IN-PATIENT REVENUE ANALYSIS

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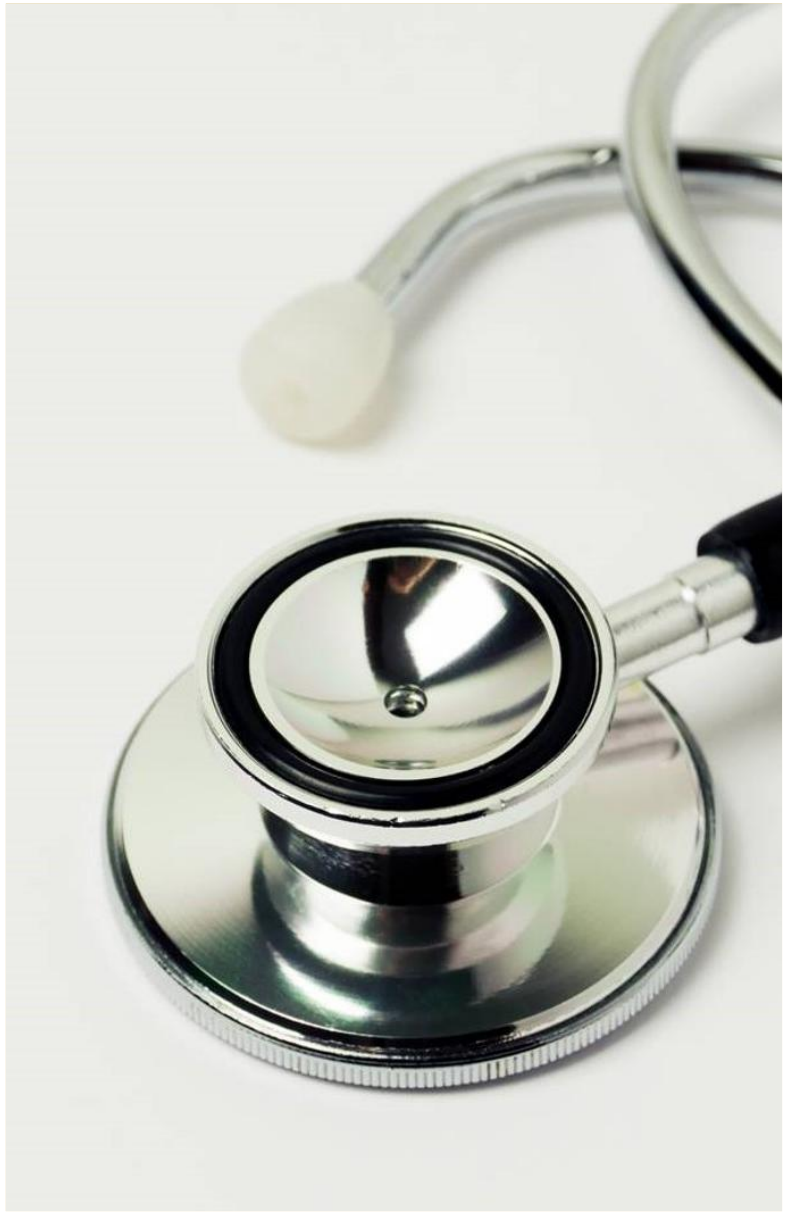
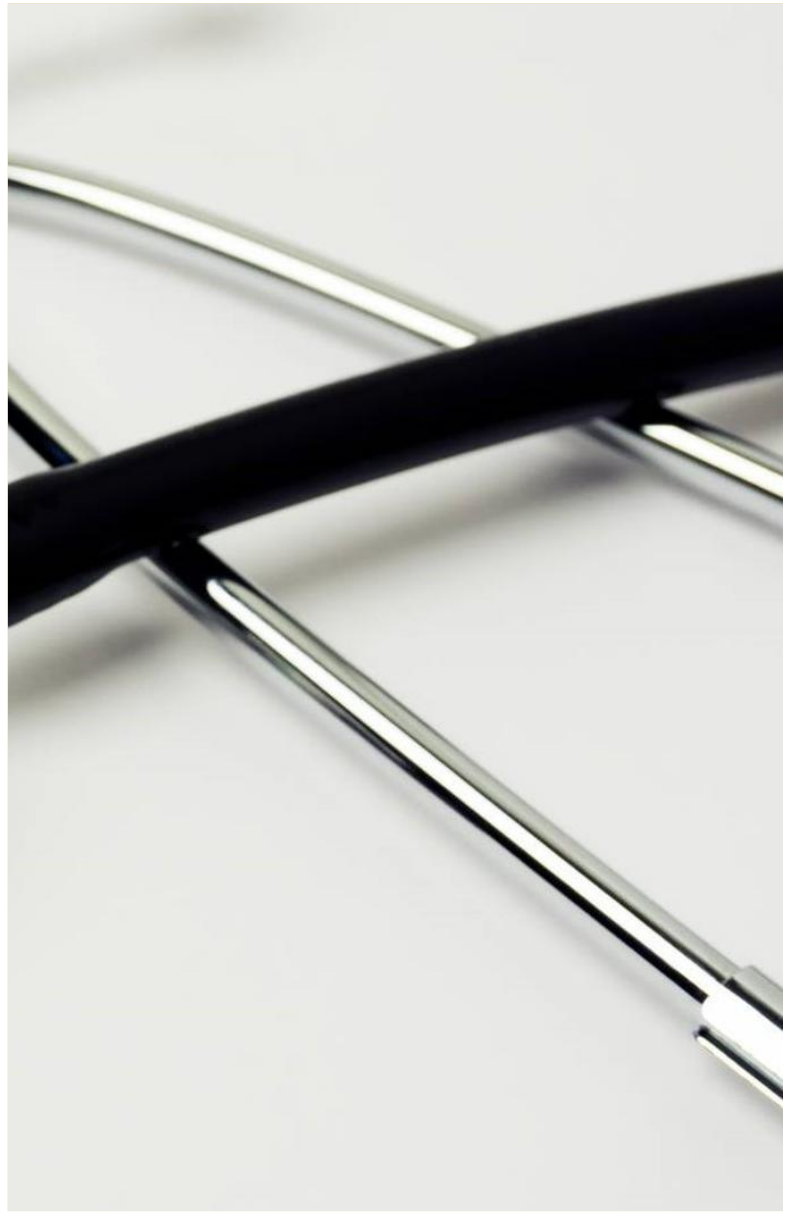




