

Analysis of healthcare expenditure distribution and efficiency in Babil Women and Children Hospital, Iraq: a 2023 cross-sectional study

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ABSTRACT

Introduction: Iraq's healthcare system faces major challenges, including political instability, infrastructure decline, and uneven workforce distribution, which affect per-capita healthcare spending, especially in tertiary hospitals. Babil Women and Children Hospital offers specialised services but operates under financial limits, heavily burdened by high fixed costs.

Objective: This study aims to analyse the distribution of healthcare expenditure at Babil Women and Children Hospital in 2023 by evaluating departmental costs, workforce composition, and per-capita spending. The analysis seeks to identify inefficiencies in resource allocation and to provide evidence-based policy recommendations that support more efficient and sustainable healthcare delivery.

Methods: A descriptive cross-sectional analysis was conducted using data from retrospective administrative, financial, and human resource records for 2023 at Babil Hospital. The data included departmental expenditures, workforce distribution, and patient volumes. Per-capita healthcare expenditure for patients was calculated by dividing the total healthcare costs by the total number of patients. Descriptive statistics were performed using Microsoft Excel.

Results: Babil Women and Children Hospital served 135,945 patients in 2023, with total expenditures of approximately \$23.5 million USD. Salaries formed 74% of the budget, disproportionately higher than global low-middle income countries benchmarks. Nursing staff were the largest group, incurring the highest salary costs. Non-salary expenditures, including drugs and consumables, accounted for 19% of the budget, while capital investments accounted for only 2%. Departmental analysis revealed an extreme reliance on salaries, in particular delivery and operating rooms, which allocate over 85% of their budgets to personnel, leaving limited resources for critical supplies. Specialised units such as the Neonatal Care Unit and the Thalassemia Clinic had higher non-salary shares, but remain underfunded. High fixed personnel costs contribute to inefficiencies and increased out-of-pocket patient expenses.

Conclusion: Babil Women and Children Hospital's financial structure reflects systemic inefficiencies in Iraq's public healthcare, characterised by excessive salary burdens and underinvestment in medical supplies and infrastructure. Policy reforms optimising staff deployment, linking compensation to productivity, and increasing non-salary funding are essential to enhancing operational efficiency and service quality, and to reducing patient financial burden.

Key words: Health finance, healthcare expenditure, Babil, budget.

INTRODUCTION

The healthcare system in Iraq is continuously undergoing significant transformations, particularly within the development of tertiary hospitals, which serve as critical hubs for advanced medical care. Understanding the distribution of per-capita healthcare expenditure in these institutions is essential for assessing the overall efficiency and accessibility

of healthcare services.^[1]

Addressing these disparities requires a comprehensive approach that prioritises sustainable funding mechanisms, workforce development, and infrastructure improvements to enhance healthcare access and equity in Iraq and the broader region.^[2]

The distribution of per-capita healthcare expenditure across specialities, departments,



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inpatient wards, and employees in Iraqi tertiary hospitals is influenced by multiple factors, including economic, political, and social variables. The Iraqi healthcare system has been significantly affected by decades of conflict, leading to a decline in infrastructure and a shortage of healthcare professionals, which in turn impacts healthcare expenditure distribution.^[3,4] The uneven distribution of human resources, exacerbated by the migration of health professionals due to unsafe conditions and systemic corruption, further complicates the allocation of healthcare spending.^[5]

Estimates suggest that the healthcare expenditure is relatively low compared to other countries in the Middle East, often cited at around (200 - 300) \$ per capita annually. However, this estimate can vary depending on the source and specific circumstances within the healthcare system.^[6]

Table 1 shows an increasing trend in healthcare expenditure in Iraq, from \$53 in 2005 to \$255 in 2022, according to the World Health Organisation (WHO).^[7]

Healthcare spending in other countries of the Middle East:

1. Saudi Arabia: Saudi Arabia has higher per-capita healthcare spending due to the robust development of its healthcare infrastructure. Reports of the WHO indicate that the expenditure can reach approximately \$1,400–\$1,600 per capita annually. This is supported by the country's higher Gross Domestic Product (GDP) per capita, which allows for substantial investments in healthcare.^[8–10]

2. Jordan: Jordan's healthcare expenditure is generally lower than that of Saudi Arabia, with estimates around (200 - 400) \$ per capita annually.^[11] The country has maintained an efficient healthcare system despite economic

challenges.^[12,13] Although having a lower Gross Domestic Product, Jordan keeps its healthcare system relatively effective through both strategic resource allocation and international aid.^[14]

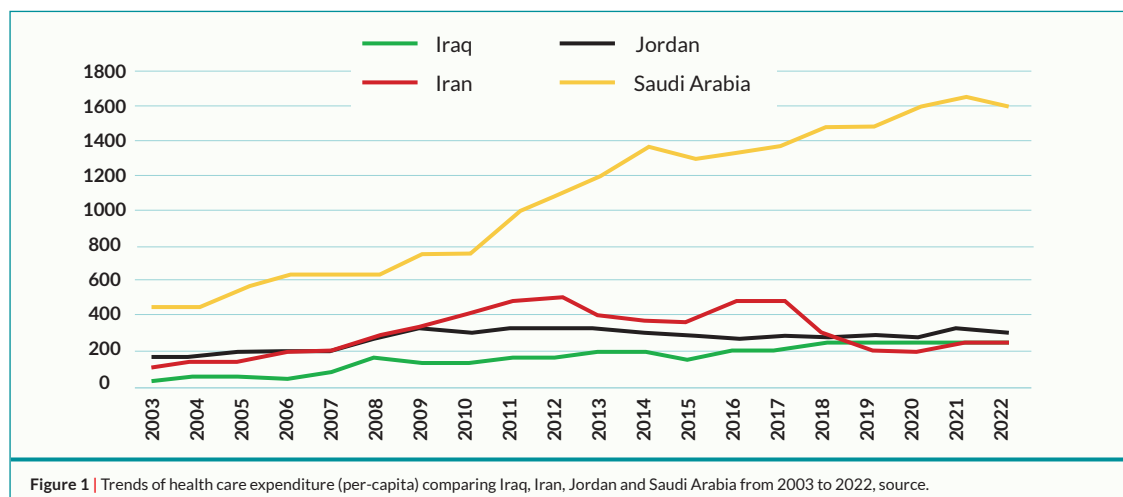
3. Iran: Iran faces challenges similar to those in Iraq, particularly high out-of-pocket expenditures and economic sanctions. Previous reports estimated the per-capita healthcare expenditure in Iran to be between (200 - 600) \$ annually,^[11] reflecting the strain on its healthcare resources.^[15] A 2023 cost-benefit analysis of a single Intensive Care Unit (ICU)—a tertiary-level service—in Iran during the COVID-19 pandemic (2020-2021) estimated the total cost of operating a 14-bed unit over one year at \$2,372,125.46. The study demonstrates the high cost of tertiary care; however, the findings are based on a single case study.^[16]

Figure 1 illustrates data published by the WHO that compare temporal trends in healthcare expenditure in Iraq from 2003 to 2022 with those in Iran, Jordan, and Saudi Arabia.^[11] This data reveals the changes in per-capita expenditure in these countries, with Iraq's expenditure increasing from \$26.9 to \$254.6, while Saudi Arabia's expenditure rose from \$457 to \$1593.

The economic disparities between these countries are reflected in their healthcare expenditures, with wealthier nations like Saudi Arabia spending more on healthcare due to their higher GDP per capita and strong public health investments.^[17] Additionally, the reliance on out-of-pocket expenditures in the Middle East, including Iraq, significantly impacts healthcare affordability and access, with lower-income households facing greater financial risks.^[15] Multiple sources state that Iraqi citizens pay for 48% to 81% of their healthcare costs directly,

Table 1 | Time-line of Iraqi Indicators of health care expenditure.

