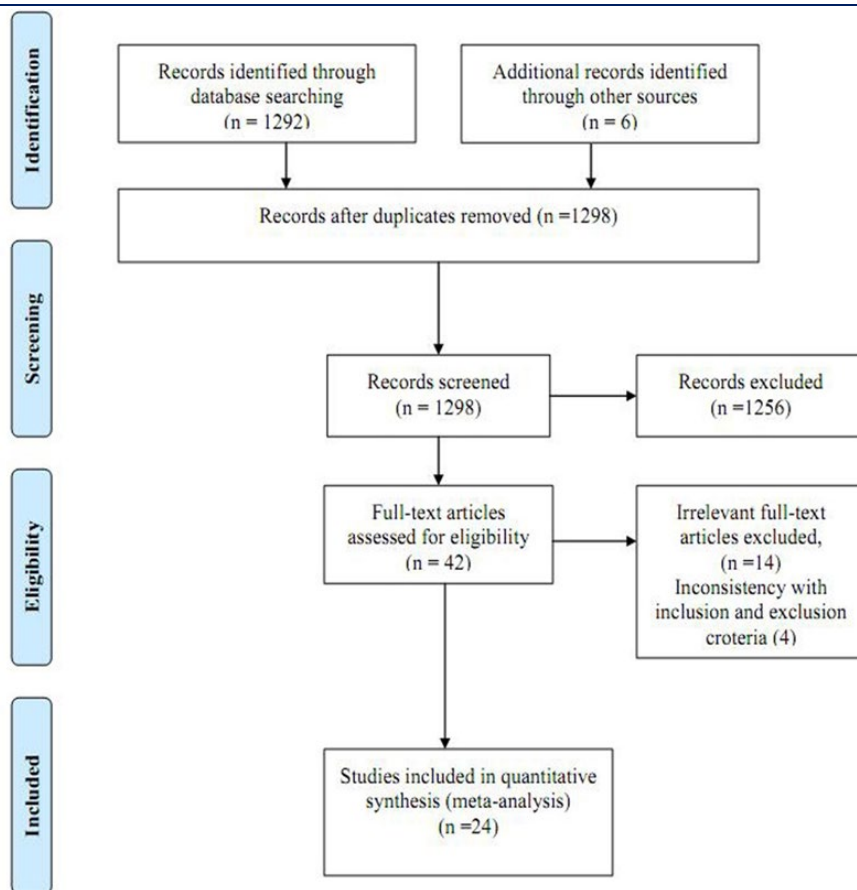
The results of the univariate meta-regression analysis revealed that there was no significant relationship between the publication year ( $p=0.267$ ), mean age ( $p=0.256$ ), and

the prevalence of depression among the elderly. However, the prevalence of depression among the elderly showed a significant relationship with the sample size of the article ( $p=0.009$ ). Specifically, as the study sample size increased, a decrease in the prevalence of depression was observed [Table 4]. The sensitivity analysis results indicated that removing the individual studies (i.e., not including their results in the overall analysis) did not result in a significant change in the pooled prevalence of depression [Figure 4]. Furthermore, the funnel plot demonstrated a statistically significant ( $p=0.004$ ) publication bias [Figure 5].

