

Economic Costs of Lower Respiratory Tract Infections Among Hospitalized Patients in Southern Sri Lanka: A Prospective Cohort Study

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BOTTOM LINE – Hospitalized LRTIs cost this Sri Lankan cohort USD 233,486 overall – a median USD 125.25 per episode, equal to 13.2% of annual per-capita household income in Galle.

BACKGROUND & OBJECTIVE

Global & Local Burden

Lower respiratory tract infections (LRTIs) are the 4th leading cause of death worldwide, and were the 3rd leading cause of hospital deaths and 4th leading cause of hospitalization in Sri Lanka (2022–2023).

What Regional Evidence Shows

- Adults with respiratory disease across India, Korea, Malaysia, Singapore, Taiwan & Thailand: mean annual cost USD 4,191/patient – 39–71% of monthly wages.
- Indirect (productivity) costs are known to reach 50–56% of total burden for influenza/pneumonia in Thailand, and 16–25% of total cost for acute respiratory infections in Northern India.

The Evidence Gap in Sri Lanka

Sri Lanka's public healthcare system provides care free at the point of use – yet patients still incur substantial out-of-pocket and productivity costs. **No prior study has quantified the episode-level economic impact of hospitalized LRTIs in Sri Lanka.**

Research Objective

To estimate the direct and indirect costs of hospitalized LRTI episodes in southern Sri Lanka from a societal perspective, by phase of care and age group.

METHODS

Study Design

Prospective cohort study (RISE-SL): 1,268 patients hospitalized with acute LRTI at a public tertiary care hospital in Galle, Sri Lanka, April 2018–March 2021. Standardized questionnaires at enrollment and a telephone follow-up ~4 weeks after admission captured costs at each phase.

Cost Framework

- BEFORE HOSPITALIZATION**
Prior GP / OPD visits, medications, transport
- DURING INDEX HOSPITALIZATION**
Bed-days, medications, labs, transport
- AFTER DISCHARGE (~4 WEEKS)**
Follow-up visits, missed work/school

Figure 1. Three-phase cost framework used to capture the full illness episode, from pre-hospitalization care-seeking through ~4 weeks post-discharge.

Direct & Indirect Costs

Direct costs: out-of-pocket spending (consultations, medicines, labs, transport) plus public healthcare system costs. Indirect costs: the value of productivity lost when patients or caregivers miss work or school because of illness.

Costing Approach

- Public healthcare system costs estimated using Sri Lanka–specific WHO-CHOICE unit costs (cost per outpatient visit and per inpatient bed-day).
- Indirect (productivity) costs valued using a human-capital approach: lost workdays for employed patients/caregivers; projected future earnings loss for missed schooling.
- All costs inflation-adjusted to 2020 LKR and converted to 2020 USD (1 USD = 181.35 LKR); societal perspective, results reported as median (IQR) overall and by age group.

