

Expenses and national insurance payments at a municipal-level hospital in rural Nepal: implications for strategic purchasing and universal health coverage

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Abstract

Background: Strategic purchasing mechanisms, including national health insurance, provide opportunities to improve quality and progress towards universal health coverage. Nepal's health insurance program (HIP), begun in 2016, is a national insurance platform aiming to improve financial risk protection, and efficiency, quality, and access to health services. HIP also further engages private-sector providers through strategic purchasing, potentially improving quality, regulation, and accountability. Bayalpata Hospital is a public-private partnership (PPP) hospital run jointly by the Ministry of Health and Population and Nyaya Health Nepal and is one of the first PPP hospitals enrolled in HIP. We evaluated Bayalpata Hospital costs and HIP guidelines to understand how HIP rates compare to health delivery costs incurred.

Methods: We employed a top-down costing methodology to analyze costs for fiscal year 2017-2018. We compared costs to HIP reimbursement rates during the same period, and projected overall coverage for costs assuming full HIP enrollment given the compulsory nature of HIP.

Results: Our data suggest HIP, as one payment mechanism in Nepal's mixed provider payment system, would cover 57% of hospital costs with full enrollment, with variation across services. Among inpatient services, 64% of costs would be covered, including 105% reimbursement for fee-for-service, 87% reimbursement for bundled packages, but only 23% - 40% for certain surgical services. For outpatient services, 59% would be covered, and for emergency services, 32% would be covered.

Conclusions: HIP is an important strategic purchasing foundation; however, payments may be insufficient to match provider costs and cover a larger percentage of inpatient-based and fee-for-service delivery than outpatient services. These dynamics may inappropriately incentivize fee-for-service health care utilization, in particular for private-sector providers without access to other public-sector payment mechanisms, while potentially disincentivizing outpatient or community-based approaches to health care, which are less well reimbursed through HIP. HIP policy revisions, and further expansion of mixed provider payment mechanisms, may more effectively incentivize primary health care approaches, while also deepening private-sector engagement. The data and experience of Bayalpata Hospital and HIP offer practical insights for Nepali policymakers and those in similar settings globally employing strategic purchasing to improve progress towards UHC and quality health delivery.

Introduction

Strategic purchasing is an important mechanism to advance progress towards universal health coverage (UHC).(1) Increasing use of strategic purchasing arrangements, including national health insurance schemes, is a key aspect of the World Health Organization's (WHO) strategy for primary health care, offering governments the opportunity to expand coverage and financial risk protection, enhance equity, and improve efficiency of health care expenditures.(2)

Nepal is deeply committed to UHC, including its 2015 Constitution enshrining the right to health care. However, strategic purchasing mechanisms have remained limited until recently. Out-of-pocket expenditures for health care constitute over 55% of current health expenditure and are a leading cause of financial risk.(3) Nepal aims to decrease out-of-pocket expenditure to 35% to reach 2030 UHC targets. Achieving this target will require an increase in public-sector health expenditure.(4,5)

The passage of the 2017 National Health Insurance Act created important foundations for strategic purchasing including the first national health insurance program (HIP). HIP is a social protection program intended to expand access and improve equity in health care delivery by removing financial barriers; encouraging pre-payment and risk-pooling to expand financial resources for health care services; and improving efficiency, quality, and accountability of health care delivery. HIP is compulsory for all citizens, by design, although currently there are minimal mechanisms to facilitate enrollment. The government aims to expand HIP nationally in 2020.(6) As HIP expands, it offers a strong strategic purchasing mechanism to further engage private-sector providers to deliver health care coverage. Deeper engagement of private-sector entities as a path towards UHC is also a strategy recommended by the WHO.(2)

A critical parallel challenge is the global need to improve quality in health care delivery. Every year, more than 5 million people die in low- and middle-income countries due to poor quality health services – more than those who die from limited access to health care.(7–9) In addition to Nepal's strong commitment to UHC, improving quality of service delivery throughout the health sector is also a priority.(10,11) Further private-sector engagement also presents an opportunity to develop enhanced regulation, accountability, and improved quality of care delivery via private-sector entities. In this way, HIP provides an important opportunity to make progress towards UHC and improved quality in health services throughout Nepal.

Nepal has recently undertaken a historic shift towards decentralization of governance and core public service delivery. In 2017, elections brought in new local governments across Nepal's 753 municipalities, throughout its seven provinces. Healthcare institutions previously operating under the centralized national- or district-level system are now largely run by locally-elected municipality officials. Additionally, advanced health care services are increasingly under the purview of Nepal's provincial governments rather than, as previously, the central government.

