Increasing the efficacy of Decision Making and Perfecting the Information collection and Analysis System by Developing A Hospital Wide Revenue Dashboard

Presented By

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Abstract

Research Problem –

How to Improve the decision-making process of the hospital by perfecting data analysis by creating Dashboards according to the hospital environment?

Methodology –

A software named *Charak* was already being used to collect data from various departments of the hospital. Dashboards were created in macro enabled excel for various departments. Cleaned data extracted from *Charak* was required to be fed to a completely automized dashboard which was created to facilitate better understanding of the revenue related data and ensure better decision making based on the analysis.
These dashboards were fully automated to produce accurate and real time data for comparisons and analysis and showcased data in form of various graphs and calculates figures.

3) Key Results –

Hospital-wide dashboards were created which would work because it did not put any extra burden on staff members for data collection as the data required by the dashboards to produce visual information was already being collected in *Charak*. These dashboards were fully automized to show any data put into it in the form of predefined graphs and filters.

(4) Conclusion –

When Decisions are taken based on primary or secondary experience of intuition, without the use of any Business Intelligence Tool, it results in a lack of authentic and proven basis in internal and external data. There are usually not many ways of accessing, Monitoring, and evaluating the validity of such decisions creating a blind loop of poor decision making.

Introduction

Healthcare is a sector with exponential growth, making it one of the largest industries in the world with enormous impact on countries' economy. However, like all other institutions, healthcare organizations are at the mercy of the unstable environment of external factors such as technological advances. For these reasons and due to this impact on the healthcare system at the level of effectiveness it is necessary that hospitals constantly improve their performance.

Therefore, to improve performance, it is necessary to measure and evaluate it, so that it is possible to allow healthcare organizations to define strategies to achieve hospitals' goals.

The strategic objectives of healthcare organizations are difficult to achieve given their complexity. The data volume is increasing due to more than 20 years of electronic storage of patients' data, with the Hospital Information System (HIS) being able to store and subsequently provide useful information throughout the hospital's medical history. The impact of the introduction of information and communications technology (ICT) in the multifaceted health sector is well known and acknowledged by health stakeholders who have witnessed the role of ICTs in diverse levels in hospital organization.

Business Intelligence (BI) is a valuable asset in today's organizations, having a direct impact on the following aspects: providing data visualization tools, improving organizational decisions, supporting analysis of breaking organizational information barriers, influencing strategic business decisions, and helping to give meaning to organizational data.

When designed to measure performance and backed by a business-oriented BI infrastructure, dashboards enable health managers to be able to measure performance, monitor KPI by preventing deviations, understand undesirable behaviors and redefine the trajectory of the objectives.
The dashboard is a mechanism that effectively and efficiently aggregates relevant information to be explored through three tasks:

1. Monitor
2. Analyze and
3. Manage

Currently, the growing need for hospital organization to have valid and reliable tools that help in the process of analyzing and evaluating the services provided to patients plus the need to have adequate and available information to facilitate measurement of the productivity of hospital organization call for further investigation in this domain.

Company Profile

About Regency Medical Center

Regency Medical Center is a 100 bedded, multi-specialty hospital located on Aly Khan Road, Dar Es Salaam, Tanzania. It was established in 1999 by the founder and Chairman Dr. Rajni Kanabar.

Their vision is to make specialized medical services available to all on an equitable basis. They believe health care should be affordable and comprehensive for everyone, and physically accessible where and when needed.
Regency Medical Center is an NHIF accredited hospital and provides all facilities under this scheme.

National Health Insurance Fund (NHIF)

NHIF is a social health insurance scheme which ensures healthcare service availability to all Tanzanians. NHIF registered beneficiaries can easily avail health care facilities in any accredited hospital in Tanzania.

Research Methodology

Key Research Question –

How to Improve the decision-making process of the hospital and perfecting data analysis by creating Dashboards according to the hospital environment?

The research design – Qualitative and Descriptive

Data Collection Tools –

Tool used to collect data – *Charak*, a specially customized software with various level of accessibility to different staff members.
Tool used to make Dashboard – Microsoft Excel

Study Setting- Regency Medical Centre, Dar Es Salaam, Tanzania

Data Collection and Analysis

Data collection and analysis was done in the following steps: -

1. Data Inventory
2. Dashboard Content
3. Dashboard design
4. Improving Dashboard flexibility and connectivity

Data Inventory

A software named *Charak* was already being used to collect data from various departments of the hospital. Dashboards were required to be made in such a way so that the information which was already being collected could be used and understood in a better way. Cleaned data was to be taken from *Charak* and fed to a completely automized dashboard which was created by me to facilitate better understanding of the revenue related data and ensure better decision making based on the analysis. The challenge here is not to increase the burden on the internal and external stakeholders in the process of collecting the quantitative data required for the dashboard.

Dashboard Content

A better way of data analysis and real time availability of data was in urgent demand and various methods were sought to achieve a solution to get closest to the requirement. First KPIs were determined to understand the indicators having a direct effect on the revenue-based performance of various department and doctors of the hospital.

Utilization Statistics
Visiting Staff
Inpatient Surgeries
Outpatient Surgeries
Natural Births
Cesarean Sections
Micellaneous
Reffered O/P Visits
I/P Surgeries
O/P Surgeries
Home Medical Visits

Direct Expenses
Salaries and Wages
Employee Benefits
lease/Rent
water
electricity
Daily Hospital Services
Insurance
Depreciation
miscellaneous
Overall Referral Rate
Overall discharge Rate
Proportion of NHIF patient in hospital
Bed Occupancy Rate
IPD per thousand population
OPD consultation per Thousand Population
Bed Occupancy Rate
No. of total admissions per thousand population
Deductions from revenue

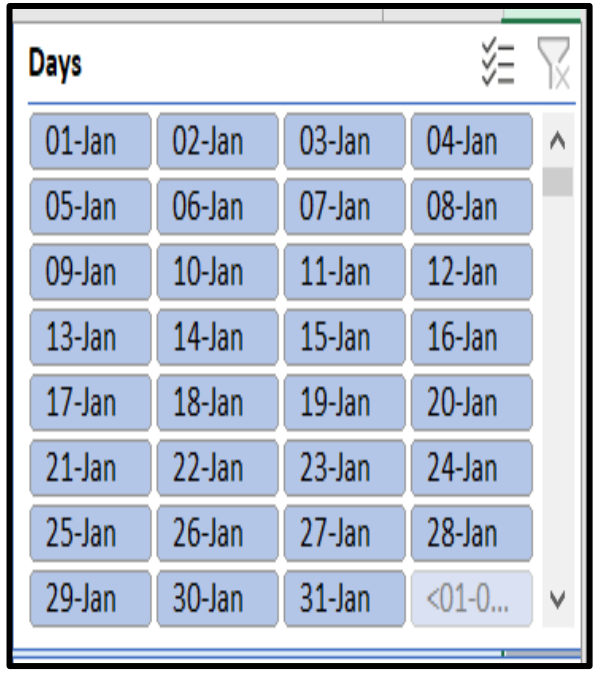
	Financial and Utilization Data by Payer Category
Adjusted Patient Days	Patient Days
	Discharges
	Avg Length of Stay
	Outpatients Visits
Gross Patient Revenue	Gross Inpatient Revenue
	Gross Outpatient Revenue
	Expenses
	Refferal Rate
	Gross Inpatient Revenue P/D
	Gross Inpatient Revenue P/Discharge
	Net Inpatient Revenue P/D
	Net Inpatient Revenue P/Discharge
	Net Outpatient Revenue P/Visit
	Payment Shortfall
	Abscounding Rate

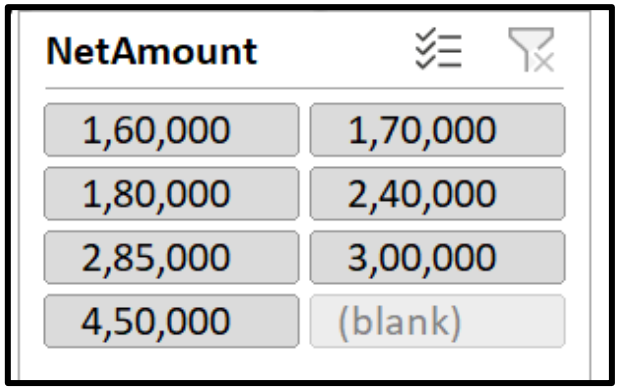
Out of these the following main were selected: -

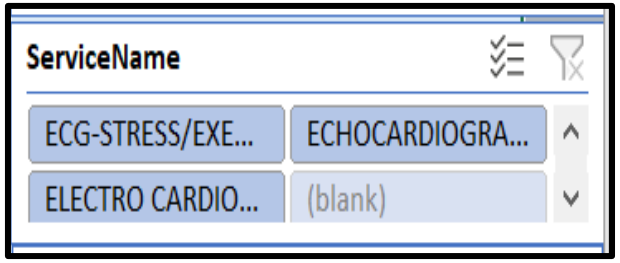
1. Revenue generated per Doctor
2. Revenue generated per Type of Payor
3. Revenue generated per Day
4. Revenue generated per Clinical Procedure

These main data figures were followed to analyze the revenue generated in the hospital with the help of the dashboards created.

