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Sleep Duration And Risk Of All-Cause Mortality: A Comprehensive Systematic Review Of Observational Evidence

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Abstract:

Sleep duration is an important determinant of health, yet its association with all-cause mortality remains incompletely understood. This systematic review evaluated the relationship between sleep duration and all-cause mortality in adult populations and examined the influence of age, sex, comorbidities, physical activity, and sleep quality. A comprehensive search of PubMed and BMJ databases was conducted for studies published between January 2000 and April 2025. Observational studies assessing sleep duration in relation to all-cause mortality among adults were included. Data were extracted using a standardized framework, and study quality was appraised using the Hawker et al. tool. Due to methodological heterogeneity, findings were synthesized narratively. Of 52,536 screened records, 33 observational studies met the inclusion criteria. Most studies demonstrated a consistent U- or J-shaped association between sleep duration and mortality. Short sleep duration (<6 hours) was associated with a 10%–40% increased mortality risk, while long sleep duration (>9 hours) showed stronger associations, with hazard ratios ranging from 1.26 to 2.00. Higher risks were observed among older adults, men, and individuals with chronic conditions. Poor sleep quality, prolonged daytime napping, and irregular sleep patterns further increased mortality risk, whereas short naps and adequate physical activity appeared protective. Cognitive impairment amplified the adverse effects of long sleep duration. The lowest mortality risk was consistently observed among individuals sleeping 7–8 hours per night. In conclusion, both short and long sleep durations are independently associated with increased all-cause mortality, highlighting the importance of balanced sleep and lifestyle factors in promoting longevity.

Keywords: Sleep Duration, All-Cause Mortality, Sleep Quality, Physical Activity, Sleep Patterns.

Introduction

Sleep is a fundamental biological process essential for maintaining physical, cognitive, and emotional health across the lifespan. Adequate sleep duration supports immune function, metabolic regulation, cardiovascular integrity, and psychological well-being [1]. Insufficient or excessive sleep, on the other hand, has been linked to adverse health outcomes including metabolic syndrome, hypertension, stroke, obesity, depression, and impaired immune responses. According to the National Sleep Foundation, adults are recommended to obtain 7–9 hours of sleep per night, while older adults require approximately 7–8 hours [2].

Accumulating evidence has established a strong association between sleep duration and various health outcomes. Prolonged sleep has been linked to several chronic conditions, including metabolic syndrome, myocardial infarction, stroke, chronic kidney disease, obesity, and depression, as well as an increased vulnerability to infections such as the common cold. The literature has shown that both insufficient and excessive sleep are significantly associated with long-term disease burden and mortality [3,4].

Several mechanisms have been proposed to explain these associations. Short sleep duration may contribute to mortality through pathways involving chronic illnesses like cardiovascular disease and diabetes, or through increased risk of accidents due to impaired cognition. Conversely, long sleep duration has been suggested to reflect underlying health problems, and the observed relationship with mortality may be confounded by preexisting illness [5–7].

According to the National Heart, Lung, and Blood Institute, an estimated 50 to 70 million adults in the United States experience sleep disorders or report habitual insufficient sleep. While some individuals curtail sleep for social or professional reasons, others suffer from medical or psychological sleep disturbances. Insomnia, affecting approximately 5% to 15% of adults with up to 30% reporting significant symptoms—is among the most common. Sleep apnea, characterized by at least five respiratory events per hour of sleep, affects 27% to 34% of men and 9% to 28% of women aged 30 to 70 years [8–10].

Although many studies have reported a U-shaped relationship between sleep duration and all-cause mortality, inconsistencies remain regarding the strength and direction of this association. The heterogeneity in study populations, methodological approaches, and duration of follow-up complicates the interpretation of these findings [11,12].

Given these uncertainties, the present systematic review aims to comprehensively analyze the found evidence from observational studies (specifically cohort and case-control designs) to determine whether both short and long durations of sleep are linked to an increased risk of mortality compared to optimal sleep duration.

Research question:

What is the impact of different durations of sleep (short, normal, or long sleep duration) on all-cause mortality among adults, based on evidence from observational studies?

