Hidden Wounds: Prevalence of Chronic Wounds in Asia, A Systematic Review and Meta-Analysis

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Editorial

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SYSTEMATIC REVIEW & META-ANALYSIS

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Abstract

Background: Chronic wounds are a persistent and costly health issue globally, with particularly high burdens in low- and middle-income countries. Despite increasing awareness, comprehensive regional estimates of chronic wound prevalence across Asia remain limited and inconsistent. **Purpose:** This study aimed to estimate the pooled prevalence of chronic wounds in Asian populations and identify key moderators associated with their distribution and burden, including comorbidities, wound types, and geographic or healthcare-related factors. **Methods:** A systematic review and meta-analysis were conducted according to PRISMA guidelines. Searches of PubMed, Embase, Scopus, and Web of Science identified 46 eligible observational studies published through 2024. Random-effects models were used to estimate pooled prevalence. Subgroup and meta-regression analyses explored the influence of demographic, clinical, and geographic moderators. Risk of bias was assessed using the Newcastle-Ottawa Scale. **Results:** A total of 46 studies comprising 6,425 chronic wound cases were included in the analysis. The pooled prevalence of chronic wounds was 32.1% (95% CI: 25.9–39.1), with substantial heterogeneity (I^2 = 98.8%). Diabetic foot ulcers were the most common wound type. Prevalence was significantly higher in developing countries (34.8%), in Southeast Asia (50.8%), and in hospital-based settings (32.6%). Smoking (β = 0.049; p = 0.019) and malnutrition (β = 0.047; $p < 0.001$) were significantly associated with increased prevalence, while serum albumin was inversely associated (β = –4.308; $p < 0.001$). **Conclusions:** Chronic wounds are highly prevalent across Asian populations, particularly in resource-limited settings. Socioeconomic context, nutritional deficiencies, and modifiable lifestyle factors contribute substantially to this burden. These findings support the need for standardized wound surveillance, targeted prevention strategies, and improved nutritional and behavioral interventions, especially in developing health systems. Future studies should adopt prospective designs and harmonized definitions to strengthen regional and global wound epidemiology.

Keywords: asia, chronic wounds, prevalence, risk factors, wound healing

Introduction

Chronic wounds, defined as wounds that fail to progress through the normal phases of healing, continue to impose a profound burden on individuals, health systems, and societies worldwide. While global awareness of the clinical and economic consequences of these wounds has increased, the problem remains particularly acute in low- and middle-income countries, where access to timely care, diagnostic resources, and multidisciplinary management remains limited [1,2].

In many parts of Asia, chronic wounds are emerging not only as a consequence of ageing populations but also as a direct reflection of rising non-communicable diseases such as diabetes, vascular disorders, and malnutrition[3,4]. Yet despite their growing impact, reliable and regionally representative data on wound prevalence remain scarce. Most existing studies are geographically restricted, methodologically heterogeneous, and often disconnected from broader epidemiological trends [5–7]. This lack of cohesive data makes it difficult for clinicians and policymakers to accurately gauge the scale of the problem or to allocate resources effectively.

Importantly, Asia is home to a vast and diverse population, encompassing countries with highly variable health system infrastructures, socioeconomic conditions, and demographic profiles. These variations are likely to influence not only the burden of chronic wounds but also the risk factors that shape their occurrence and progression [2,8]. However, few studies have attempted to synthesize the prevalence of chronic wounds across this broad and complex landscape.

To address this gap, systematic reviews and meta-analyses are essential. They provide an opportunity to consolidate disparate findings and generate meaningful estimates that can inform both clinical practice and public health policy. Previous reviews, however, have focused largely on Western populations or specific wound types, offering limited insights into the broader epidemiology of chronic wounds across Asian settings [9,10].

In response to this critical evidence gap, the present study aims to provide the first comprehensive meta-analytic estimate of chronic wound prevalence across Asia. Beyond simply quantifying prevalence, we also explore key moderating variables such as wound type, geographic region, care setting, and patient-level risk factors, including nutritional and behavioral profiles. By doing so, we seek to build a nuanced understanding of how and where chronic wounds are most likely to occur, knowledge that is essential for designing effective, context-specific interventions and improving outcomes for vulnerable populations across the region.

Methods

Search Strategy

This meta-analysis followed the Cochrane Collaboration standards and was registered with the Open Science Framework (registration number: wt6p3; https://osf.io/wt6p3). Reporting adhered to PRISMA 2020 guidelines. In January 2025, a comprehensive literature search was conducted across five major databases: PubMed, Embase, Scopus, and Web of Science, along with grey literature identified through Google Scholar. No restrictions were applied regarding language or publication year. To enhance the comprehensiveness of the search, forward and backward citation tracking was employed, including references from prior systematic reviews and meta-analyses. The search strategy utilized Boolean operators and controlled vocabulary terms (e.g., MeSH and Emtree), combining keywords such as ("Chronic Wound" OR "Wounds and Injuries" OR "Wound Healing" OR "Hard-to-heal wounds" OR "Diabetic Foot" OR "Pressure Ulcer" OR "Venous Ulcer" OR "Leg Ulcer" OR "Arterial Ulcer" AND "Prevalence" OR "Incidence" AND "Asia" OR "Asia, Southeastern" OR "Asia, Eastern" OR "Asia, Central" OR "Asia, Western" OR "Asia, Northern"). Detailed search strings for each database are provided in Appendix 1.

