# AN EXPLORATORY INVESTIGATION INTO INSTITUTIONAL AND STAFF PERFORMANCE: EVIDENCE FROM PUBLIC HOSPITALS IN GAUTENG

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A research report submitted to the School of Public Health, the Faculty of Health Sciences,
University of the Witwatersrand, South Africa, as part fulfilment of requirements for the degree of Master in Public Health (Health Economics)

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Declaration

I, Jayshina Punwasi declare that this research report is my own, unaided work. It is being submitted for the Degree of Master in Public Health specialising in Health economics at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other University.

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31st day of October 2024 in Johannesburg, South Africa

DEDICATION

For my daughters,

Tara and Harini Singh

May you always learn and grow!

**ABSTRACT**

There are various challenges facing the South African health system, especially in Gauteng, the most densely populated province in South Africa with the largest public sector hospital network. This research was undertaken to understand how hospital performance and staff performance is measured in Gauteng public hospitals and to determine if there is a correlation between hospital performance and staff performance.

Panel data from 2 administrative datasets for 34 hospitals was analysed over an 8-year period from 2013/14 to 2020/21. Hospitals were classified according to level of care into 5 categories (central, tertiary, regional, district and specialised) and data for 11 hospital performance indicators and 5 staff category indicators were analysed. Trend analysis was conducted for hospital and staff performance, PCA was used to explore the relationship between hospital performance indicators and investigate the construction of a composite index of hospital performance, and regression analysis was used to investigate the relationship between hospital performance and staff performance.

Overall, capacity within the Gauteng hospitals has not increased and output only slightly increased over the 8-year period. Trends suggest that the majority of inpatient and outpatient care were provided by central hospitals where the costs of care were the highest. Regional hospitals followed closely on most indicators except emergency headcount and expenditure per PDE. Emergency care was provided more by regional and district hospitals, but it costed more to treat a patient at a district hospital than a regional hospital. Specialised hospitals tended to be outliers on most of the indicators assessed. Staff performance had consistent scores for all 5 staff categories with doctors being scored lower than other staff categories. PCA analysis determined that patient day equivalent, bed utilisation rate, average length of stay and inpatient crude death rate could form a composite indicator of hospital performance. However, it is not straightforward to capture hospital performance in a single indicator as each of these indicators captures a different element of performance.

The key finding of this research was that there was no correlation between hospital performance and staff performance over the 8-year period based on both individual indicators and principal components. This emphasises the need for staff performance to be linked to hospital performance indicators from an output, process, quality and outcome perspective in order for Gauteng hospitals and staff to provide health care in an effective and efficient way.

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## LIST OF ABBREVIATIONS

| | |
|---|---|
| AIDS | Acquired Immunodeficiency Syndrome |
| ALOS | Average length of stay |
| BOR/BUR | Bed occupancy rate / bed utilisation rate |
| CHC | Community Health Centre |
| DHIS | District Health Information System |
| DOH(SA) | Department of Health – South Africa |
| DPSA | Department of Public Service and Administration |
| GDOH | Gauteng Department of Health |
| HIV | Human Immunodeficiency Virus |
| HR | Human Resources |
| HRH | Human Resources for Health |
| LMIC | Low- and medium-income countries |
| NHI | National Health Insurance |
| NIDS | National Indicator Data Set |
| OPD | Outpatients Department |
| OSD | Occupation Specific Dispensation |
| PCA | Principal Component Analysis |
| PHC | Primary Health Care |
| SA | South Africa |
| UHC | Universal Health Coverage |
| ZAR / R | South African Rand |

## LIST OF TERMS

**District health information system** (DHIS) – The health information system currently being used in South Africa that enables facility and district level health care providers to use locally generated information to improve the coverage and quality of health services (Williamson & Stoops, 2001).

**District hospital** – District hospitals provide general inpatient and outpatient services as well as 24-hour emergency health services. District hospitals can be classified based on their number of beds as small (50-150 beds), medium (150-300 beds) or large (>300 beds). Healthcare services are provided by general practitioners and clinical nurse practitioners to a defined population within a health district and support primary health care. District hospitals may receive outreach and support from general specialists based at regional hospitals (Dept. of Health (SA), 2012).

**Central hospital** – Central hospital provide sub-specialist and super-specialist services and central referral services and may provide national referral services. Central hospitals are attached to a medical school and provide training of health care providers and conducts research (Dept. of Health (SA), 2012).

**Financial year –** The 12-month reporting period for Government departments from 1 April to 31 March of the following year. As it spans 2 calendar years, the 12-month financial year is reflected as 2018/19 indicating the period from 1 April 2018 to 31 March 2019.

**Hospital performance** – Defined according to the achievement of specified targets, either clinical or administrative and measured by various indicators e.g. Bed occupancy rate, Average length of stay, Cost per patient day equivalent (Shaw et al., 2003).

**Occupation Specific Dispensation (OSD)** – The revised salary structures that are unique to each identified occupation in the public service and applicable to certain occupational categories including doctors, nurses, allied health professionals and

engineers. It was envisaged as a proper career pathing model for all occupational categories and a forward-looking plan to systematically increase salaries after pre-determined periods based on specific criteria such as performance, qualification, scope of work, and experience. OSD is centrally determined with a consolidated set of benefits and allowances. (Dept. of Public Service and Administration (SA), 2007b).

**Performance Management and Development System** (PMDS) – PMDS is the incentivised performance management system that is applied to all levels and sectors of public sector employees. Employees are evaluated on a quarterly and annual basis using a 5-point Likert scale to determine the financial incentive and possible grade promotion due to the employee (Dept. of Public Service and Administration (SA), 2007a).

**Regional hospital** – A regional or secondary level health facility provides specialised health services e.g. Internal medicine, Paediatrics, Obstetrics and Gynaecology, and General Surgery, to a defined regional drainage population. A regional hospital has between 200 and 800 beds and receives outreach and support from tertiary hospitals (Dept. of Health (SA), 2012).

**Specialised hospital** – A specialised hospital provides specialised health services like Psychiatric services, tuberculosis services, infectious diseases and rehabilitation services. Specialist hospitals may also be affiliated to a university as part of the teaching and training platform. Specialised hospitals have a maximum of 600 beds and care is provided by specialist doctors and medical officers (Dept. of Health (SA), 2012).

**Staff performance** – The effectiveness with which an employee performs activities that contribute to an organisation's technical core. Performance may refer to work effectiveness, quality and/or efficiency at the task level (Jankingthong & Rurkkhum, 2012).

**Tertiary hospital** – A tertiary hospital provides specialist level services provided by regional hospitals as well as sub-specialist and intensive care services under the

supervision of a specialist or specialist intensivist. Tertiary hospitals may also be academic hospitals and provide training for health care service providers (Dept. of Health (SA), 2012).

# 1. INTRODUCTION

## 1.1 Background

The South African National and Provincial Governments annually allocate substantial funding to health service delivery, yet the South African health sector continues to perform poorly relative to these significant investments (Chikobvu, 2016). At the first Presidential Health Summit in 2018, the President of the Republic of South Africa publicly recognised that the country's health system was in crisis and needed urgent reform (Shisana, 2019). This crisis had been particularly evident in Gauteng, the most densely populated province in South Africa, for many years and became more pronounced during the Covid-19 pandemic (Gauteng Dept. of Health, 2023) when the South African and global health systems came under additional strain.

To serve an estimated population of 15.1 million people (Statistics South Africa, 2023), the Gauteng Department of Health (GDOH) employs approximately 78 467 employees and spends more than ZAR 58.6 billion to deliver services through hospital and district health services (Gauteng Dept. of Health, 2023). Hospital-based health services are accessed through a network of 34 public sector hospitals: 4 central (quaternary) hospitals; 3 tertiary hospitals; 9 regional (secondary) hospitals; 12 district (primary) hospitals, and 6 specialised hospitals (Gauteng Dept. of Health, 2023). The need to improve service delivery in Gauteng hospitals, which are struggling to cater for a growing population in a resource-limited environment, has been repeatedly flagged (Rispel & Padarath, 2018), even prior to the Covid-19 pandemic. However, progress towards an efficient service has remained slow.

Due to the critical role hospitals play in providing higher levels of care, hospital performance has been considered across multiple dimensions but usually focuses on the quality of clinical care provided, the efficiency of resource use, and responsiveness to patients (Pourmohammadi et al., 2018; Shaw et al., 2003). To measure hospital performance, following international trends, a range of routine hospital indicators have been developed to monitor these aspects of public sector hospital performance in South Africa (Dept. of Health (SA), 2023). Indicators are based on headcounts relating

to the type of care (inpatient, outpatient, emergency, etc.), specific programmes (Mother and Child, Human Immunodeficiency Virus (HIV) / Acquired Immunodeficiency Syndrome (AIDS), etc.) or measures of efficiency (bed utilisation rate (BUR), expenditure per patient day equivalent (PDE), etc.), and the monitoring of these indicators is required for the functioning of health facilities and the health system (Dept. of Health (SA), 2023).

Health as a service is dependent on health workers of different categories to render patient care services directly or indirectly. Improved human resource (HR) management generally, and the introduction of performance management systems in particular, have been identified as key strategies for improving health system performance in low- and middle-income countries (LMIC) (Dieleman et al., 2009). Understanding the need for performance management in the public sector, the Department of Public Service and Administration of South Africa (DPSA) had invested significant resources in the design of the Performance Management and Development System (PMDS) (Dept. of Public Service and Administration (SA), 2007a). PMDS was designed to be applicable to all public sector departments, including health, and has since been implemented at provincial levels by the respective provincial departments of health.

The PMDS was aimed at planning, managing and improving employee performance in order to optimise every employee's output in terms of quality and quantity, thereby improving the respective departments' overall performance and service delivery (Dept. of Public Service and Administration (SA), 2007a). However, the measurement and evaluation of hospital performance and staff performance is done independently of each other with few investigations studying the relationship between them. There is a concern identified in scholarly discourse and research that the PMDS, as is currently implemented, continues to reward hospital employees for outstanding performance, while more objective metrics of hospital performance indicate significant deficiencies, and service users remain dissatisfied with hospital service delivery (Malefane, 2010).

The purpose of this research is to explore the trends and variation in available routine indicators of hospital and staff performance for public hospitals in Gauteng, and to

investigate if there is any relationship between the measures of hospital performance and staff performance.

## 1.2 Literature Review

### *1.2.1 Measuring hospital performance*

Over the last two decades there has been a significant focus on the measurement of health system performance (Anderson & Husscy, 2001; Day et al., 2021; Schroeder et al., 2006) with tools and indicators for evaluating the comparative performance of hospitals receiving particular attention (Jacobs et al., 2005; Massyn et al., 2015). Due to the complexities in developing, measuring and interpreting hospital performance, a range of process, output, quality and outcome indicators are collected by hospitals to evaluate levels of performance, identify areas of concern, and determine practical strategies for improvement (Taylor et al., 2015). In determining which indicators to report for hospitals, Chikobvu (2016) proposes that the set of indicators must properly cover all important dimensions, reflect aspects of functioning relevant to the current health context, be acceptable to potential users, and reveal problematic areas for hospitals to act upon. As performance indicators provide the link between operational activities and performance, they must also be comparable across institutions and health systems (World Health Organisation, 2016).

Various studies have identified the importance of measuring hospital performance across multiple dimensions by using multiple measures (Taylor et al., 2015). An early solution was the Pabon Lasso model which was developed in 1986 and used a graphical method for simultaneously evaluating hospital performance across three indicators: bed occupancy, average length of stay, and bed turnover (Mehrtak et al., 2014; Pabon Lasso, 1986). As the number of hospital performance indicators has since expanded, the complexity of interpreting this data has also increased. This has led to the development of composite performance indicators - a single summary measure produced by combining multiple individual indicators (Paakkonen & Seppala, 2014). While individual indicators measure specific aspects of hospital performance,

composite indicators present a single value that reflect multiple aspects and dimensions depending on the combination and weightings of the individual indicators used (Kara et al., 2022), and it is often assumed that the constituent parts of a composite indicator give a fair summary of the whole (Barclay et al., 2019).

Composite indicators have now become the most widely-used type of metric for evaluating hospital performance (Hofstede et al., 2019; Jacobs et al., 2005) and are considered to provide more information and more reliable rankings of hospital performance than single indicators or combining multiple years of a single indicator (Hofstede et al., 2019). Routine hospital performance monitoring systems relying on composite measures include those for American (Normand et al., 2008; O'Brien et al., 2007; Werner & Bradlow, 2006) and English (Jacobs et al., 2005; Jacobs & Goddard, 2007) hospitals. However, the use of composite hospital performance indicators has also been criticised for the lack of transparency in their calculation particularly in relation to the selection of indicators and the choice of weights (Barclay et al., 2019) .

A number of different mathematical methods have been used in the production of hospital composite indicators (Reeves et al., 2007). Many simply use the average of individual indicators (Normand et al., 2008), some standardise measures first (Jacobs et al., 2005), others apply unequal weighting based on expert judgement (O'Brien et al., 2007), while a few have utilised more complex statistical methods such as Principal Component Analysis (PCA) (Ehreth, 1994; Paakkonen & Seppala, 2014), Item Response Theory (IRT) (Normand et al., 2008), or other latent variable analysis methods (Chen et al., 2011; Shwartz et al., 2008). Overall, the development of composite indicators has improved the ability to detect true differences in hospital performance (Hofstede et al., 2019) from when they first began to appear in the late 1980's to present.

### *1.2.2 The impact of staff performance on hospital performance*

As healthcare is a service-related profession, the health professional and support staff within a facility are a key factor in determining hospital performance. Therefore, substantial research has focused on health worker performance within hospitals (Gile

et al., 2018; Taylor et al., 2015). A systematic review by Dieleman *et al* (2009) concluded that human resource (HR) interventions can improve health worker performance, although context is a critical factor in realising improved outcomes. Taylor et al. (2015) also conducted a systematic review of indicators that determine high performing hospitals and identified effective staff performance management as the third most significant factor in determining a hospital's level of performance following positive organisational culture and senior management support.

In terms of the quantitative association between hospital performance and staff performance, related health economics literature tends to focus more on the impact of health worker financial incentives to improve hospital performance (Brown & Sturman, M.C. Simmering, 2003; Gile et al., 2018; Steinmann & Zweifel, 2003). Studies on this relationship have explored the categories of health workers to be targeted in improving hospital performance (Luoma et al., 1996), the type of efficiencies realised through financial incentives (Bastian et al., 2016; Brown & Sturman, M.C. Simmering, 2003), and the unintended consequences of health worker performance evaluations and incentives on hospital performance (Mehrotra et al., 2012; Mendelson et al., 2017). Apart from the financial aspect, other literature in the field of performance of health workers tend to focus more on factors that affect staff performance from a human resource for health (HRH) perspective. These would include, but are not limited to factors associated with hospital staffing in terms of number of staff and types of employment (Al-Amin, 2019), work-life balance, occupational health and safety, and the effect of burn-out in different service areas such as mental health, emergency care and critical care, and the impact of HR interventions such as training and skills development (Gile et al., 2018).

Most of the literature on the relationship between hospital performance and staff performance tends to originate from Western countries. The applicability of these studies to the African context may be limited due to differences in the burden of disease, the high patient load at health facilities, and the availability of relevant hospital performance indicators (Dieleman et al., 2009; Gile et al., 2018). However, from the available literature, researchers have identified the association between institutional

performance and staff performance to be interdependent (Malefane, 2010) but complex (Gile et al., 2018).

A systematic review of studies conducted by Gile et al. (2018) on human resource interventions from Africa concluded that there is a significant gap in the literature exploring the relationship between hospital performance and staff performance and noted that the influence of contextual characteristics is seldom considered. Gile et al. (2018) identified that most studies focused on motivation-enhancing, skills-enhancing, and empowerment-enhancing interventions. While there was limited evidence of staff performance interventions on patient outcomes, it was noted that specific outcome improvements can be accomplished by different staff interventions, but the available studies did not allow for a structured set of relationships to be determined (Gile et al., 2018).

In the South African context, Malefane (2010) explored staff performance assessed by the PMDS system, institutional performance and service impact from a theoretical perspective, and contrasted it with the current practice in the South African public sector. He highlighted that interdependence must exist between individual and institutional performance, and performance assessments should ideally include performance impact. However, in the South African context, interdependence was not clearly evident. This potentially led to a situation where government employees were rewarded for outstanding performance, despite poor overall performance, and the intended beneficiaries of their service being dissatisfied (Malefane, 2010).

As hospitals and health systems in Africa face major workforce challenges, a better understanding of the relationship between hospital performance and staff performance in African settings will provide local policymakers and hospital management with important insights to improve both staff and hospital performance.

## 1.3 Statement of the Problem

The growing demand for public health services in South Africa, and in Gauteng in particular, requires public hospitals to be effective and efficient in the delivery of health services. Despite capturing and reporting on multiple hospital performance indicators, and significant changes in the staff performance management system, the usefulness of these measures and the relationship between hospital performance and staff performance indicators have not been explored in South African public-sector hospitals.

## 1.4 Justification of the study

As the public health sector faces high demands and is under constant strain, it is important that performance indicators reflect what is actually happening in facilities and differentiate between high and low performance in order to better target interventions to improve service delivery (Chikobvu, 2016). Combining multiple indicators or multiple years of data may result in a more reliable ranking of hospitals and staff (Hofstede et al., 2019).

Within facilities and government departments, it was purported on different platforms that there were inconsistencies in the measures of public hospital performance within Gauteng and the levels of staff performance reflected by the public sector PMDS assessments (Gauteng Dept. of Health, 2018; Malefane, 2010). Understanding the relationship between hospital performance and staff performance is critical to improving performance measurement and instituting relevant reforms. The study will provide guidance to health information managers, hospital managers, supervisors and policymakers in identifying areas for intervention to improve the monitoring of both health personnel and hospital performance.

## 1.5 Research Questions, Study Aim and Objectives

### *1.5.1 Research Questions*

The research questions for this study are:

1. What are the trends in hospital performance indicators and staff performance indicators of public hospitals in Gauteng?
2. How do current indicators relate to each other in capturing overall hospital performance?
3. Is there any relationship between hospital performance and staff performance for public hospitals in Gauteng?

### *1.5.2 Study Aim*

This study aims to explore trends and variation in routine indicators of hospital and staff performance for Gauteng public hospitals over an 8-year period and evaluate if there is any relationship between the staff performance and hospital performance measures.

### *1.5.3 Study Objectives*

This research study has three specific objectives:

1. Evaluate the trends in hospital performance indicators and staff performance indicators for Gauteng public hospitals over the 8-year period from 2013/14-2020/21.
2. Explore the relationship between different hospital performance indicators for Gauteng public hospitals over the 8-year period from 2013/14-2020/21 and investigate the construction of a composite index of hospital performance.
3. Investigate the relationship between hospital performance and staff performance for Gauteng public hospitals over the 8-year period from 2013/14-2020/21.

## 2. RESEARCH METHODOLOGY

To answer the research questions, a quantitative analysis was performed on existing datasets within the Gauteng Department of Health.

### 2.1 Primary datasets

The 2 datasets that were used in this research study were:

2.2.1. The hospital performance dataset comprising 11 key indicators for 34 public hospitals in Gauteng for an 8-year period (2013/14-2020/21).

2.2.2. The staff performance dataset comprising PMDS scores for 5 staff categories at 34 public hospitals in Gauteng for an 8-year period (2013/14-2020/21).

#### *2.1.1 Hospital performance dataset*

There are currently 34 public hospitals in Gauteng classified according to the level of service rendered. The number of hospitals per category is depicted in Table 2.1.

**Table 2. 1: Profile of Gauteng Department of Health Hospitals**

| Hospital level | Type of clinical services | Number of facilities |
|---|---|---|
| **Central** | Quaternary care, sub and super-specialised | 4 |
| **Tertiary** | Tertiary care, general and sub-specialised | 3 |
| **Regional** | Secondary care, general and specialised | 9 |
| **District** | Primary care, general | 12 |
| **Specialised** | Specialised care (Psychiatry, Infectious diseases, Rehabilitation) | 6 |
| **Total** | | **34** |

Hospital performance data are routinely collected by the hospital's health information officer or unit as per the indicators on the District Health Information System (DHIS)

on a weekly and/or monthly basis depending on the indicator. Some indicators measure overall hospital performance while other indicators measure programme performance based on the priority programmes outlined by the National Department of Health. At hospital level, data are aggregated and reported to hospital management on a monthly basis and then submitted to the Department of Health via Information Management templates and the DHIS system. On a quarterly and annual basis, the Gauteng Department of Health Monitoring and Evaluation Department presents summary reports to the various management structures and committees at the provincial Department of Health. Quarterly and annual data reports are presented at the Gauteng Department of Health Quarterly Reviews and published in the Department's Annual Report.

Hospital data are collected for multiple, different measures including head counts, output or outcome measures and quality indicators. From this data, 11 key indicators are used by the Gauteng Department of Health for all hospitals as measures of hospital performance as presented in Table 2.2.

**Table 2. 2: Performance Indicators for Gauteng Public-Sector Hospitals**

| Performance indicators | Explanation |
|---|---|
| **1. Inpatients Beds - Useable (#)** | The number of approved inpatient beds for the health facility. The number of approved beds is a semi-permanent data element. Any increase or decrease must be motivated and can only be done through the office of the HOD and National Department of Health should be informed when such changes occur. (Dept. of Health (SA), 2023) |
| **2. Bed Occupancy / Utilization Rate (BOR/BUR) (%)** | The occupancy of available beds in a facility. It is calculated using inpatient bed days as a proportion of maximum inpatient bed days (inpatient beds x days in period) available. It includes all specialties. (Gauteng Dept. of Health, 2023; Massyn & Mabuela, 2019) |
| **3. Average length of Stay (ALOS) (days)** | The average number of client days an admitted client spends in hospital before separation. Inpatient separation is the total of inpatient discharges, inpatient deaths and inpatient transfers out. It includes all specialties. (Dept. of Health (SA), 2023) |

| Performance indicators | Explanation |
|---|---|
| **4. Inpatient Days – total (days)** | Total number of days that inpatients spent in the institution during the period. A day is the count of all patients occupying a bed at midnight. (Dept. of Health (SA), 2023) |
| **5. Day Patients (#)** | The total count of inpatients admitted in hospitals and CHC/CDC and separated on the same calendar day.(Dept. of Health (SA), 2023) |
| **6. Emergency Head Count (#)** | All clients attending the Accident and Emergency (Casualty) and Trauma unit in a facility with conditions requiring emergency treatment only. (Dept. of Health (SA), 2023) |
| **7. OPD Head Count (#)** | The total count of patients attending the general or specialist outpatients' clinic/s. These include patients attending OPD for follow-up care, new clients attending a general or specialist outpatient clinic with a referral letter from a PHC facility or a doctor, and new clients attending a general or specialist outpatient clinic without a referral letter from a PHC facility or a doctor. (Dept. of Health (SA), 2023) |
| **8. Patient Day Equivalent (#)** | A normalized equivalency of inpatient patient days in which other types of patient encounter demographics (emergency department visits, outpatient surgeries, etc.) are converted proportionately using certain ratios. (Massyn & Mabuela, 2019). The PDE formula is the Inpatient days total + Day Patients * 0.5 + (Emergency headcount + OPD headcount total) * 0.33 (Dept. of Health (SA), 2023; Gauteng Dept. of Health, 2023) |
| **9. Cost per Patient Day Equivalent (ZAR)** | A process indicator that connects financial data (total hospital expenditure) with service-related data from the hospital admissions and outpatient records. It measures the average cost per PDE at a hospital and is expressed as Rand per PDE. (Massyn & Mabuela, 2019) |
| **10. Complaint resolution rate (%)** | Total number of complaints resolved during the reporting month within 25 working days from the complaint being logged as a proportion of all complaints resolved. (Dept. of Health (SA), 2023) |
| **11. Inpatient Crude Death Rate (%)** | Total number of deaths in a facility as a proportion of total inpatient separations. Inpatient separations include inpatient transfers out, deaths, and inpatient discharges. The indicator therefore includes deaths from all causes that occur in a health facility. (Dept. of Health (SA), 2023; Massyn & Mabuela, 2019) |

Source: (Dept. of Health (SA), 2023; Gauteng Dept. of Health, 2023; Massyn & Mabuela, 2019)

### *2.1.2 Staff performance dataset*

Gauteng Department of Health employees undergo performance evaluation and management according to the DPSA's Performance Management and Development System (PMDS). PMDS evaluations are conducted by supervisors at facility level and captured by the respective hospital's Human Resource Directorate.

