# THE ECONOMIC BURDEN AND HEALTHCARE RESOURCE UTILIZATION OF CLUBFOOT (CONGENITAL TALIPES EQUINOVARUS): A SYSTEMATIC LITERATURE REVIEW

CliniWings Clinical Research Pvt. Ltd.

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## BACKGROUND

- Clubfoot (congenital talipes equinovarus, CTEV) affects 1.18 per 1,000; ~176,000 births/year; highest in SE Asia (1.80) (Smythe et, al. 2023)
- Although the Ponseti method has transformed treatment outcomes, evidence on healthcare costs and resource utilization remains fragmented across healthcare systems
- Understanding the economic burden is essential for improving policy decisions and optimizing resource allocation

## OBJECTIVE

- To synthesize evidence on the economic burden (direct, indirect, intangible) and healthcare resource utilization (HRU) of clubfoot across ages, treatments, and settings
- To compare Ponseti versus surgery; examine HIC versus LMIC differences; identify cost drivers and reporting gaps relevant to Asia-Pacific policy

## METHODS

**Study Design**
- Systematic literature review following PRISMA 2020 and ISPOR recommendations

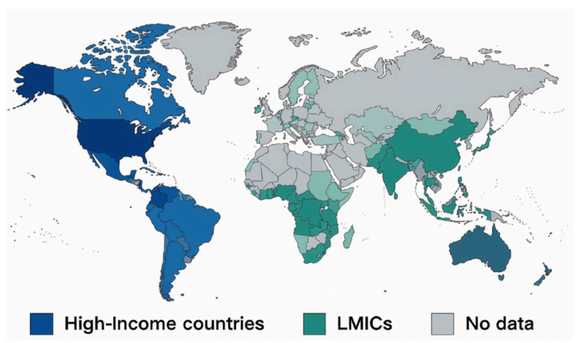
**Information Sources**
- Databases: PubMed/MEDLINE, Cochrane Library, Google Scholar
- Grey literature: Orthopedic conferences, Global/CURE Clubfoot reports (last 5 years)
- Search period: 1 Jan 2010- 03 May 2026

**Eligibility Criteria**
- Studies reporting quantitative data on costs and/or HRU related to clubfoot treatment

**Data Extraction & Analysis**
- Dual independent screening and data extraction
- Narrative synthesis due to heterogeneity in study designs, perspectives, and costing methods

## RESULTS

**Figure 1. Geographic Distribution of Included Studies (n = 73)**




**India, Nigeria, Bangladesh, Kenya, Pakistan, Brazil, USA, UK, Canada, Israel, Malaysia, China, Uganda, Madagascar, Morocco, NZ, and others. Most studies measured casts; a minority reported costs.**

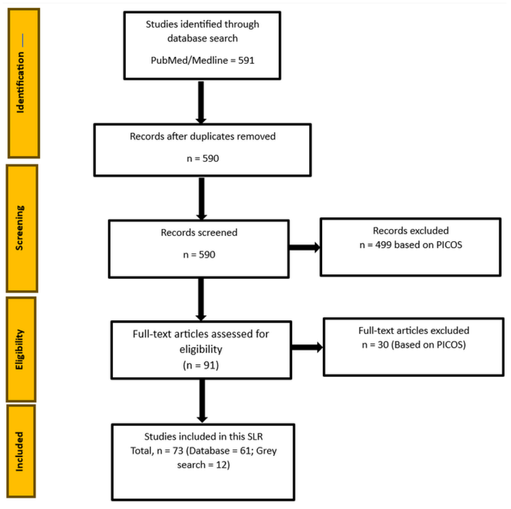
### Key Highlights


73 Studies included with >5,000 Patients


Both high-income countries (HIC) and low-middle-income countries (LMICs)