Eligibility Criteria

This meta-analysis focused on studies reporting the prevalence of chronic wounds in adult populations, including diabetic foot ulcers (DFU), pressure injuries (PI), venous leg ulcers, and other chronic non-healing wounds. Studies were eligible if they included participants with clinically diagnosed chronic wounds using established criteria or tools, such as the Braden Scale for pressure injury risk assessment [11], the PEDIS classification system for diabetic foot ulcers [12], and the Wagner grading system for wound severity [13]. Studies using objective physiological measures such as the ankle-brachial index (ABI) to assess peripheral perfusion [14], and laboratory biomarkers, including glycated hemoglobin (HbA1c) as an indicator of glycemic control [15], were also included. Pressure injury classification systems, such as the European Pressure Ulcer Advisory Panel (EPUAP) guidelines [16], were accepted as valid diagnostic standards. Studies employing a combination of clinical judgment and these validated instruments were deemed eligible. The analysis included observational designs such as cross-sectional, cohort, and case-control studies. Studies were excluded if they met any of the following criteria: (1) did not report prevalence or incidence data for chronic wounds, (2) were systematic reviews or meta-analyses, (3) involved overlapping populations, (4) presented incomplete data, or (5) did not use validated diagnostic or classification criteria. These criteria ensured that only methodologically sound and clinically relevant studies were included to improve the accuracy of pooled prevalence estimates.

Data Extraction

Two independent reviewers screened all records using EndNote (version 21). After removing duplicates, titles and abstracts were assessed, followed by full-text evaluation based on predefined inclusion and exclusion criteria. Discrepancies were resolved through discussion or consultation with a third reviewer. To ensure accuracy, data were cross-verified against previous systematic reviews and meta-analyses, with additional random checks performed. Authors of primary studies were contacted when essential information was missing. From each eligible study, extracted data included authorship, geographic location, study design, sample size, sex distribution, participant demographics (e.g., age, diabetes type, duration), diagnostic tools used, and prevalence of diabetic peripheral neuropathy or chronic wounds, depending on the study focus.

Quality Assessment

Risk of bias was independently assessed by two reviewers using two validated tools. The Newcastle-Ottawa Scale was applied to evaluate methodological quality across three domains: participant selection, comparability, and outcome assessment. Studies scoring 7–9 were considered high quality. Disagreements were resolved by consensus. A second appraisal used the Hoy et al. tool, specifically designed for prevalence studies, covering both external and internal validity across 10 items. Scores ranged from 0 to 10, with thresholds for low (9–10), moderate (7–8), and high risk (<7). Interrater reliability was quantified using Cohen's kappa, which accounts for agreement beyond chance. Values ≥0.81 indicated near-perfect agreement, enhancing confidence in the assessment process.

Data Synthesis and Analysis

Pooled prevalence estimates were calculated using a random-effects model in Comprehensive Meta-Analysis (CMA) version 3.3.070 [17]. Between-study heterogeneity was assessed using the I^2 statistic and Cochran's Q test. Heterogeneity was considered substantial if I^2 exceeded 30% and the Q-test yielded a p-value < 0.10 [18]. Results were reported as proportions with 95% confidence intervals. Where significant heterogeneity was observed, subgroup analyses and meta-regression were performed to explore the influence of moderators, including age, region, diabetes type and duration, and diagnostic tools used. Statistical significance was set at $p < 0.05$. Sensitivity analyses were conducted by excluding individual studies and by stratifying based on sample size to evaluate the stability of the pooled estimates [19]. Publication bias was examined using Peters' regression test and funnel plot symmetry [20]. A regression p-value ≥ 0.10 indicated no evidence of small-study effects. Visual inspection of funnel plot asymmetry was also used to detect potential reporting bias.

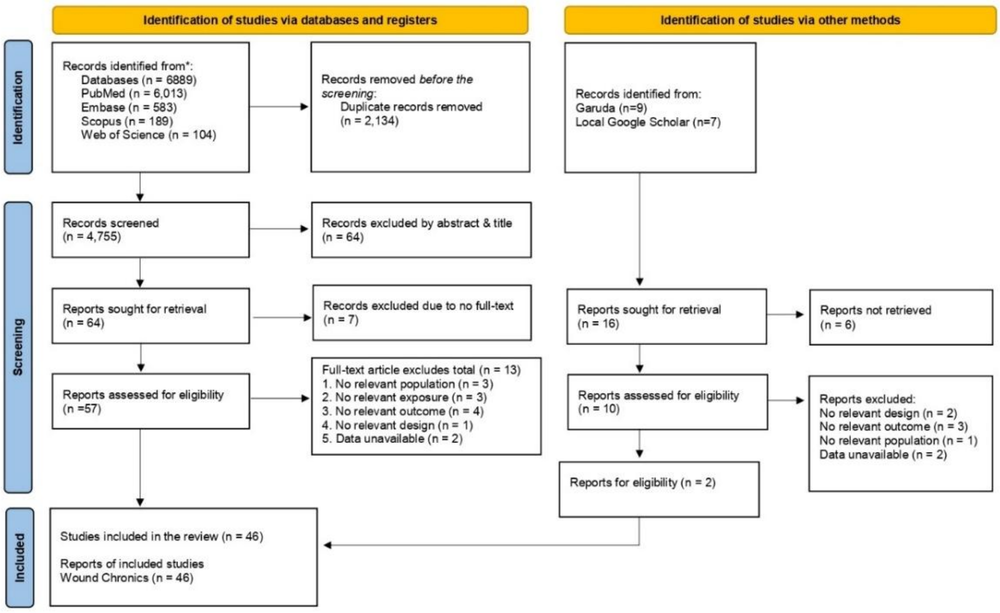

Figure 1. PRISMA Flow diagram results

Results

Search Results

A total of 6,905 records were identified, including 6,889 from electronic databases (PubMed, Embase, Scopus, and Web of Science) and 16 from additional sources such as Garuda and local Google Scholar. After removing 2,134 duplicates, 4,755 records remained for screening. Following title and abstract screening, 64 records were excluded. Of the 64 reports sought for full-text retrieval, seven were unavailable, and the remaining 57 were assessed for eligibility. Thirteen were excluded due to irrelevant population (n = 3), exposure (n = 3), outcome (n = 4), study design (n = 1), or unavailable data (n = 2).

