

ESTIMATING THE COST OF HOSPITALIZED PNEUMOCOCCAL DISEASE IN NEPAL

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INTRODUCTION

- Few studies have assessed the economic consequences of pneumococcal disease and the economic impact of pneumococcal conjugate vaccine (PCV), particularly in South Asia.
- Despite introducing the PCV-10 vaccine into its National Immunization Program in 2015, no information on the cost of pneumococcal disease, specifically the cost of pneumonia, meningitis, and sepsis, are available for Nepal.
- The role of economic evaluations has become critical to introducing new vaccines and sustaining existing vaccine programs.
- As part of a larger study (PneumoNIA) aimed at estimating the epidemiologic and economic impact of PCV-10 in Nepal, we estimated the cost of hospitalized pneumonia, meningitis, and sepsis among children 1-59 months in Nepal. The results presented here are preliminary using data from the first month of data collection.

METHODS

- We prospectively collected resource utilization data and out-of-pocket expenditures from 5 hospitals in Nepal. Refer to ISPPD-089 for details about these hospitals.
- Hospitalized children 1-59 months with an admission diagnosis of pneumonia, meningitis, and sepsis were enrolled from April 17, 2016 - May 31, 2016.
- Daily interviews with caregivers and review of the medical and billing records were used to collect out-of-pocket expenses before hospitalization, daily out-of-pocket expenses during hospitalization, hospital resource utilization and household demographic information.
- Data collection forms were piloted for 2 weeks, and full data collection began May 1, 2016. Data collection is planned for 8 months.
- To calculate the cost of hospitalized pneumonia, meningitis and sepsis, we multiplied quantities of resources used by an assigned value.
- We estimated costs based on a societal perspective, which included direct medical costs (e.g. per diem rates, costs of-diagnostics, medications), direct non-medical costs (e.g. food, lodging, transportation), and indirect costs (e.g. productivity loss). The total cost per hospitalized event was the sum of medical direct costs, non-medical costs and indirect costs.
- We estimated loss of productivity by multiplying the hours lost per day by the daily minimum wage in Nepal.
- Standard statistical tests (mean, median, standard deviation, range) were used to describe the patterns of data.
- All costs were expressed in 2016 US dollars.

RESULTS

- 155 cases were enrolled as of May 31, 2016, which included the pilot period and first month of full data collection (Table 1).
- Majority of hospitalized events came from Kanti Children's Hospital (51.3%) and were pneumonia (78.1%). Few pneumonia events were lab-confirmed.
- The cost per hospitalized event varied substantially by hospital and syndrome (Table 2 and Figure 1).
- Meningitis (\$383 per event) followed by sepsis (\$356) were the most expensive overall, which is indicative of disease severity resulting in longer hospitalizations, increased frequency of lab tests and procedures, and more expensive medicines. However, there is large variation in the cost of meningitis and sepsis between hospitals due to the small sample sizes to date.
- Cost per pneumonia event at Dharan and Kanti was higher than the other hospitals due to higher medication costs and higher loss of productivity reported in these two hospitals. Patients at these hospitals were more likely to come from greater distances.
- Care-seeking prior to hospital admission was common among all patients (87%), with 70.3% visiting an Outpatient/ER and 21.3% visiting a pharmacy, contributing 52.3% of the total cost per case.

TABLE 1: Child Characteristics by Syndrome

	Pneumonia (N=121)	Meningitis (N=6)	Sepsis (N=28)	Total (N= 155)
Gender				
Male (%)	73 (60.3)	5 (83.3)	15 (53.6)	93 (60.0)
Female (%)	48 (39.7)	1 (16.7)	13 (46.4)	62 (40.0)
Age in months				
1-11 mo (%)	59 (49.2)	5 (83.3)	21 (77.8)	85 (55.6)
12-23 mo (%)	22 (18.3)	0 (0.0)	3 (11.1)	25 (16.3)
24-35 mo (%)	14 (11.6)	0 (0.0)	1 (3.7)	15 (9.8)
36-47 mo (%)	9 (7.5)	0 (0.0)	1 (3.7)	10 (6.5)
48-59 mo (%)	16 (13.3)	1 (16.7)	1 (3.7)	18 (11.8)
≥1 dose PCV10 Received (%)	50 (41.3)	3 (50.0)	13 (52.0)	66 (43.4)
Average Household Income (SD)	\$3389.37 (\$5803.69)	\$3820.95 (\$3981.47)	\$3471.81 (\$3035.11)	\$3420.97 (\$5327.63)
Health Insurance				
None (%)	102 (89.5)	6 (100.0)	24 (96.0)	132 (91.0)
National/Government (%)	10 (8.8)	0 (0.0)	1 (4.0)	11 (7.6)
Private (%)	2 (1.8)	0 (0.0)	0 (0.0)	2 (1.4)
Hospital				
BPK Dharan (%)	15 (12.4)	1 (16.7)	1 (3.6)	17 (11.8)
Kanti (%)	53 (43.8)	3 (50.0)	25 (89.3)	78 (51.3)
Nepalgunj (%)	9 (7.4)	0 (0.0)	2 (7.1)	11 (7.2)
Patan (%)	26 (21.5)	1 (16.7)	0 (0.0)	27 (17.8)
Tansen (%)	18 (14.9)	1 (16.7)	0 (0.0)	19 (12.5)
Pre-Hospitalization Care-seeking				
Outpatient/ER (%)	87 (71.9)	5 (83.3)	17 (60.7)	109 (70.3)
Pharmacy (%)	31 (25.6)	1 (16.7)	1 (3.6)	33 (21.3)
Traditional Healer/Other (%)	3 (2.5)	1 (16.7)	0 (0.0)	4 (2.6)