Bayalpata Hospital is a community hospital in the Sanfegagar Municipality, of the Achham district of Province 7. It is owned by the government and managed through a public-private partnership (PPP) between Nepal's Ministry of Health & Population and Nyaya Health Nepal, a non-profit health care organization. Beginning in 2017, Bayalpata was one of the first PPP hospitals enrolled in HIP. Accordingly, analyzing the Bayalpata experience offers potential policy insights for HIP, and strategic purchasing broadly, as Nepal pursues its UHC and quality agendas.

In this paper we describe, 1) costs incurred for service delivery at Bayalpata Hospital; 2) a comparison of these costs with HIP rates; and 3) a projection of the percentage of overall hospital costs that could be covered by HIP, assuming all patients are enrolled in HIP and full reimbursement is received for services delivered. These analyses provide insight into HIP and have implications for strategic purchasing arrangements as a path towards achieving UHC and quality health care delivery in Nepal, and in similar settings globally.

Methods

The Setting

The Achham district where Bayalpata Hospital is located is historically one of the most remote and impoverished districts with some of the lowest-performing health indices in the country.(12,13) Nyaya Health Nepal manages the government-owned Bayalpata Hospital in Achham through a public-private partnership with the Ministry of Health and Population. Bayalpata Hospital is a 50 + bed community hospital, and provides approximately 100,000 inpatient, outpatient, and emergency patient visits per year, while also managing community health care programs throughout its catchment area. In 2017, Bayalpata Hospital became one of the first PPP hospitals empaneled in HIP. HIP enrollment in the catchment area was limited to less than 10% during the first year due to limited mobilization, awareness of insurance, and poor service availability.(14) However, more recently, enrollment is improving as the district health insurance team is expanding its efforts.(15)

Costing Analysis

Our objective was to project unit annual operating costs of Bayalpata Hospital and to compare potential reimbursement rates per HIP guidelines. Unit costs were calculated for the final cost centers including: average per visit cost of outpatient care; average per bed day and per discharge cost of inpatient care; and, average per visit cost of emergency department care. Actual costs during a full fiscal year period were used to ensure inclusion of any seasonal cyclic variation. Calculation of potential health insurance reimbursements were based on the latest schedule approved by HIP.(16)

We performed retrospective costing analysis for all costs at Bayalapatata Hospital for the period between July 16, 2017, and July 15, 2018. We collected service delivery data from the NepalEHR electronic health record platform used at Bayalpata Hospital(17,18) (numbers of visits, bed days, surgical time, average length of inpatient stay, diagnostic tests, medication prescriptions, and other procedures). We collected cost data from organizational financial records, fixed asset registers, and employee records, including direct costs (personnel, medicines, medical consumables, and depreciation of medical equipment) and indirect costs (staff benefits, utilities, facility and office supplies, patient food and reimbursements, and building and equipment depreciation).

We utilized a “top-down” step-down costing methodology described by the Joint Learning Network.(19) This approach ensures that all costs - recurrent or capital in nature - were fully captured over the measurement period. Initially, intermediate cost centers were defined in three categories, including:

1. Administrative services – including general administration, staff management, financial management, procurement & logistics, waste management, security and maintenance, information technology, medical records, patient navigation, and ambulance services;
2. Clinical support services – including pharmacy, laboratory, imaging (x-ray, ultrasound), major surgeries (cesarean section, hernia repair, hydrocele repair, laparotomy, trauma and wound debridement, open reduction and internal fixation, tibial intramedullary nailing, and other orthopedic plating and fixation), and minor procedures (wound care, incision and drainage, dressing, foreign body removal, suturing, reduction and casting/splinting, contraceptive implant); and
3. Clinical services and programs – including outpatient services (general, maternal health, pediatric, dental, and mental health), inpatient services (internal medicine, obstetric, general surgical, orthopedic trauma, isolation, tuberculosis), and emergency services.

