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SOUTHERN AFRICAN
HEALTH
JOURNAL

COLLABORATING FOR VALUE

Partnerships Transforming the
Future of Healthcare



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BOARD OF HEALTHCARE FUNDERS



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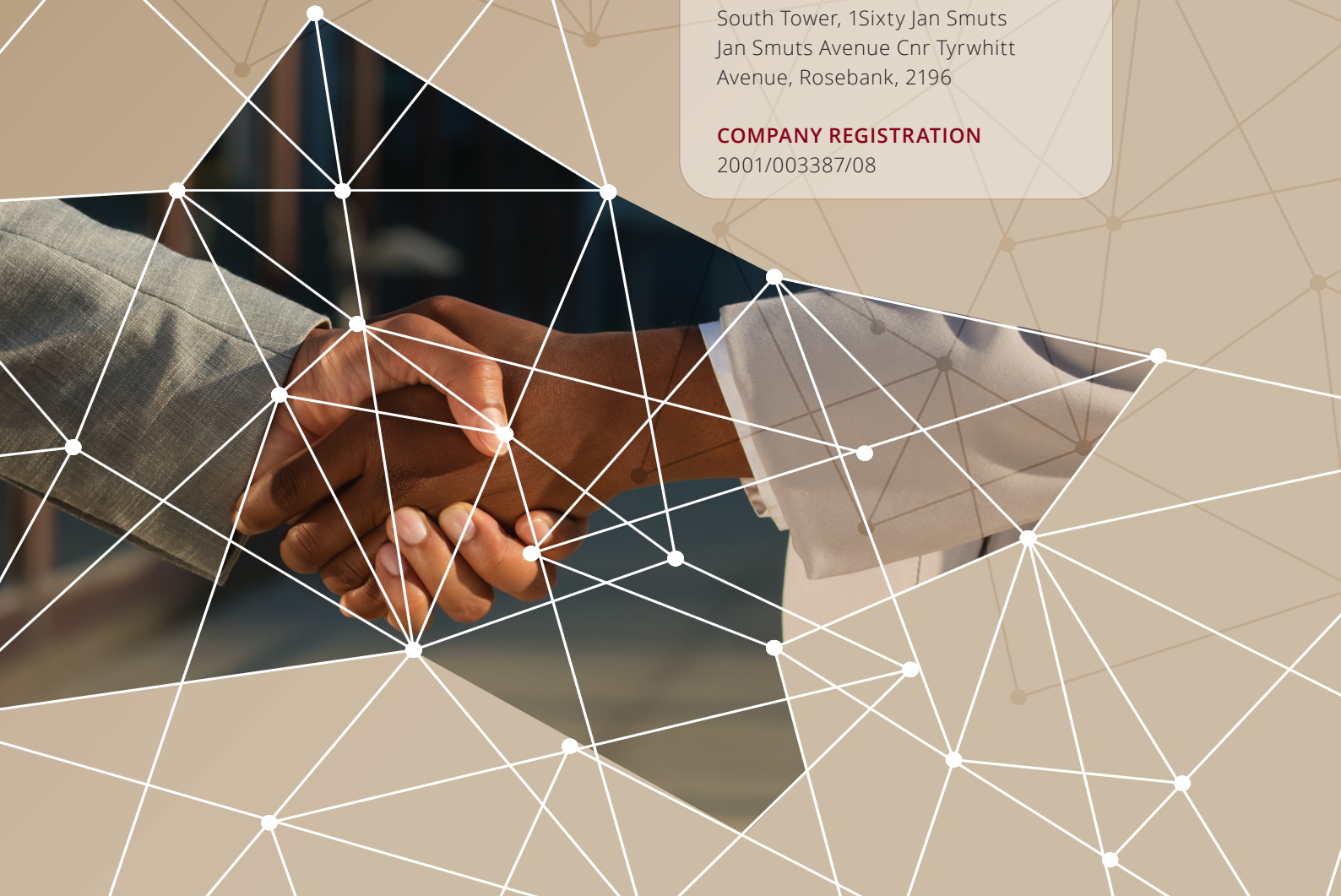
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From the EDITOR'S DESK

The Board of Healthcare Funders is pleased to present the 6th edition of the Southern African Health Journal.

The demand for healthcare services is immense and continues to rise, due to a range of interconnected factors, resulting in a persistent gap between needs and available resources. This edition of the Southern African Health Journal emphasises the importance of partnerships and explores how the health system can leverage these collaborations to meet ongoing healthcare demands.

In the opening article, Childs takes a reflective approach, imagining how South Africa might have progressed if its economic performance had been on a par with those of other low- to middle-income countries (LMICs). The conclusion is clear: the country's healthcare challenges are closely tied to its economic trajectory.

On the policy front, Brijlal and Cassim argue that private sector proposals are well-aligned with the goals of the National Health Insurance Fund, making a compelling case for pursuing partnerships to achieve universal health coverage. Kasapato emphasises the need for medical schemes to evolve in how they purchase health services, focusing on creating the right incentives for providers and better outcomes for patients—again underscoring the central role of partnerships.

Moabelo and colleagues provide a practical example of effective collaboration in healthcare. Their study explores the partnership between a medical scheme and an employer, showing how integrating workplace wellness programmes into the medical scheme framework can yield both improved health outcomes and financial benefits. Clearly, healthier employees are also advantageous for employers.

Thenga and colleagues delve into the social determinants of mental health, highlighting South Africa's relatively poor outcomes compared to its LMIC peers. Their paper calls for greater investment in primary-level mental health services as a strategy to address these disparities.

This edition of the journal also includes discussions on strategic purchasing and value-based care. Hartnick et al describe their experience delivering palliative care through multi-level partnerships. Moyo discusses how sharing outcome measurement data across the health system has led to better patient results. Similarly, Kudsk and Hill illustrate how collaboration between a health funder and a technology service provider has enhanced care for diabetic patients, empowering them to take greater control of their condition.

Mahlangu underscores the role of technology in advancing dental care, especially in resource-constrained settings where it can help close existing access gaps. Ruff and colleagues advocate for leveraging today's data-rich environment to improve decision-making in healthcare. They stress the importance of localising data analysis to optimise service delivery.

The BHF extends its gratitude to all authors, reviewers and contributors to this journal. We hope readers find the articles in this edition thought-provoking and informative.