INTRODUCTION

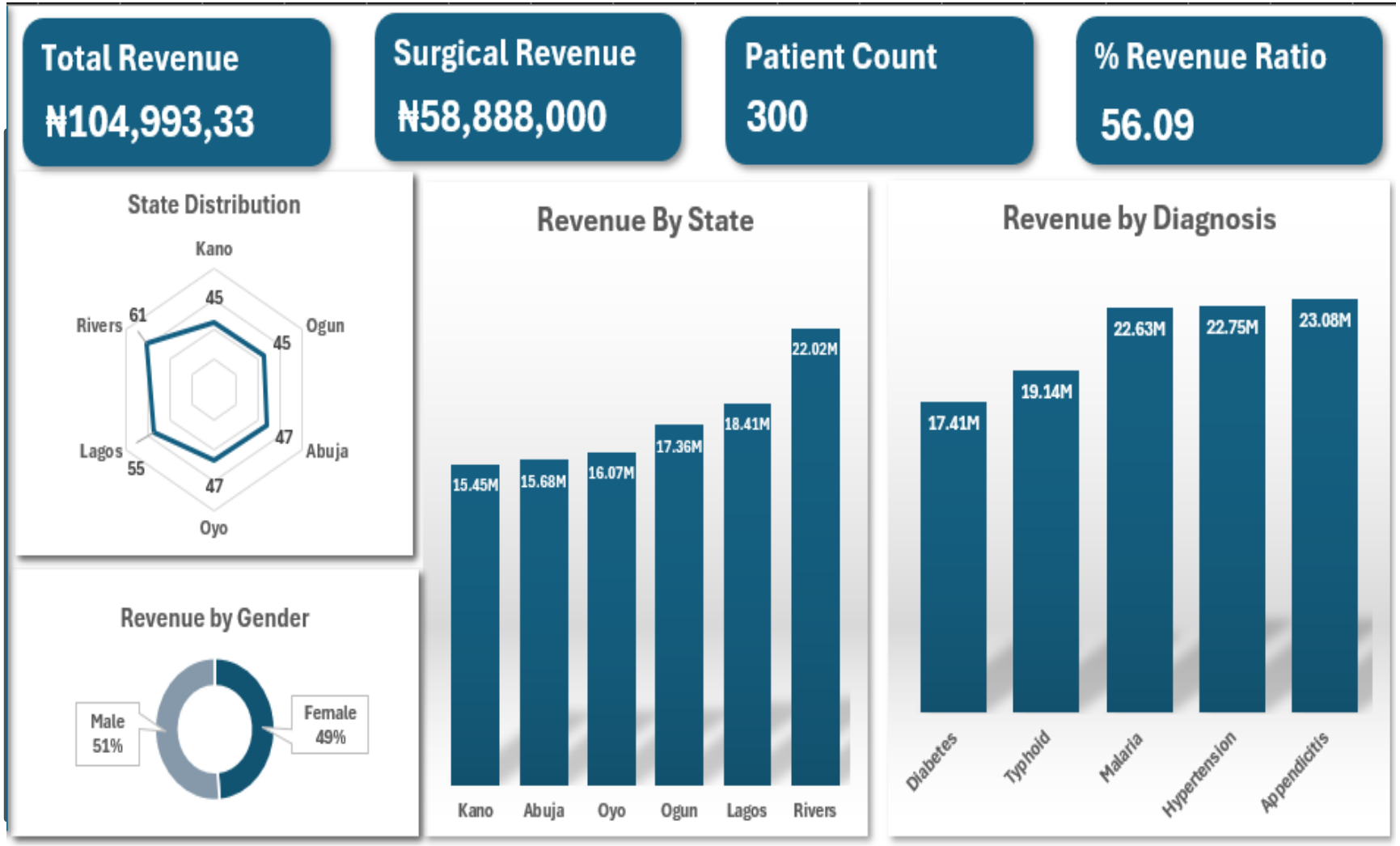
Amand Hospital is a multi-location healthcare organization in Nigeria providing inpatient services for both surgical and non-surgical cases. This project analyzes the hospital's billing data to identify potential revenue leakages and evaluate the impact of surgical procedures on overall revenue.

The objective is to uncover billing inefficiencies and generate actionable insights that support stronger financial control and more informed operational decision-making.

BUSINESS PROBLEM

Analyzing hospital billing data to identify revenue leakage and assess the contribution of surgical procedures to overall revenue performance.

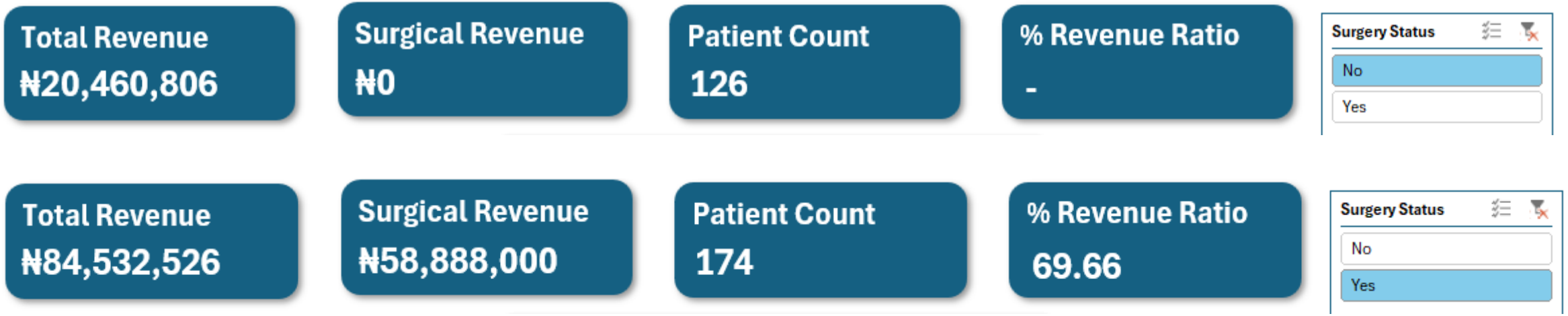
REVENUE ANALYSIS - This suggests that procedure type and cost intensity, rather than patient volume alone, are key drivers of hospital revenue.