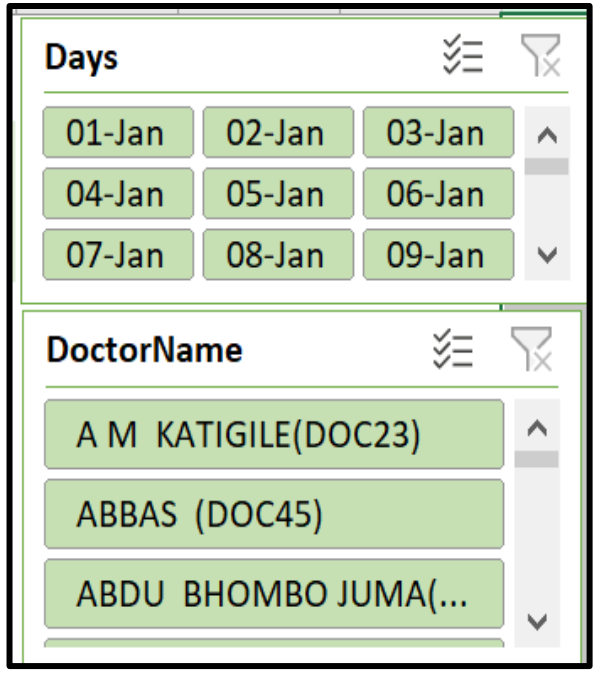
Dashboard Designing





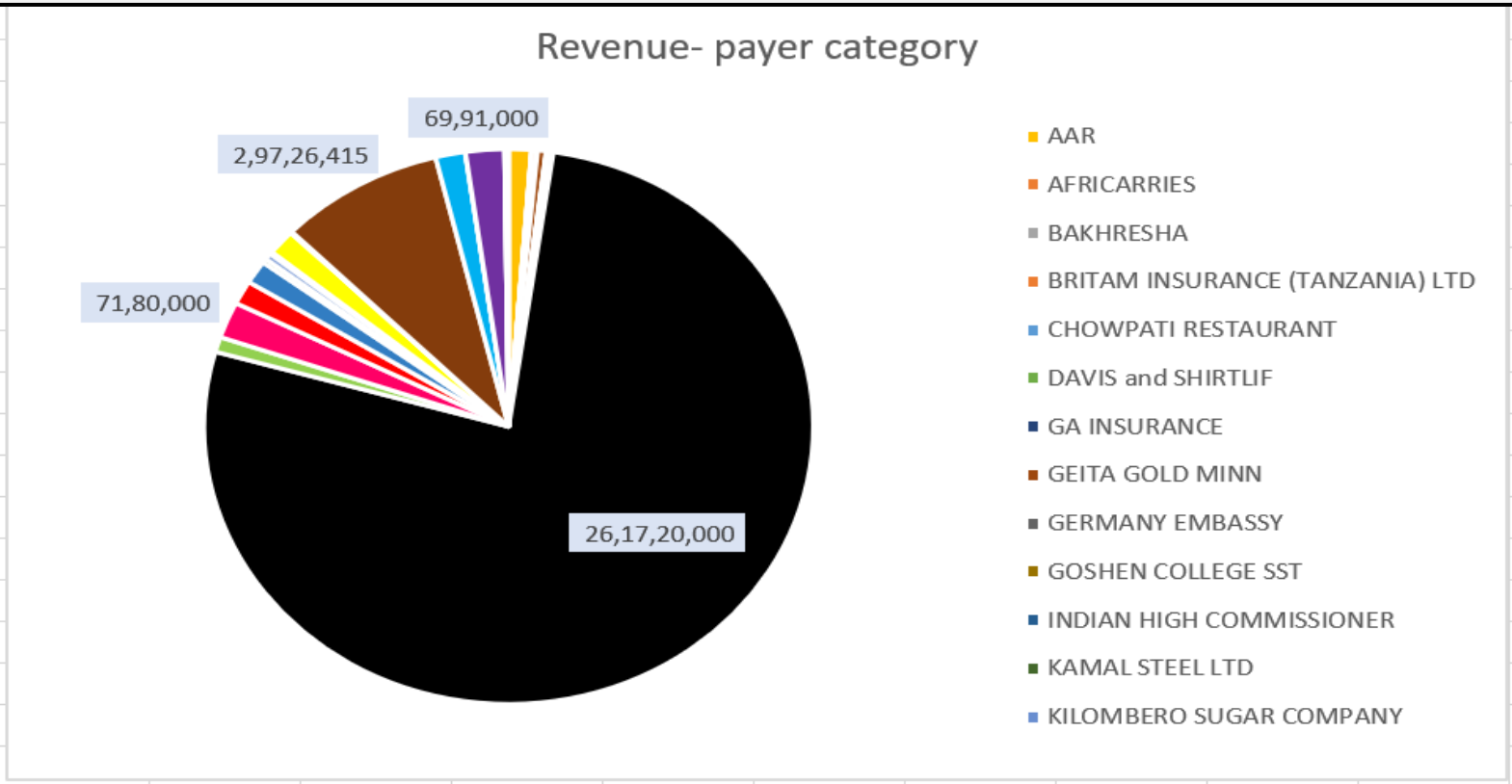


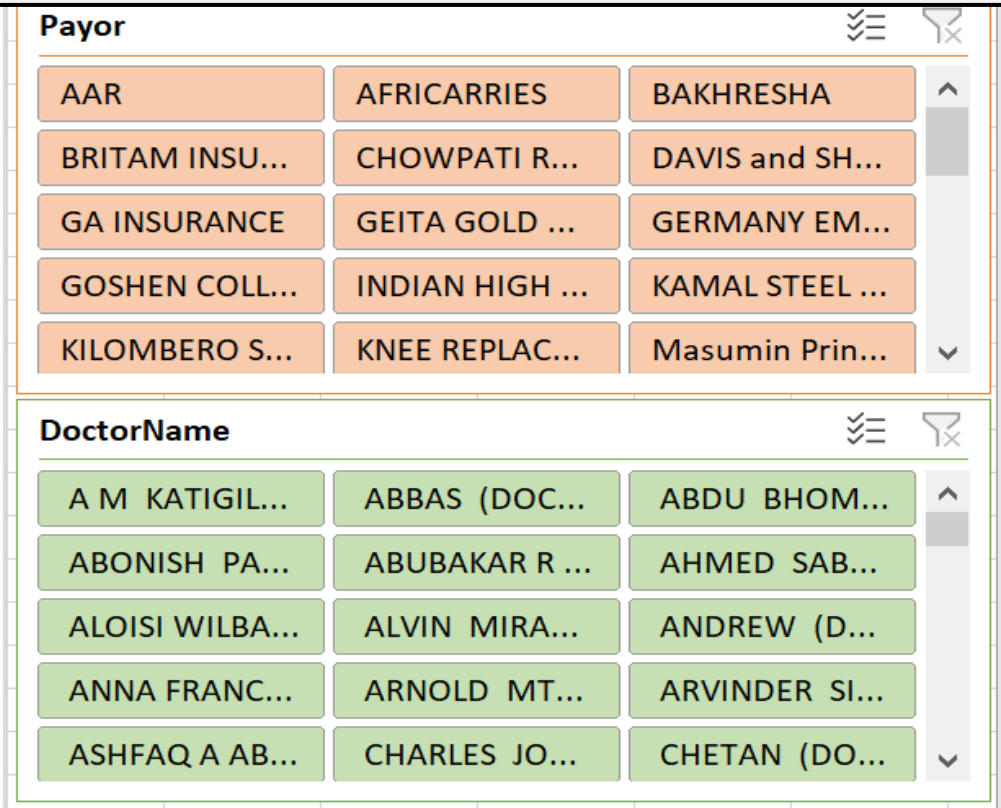
These Dashboards are operated with the help of filters. Different settings can be selected according to the requirement.
The following are some revenue related filters that have been put to facilitate better comparison and analysis.

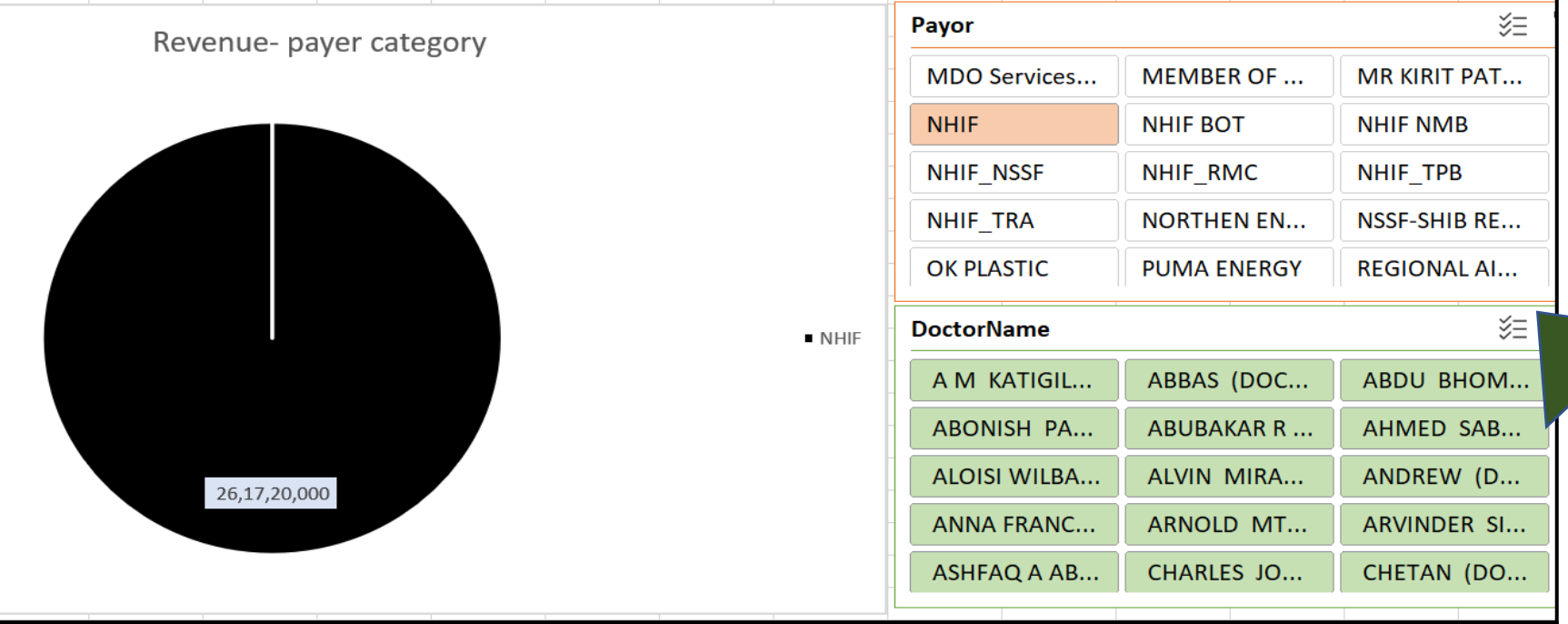


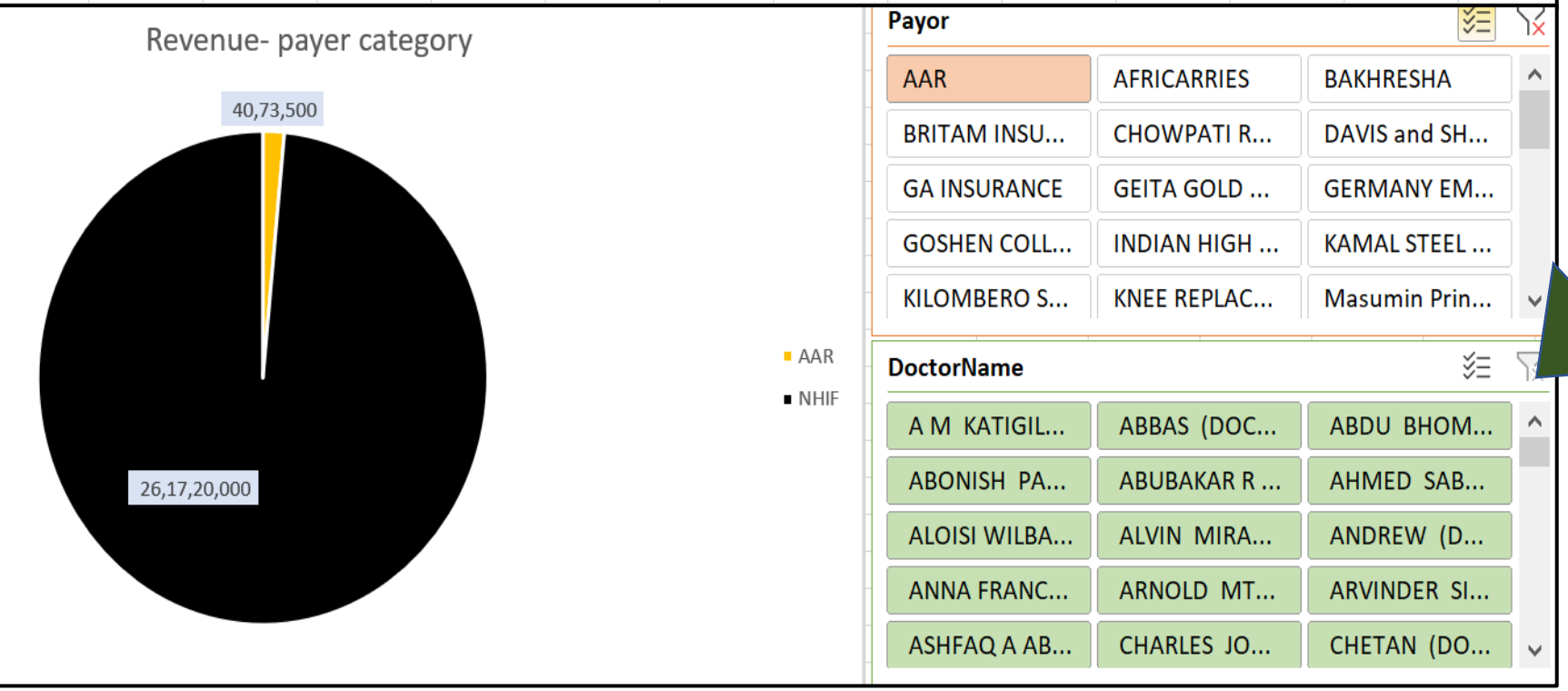
These excel worksheets are macro enabled, therefore will update with the changed data set every time.
However, due to the current way of raw data collection, it is only suitable if data is properly extracted department wise first and then put into the worksheet for accurate analysis and further decision making.

Pie Charts have been used to understand the revenue generated in the payer category.