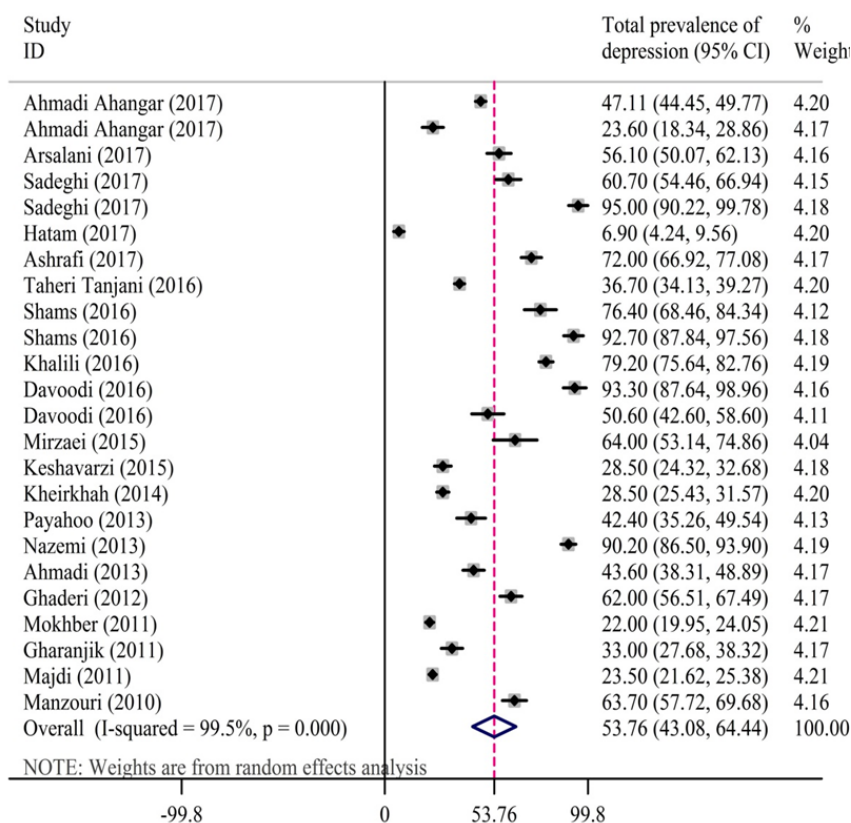
## Discussion

The findings of the current study indicate that over half of elderly individuals in Iran experience depression, a rate similar to that observed in the elderly populations of Turkey and South Africa.<sup>1,34</sup> However, these findings differ from those in other countries, such as Iran (39%),<sup>12</sup> Japan (63%),<sup>39</sup> and Korea (12%).<sup>40</sup> Differences in depression prevalence across countries may be attributed to differences in screening or diagnostic tools used, as well as demographic variables, social factors, and cultural influences, such as retirement-related isolation, societal attitudes toward aging, financial difficulties, and comorbid medical conditions. According to Rodda et al., diagnosing depression in older adults is particularly challenging due to the tendency to attribute symptoms to normal aging processes rather than recognizing them as signs of depression, which can hinder accurate identification, treatment, and management of depression in this population.<sup>9</sup>

In this study, the prevalence of depression was found to be higher among elderly women compared to elderly men, which is consistent with previous research, including a systematic review and meta-analysis by Cole et al., that showed that women are more likely to experience depressive disorders and symptoms than men. Several other epidemiological studies have also demonstrated this gender difference in depression prevalence. Specifically, studies have shown that the prevalence of depression is higher among women than men across different age groups.<sup>41-44</sup>



**Figure-1.** Flowchart describing the study design process



**Figure-2.** Forest plot of the prevalence of depression in Iranian elderly people.

The confidence interval of 95% for each study in the form of a horizontal line around the main mean and the dotted line in the middle represents the mean overall score and the rhombus shows the confidence interval of the prevalence of this disorder

**Table-2.** Characteristics of the selected studies

First Author	Year	Study	Quality	Location	Sample Size			Overall Prevalence	Prevalence	
					Overall	Men	Women		Men	Women
Ahmadi Ahangar <sup>38</sup>	2017	Case-control	Moderate	Amirkola	1354	684	670	47.11	32.4	62
					250	192	58	23.6	17.7	43.1
Arsalani <sup>37</sup>	2017	Cross-sectional	Moderate	Semnan	260	113	147	56.1	-	-
Sadeghi <sup>34</sup>	2017	Case-control	Moderate	Shahroud	235	107	128	60.7	-	-
					80	39	41	95	-	-
Hatam <sup>35</sup>	2017	Cross-sectional	Poor	Ahwaz	350	172	78	6.90	5	9.21
Ashrafi <sup>36</sup>	2017	Cross-sectional	Moderate	Salmas	300	137	163	72	-	-
Taheri-Tanjani <sup>25</sup>	2017	Cross-sectional	Poor	National	1350	642	708	36.7	30.2	42.5
Khalili <sup>24</sup>	2016	Cross-sectional	Moderate	Kashan	500	290	210	79.2	-	-
Shams <sup>18</sup>	2016	Cross-sectional	Moderate	Tehran	110	54	56	76.4	79.6	73.2
					110	37	73	92.7	91.8	93.1
Davoodi <sup>14</sup>	2016	Case-control	Moderate	Tehran	75	27	48	93.3	-	-
					150	54	96	50.6	-	-
Mirzaei <sup>16</sup>	2015	Cross-sectional	Poor	Khoramabad	78	21	57	64	52.3	68.4
Keshavarzi <sup>26</sup>	2015	Cross-sectional	Poor	Shiraz	447	125	322	28.5	17.9	82.1
Kheirkhah <sup>27</sup>	2014	Cross-sectional	Poor	Amirkala	830	830		28.5	-	-
Payahoo <sup>28</sup>	2013	Cross-sectional	Moderate	Tabriz	184	97	87	42.4	31.9	54
Nazemi <sup>17</sup>	2013	Cross-sectional	Poor	Tehran	284	125	123	90.2	93.8	86.9
Ahmadi <sup>30</sup>	2013	Cross-sectional	Poor	Shiraz	337	144	193	43.6	15	27.9
Ghaderi <sup>29</sup>	2012	Cross-sectional	Moderate	Bookan	300	154	146	62	-	-
Mokhber <sup>15</sup>	2011	Cross-sectional	Poor	Khorasan	1565	720	845	22	20.1	23.7
Gharanjik <sup>31</sup>	2011	Cross-sectional	Moderate	Golestan	300	155	145	33	-	-
Majdi <sup>32</sup>	2011	Cross-sectional	Poor	Khorasan	1962	917	1054	23.5	43.6	56.4
Manzouri <sup>33</sup>	2010	Cross-sectional	Moderate	Isfahan	248	125	123	63.7	64	63.4