Wide variation in costing methods and perspectives

**Figure 2. PRISMA Flow Diagram**




### Other HRU, Cost-drivers & Cost-Effectiveness

- **Reoperations:** Ponseti 0.88 vs primary soft-tissue release 3.2 (Abraham 2021).
- **Visits:** 7.31 per episode in infants (Damsas 2026); 8.52 clinic visits (Shah 2026). **Travel time** (Van Wijck 2015) ranged from 1.1 h (Amsterdam) to 33.2 h (Sumatra).
- **Bracing:** Local adjustable splint ~US$25 (Beldar 2025) vs imported US$350–1,200. Grimes allocated US$60 of supply cost to braces (Grimes 2016).
- **Annualized costing:** Agot 2024 (Kenya, provider perspective) US$1,128–1,143 per patient when visits, bracing, tendon procedures, and overheads are included
- **Cost-effectiveness:** Grimes 2016: US$22.46 per DALY averted (US$167; 7.42 DALYs) Hussain 2014: ICER US$1,225 favouring Ponseti.

**Search update Note: accepted abstract reported 71 studies; poster includes 73 after grey-literature reconciliation. Direction of findings unchanged.**

**Table 1. Selected direct cost estimates by setting and treatment**

| Study | Setting | Ponseti / clinic | Surgery / OR | Notes |
|---|---|---|---|---|
| Saif Ullah 2013 | Bangladesh | US$55 | — | Corrective phase |
| Malhotra 2018 | India | US$71 | Turcos procedure US$96 | Direct medical |
| Mejabi 2017 | Nigeria | US$60–77 | — | Includes brace |
| Pandey 2025 | India | ~US$65–80 | — | INR 5,507–6,665 |
| Grimes 2016 | SSA programmes | US$167 avg | — | Staff + supplies |
| Hussain 2014 | Pakistan | US$349 | US$810 | Facility cost |
| Ferreira 2011 | Brazil | R$511 bilateral | R$1,896 bilateral | Kite comparator |
| Adegbehingbe 2010 | Nigeria | Lower | ~US$3,683 Non-ponseti | Extensive surgery |
| Hedrick 2018 | USA | Clinic $2,875–5,333 | OR/OR+ $7,199–10,574 | Charges |
| Agius 2018 | New Zealand | OPD Tenotomy NZ$378 | Theatre Tenotomy NZ$6,061 | Setting effect |

### COMPARISONS THAT DRIVE THE FINDING

| | | |
|---|---|---|
|  | Corrective Casts | Early idiopathic cases 4-6 casts<br>---<br>Neglected/Complex cases 9-13 casts (~2×) |
|  | Clinic Visits | Average 5-9 visits per treatment episode |
|  | Bracing/Orthotic Device Cost | Local (Custom splint) -US$25<br>---<br>Imported (AFO/boots) US$350-1,200 |
|  | Costs | LMIC Ponseti episode cost: US$55–167<br>Costing scope matters: Kenya annualized provider cost US$1,128–1,143 |

**Figure 3. Direct treatment costs: Ponseti versus surgical pathways (costs were left as reported and not inflation-adjusted).**