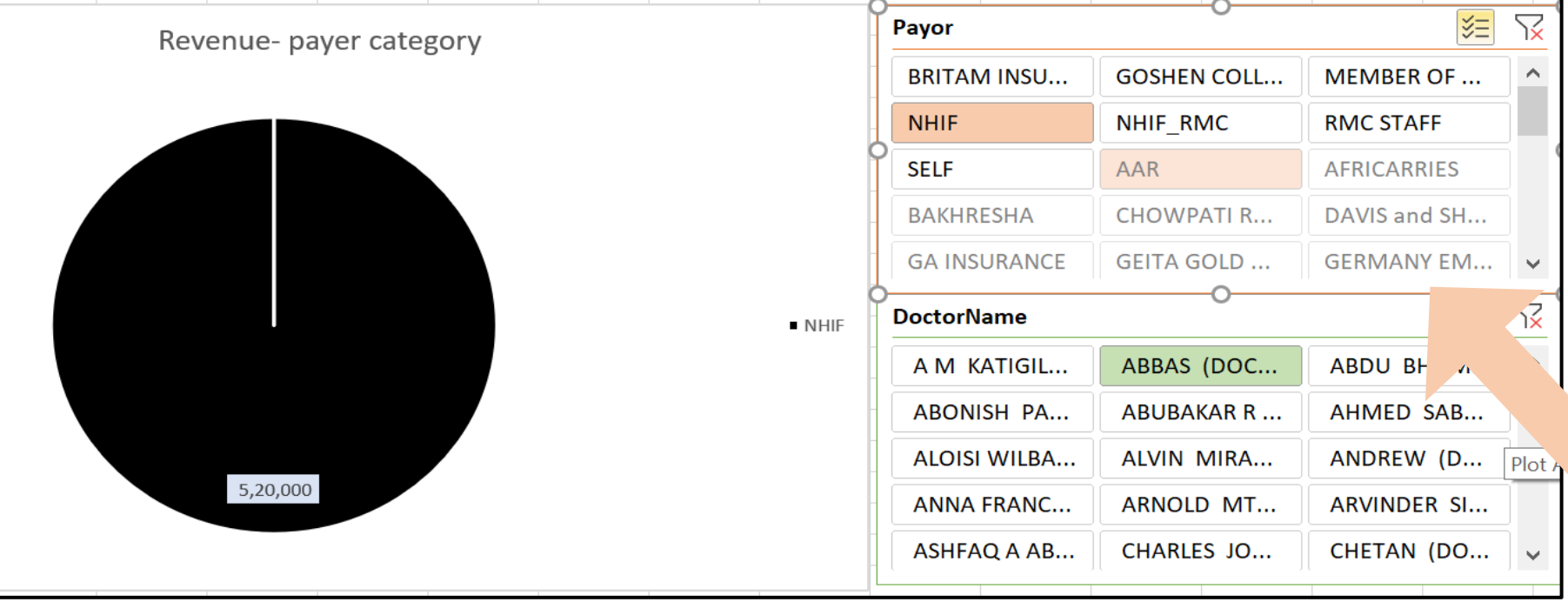


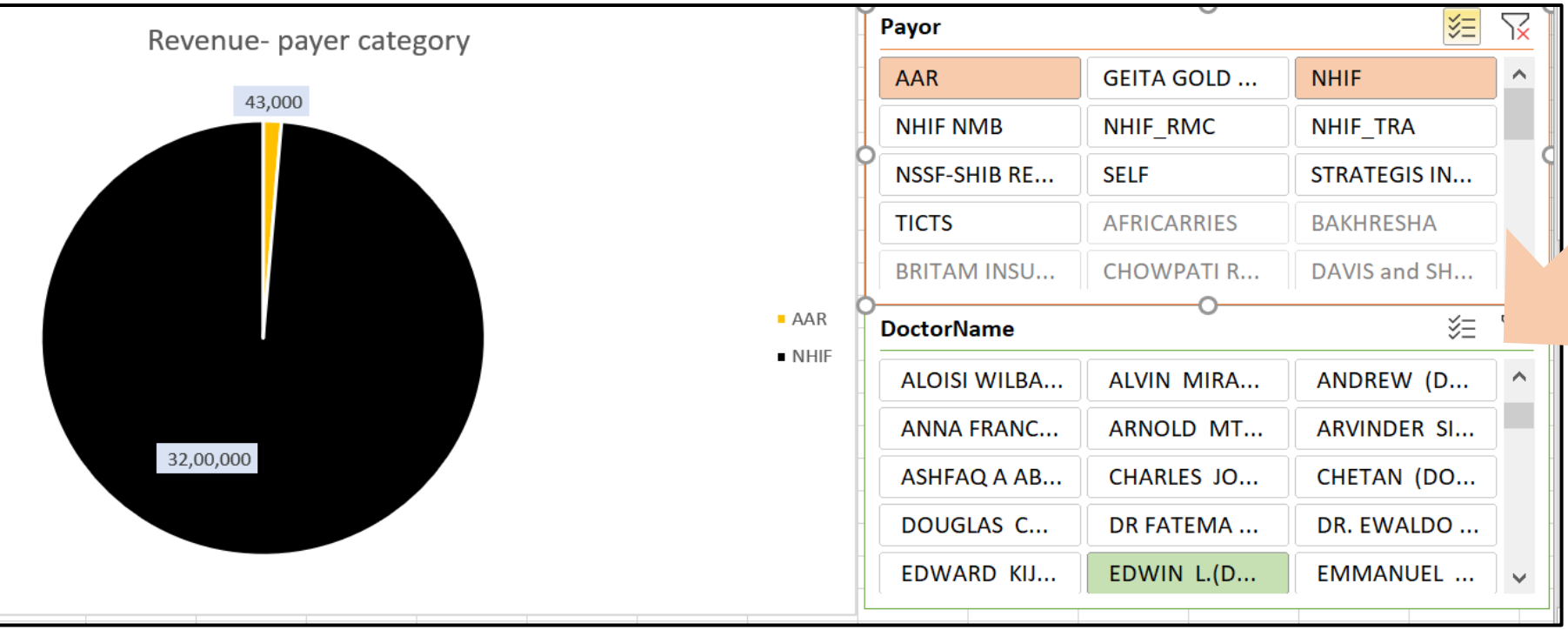




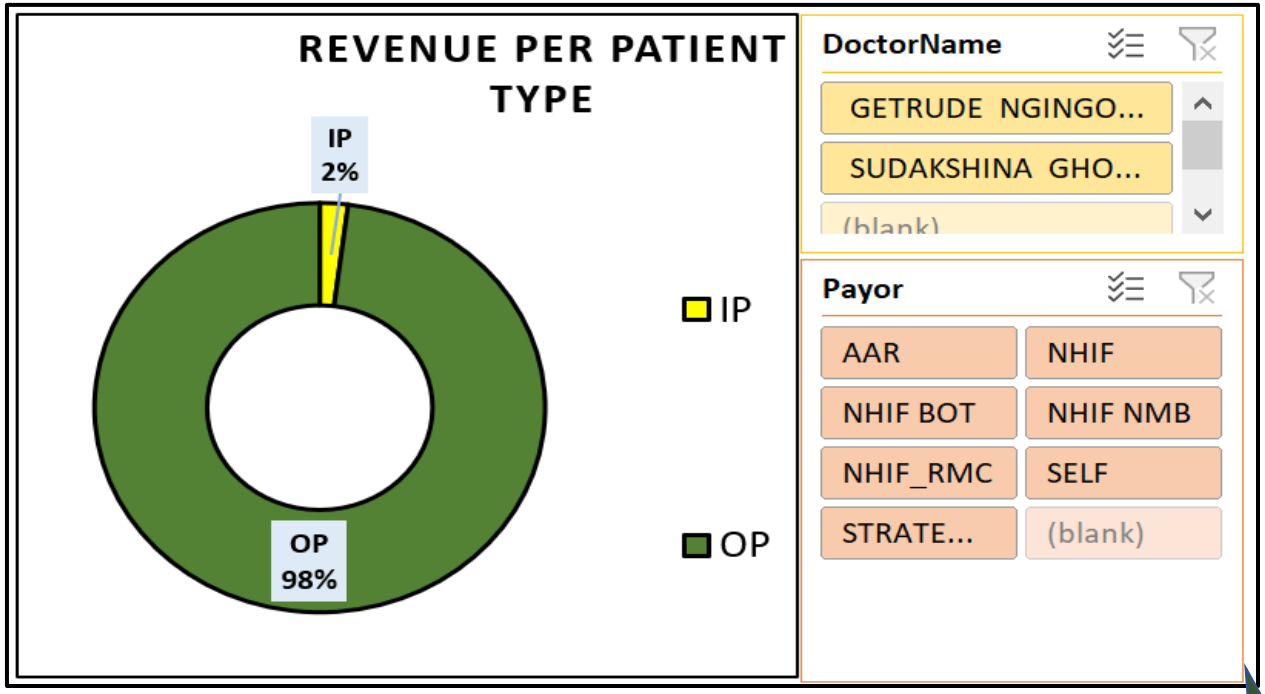


Comparison of NHIF and AAR patient revenue with the help of filter selection



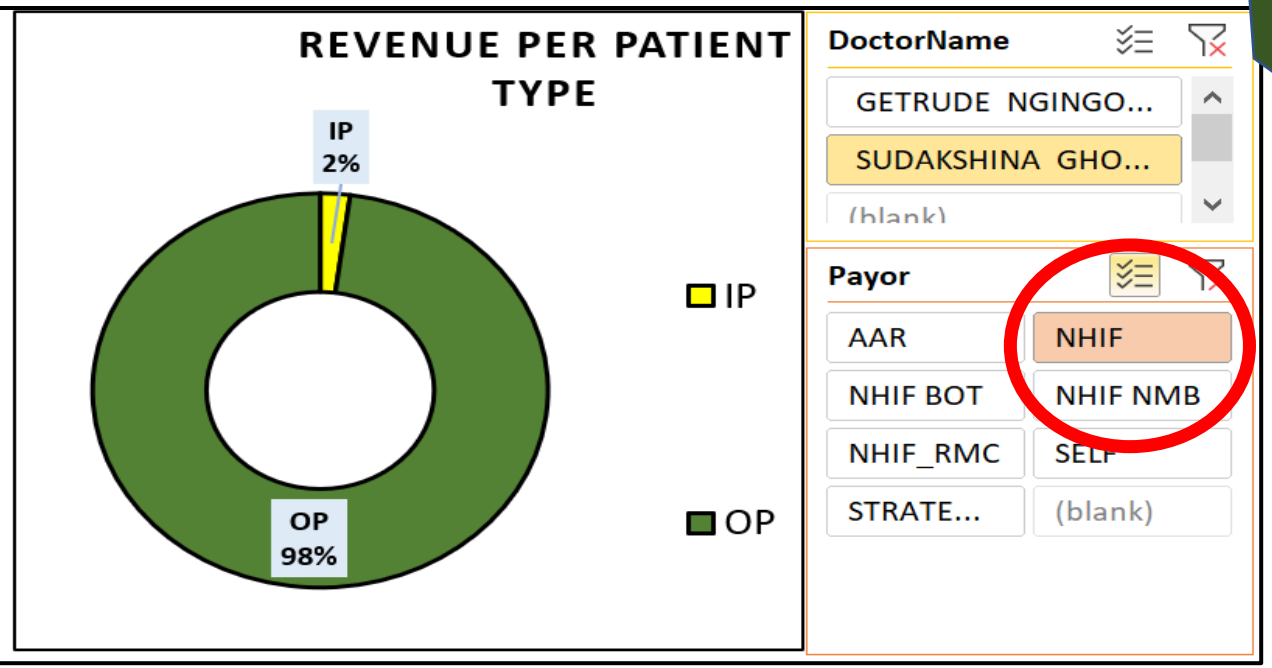


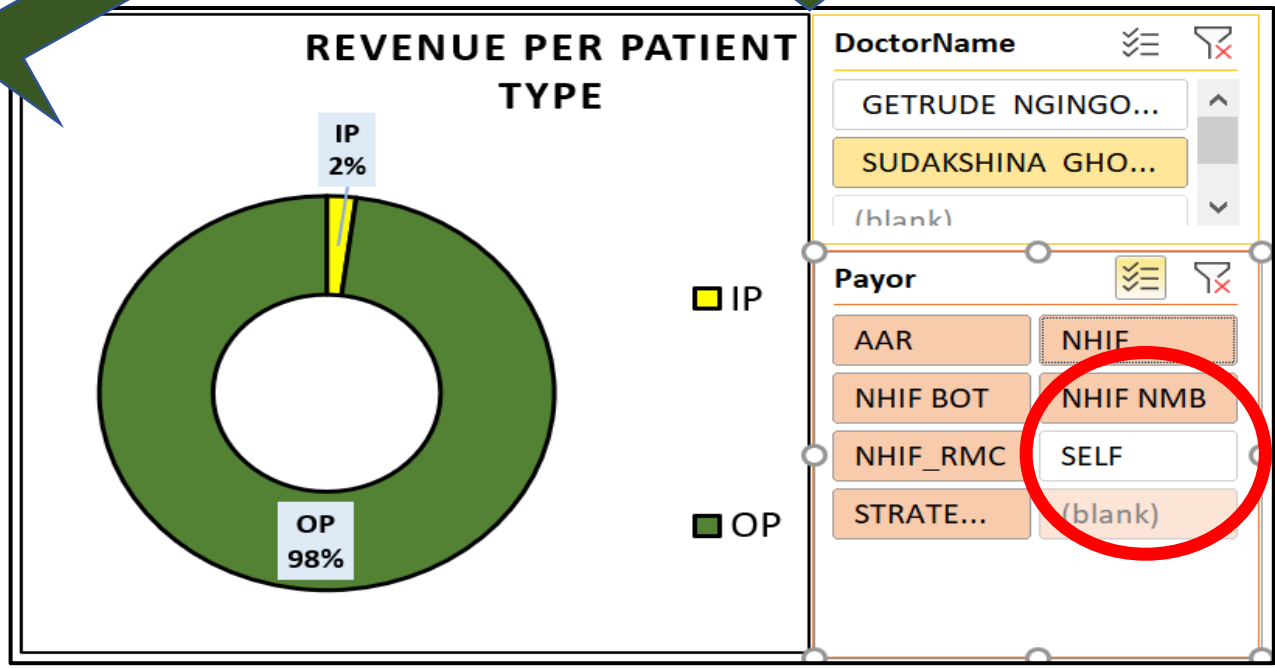
Comparison of NHIF and AAR patient revenue between two docters