**Table-3.** Sub-group analysis of the prevalence of depression among elderly

Groups		Number of Study	Sample Size	Prevalence (%)	Confidence Interval 95%	Heterogeneity		
						I <sup>2</sup> %	Q	P-value
Gender	Men	11	5961	42.26	28.22-56.30	99.2	1581.41	<0.0001
	Women	11	5662	56.06	42.33-69.79	99.1	1417.60	<0.0001
Region	1	8	5592	62.06	47.44-76.67	99.4	1947.62	<0.0001
	2, 3, 4 and 5	8	5468	39.18	28.58-49.79	98.8	646.45	<0.0001
Resident	Community	21	11062	51.21	40.49-61.93	99.4	3495.11	<0.0001
	Nursing home	3	558	71.88	49.71-94.05	97.3	73.75	<0.0001
Article	Moderate	9	4456	63.21	51.90-74.52	98.7	1050.03	<0.0001
Quality	Poor	8	7164	37.99	24.43-51.57	99.5	1498.31	<0.0001

Region 1: The provinces of Tehran, Alborz, Qazvin, Mazandaran, Semnan, Golestan, and Qom;

Region 2: The provinces of Isfahan, Fars, Boushehr, Chaharmahal va Bakhtiari, Hormozgan, and Kohkilouyeh va Boyerahamad;

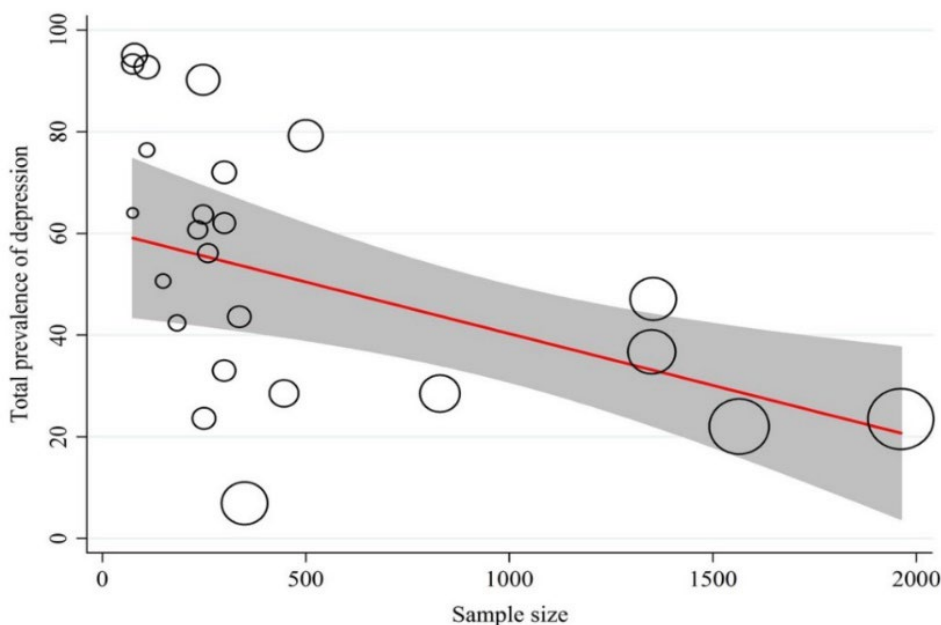
Region 3: The provinces of Eastern Azarbaijan, Western Azarbaijan, Ardebil, Zanjan, Gilan, and Kurdistan;