Prior to 2019/20, scoring was done on a quarterly basis and aggregated to produce an average annual score for each individual employee. Post 2019/20, scoring is done on a biannual basis and a final score is captured for each employee. The annual individual PMDS score is then captured on the Persal System so employees can be paid their respective performance bonuses and employees on Occupation Specific Dispensation (OSD) will then be promoted to the next salary notch if they achieve an above-average score.

However, reports of PMDS scores and completion of staff performance evaluations are not extracted from the Persal system, but submitted annually in Excel format from a facility to the Gauteng Department of Health's Human Resource and Development Directorate where individual employee scores are aggregated per staff category as listed in Table 3 for reporting purposes.

**Table 2. 3: Staff Performance (PMDS) categories for Gauteng Public-Sector Hospitals**

| Category | Explanation |
|---|---|
| **Clinical** | Clinical Managers, Specialist doctors, Registrars, Medical Officers |
| **Nursing** | Matrons, Professional Nurses, Staff Nurses, Enrolled Nursing Assistants |
| **Allied** | Pharmacists, Occupational Therapists, Physiotherapists, Speech Therapists, Audiologists, Podiatrists |
| **Admin** | Personal Assistants, Secretaries, Ward Clerks, Administrative Clerks |
| **Support** | Cleaners, Porters, Laundry Workers, Gardeners, Facility Maintenance Workers |

Prior to 2019/20, the PMDS tool used (Appendix 6.4.1) consisted of 2 sections: (1) 12 generic performance dimensions, and (2) a variable number of measures for specific outputs relevant to the individual's job description. The 12 generic performance measures in Section 1 were:

PD 1: Work as a manager in the public sector
PD 2: Plan and sponsor department work across organisational boundaries
PD 3: Plan, organise and allocate work to achieve objectives
PD 4: Manage own performance and development
PD 5: Manage the performance and development of staff
PD 6: Plan service delivery to meet client expectations
PD 7: Develop initiatives for managing development and transformation processes in a workplace
PD 8: Communicate as a manager in the public service.
PD 9 Apply problem solving strategies as a manager in the public service
PD 10: Prepare and use budgets
PD 11: Maintain physical and/or electronic information records
PD 12: Use technology to achieve workplace objectives

In Section 2, specific outputs were determined between the individual employee and the supervisor to account for activities not captured in the generic performance measures above and may include special projects to be undertaken during the evaluation period. The type and number of specific outputs are determined by supervisor and employee based on the work plan that the employee developed for the financial year.

At the start of the evaluation period, each measure was assigned a weight out of 100% for that section according to the individual's job function. At the end of the evaluation period, each measure was scored on a 5-point Likert Scale (5-Clearly outstanding, 4-Signifcantly above expectations, 3-Effective and slightly above expectations, 2-Not fully effective but meets some requirements, 1-Unacceptable performance). For each measure, the score would be multiplied by the weight and the weighted score for each measure in the respective section was added to give a score out of 100% for that

section. The percentage score for both sections were then added and scaled to produce a final score out of 5 and rounded accordingly. The final score for an individual was captured by the hospital's HR Department according to the category of staff that the individual belonged to and submitted to the HR Department at the Provincial Department of Health.

In 2019/20, the PMDS tool changed in two significant ways (Appendix 6.4.2). Firstly, the 12 dimensions listed above were replaced by 4-5 key results areas (KRAs) to cover all aspects of an employee's performance as determined by the supervisor and the employee. Each KRA would carry a minimum weighting of 10% and a maximum weighting of 30%. Secondly, the scoring system changed from a 5-point system to a 4-point system whereby 4 = highly effective (achieving 120% and above on a KRA), 3 = fully effective (achieving 100-119%on a KRA), 2 = partially effective (achieving 67 - 99% on a KRA) and 1 = not effective (achieving 66% and lower on a KRA). Individual KRA scores were added based on the weight of each respective KRA to produce an overall score out of 4 based on the rating scales.

For each KRA, the employee would do a self-assessment and score themselves, then the supervisor would assess the employee and score them accordingly. Based on the discussion between employee and supervisor, an agreed score is then captured on the assessment tool. A detailed portfolio of evidence has to be submitted for a score of 3 and 4 to justify the score agreed on by employee and supervisor. PMDS scores and the accompanying portfolio of evidence were then moderated internally by a committee who may accept or adjust the score depending on the portfolio of evidence submitted. This final score is then captured on Persal and reported to the provincial HR department.

Table 2.4 below compares the scoring criteria of the old and new PMDS systems. When comparing the scores, a score of 1, 2 and 3 have remained the same, the old criteria for a score of 4 was removed, and the criteria used for a score of 5 became the criteria for a score of 4 on the new assessment tool (Dept. of Public Service and Administration (SA), 2007a, 2017).

## Table 2. 4: PMDS Score Criteria

| PMDS pre-2019 | | | PMDS post-2019 | | |
|---|---|---|---|---|---|
| 1 | Unacceptable performance | Performance does not meet the standard expected for the job. The review/assessment indicates that the jobholder has achieved less than fully effective results against almost all of the performance criteria and indicators as specified in the Performance Agreement and Work plan. | 1 | Not effective (less than or equal to 66%) | Performance does not meet the expected standard for the job. The review / assessment indicates that the jobholder has achieved less than fully effective results against all or almost all of the performance criteria and indicators as specified in the Performance Agreement and Work plan. |
| 2 | Performance not fully effective | Performance meets some of the standards expected for the job. The review/assessment indicates that the jobholder has achieved less than fully effective results against more than half of the performance criteria and indicators as specified in the Performance Agreement and Work plan. | 2 | Partially Effective (67%-99%) | Performance meets some of the standards expected for the job. The review/assessment indicates that the jobholder has achieved less than fully effective results (partially achieved) against more than half of the performance criteria and indicators as specified in the Performance Agreement and Work plan. |
| 3 | Performance fully effective | Performance fully meets the standard expected in all areas of the job. The review / assessment indicates that the jobholder has achieved as a minimum effective results against all of the performance criteria and indicators as specified in the Performance Agreement and Work plan. | 3 | Fully Effective (100% - 119%) | Performance fully meets the standard expected in all areas of the job. The review / assessment indicates that the jobholder has achieved as a minimum effective results against all of the performance criteria and indicators as specified in the Performance Agreement and Work plan. |
| 4 | Performance significantly above expectations | Performance is significantly higher than the standard expected in the job. The review/assessment indicates that the jobholder has achieved better than fully effective results against more than half of the performance criteria and indicators as specified in the Performance Agreement and Work plan and fully achieved all others throughout the performance cycle. | 4 | Highly Effective (120% - 133%) | Performance far exceeds the standard expected of a jobholder at this level. The review/assessment indicates that the jobholder has achieved better than fully effective results against more than half/or in all areas of the performance criteria and indicators as specified in the PA and Work plan and maintained this in all areas of responsibility throughout the performance cycle. |
| 5 | Outstanding performance | Performance far exceeds the standard expected of a jobholder at this level. The review/assessment indicates that the jobholder has achieved better than fully effective results against all of the performance criteria and indicators as specified in the PA and Work plan and maintained this in all areas of responsibility throughout the performance cycle. | | | |

## 2.2 Study Design

This study was longitudinal in design as panel data was analysed from the two administrative datasets (hospital performance dataset and staff performance dataset) for 34 public hospitals in Gauteng for an 8-year period (2013/14-2020/21).

## 2.3 Study Population

The study population comprised 34 public-sector hospitals in Gauteng for an 8-year time period 2013/14-2020/21.

## 2.4 Sampling method

Data from all 34 public sector hospitals in Gauteng was used for hospital performance and staff performance.

## 2.5 Data Collection and Extraction

Hospital performance data and staff performance data was requested for each of the 34 hospitals from their existing datasets. Panel data was collected for an 8-year period based on the GDOH financial year (2013/14; 2014/15; 2015/16; 2016/17; 2017/18; 2018/2019; 2019/20 and 2020/21).

Hospital performance data: Data was accessed from the Gauteng Department of Health Monitoring and Evaluation Directorate for the 8-year period (2013/14-2020/21). Data was extracted for the 11 efficiency indicators presented in Table 2.2 from the DHIS system into Excel spreadsheets for analysis.

Staff performance data: PMDS reports and datasets were accessed from the Gauteng Department of Health Human Resource Management Department. For each hospital, annual PMDS scores for all staff was extracted for the five staff categories routinely used by HR (Table 2.3) from de-identified staff performance datasets for an 8-year period (2013/14-2020/21). Staff performance scores per category per hospital per year were captured on Excel spreadsheets for analysis.

## 2.6 Data Processing and Analysis

### *2.6.1 Data processing*

Data from the two administrative datasets was obtained in Excel spreadsheets from the respective Directorates and imported into SAS for analysis. Identified missing data was requested directly from hospital managers / information officers. Where hospitals were still unable to provide missing data elements, linear interpolation methods were used to impute missing data into only 4 data points for only 1 indicator, expenditure per PDE. The 4 missing data points of expenditure per PDE were for Central hospitals in 2013/14, District hospitals in 2014/15, and specialised hospitals in 2013/14 and 2014/15. Considering that the missing data points related to financial costs to run a service and that budget allocations for public hospitals follow a historical funding allocation, as there were sufficient data points within the 3 affected hospital categories for the other 6 years of analysis, it was feasible to use interpolation methods for the missing data points in 2013/14 and 2014/15 than to exclude these two years from the analysis.

### *2.6.2 Data analysis*

**Objective 1: Evaluate the trends in hospital performance indicators and staff performance indicators for Gauteng public hospitals over the 8-year period from 2013/14-2020/21.**

There were 11 hospital performance indicators and 5 staff performance scores per hospital per year. All indicators were numerical variables. The 8-year trends were evaluated for each indicator and for each staff category according to hospital categories. Trends in the hospital and staff performance indicators over the 8-year period were evaluated by plotting the indicators over time.

For hospital performance, trends analysis was done comparing the 5 different hospital categories as per the level of care they provide (central, district, regional, specialised and tertiary). Cumulative values were used to determine performance for 6 indicators (Inpatient beds useable, Inpatient days, Day patients, Emergency headcount, OPD headcount, and PDE) while measures of central tendency were used for 5 indicators (Inpatient BUR/BOR, ALOS, Expenditure per PDE, Complaint resolution rate, and Inpatient crude death rate).

The percentage contribution of each hospital category to the cumulative total of each indicator and the average annual increase or decrease of each indicator over the 8-year period were also calculated. Basic descriptive statistics were used to investigate variation in the hospital performance data. Measures of dispersion (range, standard deviation, inter-quartile range) were used to characterise the variation in performance for each indicator across the 34 hospitals. As trend analysis was done for each indicator per hospital category, the same method was used to analyse performance of individual hospitals within the 5 hospital categories.

For staff performance, cumulative scores for all staff categories were first adjusted to accommodate the change in the PMDS tool in 2019/20. PMDS scores for all staff categories were adjusted based on the scoring criteria of the pre-2019/20 PMDS system or old system which was a 5-point scale. The rationale for adjusting the new scores to the old scoring system was that the old system was used for 6 out of the 8 years that were being analysed, or 75% of the time period. Furthermore, the scoring criteria for the new system was derived from the old system making it more accurate as a reference point. A PMDS score of 1, 2 and 3 on the new system was equivalent to a score of 1, 2 and 3 respectively on the old system and a score of 4 on the new system was equivalent to a score of 5 on the old system. After the scores were

adjusted to the old PMDS system, trend analysis was done for each staff category per hospital category for each year of the 8-year period.

**Objective 2: Explore the relationship between different hospital performance indicators for Gauteng public hospitals over the 8-year period from 2013/14-2020/21 and investigate the construction of a composite index of hospital performance.**

To explore the relationship between hospital performance indicators, the first step was to calculate the Pearson correlation coefficient between the 11 individual hospital performance indicators and construct a correlation matrix of the measures. Based on these results we then used principal component analysis (PCA) to investigate the construction of a composite index of hospital performance.

PCA is a statistical dimension reduction technique for constructing composite indices from multiple variables with the objective of improving the discrimination between cases (Ringnér, 2008). PCA identifies a set of new variables, the principal components, which are also linear combinations of the individual variables, but with unequal weights in order to maximise the variance of the composite measures (Rencher & Christensen, 2002). The identified principal components are orthogonal (uncorrelated with each other), with the first principal component capturing the most variance of the included variables.

While all 11 available indicators for 34 hospitals were used on the preliminary descriptive analysis of Objective 1, only 6 indicators were used in the PCA based on their correlation score. Patient day equivalent was already a composite indicator and is calculated using a formula consisting of inpatient days, day patients, emergency headcount, and OPD headcount. Therefore these 4 individual variables were not included in the PCA. Inpatient usable beds were also not included as it is a semi-permanent data element and remained relatively constant throughout the period of analysis.

For the 6 indicators included in the PCA, the Eigenvalues, scree plot and component loadings were examined to understand the appropriateness of each component as a composite performance measure for hospital performance. PCA was done for all hospitals for the entire study period as combining multiple years of data may result in a more reliable ranking of hospital performance (Hofstede et al., 2019).

**Objective 3: Evaluate the relationship between hospital performance indicators and staff performance indicators for Gauteng public hospitals over the 8-year period from 2013/14-2020/21.**

The analysis for Objectives 1 and 2 helped identify the most useful individual and composite indicators for determining hospital performance among Gauteng public hospitals. The relationship between hospital and staff performance was evaluated through multiple linear regression analyses, with hospital performance indicators as dependent variables and staff performance indicators as independent variables. For hospital performance individual indicators were used, and for staff performance the sum of performance scores for the 5 staff categories was used.

Due to the change in performance evaluation scoring in the last 2 years of the study period compared to the first 6 years, a period variable was also considered but led to multi-collinearity problems for regression. The direction, size and significance of the relationship was determined from the coefficients and p-values from the regression analysis.

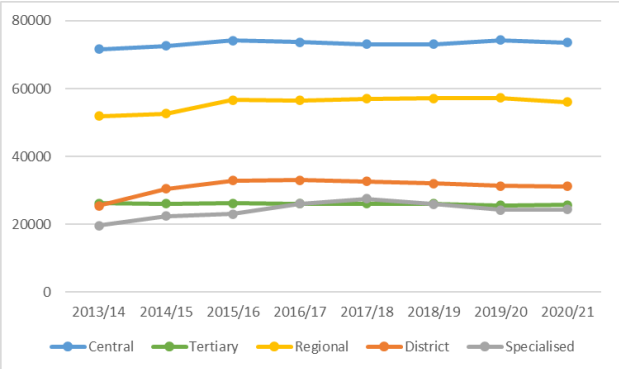
# 3. RESULTS

Data analysis was done on 34 hospitals (4 Central, 3 Tertiary, 9 Regional, 12 District and 6 Specialised) per financial year (1 April – 31 March) over an 8-year period (2013/14, 2014/15, 2015/16, 2016/17, 2017/18, 2018/19, 2019/20, and 2020/21). The most pertinent findings are presented as relates to each research objective.

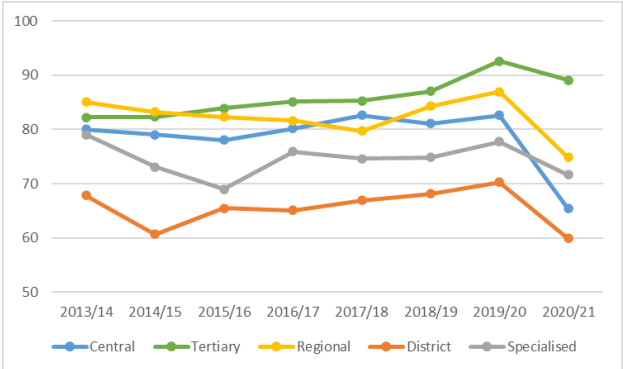
## 3.1 Objective 1: Evaluate the trends in hospital performance indicators and staff performance indicators for Gauteng public hospitals over the 8-year period from 2013/14-2020/21

### *3.1.1 Hospital performance by hospital category*

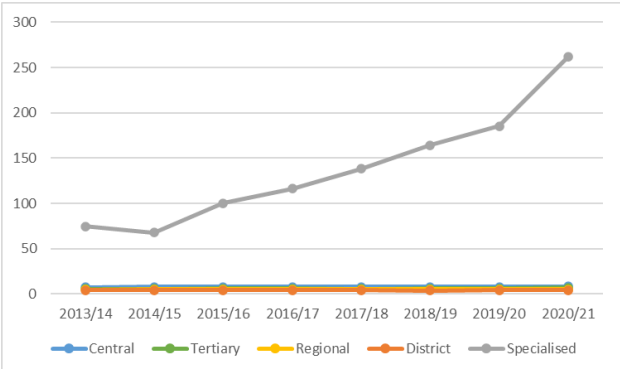
Figure 3.1 shows the trends in hospital performance indicators by hospital category over the study period. In Gauteng, the distribution of bed capacity is different to the number of hospitals per category for central, tertiary and district hospitals. The 4 central hospitals account for 12% of physical hospitals but contain 33-37% of total inpatient beds while the 3 tertiary hospitals account for 9% of hospitals but have 12-13% of usable beds (Figure 3.1.1 and 7.1.1). District hospitals have the highest number of physical hospitals with their 12 hospitals accounting for 35% of all hospitals in Gauteng, but only contributing 15% of the bed capacity in the province. Regional and specialised hospital were more proportionate in their number of facilities and inpatient bed capacity. The 6 regional hospitals constituted 26% of physical hospitals and contribute 26-27% of hospital beds, and the 6 specialised hospitals constitute 18% of physical hospitals and account for 12% of usable beds in Gauteng (Figure 3.1.1 and 7.1.1). The hospital category with the highest total number of usable inpatient beds for the entire period is central hospitals followed by regional hospitals. There were slight increases in the usable beds from 2013/14 to 2015/16 in central and regional hospital while in district and specialised hospitals number of beds increase slightly for an additional year until 2016/17 before stabilising for the rest of the years.



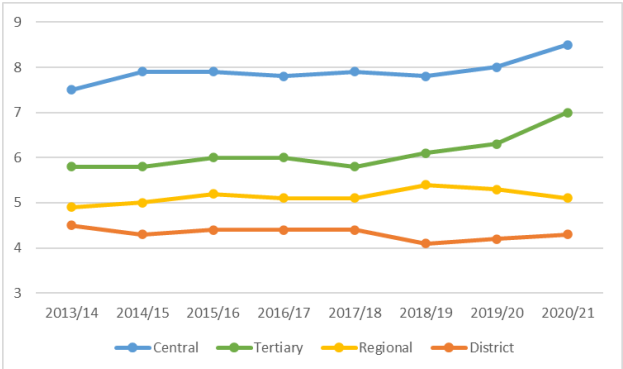

**3.1.1 Usable inpatient beds (sum)**



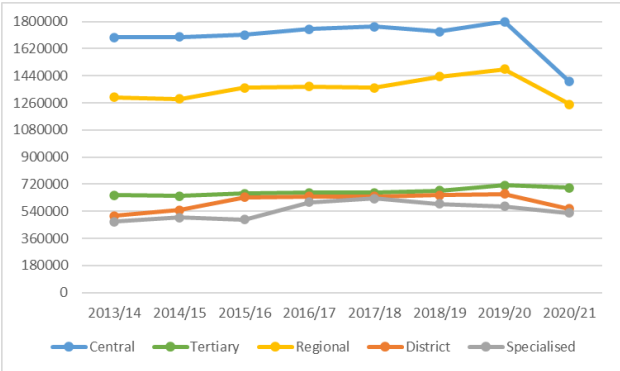

**3.1.2 Inpatient bed utilisation rate (%)(mean)**



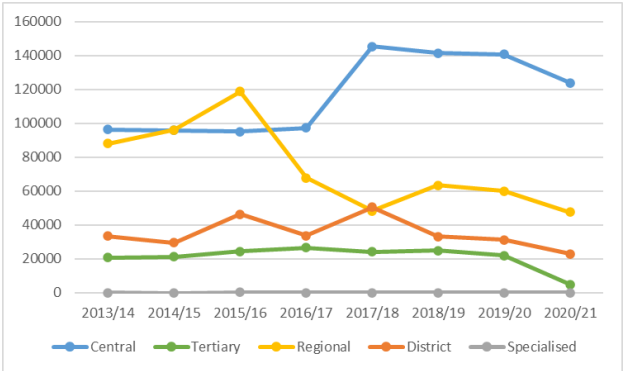

**3.1.3 (a) Avg. length of stay - all hospitals (days)(mean)**



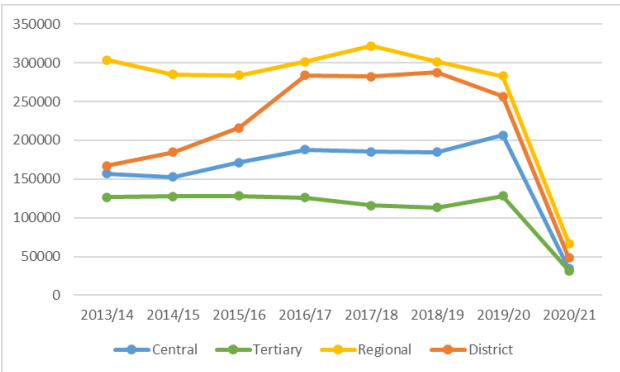

**3.1.3 (b) Avg. length of stay - acute hospitals (days)(mean)**



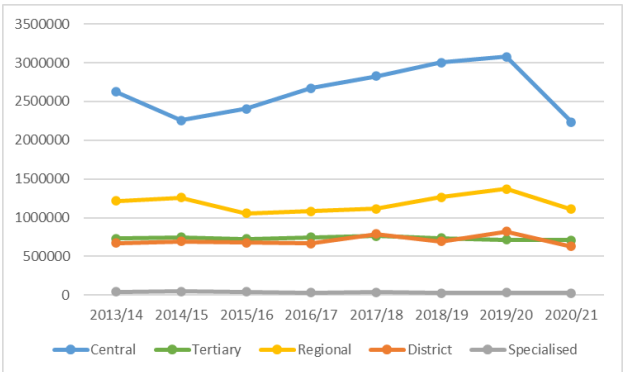

**3.1.4 Inpatient days (sum)**




**3.1.5 Day patients (sum)**




**3.1.6 Emergency headcount (sum)**




**3.1.7 OPD headcount (sum)**

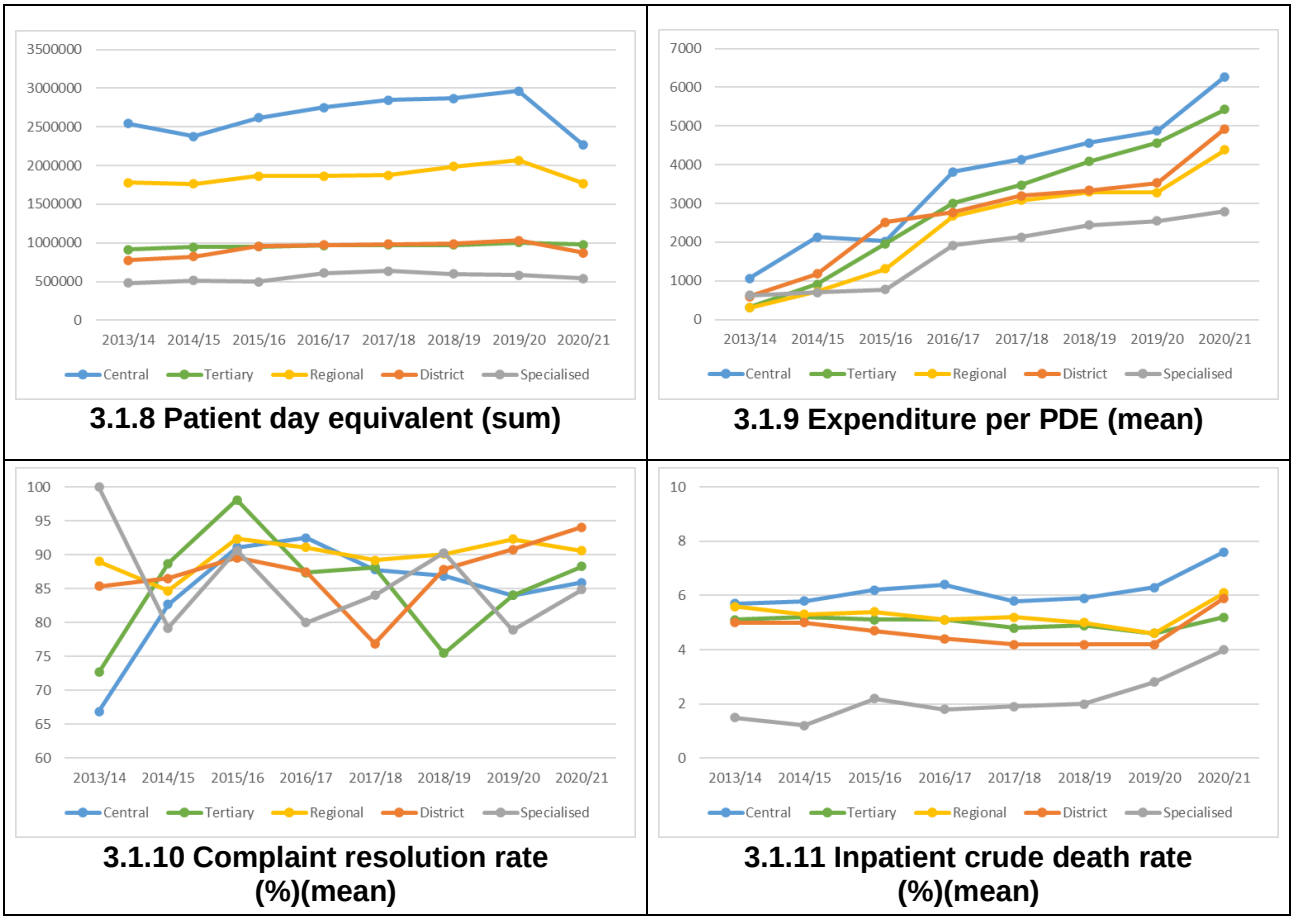



**Figure 3. 1: Hospital performance indicators by hospital category: 2013/14-2020/21**

The inpatient bed utilisation rate was highest in tertiary hospital with a BUR of over 80% for the entire period which peaked in 2019/20 at 93%. Regional hospitals had the second highest BUR being consistently over 80% followed by central hospitals with a BUR of between 78- 83%. BUR for specialised hospitals ranged between 70-80% and district hospitals consistently had the lowest BUR of between 60-70%. In 2020/21, the BUR declined for all hospital categories compared to the previous year due to the Covid-19 pandemic. Central hospitals experienced the greatest reduction of 21%, followed by district and regional hospitals with a reduction of 15% and 14% respectively, while specialised hospitals experienced a reduction of 8% in their BUR. Tertiary hospitals however experience only a 4% decline in their BUR still maintaining a high BUR of 89% during the first year of the Covid-19 pandemic.