Charlton Murove

Head of Research, Board of Healthcare Funders

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GROWTH AS A PATH to health and prosperity

AUTHOR

Barry Childs

PEER REVIEWER: Charles Hongoro

INTRODUCTION

This paper argues that a renewed focus on economic growth is of critical importance to the health and prosperity of South Africans. Health systems exist within a country's macro-economic context. South Africa's economic context is characterised by low to no real growth, deep inequality, high levels of cross-subsidy through systems of social grants and duplicative spending on services such as health and education. South Africa has among the most unequal income distributions in the world. Two direct effects of this inequality are a high level of redistribution and a concentrated tax base, with 1.66 million income earners contributing 76% of personal income tax and 1 051 companies contributing 72% of corporate income tax.

Our two-tier health financing and provider system is scheduled to be remoulded into one financing system purchasing from public and private providers. Creating one predominant financing system would be a further significant step in redistribution, which has received significant criticism and legal challenge. Pooling public and private funding for health into one public financing vehicle, the National Health Insurance (NHI) Fund, would make public spending on health the largest government expenditure item by a significant quantum and would represent an imbalance in public spending. This paper is not about the NHI health reform or health funding specifically, but the macroeconomic context within which the NHI health reform is being contested.

It is common cause that medical schemes face a number of key challenges:

- medical scheme membership is described as 'stagnant';
- the age profile of medical scheme members has been increasing over time;
- medical scheme members have been buying less cover over time, referred to as 'buy-down'
- medical scheme contribution increases are consistently higher than inflation, attributable mostly to increased utilisation of healthcare services, mostly driven by rising burden of disease.

The regulatory solution that would have mitigated these issues pre-2007 (wholly or at least in large part) was planned mandatory membership of medical schemes for those earning above some specified income. In the absence of mandatory membership, effective economic growth would have gone some way to improve the plight of medical schemes. Unfortunately, South Africa has not benefited from medical scheme regulatory reform or meaningful economic growth.

This paper considers an alternative history for the past 15 years: where we might have been economically, compared to where we are - to show the beneficial effect of economic growth, including the effect on equity within the South African health system. With this alternative past as a guide, we must ensure that we do not waste the next 15 years.

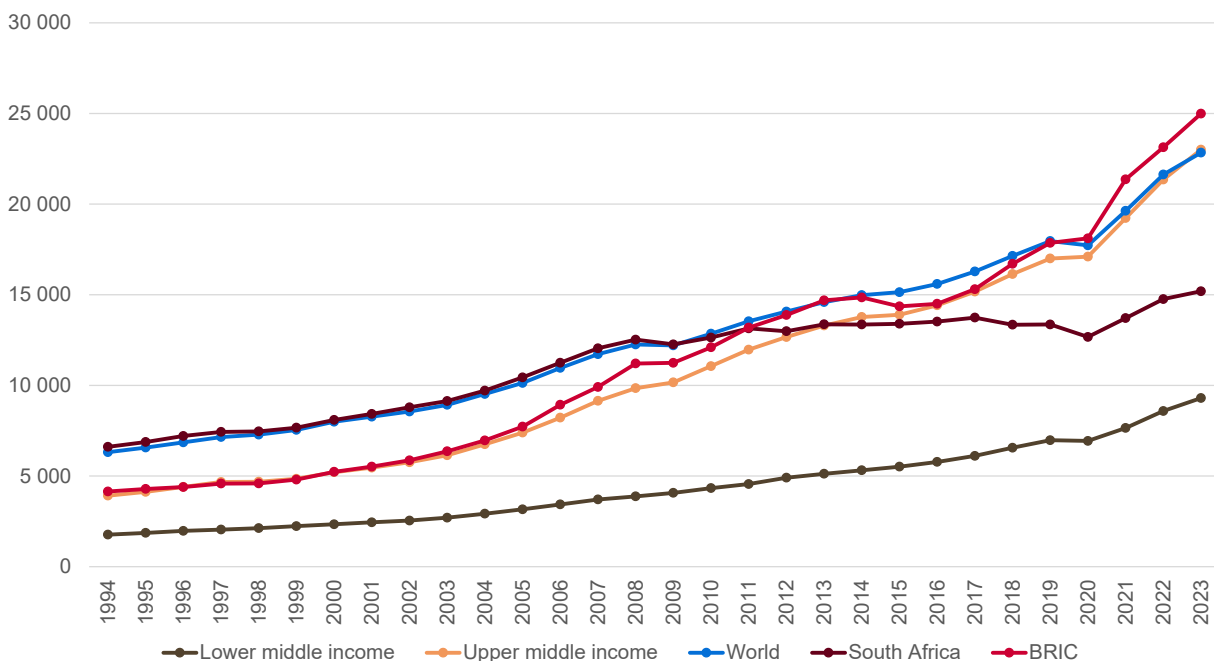
LACK OF GROWTH

Our economy should be at least 50% larger. Between 2009 and 2023, the South African economy grew only marginally (24% in total, 1.5% per annum) while the rest of the world and our peer and comparator countries grew materially:

- World - 87% in total, 4.6% per annum
- BRIC (Brazil, Russia, India, China) - 122% in total, 5.9% per annum
- UMICs (Upper-middle-income countries) - 126% in total, 6% per annum
- LMICs (Lower-middle-income countries) - 128% in total, 6.1% per annum

If South Africa had kept pace with the rest of the world at 4.6% GDP per capita growth over the period our economy would be 52% larger in real per capita terms. Figure 1 shows the real GDP growth per capita over time, comparing South Africa to these groups and illustrating the break from trend for South Africa starting after 2009.