From the additional sources, 10 reports were assessed after excluding six that could not be retrieved; eight were excluded for similar reasons. In total, 46 studies were included in the final review, all focusing on chronic wounds.

Model	Study name	Event rate	Lower limit	Upper limit	Z-Value	p-Value
	Amin et al., 2024	0,083	0,045	0,148	-7,260	0,000
	Han et al, 2024	0,023	0,020	0,027	-43,961	0,000
	Sultana et al., 2024	0,500	0,411	0,589	0,000	1,000
	Khalooei et al., 2020	0,173	0,139	0,213	-11,848	0,000
	Ehsanpour et al., 2025	0,163	0,146	0,181	-24,614	0,000
	Hadi et al,m 2023	0,636	0,590	0,680	5,591	0,000
	Dixit et al., 2011	0,186	0,147	0,232	-10,329	0,000
	Tarigan et al., 2015	0,690	0,613	0,758	4,614	0,000
	Won et al., 2012	0,335	0,320	0,349	-20,515	0,000
	Azam et al., 2023	0,589	0,553	0,624	4,745	0,000
	Salam et al., 2024	0,850	0,771	0,904	6,579	0,000
	Akhtar et al., 2022	0,168	0,150	0,188	-23,173	0,000
	Tsai et al., 2021	0,204	0,136	0,295	-5,430	0,000
	Sudha et al., 2023	0,057	0,030	0,106	-8,177	0,000
	Rastogi et al., 2025	0,197	0,185	0,209	-36,630	0,000
	AlOwais et al., 2020	0,080	0,056	0,113	-12,396	0,000
	Sutariya et al., 2016	0,039	0,015	0,099	-6,292	0,000
	Atsalam et al., 2018	0,160	0,115	0,218	-8,597	0,000
	Yusuf et al., 2016	0,120	0,086	0,167	-10,211	0,000
	Al-Bedri et al., 2020	0,400	0,309	0,499	-1,986	0,047
	Karimianfard et al., 2022	0,334	0,283	0,390	-5,614	0,000
	Zhetmekova et al., 2024	0,370	0,334	0,408	-6,485	0,000
	Aljamili et al., 2024	0,467	0,357	0,579	-0,577	0,564
	Iqbal et al., 2025	0,998	0,962	1,000	4,233	0,000
	Morat et al., 2024	0,776	0,720	0,823	8,246	0,000
	Kilic et al., 2024	0,171	0,135	0,214	-11,233	0,000
	Porselvi et al., 2022	0,467	0,385	0,551	-0,768	0,442
	Ashraf et al., 2023	0,340	0,254	0,438	-3,142	0,002
	Farida et al., 2023	0,725	0,638	0,797	4,742	0,000
	Yunir et al., 2021	0,813	0,734	0,872	6,355	0,000
	Marsya et al., 2023	0,750	0,662	0,821	5,034	0,000
	Haryanto et al., 2023	0,698	0,593	0,785	3,562	0,000
	Mustamu et al., 2024	0,491	0,360	0,623	-0,137	0,891
	Hariftyani et al., 2021	0,091	0,066	0,123	-13,190	0,000
	Sari et al., 2022	0,108	0,078	0,146	-11,817	0,000
	Amir et al., 2017	0,125	0,107	0,146	-21,640	0,000
	Primalia et al., 2024	0,991	0,869	0,999	3,289	0,001
	Prista Sari et al., 2022	0,260	0,219	0,306	-9,127	0,000
	Chavan et al., 2018	0,160	0,115	0,218	-8,597	0,000
	Amirah et al., 2019	0,357	0,313	0,404	-5,840	0,000
	Pratiwi et al., 2024	0,848	0,764	0,907	6,146	0,000
	Yazdanpanah et al., 2024	0,080	0,064	0,100	-19,889	0,000
	Mondal et al., 2025	0,318	0,237	0,412	-3,680	0,000
	Kovindha et al., 2015	0,264	0,195	0,346	-5,142	0,000
	Elnasieh et al. 2024	0,188	0,144	0,241	-9,038	0,000
	Qaddumi et al., 2019	0,330	0,249	0,424	-3,471	0,001
Fixed		0,262	0,256	0,269	-63,726	0,000
Random		0,321	0,259	0,391	-4,796	0,000

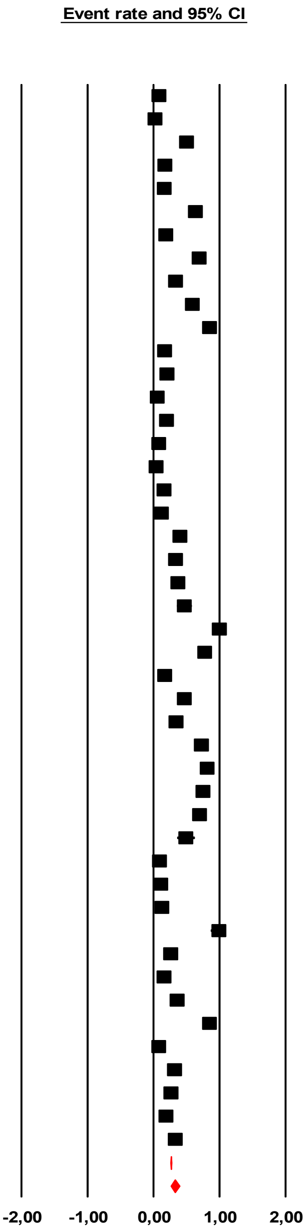

Figure 2. Forest Plot Prevalence Wound Chronic

Among these, eight were excluded for similar reasons, resulting in two eligible studiesUltimately, 46 studies met all inclusion criteria and were incorporated into the final review (Figure 1). Collectively, these studies, conducted between 2011 and 2025, reported a total of 6,425 chronic wound cases. This cumulative number reflects the overall burden of chronic wounds documented in diverse populations across Asia, as assessed in the included literature.