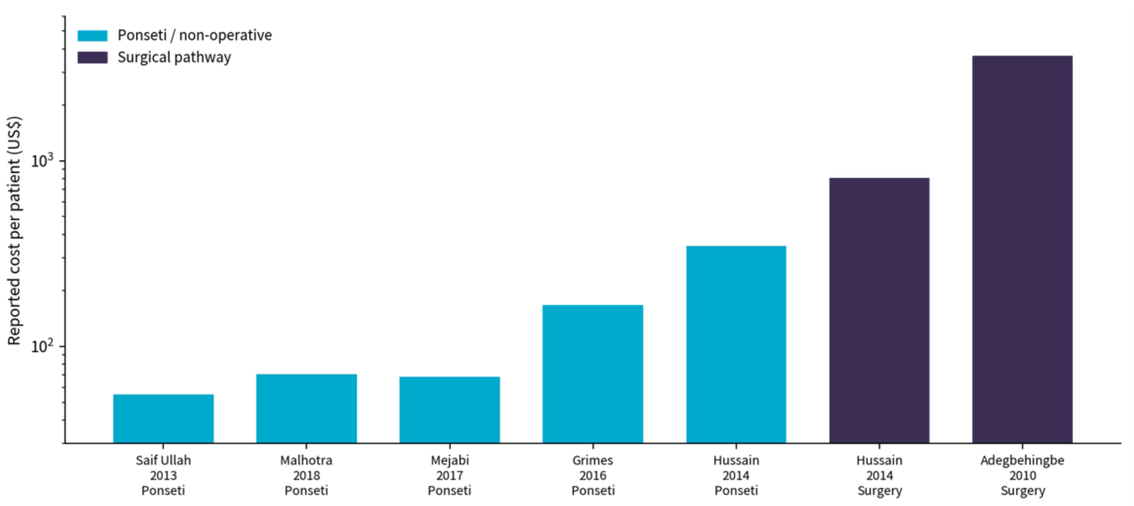
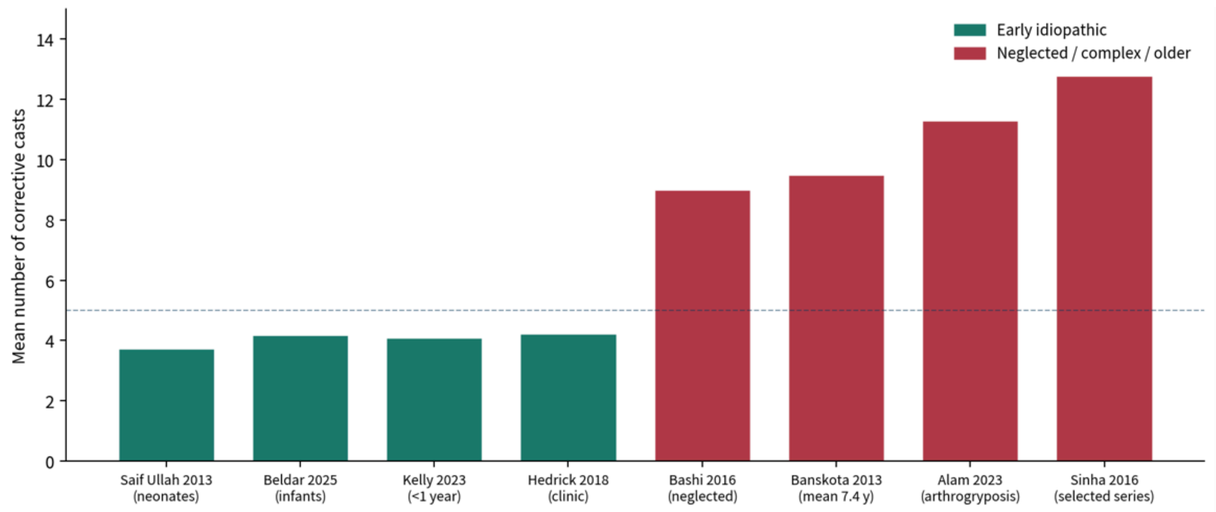



**Figure 4. Corrective casts: early idiopathic versus neglected or complex clubfoot**




## DISCUSSION

- The Ponseti method results in substantially lower direct medical costs compared to traditional surgery
- Bracing is a major cost driver, especially when imported orthotics are used
- Indirect costs (caregiver time, travel, productivity loss) contribute significantly to the overall societal burden
- Economic evidence from Asia-Pacific LMICs is scarce, highlighting a critical research gap

## CONCLUSION

- Clubfoot imposes a considerable economic burden worldwide, particularly in resource-limited settings
- The Ponseti method is a highly cost-effective and scalable intervention
- Standardized, multi-perspective, long-term economic evaluations, especially from Asia-Pacific LMICs, are urgently needed to inform policy, resource allocation, and programmatic implementation

## LIMITATIONS

- High heterogeneity in study designs and costing methodologies
- Limited use of societal perspective
- Sparse long-term outcome data
- Underrepresentation of Asia-Pacific LMICs
- Potential publication bias
- Used only freely available literature

## RESEARCH PRIORITIES

- Standardized costing frameworks
- Prospective multi-center economic evaluations
- Patient-reported outcomes and quality of life
- Budget impact and affordability analyses for LMIC settings
- Real-world evidence generation in Asia-Pacific region

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