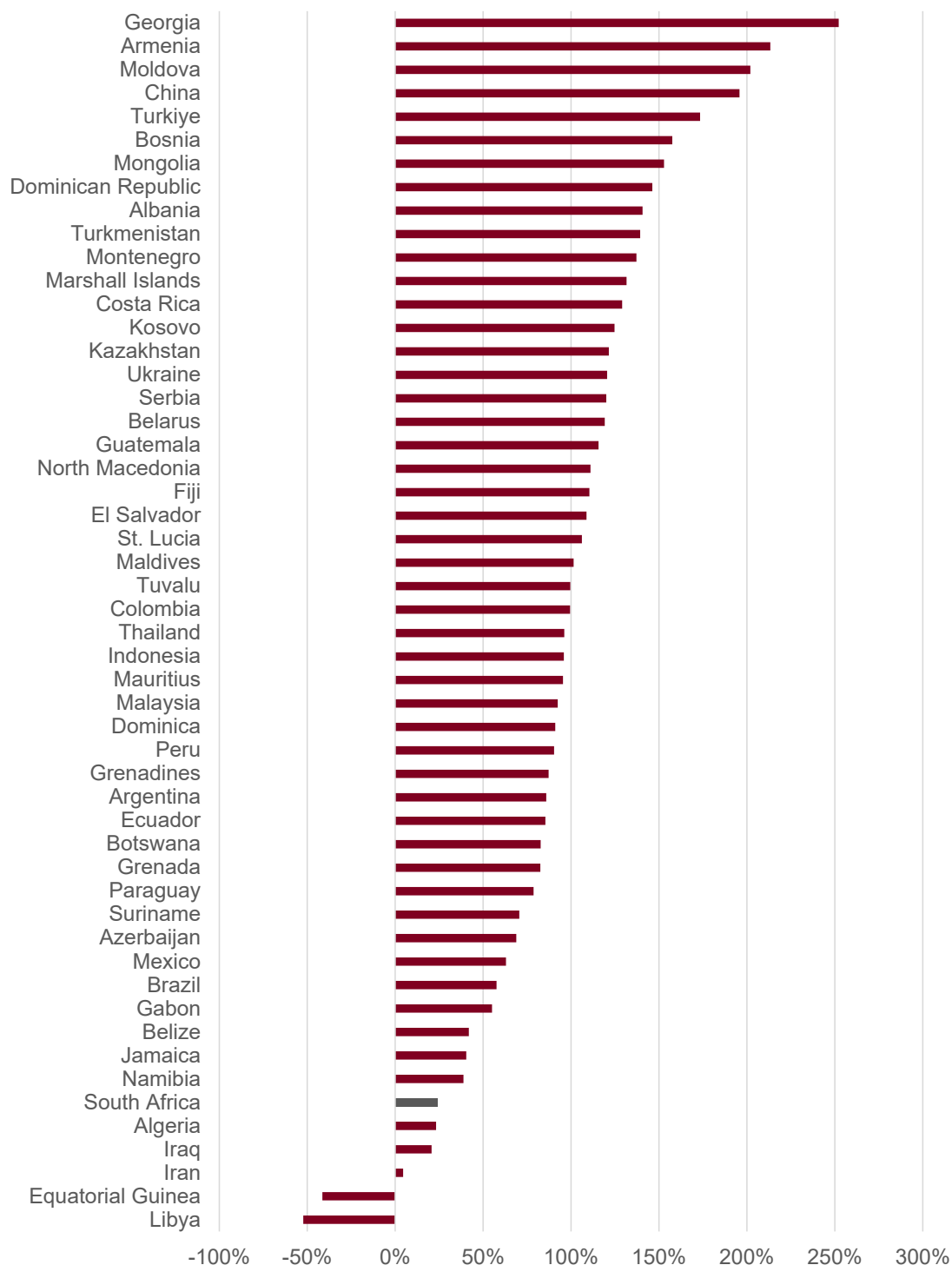
Figure 1: GDP per capita, Purchasing Power Parity adjusted (PPP) (current international \$), World Bank data



South African GDP per capita was at or above world GDP per capita until 2009. The inflection point is around the 2008 global financial crisis, after which South Africa fell well behind the rest of the world in economic policy and growth.

[1] GROWTH AS A PATH TO HEALTH AND PROSPERITY

Figure 2: 2009-2023 Growth in GDP per capita, UMICs' PPP (current international \$), by country; World Bank



As can be seen in Figure 2 above South Africa's economy grew the sixth slowest out of 50 UMICs. South Africa is not unique in its challenges and opportunities, but economically it has performed poorly relative to its peers, whether large or small, including some countries in prolonged armed conflict. Four of the five countries performing worse than South Africa are exposed to prolonged international sanction or wars.

[1] GROWTH AS A PATH TO HEALTH AND PROSPERITY

Tables 1 and 2 show the growth percentage for the groups being compared in total and per annum, respectively, for the periods 2000-2009, during which South Africa tracked world growth fairly closely; 2009-2023 where South Africa fell far behind the rest of the world; and the full period from 2000 to 2023. Figure 3 shows the same data as Table 2 graphically.

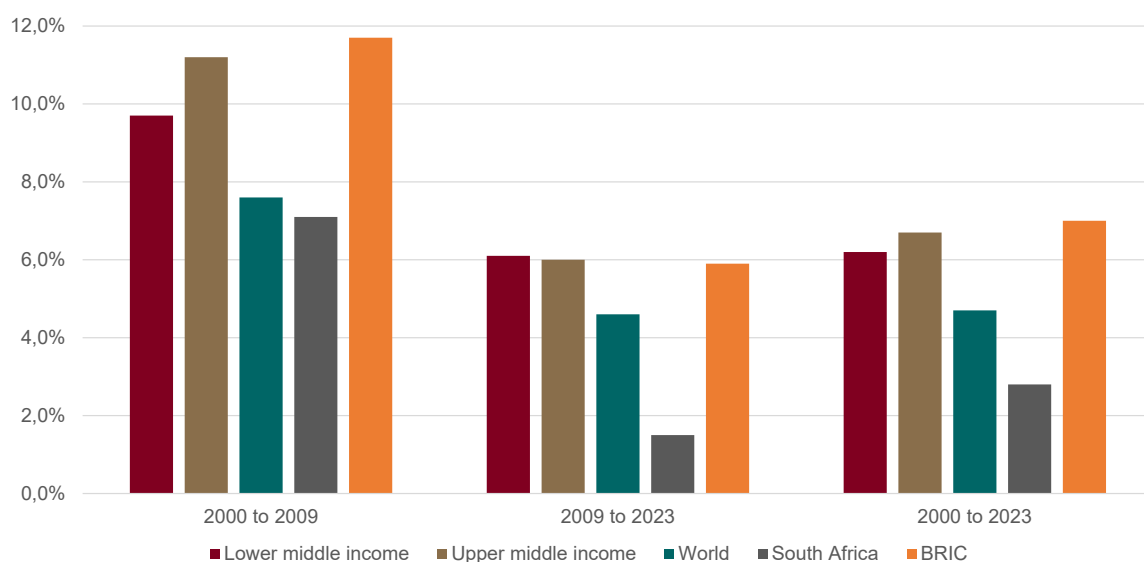
Table 1: Growth in GDP per capita, PPP (current international \$), World Bank