The average length of stay was highest in the specialised hospitals for the entire period (Figure 1.3.3 (a)) with an annual average ranging between 75-262 days. On a closer look at the acute care hospital categories (Figure 1.3.3 (b)), ALOS in central hospitals were between 7.5-8.5 days, in tertiary hospitals between 5.8-7 days, in regional hospitals between 4.9-5.4 days and in district hospitals between 4.9-5.4 days. Overall, the average length of stay correlated with the level of care of the hospital category with patients at lower levels of care having shorter admissions than patients at higher levels of care and patients in specialised hospitals staying far longer in hospital than patients in acute care hospitals.

Compared to other hospitals, central followed by regional hospitals had the highest number of inpatient days for the entire 8-year period (Figure 3.1.4). However, inpatient days for all hospital categories showed a sudden decline in 2020/21 at the onset of Covid-19, with central hospitals experiencing the largest decline of 397 884 days from 2019/20 to 2020/21. Specialised hospitals had the lowest number of inpatient days for the entire period. Inpatient days followed a similar trend as the usable inpatient beds indicator from 2013/14 to 2019/20. Central and regional hospitals had higher inpatient beds and higher inpatient days. District hospitals however had a much higher number of usable inpatient beds than tertiary and specialised hospitals, but lesser inpatient days than tertiary hospitals and similar numbers of inpatient days as specialised hospitals for some years in the time period analysed.

The number of day patients (total count of admissions in hospital per calendar day) fluctuated in regional, central and district hospitals during the entire period (Figure 3.1.5). The number of day patients was consistent in tertiary hospitals from 2013/14 to 2019/20. Based on the different service offering, the number of day patients was minimal in specialised hospitals compared to other hospital types. All hospital types experienced a reduction in number of day patients in 2020/21.

Regional hospitals had the highest emergency headcounts for the entire period (Figure 3.1.6). Specialised hospitals do not have an emergency department so have no data for this indicator. There was a significant increase in the emergency headcount from

regional and district hospitals from 2013/14 to 2019/20. However, another significant decline was seen in emergency headcount in 2020/21 in all hospitals.

With regards to OPD headcount, central hospitals had the highest number throughout the period with a decline of 840 962 OPD visits from 2019/20 to 2020/21 (Figure 3.1.7). Central hospitals contributed an average 50% of the total OPD headcount in the province over the 8-year period (Figure 6.1.7). Regional hospitals consistently had the second highest OPD headcount averaging 22% of the outpatient service offering in Gauteng province. Tertiary and district hospitals recorded relatively the same OPD headcounts year on year each contributing 13-14% of the OPD service in the province (Figure 6.1.7). Specialised hospitals had the lowest OPD headcounts accounting for 1% of the total service offering.

Following these headcount patterns, patient day equivalent was highest in central hospitals followed by regional hospitals for the 8-year period (Figure 3.1.8) while specialised hospitals had the lowest patient day equivalent. From 2014/15 to 2019/20, PDE increased slightly year-on-year for central, regional and specialised hospitals, but remained relatively constant for tertiary and specialised hospitals. A sharp decline was seen in the year 2020/21 in these two hospital types.

The average expenditure per PDE was highest in central hospitals followed by tertiary hospitals with tertiary hospitals having steady year-on-year increases (Figure 3.1.9). District hospitals had higher expenditure per PDE than regional hospitals and the highest of all hospital categories in 2015/16. Specialised hospitals had the lowest expenditure per PDE consistently from 2014/15 to 2020/21.

Expenditure per PDE is a composite variable that connects financial data to service data, where the numerator is the total expenditure to run a facility and the denominator is PDE, which is a composite variable as well. Table 3.1 compared the percentage change of PDE and expenditure per PDE for each financial year compared to the previous financial year. Percentage changes range from 0-184%, and the differences in the percentage changes ranging from 1% to 181%. These changes are not in keeping with normal CPI or with medical inflation which is significantly higher than CPI.

Further analysis of the individual indicators, including total expenditure per facility is warranted to explore this finding further.

**Table 3. 1: Annual % change of PDE and expenditure per PDE**

| | | 2013/14 to 2014/15 | 2014/15 to 2015/16 | 2015/16 to 2016/17 | 2016/17 to 2017/18 | 2017/18 to 2018/19 | 2018/19 to 2019/20 | 2019/20 to 2020/21 |
|---|---|---|---|---|---|---|---|---|
| PDE | Central | -6,5% | +10,1% | +5,1% | +3,5% | +0,6% | +3,4% | -23,6% |
| | Tertiary | +3,1% | +1,0% | +1,4% | +0,5% | +0,1% | +3,1% | -2,4% |
| | Regional | -0,9% | +5,9% | -0,1% | +0,6% | +6,1% | +3,9% | -14,4% |
| | District | +6,4% | +16,1% | +1,7% | +1,1% | +0,8% | +4,1% | -15,5% |
| | Specialised | +7,2% | -3,3% | +23,0% | +3,9% | -5,8% | -2,5% | -7,9% |
| Expenditure per PDE | Central | +100,0% | -5,0% | +88,9% | +8,5% | +10,3% | +6,8% | +28,7% |
| | Tertiary | +184,5% | +115,1% | +53,5% | +15,4% | +17,7% | +11,6% | +19,0% |
| | Regional | +137,0% | +81,9% | +104,9% | +15,0% | +6,8% | -0,4% | +33,8% |
| | District | +100,0% | +113,4% | +10,1% | +15,6% | +4,5% | +5,5% | +39,9% |
| | Specialised | +11,1% | +11,1% | +146,5% | +11,2% | +14,4% | +4,6% | +9,4% |

The complaint resolution rate per hospital category increased over the time period in central, tertiary, regional and district hospitals (Figure 3.1.10). Comparing 2013/14 to 2020/21, there was a 2% increase in the complaint resolution rate in regional hospitals compared to a 19% increase in central hospital in the same time period. Specialised hospitals however fluctuated over the period and showed a decline of 15% in 2020/21 compared to 2013/14. Overall, as a province, the complaint resolution rate improved over time with the average rate being over 75% from 2014/15 and being over 85% in 2020/21 with regional and district hospitals achieving a complaint resolution rate of over 90%.

Central hospitals consistently had the highest inpatient crude death rate for the entire period of 5.7-7.6%, followed by regional hospitals (5-6.1%) and tertiary hospitals (4.8-5.2%) (Figure 3.1.11). Specialised hospitals had the lowest inpatient death rate throughout ranging from 1.2-2.8% but experienced a marked increase in 2020/21 to 4% (Figure 11). All hospital categories showed an increase in their inpatient death rate in 2020/21 with the largest increase in district hospitals of 40% compared to the previous year. Overall, the provincial average inpatient crude death rate was between 4.4-4.5% prior to 2020/21, when it experienced an increase to 5.8% with the onset of Covid-19 in that year.

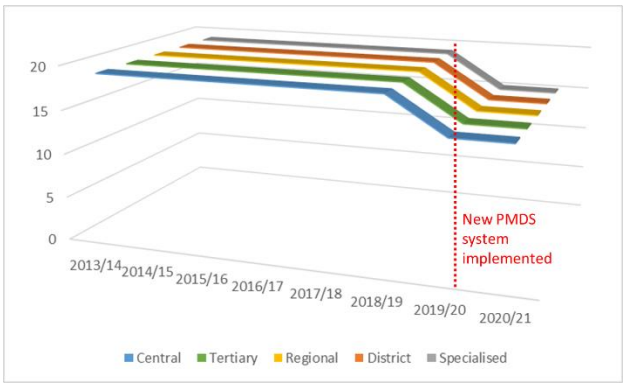
Means, standard deviations, medians and interquartile ranges (IQR) were calculated to determine the annual increase or decrease over the study period for all hospitals and for each hospital level (Appendix 6.1). Significant findings in specific indicators for hospital categories were presented in the trend analysis above. The analysis of individual hospitals within each category (central, tertiary, regional, district and specialised) is presented in Appendix 6.2.

### *3.1.2 Analysis of staff performance*

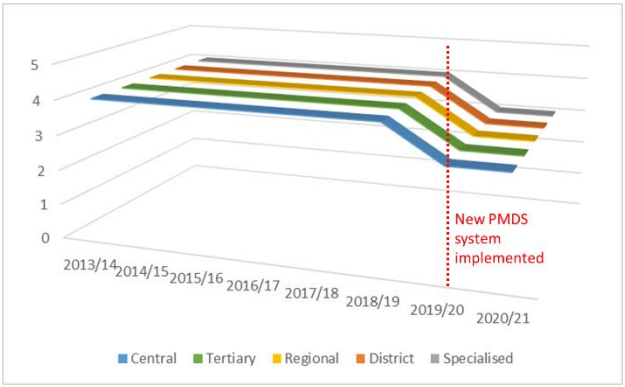
Staff performance data was analysed per hospital category and for each year of the analysis period according to the 5 staff categories: Administration, Allied, Doctors, Nursing and Support Staff. Figure 3.2 presents the trends of the staff performance score from 2013/14 to 2020/21 by hospital type, noting that the PMDS scores for the new PMDS system was adjusted according to the scoring criteria of the old PMDS system.

The cumulative score of each hospital category either equated to 19 or 15 (Figure 3.2.1). For each staff category, the scores for Administration (Figure 3.2.2), Allied (Figure 3.2.3), Nursing (Figure 3.2.5) and Support Staff (Figure 3.2.6) were the same across the hospital categories with no variation in the scoring with regard to level of hospital worked in. With the introduction of the new PMDS system, average performance scores changed from 4 to 3 for these 4 staff categories.

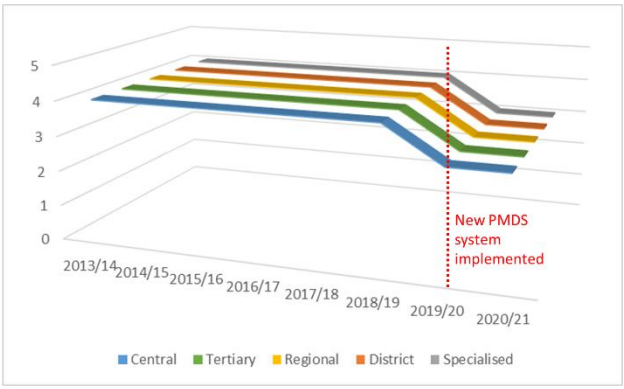
The average performance score for Doctors throughout the time period was 3 (Figure 3.2.4). From 2013/14 to 2018/19 when the old PMDS system was in place, Doctors scored lower that the other 4 staff categories. However, with the introduction of the new PMDS system in 2019/20, the scores of all 5 staff categories appear to be consistent.



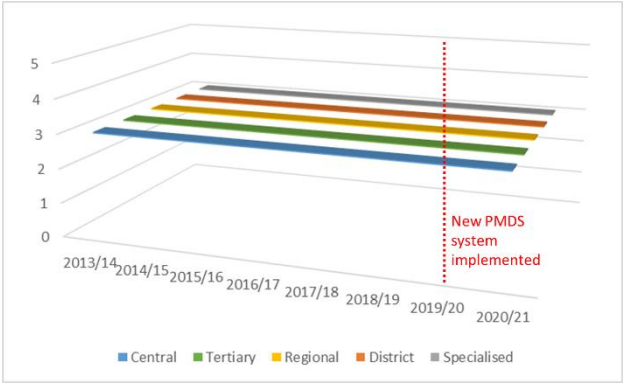

**3.2.1 Cumulative staff score**



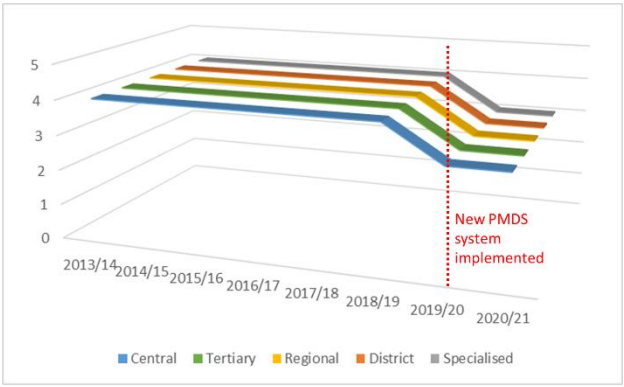

**3.2.2 Avg. PMDS score - Administration**



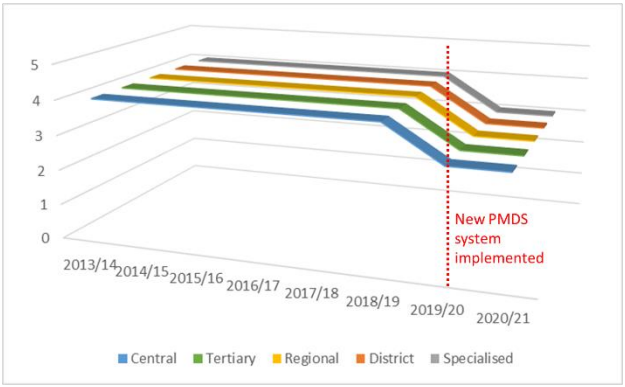

**3.2.3 Avg. PMDS score - Allied**




**3.2.4 Avg. PMDS score - Doctors**




**3.2.5 Avg. PMDS score - Nursing**




**3.2.6 Avg. PMDS score - Support**

**Figure 3. 2: Staff performance indicators by hospital category: 2013/14-2020/21**

## 3.2 Objective 2: Explore the relationship between different hospital performance indicators for Gauteng public hospitals over the 8-year period from 2013/14-2020/21 and investigate the construction of a composite index of hospital performance.

### *3.2.1 The correlation matrix of hospital performance indicators*

To evaluate the relationships between the different hospital performance indicators, the correlation matrix between the variables is presented in Table 3.2.

Variables that were very highly positively correlated (r>0.9) were inpatient beds and inpatient days, inpatient beds and patient day equivalent, and patient day equivalent and inpatient days. Variables that were highly correlated were inpatient beds, inpatient days and patient day equivalent with OPD headcounts and day patients.

Of note is that there is low and non-significant negative correlation of these measures (inpatient beds, inpatient days, PDE) with ALOS, expenditure per PDE and the complaint resolution rate.

**Table 3. 2: Correlation matrix of hospital performance indicators**

| Variable | Inpatient beds | BUR | ALOS | Inpatient days | Day patients | Emergency head count | OPD head count | PDE | Exp. per PDE | Complaint resolution rate | Crude death rate |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Inpatient beds** | 1 | | | | | | | | | | |
| **BUR** | 0.319* | 1 | | | | | | | | | |
| **ALOS** | -0.042 | -0.089 | 1 | | | | | | | | |
| **Inpatient days** | 0.989* | 0.413* | -0.049 | 1 | | | | | | | |
| **Day patients** | 0.619* | 0.163* | -0.051 | 0.582* | 1 | | | | | | |
| **Emergency headcount** | 0.561* | 0.364* | 0.383* | 0.597* | 0.313* | 1 | | | | | |
| **OPD headcount** | 0.735* | 0.314* | -0.195* | 0.736* | 0.713* | 0.353* | 1 | | | | |
| **PDE** | 0.960* | 0.396* | -0.081 | 0.967* | 0.666* | 0.564* | 0.874* | 1 | | | |
| **Exp. per PDE** | -0.040 | -0.077 | 0.02 | -0.03 | -0.019 | -0.085 | -0.029 | -0.051 | 1 | | |
| **Complaint resolution rate** | -0.016 | -0.029 | -0.085 | -0.017 | -0.181* | 0.021 | -0.039 | -0.012 | -0.007 | 1 | |
| **Crude death rate** | 0.164* | -0.146* | 0.282* | 0.138* | 0.007 | 0.099 | 0.179* | 0.169* | -0.052 | -0.018 | 1 |

### *3.2.2 PCA Analysis for the entire period 2013/14 – 2020/21*

The 6 variables used in the PCA analysis were patient day equivalent, bed utilization rate, average length of stay, expenditure per PDE, complaint resolution rate and inpatient crude death rate. Patient day equivalent was chosen for the PCA analysis as it is a composite variable calculated through a standardised formula containing inpatient days, day patients, emergency headcount and OPD headcount. Each of the other 5 variables in the PCA represented a different component of hospital performance and was selected accordingly.

The PCA analysis is presented in Table 3.3 below which shows that there are 2 components which accounted for most of the variance in hospital indicators that are suitable for extraction. Component 1 had an Eigenvalue of 1.486 and Component 2 had an Eigenvalue of 1.301. Components 3 and 4 were noted as their Eigenvalues were 1.018 and 0.975 respectively.

**Table 3. 3: PCA results for hospital performance indicators**

| Component | Eigenvalue | Difference | Proportion | Cumulative |
|---|---|---|---|---|
| Comp1 | 1.486 | 0.185 | 0.247 | 0.247 |
| Comp2 | 1.301 | 0.282 | 0.216 | 0.464 |
| Comp3 | 1.018 | 0.043 | 0.169 | 0.634 |
| Comp4 | 0.975 | 0.204 | 0.162 | 0.796 |
| Comp5 | 0.771 | 0.323 | 0.128 | 0.925 |
| Comp6 | 0.448 | . | 0.074 | 1 |

The scree plot in Figure 3.3 shows the Eigenvalues of each of the principle components extracted.

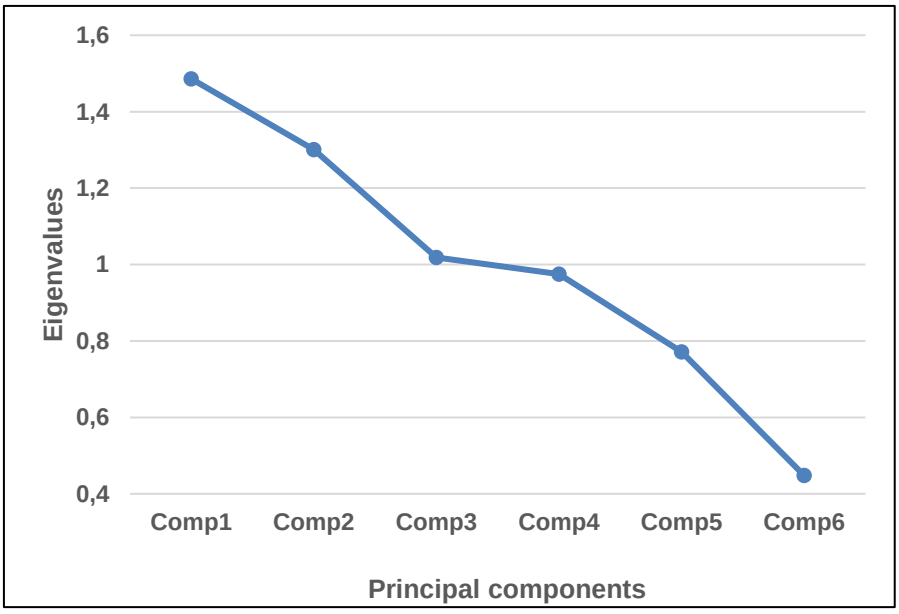



**Figure 3. 3: Scree plot of Eigenvalues**

Although the results of the PCA suggest 2 components of performance should be extracted, the eigenvalues are not high.

The component loadings as presented in Table 3.4 below indicate that Component 1 is related to patient day equivalent, bed utilisation rate, average length of stay and crude death rate. Component 2 is also related to patient day equivalent, bed utilisation rate, average length of stay and crude death rate but the relationship appears different. Component 3 which had an Eigenvalue of 1.018 appears to be clearly linked to the complaint resolution rate and Component 4 with an Eigenvalue of 0.975 is linked to expenditure per PDE.

**Table 3. 4: Factor loadings of PCA Analysis**

| Variable | Comp1 | Comp2 | Comp3 | Comp4 | Comp5 | Comp6 | Unexplained |
|---|---|---|---|---|---|---|---|
| **Patient day equivalent** | 0.500 | 0.540 | 0.066 | 0.201 | -0.240 | -0.595 | 0 |
| **Bed Utilisation Rate** | 0.646 | 0.225 | -0.143 | 0.023 | 0.442 | 0.561 | 0 |
| **Average length of stay** | -0.444 | 0.449 | -0.123 | 0.006 | 0.717 | -0.266 | 0 |
| **Expenditure per PDE** | -0.077 | -0.164 | -0.555 | 0.809 | -0.042 | 0.013 | 0 |
| **Complaint resolution rate** | 0.039 | -0.205 | 0.782 | 0.514 | 0.282 | -0.006 | 0 |
| **Inpatient crude death rate** | -0.356 | 0.620 | 0.195 | 0.197 | -0.388 | 0.509 | 0 |

## 3.3 Objective 3: Evaluate the relationship between hospital performance indicators and staff performance indicators for Gauteng public hospitals over the 8-year period from 2013/14-2020/21.

Linear regression was done separately for the 6 hospital performance indicators and the 2 principal components with the cumulative staff score for each hospital category. The cumulative staff score was used because, as shown in Objective 1, the

performance scores for the different staff categories were identical and completely correlated, and doing regression analysis of the different staff categories separately is not possible due to multi-collinearity problems. The year and hospital type were included as additional covariates in these models. District hospitals were used as the base or control for both linear regression analyses.

The output of linear regression for staff performance against the different hospital indicators is presented in Table 3.5. PDE, BUR and complaints resolution rate had positive coefficients but the respective p-values ranging from 0.462 to 0.702. The largest coefficient for PDE was in relation to central hospitals, for BUR was in relation to tertiary hospitals, and for complaints resolution was in relation to regional hospital. ALOS, expenditure per PDE and crude death rate had negative coefficients and p-values ranging from 0.122 to 0.471. The largest absolute coefficient for ALOS was in relation to specialised hospitals, for expenditure per PDE was in relation to specialised hospitals and for crude death rate was in relation to central hospitals.

Overall, although the absolute coefficient was high for some of the individual hospital indicators, the p-values indicate that there was no significance on the variable tests for all the models signifying that there was no relationship between the hospital performance indicator and the staff performance score. There is however some variation by hospital as the variable tests did differ for the different indicators.