The costing analysis consisted of the following four steps. First, all direct costs were attributed to intermediate cost centers based on utilization of resources (e.g. personnel or consumable utilization). Personnel costs include salary and other regular benefits constituting monthly employee payroll. Where employees worked in more than one cost center, the apportionment was done as per duty roster assignments. For supervisory functions that do not have a fixed duty roster assignment, apportionment was done based on services data. To calculate the cost of surgical procedures, timestamp data from the operating theater register was used. Medicines and consumables usage data was collected from the hospital's inventory management system. For medicines dispensed from the pharmacy, service utilization data was used to allocate medicine and consumables costs to intermediate cost centers. Medical equipment depreciation was calculated based on market replacement costs and assumed useful life of 5–8 years based on a straight-line depreciation schedule with zero salvage value.

Second, all indirect costs were attributed to intermediate cost centers based on relative use (e.g., staff benefits were distributed based on number of employees in each department). All indirect costs including staff benefits, utility expenses, repairs and maintenance, and patient food and reimbursements, were based on actual expenses incurred during the period of analysis. These costs were allocated to cost centers using

programmatic allocation statistics such as number of patient visits, number of bed days, number of employees, and floor space occupation. Both building and non-medical equipment depreciation were based on number of years of useful life recommended by the Accounting Standards Board of Nepal(20) and a straight-line depreciation schedule with zero salvage value. The direct and indirect costs attributed in the first two steps include both 'unshared' costs applicable to a specific cost center, as well as 'shared' costs of resources used by more than one cost center.

Third, administrative service intermediate costs were allocated downstream to either clinical support services or clinical services and programs. For example, waste management costs were allocated based on floor space, whereas financial and procurement management costs were allocated based on the proportion of direct costs already allocated to clinical support services or clinical services and programs.

Fourth, all clinical support service costs (including direct, indirect, and allocated administrative service costs) were distributed to clinical services and programs (e.g. laboratory costs were distributed based on number of orders made by a clinical service unit). Hence, the final cost centers consist of only clinical services and programs for which the unit costs are calculated. The total final cost center costs in outpatient, inpatient, and emergency categories were used as the numerator in calculating unit costs. Final unit costs included cost per outpatient visit, cost per inpatient discharge, cost per inpatient bed day, and cost per emergency visit. Unit costs of clinical support services - cost of major surgeries, lab tests, radiology, and pharmacy - were obtained after step three, but prior to allocation of clinical support costs to final cost centers in the last step.

HIP rates utilized were as per national guidelines(6) and the HIP payment schedule.(16) Bundled reimbursements are constituted as a single payment intended to be inclusive of all consultation, medications, and diagnostics for a given diagnosis – e.g. inpatient treatment of pneumonia. Fee-for-service payments are paid individually for specific consultations, diagnostics, or other treatments. Unit costs calculated for Bayalpata Hospital were compared to comparable line items included in the HIP payment schedule.

Finally, given the compulsory nature of the HIP per the National Health Insurance Act,(21) we projected the potential coverage of overall hospital expenses by HIP assuming all patients were enrolled in HIP during the period of analysis, and full reimbursement was received from HIP for all services delivered. To do so, we used the HIP payment schedule and compared these to known services delivered at Bayalpata Hospital during the period of analysis to map both bundled and fee-for-service payments to final cost centers. Bundled payments were applicable for surgical and medical management of inpatients, whereas fee-for-service payments were applicable to all outpatient, remaining inpatient and emergency care categories.

All costs were initially measured in Nepalese rupees (NPR) and then converted to US dollars using a conversion rate of NPR104.4 to \$1.00 USD, the average exchange rate for the measurement period.(22)

Results

Bayalpata Hospital usage and costs

Table 1 illustrates descriptive statistics, including overall usage rates by service domain, services delivered, and total costs. Figure 1 illustrates cost breakdown by expense type. Personnel comprised a predominant share of costs at 48%, with medicines and other consumables comprising an additional 12% and 14% respectively.

Table 1: Bayalpata Hospital descriptive statistics (July, 2017 – June, 2018)

Bayalpata Hospital, 2017–2018	
Total Outpatient Visits	79,915
Total inpatient bed days	18,340
total inpatient discharges	3700
average inpatient length of stay	4.4 days
total emergency visits	7,813
total major surgical procedures	448
total minor surgical procedures	6,637
total laboratory diagnostic tests performed	137,809
total medication prescriptions	230,113
total x-rays performed	30,318
total number of deliveries	789
outpatient visits per outpatient staff	2,756
inpatient bed days per inpatient staff	736
emergency visits per er staff	610
overall costs	\$1,567,361.48
direct costs	\$1,176,692.30
indirect costs	\$390,669,18

Figure 2 illustrates costs of outpatient service delivery, per outpatient visit, by service. Service costs ranged from \$7.56 for pediatric visits to \$13.93 for maternal health visits. Average outpatient visit cost was \$9.12. Figure 3 shows costs of emergency services, by visit, and inpatient services, by bed day. Emergency visit costs, on average, were \$33.49. Inpatient services ranged from \$21.22 for general inpatient bed days to \$75.90 for orthopedic service bed days. Average inpatient bed day cost was \$32.14. Figure 4 illustrates costs of major procedural hospitalizations, ranging from \$61.81 for hospitalization for vaginal deliveries, to \$565.46 for hospitalizations for cesarean delivery.