	2000 TO 2009	2009 TO 2023	2000 TO 2023
Lower middle income	130%	128%	298%
Upper middle income	160%	126%	342%
World	93%	87%	186%
South Africa	85%	24%	88%
BRIC	171%	122%	378%

Table 2: Growth per annum in GDP per capita, PPP (current international \$), World Bank

	2000 TO 2009	2009 TO 2023	2000 TO 2023
Lower middle income	9,7%	6,1%	6,2%
Upper middle income	11,2%	6,0%	6,7%
World	7,6%	4,6%	4,7%
South Africa	7,1%	1,5%	2,8%
BRIC	11,7%	5,9%	7,0%

Figure 3: Growth per annum in GDP per capita, PPP (current international \$), World Bank



Note that world GDP growth is lowered over time due to countries with higher population growth rates dragging the weighted average world GDP down. As such, comparison to world GDP growth is an artificially low benchmark.

INCOME AND EXPENDITURE

Between 2009 and 2023, South African government expenditure increased by 190%, government income increased by 174% and government debt grew by 530%. Current government income and expenditure is summarised below (Table 3).

Table 3A: 2023/2024 Government income and expenditure, National Treasury

	R BILLION	% OF GDP
Revenue	1921,4	27,3%
Expenditure	2268,9	32,2%
Deficit	-347,5	-4,9%

Table 3B: 2023/2024 Government revenue by source, National Treasury

	R BILLION	% OF REVENUE
Personal income tax	738,7	38,4%
VAT	476,7	24,8%
Corporate income tax	302,7	15,8%
Customs and excise duties	141,8	7,4%
Fuel levies	95,8	5,0%
Other	165,7	8,6%

Table 3C: 2023/2024 Government expenditure by department, National Treasury

	R BILLION	% OF REVENUE
Basic education	303,0	13,4%
Other learning and culture	165,4	7,3%
Health	267,3	11,8%
Grants	355,2	15,7%
Other social development	13,3	0,6%
Community development	251,5	11,1%
Economic development	239,8	10,6%
Peace and security	236,8	10,4%
General public services	76,9	3,4%
Payments for financial assets	3,5	0,2%
Debt servicing	356,1	15,7%

The largest areas of government expenditure are debt servicing and social grants, each 15,7% of total expenditure followed by basic education and then health (Table 3C above). Government debt has increased from around 30% of GDP in 2009 to over 70% of GDP in 2023.

Having set the scene highlighting the past 14 unproductive years and current expenditure, we can contemplate an alternative history. If South Africa's economy had grown at the same rates as the world average (4,6% per year over 14 years) our economy in 2023/2024 would have been 52% larger.

[1] GROWTH AS A PATH TO HEALTH AND PROSPERITY

Economies are complex to model, but for the purpose of this paper we will simplify with some linear extrapolation from economic growth. To do this we must make some assumptions.

Job elasticity in South Africa is estimated to be as high as 0,7 relative to GDP which means that for every 1% growth in GDP, there would be a commensurate 0.7% growth in the number of jobs. I have used 0,5 for conservatism. Therefore, if the economy were 50% larger, we would have (at least) 25% more jobs.

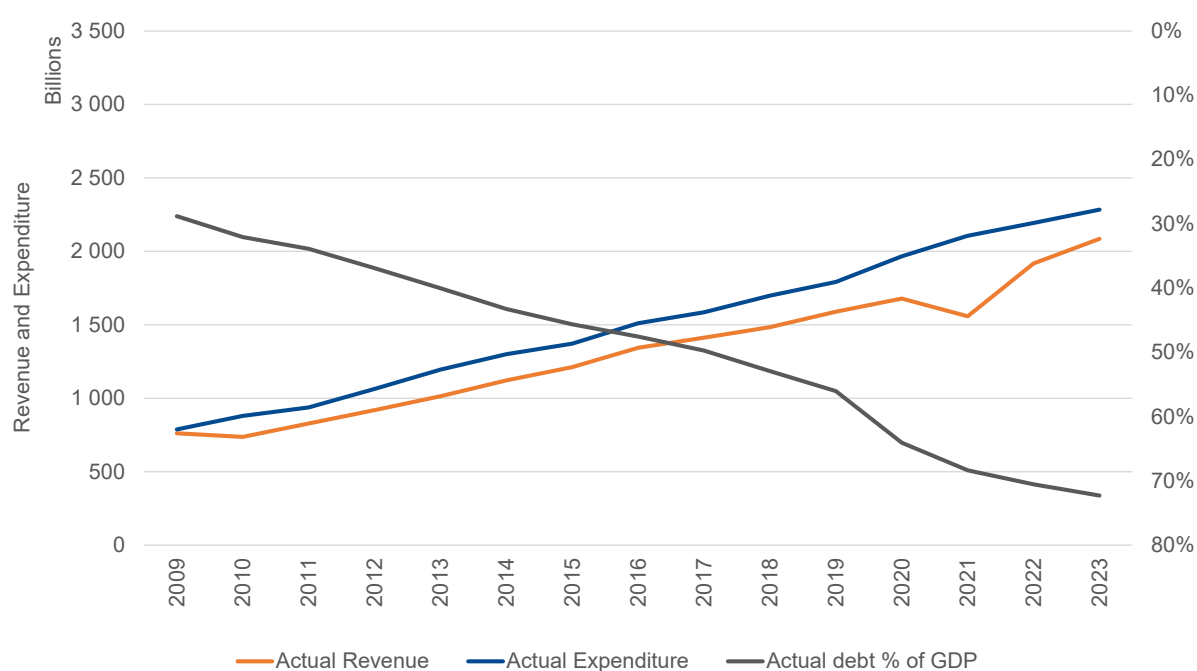
The number of jobs in South Africa is well correlated with medical scheme membership. Scheme members need a sufficient income to afford contributions. If more South Africans had jobs, more people would belong to medical schemes. I will assume the same proportion of job growth applies to medical scheme membership growth – 25%.

Tax elasticity (or tax buoyancy) is complex to calculate and varies by tax type. Tax buoyancy for South Africa over the long term varies between 0,75 and 1,55, averaging at 1,09 between 1994 and 2016. I will use a conservative figure of 1,0 for all taxes. Thus, for a 50% growth in the economy, we would collect 50% more taxes.