INSIGHTS

- Surgical procedures contributed 56% of total hospital revenue (₦104M), confirming surgery as the primary revenue driver.
- Rivers State generated the highest revenue at ₦22M.
- Patient distribution shows Rivers State (61 patients) had the highest admissions, followed by Lagos (55) and Oyo (47), while Kano recorded the lowest (45).
- Revenue generation does not directly correlate with patient volume, as observed in Ogun State, which generated relatively high revenue despite fewer patient.
- Appendicitis was the highest revenue-generating diagnosis at ₦23M, while Diabetes generated the lowest revenue at ₦17M, reflecting differences in treatment complexity and surgical involvement.
- Gender distribution was nearly balanced, with 51% male and 49% female patients, indicating minimal gender bias in hospital utilization.

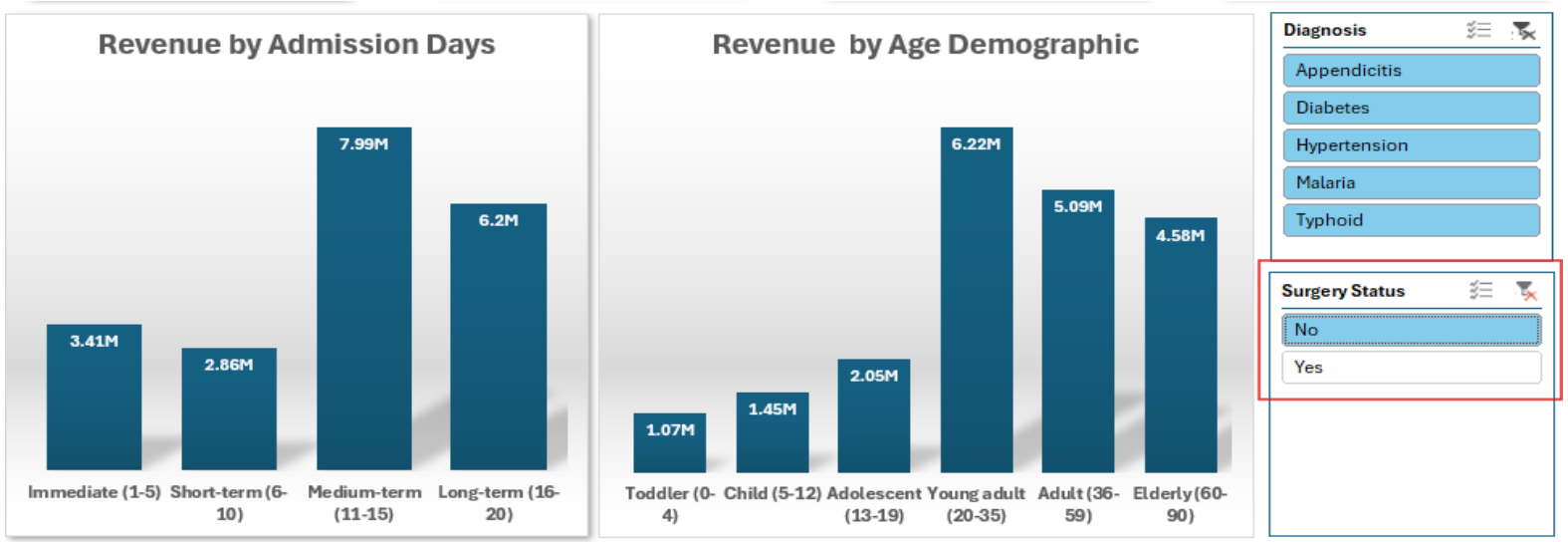
SURGICAL REVENUE VS TOTAL REVENUE - Which is the revenue generator?