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Bayalpata Hospital costs compared to health insurance program payments

Table 2 (*attached at end of document) demonstrates a comparison of select line item costs as compared to the payment stipulated per HIP guidelines. Results include the following.

Table 2
Comparison of Bayalpata Hospital costs relative to HIP payment schedule

Patient Care at Bayalpata Hospital	Bayalpata Hospital Cost (average)	HIP reimbursements					Total HIP reimbursement (average)	% of Bayalpata Hospital expenses covered by HIP
		Consultation	Medications (average)	Lab tests (average)	Radiology (average)	Other Procedures (average)		
Outpatient Department Care (average, per patient visit)								
General outpatient visit	\$8.99	\$1.92	\$2.37	\$0.66	\$0.79	\$0.21	\$5.94	66%
General maternity	\$13.93	\$1.92	\$0.73	\$1.83	\$3.15	\$0.99	\$8.61	61%
General pediatric	\$7.56	\$1.92	\$2.36	\$0.14	\$0.36	\$0.00	\$4.78	63%
General dental	\$9.77	\$1.92	\$2.37	\$0.01	\$0.01	\$1.10	\$5.40	55%
Mental health	\$8.71	\$1.92	\$1.02	\$0.03	\$0.01	\$0.00	\$2.98	34%
Inpatient Department Care		HIP reimbursements						
		Bundled Reimbursement (average, per discharge)	Fee-for-service Reimbursement (average, per discharge)	Medications (average, per discharge)	Lab tests (average, per discharge)	Radiology (average, per discharge)		
General medical inpatient service (average, per discharge)	\$96.28							
Bundled package reimbursements		\$84.02	-	-	-	-	\$84.02	87%
Fee-for-service reimbursements		-	\$88.95	\$6.80	\$3.51	\$1.48	\$100.74	105%
Maternity inpatient service (average, per discharge)								
Vaginal Delivery	\$61.48	\$54.14	-	-	-	-	\$54.14	88%
Cesarean Section	\$552.61	\$176.24	-	-	-	-	\$176.24	32%
Orthopedic inpatient service (average, per discharge)	\$549.46	\$221.86	-	-	-	-	\$221.86	40%
General surgical inpatient service (average, per discharge)	\$397.52	\$90.90	-	-	-	-	\$90.90	23%
Emergency Department Care		HIP reimbursements						
		Consultation	Medications (average)	Lab tests (average)	Radiology (average)	Other Procedures (average)		
Emergency visits (average, per patient visit)	\$33.49	\$3.83	\$2.46	\$1.74	\$2.62	\$0.04	\$10.70	32%

First, HIP rates are generally less than costs incurred at Bayalpata Hospital during the period of analysis (Table 2). Outpatient HIP payments of \$1.92 per consultation, with additional coverage for medications, labs, radiology and other procedures, covered 34% (mental health) to 66% (general outpatient) of average visit cost. HIP payments for emergency care covered 32% of average emergency visit costs. HIP payments for inpatient service delivery varied significantly, ranging from 23–105% of costs incurred. Rates for major procedural hospitalizations also varied significantly, from 23–88% of total hospitalization costs. Certain services provided by Bayalpata Hospital are not included in the HIP, including HIV, tuberculosis, and leprosy care. Combined, these three service categories contributed to 5.5% of overall costs during the measurement period.

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Secondly, data demonstrates significant variation in costs incurred at Bayalpata Hospital for outpatient and emergency services (Table 2), though HIP payment rates for these services are not specific to diagnosis or services delivered. Conversely, HIP has diagnosis-specific rates for over one hundred inpatient bundled payments including appendectomy, cholecystectomy, pneumonia, cellulitis, and childbirth. In our analysis these bundled payments constituted only 13% of total potential reimbursements if all patients were enrolled in HIP, with the remaining 87% of potential reimbursements from fee-for-service payments.