**Table 3. 5: Regression analysis exploring the relation between staff performance and hospital performance indicators (PDE, BUR, ALOS, Expenditure per PDE, Complaint resolution rate and Crude death rate)**

| | Patient Day Equivalents | | | Bed Utilisation Rate | | | Average Length of Stay | | |
|---|---|---|---|---|---|---|---|---|---|
| Variables | *Coef* | *95%CI* | *p value* | *Coef* | *95%CI* | *p value* | *Coef* | *95%CI* | *p value* |
| **HR performance score** | **4,102.2** | **[-6,871.9 - 15,076.2]** | **0.462** | **0.3** | **[-1.0 - 1.5]** | **0.652** | **-11.7** | **[-34.8 - 11.4]** | **0.320** |
| Year | 4,454.2 | [-3,919.1 - 12,827.5] | 0.296 | -0.2 | [-1.1 - 0.8] | 0.719 | 5.9 | [-11.8 - 23.5] | 0.512 |
| District hospitals (Ref) | — | | | — | | | — | | |
| Central hospitals | 584,438.9 | [542,513.3 - 626,364.5] | <0.001*** | 15.0 | [10.2 - 19.8] | <0.001*** | 4.7 | [-83.6 - 92.9] | 0.917 |
| Tertiary hospitals | 242,025.3 | [195,189.6 - 288,860.9] | <0.001*** | 21.5 | [16.2 - 26.9] | <0.001*** | 3.2 | [-95.4 - 101.7] | 0.950 |
| Regional hospitals | 128,588.9 | [96,473.8 - 160,704.0] | <0.001*** | 18.9 | [15.2 - 22.6] | <0.001*** | 1.8 | [-65.8 - 69.4] | 0.957 |
| Specialised hospitals | 13,810.6 | [-22,547.8 - 50,168.9] | 0.455 | 3.5 | [-0.6 - 7.7] | 0.096 | 223.9 | [146.8 - 300.9] | <0.001*** |
| Constant | -14,617.8 | [-243,339.8 - 214,104.2] | 0.900 | 59.8 | [33.6 - 86.0] | <0.001*** | 186.9 | [-294.4 - 668.3] | 0.445 |
| *Observations* | | *269* | | | *269* | | | *268* | |
| *R-squared* | | *0.764* | | | *0.363* | | | *0.149* | |
| *p value* | | *<0.001* | | | *<0.001* | | | *<0.001* | |

| | Expenditure / PDE | | | Complaint Resolution Rate | | | Crude Death Rate | | |
|---|---|---|---|---|---|---|---|---|---|
| Variables | *Coef* | *95%CI* | *p value* | *Coef* | *95%CI* | *p value* | *Coef* | *95%CI* | *p value* |
| **HR performance score** | **-678.3** | **[-2,529.8 - 1,173.1]** | **0.471** | **0.4** | **[-1.5 - 2.2]** | **0.702** | **-0.2** | **[-0.5 - 0.1]** | **0.122** |
| Year | -821.7 | [-2,234.4 - 591.0] | 0.253 | 1.0 | [-0.5 - 2.5] | 0.180 | -0.0 | [-0.2 - 0.2] | 0.864 |
| District hospitals (Ref) | — | | | — | | | — | | |
| Regional hospitals | -2,962.0 | [-8,380.1 - 2,456.1] | 0.283 | 2.8 | [-2.6 - 8.1] | 0.310 | 0.4 | [-0.5 - 1.3] | 0.347 |
| Tertiary hospitals | -2,525.9 | [-10,427.5 - 5,375.7] | 0.530 | -1.1 | [-8.7 - 6.6] | 0.786 | 0.5 | [-0.8 - 1.7] | 0.481 |
| Central hospitals | -1,791.3 | [-8,864.6 - 5,281.9] | 0.618 | 0.6 | [-6.3 - 7.4] | 0.869 | 1.2 | [0.0 - 2.3] | 0.041* |
| Specialised hospitals | 3,712.1 | [-2,421.9 - 9,846.1] | 0.234 | -1.1 | [-7.4 - 5.1] | 0.720 | -1.2 | [-2.2 - -0.2] | 0.015* |
| Constant | 21,455.1 | [-17,132.5 - 60,042.7] | 0.275 | 74.0 | [35.6 - 112.3] | <0.001*** | 9.1 | [2.9 - 15.2] | 0.004** |
| *Observations* | | *269* | | | *254* | | | *268* | |
| *R-squared* | | *0.023* | | | *0.018* | | | *0.075* | |
| *p value* | | *0.415* | | | *0.593* | | | *0,002* | |

(*** p<0.001, ** p<0.01, * p<0.05)

The output of linear regression of the first 2 principal components is presented in Table 3.6. Staff performance in relation to principal component 1 had a coefficient of 0.1 and a p-value of 0.117, while staff performance in relation to principal component 2 had an absolute coefficient of -0.1 and a p-value of 0.232. For both principal components, it was noted that all other hospitals categories performed better than District hospitals.

Although variable tests did differ by year and hospital category creating some variation, there was no significance on the variable tests for both principal components. This therefore confirmed that there was no correlation that could be determined between the principal components measuring hospital performance and the staff performance score.

**Table 3. 6: Linear regression analysis exploring the relation of staff performance and principal components 1 and 2**

| | **Composite Index Component 1** | | | **Composite Index Component 2** | | |
|---|---|---|---|---|---|---|
| Variables | *Coef* | *95%CI* | *p value* | *Coef* | *95%CI* | *p value* |
| **HR performance score** | **0.1** | **[-0.0 - 0.2]** | **0.117** | -0.1 | [-0.2 - 0.0] | 0.232 |
| Year | -0.0 | [-0.1 - 0.1] | 0.948 | -0.0 | [-0.1 - 0.1] | 0.856 |
| District hospitals (Ref) | — | | | — | | |
| Regional hospitals | 1.2 | [0.9 - 1.5] | <0.001*** | 0.7 | [0.4 - 1.0] | 0.000*** |
| Tertiary hospitals | 1.5 | [1.1 - 2.0] | <0.001*** | 1.1 | [0.7 - 1.5] | 0.000*** |
| Central hospitals | 1.9 | [1.5 - 2.3] | <0.001*** | 2.0 | [1.6 - 2.4] | 0.000*** |
| Specialised hospitals | -0.1 | [-0.4 - 0.3] | 0.720 | 0.3 | [-0.0 - 0.7] | 0.056 |
| Constant | -2.1 | [-4.3 - 0.0] | 0.053 | 0.6 | [-1.6 - 2.7] | 0.614 |
| *Observations* | | *253* | | | *253* | |
| *R-squared* | | *0.404* | | | *0,319* | |
| *p value* | | *<0.001* | | | *<0.001* | |

(*** p<0.001, ** p<0.01, * p<0.05)

# 4. DISCUSSION

## 4.1 Summary of Key Findings

Overall, capacity in the health system in Gauteng has not increased and output has slightly increased over the 8-year period. The trends suggest that the majority of inpatient and outpatient care is being provided by central hospital where the costs of care are the highest. Regional hospitals follow closely on most indicators except emergency headcount and expenditure per PDE. Emergency care is provided more by regional and district hospitals, but it costs more to treat a patient at a district hospital than a regional hospital. Specialised hospitals tend to be outliers on most of the indicators assessed. Of particular note is the change in trends in 2020/21, the first year of the Covid-19 pandemic, with significant fluctuations seen in many hospital performance indicators.

Staff performance had similar scores for all 5 staff categories for each year of analysis with doctors being scored lower than other staff categories. The introduction of the new PMDS system resulted in an overall reduction in performance scores with all 5 categories achieving the same scores.

PCA analysis determined that patient day equivalent, bed utilisation rate, average length of stay and inpatient crude death rate could form a composite indicator of hospital performance. However, it is not straightforward to capture hospital performance in a single indicator as each of these indicators captures a different element of performance.

The key finding of this research is that there was no correlation between hospital performance and staff performance over the 8-year period based on both individual indicators and principal components.

## 4.2 Study findings in relation to the current body of knowledge

### *4.2.1 Measuring hospital performance*

Appropriately measuring hospital performance has become essential to providing healthcare in all contexts, but especially in low- and middle-income countries with increasing patient volumes, escalating healthcare costs and limited resources (Budimir et al., 2016; Diaconu et al., 2021). Currently there are sets of hospital indicators used widely to measure hospital performance, but no unanimous classification exists (Carini et al., 2020). As such, hospital performance measures used in Gauteng public hospitals have focused more on headcounts and outputs than quality, efficiency and outcomes with service provision often following historic patterns rather than purposeful data-driven approaches. While it is difficult to identify clear performance patterns among disparate indicators, it remains uncertain if the selected indicators used in Gauteng hospitals are actually able to differentiate well-performing from poorly-performing hospitals as described in the literature by Taylor et al. (2015) .

A well-known phenomenon within health systems is the inverse care pyramid where the majority of healthcare services are provided by specialists and super-specialists with a curative focus lens instead of services being provided at the primary and community level with a preventative focus (Du et al., 2019). A similar phenomenon appears in Gauteng with central and tertiary hospitals, although fewer in number, seeing far higher patient volumes compared to district and regional hospitals. Of note is that both these groups are managed separately at a provincial level, with central and tertiary hospitals overseen by the clinical services directorate and regional and district hospitals managed by District Health Services (Gauteng Dept. of Health, 2023). The separate reporting and accountability lines for the different levels of hospitals in Gauteng can result in fragmented monitoring of performance, resource allocation and service delivery affecting the overall strategic management of hospitals and health systems as reported by Budimir et al. (2016).

In analysing hospital capacity and output, this study has identified that the overall capacity in the health system in Gauteng has not increased, and output has slightly

increased in the period of evaluation despite rapid population growth in the province (Gauteng Dept. of Health, 2023). Gauteng Dept. of Health (2023) have identified but not measured the burden of care especially on existing hospitals who service higher volumes and complexity of patients. The impact of this was evident when the Covid-19 pandemic exposed and amplified the long-standing challenges in Gauteng's healthcare system including inappropriate decisions and fragmented planning of services at hospital level, poor data quality, corruption, and the chronic under-investment and insufficient focus on the health workforce (Rispel et al., 2021).

In terms of hospital performance, a greater mix of operational and quality indicators have been shown to provide a more comprehensive picture of hospital performance and healthcare system productivity, increasing the need and use of composite indicators in measuring hospital and healthcare systems performance (Lahariya, 2020). Historically, Gauteng hospitals have focused on predominantly output-based indicators as a measure of hospital performance as demonstrated by only complaint resolution rates routinely collected among potential quality assurance datasets. However, in recent years, with the advent of national quality assurance evaluation tools, hospitals have begun to report more regularly on a greater number of quality-of-care based indicators (Gauteng Dept. of Health, 2023) which assists hospital managers at a local level to improve hospital performance and the provincial department improve overall health system performance (REF).

The indicators used by monitoring and evaluation units to assess hospital performance also need to include a mix of output, process, quality and outcome indicators (Carini et al., 2020), with composite indicators, within and across these indicators types, being more widely used to provide a more reliable ranking of hospital performance than the exclusive use of single indicators or a single type of indicator (Hofstede et al., 2019). As seen in this analysis of hospital performance, both single and composite indicators provide different perspectives of hospital performance when data sets are complete and uniform across facilities which aligns to the scholarly discourse regarding indicators to consider when measuring hospital performance as described by Carini et al. (2020) However, a greater number of process, quality and outcome indicators than

currently collected and reported by Gauteng Department of Health for the analysis period would strengthen this inference.

### *4.2.2 The importance of measuring hospital performance in Gauteng*

Hospital performance should align with the goals of the health system in which those hospitals exist. Universal health coverage (UHC) has been the goal of health systems across the world for decades to ensure that citizens of a country get equitable access to healthcare services (Lahariya, 2020). As South Africa continues to make strides towards UHC through the implementation of the National Health Insurance (NHI), monitoring and evaluation will play a critical role in the planning and distribution of services, improving the quality of care, and the disbursement of funds (Day et al., 2021; Diaconu et al., 2021). From a financing perspective, in the proposed NHI structure, healthcare providers including hospitals will directly access and bill the NHI fund for services provided (Mash, 2020), fundamentally changing the current system where provinces are responsible for the overall management of hospitals and the disbursement of hospital budgets.

Therefore, integrated information and data systems will form the basis of NHI implementation, and the monitoring and evaluation thereof will inform service provision and service delivery directly. Appropriate, accurate and timeous capturing and submission of information will ultimately impact the disbursement of funds to health facilities and their ability to provide their current and future services. This research has highlighted a gap between current data collection and reporting practices from the type of hospital indicators to the quality of staff performance indicators. In the context of the goals of the envisaged NHI in South Africa (Mash, 2020), the extent of that gap will be determined as NHI implementation becomes more widespread across the province and country.

In Gauteng, this research has identified a concern around the performance of District hospitals who have the highest number of hospitals per category of all hospitals in the province. The first phase of NHI implementation in South Africa, commenced in 2012 and concluded in 2017, focused on health system strengthening through pilot sites at

the primary and district health care level (Zondi & Day, 2019). During this time, BUR and emergency headcounts were on an upward trend in District hospitals with mild fluctuations in OPD headcounts indicating increased use of this service and suggesting an increase in access to hospital-based services. Cost per PDE also went up for district hospitals suggesting greater financial allocations. This however could not be investigated in detail due to the study period and the impact of Covid-19 on the different hospital indicators, and the improvements suggested thus far appear to have little impact on shifting the inverse care pyramid as described by Du et al. (2019).

Hafner et al. (2011) and Nunes et al. (2023) have highlighted that the public reporting of hospital performance data not only increases transparency and accountability but has been shown to motivate and energise organisations to improve and / or maintain levels of performance. Currently, Gauteng Department of Health publishes an annual report encompassing the performance of the entire health service in the province. Reporting is programme-based covering Administration, District health services, Central hospital services, Provincial hospital services, Emergency medical services Health care support services, Health science and training, and Health facilities management (Gauteng Dept. of Health, 2023). Current reporting focuses on performance of the preceding financial year and does not factor changes over a period of time, but this study has emphasised the need to report on data over a period of time as it allows for greater transparency, accountability and governance (Nunes et al., 2023).

### *4.2.3 The relationship between hospital performance and staff performance*

While this research found no correlation between hospital performance and staff performance in Gauteng hospitals based on the available data, the separate reporting structures and the different measurement tools, staff performance remains an important concern within the public health systems. Health workforce management is essential for the progressive realization of universal health coverage globally (Cometto et al., 2020) and especially in Gauteng where chronic underinvestment in and lack of prioritisation of the health workforce has been identified as a significant challenge (Rispel et al., 2021). While adequate hospital staffing levels are important to achieve

better hospital performance (Al-Amin, 2019), measurement of staff performance including the selection and definition of performance indicators across a health system and the appropriate reporting timeframes provides a basis for strategic management of hospitals and healthcare systems (Budimir et al., 2016).

The findings and concerns in this study regarding staff performance align to the academic discourse and research mentioned by Malefane (2010) when he evaluated staff performance as per the PMDS system used in South African public service and highlighted the problems with the way it was implemented. This study has found that there is a lack of variation in staff performance irrespective of staff category emphasising the disconnect of PMDS evaluations alluded to by Malefane (2010) who suggested that staff were being rewarded for high work performance, despite public departments failing to meet their service obligations. With particular reference to the South African hospital environment, Combrink (2021) found that the implementation of PMDS affects staff performance which would then affect hospital performance. HR practices including the execution of PMDS within hospitals, insufficient feedback on performance outcomes, poor recognition of employees who perform above expectations, the lack of or delays in implementing annual salary increases and the lack of resources to perform as agreed, are directly associated with the quality and degree of the performance of healthcare personnel (Combrink, 2021).

In order to optimise the health workforce towards UHC and the implementation of NHI, no best practices can simply be replicated across countries (Cometto et al., 2020). With the implementation of the new performance management tool across the public sector, hospitals in Gauteng have to identify uniform key results areas (KRAs) for all hospitals. The research finding of no correlation between hospital performance and staff performance in Gauteng emphasises the need for staff performance KRAs to be linked to hospital performance indicators from an output, process, quality and outcome perspective, as relates to the clinical service or respective area in which staff perform their daily work.

## 4.3 Strengths and Limitations of this study

### *4.3.1 Strengths*

With regards to hospital performance and staff performance and their relationship, this is the first time that an analysis of this kind is being done of public hospitals in Gauteng. Hospital performance was based on a robust well-established dataset with only 4 missing data points providing reliable data measurement. The time period of 8-years covered in the analysis provided increased data points for analysis. Of note was the impact of the start of the Covid-19 pandemic on hospital performance where Gauteng experienced the highest burden of disease amongst all the provinces in South Africa. This research study is also the first time that trend analysis of Gauteng hospitals was analysed across multiple years, multiple levels of care, and multiple hospitals within the different levels of care, and presented outside of provincial management platforms.

For staff performance, this research project is also the first detailed look at actual staff performance measures in hospitals as captured on the PMDS and reported on existing structures. Comparing the adjusted scores of the old and new PMDS systems was also insightful as there was some change that was evident though the impact remains questionable.

Considering the demands on Gauteng public sector hospitals, this exploratory investigation into hospital performance and staff performance can provide useful insights to various stakeholders for targeted interventions to improve health service delivery in the province.

### *4.3.2 Limitations*

This research is based on secondary data analysis of administrative datasets and was dependent on the quality and integrity of the primary datasets obtained from GDOH. Hospitals, as per their classification and services, report on different indicators on DHIS and to GDOH. For the study period, only 11 indicators were consistently reported on by all hospitals in Gauteng and all 11 indicators were used in this study. With missing data, linear interpolation was used on only 4 data points in the trend analysis.

The indicators currently collected and reported on by Gauteng hospitals are predominantly output-based indicators. A larger number of indicators, including indicators focused on efficiency and quality of care metrics within hospitals would have enriched the analysis. The sample size for this study was another limitation as there are only 34 public hospitals in Gauteng, hence panel data was used over an 8-year period as compared to a 5-year period when the study was originally undertaken.

PMDS data are the only available performance management measure and is conducted in a subjective manner as performance scores are agreed between supervisor and employee. Performance contracts are still paper based and only the final score is captured per individual on the Persal system at institution level and an excel report sent to the head office. Unfortunately, only the final score is captured and not how the score was calculated or the KRAs the score was based on. While this limited the extent to which staff performance could be investigated, it still allowed for the analysis to be conducted. The change in the staff performance management tool shifted the scoring from a 5-point scale to a 4-point scale, but the trend appeared consistent based on the 2 years of data on the new scoring system and was therefore included in the analysis.

This study evaluated a statistical association and made no inference on causality. As this was a preliminary investigation, it does raise concerns about how both hospital performance and staff performance are measured, captured and reported.

# 5. RECOMMENDATIONS AND CONCLUSION

## 5.1 Recommendations for future research

As a preliminary investigation, this study has highlighted the need for further investigation into both hospital and staff performance within the Gauteng Department of Health. The need for proper data collection, capturing, verification and reporting in order for meaningful analysis to be conducted cannot be over-emphasised. As newer tools and indicators are being used to capture hospital performance, further research can be done focused on or including quality-based hospital indicators such as the Ideal Hospital Assessment or Office of Health Standards Compliance Assessment, which have recently become standardised across hospitals in Gauteng.

The reporting of hospital performance from an efficiency perspective can also be a focus of future research. Consistently captured and/or mandatory indicators, should be captured and reported on in the context of predetermined performance targets for hospitals. For indicators where performance targets exist or can be sourced from GDOH, further research can be done to determine hospital performance through realisation of these targets over a period of time. This can be done for hospitals within Gauteng or a particular province, or the investigation can be expanded to hospitals across South Africa.

National interventions such as the Ideal Hospital Assessment, were implemented in 2019/20, but not consistently reported on especially during 2020/21 when the world was in the midst of the Covid-19 pandemic. The OHSC assessment however only became widely used in more recent years. If this study (partially or entirely) is replicated, considering the changes in hospital performance reporting and staff performance assessments, it is recommended that the start of the analysis period be 2019/20 or thereafter depending on the objectives of the envisaged research. Alternatively, the start of analysis can be from 2022/23 to mitigate the effects of the Covid-19 pandemic on hospital and staff performance.

With regards to staff performance, further research can be done on the implementation of the new PMDS system and if the changes have improved performance

management at an individual hospital, within a hospital category or overall for GDOH. With multiple years of data potentially available, further analysis will provide a better understanding of the appropriateness of the tool and interventions needed to performance manage the different categories of staff that work in a hospital. An analysis of other HR related measures which may be more objective such as absenteeism or vacancy rates can also be explored. Considering the significant cost of employment of the health workforce on the public sector wage bill, it may also be beneficial to investigate current staffing norms, performance management of frontline staff, and the impact on quality of care indicators.

### 5.2 Recommendations for hospital management

From a management perspective, the ability and opportunity to review performance data and reports is critical to managing an efficient and effective hospital. Therefore interventions in understanding data flows within a hospital including reporting processes and systems, in skills gap identification and capacitation, and in managers receiving real time data on which to make decisions will improve hospital performance holistically. Monitoring and meaningful reporting of hospital performance data should happen on a monthly basis within facilities to ensure changes in trends are identified early and managers can intervene accordingly. Comparison of hospital data within hospital categories should also occur regularly for individual hospitals to benchmark against and to share best practices.

It is essential that current performance indicators captured and reported be reviewed to measure what matters across all areas of hospital and staff performance. While facilities collect a variety of indicators and report it across different platforms, the official datasets have a predominant operational capacity perspective. Other indicators routinely measured, particularly quality of care indicators such as patient experience of care scores, PSI and SAE monitoring, should be captured and analysed further. Outcome indicators should also be included when evaluating hospital performance.

With regards to staff performance in particular, the new performance management tool implemented in 2019/20 requires further exploration considering the variability of KRAs that managers and employees have the liberty to decide on. Managers need to

align KRAs within staff categories and across the hospital depending on the core job function of the employee. Performance evaluations should consider all aspects of employment taking into consideration aspects of absenteeism and productivity.

To plan service delivery in a growing population like Gauteng, referrals between facilities, EMS and PHC/CHCs can also yield important and relevant findings to improve service delivery for Gauteng Department of Health as a whole. Emergency services, referral routes and referral pattern should be reviewed regularly by managers to ensure that they are still relevant to the changes in the province and in the health system.

## 5.3 Conclusion

As the most densely populated and fastest growing province in South Africa, Gauteng requires a comprehensive strategy to provide for the ever-increasing health needs of its population. As the province currently provides the bulk of its service thorough its hospital network, to which the largest portion of the provincial health budget is allocated, appropriate measurements of hospital performance are crucial to meeting its mandate. As this research has shown, there is benefit that can be realised by regularly monitoring hospital performance indicators across the different aspects of patient care and over a reasonable time period. The types of hospital performance indicators are also important in terms of type of indicator measure be it output, process or efficiency, quality, or outcome. Both individual and composite indicators should be used to monitor hospital performance as both provide different but necessary perspectives.

Understanding the importance role that hospital staff play in the delivery of health services, performance management of staff is vital to a hospital achieving its mandate. The challenges within existing performance management systems and the opportunities in appropriate performance management of health workers add a concerning but interesting dynamic to the provision of health services. The finding of no correlation between hospital performance and staff performance in Gauteng hospitals is also concerning as it would be assumed that hospital performance drives staff performance and staff performance influences hospital performance.

‘Measuring what matters’ is a widely used term and has formed the basis of policy, governmental improvement strategies and business productivity plans. This research study has highlighted the need for the Gauteng Department of Health to ‘measure what matters’ and highlighted the need for integrated approaches towards hospital and staff performance that will improve the functioning of hospitals and the health system in Gauteng.