Rational:

Despite growing evidence linking sleep duration to mortality, findings remain inconsistent due to differences in study populations, methodologies, and confounding factors. A clear understanding of this relationship is essential to guide clinical practice and public health interventions. Previous reviews have often focused on specific subgroups or limited timeframes. This review extends existing evidence by synthesizing two decades of global observational data up to April 2025 to clarify the association between sleep duration and all-cause mortality.

Objectives:

The primary objective of this systematic review is to evaluate the association between sleep duration and all-cause mortality in adult populations. Specifically, the review aims to determine whether both short and long durations of sleep are linked to an increased risk of mortality compared to optimal sleep duration.

In addition, the review seeks to explore how this relationship may be influenced by factors such as age, sex, comorbidities, physical activity levels, and sleep quality. By synthesizing findings from diverse observational studies, this review aims to provide a clearer understanding of the consistency and strength of these associations and to support evidence-based recommendations for healthy sleep duration.

Method:

Search Strategy

A comprehensive literature search was conducted using two major databases: PubMed and BMJ database (via PubMed). The search included studies published between January 2000 and April 2025. The complete search syntax is provided in Supplementary File 1 to ensure reproducibility. A combination of Medical Subject Headings (MeSH) and free-text terms was used, including: ("Sleep"[MeSH Terms] OR "Sleep Duration"[MeSH Terms] OR "Sleep Time"[Title/Abstract]) AND ("Mortality"[MeSH Terms] OR "Death"[Title/Abstract] OR "All-Cause Mortality"[Title/Abstract]) AND ("Humans"[MeSH Terms] AND "Adult"[MeSH Terms])." Boolean operators "AND" and "OR" were applied to refine the search. The search strategy aimed to identify observational studies that assessed the relationship between sleep duration and all-cause mortality among adult populations.