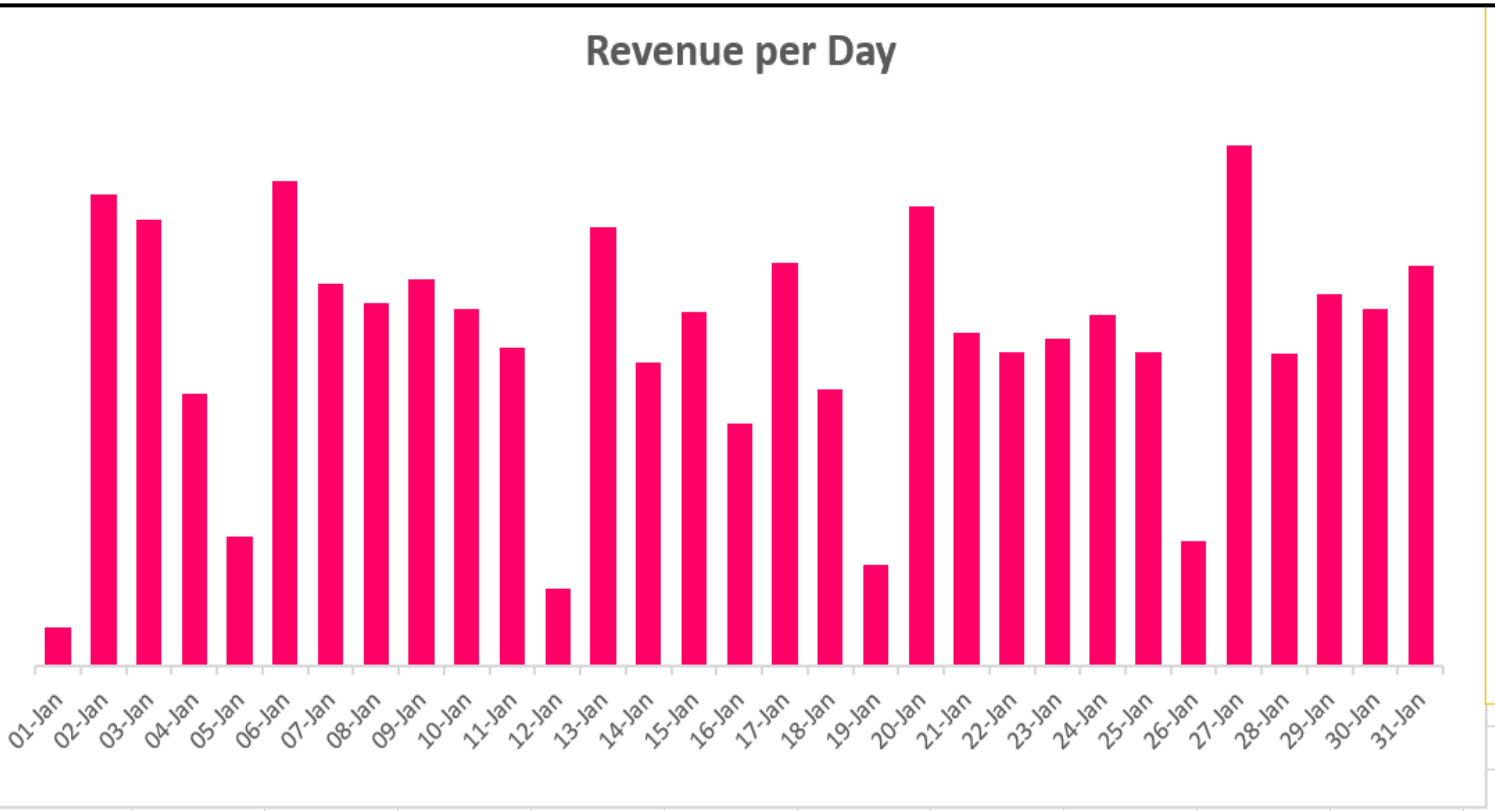
Doughnut Charts have been used to understand the revenue generated in the Patient type category.

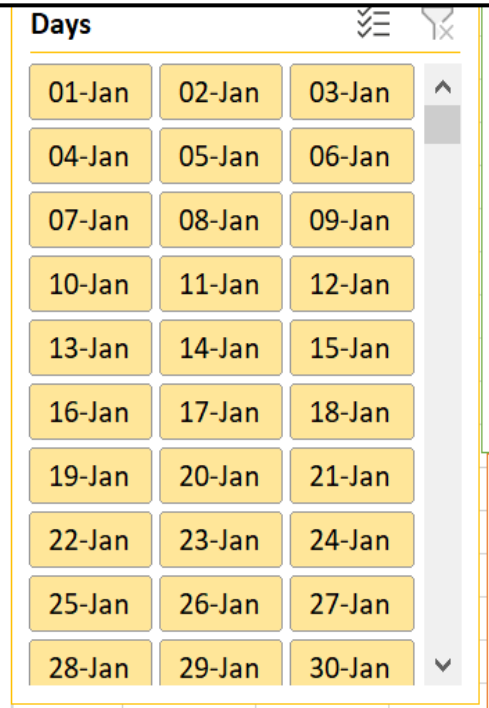
Payer Categories can be selected to get related data for comparisons and analysis.

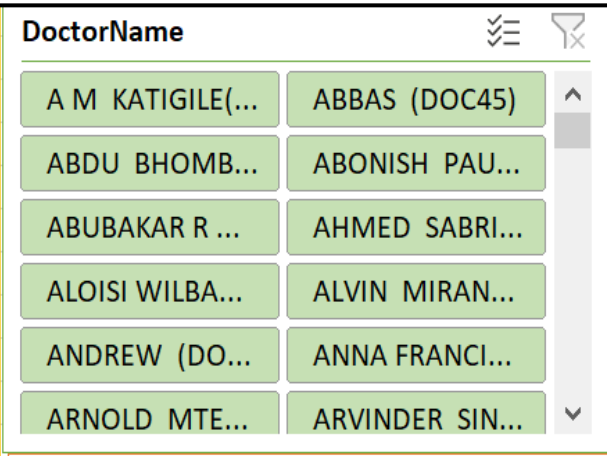


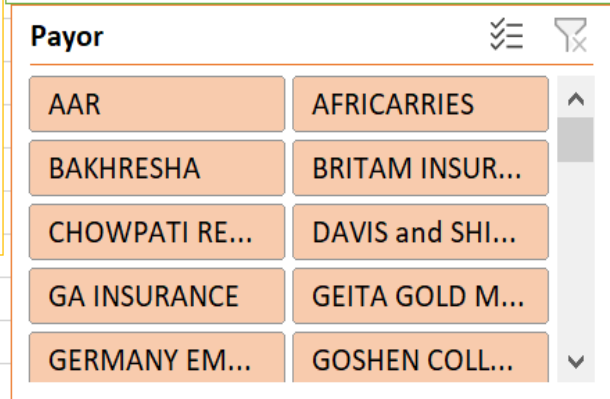


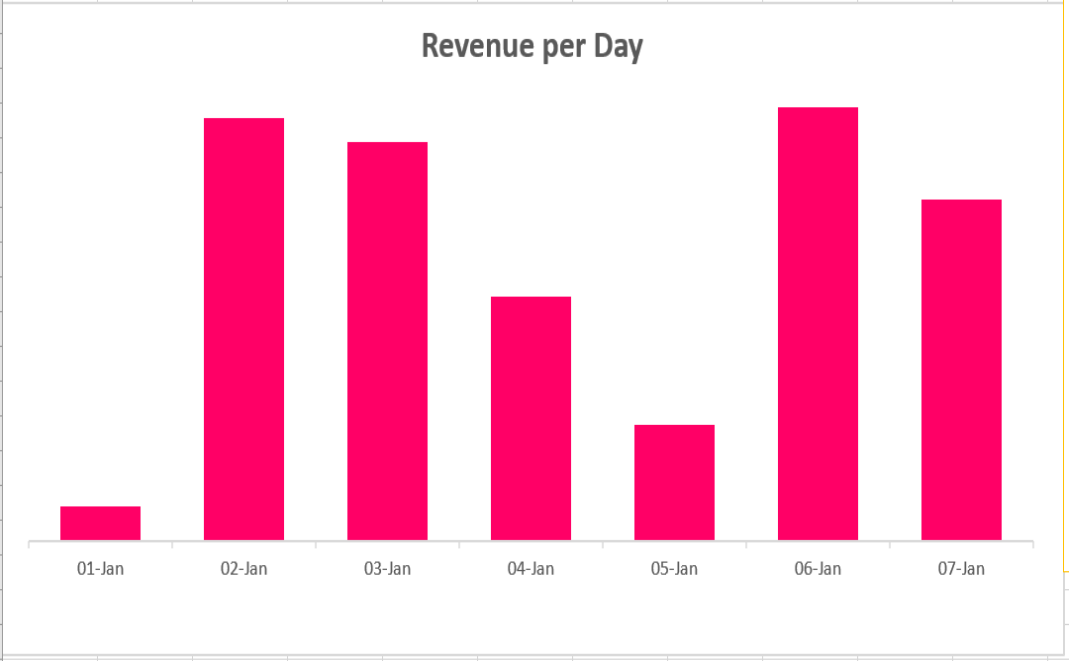
Column Charts have been used to understand the revenue generated per day.