Indicator	2005	2010	2015	2019	2022
Current Health Expenditure per capita (CHE) (US\$)	53	145	149	242	255
General Government health Expenditure/Health spending (GGHE-D%CHE) (%)	67 %	73.5 %	23.2 %	49.4 %	50.9 %
Out-of-pocket spending/Health spending (OOPS%CHE) (%)	29 %	26 %	76.2 %	50.1 %	47.8 %
Priority to health (GGHE-D%GGE) (%)	3.2 %	4.8 %	1.7 %	6 %	5.8 %
GDP per capita (US \$)	1,759	4,462	4,724	5,646	5,931



indicating that official government expenditure is a small fraction of the total cost borne by patients.^[18,19]

Some published documents provide a “bottom-up” view, analysing costs at a specific hospital or for a specific service. This is the only context where “tertiary level” costs are explicitly mentioned, but they are not national averages. A WHO-CHOICE (Choosing Cost-Effective Interventions) document provides estimates for “cost per inpatient bed day.” While the data are from a 2010 model, it lists the mean cost per primary hospital bed day in Iraq as \$39.77 (in 2010 International Dollars). This document confirms that methodologies exist for such analysis, but they are not updated, although data for the tertiary level were publicly available.^[20] Unfortunately, not all the WHO “Health system response” indicators were reported to the WHO by the Iraqi authorities until 2019, such as “Population with catastrophic health expenditure” and “Population impoverished due to out-of-pocket health expenditure”, which may result in difficulties in the assessment of these indicators from unofficial data.^[21]

The political instability and security issues in Iraq further hinder the development of a cohesive national health policy, affecting the equitable distribution of healthcare resources.^[3,4] In contrast, countries with more stable political environments, like Saudi Arabia, can implement more effective healthcare policies and investments.^[14] The differences in

healthcare expenditure and resource allocation across these countries highlight the need for tailored policy interventions that consider each country’s unique socio-economic and political context to improve healthcare equity and efficiency.^[9]

This study aimed to analyse the distribution of healthcare expenditure at Babil Women and Children Hospital in 2023, focusing on departmental costs, workforce composition, and per-capita spending. The objectives are to identify inefficiencies and to inform policy recommendations for sustainable tertiary healthcare delivery.

METHODS

Study design: A descriptive cross-sectional study was conducted at the Babil Women and Children Hospital of the Babil Health Directorate in Iraq from 1 December 2024 to 30 June 2025 to analyse hospital administrative, financial, and human resource records for 2023.

Ethical Consideration: The research protocol was approved by the Ethical Research Committee of the Babil Health Directorate. The authors obtained the administration’s agreement for the Babil Women and Children Hospital.

Sampling: All hospital departments, comprising 12 distinct departments and 18 inpatient wards, that were operational during the study period were included in this study.

Table 2 | Expenditure of the Babil hospital per year 2023

	Iraqi Dinar (IQD)	US Dollar (\$)
Total expenditure	31,039,771,278	23,514,978
Total salaries	23,015,518,396	17,435,999
Per-capita expenditure on salaries	228,326	173
Per-capita expenditure without salaries	59,026	45

Data Collection: Data were extracted retrospectively from the hospital's administrative, financial, and human resources records for 2023.

Key Variables: Staff is distributed to doctors, nurses, and support staff. Total departmental cost (refers to the cumulative expenditure incurred by a specific department within an organisation). This includes all direct and indirect costs associated with the department's operations, such as salaries, materials, utilities, overheads, and other resources consumed in delivering departmental functions.^[22]

Number of patients served (refers to the total count of individual patients who receive healthcare services from a medical facility or department within a specified period).