Ethical Approval

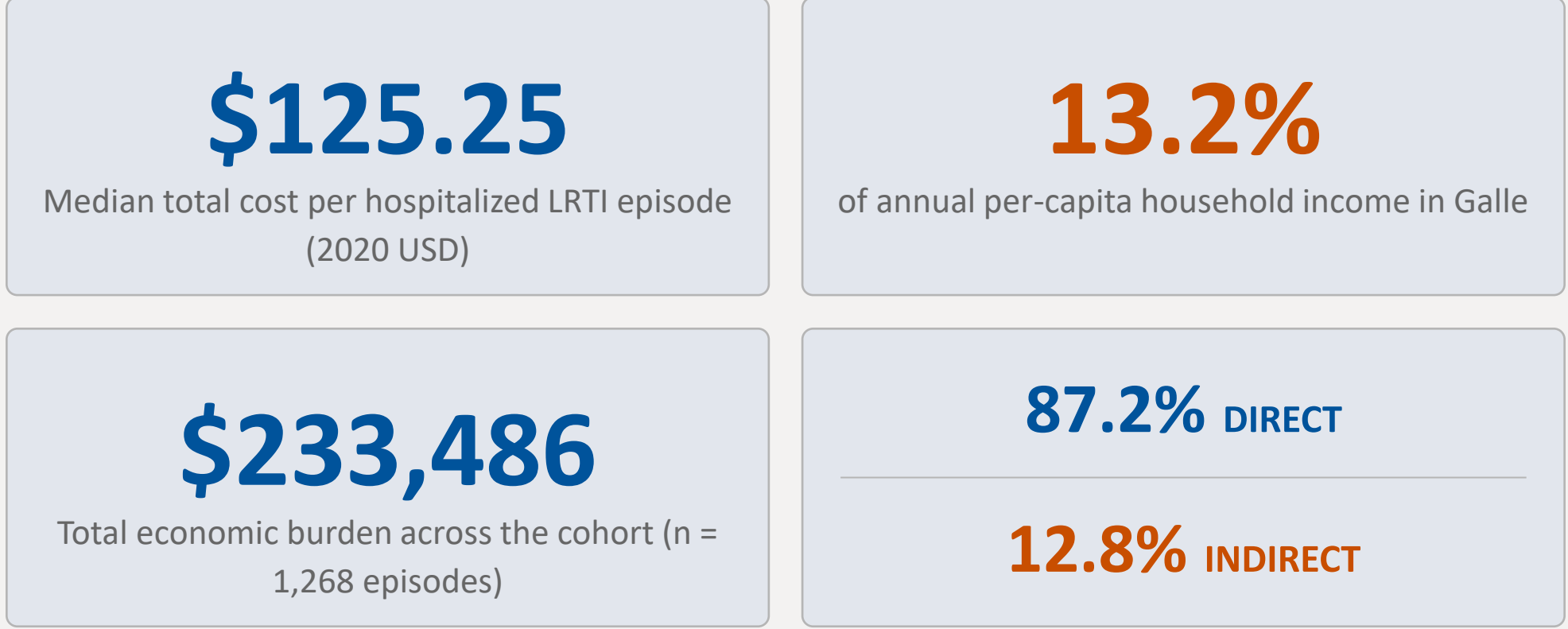
Ethical approval was obtained from the Ethical Review Committee of the Faculty of Medicine, University of Ruhuna (Sri Lanka) and the Institutional Review Board of Duke University (USA). Written informed consent was obtained from all adult participants and the parents or guardians of children <18 years; assent was obtained from children 12–17 years.

RESULTS

Study Population (N = 1,268)

- Median age 58.0 years (IQR 32.0–69.0); 50.9% male; 95.3% Sinhalese; 49.6% rural residence.
- Age distribution: 8.1% aged 0–5y · 4.1% aged 6–10y · 3.9% aged 11–18y · 48.5% aged 19–64y · 35.3% aged ≥65y.
- Most common admission diagnosis: LRTI (61.0%), followed by asthma (11.7%) and COPD (6.6%); among adults ≥18y, 54.7% were unemployed, housewives, or retired.