We would hope that surpluses would be used to pay down any deficit rather than expanding the current deficit. Let us assume that with the benefit of hindsight we can set the rate of annual increases in government expenditure such that government debt would be held close to 2008/2009 levels. Keeping to round numbers we can assume government expenditure would attract a 25% additional increase over the period (compared to the 50% increase in revenue).

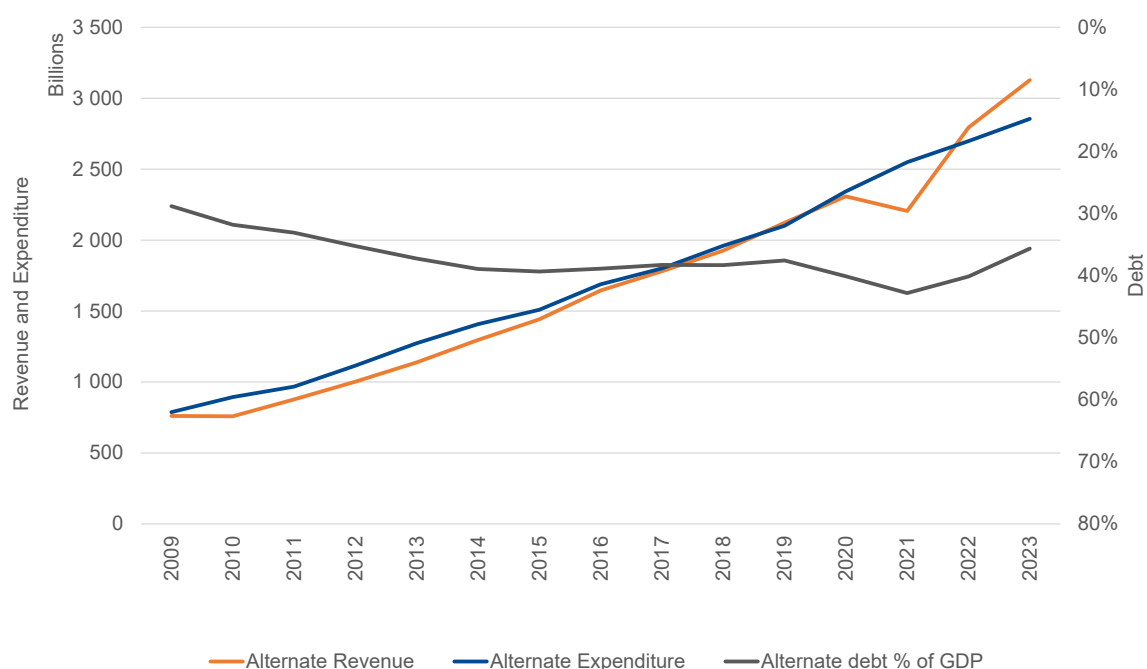
The combined effect of the alternative fiscal assumptions yields expenditure much closer to revenue with some years showing a surplus and some a deficit. Government debt is maintained close to 30% of GDP. Graphically using the same axes for actual and alternative scenarios we see the following (Figure 4).

Figure 4A: Actual government revenue, expenditure, debt as % of GDP; Treasury data



[1] GROWTH AS A PATH TO HEALTH AND PROSPERITY

Figure 4B: Alternative government revenue, expenditure and debt as % of GDP; Modelled results



Allowing for 25% higher government expenditure at the same time as a smaller debt burden (roughly half the actual 2023 debt burden) translates to 39% higher expenditure on service delivery via the various government departments. Higher employment also lowers the need for social grants, but we will assume for now that total grant expenditure remains the same while being spread over fewer people, meaning higher real receipts in the hands of those in need. Assuming the 39% of government expenditure is spread evenly across government departments we would see the following alternative expenditures in 2023 (Table 4).

Table 4: 2023/2024 Alternative government expenditure by department:

	R BILLION (ALTERNATIVE)	% OF EXPENDITURE (ALTERNATIVE)	ADDITIONAL EXPENDITURE VERSUS ACTUAL
Basic education	421,2	14,8%	118,2
Other learning and culture	229,9	8,1%	64,5
Health	371,5	13,1%	104,2
Grants	493,7	17,4%	138,5
Other social development	18,5	0,7%	5,2
Community development	349,6	12,3%	98,1
Economic development	333,3	11,8%	93,5
Peace and security	329,2	11,6%	92,4
General public services	106,9	3,8%	30,0
Payments for financial assets	4,9	0,2%	1,4
Debt servicing	178,1	6,3%	-178,1

HEALTHCARE

Inequity in the healthcare system mirrors inequity in the economy overall. While it is an oversimplification to compare medical scheme contributions to public sector expenditure, it is acknowledged that medical schemes spend roughly five times the amount per capita than is spent per person in the public sector. We can extend the alternative analysis above to the health system to see what the effect would be of achieving the middling economic growth seen in the rest of the world. Medical scheme membership would have risen by 25% from nine million lives to 11.25 million. The lives entering medical scheme membership would on average be younger (for example, economic growth would not buoy pensioner membership but working-age people entering the job market, weighted toward younger ages).

As mentioned above, real incomes would also be higher, meaning less pressure on scheme contributions and consequently less buy-down. Altogether this effect would begin to unwind 25 years of the actuarial death spiral of anti-selection although not remove it completely. While full medical scheme regulatory reforms could have seen contributions as much as 40% lower, a very conservative back-of-the-envelope actuarial estimate allowing for the positive effects of economic growth suggests contributions could be 10% lower than current levels, after allowing for less buy-down and younger market entrants.

Comparative figures between actual and the result of alternative history would be as follows (Table 5):

Table 5: 2022 Medical scheme and public health expenditure comparisons, CMS and Treasury data

	2022 ACTUAL		2022 ALTERNATIVE	
	Medical schemes	Public sector	Medical schemes	Public sector
Lives	8 956 765	53 223 626	11 195 956	50 984 435
Expenditure (R billion)	232 488	265 902	261 549	369 604
Spend per capita (R)	25 957	4 996	23 361	7 249

The per capita difference in expenditure would drop from 5.2 to 3.2, still notably higher in the private sector. Public health expenditure would be 45% higher per capita without the need to raise taxes, or limit or prohibit medical schemes from providing benefits to members.

One added benefit of higher public healthcare spending would be less reliance on external funding. Had we achieved moderate economic growth, South Africa would not have needed billions of dollars in aid funding from the USA government and NGOs, and the turmoil created by the recent aid spending cuts would not have affected local programmes.