Proportion of expenditure attributed to salaries (refers to the percentage of the total departmental or organisational expenditure that is allocated specifically to employee compensation, including wages, salaries, benefits, and related payroll costs).^[23]

KIMADIA supplies cost: KIMADIA is the Iraqi state-owned agency responsible for the procurement and supply of drugs and major medical supplies to public healthcare facilities. It manages the centralised purchase and distribution of essential pharmaceuticals and medical consumables.^[24]

Commodity Supplies costs (defined as the expenses incurred in procuring raw materials or basic goods that are essential inputs for production or trade. These costs encompass the purchase price of commodities, transportation, storage, and handling fees associated with making the commodities available for use).^[25,26]

Service Supplies cost refers to the expenses incurred for procuring the necessary materials, equipment, and consumables required

to deliver a specific service. These costs encompass all items directly used or consumed during service provision, excluding labour or overhead expenses.^[22,27]

Capital expenditures costs refer to the funds used by an organisation to acquire, upgrade, and maintain physical assets such as property, industrial buildings, or equipment. These expenditures are typically long-term investments intended to improve the productive capacity or extend the life of an asset.^[28]

Asset Maintenance costs refer to the expenditures incurred to preserve, repair, and ensure the continued functionality and efficiency of an organisation's physical assets, such as machinery, equipment, buildings, and infrastructure.^[29]

Data Analysis: Descriptive statistical methods were utilised to determine per capita healthcare expenditures (per capita healthcare expenditure = total expenditure costs/ the number of patients treated). This metric will facilitate a standardised evaluation of financial resource allocation per patient.^[30] Descriptive statistics were also employed to examine staff distribution, salary expenditures, and per capita

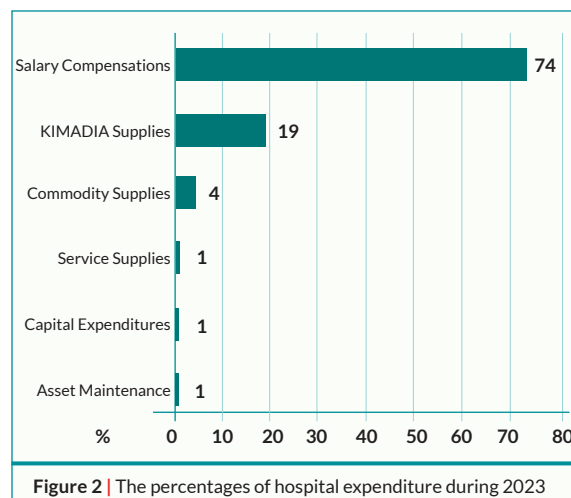


Table 3 | The working staff numbers and their total salaries

Staff	Number	Total Salaries
Doctors (Specialist doctors with consultants and residents)	172	2,083,510,087
Pharmacists	163	1,974,489,210
Nursing staff	610	7,389,192,748
Midwives	121	1,465,725,119
Other health staff	240	2,907,223,376
Administrator staff	247	2,992,017,391
Laboratory staff (Biology and others workers)	311	3,767,276,959
Diagnostic Radiology workers	36	436,083,506

Table 4 | Distribution of expenditure (IQD) according to the departments of the hospital

Department	Number of patients	Salaries of the workers	Total expenditure	Non-Salary share
Emergency	55,273	3,801,594,757	4,635,035,033	18.0%
Operation Room	8687	1,731,994,586	1,997,417,026	13.3%
Delivery Room	4963	1,954,115,353	2,298,608,162	10.2%
Inpatient Wards	37,934	12,126,115,341	17,118,456,001	15.4%
Consultation Clinics	22,804	1,834,189,807	3,125,375,287	46.8%
Neonatal Care Unit	6,284	1,567,508,552	1,864,879,769	44.3%

expenditure across departments. Analyses were conducted using Microsoft Excel (2024)

RESULTS

Babil Women and Children Hospital is a vital provider of specialised services in Babil governorate, with a capacity of 410 clinical beds, as evidenced by its high patient volume in 2023. Throughout the year, the institution served 135,945 patients. The total annual financial expenditure reached 31,039,771,278 Iraqi Dinar (IQD), equivalent to approximately \$23,514,978 USD. **Table 2**

Analysis of the hospital's total expenditure reveals that a significant portion (74%) was allocated to salaries, followed by KIMADIA supplies and commodity supplies. Capital expenditure includes expenditure on the purchase of durable equipment (medical, laboratory, machinery and equipment). (**Figure 2**).