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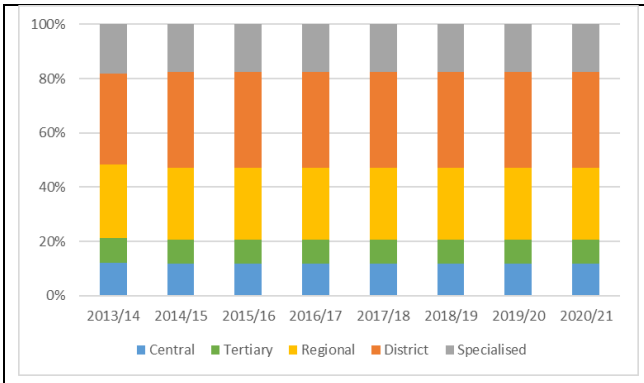
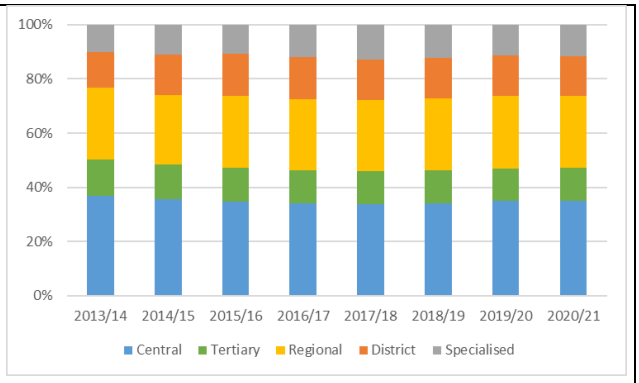
# 7. APPENDICES

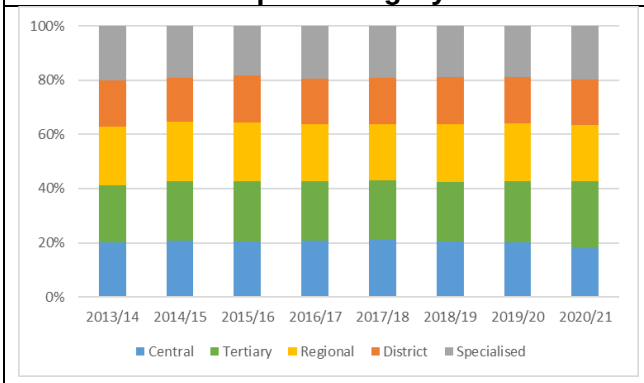
## 7.1 Hospital Performance per hospital category



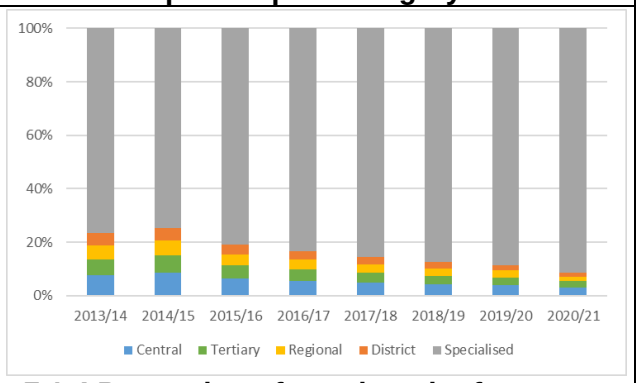

**7.1.1 Proportion of no. of hospitals per hospital category**



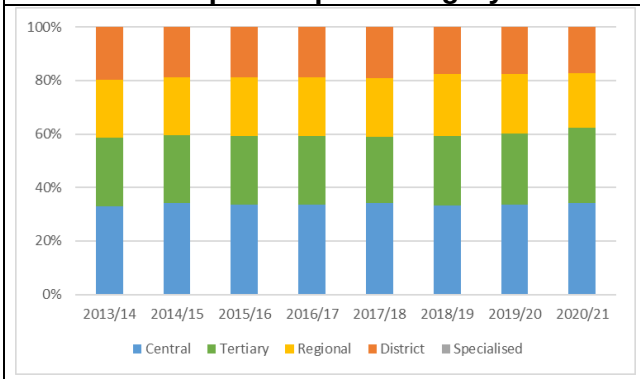

**7.1.2 Proportion of usable inpatient beds per hospital category**



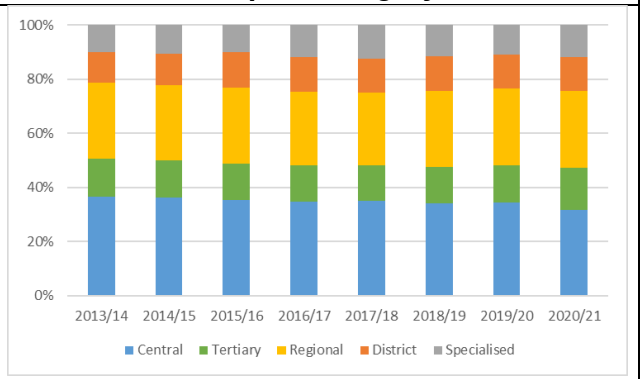

**7.1.3 Proportion of inpatient bed utilisation rate per hospital category**



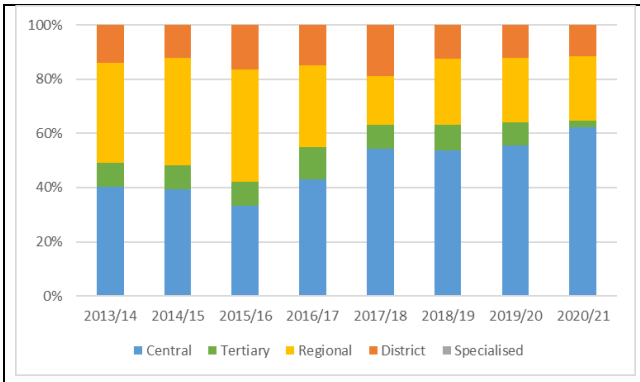

**7.1.4 Proportion of avg. length of stay per hospital category**



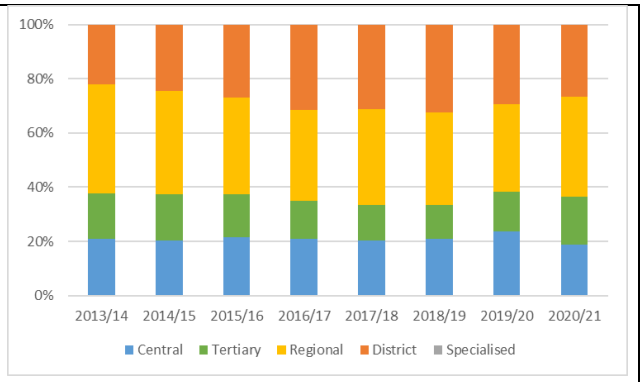

**7.1.5 Proportion of avg. length of stay for acute hospitals per hospital category**



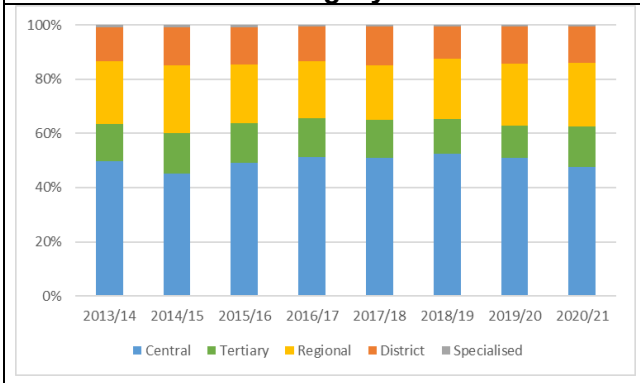

**7.1.6 Proportion of inpatient days per hospital category**



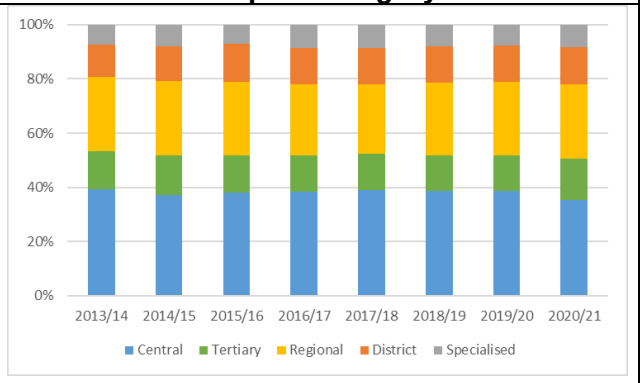

**7.1.7 Proportion of day patients per hospital category**



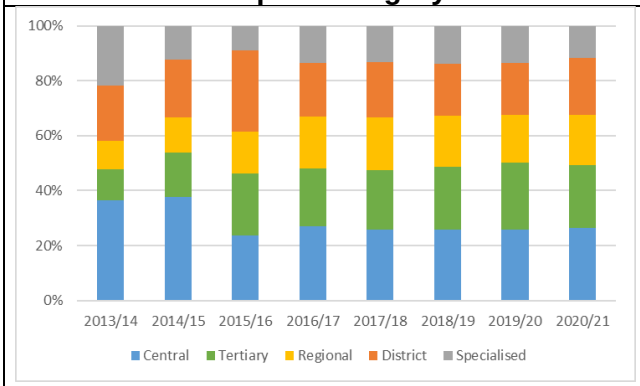

**7.1.8 Proportion of emergency headcount per hospital category**



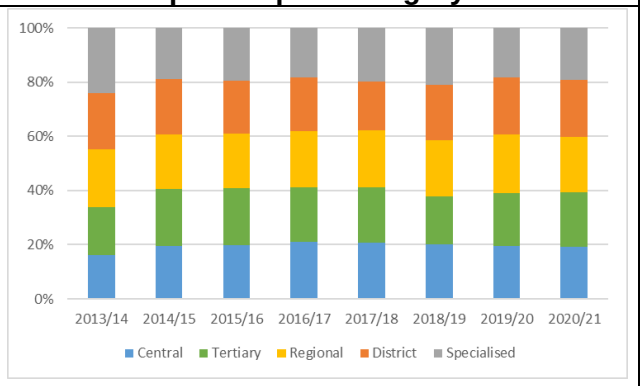

**7.1.9 Proportion of OPD headcount per hospital category**



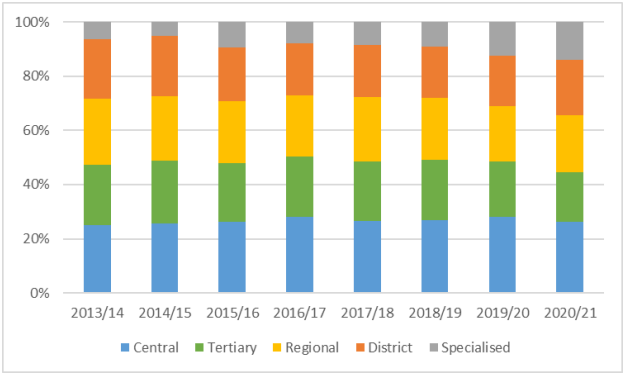

**7.1.10 Proportion of patient day equivalent per hospital category**




**7.1.11 Proportion of expenditure per PDE per hospital category**




**7.1.12 Proportion of complaint resolution rate per hospital category**




**7.1.13 Proportion of inpatient crude death rate per hospital category**

**Figure 7. 1: Percentage contribution to total service per hospital category**

## Table 7. 1: Hospital performance summary statistics per hospital category 2013/14-2020/21

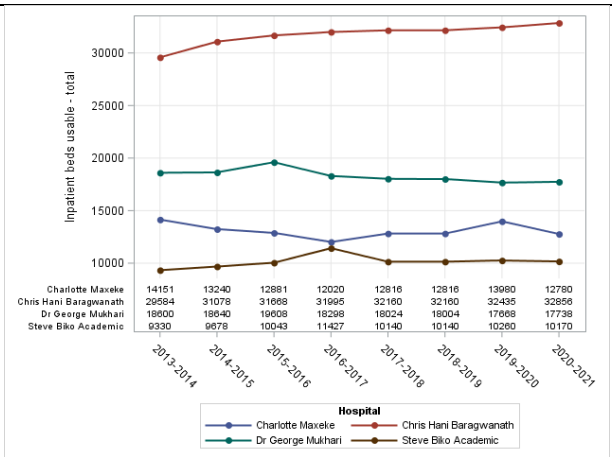
| Variable | Overall (n=34) | Central (n=4) | Tertiary (n=3) | Regional (n=9) | District (n=12) | Specialised (n=6) |
|---|---|---|---|---|---|---|
| **Inpatient beds usable - total** | | | | | | |
| Median | 3862.0 | 15910 | 8610.0 | 5454.0 | 2597.0 | 3192.0 |
| (IQR) | (2597.0-8848) | (11724-24596) | (7368.0-10071) | (3863.0-9279.5) | (2055.0-3238) | (1644.0-7378) |
| Mean (SD) | 6254.2 (5966.6) | 18325 (8444.4) | 8672.8 (1213.1) | 6185.5 (2703.7) | 2678.6 (1053.0) | 4028.6 (3079.6) |
| Min-Max | 45-32856 | 9330-32856 | 6912-10173 | 2688-10820 | 111-5199 | 45-10160 |
| **Inpatient (usable) bed utilisation rate** | | | | | | |
| Median (IQR) | 76.3 (65.8-83.2) | 80.7 (77.7-82.7) | 86.2 (79.3-89.8) | 83.1 (78.6-88.1) | 66.0 (58.0-71.0) | 71.4 (58.8-80.3) |
| Mean (SD) | 73.6 (14.7) | 79.2 (6.3) | 85.7 (8.4) | 83.1 (9.1) | 64.2 (12.1) | 67.7 (17.9) |
| Min-Max | 0-113 | 62-89 | 72-103 | 63-113 | 4-89 | 0-100 |
| **Average length of stay - total** | | | | | | |
| Median (IQR) | 5.5 (4.1-7.9) | 8.0 (7.7-8.2) | 6.4 (5.4-6.9) | 4.9 (4.0-6.1) | 4.1 (3.6-4.7) | 88.3 (73.7-214.4) |
| Mean (SD) | 44.2 (234.3) | 7.9 (0.6) | 6.4 (1.0) | 5.0 (1.3) | 4.2 (0.9) | 227.5 (526.4) |
| Min-Max | 1-3584 | 7-9 | 5-9 | 3-8 | 1-7 | 17-3584 |
| **Inpatient days - total** | | | | | | |
| Median | 82868 | 335761 | 202370 | 134599 | 51561 | 50835 |
| (IQR) | (51099-206079) | (279086-531072) | (193863-263579) | (79863-208782) | (37999-61765) | (32039-178288) |
| Mean (SD) | 145352 (142669) | 423635 (192268) | 223182 (43609) | 150546 (67103) | 51883 (22490) | 93130 (82437) |
| Min-Max | 104-768711 | 192407-768711 | 156474-314599 | 56410-287105 | 104-115710 | 1013-266841 |
| **Day patient - total** | | | | | | |
| Median | 2904.0 | 23813 | 4851.5 | 3360.0 | 1432.0 | 25.0 |
| (IQR) | (1136.0-7627) | (7576.0-42686) | (4204.5-11969) | (1773.5-7320) | (663.50-2897.5) | (0.0-56) |
| Mean (SD) | 8548.4 (14781) | 29246 (23708) | 7017.8 (4976.2) | 8192.7 (13523) | 3045.9 (4588.9) | 28.1 (24.7) |
| Min-Max | 0-81212 | 5845-79771 | 454-16399 | 558-81212 | 64-19359 | 0-71 |
| **Emergency headcount – total** | | | | | | |
| Median | 27874 | 34027 | 43518 | 32447 | 12743 | NA |
| (IQR) | (10203-40885) | (25064-59551) | (20505-50175) | (14163-42013) | (7041.0-30186) | |
| Mean (SD) | 27384 (18567) | 40011 (21519) | 37418 (17572) | 29811 (16773) | 18572 (14465) | NA |
| Min-Max | 29-74360 | 6148-74360 | 6012-60730 | 87-62923 | 29-60182 | NA |
| **OPD headcount - total** | | | | | | |
| Median | 89143 | 562674 | 237097 | 108419 | 56538 | 6985.5 |
| (IQR) | (39121-208022) | (455950-823038) | (180920-306416) | (71530-203365) | (36088-89762) | (4975.5-12145) |
| Mean (SD) | 168363 (223765) | 659505 (263089) | 245151 (70812) | 133663 (72501) | 60800 (33764) | 9220.8 (6811.0) |
| Min-Max | 96-1250000 | 369651-1250000 | 113349-366592 | 7279-268554 | 1329-137088 | 96-27655 |
| **Patient Day Equivalent** | | | | | | |
| Median | 127796 | 617415 | 308215 | 172229 | 82892 | 50868 |
| (IQR) | (69552-283382) | (483116-829589) | (279625-356655) | (131705-293769) | (60183-101347) | (33573-178283) |
| Mean (SD) | 207376 (211250) | 663704 (238220) | 321290 (47198) | 207854 (92440) | 79588 (32294) | 93075 (83295) |
| Min-Max | 847-1110000 | 228551-1110000 | 275031-425263 | 83538-364753 | 847-156905 | 1049-271276 |
| **Expenditure per PDE** | | | | | | |
| Median | 3128.5 | 4130.9 | 3409.1 | 3008.2 | 3115.4 | 2020.2 |
| (IQR) | (1859.8-4152.1) | (2871.0-5074.6) | (1783.1-4426.1) | (1278.5-3797.3) | (2462.9-3783.1) | (1363.8-4783.3) |
| Mean (SD) | 4956.9 (17529) | 3755.9 (2193.3) | 3021.3 (1885.6) | 2585.2 (1729.3) | 5485.2 (23572) | 9259.3 (24981) |
| Min-Max | 0-229830 | 0-8179 | 0-6385 | 0-6454 | 0-229830 | 0-127715) |
| **Complaint resolution rate** | | | | | | |
| Median (IQR) | 88.6 (78.4-97.9) | 91.3 (75.8-96.4) | 84.8 (80.6-88.5) | 91.1 (85.0-97.9) | 87.9 (75.0-98.3) | 92.3 (70.0-100.0) |
| Mean (SD) | 85.6 (16.8) | 85.4 (13.3) | 83.8 (13.1) | 87.8 (13.1) | 85.0 (14.7) | 84.1 (27.6) |
| Min-Max | 11-160 | 53-102 | 48-121 | 49-108 | 33-107 | 11-160 |
| **Inpatient crude death rate** | | | | | | |
| Median (IQR) | 5.0 (3.6-6.1) | 6.1 (5.2-6.6) | 4.9 (4.3-6.1) | 5.2 (4.8-6.2) | 4.80 (3.6-5.9) | 1.1 (0.1-2.2) |
| Mean (SD) | 4.9 (2.9) | 6.0 (1.0) | 5.2 (1.3) | 5.2 (1.5) | 4.8 (1.6) | 3.6 (5.9) |
| Min-Max | 0-24 | 4-8 | 4-9 | 18 | 2-9 | 0-24 |

## 7.2 Hospital Performance Indicators per hospital per category

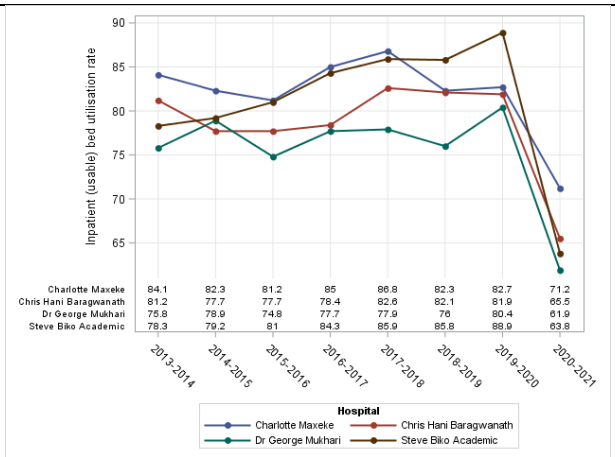
### *7.2.1 Central Hospitals*

Chris Hani Baragwanath Academic Hospital (CHBAH / Chris Hani Baragwanath) had the highest number of inpatient beds usable in the 8-year period, followed by Dr George Mukhari Academic Hospital (DGMAH / Dr George Mukhari) and Charlotte Maxeke Johannesburg Academic Hospital (CMJAH / Charlotte Maxeke). Steve Biko Academic Hospital (SBAH / Steve Biko) had the lowest number of usable beds. However with bed utilization and average length of stay, there was fluctuation amongst all hospitals for the entire period. Charlotte Maxeke and Steve Biko hospitals had higher utilization rates, but only CMJAH has a consistently lower average length of stay from 2014/15 to 2020/21. All hospitals experienced a sudden decline in bed utilisation rates in 2020/2021 and an increase in average length of stay compared to previous years.

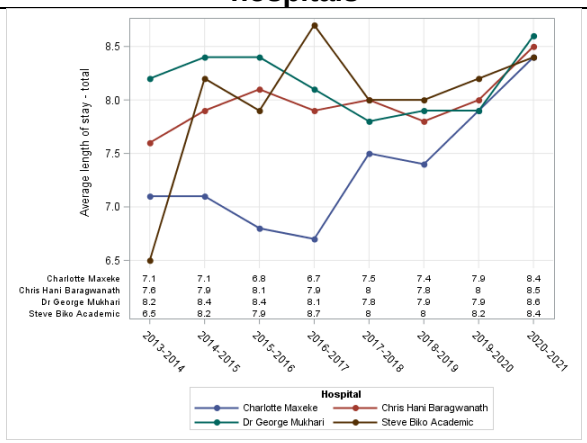
For inpatient days, day patients and emergency headcounts, Chris Hani Baragwanath was consistently higher than the other central hospitals followed by Dr George Mukhari and Charlotte Maxeke respectively. For OPD headcounts, Charlotte Maxeke had the highest OPD headcounts throughout the entire period followed by Chris Hani Baragwanath. Patient day equivalent was highest year on year in Chris Hani Baragwanath and lowest in Steve Biko while expenditure per PDE was highest year on year in Steve Biko and lowest in Chris Hani Baragwanath. Complaint resolution and inpatient crude death rates fluctuated throughout the period. Of note is that in 2020/21, bed utilization rate, inpatient days, day patients, emergency headcount, OPD headcount and patient day equivalent declined for all central hospitals while average length of stay, expenditure per PDE and inpatient crude death rates all increased in 2020/21 compared to previous years.