We also need to do more to improve the social determinants of health, to improve the dignity and basic living standards of the vulnerable; this too can best be achieved through the additional fiscal space that a larger economy would provide.

WHAT IS TO COME

Hindsight is 20/20 and it is easy to look backwards and make up alternative scenarios wishing for what might have been. But it is not wishful thinking to expect the realisation of the great resources available in South Africa to at least be in line with the rest of world's average. The necessary steps are, at a minimum: minimising corruption and maximising good stewardship of public funds and assets; public investment in infra-

structure; making it much easier to do business in South Africa through reduced bureaucracy; and providing incentives for private sector investment and employment.

It is core to actuarial training to look at the past as a guide to the future. By looking back, we can see a future that must be avoided with the highest priority – another wasted decade and a half digging deeper debt holes and focusing more on redistribution than growth. We have spent the last 14 years or more showing what not to do. It is imperative that we accelerate our pursuit of growth to improve the prosperity of all South Africans. In so doing, we will dramatically narrow the inequity in the country in general and the health system specifically.

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- 2 <https://www.dailymaverick.co.za/opinionista/2025-03-10-sas-heavy-tax-reliance-on-a-limited-number-of-high-earners-is-a-critical-weakness/>
- 3 <https://www.moonstone.co.za/sas-corporate-tax-base-rests-on-a-few-large-companies/>
- 4 Measured using GDP per capita on a purchasing power parity adjusted basis, in constant dollar terms. Using rands, South Africa's real GDP per capita increased by 1,05% in total over the period between 2009 and 2023 (0,07% per annum), so using international dollars paints a more flattering picture.
- 5 World Bank
- 6 The World Bank groups South Africa in the upper-middle income group of countries.
- 7 BRIC used, excluding South Africa. Simple unweighted average across BRIC countries.
- 8 International Monetary Fund. South Africa: 2014 Article IV Consultation
- 9 Naape B, Mahoyne N (2020). How buoyant is the South African Tax system. Economic Research South Africa
- 10 <https://www.insight.co.za/we-told-you-so/>
- 11 Unfortunately, the 2023 CMS annual report with details on pertinent medical scheme figures and the accompanying annexures were still not available at the time of writing.

ALIGNING PRIVATE SECTOR Proposals with South Africa's Vision for Universal Health Coverage

AUTHORS

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PEER REVIEWER: Buddy Modi

EXECUTIVE SUMMARY

South Africa's national health insurance (NHI) represents a transformative policy designed to achieve universal health coverage (UHC) by pooling public and private healthcare resources. With the NHI now promulgated as an Act (National Department of Health, 2022), the focus has shifted toward practical implementation following years of debate during its time as a Bill. The Act is intended to guarantee that all citizens have access to comprehensive and affordable healthcare, even as long-standing inequalities persist between a resource-rich private sector and an underfunded public system.

Private sector stakeholders have long contributed proposals addressing key issues such as governance, funding, service delivery, quality assurance and technological innovation. These proposals aim to ensure that the NHI fulfils its UHC goals of equitable access, financial sustainability and integrated care, while avoiding unintended consequences such as two-tiered service delivery or excessive state control.

To clarify how private sector input has evolved, this article presents a comparison table summarising stakeholder contributions during three pivotal phases: before the NHI Bill was introduced (Pre-Bill), during parliamentary debate (Bill Process) and following its enactment (Post-Act). Proposals from groups such as Discovery Health, the Board of Healthcare Funders (BHF), private hospital networks (e.g. Netcare and Mediaclinic), specialist organisations (represented by the South African Private Practitioners Forum [SAPPF]), civil society organisations (including the Treatment Action Campaign [TAC] and SECTION27) and Business Unity South Africa (BUSA) are considered.

The article evaluates the alignment of these proposals with UHC objectives and examines whether observed differences reflect mere ideological variation or deeper systemic tensions. In conclusion, clear strategic recommendations are provided to foster meaningful integration of private sector contributions into the national healthcare framework.

INTRODUCTION

Healthcare in South Africa is historically divided between a large public sector, funded by taxes, and a relatively small but well-funded private sector, financed by medical schemes and out-of-pocket payments (Competition Commission South Africa, 2019). This arrangement has entrenched inequities in health outcomes. While many South Africans rely on public facilities that often struggle with inadequate staffing and resource constraints, a minority benefits from high-quality private healthcare services.

Recognising this disparity, the government developed the national health insurance (NHI) framework to ensure that every resident has fair access to comprehensive healthcare (Republic of South Africa, 2019).

The NHI aims to unify existing healthcare financing by creating a single strategic purchaser that contracts both public and private providers under standardised regulations. According to the World Health Organization (2021), UHC is defined as a healthcare system that ensures all people receive the health services they need without suffering financial hardship. However, achieving this standard in South Africa requires more than new legislation; it demands a fundamental transformation of the current systems in governance, financing, service delivery and accountability.

South Africa's critical health challenges remain evident in persistently high maternal mortality rates, widespread communicable diseases and a rising burden of non-communicable conditions. These issues, compounded by significant workforce shortages and fragmented data management systems, underscore the urgent need for robust reform. In this context, integrating private sector innovation is not optional but rather a vital component for creating a resilient and inclusive health system.

This paper examines how private sector proposals can help bridge these gaps. By reviewing contributions on governance, financing, public-private partnerships (PPPs), quality assurance, technological integration and phased implementation, the analysis seeks to identify practical points of convergence between government objectives and private sector expertise. International examples, from countries such as Thailand, Colombia and the United Kingdom, provide further context by illustrating how hybrid approaches can successfully integrate diverse funding and service delivery models. Their experiences offer valuable benchmarks for assessing South Africa's path forward.

THE NHI ACT AND ITS CORE UHC OBJECTIVES

The NHI Act is founded on three principal objectives:

1. **Equity in access:** Every South African should have equal access to essential health services, regardless of income or location. This objective is central to addressing the longstanding disparities that divide the healthcare system.
2. **Financial sustainability:** The system must reduce out-of-pocket spending and protect both individuals and the state from catastrophic healthcare expenses. Financial sustainability is crucial for maintaining long-term viability.
3. **Integration of public and private healthcare:** A unified system must harness the strengths of both sectors. By leveraging the expertise and resources of the private sector, the NHI aims to enhance overall service delivery and broaden the resource base available to all citizens.