Table 3 illustrates the composition and distribution of healthcare personnel within the hospital, along with their corresponding salary allocations. The nursing staff are the largest group and incurs the highest salary costs, followed by health staff and laboratory

personnel.

Table 4 shows the main areas of financial allocation, including salaries, the Emergency Room, Operating Room, Delivery Room, Inpatient Wards, Consultation Clinics, and the Neonatal Care Unit. In **Figure 3**, the significant portion of delivery room expenditures was found to be allocated to salaries, followed by inpatient wards.

Table 5 indicates that the paediatric wards treated the highest number of patients and incurred the greatest total expenditure, followed by the obstetrics and gynaecology units and the inborn neonatal care unit.

Table 6 presents the expenditure data for consultation clinics. The haematology clinic recorded the highest number of patients and the greatest overall expenditure. In contrast, the cardiology and infertility clinics, while serving fewer patients, exhibited the highest per-capita expenditure. (**Figure 4**).

DISCUSSION

Babil Women and Children Hospital's financial structure reveals a critical imbalance dominated by an excessively high salary expenditure, which accounts for 74% of the total

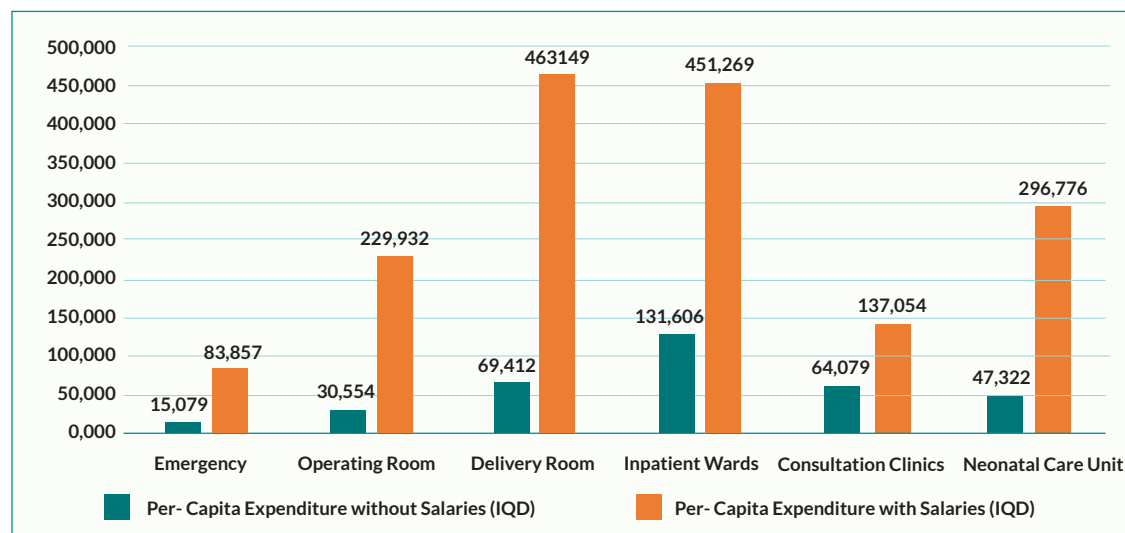


Figure 3 | Per-capita expenditure with and without salaries across the department of the hospital