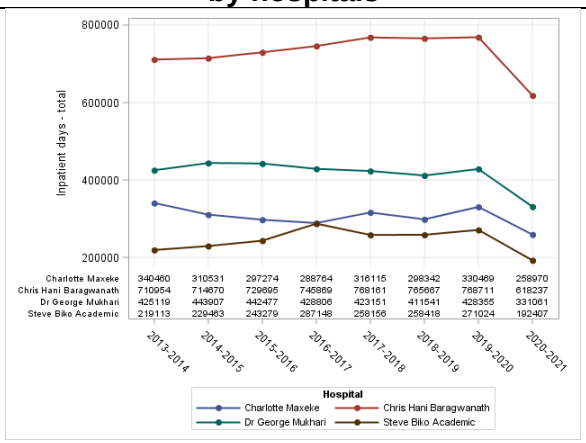

**7.2.1: Inpatient beds usable by central hospitals**



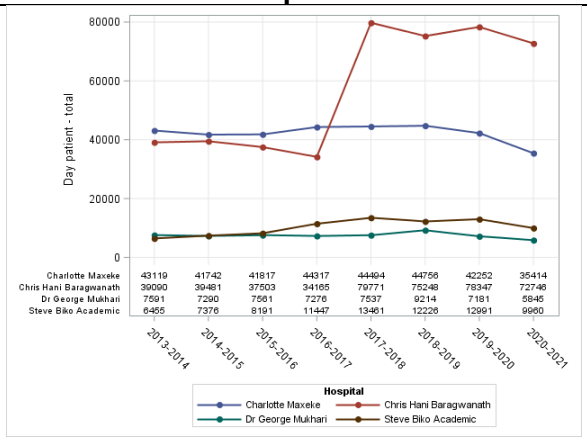

**7.2.2: Inpatient (usable) bed utilisation rate by hospitals**



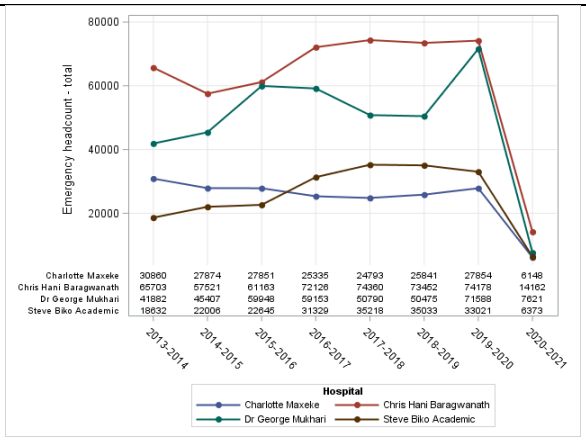

**7.2.3: Average length of stay by central hospitals**



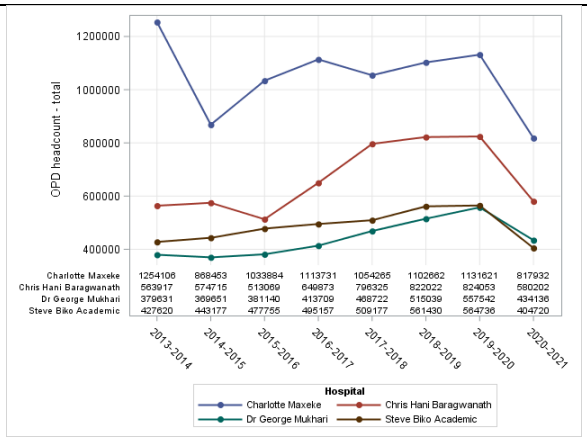

**7.2.4: Inpatient days by central hospitals**



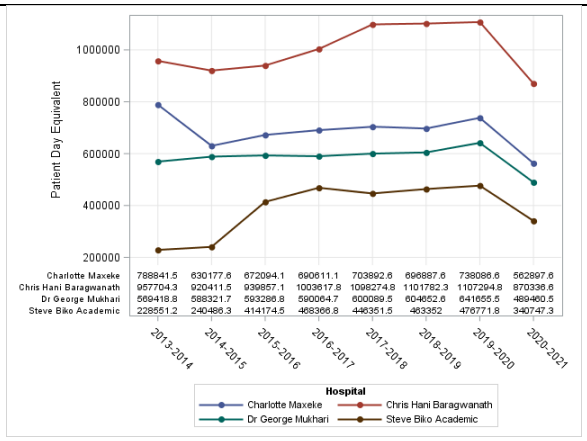

**7.2.5: Day patient by central hospitals**



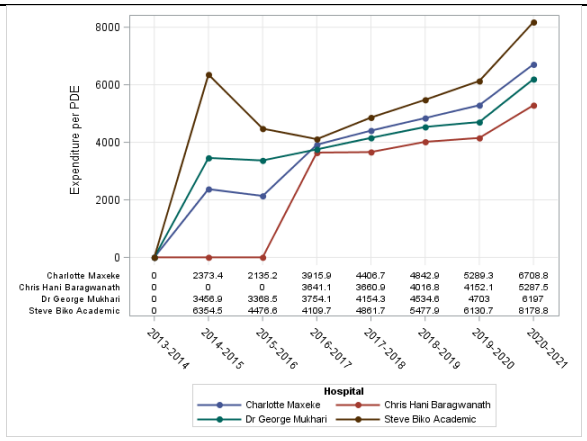

**7.2.6: Emergency headcount by central hospitals**



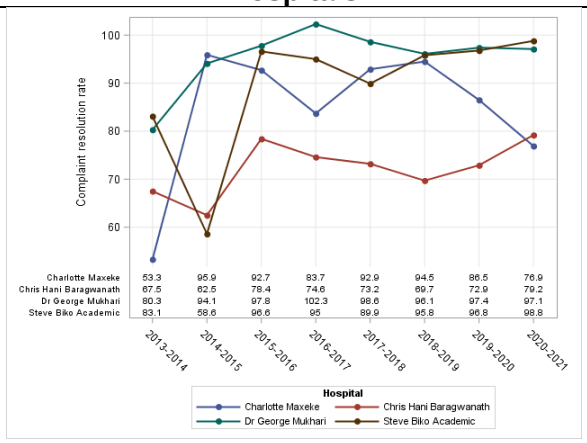

**7.2.7: OPD headcount by central hospitals**



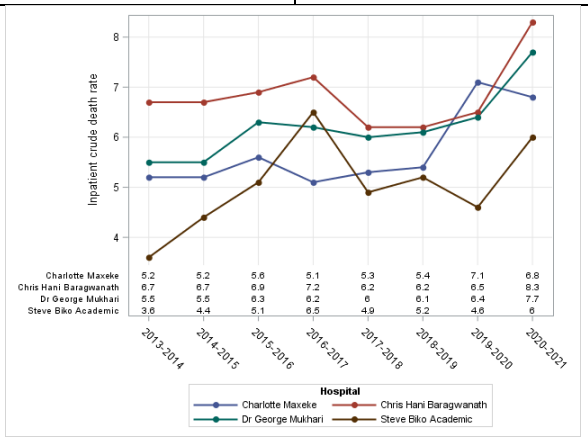

**7.2.8: Patient day equivalent by central hospitals**




**7.2.9: Expenditure per PDE by central hospitals**




**7.2.10: Complaint resolution rate by central hospitals**

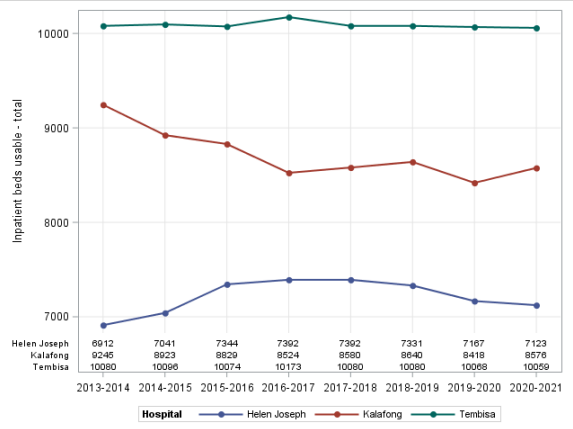



**7.2.11: Inpatient crude death rate by central hospitals**

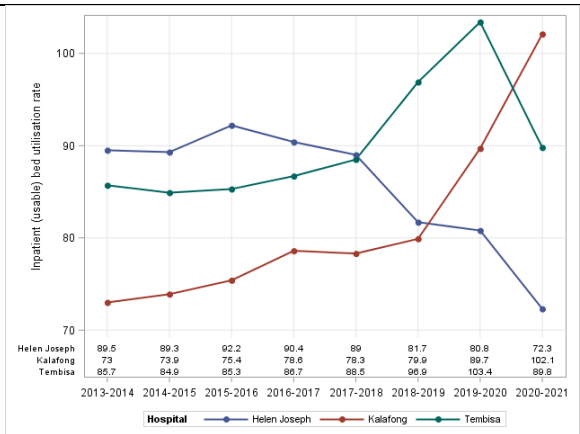
**Figure 7. 2: Hospital performance of central hospitals**

### *7.2.2 Tertiary Hospitals*

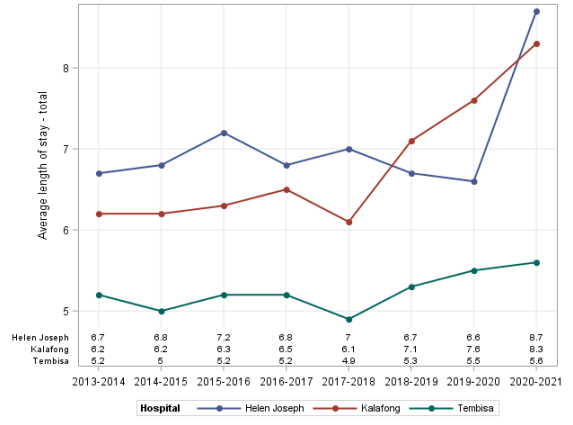
Among the three tertiary hospitals, Tembisa had the highest number of inpatient beds, followed by Kalafong. Helen Joseph had the highest inpatient bed utilization rate from 2013/14 but experienced a steady decline from 2016/17 onwards with Tembisa and Kalafong having significantly higher inpatient bed utilization. Helen Joseph had the highest average length of stay, day patients and OPD headcounts but the lowest inpatient days while Tembisa had the lowest average length of stay but the highest inpatient days and emergency headcounts. OPD headcounts increased only in Helen Joseph in 2020/21, but patient day equivalent increased in both Helen Joseph and Kalafong. Tembisa had the highest patient day equivalent for the entire period. All three hospitals had a steady increase in their expenditure per PDE over the eight-year period. The complaints resolution rate fluctuated over the years with Kalafong having the highest average rate. Helen Joseph consistently had the highest inpatient crude death rate with a rapid increase in 2020/21.



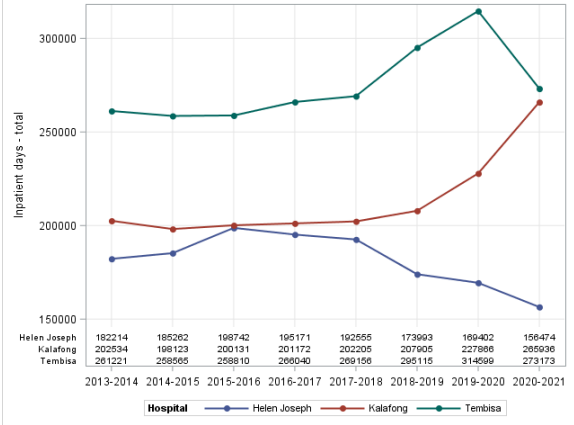

**7.3.1: Inpatient beds usable by tertiary hospitals**



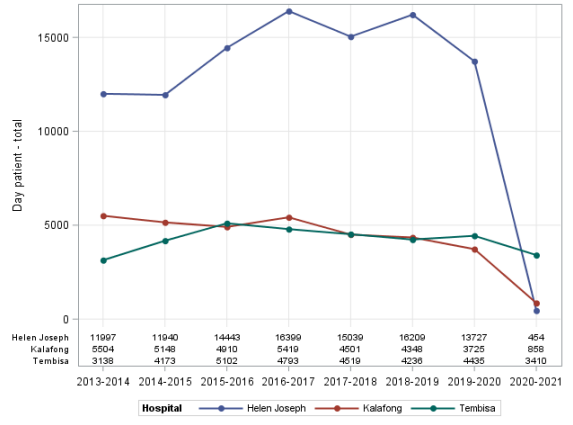

**7.3.1: Inpatient (usable) bed utilisation rate by tertiary hospitals**



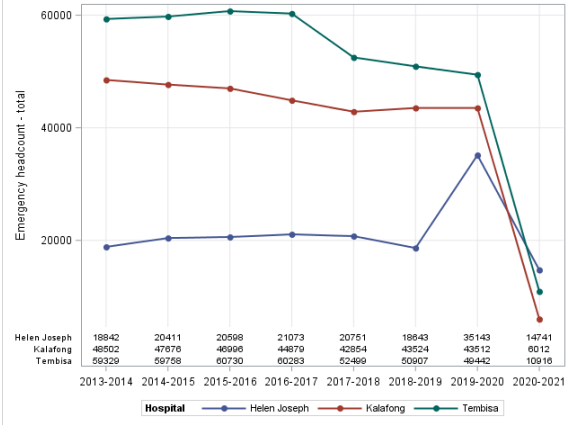

**7.3.3: Average length of stay by tertiary hospitals**



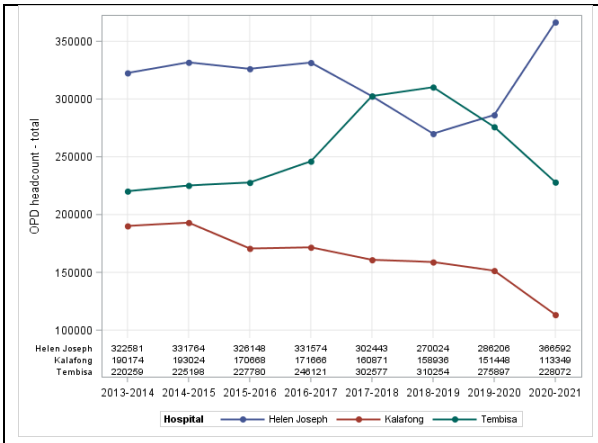

**7.3.4: Inpatient days by tertiary hospitals**



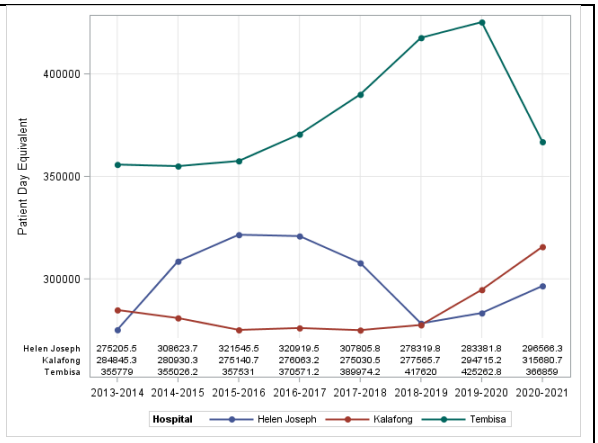

**7.3.5: Day patient by tertiary hospitals**



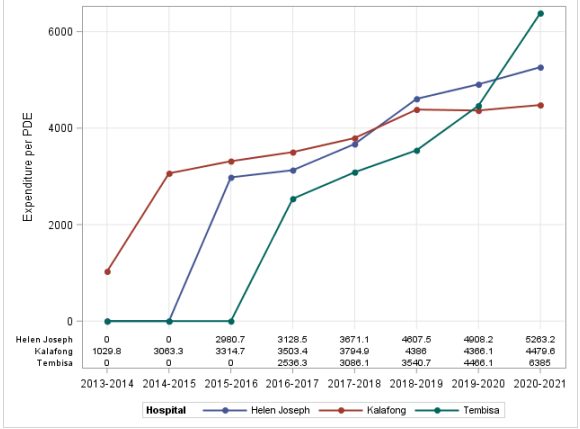

**7.3.6: Emergency headcount by tertiary hospitals**



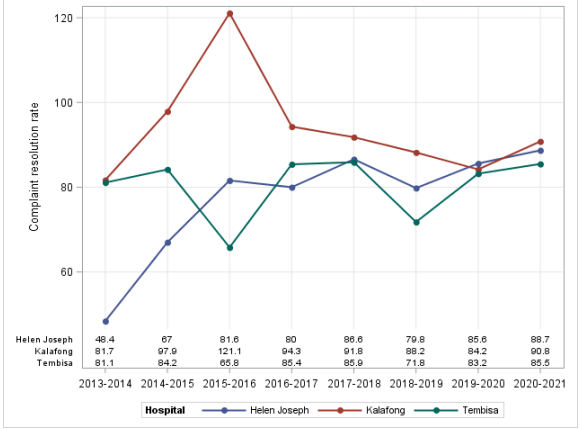

**7.3.7: OPD headcount by tertiary hospitals**



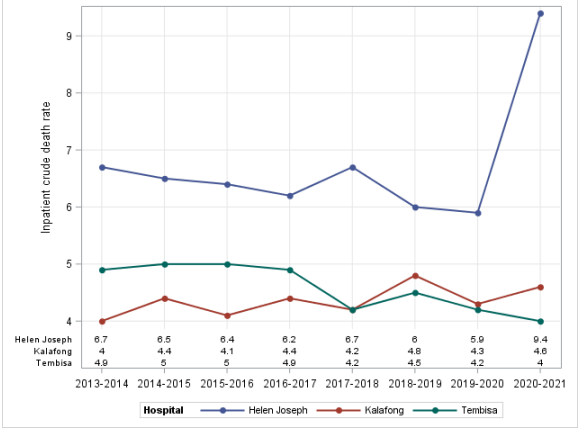

**7.3.8: Patient day equivalent by tertiary hospitals**




**7.3.9: Expenditure per PDE by tertiary hospitals**




**7.3.10: Complaint resolution rate by tertiary hospitals**



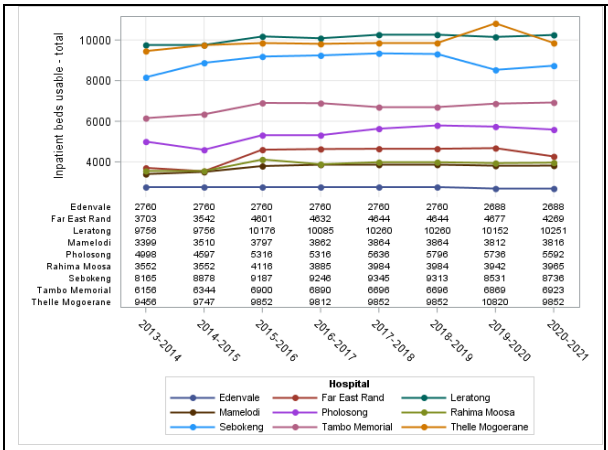

**7.3.11: Inpatient crude death rate by tertiary hospitals**

**Figure 7. 3: Hospital performance of tertiary hospitals**

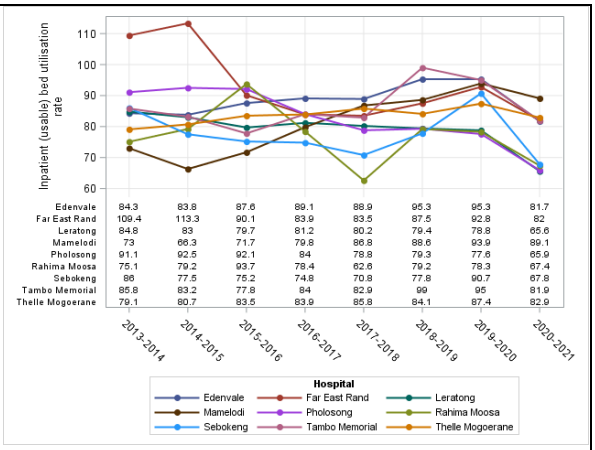
### *7.2.3 Regional Hospitals*

Among the nine regional hospitals, the numbers of inpatient beds usable remained consistent throughout the period with Leratong and Thelle Mogoerane having the highest number in inpatient beds and Edenvale, Rahima Moosa and Mamelodi having the lowest. Inpatient bed utilization fluctuated throughout the period with all regional hospitals showing a decrease in 2020/21. There was also some fluctuation in average length of stay with Pholosong and Rahima Moosa showing the greatest variation over the period. Thelle Mogoerane, Sebokeng and Leratong had higher average length of stay and inpatient days compared to the other regional hospitals. Emergency and OPD headcounts also fluctuated with a marked decrease in Emergency headcounts and notable decrease in OPD headcounts for all hospitals in 2020/21. Day patients were highest in Rahima Moosa throughout the period even with a decline in 2020/21.

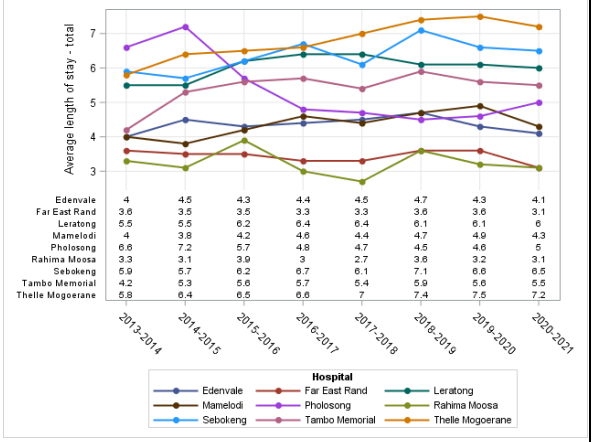
Leratong, Thelle Mogoerane and Sebokeng had higher patient day equivalents compared to the other six hospitals with Edenvale consistently having the lowest. Expenditure per PDE showed an upward trend for all hospitals over the period, with a notable increase in 2020/21. The complaint resolution rate fluctuated throughout the period with Rahima Moosa having the lowest complaint resolution rate in most years compared to other hospitals. All hospitals except Mamelodi and Rahima Moosa had a marked increase in death rate in 2020/21 with Rahima Moosa having the lowest inpatient crude death rate in all hospitals.



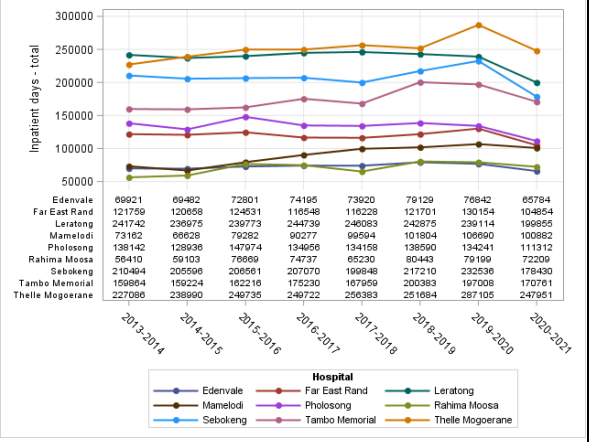

## 7.4.1: Inpatient beds usable by regional hospitals



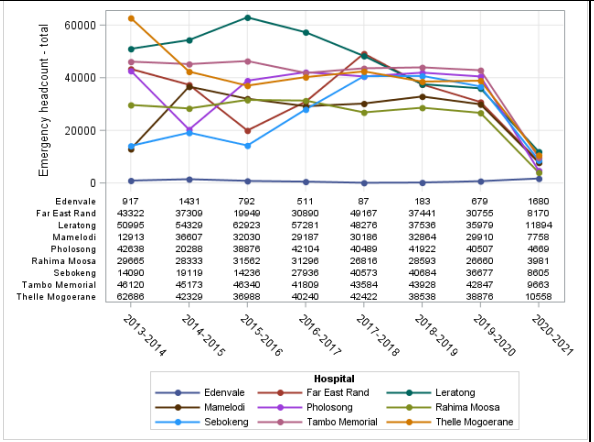

## 7.4.2: Inpatient (usable) bed utilisation rate by regional hospitals



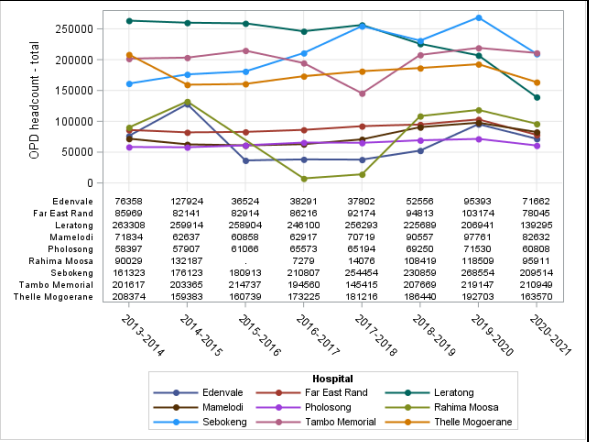

## 7.4.3: Average length of stay by regional hospitals



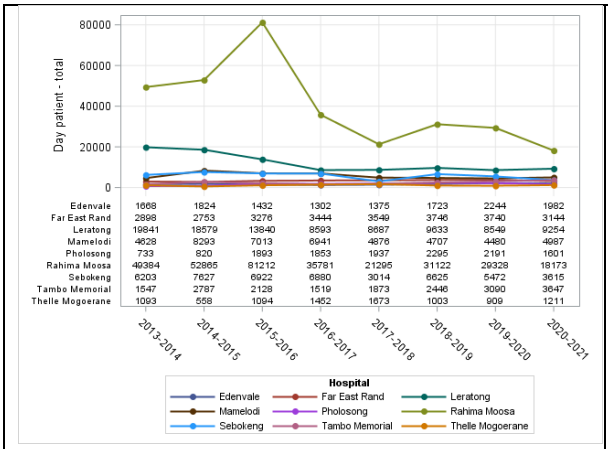

## 7.4.4: Inpatient days by regional hospitals



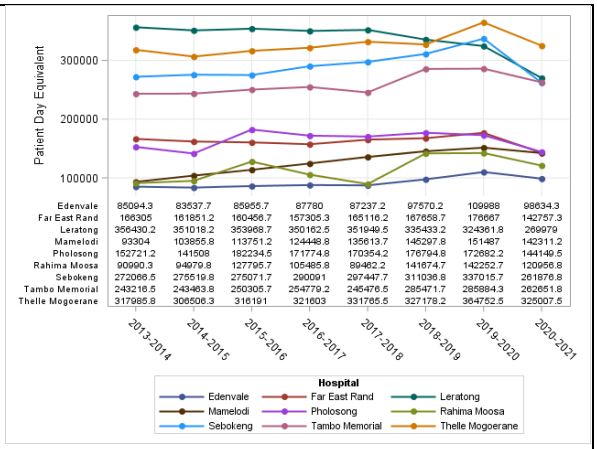

## 7.4.5: Emergency headcount by regional hospitals



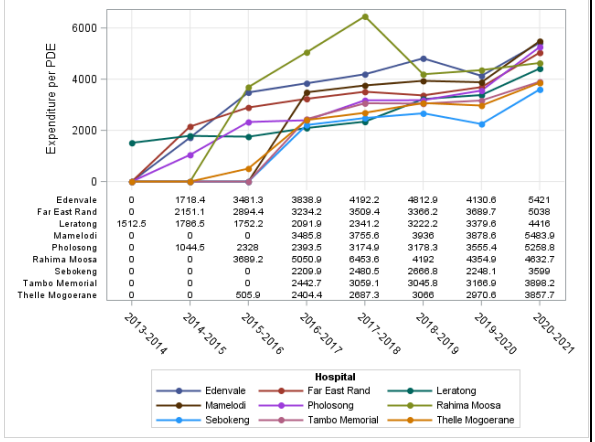

## 7.4.6: OPD headcount by regional hospitals



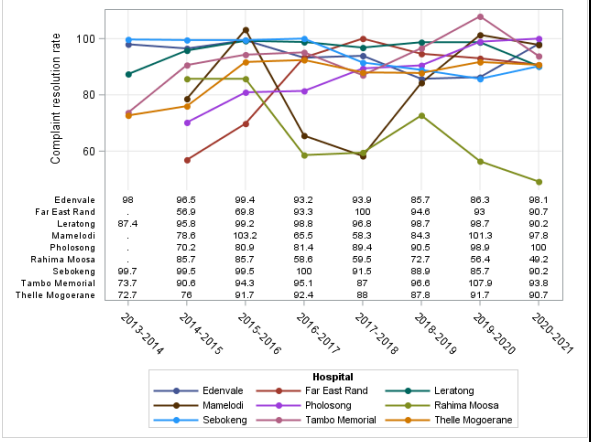

**7.4.7: Day patient by regional hospitals**



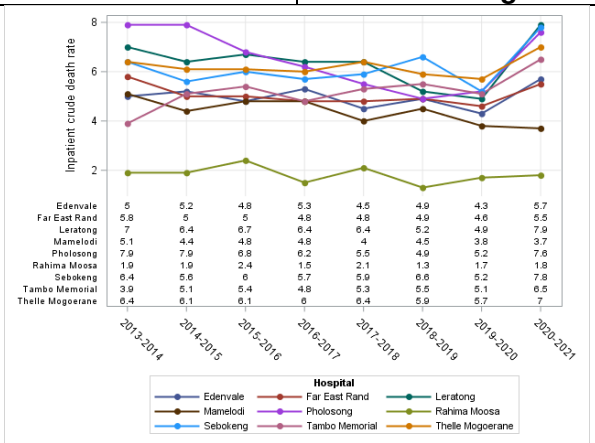

**7.4.8: Patient day equivalent by regional hospitals**




**7.4.9: Expenditure per PDE by regional hospitals**




**7.4.10: Complaint resolution rate by regional hospitals**




**7.4.11: Inpatient crude death rate by regional hospitals**

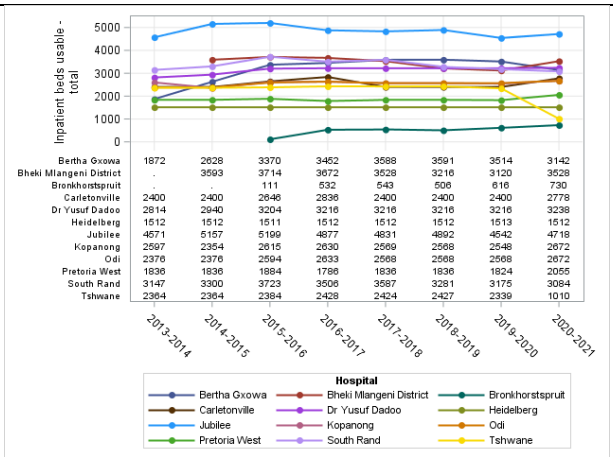
**Figure 7. 4: Hospital performance of regional hospitals**