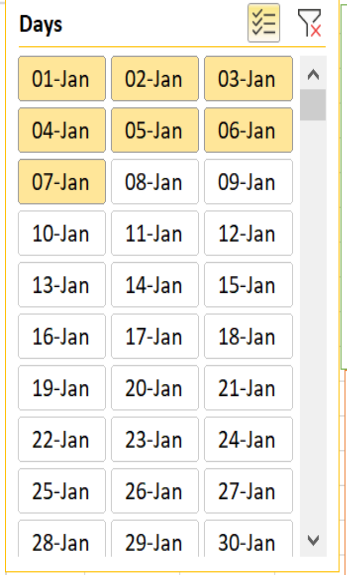


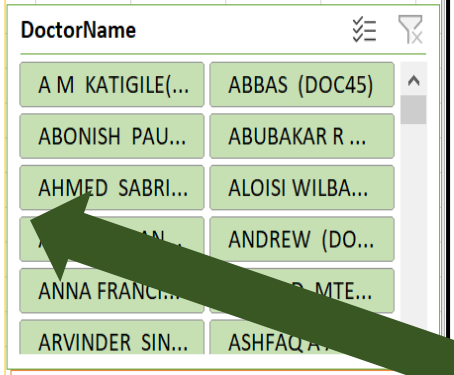


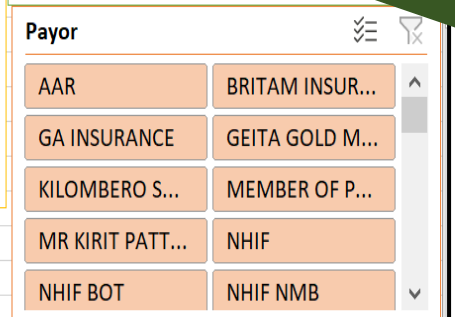




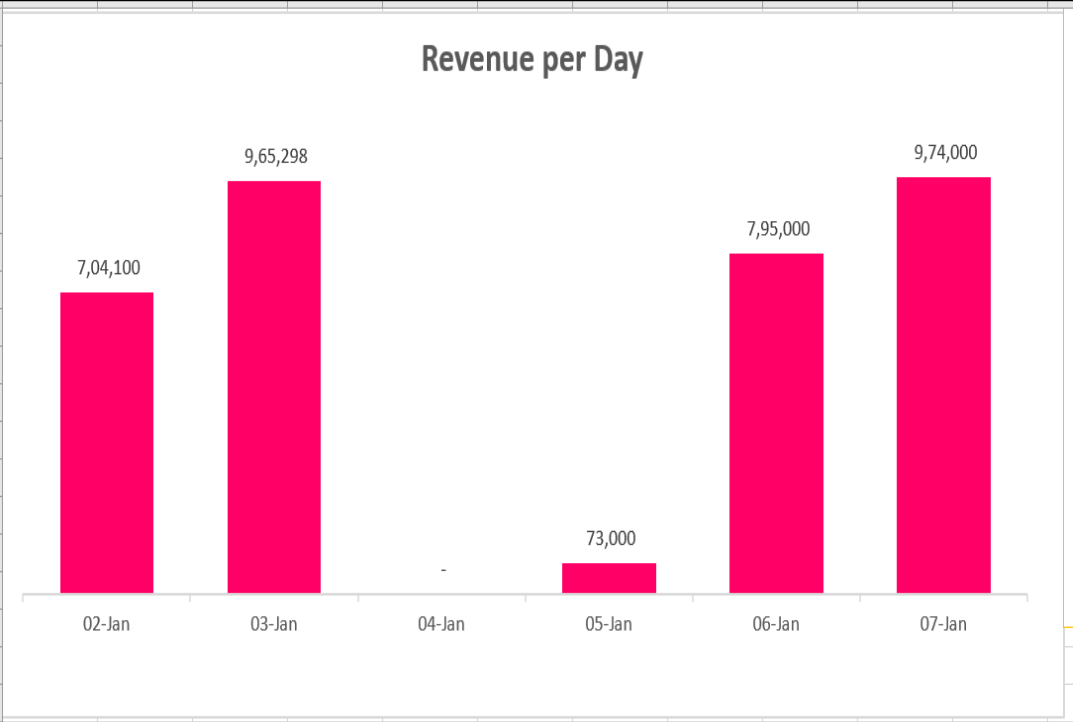


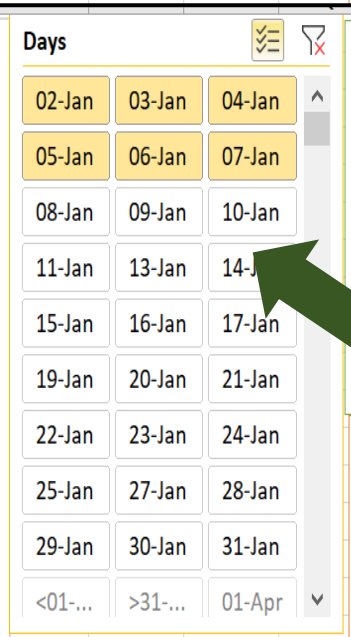


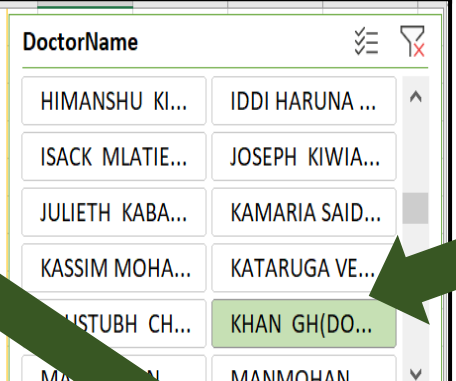


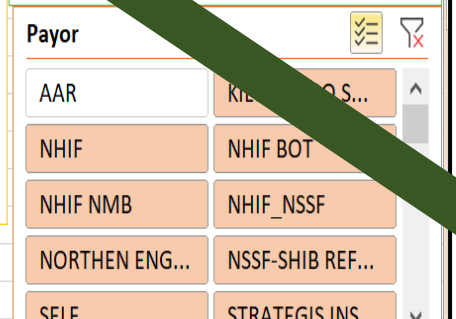


Weekly Statistics with the desired filter selection can be obtained.



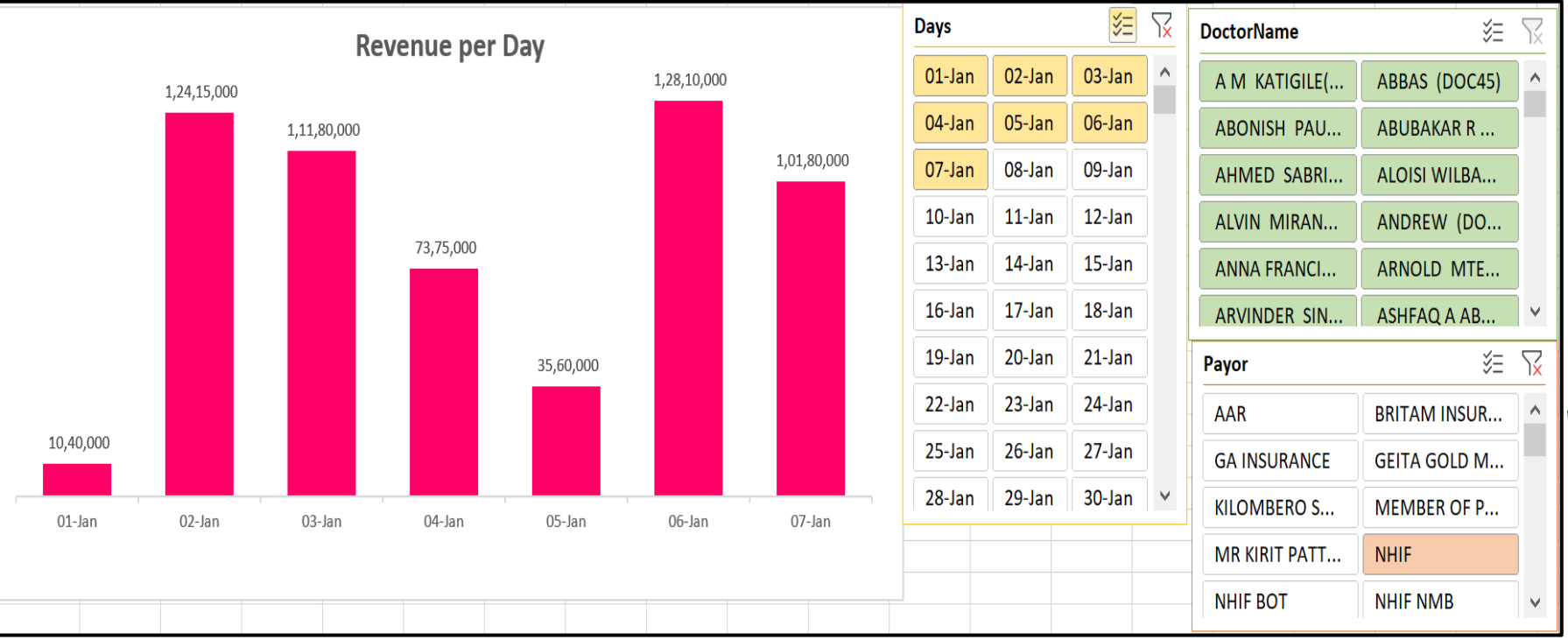


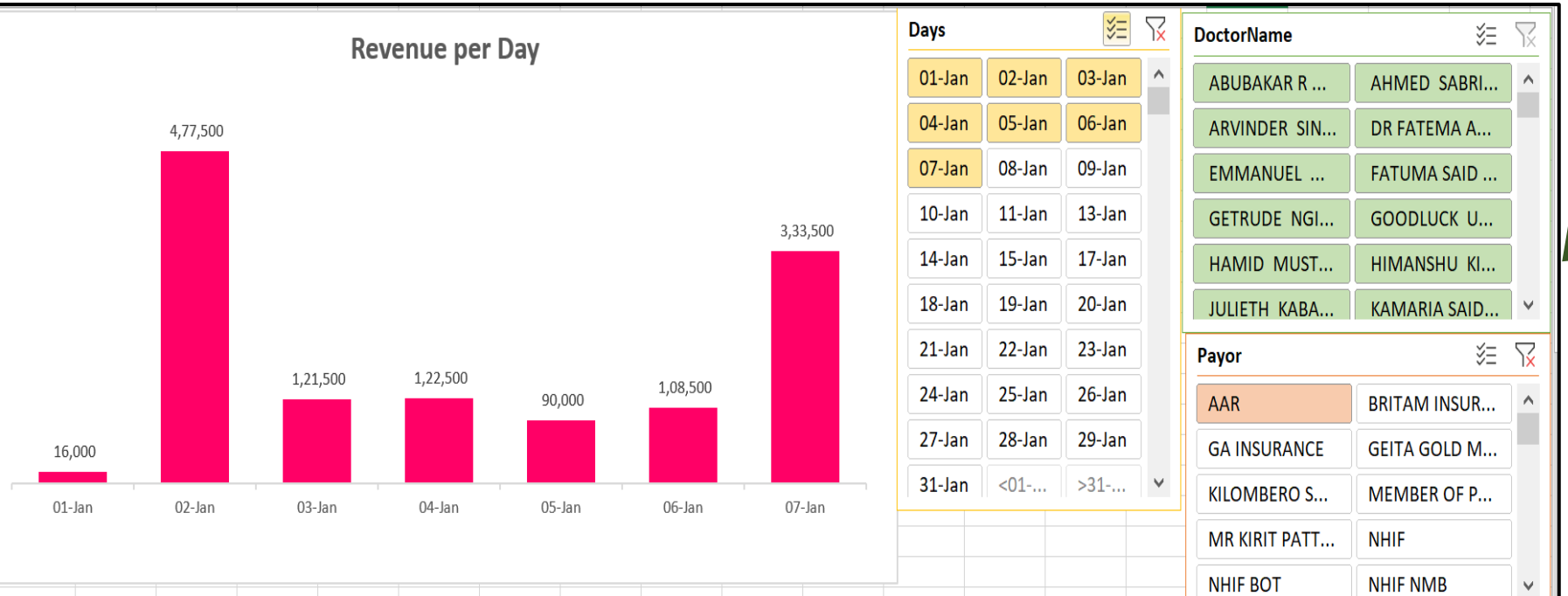




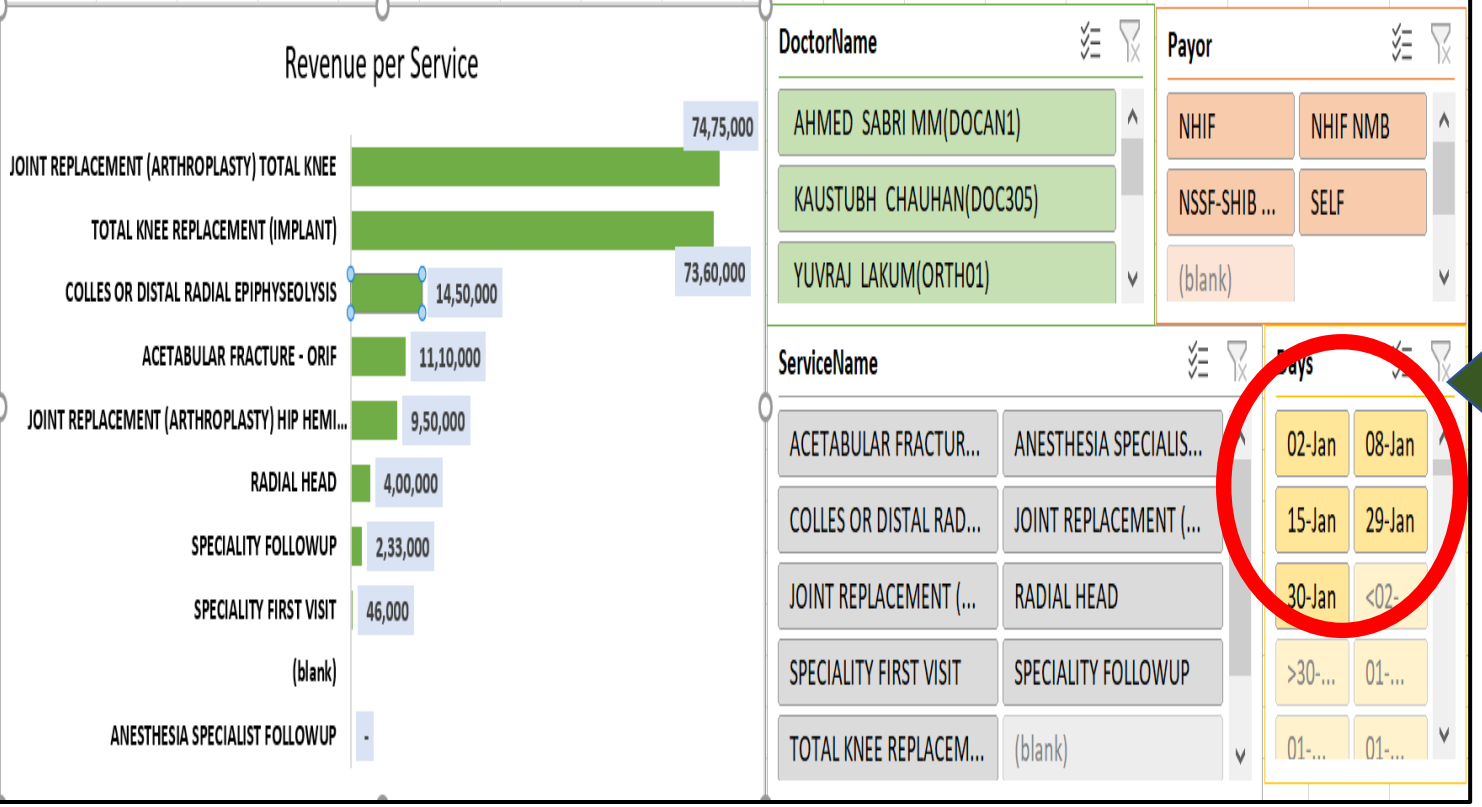
Doctor performance Statistics per day in terms of revenue with the desired filter selection can be seen.