Inpatient ward	Total Inpatients	Salaries of Health workers (IQD)	Total expenditure on the ward (IQD)
Paediatric Surgery unit	3,005	960,588,828	1,356,064,751
Paediatric Intensive Care unit	182	58,178,758	82,131,043
Inborn Neonatal care unit	5,928	1,894,965,249	2,675,125,407
Neonatal intensive care unit	89	28,450,052	40,162,983
Obstetrics and gynaecology units	11,719	3,746,136,597	5,288,426,896
Paediatric units	12,832	4,101,922,077	5,790,689,814
Nephrology unit	227	72,563,615	102,438,169
Infectious disease unit	1,270	405,972,649	573,112,224
Private wards unit	2,682	857,337,516	1,210,304,713
Total	37,934	12,126,115,341	17,118,456,001

budget, closely mirroring Iraq's national public health sector trend, where approximately 76% of government health spending is dedicated to employee compensation.^[20] This proportion far exceeds global benchmarks for Low and Middle-Income Countries (LMICs), where personnel costs typically account for only 25% to 33% of total health expenditure,^[31] severely limiting the hospital's operational flexibility. Low and Middle-Income Countries: are classified by the World Bank or similar international bodies based on gross national income per capita, representing nations with lower to middle economic development levels compared to high-income countries.^[32] As a result, only 19% of the budget is allocated to KIMADIA supplies for drugs and consumables, forcing the supplies budget to serve as the primary buffer against financial pressures and increased

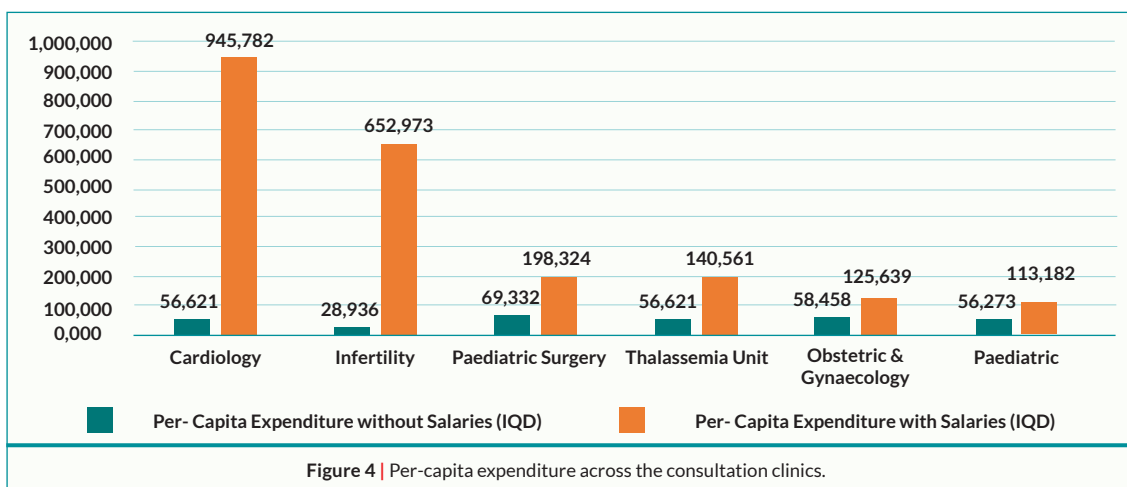
patient needs, thereby undermining the quality of care, especially in specialised and acute units. Additionally, a mere 2% of the budget is allocated to capital expenditure and asset maintenance, leading to rapid deterioration of infrastructure and medical technology and jeopardising complex services such as neonatal care.

The hospital's overall per-capita expenditure stands at 228,326 IQD (\$173 USD), including salaries, but drops sharply to 59,026 IQD (\$45 USD) when salaries are excluded, highlighting the limited resources available for variable, patient-centred services. This financial prioritisation secures employment entitlements but maintains health inequities by imposing high out-of-pocket (OOP) expenses on patients; in 2023, 12.6% of households

Table 6 | Spending on consultation clinics

Consultation clinic	Number of Patients	Salaries of the workers	Total expenditure
Cardiology clinic	23*	20,450,697	21,752,980
Paediatric surgery clinic	147	18,961,779	29,153,561
Infertility clinic	362	225,901,354	236,376,241
Obstetrics and gynaecology clinic	5,856	393,409,621	735,740,239
Paediatric clinic	7,491	426,305,728	847,849,137
Haematology clinic	8,925	749,160,627	1,254,503,128
Total	22,804	1,834,189,806	3,125,375,286