Prevalence of Chronic Wound

This meta-analysis, comprising 46 independent studies, estimates the pooled prevalence of chronic wounds at 32.1% (95% CI: 25.9%–39.1%) using a random-effects model, reflecting a substantial burden across diverse clinical settings and populations. The high heterogeneity observed (I^2 = 98.8%; Q = 3615.288; $p < 0.001$) underscores significant between-study variability, likely attributable to differences in diagnostic criteria, patient demographics, and healthcare contexts. The overall effect was statistically significant (Z = –4.796; p < 0.001), indicating that chronic wounds represent a widespread and clinically relevant condition. Forest plot visualization further revealed a wide range of prevalence estimates, from as low as 2.3% to as high as 99.8%, suggesting marked disparities in underlying risk factors and healthcare infrastructure (Figure 1 and Supplemental 1).

Table 1. Characteristic Study

No	Author/year	Country/ Region Asia	Study Settings/ Designs	Type of Wound	Sample Size	Mean Age (Mean±SD)	Male /Female (%)
1	(Amin et al., 2024)	Saudi Arabia (South Asia)	Hospital-based Cross-sectional	PI	120	48.3±ND	75/25
2	(Han et al, 2024)	China (East Asia)	Hospital-based Cross-sectional	PI	6078	61.92±15.2	62.1/37.9
3	(Sultana et al., 2024)	Bangladesh (South Asia)	Hospital-based Cross-sectional	DFU	120	57.5±ND	59.2/40.8
4	(Khalooei et al., 2019)	Iran (West Asia)	Hospital-based Cross-sectional	DFU	400	57.1±11.9	31/69
5	(Ehsanpour et al., 2015)	Iran (West Asia)	Hospital-based Cross-sectional	DFU	1658	59.73±13.8	52.1/47.9
6	(Hadi et al., 2023)	Malaysia (Southeast Asia)	Hospital-based Cross-sectional	DFI	434	63±ND	37.1/62.9
7	(Dixit et al., 2011)	India (South Asia)	Hospital-based Cross-sectional	DFU	323	58.2±8.6	31.3/68.7
8	(Tarigan et al., 2015)	Indonesia (Southeast Asia)	Hospital-based Cross-sectional	DFU	155	46±ND	59/41
9	(Won et al., 2012)	South Korea (East Asia)	Hospital-based Cross-sectional	DPN	3999	59.0±10.0	51.5/48.5
10	(Azam et al., 2023)	Pakistan (South Asia)	Hospital-based Cross-sectional	Burn	720	27.7±6.2	71.7/28.3
11	(Salam et al., 2024)	Bangladesh (South Asia)	Hospital-based Cross-sectional	DFU	113	56.0±12.6	61.9/38.0
12	(Akhtar et al., 2022)	Pakistan (South Asia)	Hospital-based Cross-sectional	DFU	1503	51.58±11.5	33.5/66.5
13	(Tsai et al., 2021)	Taiwan (East Asia)	Hospital-based Cross-sectional	DFU	98	58±ND	54.1/45.9
14	(Sudha et al., 2023)	India (South Asia)	Hospital-based Cross-sectional	DFU	158	58±12.0	65/35
15	(Rastogi et al., 2025)	India (South Asia)	Hospital-based Cross-sectional	DFU	4290	51.1±9.4	67.8/32.2
16	(AlOwais et al, 2020)	Saudi Arabia (South Asia)	Hospital-based Cross-sectional	DFU	350	52.5±ND	53.9/46.1
17	(Sutariya et al, 2016)	India (South Asia)	Hospital-based Cross-sectional	DFU	103	ND	75.7/24.3
18	(Atsalam et al., 2018)	India (South Asia)	Hospital-based Cross-sectional	DFU	200	54.3±8.6	70/30
19	(Yusuf et al., 2016)	Indonesia (Southeast Asia)	Hospital-based Cross-sectional	DFU	249	61.3±9.1	41/59
20	(Al-Bedri et al., 2020)	Iraq (West Asia)	Hospital-based Cross-sectional	PI	100	31.7±14.6	85/15
21	(Karimianfard et al., 2022)	Iran (West Asia)	Hospital-based Cross-sectional	PI	299	59.5+18.7	43.8/54.2
22	(Zhetmekova et al., 2024)	Kazakhstan (Central Asia)	Hospital-based Cross-sectional	PU	640	54.3±10.6	62.2/37.8
23	(Aljamili et al., 2024)	Saudi Arabia (South Asia)	Hospital-based Cross-sectional	DFU	75	56.0±ND	74.7/25.3