### *7.2.4 District Hospitals*

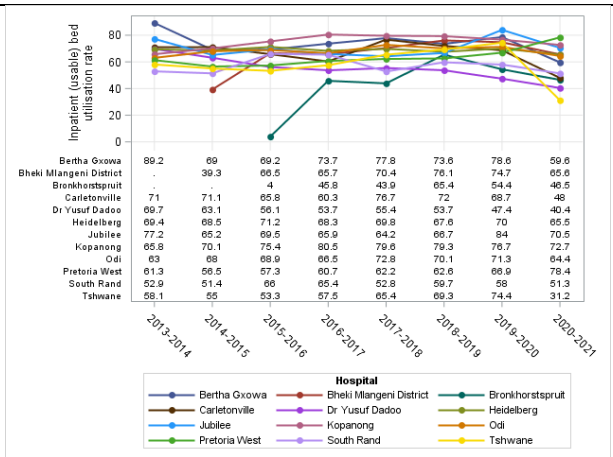
Among the twelve district hospitals in Gauteng, Jubilee had the highest number of inpatient beds usable and Bronkhorstspruit had the lowest. The bed utilization rate fluctuated across all hospitals during the period of investigation with a decline in 2020/21 in all hospitals except Pretoria West. The average length of stay and number of inpatient days was highest in Jubilee while Bronkhorstspruit had the lowest number of inpatient days for the entire period. There was a sudden decrease in inpatient days in Bertha Gxowa, Tshwane and Jubilee hospitals in 2020/21. The number of day patients varied with Jubilee hospital initially having a higher number of day patients, Bheki Mlangeni had an increase from 2015/16 which then slightly declined from 2019/20, and South Rand had a spike in 2017/18.

Tshwane reported the highest emergency headcount in most years except 2016/17 and 2017/18 when Bheki Mlangeni recorded the highest emergency headcount. OPD headcounts fluctuated with Tshwane and Odi hospitals recording higher numbers than other district hospitals. Emergency and OPD headcounts declined in all hospitals in 2020/21.
Jubilee hospital consistently had a higher patient day equivalent and Bronkhorstspruit consistently had the lowest throughout the entire period while the expenditure per PDE was similar across all hospitals except in Bertha Gxowa which had a spike in the year 2014/15.

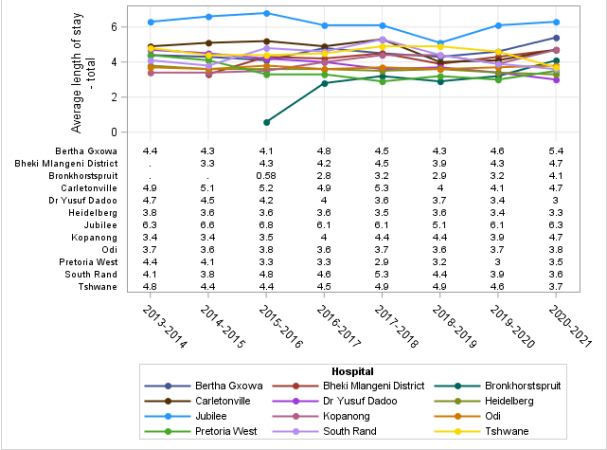
The complaint resolution rate also fluctuated with Kopanong having the lowest complaint resolution rate in most years compared to other hospitals. Inpatient crude death rates also fluctuated year-on-year with most hospitals experiencing an increase in 2020/21 except Tshwane which had a decrease.



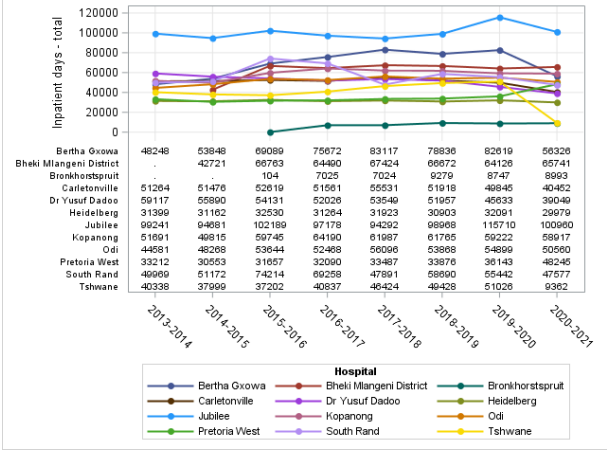

## 7.5.1: Inpatient beds usable by district hospitals



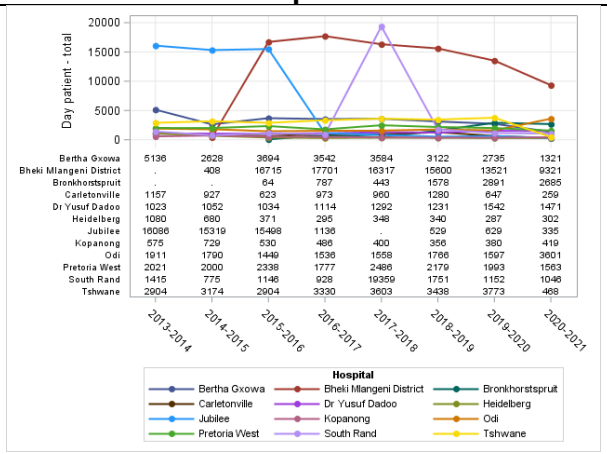

## 7.5.2: Inpatient (usable) bed utilisation rate by district hospitals



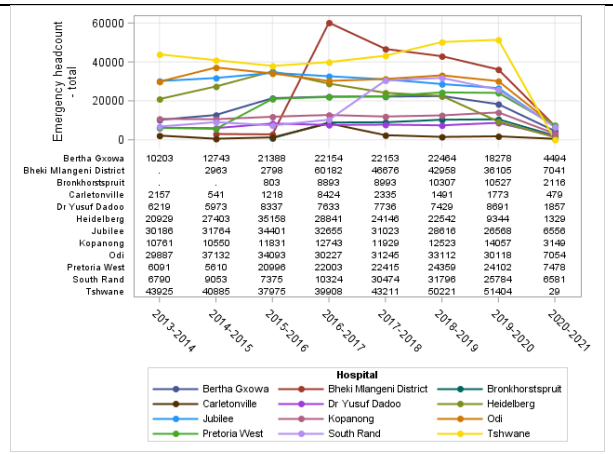

## 7.5.3: Average length of stay by district hospitals



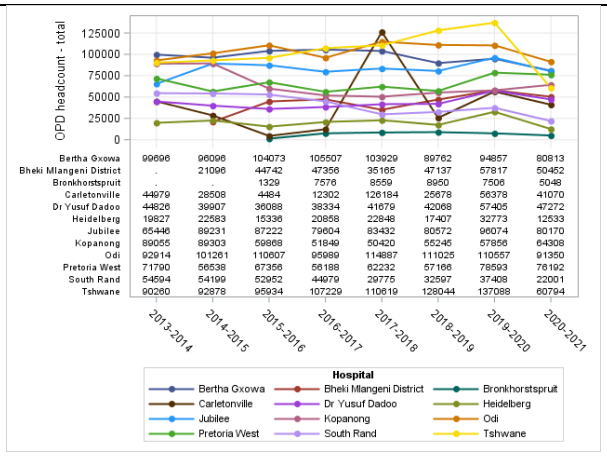

## 7.5.4: Inpatient days by district hospitals




## 7.5.5: Day patient by district hospitals

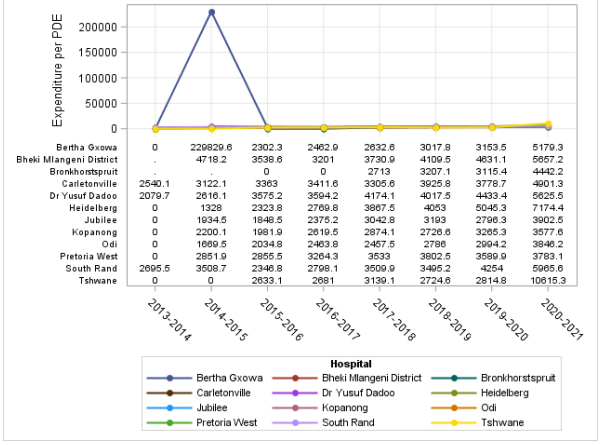



## 7.5.5: Emergency headcount by district hospitals

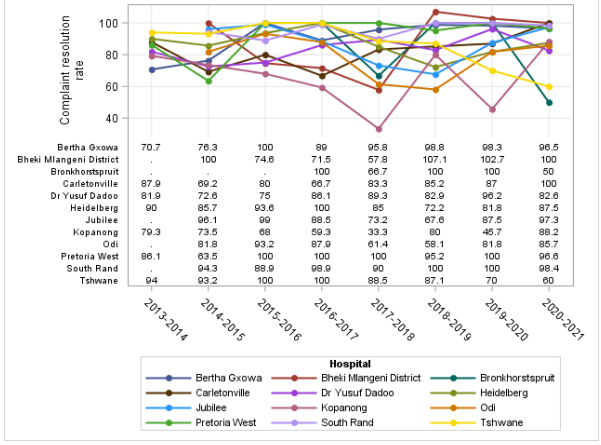



**7.5.6: OPD headcount by district hospitals**

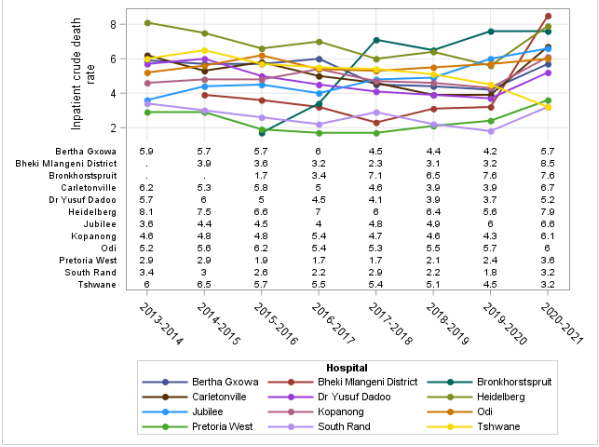

**7.5.7: Patient day equivalent by district hospitals**




**7.5.9: Expenditure per PDE by district hospitals**




**7.5.10: Complaint resolution rate by district hospitals**




**7.5.11: Inpatient crude death rate by district hospitals**

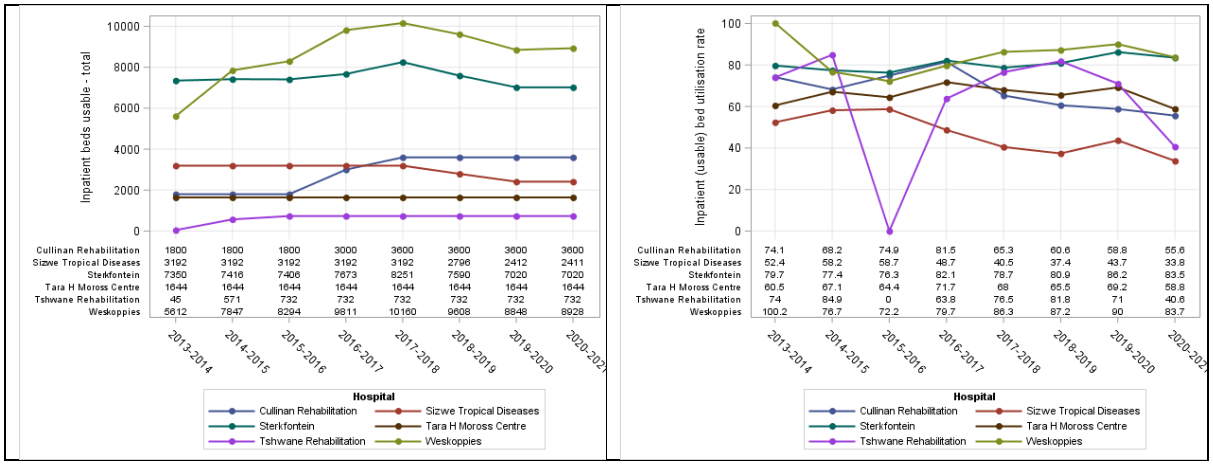
**Figure 7. 5: Hospital performance of district hospitals**

### *7.2.5 Specialised Hospitals*

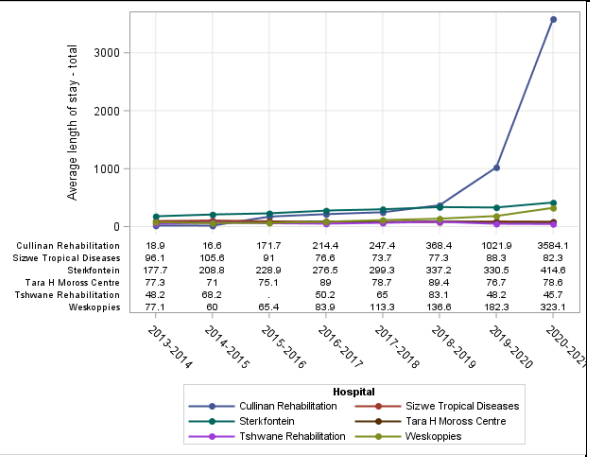
The number of inpatient beds usable was highest in Weskoppies from 2014/15 to 2020/21 and lowest in Tshwane rehab for the entire period. Inpatient bed utilization rate fluctuated but was higher in Weskoppies hospital and Sterkfontein compared to other specialised hospitals.

Cullinan Rehab had the highest length of stay with a rapid increase from 2018/19 to 2020/21. Weskoppies and Sterkfontein had a similar trend in inpatient days recording higher values for the entire period. Weskoppies was the only hospital that had data for day patients.

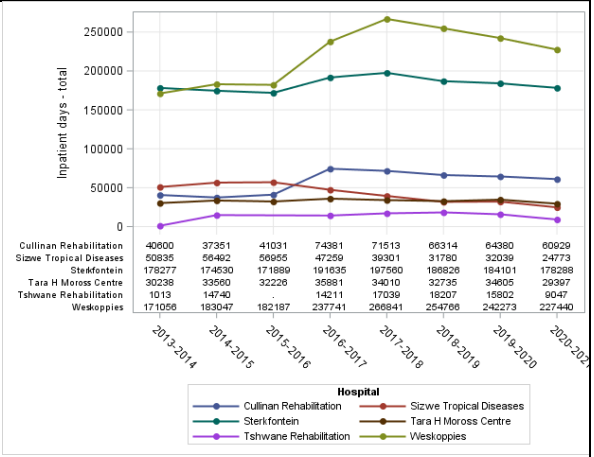
Weskoppies also had the highest overall OPD headcount followed by Tara, while Cullinan Rehab and Sterkfontein did not have data for this indicator. Patient day equivalent was highest in Weskoppies followed by Sterkfontein and lowest in Tshwane Rehab. Sterkfontein had higher expenditure per PDE in 2013/14 and 2014/15 and Tshwane rehabilitation hospital had a peak in 2015/16. Thereafter expenditure per PDE followed similar trends for all specialised hospitals. The complaints resolution rate fluctuated year-on-year but Weskoppies had the most consistent complaint resolution rate compared to other hospitals. The trend in the inpatient death rate showed Sizwe Tropical Diseases having the highest rate except in 2020/21 when Cullinan Rehab had a rapid spike in their death rate.



## 7.6.1: Inpatient beds usable by specialised hospitals



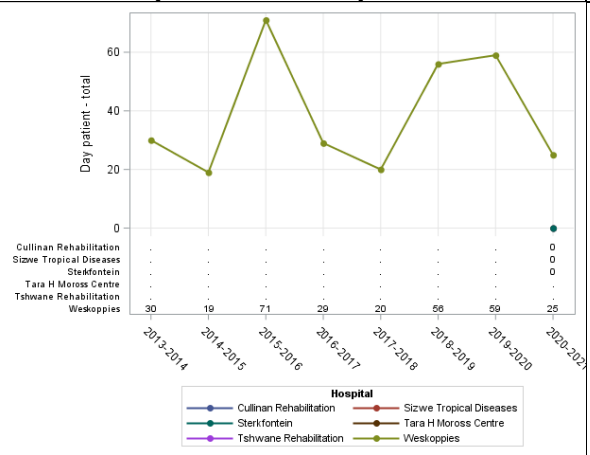

## 7.6.2: Inpatient (usable) bed utilisation rate by specialised hospitals



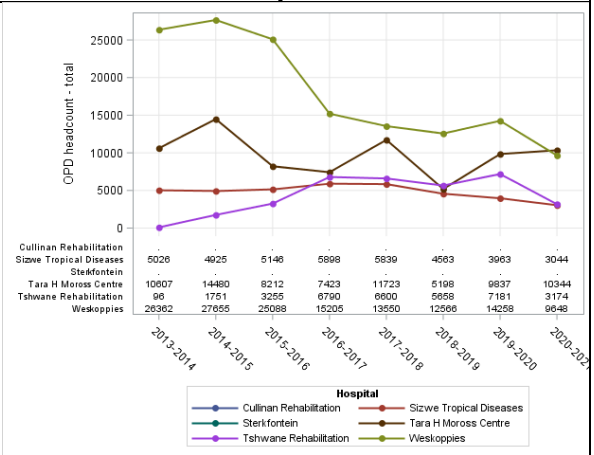

## 7.6.3: Average length of stay by specialised hospitals

## 7.6.4: Inpatient days by specialised hospitals

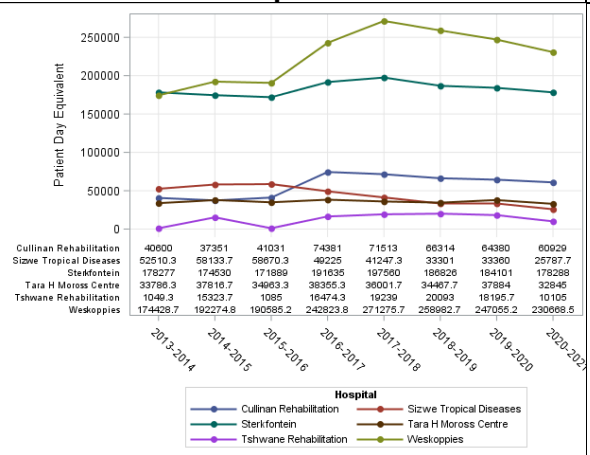
## 7.6.5: Day patient by specialised hospitals