Auto selection of dates according to the doctor's consultation will happen in such cases.



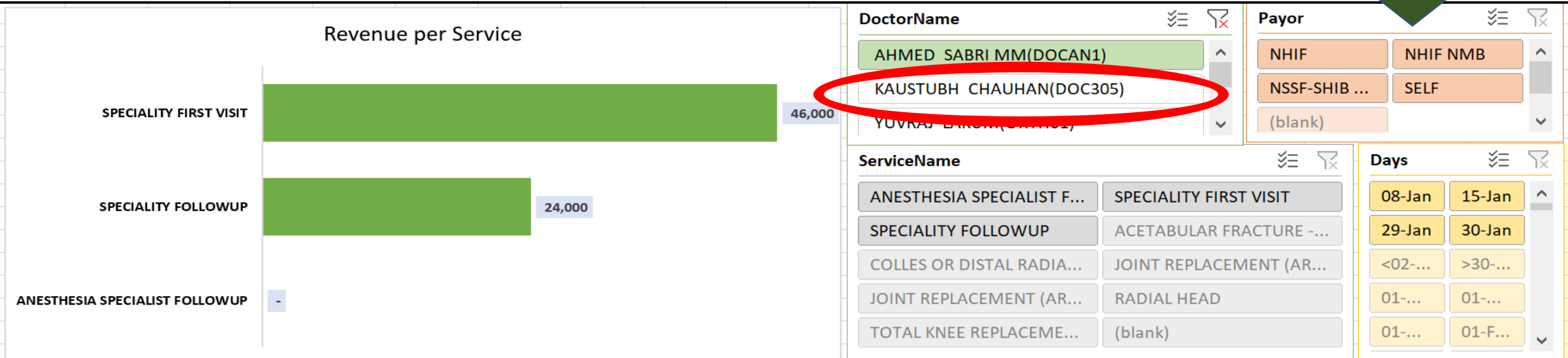


Weekly payer category analysis by various selections can be easily displayed.



Dates can be selected by turning on the multiple selection tool to get data for a specific date or any number of day for example: 1 week

Doctor's name can be selected from the filters to get all the data associated with that doctor as well as a comparison if needed for further analysis



(4) Improving Dashboard flexibility and connectivity

These dashboards were fully automized to show any data put into it in the form of predefined graphs and filters. It was made macro enabled and other functions were added to facilitate better connectivity and user-friendly interface for internal and external stakeholders.

Various prototypes were made of dashboards on excel of various departments and presented to the management for further action.

Limitations

In these revenue-based dashboards, footfall, an essential KPI as not been included which might lead to a little inaccuracy of the overall view of the revenue when calculated in terms of profits.

A Dashboard is only as good as the user customizing and taking out information from it.

One must know how to operate, view, understand the data showcased. One must have time to identify the data needs and organize the data base. Data management is required for more real time and advanced information flow system to be established. Feeding the required data into the dashboard, monitoring and evaluating is essential to take full advantage of this business intelligence tool.

Conclusion

The implementation of dashboards on revenue generation is like an asset for the organization. The most important thing to notice is that the prototype of dashboard was loaded with real data from hospital which made it easier for stakeholders to understand. Dashboard implementation has all conditions to materialize as it puts no extra burden on the staff to collect the required data. Apart from all this dashboard also allow us to measure the revenue based performance and productivity of the organization.

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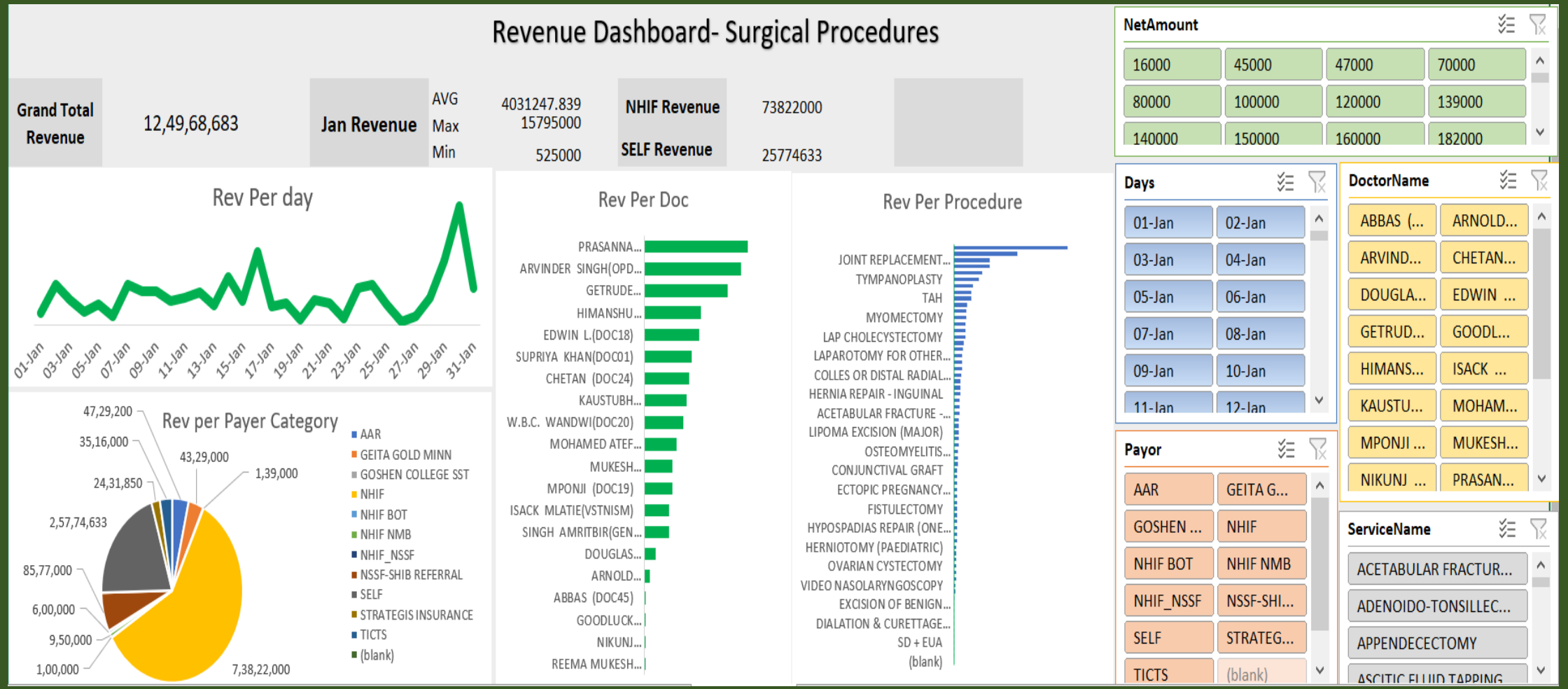
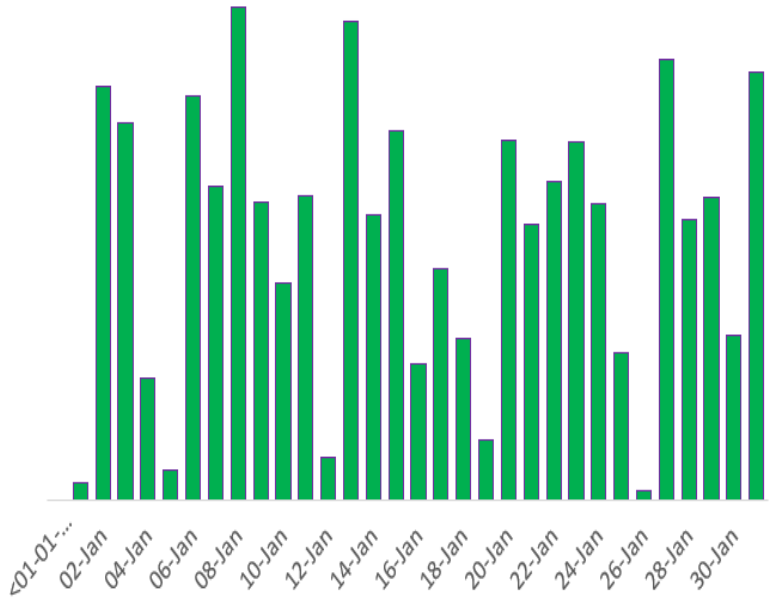
Annexure


Revenue Dashboard- Surgical Procedures
Grand Total Revenue
12,49,68,683
Jan Revenue
AVG
4031247.839
Max
15795000
Min
525000
NHIF Revenue
73822000
SELF Revenue
25774633
Rev Per day
01-Jan
03-Jan
05-Jan
07-Jan
09-Jan
11-Jan
13-Jan
15-Jan
17-Jan
19-Jan
21-Jan
23-Jan
25-Jan
27-Jan
29-Jan
31-Jan
Rev per Payer Category
47,29,200
35,16,000
43,29,000
1,39,000
24,31,850
2,57,74,633
85,77,000
6,00,000
9,50,000
1,00,000
7,38,22,000
AAR
GEITA GOLD MINN
GOSHEN COLLEGE SST
NHIF
NHIF BOT
NHIF NMB
NHIF_NSSF
NSSF-SHIB REFERRAL
SELF
STRATEGIS INSURANCE
TICTS
(blank)
Rev Per Doc
PRASANNA...
ARVINDER SINGH(OPD...
GETRUDE...
HIMANSHU...
EDWIN L.(DOC18)
SUPRIYA KHAN(DOC01)
CHETAN (DOC24)
KAUSTUBH...
W.B.C. WANDWI(DOC20)
MOHAMED ATEF...
MUKESH...
MPONJI (DOC19)
ISACK MLATIE(VSTNISM)
SINGH AMRITBIR(GEN...
DOUGLAS...
ARNOLD...
ABBAS (DOC45)
GOODLUCK...
NIKUNJ...
REEMA MUKESH...
Rev Per Procedure
JOINT REPLACEMENT...
TYMPANOPLASTY
TAH
MYOMECTOMY
LAP CHOLECYSTECTOMY
LAPAROTOMY FOR OTHER...
COLLES OR DISTAL RADIAL...
HERNIA REPAIR - INGUINAL
ACETABULAR FRACTURE -...
LIPOMA EXCISION (MAJOR)
OSTEOMYELITIS...
CONJUNCTIVAL GRAFT
ECTOPIC PREGNANCY...
FISTULECTOMY
HYPOSPADIAS REPAIR (ONE...
HERNIOTOMY (PAEDIATRIC)
OVARIAN CYSTECTOMY
VIDEO NASOLARYNGOSCOPY
EXCISION OF BENIGN...
DIALATION & CURETTAGE...
SD + EUA
(blank)
NetAmount
16000
45000
47000
70000
80000
100000
120000
139000
140000
150000
160000
182000
Days
01-Jan
02-Jan
03-Jan
04-Jan
05-Jan
06-Jan
07-Jan
08-Jan
09-Jan
10-Jan
11-Jan
12-Jan
DoctorName
ABBAS (...
ARNOLD...
ARVIND...
CHETAN...
DOUGLA...
EDWIN ...
GETRUD...
GOODL...
HIMANS...
ISACK ...
KAUSTU...
MOHAM...
MPONJI ...
MUKESH...
NIKUNJ ...
PRASAN...
Payor
AAR
GEITA G...
GOSHEN ...
NHIF
NHIF BOT
NHIF NMB
NHIF_NSSF
NSSF-SHI...
SELF
STRATEG...
TICTS
(blank)
ServiceName
ACETABULAR FRACTUR...
ADENOIDO-TONSILLEC...
APPENDECECTOMY
ASCITIC FLUID TAPPING