* The critically ill patients are served by the cardiology team at their place of admission

**Figure 4** | Per-capita expenditure across the consultation clinics.

in Iraq (including Babil Governorate) faced catastrophic health expenditures exceeding 40% of their capacity to pay.^[33] The hospital exemplifies unsustainable public-sector spending that prioritises personnel costs over critical service-delivery inputs, reflecting systemic failures in Iraq's public healthcare funding and policy alignment.

The salary burden is compounded by a structural imbalance in workforce composition: nursing staff constitutes the largest cadre with 610 workers receiving a total salary of IQD 7,389,192,748, necessitating a rigorous evaluation of deployment models, shift efficiency, and skill mix to ensure optimal patient care hours. Moreover, administrative and general health staff roles (487 positions) significantly outnumber medical staff (172 positions), suggesting that administrative bloat is common in public institutions with politically mandated employment guarantees, thereby reducing institutional efficiency. This results in the hospital incurring substantial fixed human capital costs for 1,690 staff, yet this capacity

may not translate into equivalent service delivery hours. Policy modelling indicates that linking wages to contracted work hours and increasing public wages could improve health workers' productivity, allowing the Ministry of Health to maintain service volume with fewer health workers, thereby reducing the salary burden while enhancing care quality.^[34] The current high salary allocation risks paying for underutilised capacity, compounding inefficiencies and crowding out operational budgets.

An analysis of department-level expenditure reveals extreme reliance on personnel costs. The Delivery Room has the highest per-capita cost at IQD 463,149 but the lowest non-salary share of only 10.2%, leaving virtually no budgetary buffer for critical supplies needed during obstetrical emergencies, such as massive haemorrhage management or immediate C-section consumables. This operational starvation poses unacceptable clinical and legal risks, as fixed staff costs crowd out essential flexible resources for maternal

and neonatal safety. Similarly, the Operation Room spends over 86% of its budget on staff, with a non-salary share of only 13.3%, thereby limiting the availability of sterile supplies, specialised instruments, and anaesthetic agents. This restricts surgical volume, delays elective procedures, and forces patients or families to purchase necessary supplies, exacerbating the cycle of catastrophic health expenditures. In contrast, the Neonatal Care Unit (NCU) displays notably higher non-salary per-capita spending (IQD 131,606) and a 44.3% non-salary share, reflecting the high technical complexity and resource intensity of intensive care services, which require specialised monitoring equipment, costly pharmaceuticals, and controlled environments such as incubators. The nearly 50/50 cost split in the NCU underscores that highly specialised, technology-dependent units must overcome the general 74% salary barrier to maintain operational efficacy.

Consultation Clinics (CC), particularly the Thalassemia Unit, also demonstrate a high non-salary share of 46.8%, driven by the management of pharmacologically and transfusion-dependent chronic diseases. The Thalassemia Unit incurred over IQD 1.25 billion in total expenditure for 8,925 patients, placing significant strain on the hospital's overall 19% KIMADIA budget and underscoring the need for a robust, continuous, high-cost supply chain.

The Inpatient Wards (IPW) represent the largest total expenditure at IQD 17.1 billion but have a non-salary share of only 15.4%, indicating that over 84% of costs are fixed personnel expenses. This suggests that efficiency improvements should focus on patient flow management and reducing length of stay to maximise throughput relative to the substantial fixed salary costs. The Emergency Room (ER), despite its high patient volume (55,273 patients) and the lowest total per-capita cost (IQD 83,857), maintains a low non-salary share of 18.0%, indicating limited budgetary capacity for advanced diagnostics or imaging, which may lead to inefficient downstream processes and delays in emergency care.