Figure 5 illustrates projected HIP payments assuming enrollment of all patients in HIP during the analysis period. Results highlight the variance between HIP rates for outpatient, inpatient, and emergency services. Most HIP payments were less than costs incurred with HIP payments expected to cover 32% of emergency, 59% of outpatient, and 64% of inpatient service costs at Bayalpata Hospital. Fee-for-service inpatient care was covered, on average, at a higher rate than bundled payments, at 105% and 87% of inpatient costs, respectively. Overall, 57% of all hospital costs would have been covered under HIP guidelines if all patients had been enrolled in HIP during the analysis period.

Discussion:

Strategic purchasing provides opportunities for progress towards universal health coverage, deeper private sector engagement, and improved quality of health care service delivery. We describe costs at one of the first PPP hospitals enrolled in Nepal's HIP, and a comparison of those costs relative to HIP rates.

HIP is a critical strategic purchasing foundation, and not intended to finance 100% of service delivery costs as it is one mechanism within a broader mixed provider payment system. Other health financing mechanisms include the Basic Health Care Services (BHCS) – constitutionally-mandated services including preventive, promotive, and basic curative and emergency services provided at no cost to citizens at public-sector facilities.(23) While BHCS has been established in policy, it has not been fully implemented and details of exact staffing, medication and supply allocations per facility remain unclear. Bayalpata Hospital is eligible for BHCS, although only partial coverage was allocated during the study period. Other health financing mechanisms include vertical programs (e.g. HIV/AIDs, tuberculosis, etc.), performance-based financing,(24) and local financing through provincial and municipal budgetary allocations.(25) Finally, out-of-pocket payments presently cover over 55% of health expenditures, though the government aims to decrease out-of-pocket payments to 35% by 2030.

The Bayalpata Hospital example and data presented offer lessons regarding strategic purchasing in Nepal. First, there was a significant difference between service delivery costs incurred and payments per HIP guidelines (Table 2 and Fig. 5). Projections suggest 57% of all hospital costs could have been covered by HIP if all patients were enrolled and full reimbursement was received from HIP. When HIP and BHCS are fully operationalized, if combined with other mechanisms including performance-based payments and provincial or municipality allocations, this may provide a viable public-sector financing strategy for the costs incurred at public-private partnership facilities like Bayalpata Hospital. However, of the various mixed provider payment system mechanisms, only HIP is available to private-sector providers. Thus, unless other mechanisms are also extended to include the private-sector, there remains insufficient public financing for strategic purchasing of private-sector service delivery; Nepal's goal of decreasing out-of-pocket payments to 35% by 2030 may also be infeasible in this situation. These dynamics risk undermining progress towards UHC – given challenges with access and quality of public-sector health facilities throughout Nepal, many citizens are likely to continue purchasing private-sector services via high out-of-pocket payments, leading to ongoing and significant financial risk. Additionally, by not effectively engaging private sector entities through adequate financing mechanisms, opportunities to improve quality of care delivery through enhanced regulation may be missed. Finally, while HIP guidelines stipulate rates should be regularly adjusted for inflation, this has not happened in practice. For future HIP payments to be effective, regular adjustment of HIP rates relative to inflation and other changes in health care market costs, should be implemented.

Secondly, the difference between costs at Bayalpata Hospital and HIP payments varied by area of service delivery (Fig. 5), with HIP payments covering a larger percentage of inpatient service delivery (64%) than outpatient (59%) or emergency services (32%). In part, this is by design in the mixed provider payment system, as BHCS will support more outpatient and emergency services when fully implemented. However, these results demonstrate potentially inadequate inpatient financing, and it remains unclear if outpatient and emergency financing will be sufficient with BHCS. The higher coverage rates for inpatient care are notable as they could inappropriately incentivize providers to favor inpatient services instead of mechanisms to prioritize primary health care in the outpatient and community settings. Furthermore, neither HIP nor the basic package provide payments for community health service delivery, for example by community health workers, a key strategy endorsed by WHO to achieve UHC.(2) Moreover, as reimbursements for fee-for-service inpatient care provide a higher rate of coverage than bundled payments (Table 2) this may also distort how providers choose to provide inpatient care by incentivizing volume of services provided over more efficient and appropriate care.(26)

These dynamics are particularly relevant for private-sector providers empaneled in HIP as they are not eligible for BHCS and thus have an incentive for inpatient services over outpatient or emergency service delivery. Broadly, these dynamics are problematic as both the Nepal Sustainable Development Goals strategy(27) and the World Health Organization's primary health care strategy(2) aim to prioritize robust primary health care systems and avoid unnecessary hospitalizations and health care utilization .