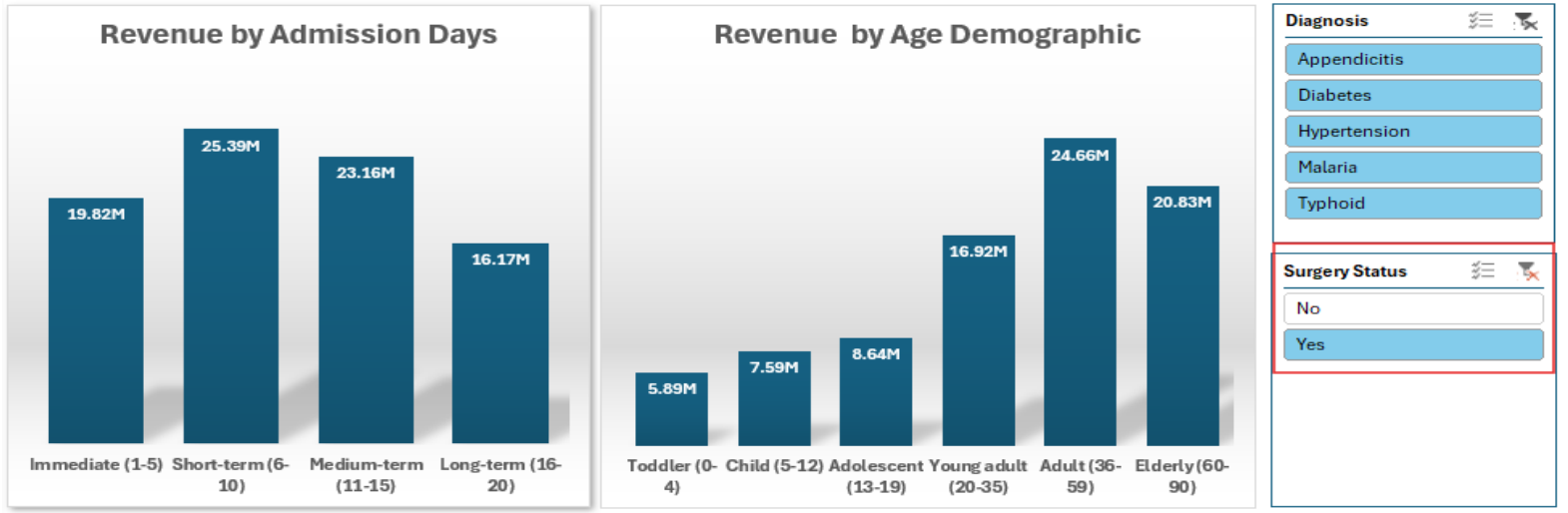


INSIGHTS

- Surgical Procedures Contribute Significantly to Revenue -The data shows that in surgical admissions, the surgical revenue makes up approx. 70% of the organization's total revenue. This suggests that surgical services are a major driver of the organization's overall financial performance.
- Increased Surgical Volume Correlates to Higher Revenues - The analysis indicates that a higher proportion of patients received surgical treatment. This implies that performing more surgical procedures is associated with generating greater revenue compared to regular inpatient admissions.

SURGICAL ADMISSIONS VS NON-SURGICAL ADMISSIONS - Which is the revenue generator?





INSIGHTS

Non-surgical cases

- Based on admission length, medium-term admissions generated the highest revenue (₦8M), followed by long-term (₦6.2M), immediate (₦3.4M), and short-term cases (₦2.6M). This means that increase in admission days can increase the revenue generated.
- By age demographic, young adults generated the highest revenue (₦6.2M), while toddlers contributed the least (₦1M).