No	Author/year	Country/ Region Asia	Study Settings/ Designs	Type of Wound	Sample Size	Mean Age (Mean±SD)	Male /Female (%)
24	(Iqbal et al., 2025)	Pakistan (South Asia)	Hospital-based Cross-sectional	DFU	200	55.0±ND	
25	(Morat et al., 2024)	Malaysia (Southeast Asia)	Hospital-based Cross-sectional	AC-CW	254	56.9±16.4	53.1+46.9
26	(Kilic et al., 2025)	Turkey (West Asia)	Hospital-based Cross-sectional	DFU	357	60.2±13.1	47.5+52.5
27	(Porselvi et al., 2022)	India (South Asia)	Hospital-based Cross-sectional	DFU	137	ND	ND
28	(Ashraf et al., 2023)	Pakistan (South Asia)	Hospital-based Cross-sectional	PO	100	53.7±9.8	58/42
29	(Farida et al., 2023)	Indonesia (Southeast Asia)	Hospital-based Cross-sectional	DFU	120	58.0±ND	37.5/62.5
30	(Yunir et al., 2021)	Indonesia (Southeast Asia)	Hospital-based Cross-sectional	DFU	123	53.3±9.1	48.8/51.2
31	(Marsya et al., 2023)	Indonesia (Southeast Asia)	Hospital-based Cross-sectional	DFU	84	46.0±ND	ND
32	(Haryanto et al., 2023)	Indonesia (Southeast Asia)	Hospital-based Cross-sectional	DFU	86	52.0±ND	45.4/54.6
33	(Mustamu et al., 2024)	Indonesia (Southeast Asia)	Hospital-based Cross-sectional	DFU	53	58.4±7.2	54.7/45.3
34	(Hariftyani et al., 2021)	Indonesia (Southeast Asia)	Hospital-based Cross-sectional	DFU	397	57.0±9.8	47.3/52.6
35	(Sari et al., 2022)	Indonesia (Southeast Asia)	Hospital-based Cross-sectional	PI	325	ND	ND
36	(Amir et al., 2017)	Indonesia (Southeast Asia)	Hospital-based Cross-sectional	PI	1132	55.6±17.9	ND
37	(Primalia et al., 2024)	Indonesia (Southeast Asia)	Hospital-based Cross-sectional	DFU	48	49.8±7.2	45.8/54.2
38	(Prista Sari, 2022)	Indonesia (Southeast Asia)	Hospital-based Cross-sectional	DFU	396	21.3±1.1	11.9/88.1
39	(Chavan, 2018)	India (South Asia)	Hospital-based Cross-sectional	DFU	200	55.0±ND	60/40
40	(Amirah et al., 2019)	Saudi Arabia (South Asia)	Hospital-based Cross-sectional	PI	431	ND	67.7/32.3
41	(Pratiwi et al., 2024)	Indonesia (Southeast Asia)	Hospital-based Cross-sectional	DFU	99	57.0±8.9	45.5/54.5
42	(Yazdanpanah et al., 2024)	Iran (South Asia)	Hospital-based Cross-sectional	DFU	901	53.2±11.4	41.7/58.3
43	(Mondal et al., 2025)	India (South Asia)	Hospital-based Cross-sectional	DFU	331	55.2±8.4	ND
44	(Kovindha et al., 2015)	Thailand (Southeast Asia)	Hospital-based Cross-sectional	PI	129	ND	72.7/27.3

No	Author/year	Country/ Region Asia	Study Settings/ Designs	Type of Wound	Sample Size	Mean Age (Mean±SD)	Male /Female (%)
45	(Elnasieh et al., 2024)	Saudi Arabia (South Asia)	Hospital-based Cross-sectional	PI	250	59.5±12.3	52.8/47.2
46	(Qaddumi et al, 2019)	Palestine (West Asia)	Community-based Cross-sectional	PI	109	54.7±ND	45/55

Abbreviations: PI: pressure injury, DFU: diabetic foot ulcer, AC-CW: acute wound to chronic wound

Quality Study

A total of 46 studies were included, primarily conducted in South Asia [21–23] and Southeast Asia [24,25]. Most were cross-sectional and hospital-based (Han et al., 2024; Hadi et al., 2023). Diabetic foot ulcer (DFU) was the most reported wound type [26,27], followed by pressure injury (PI) and peripheral neuropathy. Sample sizes ranged from 48 to 6,078, with mean ages between 46–63 years. Males were generally more represented [21,28]. Prevalence ranged from 3.6% to 100%, with higher values often found in diabetic populations [29,30]. Diagnostic tools included the Wagner Scale, Branden Scale, and ABI, with observation periods from 1 month to 5 years (Table 1 and supplementary)

Diabetes was reported in nearly all studies, with 100% prevalence in over half [31,32]. Common comorbidities included cardiovascular disease [21,23,25,31,33–41], kidney disease (Hariftyani et al., 2021), malnutrition [21,25,26,40,42,43], and smoking (Yusuf et al., 2016). Some studies noted psychological issues and mobility impairment (Sudha et al., 2023; Qaddumi et al., 2019). HbA1c was the most reported lab marker [23,25,34,36,40,41,44–47], with mean values between 7.0–13.2%. Other labs included albumin [33,34,40,43] (Table 1 and Appendix 1).

Table 2. Moderator analysis

Variable	Wound Chronic					
	n	β /OR [CI 95%]	P_1	P_2	Q	I^2
Age (years)	41	-0.024 [-0.063 to 0.013]	0.202		3328.42	98.83
Male (%)	38	-0.008 [-0.031 to 0.013]	0.445		3083.14	98.83
Female (%)	38	0.008 [-0.013 to 0.031]	0.446		3083.15	98.83
Country						
Developing	39	0.348 [0.268 to 0.437]	<0.001	0.039*	4.240	98.75
Developed	7	0.221 [0.150 to 0.312]	<0.001			
Study Settings						
Hospital	45	0.32 [0.170 to 0.208]	<0.001	<0.001*	24.802	98.75
Community	1	0.168 [0.150 to 0.188]	<0.001			
Region Asia						
Central Asia	1	0.370 [0.334 to 0.408]	<0.001	0.005*	15.048	98.75
East Asia	3	0.127 [0.014 to 0.595]	0.102			
South Asia	20	0.258 [0.187 to 0.345]	<0.001			
Southeast Asia	16	0.509 [0.335 to 0.681]	0.922			