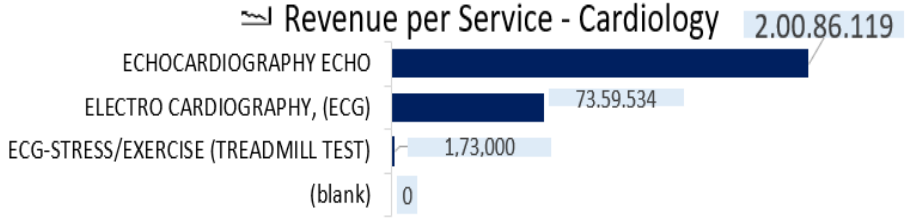
Revenue Dashboard- Cardiology

Grand Total Revenue- **10,25,000**	**Jan Revenue - AVG- 5,57,000** **(8 Jan) Max 14,52,300** **(26 Jan) Min 2,76,18,653**	**NHIF Revenue - 1,93,20,000**

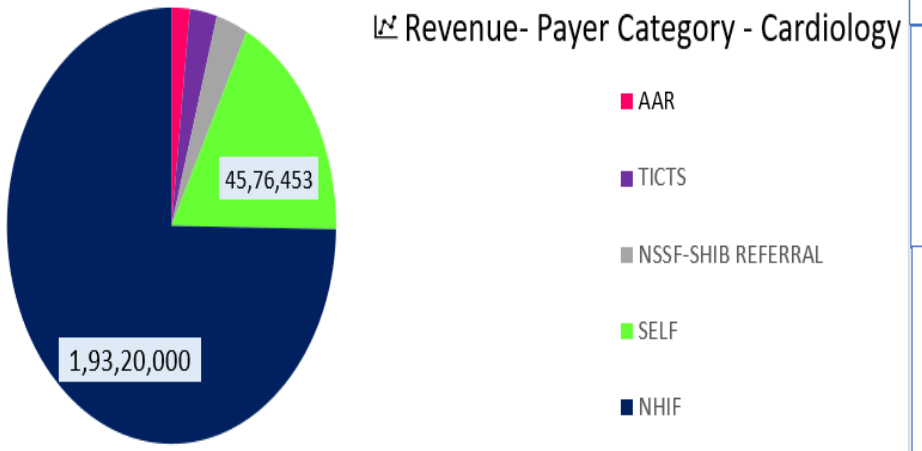
Revenue per day



Revenue per Service - Cardiology



Revenue- Payer Category - Cardiology



Days

01-Jan	02-Jan	03-Jan	04-Jan
05-Jan	06-Jan	07-Jan	08-Jan
09-Jan	10-Jan	11-Jan	12-Jan
13-Jan	14-Jan	15-Jan	16-Jan
17-Jan	18-Jan	19-Jan	20-Jan
21-Jan	22-Jan	23-Jan	24-Jan
25-Jan	26-Jan	27-Jan	28-Jan
29-Jan	30-Jan	31-Jan	<01-0...

ServiceName

ECG-STRESS/EXE...	ECHOCARDIOGRA...
ELECTRO CARDIO...	(blank)

Payor

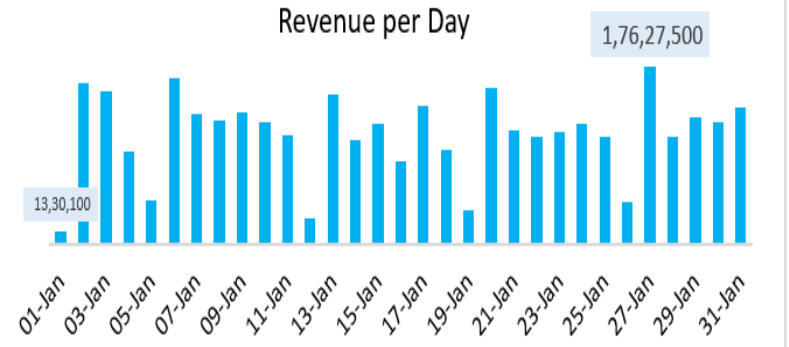
AAR	GEITA GO...	KNEE REP...
MEMBER ...	NHIF	NHIF BOT
NHIF NMB	NHIF_NSSF	NHIF_RMC
NHIF TPB	NORTHE...	NSSF-SHI...

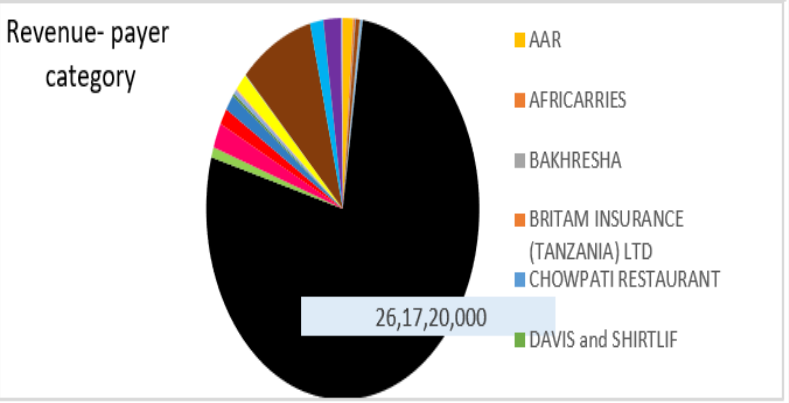
NetAmount

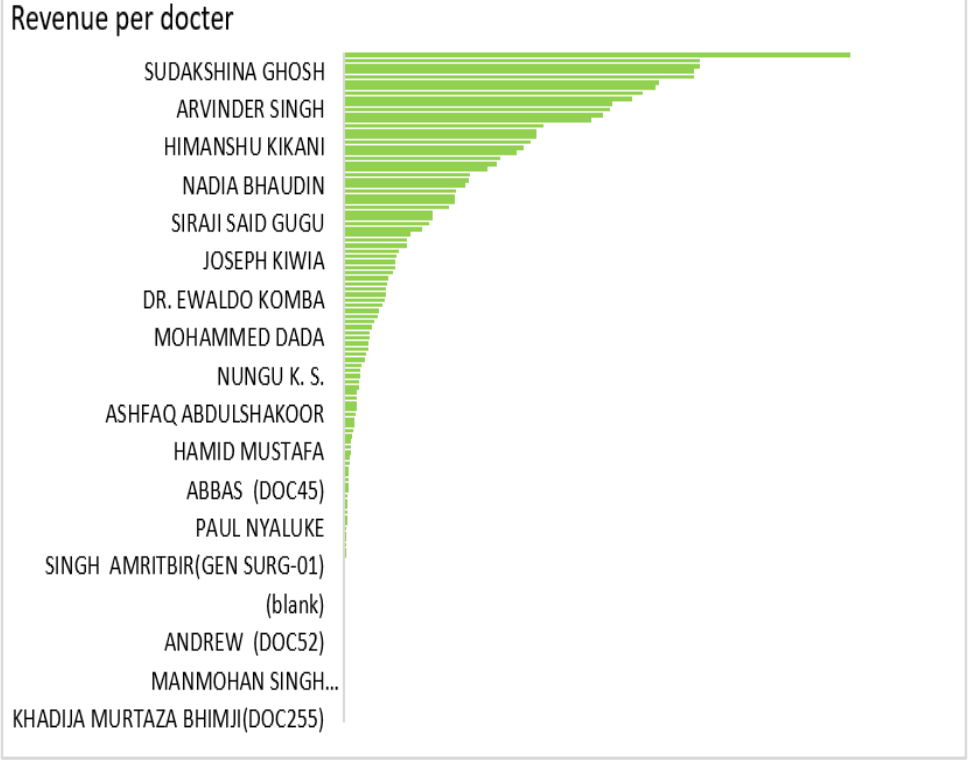
15000	30834	32000
32500	37400	39000
40000	58000	80000

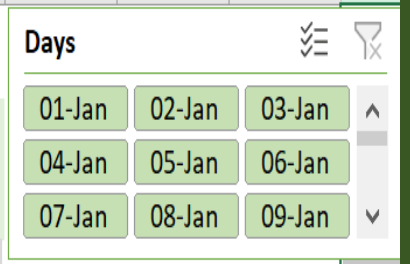
Revenue Dashboard- OPD

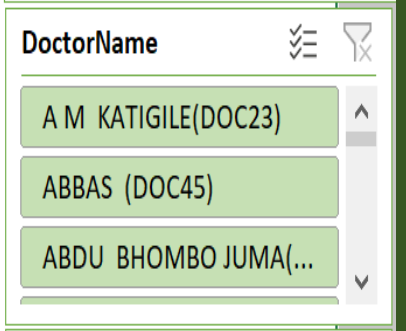
Grand Total Revenue-	33,98,95,515	Jan Revenue - AVG- 1,09,64,371 (30 Jan) Max 1,76,27,500 (2 Jan) Min 13,30,100	NHIF Revenue - 26,17,20,000

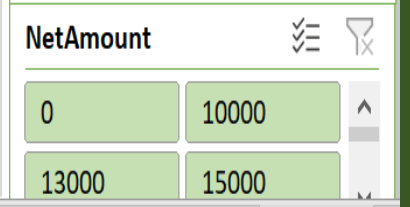










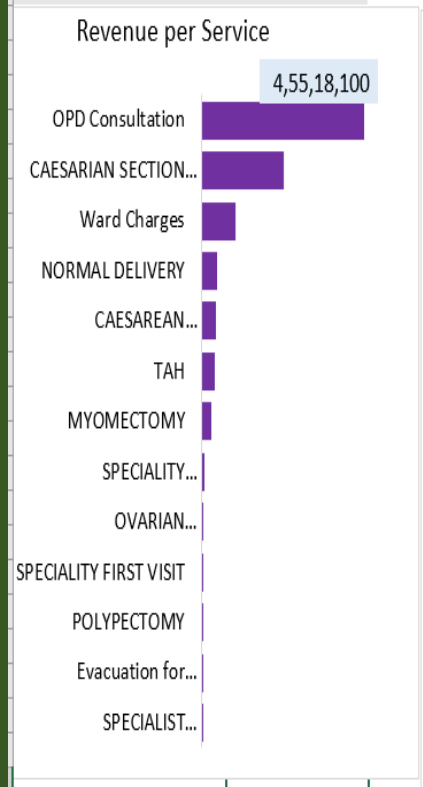


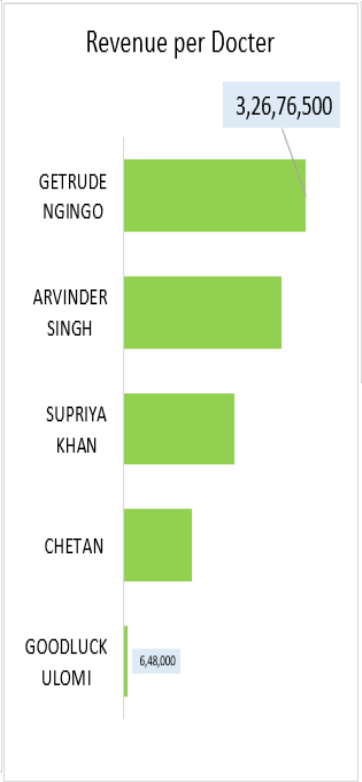
Revenue Dashboard- GYN

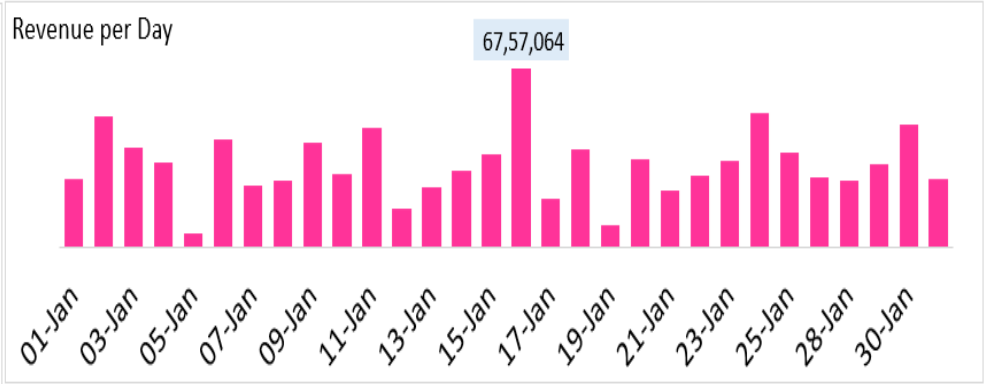
Grand Total Revenue-	93661544

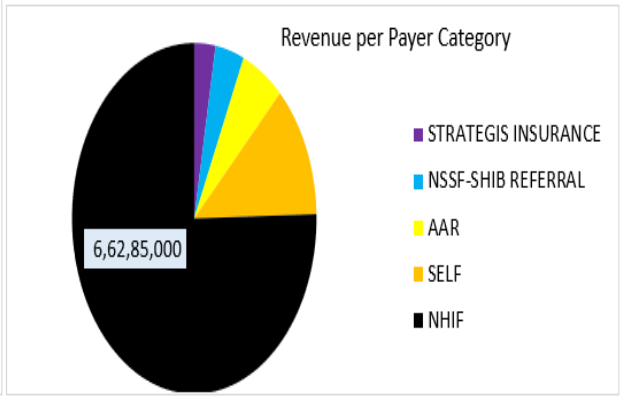
Jan Revenue - AVG- 61,58,870
(16 Jan) Max 67,57,064
(5 Jan) Min 5,27,954