In sum, our analysis offers insight into areas that HIP policy may improve to further optimize strategic purchasing in Nepal. We summarize learnings from the Bayalpata Hospital example with recommendations for policymakers to consider (Box).

Our analysis includes several limitations. First, Bayalpata Hospital operates through a PPP in which there are no user fees. In addition to government financing, Bayalpata receives additional external financing. As a single PPP facility, it is not necessarily representative of other facilities in Nepal. Accordingly, the generalizability of our data and implications should be interpreted with caution. Nonetheless, the mapping of costs to HIP's rate schedule are the first such data we are aware of, and our methodology and results are of potential relevance to policymakers.

Second, our costing analysis employed a top-down approach as opposed to measuring costs directly at the patient level. While this ensures inclusion of all costs incurred it limits specificity for certain aspects of care (e.g. specific diagnostic procedures or individual-patient level costs). Due to limitations in time and resources this methodology was most appropriate, however, more detailed analysis may be employed in future research.

Third, Bayalpata Hospital is likely more expensive than some other facilities in Nepal's health sector on a per capita basis. As it is a PPP, Bayalpata must ensure locally certain functions that other public-sector health facilities access via central government administration, including financial management, human resources, procurement, security, and maintenance. Additionally, Bayalpata provides some services that other facilities do not, including mobile health initiatives, electronic health records, and ongoing quality improvement and research initiatives. Finally, human resources costs, including salaries and benefits, are not completely aligned with government packages as PPP facilities cannot offer pensions and certain other government benefits, and for some roles, salaries are higher than in government facilities. Thus, it is possible that a portion of the difference between HIP payments and costs incurred are due to the higher cost structure of Bayalpata Hospital. Further research to elucidate costs at other facilities should be pursued (Box).

Conclusions:

Strategic purchasing offers an opportunity to advance progress towards UHC while also improving quality of health care service delivery, and Nepal's HIP provides an important foundation in these regards. Data analyzed from the first PPP hospital empaneled in HIP demonstrates early successes, and also provides insight into areas for further improvement in HIP structure and policy. Nepal's policymakers should consider these lessons as we collectively pursue better health for all citizens, and they may also be relevant in similar settings globally aiming to achieve UHC and higher quality health delivery.

Abbreviations

BHCS
Basic Health Care Services
HIP
health insurance program
NPR
Nepalese rupees
PPP
public-private partnership
UHC
universal health coverage
USD
United States dollar
WHO
World Health Organization

Declarations

Ethics approval and consent to participate:

Not applicable as no human subjects were involved in this study.

Consent for publication:

Not applicable

Availability of data and materials:

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests:

AA, DC, BD, SKD, BG, HG, SPK, NM, RM, PM, MP, AR, PR, SS, RShcheran, and BS are employed by, and PN, RSchwarz, BA, DB, NC, DM, DS, and EW work in partnership with a nonprofit healthcare company (Nyaya Health Nepal, with support from the US-based nonprofit, *Possible*) that delivers free healthcare in rural Nepal using funds from the Government of Nepal and other public, philanthropic, and private foundation sources. RSchwarz and DS are employed at an academic medical center (Brigham and Women's Hospital) that receives public sector research funding, as well as revenue through private sector fee-for-service medical transactions and private foundation grants. RSchwarz and DS are faculty members at a private medical school (Harvard Medical School). RSchwarz is employed at an academic medical center (Massachusetts General Hospital) that receives public sector research funding, as well as revenue through private sector fee-for-service medical transactions and private foundation grants. PN is a graduate student at a public university (University of North Carolina). BA is a faculty member at a public university (University of California, San Francisco). SRA is a faculty member at a public university (Tribhuvan University, Kathmandu, Nepal). DC, DM, and SS are faculty members at and NC is employed by a private medical school (Icahn School of Medicine at Mount Sinai). DC is a faculty member at and employed part-time at a public university (University of Washington). IB and MD are employed by the government of Nepal. BG, PR, and RS are fellows with a bidirectional fellowship program (HEAL Initiative) that is affiliated with a public university (University of California, San Francisco) that receives funding from public, philanthropic, and private foundation sources. SPK is a graduate student at a private university (Eastern University). DM is a non-voting member on *Possible's* Board of Directors, for which he receives no compensation. DS is employed at an academic medical center (Beth Israel Deaconess Medical Center) that receives public sector research funding, as well as revenue through private sector fee-for-service medical transactions and private foundation grants. DS is employed at an academic research center (Ariadne Labs) that is jointly supported by an academic medical center (Brigham and Women's Hospital) and a private university (Harvard T.H. Chan School of Public Health) via public sector research funding and private philanthropy. EW is employed at an academic medical center (University of Pittsburgh Medical Center) that receives public sector research funding, as well as revenue through private sector fee-for-service medical transactions and private foundation grants. All authors have read and understood Global Health Research and Policy's policy on declaration of interests, and declare that we have no competing financial interests.