To realise these objectives, the Act establishes a centralised funding mechanism accompanied by universal enrolment and a well-defined purchaser-provider split. Yet, its success depends not only on robust policy design but also on effective implementation, which in turn requires transparent governance, a balanced funding mix and consistent quality across all service providers.

The Act initiates a sweeping realignment of administrative systems and health economics infrastructure, thereby making collaborative engagement with the private sector indispensable.

PRIVATE SECTOR PROPOSALS AND CONTRIBUTIONS

Private stakeholders have contributed a variety of proposals aimed at refining the NHI framework. Their recommendations fall into several key themes:

Governance and oversight

Discovery Health stresses the need for independent oversight boards to prevent mismanagement of resources (Discovery Health, 2023). Similarly, the Board of Healthcare Funders (BHF) argues that robust governance mechanisms are essential to preserve the integrity of medical schemes (BHF, 2023). Civil society organisations, particularly the Treatment Action Campaign (TAC), advocate for stringent parliamentary oversight and effective community-level accountability to ensure that public trust is maintained (TAC, 2022).

Funding models

A major focus is on creating a sustainable financing mechanism. Discovery Health advocates a multi-payer model that integrates regulated private contributions with public funding. In contrast, the BHF cautions that eliminating private medical schemes entirely could undermine both financial stability and patient choice (BHF, 2023). Additionally, Business Unity South Africa (BUSA) warns that an overly centralised funding model might deter private investment and limit innovation, proposing instead a blended model that balances public and private resources (BUSA, 2022).

PPPs

Private hospital groups, including Netcare and Mediclinic, have strongly supported the formation of PPPs. They propose contracting private facilities for high-demand services such as elective surgeries, maternal care and chronic disease management, which could alleviate burdens on public hospitals. These partnerships must be underpinned by performance-based contracts, setting clear targets for service delivery and reimbursement to ensure fairness and transparency (Netcare, 2023; Mediclinic, 2023).

Provider accreditation and quality assurance

To ensure high standards of care, the NHI Act requires that all providers be accredited before participating. Private stakeholders have proposed establishing mentorship programmes where well-resourced private hospitals support underperforming public clinics in meeting national standards. Civil society emphasises that such quality assurance measures are crucial to prevent the expansion of healthcare service coverage from resulting in diminished care quality (Office of Health Standards Compliance, 2023; TAC, 2022).

Technology and innovation

In an increasingly digital world, technology is vital to improving healthcare access and efficiency. Discovery Health recommends the national adoption of digital tools – such as electronic health records and advanced fraud detection systems – originally developed in the private sector. Netcare and Mediclinic further argue for a significant scale-up of telemedicine, especially to serve rural and underserved populations (National Department of Health, 2022). Such technological integration would not only streamline care but also enhance data accuracy and reduce administrative burdens.

Phased implementation

Given the scale of the transformation required by the NHI, several stakeholders advocate a gradual roll-out. Pilot programmes in select districts can enable the collection of performance data, which in turn can inform adjustments before nationwide implementation. This phased approach is seen as an effective way to manage risk, maintain service quality and learn from early challenges (Mediclinic, 2023).

Key challenges:

Several persistent challenges have been identified. Workforce shortages in public healthcare facilities remain critical, necessitating improved pay structures, training initiatives and partnerships with educational institutions (National Department of Health, 2022). There is also significant concern that inflexible reimbursement rates could force private providers to withdraw, thereby reducing the overall capacity of the healthcare system (Discovery Health, 2023; BHF, 2023). Moreover, ensuring that patient choice is not compromised is a recurring theme, with many stakeholders arguing for the continued operation of private medical schemes within a regulated framework.

Table 1: Stakeholder Comparison Table

STAKEHOLDER	PRE-BILL	DURING BILL PROCESS	POST-ACT
Discovery Health	Engaged in early UHC dialogues.	Advocated for a multi-payer approach and called for financial safeguards.	Continues to promote a blended financing model and robust governance (Discovery Health, 2023).
BHF	Participated in initial policy consultations.	Critiqued proposals that marginalised private schemes and recommended legal safeguards.	Pursued legal action to preserve the role of medical schemes (BHF, 2023).
Netcare & Mediclinic	Emphasised the potential of private sector capacity.	Championed public-private partnerships and phased implementation models.	Engaged in pilot programmes with performance metrics and ongoing dialogue (Netcare, 2023; Mediclinic, 2023).
SAPPF (Specialists)	Endorsed UHC with conditions regarding autonomy.	Raised concerns over tariff standardisation and lack of flexibility.	Pursued litigation to protect independent specialist practice (SAPPF, 2023).
SECTION27 & TAC	Advocated for universal access and social equity.	Demanded transparency, anti-corruption measures, and inclusion of marginalised groups.	Continue to monitor the NHI implementation for accountability and inclusiveness (SECTION27, 2022; TAC, 2022).
BUSA	Supported UHC while flagging economic risks.	Urged policymakers to balance public spending with private investment.	Advocated for pragmatic financing approaches that integrate public and private resources (BUSA, 2022).

DISCUSSION

The convergence of private sector proposals indicates unanimous support for the UHC vision, yet practical strategies diverge considerably. Discovery Health strongly advocates for a regulated multi-payer system that can alleviate funding gaps by integrating private contributions. Conversely, the BHF emphasises that completely sidelining private medical schemes could erode patient choice and destabilise the financial base. Such differences are not merely academic; they represent fundamental concerns about how best to distribute risk and ensure system resilience.

Private hospital networks such as Netcare and Mediclinic underscore the potential of PPPs to address capacity bottlenecks. Their proposals to pilot PPPs in designated districts are intended to test performance, allow for adaptive policy adjustments and ultimately reduce the service burden on public hospitals. These measures are particularly important given the consistent challenges of overcrowding and long wait times experienced in the public sector.

The perspective of specialist groups, represented by the SAPPF, is equally critical. While supporting UHC as a principle, the SAPPF cautions that uniform tariff regulations could compromise the financial sustainability of specialist practices – a risk that might ultimately diminish high-quality service provision. Their active pursuit of legal measures is indicative of broader concerns about maintaining professional independence within a centrally controlled system.

Civil society actors, including the TAC and SECTION27, lend a crucial voice to the debate by insisting that any expansion of coverage must go hand-in-hand with robust accountability and transparency measures. Their insistence on anti-corruption safeguards and the inclusion of marginalised voices ensures that the drive toward UHC does not overlook the needs of vulnerable populations.