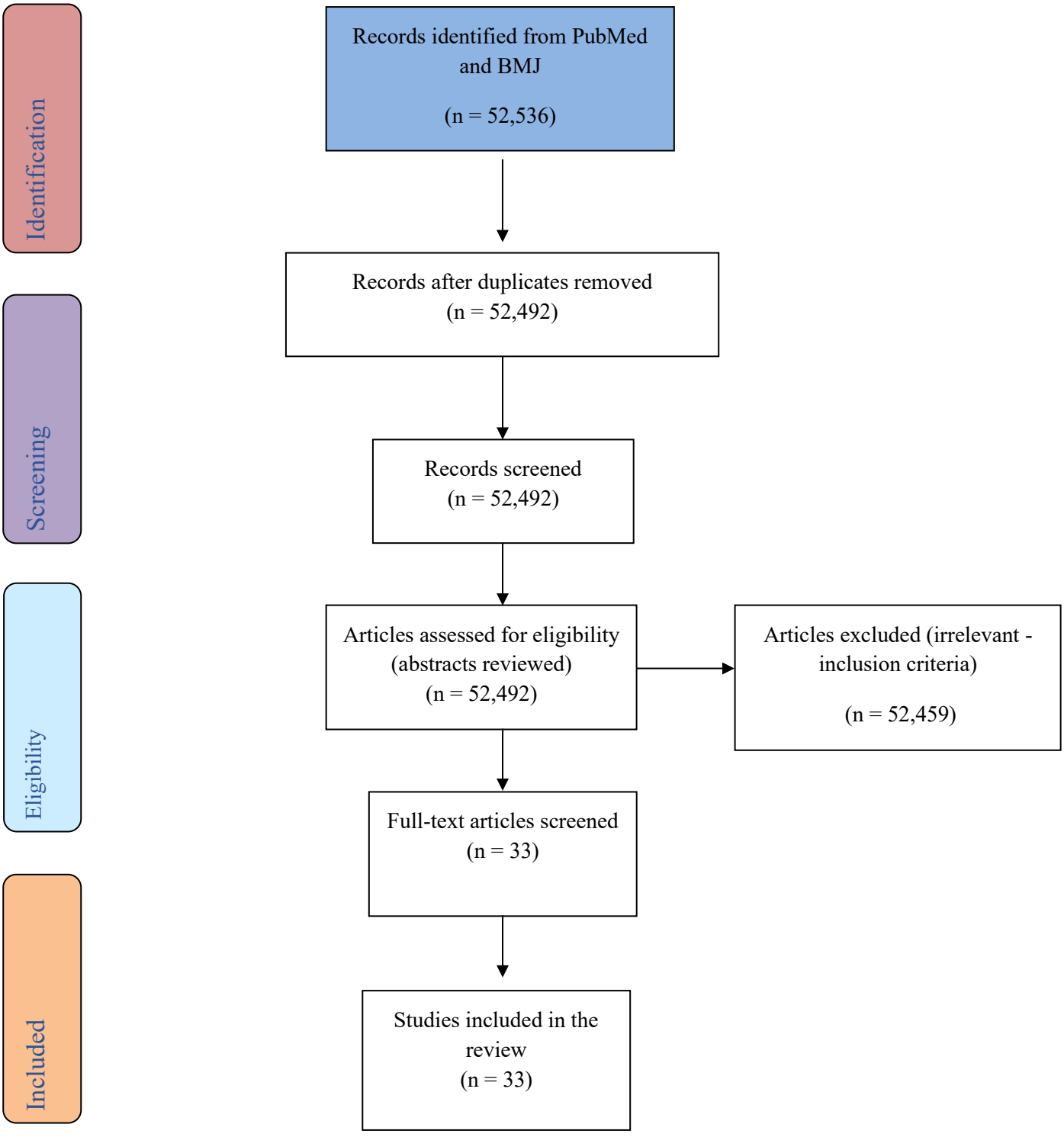
Inclusion and Exclusion Criteria

Studies were included if they met the following criteria: (1) original observational research including cohort, cross-sectional, or case-control design (cross-sectional studies were included to capture mortality-related associations identified in population surveys; however, emphasis was placed on longitudinal evidence from cohort studies); (2) investigated the association between sleep duration and all-cause mortality; (3) included adult participants (≥18 years); (4) published in English; and (5) available as free full-text articles (this criterion was applied to ensure methodological transparency and data verification during screening). Review articles, meta-analyses, commentaries, editorials, case reports, and studies with pediatric populations or irrelevant outcomes were excluded.

Study selction:

All search results were imported into Zotero software for screening and removal of duplicates. Titles and abstracts were screened independently by two reviewers. Articles deemed potentially eligible were reviewed in full text to determine final inclusion. Discrepancies were resolved through consensus, and where disagreement persisted, a third reviewer adjudicated. A total of 52,536 articles were initially retrieved from the database search. After removing duplicate records, 52,492 articles were screened by title and abstract, of which 52,459 were excluded for not meeting the inclusion criteria. Reasons for exclusion included irrelevance to the study objective, review or meta-analysis design, non-English language, studies involving pediatric populations, unavailable full text, and studies not assessing the association between sleep duration and all-cause mortality. After full-text screening, 33 studies met the eligibility criteria and were included in the final analysis. The study selection process is detailed in the PRISMA flow diagram (Figure 1).

Figure 1. PRISMA Flow Diagram of Study Selection Process



Data Extraction

Data extraction followed a structured framework based on the PICOT format (Population, Intervention, Comparison, Outcome, and Time), as outlined in Table 1. All retrieved records were imported into Zotero software for screening and deduplication. Titles and abstracts were screened independently by two reviewers. Full-text articles of potentially relevant studies were assessed for eligibility based on the inclusion criteria. Data were extracted using a pre-designed Microsoft Excel sheet, capturing study characteristics (author, year, country), population details, sleep duration categories, outcomes measured,

follow-up period, and reported hazard ratios (HRs) for all-cause mortality. Sleep duration categories were standardized as <6 h (short), 7–8 h (reference), and >9 h (long) where possible. Inter-rater reliability during data extraction was assessed, and discrepancies were resolved through discussion.