Variable	Wound Chronic					
	n	β /OR [CI 95%]	P_1	P_2	Q	I^2
West Asia	6	0.247 [0.177 to 0.334]	<0.001			
Type Wounds						
Burn	1	0.589 [0.553 to 0.624]	<0.001	<0.001**	93.264	98.75
AC-CW	1	0.776 [0.720 to 0.823]	<0.001			
DFU	32	0.346 [0.278 to 0.420]	<0.001			
PI	12	0.205 [0.111 to 0.348]	<0.001			
Comorbid						
CVD	14	-0.001 [-0.038 to 0.038]	0.945		1667.44	99.28
CKD	10	-0.010 [-0.036 to 0.016]	0.465		604.65	98.68
BMI	8	0.327 [-0.110 to 0.766]	0.142		226.05	97.35
Smoking	15	0.049 [0.007 to 0.090]	0.019*		1779.19	99.27
Malnutrition	6	0.047 [0.023 to 0.070]	<0.001*		64.96	93.84
Psychology						
Mobility	4	0.026 [-0.008 to 0.061]	0.141		27.94	92.84
Laboratory						
HbA1C	13	-0.124 [-0.382 to 0.133]	0.344		703.84	98.44
Albumin	5	-4.308 [-6.220 to -2.396]	<0.001*		41.63	92.79

Abbreviations: p^1: p-value within group comparison (meta-regression), p^2: p-value between group comparison (subgroup analysis), β: beta coefficient, ci 95%: 95%, I^2: I-square, *: Significant, BMI: body mass index, CKD: chronic kidney disease, CVD: cardiovascular disease, HbA1c: hemoglobin a1c, AC-CW: acute chronic to chronic wound, DFU: diabetic foot ulcer, PI: pressure injury.

Moderator Analysis

Several moderator variables demonstrated statistically significant associations with the prevalence of chronic wounds. In terms of country classification, studies conducted in developing countries reported a significantly higher prevalence (OR = 0.348; 95% CI: 0.268 to 0.437; p < 0.001) compared to those in developed countries (OR = 0.221; 95% CI: 0.150 to 0.312; p < 0.001), with a significant between-group difference (p_2 = 0.039). Regarding study setting, hospital-based studies showed a higher prevalence (OR = 0.32; p < 0.001) than community-based studies (OR = 0.168; p < 0.001), and this difference was also statistically significant (p_2 < 0.001) (Table 2).

Across Asian regions, Southeast Asia exhibited the highest prevalence (OR = 0.509; p < 0.001), followed by Central Asia (OR = 0.370), South Asia (OR = 0.258), and West Asia (OR = 0.247), with a statistically significant variation between regions p_2 = 0.005 (Figure 3). Based on the mixed-effects meta-analysis of 46 studies conducted between 2011 and 2025, the overall pooled prevalence of chronic wounds was 26.3% (95% CI: 25.3%–27.4%; p = 0.000), with a notably high level of heterogeneity across studies (I^2 = 98.76%). Among the 15 countries analyzed, Malaysia (70.9%) and Bangladesh (70.2%) reported the highest prevalence rates, followed by Pakistan (56.4%), Indonesia (49.7%), and Iraq (40.0%). In contrast, countries such as Iran (27.5%), Thailand (26.4%), Kazakhstan (37.0%), and South Korea (34.9%) demonstrated moderate prevalence estimates. Furthermore, Palestine (42.4%), Taiwan (29.5%), India (24.8%), and Saudi Arabia (23.0%) were found to have slightly lower yet significant prevalence levels. Notably, the lowest prevalence was observed in China (2.3%) and Turkey (17.1%) (Figure 5).

In terms of wound types, the highest prevalence was found in acute-on-chronic wounds (AC-CW) (OR = 0.776; $p < 0.001$), followed by burns (OR = 0.589), diabetic foot ulcers (DFU) (OR = 0.346), and pressure injuries (PI) (OR = 0.205), with a significant difference among wound types ($p_2 < 0.001$) (Table 2). Among comorbidities, both smoking (β = 0.049; 95% CI: 0.007 to 0.090; p = 0.019) and malnutrition (β = 0.047; 95% CI: 0.023 to 0.070; $p < 0.001$) were significantly associated with increased prevalence of chronic wounds. In contrast, other comorbidities such as cardiovascular disease (CVD), chronic kidney disease (CKD), body mass index (BMI), and HbA1C levels did not show significant associations. Notably, serum albumin levels demonstrated a strong negative association with prevalence (β = -4.308; 95% CI: -6.220 to -2.396; $p < 0.001$), indicating that hypoalbuminemia may serve as a strong predictor of chronic wound occurrence (Table 2).

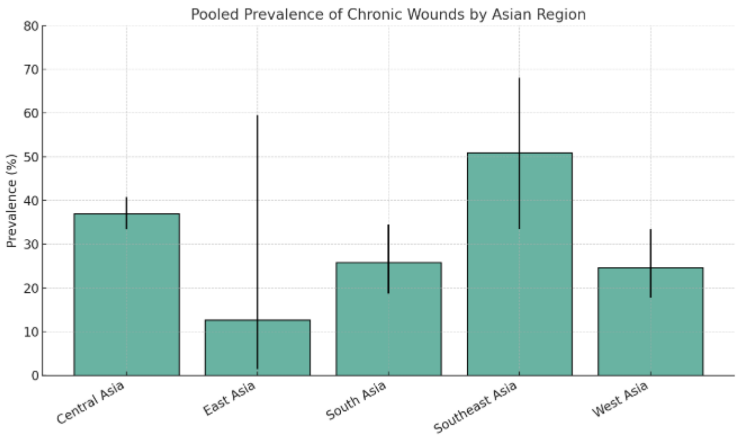

Figure 3. Prevalence of Chronic Wounds in the Asia Region.

Quality of Bias

To assess the risk of bias, two independent reviewers evaluated all 46 studies included in this review. The overall methodological quality, as measured by the Newcastle-Ottawa Scale (NOS), yielded an average score of 6.2, indicating a moderate to low risk of bias across the studies. In addition, the assessment tool developed by [48] revealed that 25 studies (54.35%) were categorized as having a low risk of bias, 18 studies (39.13%) as moderate risk, and only 3 studies (6.52%) as high risk (see Appendix 1). To ensure consistency between reviewers, inter-rater reliability was tested using Cohen's kappa coefficient, which yielded a value of 0.81. This result reflects substantial agreement between the two raters, with statistical significance ($p < 0.05$) and a 95% confidence interval ranging from 0.70 to 0.92. Any discrepancies arising from the independent evaluations were resolved through discussion. Where necessary, specific issues were referred to an expert reviewer for further consideration and clarification.