NHIF Revenue - 15715000









Days

01-Jan	02-Jan	03-Jan
04-Jan	05-Jan	06-Jan
07-Jan	08-Jan	09-Jan
10-Jan	11-Jan	12-Jan
13-Jan	14-Jan	15-Jan
16-Jan	17-Jan	18-Jan

AttendingDoctorDBKey

ARVINDER SINGH(...	CHETAN (DOC24)
GETRUDE NGINGO...	GOODLUCK ULOMI...
SUPRIYA KHAN(DO...	ARVINDER SINGH
CHETAN	GETRUDE NGINGO

Payor

AAR	BRITAM INS...	GEITA GOL...
MR KIRIT P...	NHIF	NHIF BOT
NHIF NMB	NHIF_NSSF	NHIF_RMC
NHIF_TPB	NHIF_TRA	NORTHEN ...

ServiceName

CAESAREA...	CAESARIAN...	Evacuation ...
MYOMECT...	NORMAL D...	OPD Consul...
OVARIAN C...	POLYPECT...	SPECIALIST ...

NetAmount

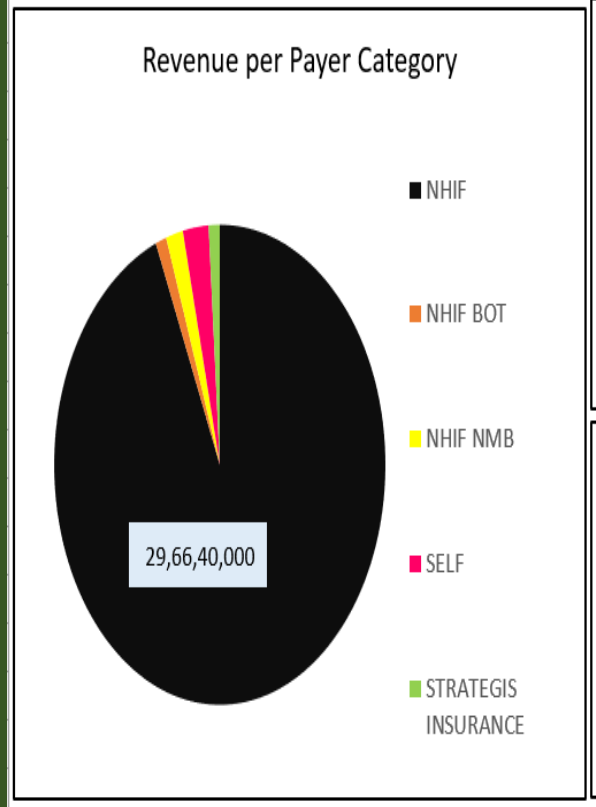
0	10000	15000	21148
22884	22998	23000	24000
25000	30000	32100	32500
33000	35000	48000	50000

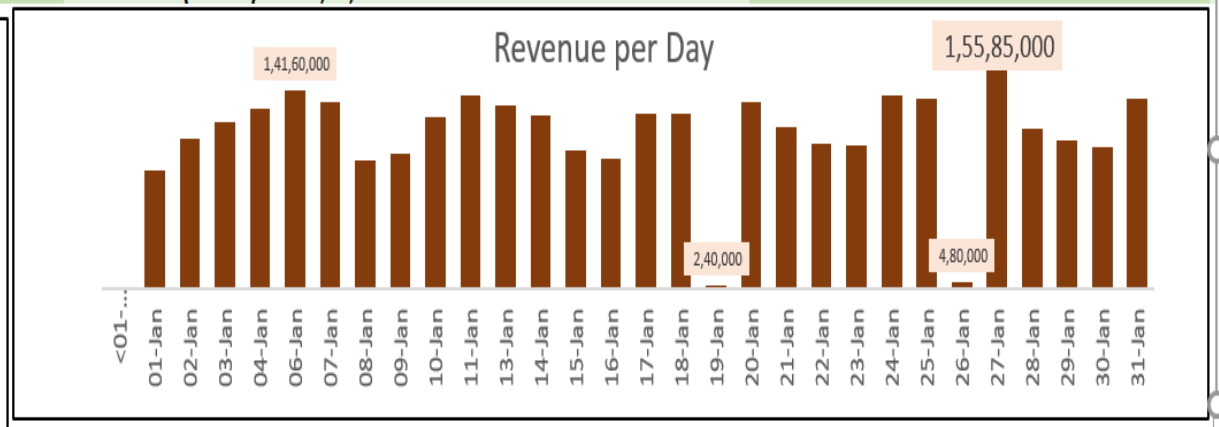
Revenue Dashboard- Dialysis

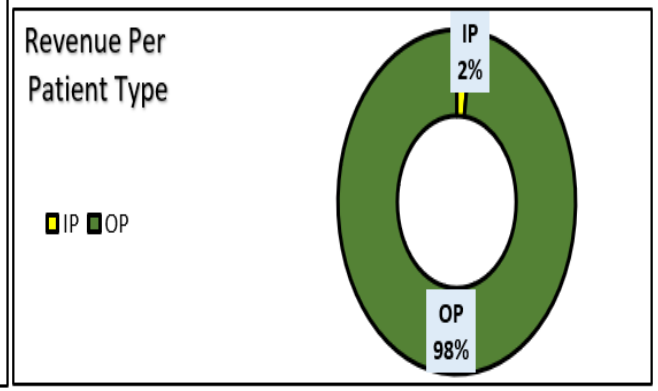
Grand Total Revenue- 13665000

Jan Revenue - AVG- 1,36,65,000
(27 Jan) Max 1,55,85,000
(19 Jan) Min 2,40,000

NHIF Revenue - 3360000







Payor

AAR	NHIF
NHIF BOT	NHIF NMB
NHIF_RMC	SELF
STRATEG...	(blank)

Days

01-Jan	02-Jan	03-Jan	04-Jan
06-Jan	07-Jan	08-Jan	09-Jan
10-Jan	11-Jan	13-Jan	14-Jan
15-Jan	16-Jan	17-Jan	18-Jan
19-Jan	20-Jan	21-Jan	22-Jan

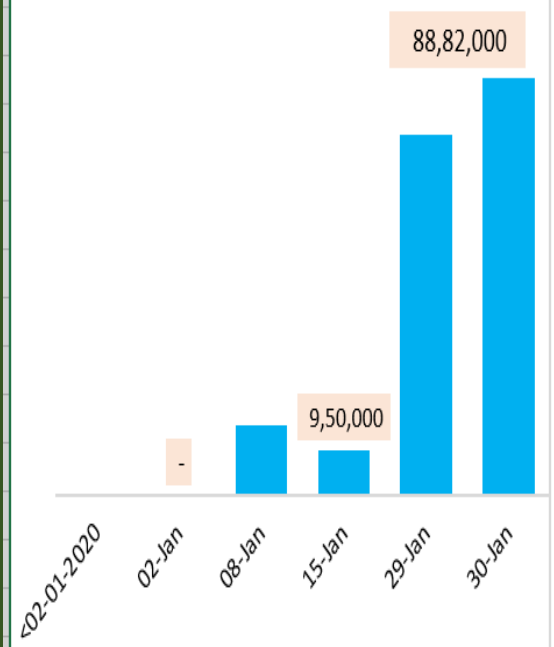
NetAmount

1,60,000	1,70,000
1,80,000	2,40,000
2,85,000	3,00,000
4,50,000	(blank)

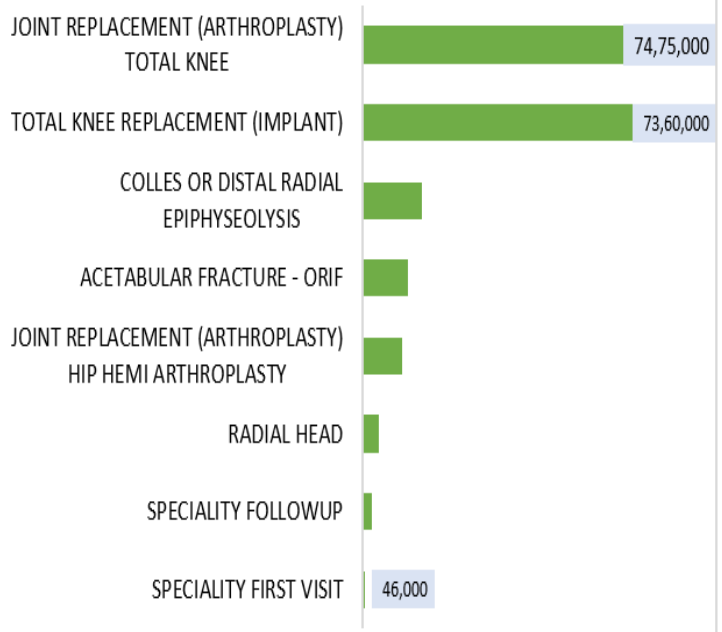
Revenue Dashboard- Orthopaedics

Grand Total Revenue-	88,82,000	Jan Revenue - AVG- 1,90,24,000 (30 Jan) Max 76,82,000 (2 Jan) Min 0		NHIF Revenue -	20,60,000

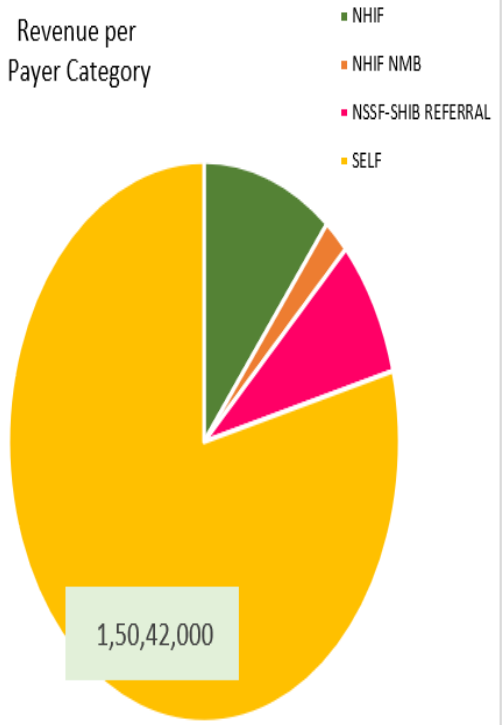
Revenue per Day



Revenue per Service



Revenue per Payer Category



Days

02-Jan	08-Jan
15-Jan	29-Jan
30-Jan	<02-01-2...
>30-01-2...	01-Apr

ServiceName

- ACETABULAR FRACTUR...
- ANESTHESIA SPECIALIST...
- COLLES OR DISTAL RADI...
- JOINT REPLACEMENT (A...
- JOINT REPLACEMENT (A...

Payor

NHIF	NHIF...	NSSF...
SELF	(blank)	

NetAmount

-	23,000
24,000	4,00,000
9,50,000	11,10,000

Thank you!