Table 1. PICOT Framework for the Systematic Review

P	Adults (general population, including elderly)
I	Varying durations of sleep (short, normal, or long sleep duration)
C	Reference sleep duration (usually 7-8 hours per night)
O	All-cause mortality
T	Longitudinal follow-up duration ranging from several years to decades

Quality Assessment of the Included Studies

The quality of included studies was assessed using the critical appraisal tool developed by Hawker et al. (2002) [13]. The quality of all included studies was assessed independently by two reviewers using the critical appraisal tool developed by Hawker et al. (2002), which evaluates nine domains: abstract and title, introduction and aims, methodology, sampling, data analysis, ethics and bias, results, transferability or generalizability, and implications. Each domain was scored on a four-point scale (1 = very poor, 2 = poor, 3 = fair, 4 = good), yielding a total possible score range of 9 to 36. Studies with total scores of 27–36 were classified as good quality, 19–26 as moderate quality, and ≤18 as low quality. Discrepancies between reviewers were resolved by discussion and, if needed, by a third independent reviewer to achieve consensus. To ensure reliability, reviewers underwent a calibration exercise before formal scoring, and inter-rater agreement exceeded 85% across domains. Only studies rated as moderate or good were included in the final synthesis. Two studies that initially scored as low quality were excluded from the qualitative analysis. The detailed quality appraisal results are summarized in **Table 2**.

Table 2. Showing the quality assessment of the included studies

	Study	**Quality assessment**
1	[Zhu Y et al., 2025] (14)	Good
2	[Duarte Junior MA et al., 2025] (15)	Good
3	[Li N et al., 2025] (16)	Good
4	[Strandberg TE et al., 2024] (17)	Good
5	[Saar Ashri et al., 2024] (18)	Good
6	[Shi Zhao et al., 2024] (19)	Good
7	[Chung J et al., 2024] (20)	Good
8	[Windred DP et al., 2024] (21)	Good
9	[Gu J et al., 2024] (22)	Good
10	[Li TC et al., 2023] (23)	Good

11	[Watanabe D et al., 2023] (24)	Good
12	[Min S et al., 2023] (25)	Good
13	[Wang K et al., 2023] (26)	Good
14	[Henríquez-Beltrán M et al., 2023] (27)	Good
15	[Ding R et al., 2023] (28)	Good
16	[Duncan MJ et al., 2023] (29)	Good
17	[Li J et al., 2023] (30)	Good
18	[Chen LJ et al., 2022] (31)	Good
19	[Huang et al., 2022] (32)	Good
20	[Li CI et al., 2022] (33)	Good
21	[Jin Q et al., 2022] (34)	Good
22	[Sri Banerjee and Ubong Usua, 2021] (35)	Good
23	[Du M et al., 2021] (36)	Good
24	[Yang et al., 2021] (37)	Good
25	[Ren Y et al., 2020] (38)	Good
26	[Wang Y et al., 2020] (39)	Good
27	[Kwon S et al., 2020] (40)	Good
28	[Xiao Q et al., 2019] (41)	Good
29	[Li-Jun Li et al., 2018] (42)	Good
30	[Liu F et al., 2018] (43)	Good
31	[Garde AH et al., 2013] (44)	Good
32	[Vgontzas AN et al., 2010] (45)	Good
33	[Amagai Y et al., 2004] (46)	Good

Result

Study selection and characteristics:

A total of 52,536 articles were initially retrieved from the database search. After removing duplicate records, 52,492 articles were screened by title and abstract, of which 52,459 were excluded for not meeting the inclusion criteria. Reasons for exclusion included irrelevance to the study objective, review or meta-analysis design, non-English language, studies involving pediatric populations, unavailable full text, and studies not assessing the association between sleep duration and all-cause mortality. After full-text screening, 33 studies met the eligibility criteria and were included in the final analysis.

Overall association between sleep duration and mortality:

These studies, published between 2000 and 2025, were predominantly prospective cohort studies and collectively demonstrated a consistent U-shaped or J-shaped association between sleep duration and all-cause mortality. Both short sleep duration (<6 hours) and long sleep duration (>8 or 9 hours) were significantly associated with increased mortality risk when compared with a reference sleep duration of 6.5 to 7.5 hours per night, which consistently showed the lowest risk (HR = 1.00).