SD: Standard deviation

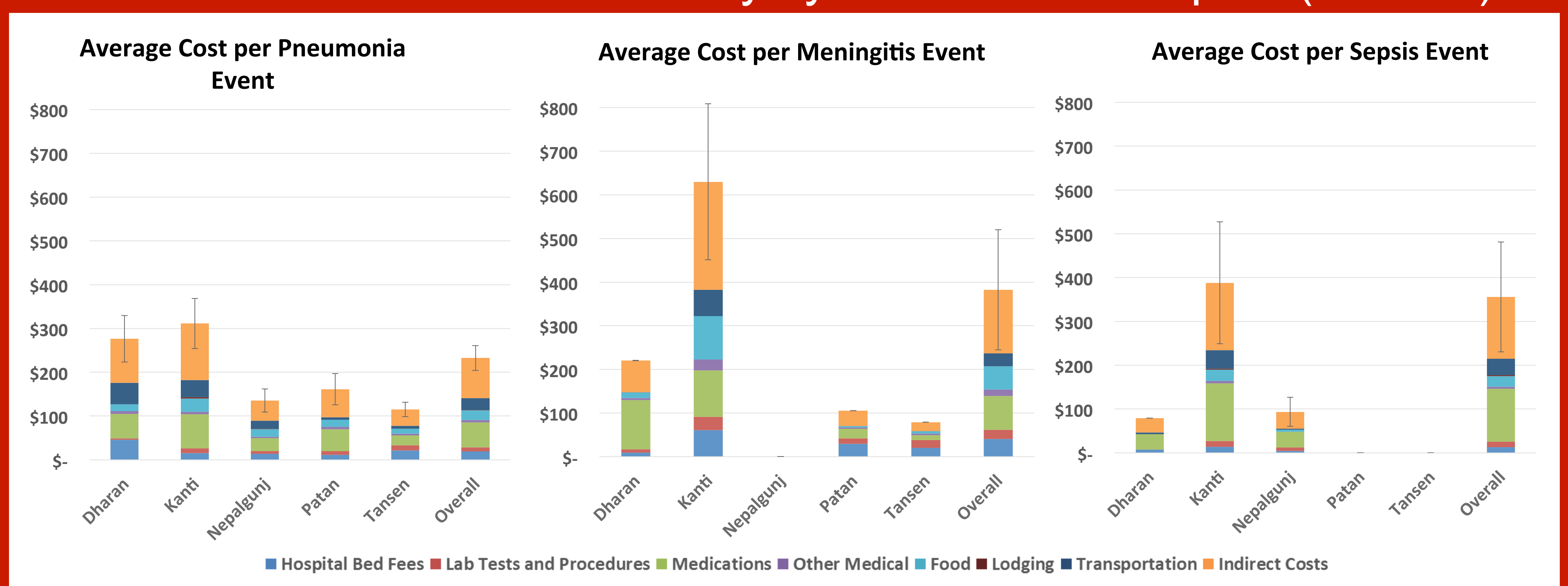
CONCLUSION

- Despite variation in the cost per event at each hospital, hospitalized pneumonia, meningitis, and sepsis represented a significant economic burden.
- The cost due to productivity loss was just as important as the direct costs to treat pneumococcal disease and presented a major proportion of the overall economic burden of this disease in Nepal.
- Data from this analysis can be used to assess the cost-effectiveness of PCV in Nepal and other South Asian countries.
- Economic data is critical to informing policy decisions and securing financial support for PCV vaccination in the future.

TABLE 2: Breakdown of cost per event FIGURE 1: Distribution of cost by syndrome and hospital (95% CI)

	Pneumonia (N=121)	Meningitis (N=6)	Sepsis (N=28)
Length of Illness in Days (SD)	11.64 (6.73)	17.00 (7.62)	15.71 (20.08)
Pre-Hospitalization	6.26 (5.14)	8.83 (6.97)	10.43 (18.97)
Pediatric Ward	4.76 (3.47)	5.5 (4.51)	5 (2.51)
PICU Ward	0.63 (1.46)	2.67 (6.53)	0.29 (1.05)
Days Missed Work (SD)	26.74 (27.85)	40.54 (36.38)	40.03 (49.93)
Paid	4.38 (10.39)	14.08 (23.59)	12.37 (26.67)
Unpaid	22.36 (23.06)	26.46 (19.00)	27.66 (28.78)
Average Cost per Event (SD)	\$232.59 (\$212.36)	\$382.51 (\$303.08)	\$356.00 (\$475.32)
Medical Costs (%)	\$91.04 (39.1)	\$153.62 (40.2)	\$151.30 (42.5)
Non-Medical Cost (%)	\$49.93 (21.5)	\$83.60 (21.9)	\$63.39 (17.8)
Indirect Costs (%)	\$91.62 (39.4)	\$145.29 (38.0)	\$141.30 (39.7)
Average Costs by Timing*			
Pre-Hospitalization (%)	\$111.42 (47.9)	\$163.22 (42.7)	\$86.62 (24.3)
During Hospitalization (%)	\$121.17 (52.1)	\$219.29 (57.3)	\$269.37 (75.7)

SD: Standard deviation *Includes medical, non-medical, and indirect costs incurred during each timeframe.



CI: 95% Confidence Interval