Surgical Cases

- Short-term surgical admissions generated the highest revenue (₦25M), followed by medium-term (₦23M), immediate (₦19M), and long-term cases (₦16M). In this case, shorter stays are more beneficial for the organization than longer stay.
- From an age perspective, adults and Elderly were the top revenue contributors, with toddlers contributing the least (₦5.9M).

AGE DEMOGRAPHY VS DIAGNOSIS – What's the trend?

Surgery Status	No					
Age Demographic by Diagnosis (Revenue)						
Sum of Bill_Amount_NGN	Diagnosis					
Age_Demographic	Appendicitis	Typhoid	Malaria	Hypertension	Diabetes	Grand Total
Toddler (0-4)	.45M	.16M	.47M			1.07M
Child (5-12)	.48M	.36M	.61M			1.45M
Adolescent (13-19)	.41M	.18M		.76M	.71M	2.05M
Young adult (20-35)	1.25M	2.28M	1.17M	.55M	.97M	6.22M
Adult (36-59)	1.18M	.67M	.83M	1.24M	1.16M	5.09M
Elderly (60-90)	1.05M	.89M	1.15M	.97M	.53M	4.58M
Grand Total	**4.81M**	**4.53M**	**4.22M**	**3.52M**	**3.37M**	**20.46M**

Surgery Status	Yes					
Age Demographic by Diagnosis (Revenue)						
Sum of Bill_Amount_NGN	Diagnosis					
Age_Demographic	Hypertension	Malaria	Appendicitis	Typhoid	Diabetes	Grand Total
Toddler (0-4)	1.21M	1.61M	1.83M	1.24M		5.89M
Child (5-12)	1.47M	2.12M	1.92M	1.21M	.88M	7.59M
Adolescent (13-19)	1.17M	2.75M	1.26M	2.12M	1.34M	8.64M
Young adult (20-35)	2.61M	.97M	4.7M	3.54M	5.09M	16.92M
Adult (36-59)	7.11M	4.15M	4.14M	4.34M	4.9M	24.66M
Elderly (60-90)	5.65M	6.8M	4.41M	2.16M	1.82M	20.83M
Grand Total	**19.22M**	**18.41M**	**18.26M**	**14.61M**	**14.03M**	**84.53M**

INSIGHTS

Non-surgical cases

- Revenue increases progressively across age groups, peaking in young adults, indicating higher healthcare utilization and treatment intensity within this demographic.
- Based on diagnosis, Appendicitis generated the highest revenue (₦4.81M) then Typhoid (₦4.53M) and followed by Malaria (₦4.22M).