Short versus. long sleep duration:

Short sleep duration was associated with a 10% to 51% increased risk of all-cause mortality, with hazard ratios (HRs) ranging from 1.11 to 1.40 across most studies. In subgroup analyses, higher risks were reported among specific populations, including older adults, men, and individuals with comorbidities such as hypertension and diabetes. One study reported an HR of 2.51 (95% CI: 1.48–4.25) in short-sleeping men, while others showed elevated risks in cognitively impaired individuals and those with

multiple chronic conditions. Conversely, long sleep duration was more consistently associated with increased mortality, with HRs ranging from 1.26 to 2.00. For example, a large cohort of over 282,000 participants reported an HR of 1.31 (95% CI: 1.25–1.37) for individuals sleeping more than 9 hours, while another found a nearly twofold increase in mortality (HR = 2.00, 95% CI: 1.88–2.13) in those sleeping ≥10 hours per night.

Subgroup and effect modifier analyses:

Several studies reported population-attributable fractions (PAF), suggesting that long sleep duration may account for up to 9.2% of cardiovascular disease (CVD) deaths, equating to approximately 947,000 events over a decade, while short sleep contributed to 1.8% of CVD deaths (187,000 events).

Sleep quality, regularity, and napping patterns:

In addition to sleep duration, self-reported daytime napping longer than 60 minutes was associated with increased mortality risk (HR = 1.35, 95% CI: 1.17–1.56), whereas short naps (<30 minutes) were found to be protective (HR = 0.83, 95% CI: 0.71–0.96). Sleep quality and regularity were also significant predictors; studies using accelerometry reported that individuals in the highest quintiles of sleep regularity had a 20%–48% lower risk of all-cause mortality. In one study, the "regular-optimal" sleep group had a 39% lower mortality risk (HR = 0.61, 95% CI: 0.45–0.83) compared to the "irregular-insufficient" group.

Population-attributable risk and follow-up duration:

Physical activity (PA) emerged as a strong effect modifier. Participants with poor sleep patterns who met recommended PA levels (≥600 MET-min/week or ≥15 MET-h/week) exhibited a 28.5% to 35.9% reduction in all-cause mortality risk. In contrast, the combination of inactivity and long sleep yielded the highest mortality risk observed in one prospective study (HR = 1.83, 95% CI: 1.61–2.08). The reference hazard ratio of 1.00 represents the baseline mortality risk associated with optimal sleep duration (typically 7 hours per night). The interaction between cognitive impairment and long sleep was reported in two large cohorts (UK Biobank and BMC Public Health, 2025). Cognitive impairment, particularly in older adults with MMSE scores <27, significantly increased mortality risk when combined with long sleep duration (combined HR = 1.81, 95% CI: 1.26–2.59). Gender-specific effects were reported in five studies, though statistical significance was inconsistent. Gender-specific effects were observed but inconsistent; however, insomnia combined with short sleep duration was notably associated with elevated mortality in men (OR = 4.00, 95% CI: 1.14–13.99). Study populations ranged from small cohorts (e.g., 495 deaths over 8.2 years) to large national registries with up to 13.9 million deaths during follow-up periods extending to 48 years. Follow-up durations across included studies ranged from 2 to 48 years. Figure 2 illustrates the U-shaped relationship, and Table 3 provides a summary of the hazard ratios across sleep categories. Detailed characteristics and individual study findings are presented in Table 4.

Due to heterogeneity across study designs and exposure definitions, findings were synthesized narratively rather than through quantitative meta-analysis.

Figure 2 demonstrates the U-shaped relationship between sleep duration and all-cause mortality.