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Figures

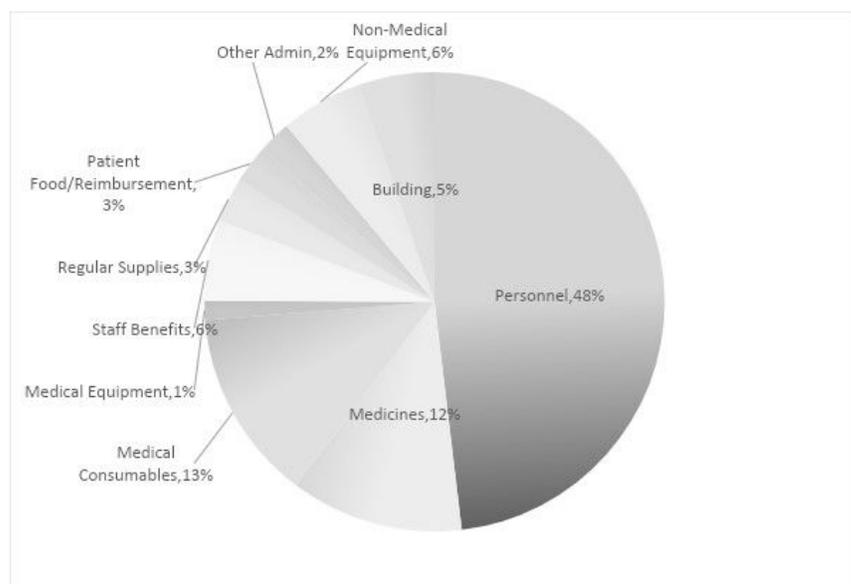


Figure 1

Overall Bayalpata Hospital costs, by expense type

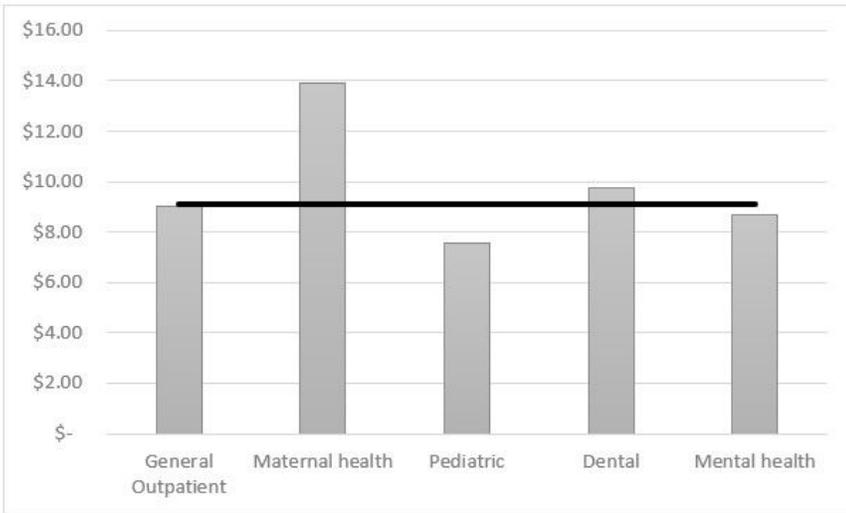


Figure 2

Outpatient visit costs at Bayalpata Hospital, per visit, per service. Average visit cost was \$9.12.