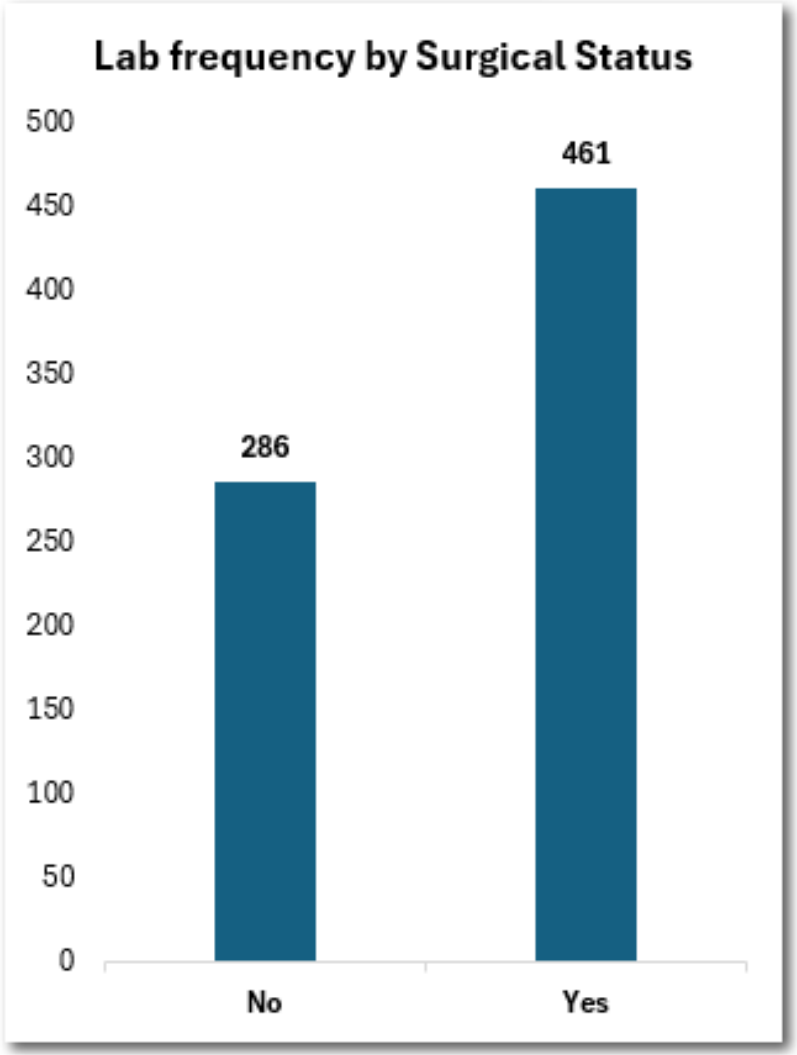
Surgical Cases

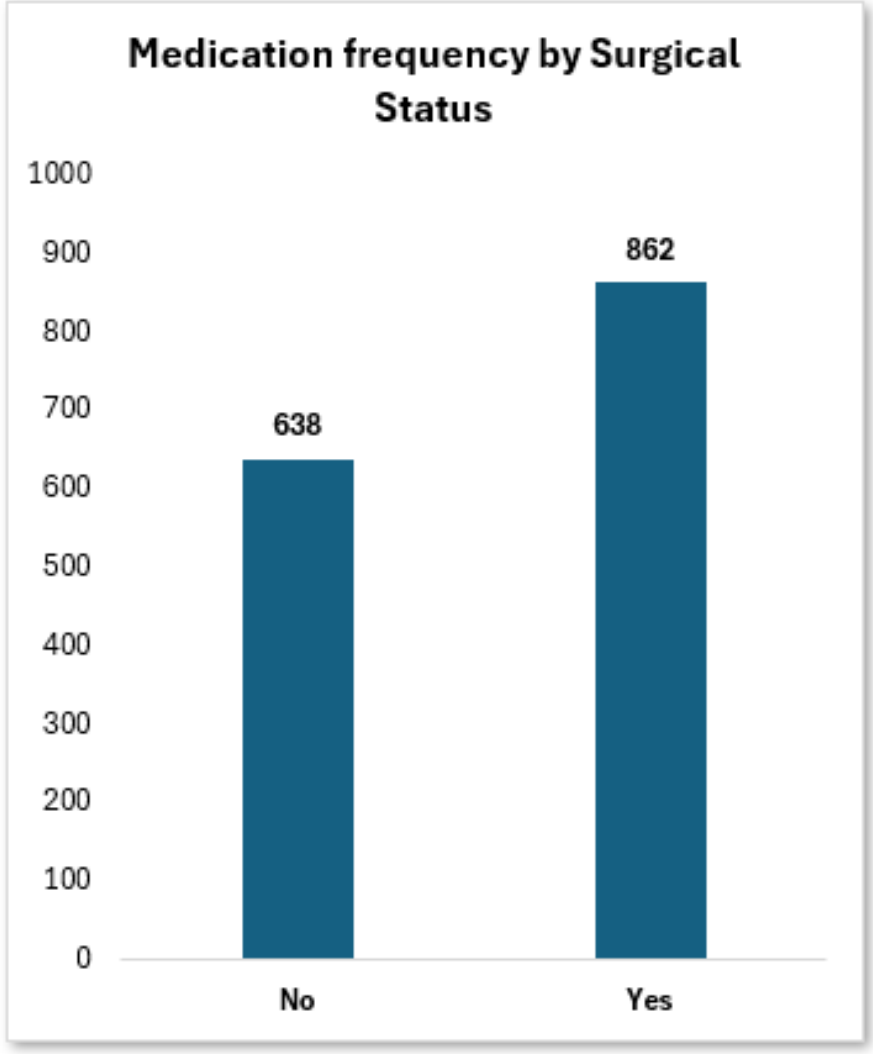
- Surgical revenue rises steadily from pediatric to adult age groups, peaking from young adults to elderly, reflecting higher incidence of surgery-driven diagnoses within these populations.
- Based on diagnosis, Hypertension generated the highest revenue (₦19.2M), then Malaria (₦18.4M) with the least being Diabetes(₦14M).