Region 4: The provinces of Kermanshah, Ilam, Hamedan, Markazi, and Khouzesan;

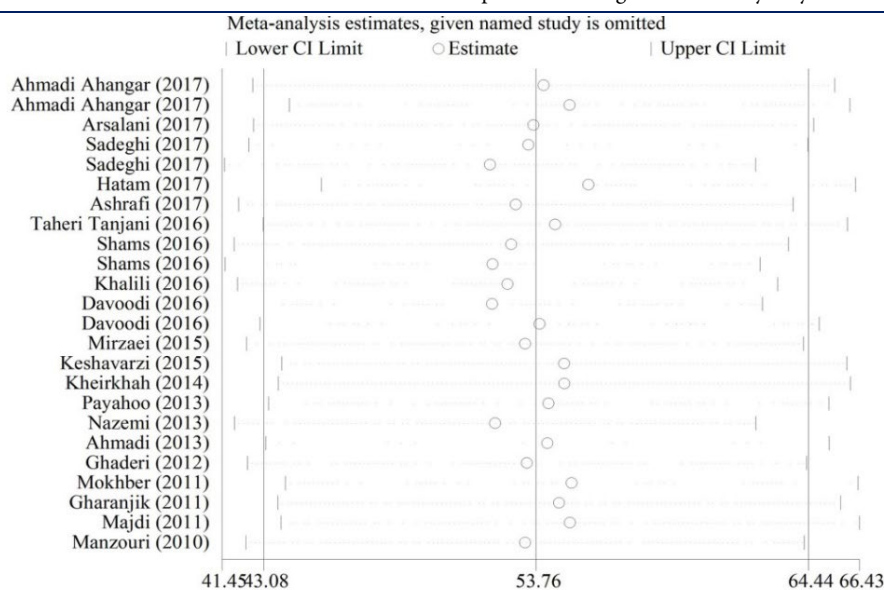
Region 5: The provinces of Khorasan Razavi, Southern Khorasan, Northern Khorasan, Kerman, Yazd, and Sistan va Balouchestan.

**Table-4.** Univariate meta-regression of prevalence of depression in Iranian elderly people

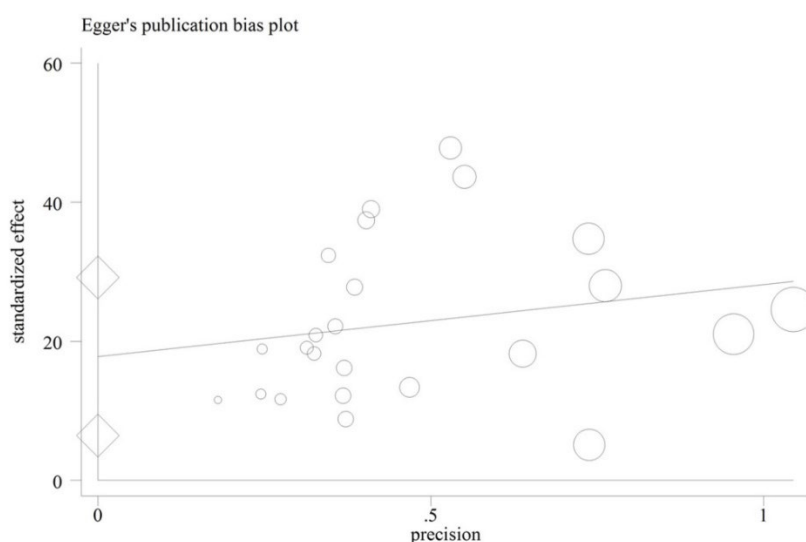
Variable	Coefficient	Standardized Error	t	p-value	95% Confidence Interval
Publication Year	2.59	2.27	1.14	0.267	-2.12 - 7.31
Sample Size	-0.03	0.01	2.85	0.009	-0.04 - -0.01
Mean Age	2.75	2.31	1.19	0.256	-2.25 - 7.75