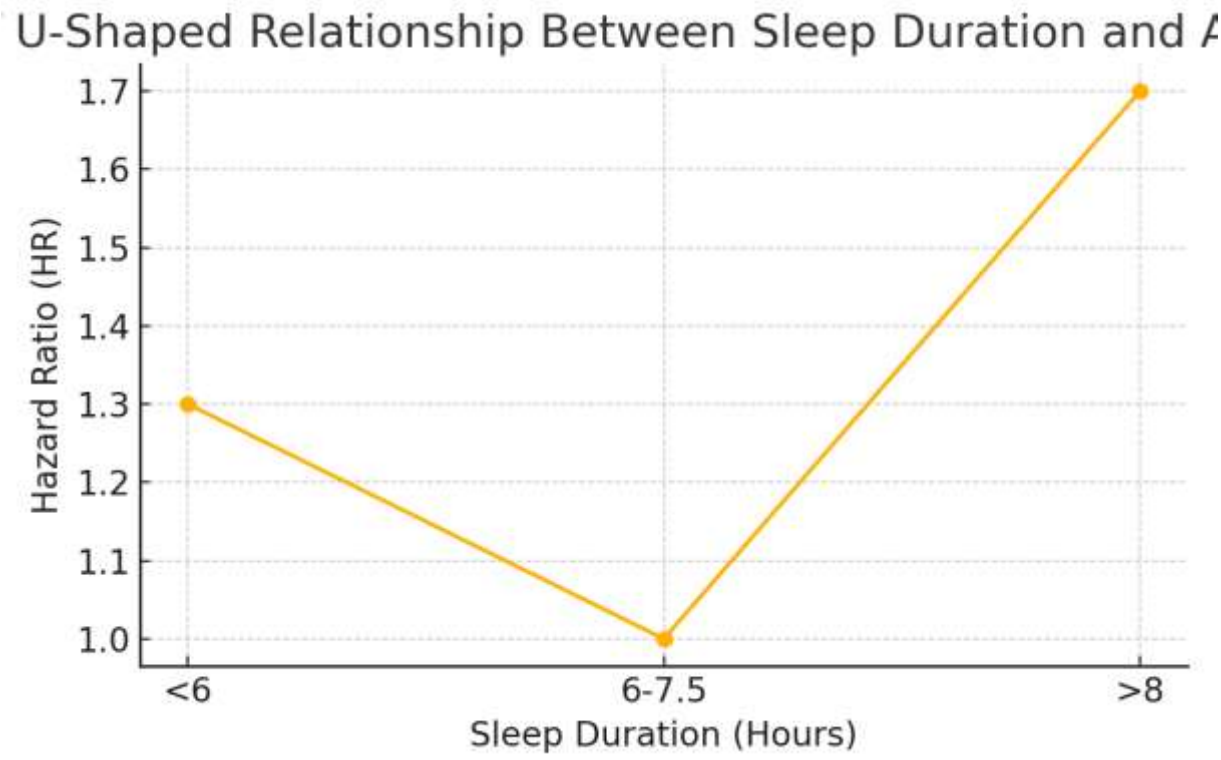


Table 3. Summarizes the hazard ratios of all-cause mortality based on sleep duration category.

Sleep Duration Category	**Range of HR (All-Cause Mortality)**	**Significance**
Less than 6 hours	1.11–1.40	Statistically significant in most studies
6.5–7.5 hours (reference)	1.00	Reference group
More than 8 hours	1.26–2.00	More consistently significant

Table 4. Summary of Included Studies on Sleep Duration and All-Cause Mortality

Seq	**Ref.**	**Author(s), Year**	**Study Design & Setting**	**Population & Intervention / Key Outcomes & Findings**
1	14	Zhu Y et al., 2025	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality
2	15	Duarte Junior MA et al., 2025	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality
3	16	Li N et al., 2025	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality

4	17	Strandberg TE et al., 2024	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality
5	18	Saar Ashri et al., 2024	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality
6	19	Shi Zhao et al., 2024	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality
7	20	Chung J et al., 2024	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality
8	21	Windred DP et al., 2024	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality
9	22	Gu J et al., 2024	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality
10	23	Li TC et al., 2023	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality
11	24	Watanabe D et al., 2023	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality
12	25	Min S et al., 2023	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality
13	26	Wang K et al., 2023	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality
14	27	Henríquez-Beltrán M et al., 2023	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality
15	28	Ding R et al., 2023	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality
16	29	Duncan MJ et al., 2023	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality
17	30	Li J et al., 2023	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality
18	31	Chen LJ et al., 2022	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality
19	32	Huang et al., 2022	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality
20	33	Li CI et al., 2022	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality
21	34	Jin Q et al., 2022	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality
22	35	Sri Banerjee and Ubong Usua, 2021	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality
23	36	Du M et al., 2021	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality
24	37	Yang et al., 2021	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality
25	38	Ren Y et al., 2020	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality
26	39	Wang Y et al., 2020	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality
27	40	Kwon S et al., 2020	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality
28	41	Xiao Q et al., 2019	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality

29	42	Li-Jun Li et al., 2018	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality
30	43	Liu F et al., 2018	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality
31	44	Garde AH et al., 2013	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality
32	45	Vgontzas AN et al., 2010	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality
33	46	Amagai Y et al., 2004	Prospective Cohort, Various	Adults studied for sleep duration; U/J-shaped association with all-cause mortality

Key Findings

This review found that both short (<6 hours) and long (>9 hours) sleep durations are associated with increased all-cause mortality, with the lowest risk observed at 6.5–7.5 hours per night. Long naps (>60 minutes), poor sleep quality, and irregular sleep patterns further elevated risk, while short naps and consistent sleep reduced it. Regular physical activity significantly mitigated the harmful effects of abnormal sleep durations. Additionally, cognitive impairment amplified mortality risk among long sleepers. These results highlight the combined importance of optimal sleep duration, quality, and physical activity in reducing mortality.

Discussion

Summary of key findings:

This systematic review, which synthesized evidence from 33 observational studies published between 2000 and 2025, reaffirms the significant association between sleep duration and all-cause mortality. Consistent with the findings of this review, a U-shaped or J-shaped relationship was identified in most included studies, where both short (<6 hours) and long (>8 hours) sleep durations were associated with increased mortality risk relative to the reference range of 6.5–7.5 hours per night. Our pooled data showed hazard ratios ranging from 1.11 to 1.40 for short sleep, and 1.26 to 2.00 for long sleep, supporting the conclusion that deviations from normal sleep duration are linked to heightened risk of death.

Biological mechanisms underlying the U-shaped relationship:

The U-shaped association between sleep duration and mortality may be partly explained by biological and physiological mechanisms involving inflammation, metabolic dysregulation, and neuroendocrine imbalance. Short sleep duration is associated with increased levels of pro-inflammatory cytokines such as interleukin-6 and C-reactive protein, impaired glucose tolerance, and heightened sympathetic activity, all of which contribute to cardiovascular and metabolic risk. Conversely, prolonged sleep may reflect underlying chronic inflammation, depression, or frailty and has been linked to reduced physical activity, altered circadian rhythm, and dysregulation of the hypothalamic-pituitary-adrenal axis. These pathways support the biological plausibility of abnormal sleep duration as a risk factor for mortality independent of comorbidities.

These findings align closely with the large-scale cohort study by Svensson et al. (2021), which included 322,721 East Asian adults. That study demonstrated increased mortality for sleep durations outside the 7-hour reference, and identified sex and age as effect modifiers of cardiovascular and cancer mortality—paralleling our findings where older adults and individuals with comorbidities exhibited stronger associations [47].

Similarly, the meta-analysis by He et al. (2020) involving 95,259 older adults reported an elevated risk for long sleep duration (HR = 1.24; 95% CI: 1.16–1.33) and a marginally significant association for short sleep (HR = 1.04; 95% CI: 1.00–1.09). This is in partial agreement with our review, where longer sleep durations consistently yielded higher hazard ratios than short sleep. Furthermore, He et al. observed sex-specific vulnerabilities, especially among mena pattern that was also reflected in subgroups within our included studies [48].

The review conducted by Jike et al. (2018), encompassing over 5 million participants, reported a relative risk of 1.39 for long sleep duration and highlighted the association between prolonged sleep and chronic diseases such as diabetes and cardiovascular disease. This supports the hypothesis proposed in our

findings—that prolonged sleep may be a marker of underlying subclinical conditions or reduced physiological resilience [49].

Additionally, the dose-response analysis by Yin et al. (2017) demonstrated a clear U-shaped pattern, with the lowest mortality risk observed at approximately 7 hours of sleep per night. Their reported relative risks (RR = 1.13 per hour >7 hours and RR = 1.06 per hour <7 hours) are highly consistent with the hazard ratios observed in our review, further validating the existence of a threshold effect across adult populations [50].