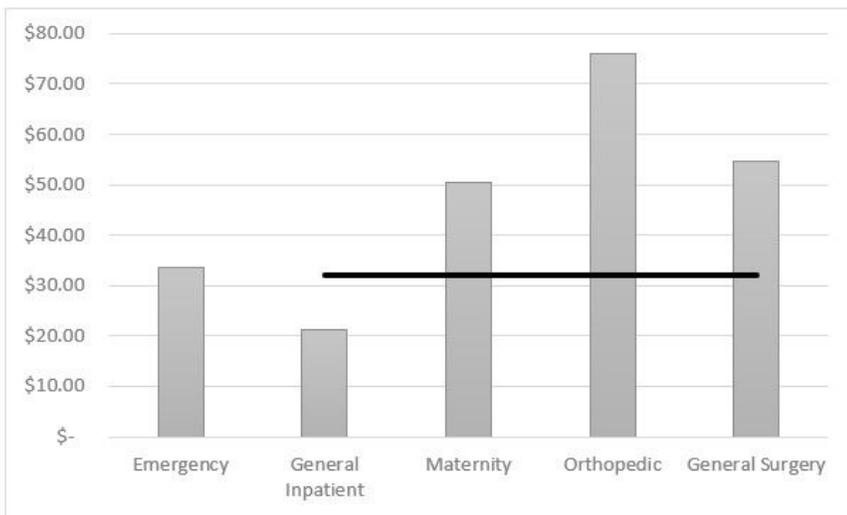


Figure 3

Outpatient visit costs at Bayalpata Hospital, per visit, per service. Average visit cost was \$9.12.

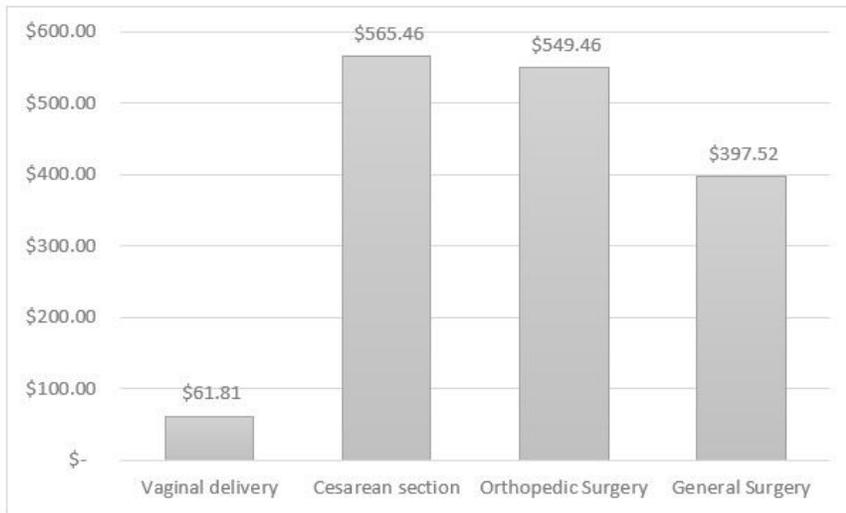


Figure 4

Average costs of major procedural hospitalizations (average total cost of procedure and hospitalization)

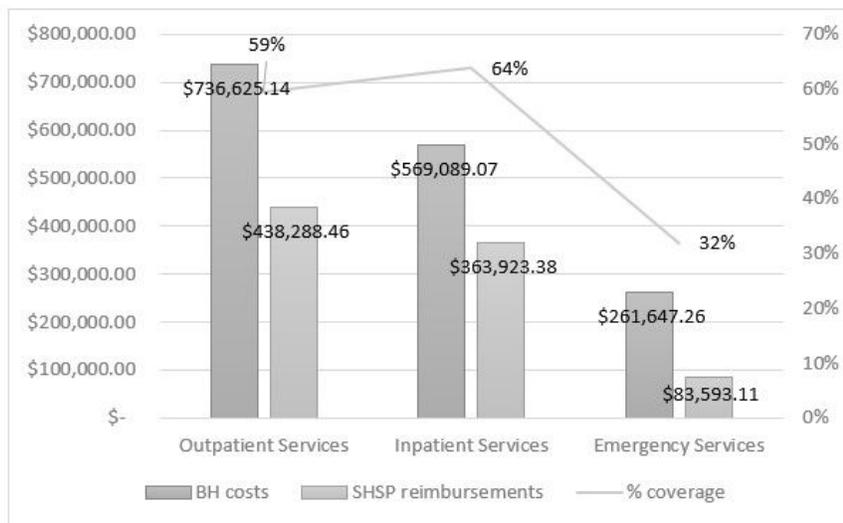


Figure 5

Comparison of Bayalpata Hospital costs relative to potential HIP payments, assuming full enrollment of catchment area