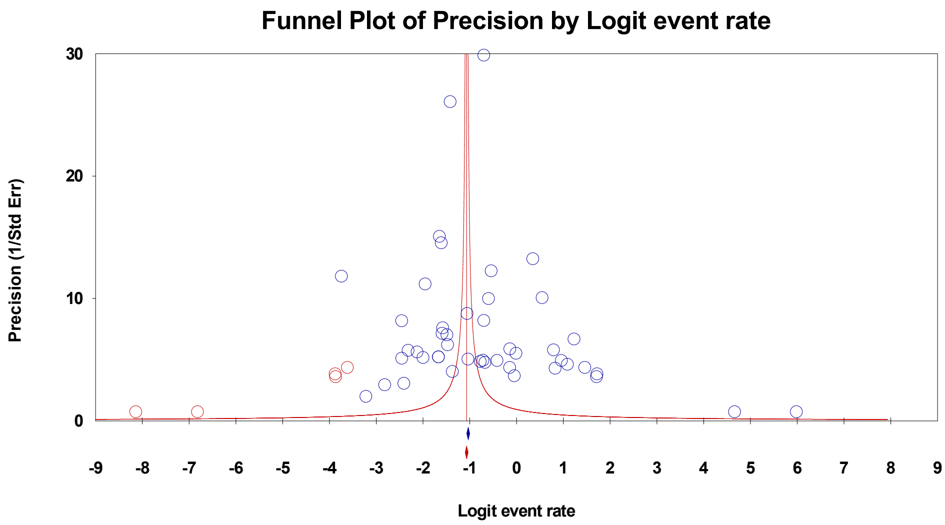

Figure 4. Funnel Plot of Precision by Logit Event Rate

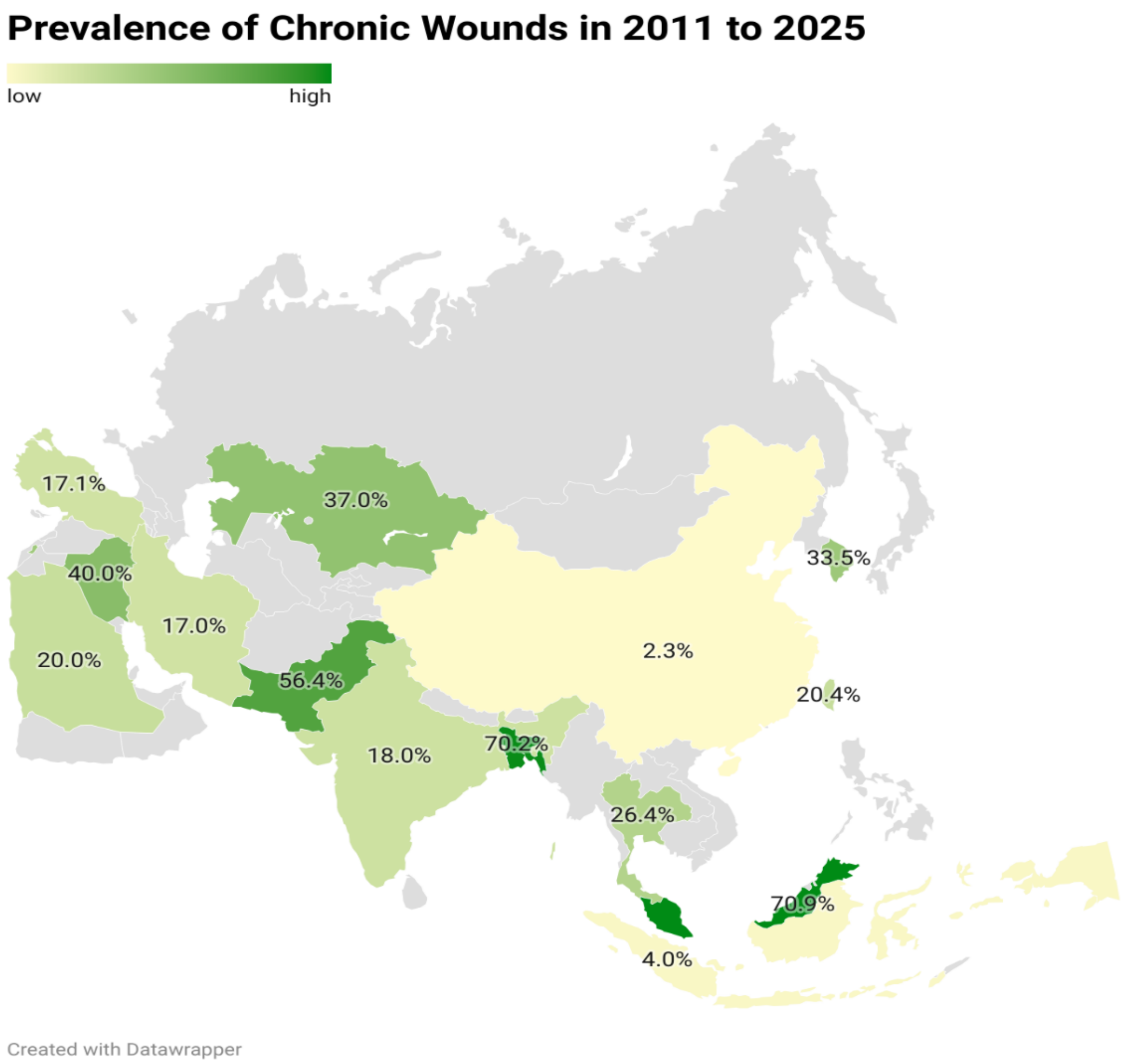

Figure 5. Prevalence of Chronic Wounds in 2011-2025 (Datawrapper 2025)

Publication Bias

Publication bias was assessed using Egger's regression test, Duval and Tweedie's trim-and-fill method, and visual inspection of the funnel plot. Egger's test showed a non-significant intercept (β = 2.18; p = 0.324), indicating no evidence of small-study effects. The trim-and-fill analysis identified five potentially missing studies on the left side of the mean, slightly lowering the pooled prevalence estimate from 0.321 to 0.263 under the random-effects model. Although the funnel plot revealed minor asymmetry, the overall adjustment was minimal. Collectively, these findings suggest that the risk of publication bias is low and the pooled estimate of chronic wound prevalence remains robust (Figure 4 and Appendix 1).