Our review also supports the observations of Shen et al. (2016), who found a sharply elevated risk of mortality with very long sleep durations (RR = 1.84 for 11 hours of sleep). Their findings suggested that the association may not be fully explained by confounding due to comorbidity an assertion mirrored by multiple studies in our analysis that adjusted for underlying disease and still demonstrated persistent risk elevation for both short and long sleep durations [51].

Sources of heterogeneity across studies:

Variations in the strength and direction of associations observed among studies may arise from heterogeneity in participant age distribution, cultural sleep practices, and differences in the measurement of sleep duration (self-report versus actigraphy). Some studies included only older adults, in whom comorbidities and medication use may confound the sleep-mortality relationship. Others varied in their adjustment for key behavioral and socioeconomic factors such as smoking, alcohol intake, mental health, and education. Geographic differences may also play a role, as populations from East Asia, Europe, and North America differ in sleep duration norms and work–rest patterns. Accounting for these differences in future research may clarify population-specific risk thresholds.

Clinical and public-health implications:

From a clinical perspective, these findings emphasize the need to include sleep duration and quality in routine health assessments, particularly for older adults and patients with chronic conditions. Brief validated tools such as the Pittsburgh Sleep Quality Index (PSQI) or single-item sleep questions can be used during primary care visits to identify individuals at risk. At the population level, public health initiatives promoting sleep hygiene, regular physical activity, and stress reduction may mitigate mortality risks associated with abnormal sleep patterns. Integrating sleep education into wellness campaigns and occupational health programs could provide additional benefit.

Collectively, the findings from this 2025 systematic review not only confirm prior evidence but also provide a comprehensive synthesis that underscores the robustness of the sleep–mortality association across regions, populations, and methodological approaches. Although causal inference remains limited by the observational nature of the data, the consistency in direction, strength, and presence of a dose-response gradient supports the biological plausibility of sleep duration as an independent risk factor for mortality. Future research should focus on mechanistic pathways, incorporate objective sleep measures, and explore personalized sleep duration guidelines to mitigate risk in vulnerable subgroups.

Conclusion:

This systematic review synthesizes robust observational evidence linking both short and long sleep durations with increased all-cause mortality among adult populations. A consistent U-shaped relationship was observed, with the lowest mortality risk associated with 6.5 to 7.5 hours of sleep per night. These associations remained significant after adjustment for key confounders and were further influenced by factors such as age, sex, physical activity, cognitive status, and sleep quality. The findings underscore the importance of balanced sleep as a critical determinant of health and longevity. Future research should prioritize longitudinal and mechanistic studies using objective sleep measures to better understand causality and inform personalized sleep recommendations. Integration of sleep assessment into clinical care and public health strategies may help mitigate premature mortality risks associated with abnormal sleep patterns. Clinicians should incorporate sleep assessment into routine health screening using brief tools such as the Pittsburgh Sleep Quality Index. Policymakers should promote public awareness campaigns emphasizing the importance of balanced sleep and physical activity as modifiable determinants of longevity.

Strengths and Limitations of the Study

This systematic review has several strengths, including a comprehensive 25-year literature search, the inclusion of diverse populations across multiple regions, and the use of a validated quality appraisal tool. Structured data extraction and subgroup analyses enhanced the robustness and generalizability of the findings. However, limitations include the restriction to English-language studies, reliance on self-reported sleep data, and the observational design of included studies, which precludes causal inference. Additionally, variability in sleep duration definitions and residual confounding from unmeasured factors may have influenced the observed associations.

List of Abbreviations

CI – Confidence Interval
CVD – Cardiovascular Disease
HR – Hazard Ratio
MMSE – Mini-Mental State Examination
MET – Metabolic Equivalent Task
OR – Odds Ratio
PA – Physical Activity
PAF – Population Attributable Fraction
PICOT – Population, Intervention, Comparison, Outcome, Time
PRISMA – Preferred Reporting Items for Systematic Reviews and Meta-Analyses
RR – Relative Risk
U/J-shaped – U-shaped or J-shaped relationship

Conflict of interest

The authors declare that there is no conflict of interest.

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Consent to participate

Not applicable.

Ethical approval

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