**Figure-3.** Meta-regression of prevalence of depression in Iranian elderly population by sample size of studies



**Figure-4.** plot of sensitivity Analysis



**Figure-5.** Funnel plot of publication bias

The reasons for this higher prevalence of depression in women can be attributed to hormonal differences, the effects of pregnancy, differences in perceived stresses, socio-psychological pressures on women, and social, cultural, and economic discrimination, which can increase elderly people's vulnerability to depression. Researchers believe that women are more resilient to disease and can better tolerate pain resulting from diseases; however, they are more susceptible to conditions that affect their emotions and can develop mental illnesses, such as depression, when facing adversity. Additionally, women are more prone to physical or psychological problems due

to stress, which may also contribute to the higher prevalence of depression among elderly women.<sup>45</sup>

The findings revealed that the prevalence of depression among the elderly residing in nursing homes was higher compared to those living at home. Living with family as a vital source of support can enhance feelings of belonging, acceptance, usefulness, and the perception of playing an essential role within the family for older adults. This, in turn, can foster increased social interactions, which can boost self-esteem and minimize susceptibility to loneliness. This finding can be attributed to the loneliness and isolation of this elderly group. The results of the



present meta-analysis indicate that there is no association between depression and the age of the elderly, which is consistent with the findings of studies conducted in South Korea and China.<sup>40,46</sup> In a systematic review and meta-analysis, Volkert et al. examined the prevalence of mental disorders in older adults in Western countries and found that there was a significant association between age and depression; however, when the study on older adults aged 85 years or older was excluded, the association between age and depression was no longer statistically significant, and therefore, the relationship between these two variables remained unclear.<sup>47</sup> It indicates that, when reaching old age, various people experience comparable amounts of depression. In other words, until one reaches old age, depression appears to be unaffected by age.

According to the findings of the current study, there is no association between education level, marital status, and depression among the elderly, which is consistent with previous studies conducted by Kim et al.,<sup>40</sup> in South Korea and Ranjan et al., in Nepal.<sup>48</sup> Because of the cultural significance of the elderly in Iranian families, elderly individuals are not left without support after the death of their spouses but rather cared for by their children and extended family members, potentially explaining why there is no correlation between marital status and the prevalence of depression among Iranian seniors. Interestingly, a study by Girma et al., found that the likelihood of developing depression was significantly higher among those who were illiterate or unmarried, with respective risks being 3 and 10 times greater compared to literate and married individuals.<sup>49</sup>

The prevalence of depression in older adults was found to be higher in studies conducted in Region 1 of Iran (provinces of Tehran, Alborz, Qazvin, Mazandaran, Semnan, Golestan, and Qom) compared to other regions of the country, likely due to improved access to medical and healthcare services and earlier diagnosis leading to more effective interventions. A significant limitation of this study was the lack of complete demographic data in the selected articles, making it difficult to analyze specific findings. Our review of articles revealed that, until this study, no comprehensive investigation on the prevalence of depression among Iranian elderly individuals had been

conducted, which represents an innovative aspect of our research.

In this study, contrasting previous research, the prevalence of depression was also found among residents (both nursing home and community-dwelling), according to our findings. Moreover, we registered the study on PROSPERO and used the Geriatric Depression Scale (GBS), a specifically designed tool for assessing depression in older adults, to evaluate depression in our sample. These additional strengths highlight the comprehensive nature of our study. Notably, the high prevalence of depression observed in both groups underscores the urgent need for the healthcare system, particularly the geriatric nursing system, to develop strategies that can effectively identify risk factors linked to depression and deliver tailored interventions adapted to the unique cultural context of Iranian society and families.

## Conclusions

The current findings of this study suggest that depression is prevalent among older Iranians at a high rate, with over half of older adults in Iran suffering from depression, the majority of them being women. These results highlight the need for policymakers to allocate appropriate health care resources toward managing this chronic condition. As many older individuals have concurrent medical issues, depression can exacerbate these comorbidities, leading to reduced adherence to medications and an increased likelihood of disability and mortality. Early detection and adequate medical interventions are therefore crucial to mitigating the potential consequences of depression, including repeat hospitalizations.

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## Competing interests

The authors declare no competing interests.

## Abbreviations

PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses; SID: Scientific Information Database; GDS: Geriatric Depression Scale.

## Authors' contributions

Design: MN; data collection: HM and MF; analysis and interpretation of data: SD and RGG; Manuscript preparation: MN, SV and RGG; Manuscript revision: AK and MZ. All the authors read and approved the final manuscript. All authors take responsibility for the integrity of the data and the accuracy of the data analysis.

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Kurdistan University of Medical Sciences.

## Role of the funding source

None.

## Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

## Ethics approval and consent to participate

Not applicable.

## Consent for publication

Not applicable.

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