Discussion

This systematic review and meta-analysis reveal a significant burden of chronic wounds across Asian populations, with a pooled prevalence estimate of 32.1% (95% CI: 25.9%–39.1%) based on 46 eligible studies. The high heterogeneity observed (I^2 = 98.8%) underscores considerable variability among the studies, likely due to differences in diagnostic criteria, clinical settings, sample demographics, and health system capacities. These findings are consistent with previous global estimates of chronic wound prevalence, which have reported rates ranging from 1% to over 40% depending on the population and methodology used[1,2]. The inclusion of hospital-based cross-sectional studies (Han et al., 2024; Hadi et al., 2023) may have contributed to elevated prevalence due to higher case detection in clinical settings.

Importantly, the prevalence of chronic wounds was significantly higher in developing countries (OR = 0.348) compared to developed nations (OR = 0.221), with a statistically significant between-group difference ($p = 0.039$). This pattern was mirrored in regional subgroup analyses, where Southeast Asia reported the highest prevalence (OR = 0.509), followed by Central Asia and South Asia. These geographic and economic disparities highlight the influence of systemic healthcare limitations, unequal access to early intervention, and differing public health capacities[3]. Furthermore, diabetic foot ulcers (DFU) were the most commonly reported wound type [27,43], reflecting the growing burden of diabetes and associated complications in low- and middle-income countries [10].

The moderator analyses provide valuable insights into the clinical and behavioral determinants of chronic wounds. Among the comorbidities analyzed, smoking ($\beta = 0.049$; $p = 0.019$) and malnutrition ($\beta = 0.047$; $p < 0.001$) were positively and significantly associated with increased prevalence, suggesting that modifiable risk factors play a crucial role in wound development and delayed healing [4,49]. Interestingly, other well-established comorbidities, such as cardiovascular disease and chronic kidney disease, showed no statistically significant association in this analysis, possibly due to inconsistencies in measurement or underreporting across studies [50]. Notably, serum albumin levels demonstrated a strong inverse relationship with wound prevalence ($\beta = –4.308$; $p < 0.001$), supporting the role of protein status and nutritional adequacy in tissue repair and inflammation control [51]

The methodological quality of included studies was generally acceptable. According to the Newcastle-Ottawa Scale, most studies demonstrated moderate to low risk of bias, with a mean score of 6.2. Inter-rater reliability was high ($\kappa = 0.81$), indicating substantial agreement between reviewers. Furthermore, publication bias was minimal, as confirmed by Egger's regression test ($p = 0.324$) and Duval and Tweedie's trim-and-fill method, which suggested the presence of only five potentially missing studies. These findings collectively enhance the credibility of the pooled estimates and the internal validity of the review [18,52].

In light of these findings, chronic wounds must be regarded as a critical public health issue, particularly in resource-limited settings. Addressing the burden of chronic wounds requires region-specific prevention strategies, improved nutritional support, lifestyle interventions targeting smoking cessation, and stronger primary healthcare systems [53]. Future research should prioritize longitudinal cohort designs, standardized diagnostic frameworks, and integration of digital wound monitoring technologies to improve case management [8]. Overall, this study underscores the importance of multidisciplinary and context-specific approaches to mitigate the growing impact of chronic wounds across Asia.

Limitations

Several limitations should be acknowledged. The high degree of heterogeneity across studies, driven by differences in population characteristics, diagnostic thresholds, and reporting practices, introduces uncertainty in the pooled estimates. The predominance of hospital-based, cross-sectional data limits causal inference and may overrepresent clinically advanced cases. Incomplete reporting of relevant covariates—including wound duration, treatment history, and socioeconomic factors—restricted deeper subgroup analysis. Finally, although publication bias was not statistically significant, the underrepresentation of community-based studies and certain wound types limits broader generalizability.

Conclusions

This study consolidates current evidence on the burden and determinants of chronic wounds across Asia, revealing a high pooled prevalence and distinct patterns associated with geography, comorbidities, and nutritional status. The findings extend previous knowledge by quantifying the influence of modifiable factors such as malnutrition and smoking in large-scale data. These observations provide a basis for hypothesis-driven studies exploring mechanistic links between systemic health and chronic wound development. Given the limitations of existing literature, future work should prioritize prospective designs, harmonized diagnostic criteria, and inclusion of underrepresented settings to improve the granularity and applicability of epidemiological models in wound research.

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Conflict of Interest

The authors declare no competing interests.

Data availability

All data generated or analyzed during this study are included in this published article and its

supplementary information files. Additional datasets are available from the corresponding author upon reasonable request.

Author contributions

Asmat Burhan conceptualized and supervised the study. Nurul Syafiqah and Kritsada Ruangdet conducted the literature search and data extraction. Lê Thị Kim Oanh, Emily R. MacLeod, and Ananya Dutta Roy performed the quality assessment and statistical analyses. Elin M. Norrström and Indah Susanti contributed to data interpretation and manuscript drafting. All authors reviewed and approved the final manuscript.

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