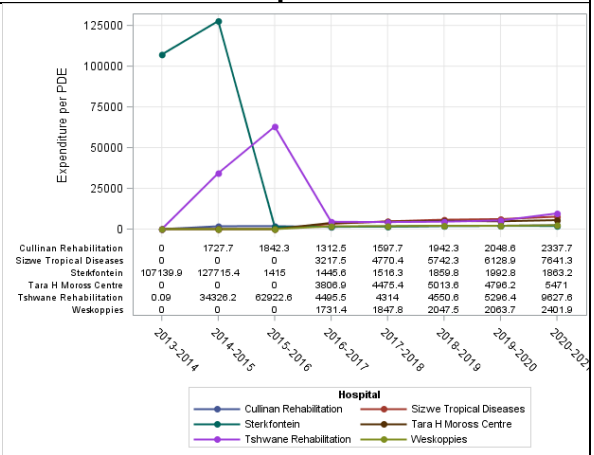

## 7.6.6: OPD headcount by specialised hospitals

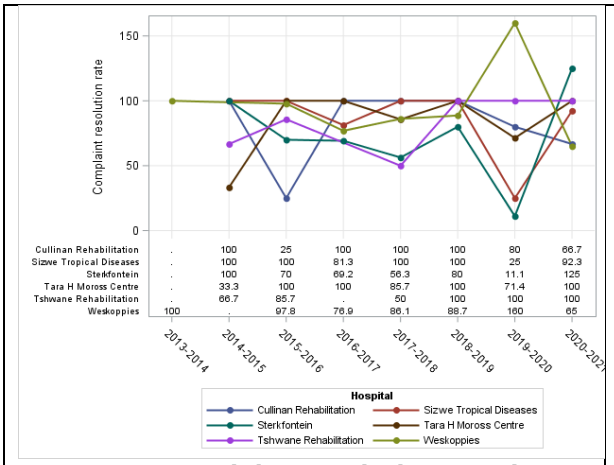



## 7.6.7: Patient day equivalent by specialised hospitals

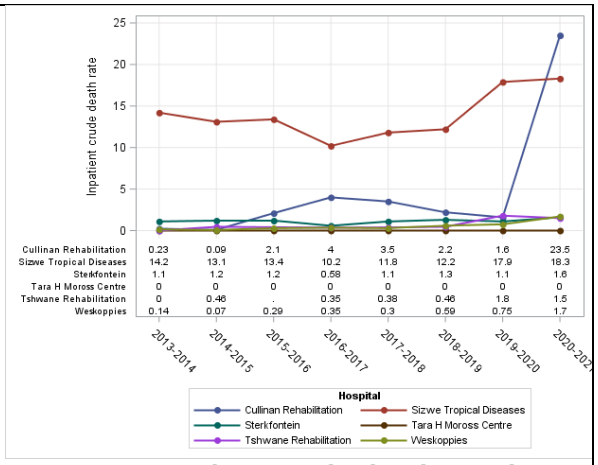



## 7.6.8: Expenditure per PDE by specialised hospitals






**7.6.9: Complaint resolution rate by specialised hospitals**




**7.6.10: Inpatient crude death rate by specialised hospitals**

**Figure 7. 6: Hospital performance of specialised hospitals**

## 7.3 Staff Performance per hospital category

### Table 7. 2: Summary statistics for staff indicators by hospital category

| Variable | Overall | Central | Tertiary | Regional | District | Specialised |
|---|---|---|---|---|---|---|
| **Administration score** | | | | | | |
| Median (IQR) | 4.0 (3.5-4.0) | 4.0 (3.5-4.0) | 4.0 (3.5-4.0) | 4.0 (3.5-4.0) | 4.0 (3.5-4.0) | 4.0 (3.5-4.0) |
| Mean (SD) | 3.8 (0.4) | 3.8 (0.4) | 3.8 (0.4) | 3.8 (0.4) | 3.8 (0.4) | 3.8 (0.4) |
| Min, Max | 3-4 | 3-4 | 3-4 | 3-4 | 3-4 | 3-4 |
| **Allied score** | | | | | | |
| Median (IQR) | 4.00 (3.50-4) | 4.00 (3.50-4) | 4.00 (3.50-4) | 4.00 (3.50-4) | 4.00 (3.50-4) | 4.00 (3.50-4) |
| Mean (SD) | 3.8 (0.4) | 3.8 (0.4) | 3.8 (0.4) | 3.8 (0.4) | 3.8 (0.4) | 3.8 (0.4) |
| Min, Max | 3-4 | 3-4 | 3-4 | 3-4 | 3-4 | 3-4 |
| **Doctors score** | | | | | | |
| Median (IQR) | 3.0 (3.0-3.0) | 3.0 (3.0-3.0) | 3.0 (3.0-3.0) | 3.0 (3.0-3.0) | 3.0 (3.0-3.0) | 3.0 (3.0-3.0) |
| Mean (SD) | 3.0 (0.0) | 3.0 (0.0) | 3.0 (0.0) | 3.0 (0.0) | 3.0 (0.0) | 3.0 (0.0) |
| Min, Max | (3-3) | (3-3) | (3-3) | (3-3) | (3-3) | (3-3) |
| **Nursing score** | | | | | | |
| Median (IQR) | 4.0 (3.5-4.0) | 4.0 (3.5-4.0) | 4.0 (3.5-4.0) | 4.0 (3.5-4.0) | 4.0 (3.5-4.0) | 4.0 (3.5-4.0) |
| Mean (SD) | 3.8 (0.4) | 3.8 (0.4) | 3.8 (0.4) | 3.8 (0.4) | 3.8 (0.4) | 3.8 (0.4) |
| Min, Max | 3-4 | 3-4 | 3-4 | 3-4 | 3-4 | 3-4 |
| **Support score** | | | | | | |
| Median (IQR) | 4.0 (3.5-4.0) | 4.0 (3.5-4.0) | 4.0 (3.5-4.0) | 4.0 (3.5-4.0) | 4.0 (3.5-4.0) | 4.0 (3.5-4.0) |
| Mean (SD) | 3.8 (0.4) | 3.8 (0.4) | 3.8 (0.4) | 3.8 (0.4) | 3.8 (0.4) | 3.8 (0.4) |
| Min, Max | 3-4 | 3-4 | 3-4 | 3-4 | 3-4 | 3-4 |

## 7.4 PMDS templates

### *7.4.1 Previous PMDS template (pre-2019/20)*

GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

**MANAGER / PROFESSIONAL (GRADE 11 – 12)**
**Performance Evaluation Form**

| | |
|---|---|
| **Job Title** | |
| **Primary Purpose of Role:** | |
| **Full Name & Surname of Official** | |
| **PERSAL number** | |
| **Department/ Unit/ Ward** | |
| **Directorate/ Institution/ District** | |
| **Date** | |
| **Full Name & Surname of Supervisor/Manager** | |
| **Persal number: Manager/ Supervisor** | |

| Rating Guide | | | | |
|---|---|---|---|---|
| CO | VE | E | MS/D | NYE |
| 5 | 4 | 3 | 2 | 1 |

**SECTION 1: PERFORMANCE REVIEW – GENERIC PERFORMANCE DIMENSIONS**

**Please Note: The sum of the weightings for the Performance Dimensions used must total 100**

| KEY | CO=Clearly Outstanding | VE= Very Effective | E = Effective | MS/D = Developing – Meets Some Requirements | NYE = Not Yet Effective |
|---|---|---|---|---|---|

| Performance Dimension | Weighting | CO | VE | E | MS/D | NYE | Definitions | Total |
|---|---|---|---|---|---|---|---|---|
| **PD1**: Work as a Manager in the Public Sector | | | | | | | **Work as a Manager in the Public Sector**<br>*People who meet this standard have in the past year been able to:*<br>• *Describe the role, structure and aims of a public sector department and the role of each member of their work team (or department).*<br>• *Describe the Acts, Regulations, policies and procedures that affect the work of the GPG / Department.*<br>• *Show what these mean for the work group (or teams) they manage.* | |
| **PD2: Plan and sponsor department work across organisational boundaries.** | | | | | | | **Plan and sponsor work across organisational boundaries**<br>**People who meet this standard have in the past year been able to:**<br>• *Plan and sponsor activities across organisational boundaries and structures.*<br>• *Co-ordinate these activities* | |

1

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **PD3**: Plan, Organise and Allocate work to achieve Objectives. | | | | | | | **Plan, Organise and Allocate work to achieve Objectives**<br>*People who meet this standard have in the past year been able to:*<br>• *Prepare work plans for a specific work area that provide direction and guidance to team leaders or work groups.*<br>• *Organise and allocate responsibility for the achievement of objectives.* | |
| **PD 4:** Manage Own Performance and development. | | | | | | | **Manage Own Performance and development**<br>*People who meet this standard have in the past year been able to:*<br>• *Identify how effective they are in their own work.*<br>• *Set and achieve objectives for the improvement of their own performance.*<br>• *Develop the skills and knowledge needed to adapt to new performance requirements in a workplace (e.g. in technology, work practices, and issues and trends).* | |
| **PD5:** Manage the performance and development of staff | | | | | | | **Manage the performance and development of staff**<br>• *People who meet this standard have in the past year been able to plan for and review the on-the-job performance of individuals and work groups.* | |
| **PD 6:** Plan Service Delivery to meet Client Expectations | | | | | | | **Plan Service Delivery to meet Client Expectations**<br>*People who meet this standard have in the past year been able to:*<br>• *Clarify client expectations of a work area.*<br>• *Develop a plan for service delivery that meets and exceeds client expectations in terms of quality and timeliness.*<br>• *Implement a plan for service delivery that meets and exceeds client expectations in terms of quality and timeliness.*<br>• *Evaluate a plan for service delivery that meets and exceeds client expectations in terms of quality and timeliness.* | |
| **PD 7:** Develop Initiatives for Managing Development and Transformation Processes in a Workplace | | | | | | | **Develop Initiatives for Managing Development and Transformation Processes in a Workplace**<br>*People who meet this standard have in the past year been able to:*<br>• *Develop a culture in the workplace that is conducive to productive change.*<br>• *Lead and management change processes in a work group.* | |
| **PD 8:** Communicate as a Manager in the Public Service. | | | | | | | **Communicate as a Manager in the Public Service.**<br>*People who meet this standard have in the past year been able to:*<br>• *Lead and conduct formal meetings.*<br>• *Give clear verbal instructions and guidelines for staff in a workplace.*<br>• *Give clear written instructions and guidelines for staff in a workplace.*<br>• *Prepare and present formal reports and correspondence for senior and external audiences.* | |

2

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **PD 9** | Apply Problem Solving Strategies as a Manager in the Public Service | | | | | | **Apply Problem Solving Strategies as a Manager in the Public Service**<br>*People who meet this standard have in the past year been able to:*<br>• *Identify workplace problems.*<br>• *Propose solutions*<br>• *Implement a preferred solution.*<br>• *Get support / buy in for the proposed solutions.*<br>• *Evaluate the Outputs of the interventions.* | |
| **PD 10:** | Prepare and Use Budgets | | | | | | **Prepare and Use Budgets**<br>*People who meet this standard have in the past year been able to:*<br>• *Make and justify budgetary proposals for expenditure and revenue.*<br>• *Manage and control the budgetary process.*<br>• *Monitor, control, and review performance of budget holders against their budget allocation.*<br>• *Report progress and performance in terms of public sector requirements.* | |
| **PD 11**: | Maintain physical and/or electronic information records | | | | | | **Maintain physical and/or electronic information records**<br>*People who meet this standard have in the past year been able to:*<br>• *Apply departmental procedures and standards for the storage of physical or electronic information*<br>• *Ensure that all members of the work group enter information into and extract information from records efficiently.* | |
| **PD 12:** | Use Technology to achieve Workplace Objectives | | | | | | **Use Technology to achieve Workplace Objectives**<br>• *People who meet this standard have in the past year been able to use computers and equipment efficiently to achieve workplace objectives.*<br><br>*Note: Technologies are not limited to computers and computer applications such as e-mail, word processing, the use of spreadsheets, and the use of databases (such as PERSAL and BAS). Technologies may include other office equipment such as facsimile, copiers, and could include specialist equipment such as cheque scanners, bar code scanners, etc. Non-electronic technologies are also included.* | |
| **TOTAL** | | **100** | | | | | | |

3

**SECTION 2: PERFORMANCE REVIEW – SPECIFIC OUTPUTS**
***This section is specific to the official and could include projects.***

| OUTPUTS | WEIGHTING | MEASURES | Clearly Outstanding (5) | Very Effective (4) | Effective (3) | Meets some require-ments / Developing (2) | Not yet Effective (1) | Total |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| **Total : (Must Add up to 100)** | 100 | | | | | | | |

4

**SECTION 3: PERFORMANCE DEVELOPMENT**

**Employee Development Plan**
*This section should be completed after employee and manager have agreed upon desired areas of improvement and development. Listed below are the suggested generic competencies. Add or delete competencies to suit the specific requirements of the job. Then select two to three competencies for development and write a plan based on developmental objectives and the corresponding development activities (on-the-job training, formal training and tertiary education); include measurements and time frames for completion.*

| | |
|---|---|
| **1**: Work as a Manager in the public sector | |
| **2**: Plan and sponsor department work across organisational boundaries | |
| **3**: Plan, Organise and Allocate Work to achieve Objectives | |
| **4**: Manage Own Performance and development | |
| **5:** Manage the Performance and Development of Staff | |
| **6**: Plan Service Delivery to meet Client Expectations | |
| **7**: Develop Initiatives for Managing Development and Transformation Processes in a Workplace | |
| **8**: Communicate as a Manager in the Public Service | |
| **9**: Apply Problem Solving Strategies as a Manager in the Public Service | |
| **10:** Prepare and Use Budgets | |
| **11**: Maintain physical and/or electronic information records. | |
| **12:** Use Technology to achieve Workplace Objectives | |
| **13.** Other; Please specify: | |

| **DEVELOPMENT OBJECTIVE 1** | |
|---|---|
| | |
| | |
| Development Activities: | |
| | |
| Measurements: | |
| | |
| Time Frame (for completion): | |



| **DEVELOPMENT OBJECTIVE 2** | |
|---|---|
| | |
| | |
| Development Activities: | |
| | |
| Measurements: | |
| | |
| | |
| | |
| Time Frame (for completion): | |
| | |

| **DEVELOPMENT OBJECTIVE 3** | |
|---|---|
| | |
| Development Activities: | |
| | |
| | |
| Measurements: | |
| | |
| | |
| Time Frame (for completion): | |
| | |

| **Signature section:** | **At the start of the Performance Appraisal Cycle)** |
|---|---|

**Seen by Official:** _____ **Date :** _____

**Agreed by Supervisor** _____ **Date :** _____

**Agreed by next level Manager :** _____ **Date :** _____

**Succession Planning:**
Does this person have the potential to be promoted to a more senior level irrespective of whether a post is currently available in the company?

| No | Needs more development | Yes |
|---|---|---|
| | | |

If yes, to which position or group of positions (job family)? (Irrespective of whether this position is currently available):

| | | |
|---|---|---|
| | | |

Within what period?

| Less than 6 months | 6 to 12 months | Longer than 12 months |
|---|---|---|
| 1 | 2 | 3 |

If employee has been assessed as less than effective (E), please provide a reason.

| Needs more experience/ training | Lacks initiative / motivation / drive | Has reached goal / full potential | Lack of dedication / commitment / loyalty / attitude problem | Poor job fit | Near ill health | Other e.g. Personal / Organisational problems (please elaborate) |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**Planned actions to address Performance:**

| **Overall score** (for Section 1 and Section 2, for full Appraisal Cycle ) | **Final Rating** (for full Appraisal Cycle) |
|---|---|
| | |

7

**Signature section :**
**At the end of the Performance Appraisal Cycle)**

**Seen by Official:** _____ **Date :** _____

**Agreed by Supervisor** _____ **Date :** _____

**Agreed by next level Manager :** _____ **Date :** _____

| **Comments Official:** | |
|---|---|

| **Comments Supervisor/Manager:** | |
|---|---|

8

## *7.4.2 Current PMDS template (2019/20 onwards)*

GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

| Performance Cycle | |
|---|---|

**ANNEXURE A**

**EMPLOYEE PERFORMANCE AGREEMENT AND DEVELOPMENT PLAN**

**Employees (Salary Levels 1-12)**

| | | | | | |
|---|---|---|---|---|---|
| **Name and Surname:** | | **Institution** | | **Component:** | |
| **Job Title:** | | **Salary Level:** | | **PERSAL Number:** | |
| **Job Purpose:** | | | | | |
| **Name and Surname of Supervisor:** | | | **Supervisor PERSAL Number:** | | |
| **Date of appointment:** | | | **Probation? Yes/No** | | |



**Key Responsibility Areas (KPA)**

**This section is specific to the official and could include projects.**

| KEY RESPONSIBILITY AREAS | WEIGHTING |
|---|---|
| | |
| | |
| | |
| | |
| | **100%** |

**Work Plan**

| Key Responsibility Areas (As reflected in the above page/s) | Performance objective / Output | Activities | Key Performance Standards / Measures | Target Dates | Resource Requirements |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |



**Signatures**

**Name of Official :** _____ **Signature:** _____

**Date:** _____

**Agreed by Supervisor:** _____ **Signature:** _____

**Date:** _____

**Agreed by Next Level Manager:** _____ **Signature:** _____

**Date:** _____

**ANNEXURE B**

**GENERIC ASSESSMENT FACTORS**

| KEY | Generic Assessment Factors (GAFs) | Applicable |
|---|---|---|
| | **GAF1:** Job knowledge | |
| | **GAF2:** Technical skills | |
| | **GAF3:** Acceptance of responsibility | |
| | **GAF4:** Quality of work | |
| | **GAF5:** Reliability | |
| | **GAF6:** Initiative | |
| | **GAF7:** Communication | |
| | **GAF8:** Interpersonal relationships | |
| | **GAF9:** Flexibility | |
| | **GAF10:** Team work | |
| | **GAF11:** Planning and execution | |
| | **GAF12:** Leadership | |
| | **GAF13:** Delegation and empowerment | |
| | **GAF14:** Management of financial GAF resources | |
| | **GAF15:** Management of human resources | |
| | **Total** | |



**ANNEXURE C**

**Personal Development Plan**

*This section should be completed after employee and manager have agreed upon desired areas of improvement and development. Listed below are the suggested generic assessment factors from which **only five** may be selected. Add or delete GAFs suitable for specific requirements of the job. Then select **two to three** competencies for development and write a plan based on developmental objectives and the corresponding development activities (on-the-job training, formal training and tertiary education); include measurements and time frames for completion*

| Generic Assessment Factors (GAFs) | | Competency Gaps (Tick) |
|---|---|---|
| 1 | Job knowledge | |
| 2 | Technical skills | |
| 3 | Acceptance of responsibility | |
| 4 | Quality of work | |
| 5 | Reliability | |
| 6 | Initiative | |
| 7 | Communication | |
| 8 | Interpersonal relationships | |
| 9 | Flexibility | |
| 10 | Team work | |
| 11 | Planning and execution | |
| 12 | Leadership | |
| 13 | Delegation and empowerment | |
| 14 | Management of financial GAF resources | |
| 15 | Management of human resources | |

| Personal Development Plan | | | | | |
|---|---|---|---|---|---|
| Key Skills Required | Intervention (courses, seminars, on the Job training) | Training / Development Program Identified | Timelines | Desired Outcome for: | |
| | | | | Self | Department |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |



| Signature Section: | Any disagreements will be dealt with in terms Regulation 72 (4) of the Public Service Regulation, 2016. |
|---|---|

**Name of Official :** _____ **Signature:** _____

**Date:** _____

**Agreed by Supervisor:** _____ **Signature:** _____

**Date:** _____

**Agreed by Next Level Manager:** _____ **Signature:** _____

**Date:** _____

**Comments:**

_____

_____

**Planned Actions to Address Performance:**

_____

_____

## 7.5 Research documentation

### *7.5.1 Ethics certificate*

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

**Office of the Deputy Vice-Chancellor (Research and Postgraduate Affairs**

**TO:** Dr J Punwasi
School of Public Health
Medical School
University

E-mail: jayshina@gmail.com

**CC:** Supervisor: Dr D Blaauw
<Duane.Blaauw@wits.ac.za>
and <HREC-Medical Research Office@wits.ac.za>

**FROM:** Mr Iain Burns
Human Research Ethics Committee (Medical)
Tel: 011 717 1252

E-mail: Iain.Burns@wits.ac.za

**DATE:** 2021/01/20

**REF:** R14/49

**PROTOCOL NO:** **M200701** (This is your ethics application reference number. Please quote it in all enquiries, oral or written, relating to this study.)

**PROJECT TITLE:** *An exploratory investigation into institutional and staff performance: evidence from public hospitals in Gauteng*

Please find attached the Clearance Certificate for the above project. I hope it goes well and that an article in a recognized publication comes out of it. This will reflect well on your professional standing and contribute to Government funding of the University.

MSWorks2000/Iain0007/Clearscan.wps

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

R49 Dr J Punwasi

# HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
## CLEARANCE CERTIFICATE NO. M200701

| | |
|---|---|
| **NAME:** (Principal Investigator) | Dr J Punwasi |
| **DEPARTMENT:** | School of Public Health<br>Medical School<br>University |
| **PROJECT TITLE:** | *An exploratory investigation into institutional and staff performance: evidence from public hospitals in Gauteng* |
| **DATE CONSIDERED:** | 2020/07/31 |
| **DECISION:** | Approved unconditionally |
| **CONDITIONS:** | |
| **SUPERVISOR:** | Dr D Blaauw |
| **APPROVED BY:** | Dr CB Penny, Chairperson, HREC (Medical) |
| **DATE OF APPROVAL:** | 2021/01/20 |

**This Clearance Certificate is valid for 5 years from the date of approval. An extension may be applied for.**

---

**DECLARATION OF INVESTIGATORS**

To be completed in duplicate and **ONE COPY** returned to the Research Office secretariat on the 3rd floor, Phillip Tobias Building, Parktown, University of the Witwatersrand, Johannesburg.

I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated from the research protocol as approved, I/we undertake to submit details to the Committee. **I agree to submit a yearly progress report**. When a funder requires annual re-certification, the application date will be one year after the date when the study was initially reviewed. In this case, the study was initially reviewed in **July** and therefore reports and re-certification will be due in the month of **July** each year. Unreported changes to the study may invalidate the clearance given by the HREC (Medical).

Signature of Principal Investigator  Date

### *7.5.2 Plagiarism Declaration Report*

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

FACULTY OF HEALTH SCIENCES

**PLAGIARISM DECLARATION TO BE SIGNED BY ALL HIGHER DEGREE STUDENTS**

SENATE PLAGIARISM POLICY: APPENDIX ONE

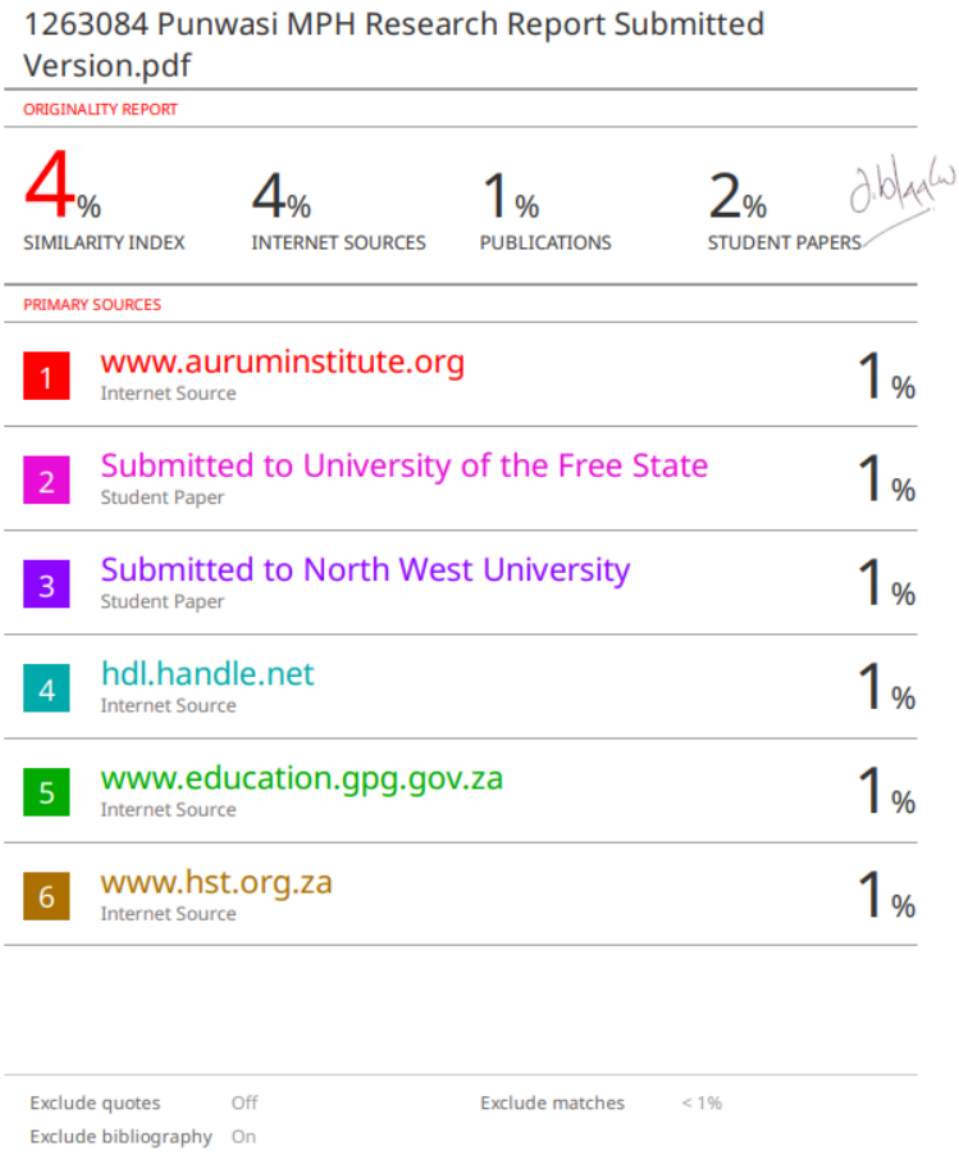
I Jayshina Punwasi (Student number: 1263084) am a student registered for the degree of Master in Public Health in the academic year 2018.

I hereby declare the following:

- I am aware that plagiarism (the use of someone else's work without their permission and/or without acknowledging the original source) is wrong.
- I confirm that the work submitted for assessment for the above degree is my own unaided work except where I have explicitly indicated otherwise.
- I have followed the required conventions in referencing the thoughts and ideas of others.
- I understand that the University of the Witwatersrand may take disciplinary action against me if there is a belief that this is not my own unaided work or that I have failed to acknowledge the source of the ideas or words in my writing.
- I have included as an appendix a report from "Turnitin" (or other approved plagiarism detection) software indicating the level of plagiarism in my research document.

Signature:  Date: 28 / 03 / 2024

### *7.5.3 Turnitin Report*



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