WHICH AGE DEMOGRAPHICS CONTRIBUTE MOST TO SURGICAL AND NON-SURGICAL REVENUE?

These trends suggest that adult and young adult populations are the primary drivers of both surgical and non-surgical revenue, while elderly care may require alternative cost-recovery or subsidy strategies.

LAB & MEDICATION FREQUENCY – Do they impact revenue?





INSIGHTS

- Surgery-driven admissions generate higher revenue not only from procedures but also from associated lab investigations amplifying total billing per patient.
- Increased medication usage in surgical admissions further elevates total billing, positioning medications as a secondary revenue driver after surgery.

ANOMALY DETECTION

The table highlights several patient cases where the "% Revenue Ratio" exceeds 100%, indicating that the Surgical Cost is higher than the total Bill Amount. This suggests potential data quality issues or billing irregularities.

Anomaly_Detection	Anomaly detected		
Anomaly_Detection			
Patient_ID	Surgery_Cost	Bill_Amount	% Revenue Ratio
HOSP-ID-1039	700,000	360,000	194
HOSP-ID-1060	420,000	240,000	175
HOSP-ID-1082	150,000	90,000	167
HOSP-ID-1094	613,000	360,000	170
HOSP-ID-1139	598,000	360,000	166
HOSP-ID-1158	160,000	90,000	178
HOSP-ID-1264	607,000	360,000	169
HOSP-ID-1269	280,000	150,000	187
HOSP-ID-1299	160,000	90,000	178

HOW CAN THE ANOMALY BE ADDRESSED?

- Reviewing the billing and payment records for these patients to verify the accuracy of the data.
- Confirming discounts approval or co-payment processes that could explain the high revenue ratios.
- Identifying any potential systemic issues or gaps in the hospital's revenue management processes that may be contributing to these anomalies.

FINAL TIPS & KEY TAKEAWAYS

- Procedure type and cost intensity, rather than patient volume alone, are the primary drivers of hospital revenue.
- Surgical cases contribute disproportionately to total revenue, with short-term surgical admissions generating the highest returns, indicating that procedure intensity outweighs length of stay.
- Revenue contribution increases with patient age, as adult and young adult groups are more likely to require complex, higher-cost interventions, with a decline observed in the elderly population.
- These findings suggest that hospitals should prioritize surgical efficiency and strategically focus on adult and young adult care pathways to optimize revenue performance while reassessing cost recovery approaches for elderly care.
- Growth in surgical admissions leads to increased consumption of medications and laboratory services, making surgery a key multiplier of ancillary revenue.

RECOMMENDATIONS

Address the potential revenue leakage or billing control gaps by capturing adjustment details within the dataset. This will strengthen financial transparency and analytical reliability.

Focus on increasing the number of surgeries performed, as this will directly relate to an increase in revenue.

Optimize short treatment days, as longer lengths of stay do not directly relate to higher revenue, especially in non-surgical cases. This can help increase revenue and reduce cost per patient.

LIMITATIONS

Some surgical costs exceeded the total billed amount, indicating potential billing anomalies or undocumented adjustments. These discrepancies should be properly documented within the dataset to improve data accuracy and prevent ambiguity in future analyses.

THANK YOU

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Email

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Portfolio