Key Findings at a Glance



Cost by Phase of Care

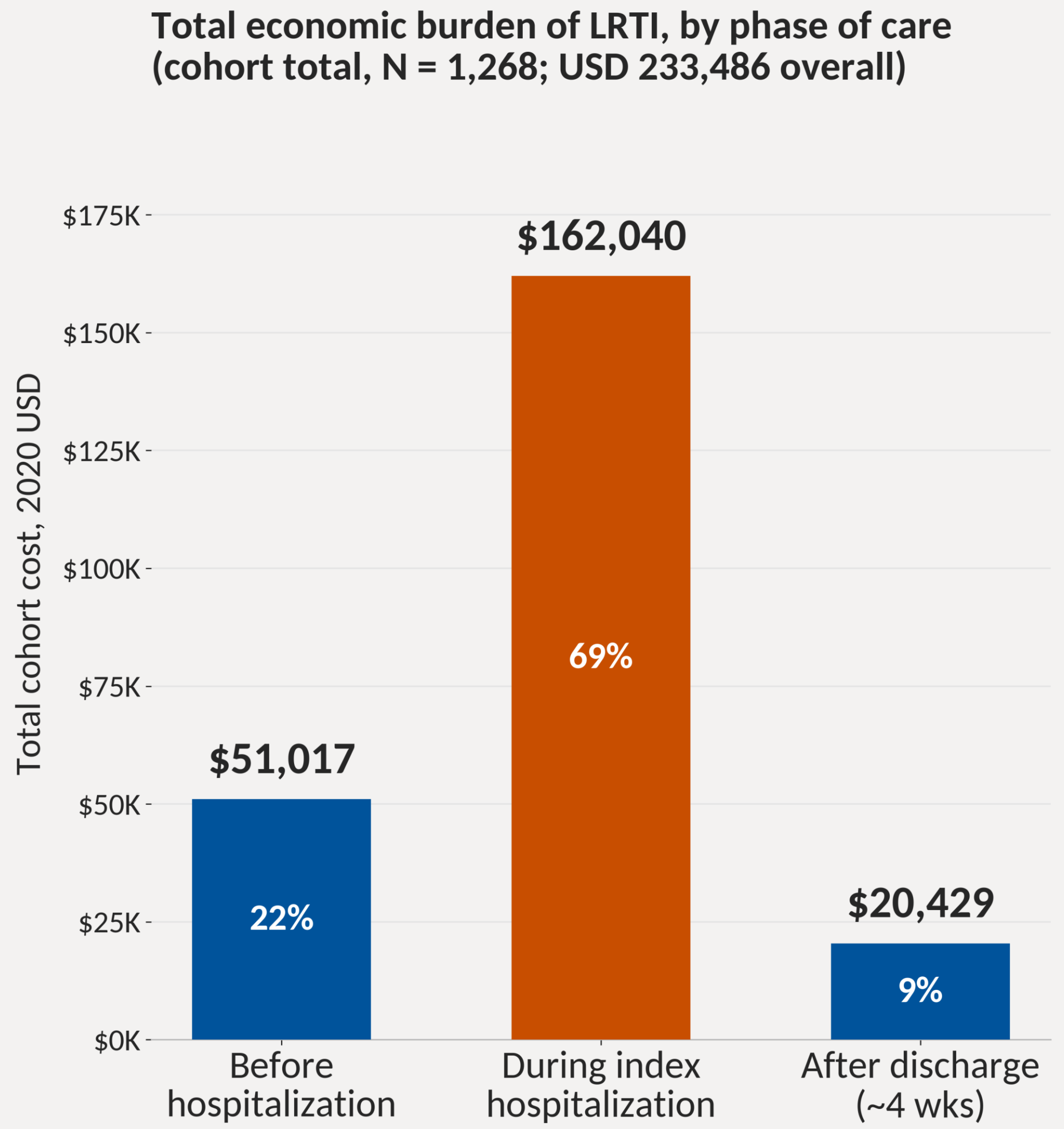


Figure 2. Total economic burden of LRTI, by phase of care (cohort total, N=1,268). Nearly 7 in 10 dollars spent on an LRTI episode occur during the index hospitalization – the phase most amenable to prevention-focused interventions.

Table 1. Median (IQR) cost per hospitalized LRTI episode, overall cohort (2020 USD).

Cost component (overall population)	Median (IQR), 2020 USD
Out-of-pocket cost	\$6.14 (1.93–15.60)
Transportation	\$2.76 (0.86–6.62)
Medication	\$6.61 (3.31–12.68)
Laboratory tests	\$7.07 (2.71–17.56)
Healthcare system cost*	\$95.87 (71.90–137.62)
Total direct cost	\$106.15 (77.42–149.38)
Total indirect cost	\$18.47 (7.92–39.59)
Total cost (direct + indirect)	\$125.25 (90.71–181.79)

* Sri Lanka–specific WHO-CHOICE unit costs (public sector).