Overall, Babil Hospital's financial and

operational challenges are deeply influenced by Iraq's broader fiscal rigidities, institutional constraints, and political economy factors, including extensive entitlement programs for civil servants. The large fixed wage bill restricts budgetary flexibility and hampers the government's ability to reallocate funds or improve spending efficiency, as funding is often secured independent of performance outcomes.^[20] This results in persistent underinvestment in essential medical supplies, infrastructure maintenance, and technology, which undermines service quality and patient safety. The hospital's experience reflects systemic issues in public healthcare financing in Iraq, where prioritising personnel costs over critical inputs perpetuates health inequities by shifting financial burdens onto patients through high out-of-pocket payments. Addressing these imbalances requires policy reforms that target wage structures and staff deployment, and that link compensation to productivity, alongside increased investment in operational resources to ensure sustainable, high-quality care delivery.

CONCLUSION

The analysis of Babil Women and Children Hospital's 2023 financial data reveals a critical imbalance in resource allocation, with an overwhelming 74% of the budget dedicated to salaries. This unbalanced expenditure limits funding for essential medical supplies, capital investment, and operational flexibility, thereby undermining the quality and efficiency of healthcare services. High fixed personnel costs, combined with a staff composition skewed towards administrative roles, contribute to inefficiencies and restrict the hospital's capacity to respond to patient needs effectively. Department-level expenditures demonstrate that specialised units with high technical demands, such as the Neonatal Care Unit and Thalassemia Clinic, require greater non-salary funding to maintain service quality, yet overall non-salary shares remain low. The hospital's financial structure reflects broader systemic challenges in Iraq's public healthcare sector, including rigid wage policies and

political constraints that prioritise employment over performance. This situation creates health inequities by increasing patients' out-of-pocket costs and limiting investment in critical care inputs. Addressing these issues requires comprehensive policy reforms to optimise staff deployment, link compensation to productivity, and increase investment in medical supplies and infrastructure to ensure sustainable, high-quality tertiary healthcare delivery.

RECOMMENDATIONS

1. Conducting a thorough review of staff roles and distribution to reduce administrative bloat and better align workforce composition with clinical needs. Prioritise increasing the proportion of medical staff relative to administrative personnel to enhance operational efficiency and patient care.
2. Implementation of policies that connect wages to contracted work hours and measurable productivity. This approach can improve health worker efficiency, reduce underutilised capacity, and maintain service volume with fewer staff, thereby lowering the fixed salary burden.
3. Rebalance the budget to allocate a larger share of resources toward essential medical supplies, consumables, and capital investments. This is critical for specialised, resource-intensive units such as the Neonatal Care Unit and the Thalassemia Clinic to maintain high-quality service delivery.
4. Allocate sufficient funds for infrastructure upkeep and procurement of medical and laboratory equipment. Preventing deterioration of facilities and technology is essential to support complex tertiary care services and ensure patient safety.
5. Focus on strategies to reduce length of stay and optimise patient throughput, especially in inpatient wards where fixed personnel costs dominate. Efficient patient management can maximise the use of existing human resources.
6. Advocate for policy reforms at the national level to address rigid wage structures and political constraints that prioritise

employment over performance. Sustainable funding should support flexible resource allocation and incentivise quality care.

7. Implementation of measures to lower the financial burden on patients, such as improving supply chain management to reduce the need for patients to purchase essential medical supplies. This will help mitigate health inequities linked to catastrophic health expenditures.
8. Ensure a continuous, reliable supply of pharmaceuticals and consumables for chronic disease units, such as the Thalassemia Clinic, recognising their significant impact on hospital budgets and patient outcomes.

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Abbreviations list: Consultation Clinics (CC), Current Health Expenditure per capita (CHE), Emergency Room (ER), Gross Domestic Product (GDP), Inpatient Wards (IPW), Iraqi Dinar (IQD), Low and Middle-Income Countries (LMICs), Neonatal Care Unit (NCU), Out-of-pocket (OOP), United States of America (USA)

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