EACH DAY OF HOSPITALIZATION MATTERS
1 fewer hospital day → ~25% lower estimated inpatient cost

Care-Seeking & Health Resource Use

- 69.6% sought care before the index hospitalization – most often a private-sector GP visit alone (62.5% of care-seekers); 27.4% sought traditional medicine, most common among young children.
- 18.1% had a prior hospitalization for the same illness (74.8% at public hospitals); 23.2% sought additional care after discharge, most commonly another GP visit (59.9%).
- Median length of stay: 4 days (IQR 3–5); 95.7% received antibiotics (median 1 type); ICU care 1.2%, oxygen support 6.6%, ventilation support 3.2%.

RESULTS (CONTINUED)

Results by Age Group

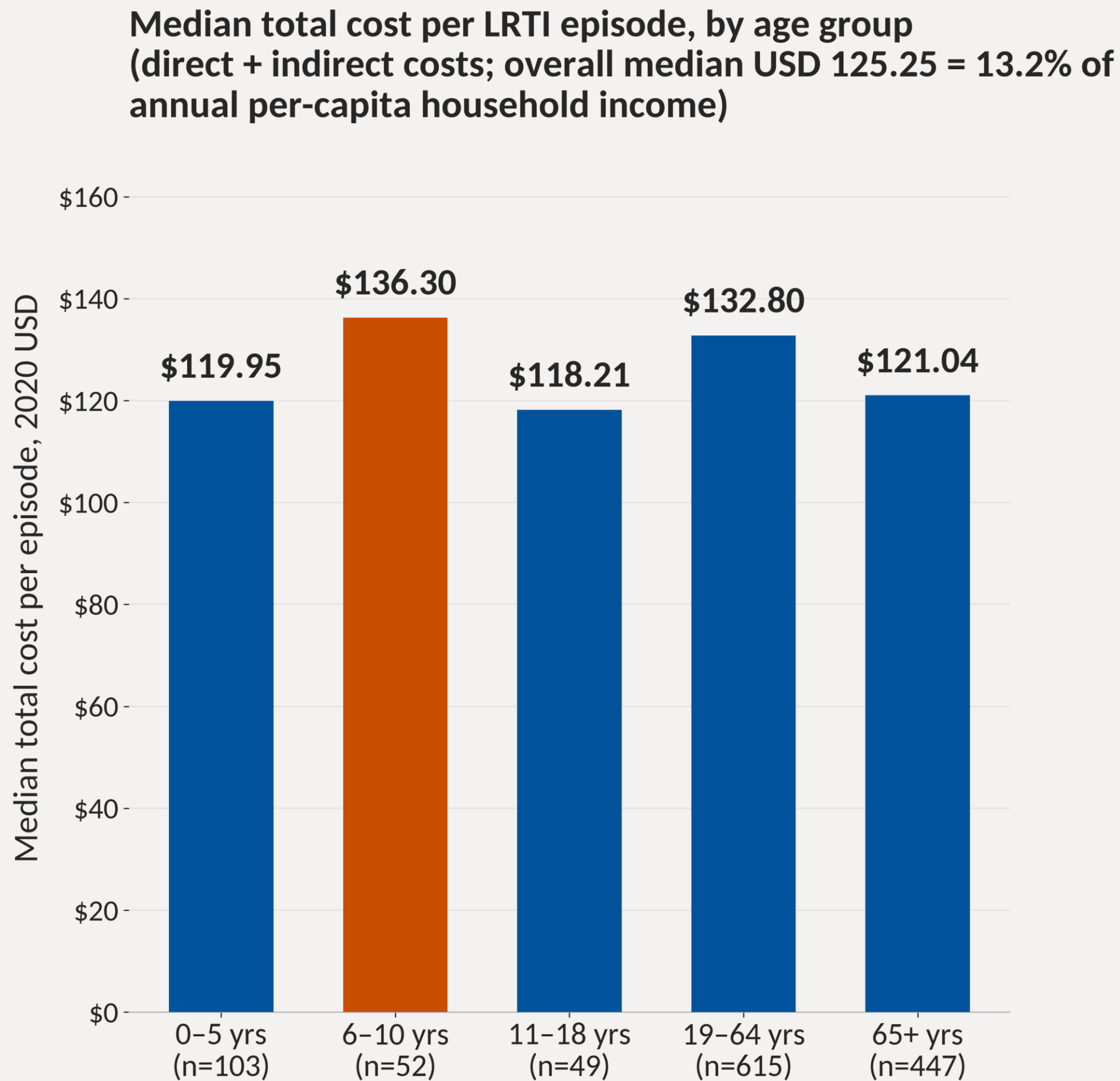


Figure 3. Median total cost per LRTI episode, by age group. Cost burden is not evenly distributed across the lifespan – highest among school-age children (6–10y) and working-age adults (19–64y), the group with the greatest indirect (productivity) losses.

Composition of total cohort economic burden (USD 233,486)

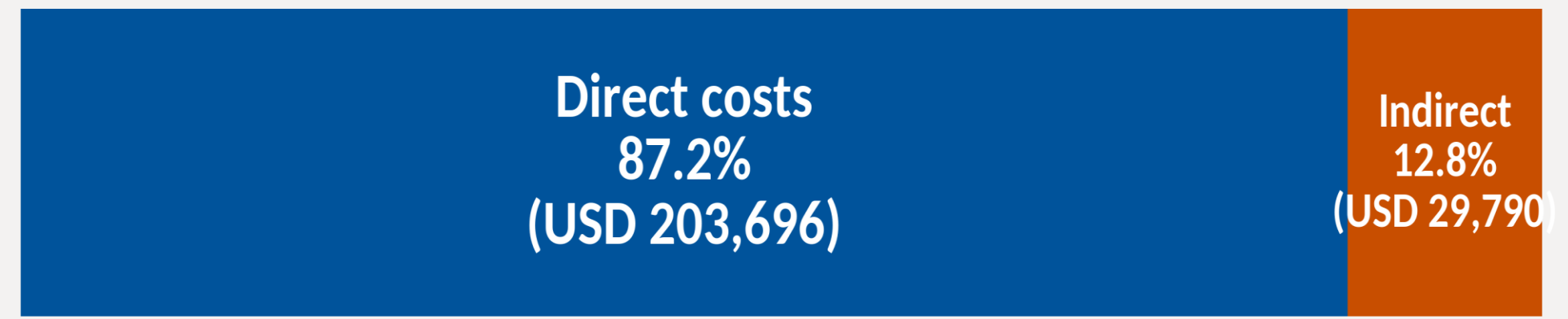


Figure 4. Composition of total cohort economic burden (direct vs. indirect costs).

Public Health System Burden

- \$170,636 in public healthcare system costs across the cohort, representing ~73% of total episode costs and ~84% of direct costs.
- This was consistent with a Sri Lankan dengue cohort (84%), though below a Malaysian pediatric ARI cohort (94.5%).

CONCLUSIONS & IMPLICATIONS

Policy Implications

- These episode-level, age-disaggregated estimates provide inputs for economic evaluations of preventive interventions – including influenza, RSV, and pneumococcal vaccines, several not yet in Sri Lanka's routine immunization program.
- Interventions that prevent hospitalization or shorten length of stay could meaningfully reduce costs to both households and the public health system.
- Future work should extend this analysis to outpatient LRTI/ARI cases and repeat it in the post-COVID-19 era to assess whether care-seeking and cost patterns have shifted.

Strengths & Limitations

- Prospective design captured the full illness episode – pre-hospitalization care-seeking, the index admission, and 4 weeks post-discharge – not just inpatient charges.
- First study, to our knowledge, to quantify episode-level LRTI costs in Sri Lanka by phase of care and age group across a broad age range (≥1 year), spanning pediatric, working-age, and older-adult populations.
- Single-center cohort from one public tertiary hospital; findings may not generalize to other regions or the private sector.
- Costs relied on non-LRTI-specific WHO-CHOICE unit costs and a uniform district-level income proxy; post-discharge costs were captured only through ~4 weeks.

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