BUSA contributes an important economic dimension, stressing that the success of the NHI will depend on creating a financing framework that does not stifle private investment. BUSA argues that the private sector's capacity for innovation and efficient service delivery must be retained to complement state resources effectively.

These varied positions demonstrate that while all stakeholders share the goal of UHC, they differ in the mechanisms needed to achieve it. Such differences are rooted not only in ideological convictions regarding the roles of the state versus the market but also in practical concerns about system capacity, financial risk and quality assurance. Ultimately, a successful NHI implementation will require reconciling these differences through continuous dialogue, iterative reforms and a flexible policy framework that adapts to evolving challenges and opportunities.

FUTURE DIRECTIONS

Looking ahead, several strategic measures are essential for the successful realisation of the NHI Act:

1. Strengthening independent oversight:

Policymakers should establish multi-sector oversight boards that include representatives from both the public and private spheres. Regular external audits and stringent accountability protocols are vital to ensure transparency and combat corruption (TAC, 2022).

2. Implementing pilot programmes:

A phased rollout beginning with well-defined pilot programmes in strategically chosen districts is recommended. This approach will allow for empirical evaluation and refinement of reimbursement models, service delivery protocols and workforce management before broader adoption (Republic of South Africa, 2019).

3. Developing blended financing models:

It is essential to design a funding mechanism that combines tax revenues, payroll contributions and regulated private payments. Such a hybrid model can help maintain a financially sustainable system while preserving the innovative capacity of the private sector (Discovery Health, 2023).

4. Formalising PPPs:

Establish clear guidelines and contracts for PPPs. These contracts should include performance indicators, service level agreements and fair reimbursement terms, thereby ensuring that private sector engagement leads to measurable improvements in care quality and access (Netcare, 2023; Mediclinic, 2023).

5. Expanding digital health initiatives:

Investment in digital infrastructure – such as interoperable electronic health records, telemedicine services and advanced data analytics – is crucial. These technologies can improve patient tracking, reduce administrative burdens and enhance access, especially in rural areas (National Department of Health, 2022).

6. Ensuring rigorous quality assurance:

A national accreditation system that ties reimbursement to periodic reaccreditation should be fully implemented. Additionally, mentorship programmes connecting high-performing private hospitals with under-resourced public facilities can elevate overall care standards (Office of Health Standards Compliance, 2023).

7. Encouraging continuous stakeholder dialogue:

Ongoing engagement between government, the private sector and civil society will be essential for adapting policies based on real-time feedback and changing health system dynamics. Transparent communication channels and regular stakeholder forums should be institutionalised.

CONCLUSION

South Africa's NHI Act represents a bold step toward equitable healthcare. Private sector proposals offer insights that can strengthen governance, financing, service quality and access. Yet, meaningful implementation depends on how well these ideas are integrated into the Act's design and delivery. The overarching challenge remains: can South Africa reconcile the efficiency and innovation of the private sector with the equity and accountability of a state-led system? Only through inclusive, evidence-based policymaking, continuous dialogue and adaptive reforms can the nation overcome systemic divides and build a sustainable healthcare system that works for everyone.

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Exploring the future role of medical schemes in South Africa's evolving UHC/NHI landscape

FROM PASSIVE PAYERS TO STRATEGIC PARTNERS

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PEER REVIEWER: Kelly Chennelles

EXECUTIVE SUMMARY

As South Africa moves toward implementing national health insurance (NHI) to achieve universal health coverage (UHC), the role of medical schemes and private healthcare funders is under critical review. Traditionally serving a small, affluent population segment, these funders must now adapt to a unified, publicly funded system. This article situates South Africa's reforms within global trends in health financing, emphasising a shift from passive reimbursement to strategic purchasing and value-based care that enhance equity, efficiency and health outcomes. Under the NHI, medical schemes will be limited to offering complementary coverage for services not included in the national benefits package.

To remain relevant, private funders must align with national priorities and contribute to an integrated, outcomes-driven health system. Without strategic repositioning, medical schemes risk marginalisation or obsolescence.

Key takeaways:

- Medical schemes must shift from passive payers or a reliance on 'managed care' to strategic purchasers aligned with UHC goals.
- Competent, independent purchasing agencies are essential for effective NHI implementation.
- Private funders can already begin to support system integration if appropriately regulated and aligned with national health priorities.
- Without reform, medical schemes may lose relevance in the post-NHI landscape.

INTRODUCTION

The history of health insurance as a mechanism for financing healthcare services has been marked by continuous evolution from its origins in the late 19th century in Europe to the introduction of Medicare in the USA in 1965 and the emergence of modern-day systems (Rice et al, 2013). Initially based on passive reimbursement models, health insurance structures have progressively shifted toward active purchasing strategies, driven by rising healthcare costs, aging populations and advances in medical technologies (OECD, 2021). These pressures led to early attempts at cost-containment through models like managed care, which failed to achieve long-term sustainability and equitable outcomes (Enthoven, 1993). In response, strategic purchasing, as promoted by the World Health Organization (WHO), has gained traction globally, offering a more proactive, outcome-oriented approach to healthcare financing (WHO, 2010). Innovations such as value-based care (VBC) exemplify this transition, emphasising quality and efficiency over service volume (Mechanic and Altman, 2009).

Within this broader global trend toward universal health coverage (UHC), South Africa's proposed national health insurance (NHI) represents a potentially bold and transformative shift in health system design, should it fully embrace the philosophy of the separation of purchaser from providers, which is not yet clear. Furthermore, the NHI poses critical questions about the future role of medical schemes and private healthcare funders, which have historically operated within a parallel system serving a minority of the population (McIntyre et al, 2018) and whose success at management of the system is questionable. The aim is to establish a unified, publicly funded system that ensures equitable access to essential health services. As the NHI moves toward phased implementation, the relevance, structure and regulatory status of medical schemes remain under scrutiny.

GLOBAL LESSONS ON HEALTH FINANCING TRANSITIONS

Health insurance in Europe originated with Germany's 1883 Health Insurance Law, which introduced the Bismarckian social insurance model (Saltman and Figueras, 1997), jointly funded by employers and employees and marked by passive funding (Busse et al, 2011). Following Germany's example, several European countries, including Austria, France, Belgium, Switzerland and Norway, adopted similar social insurance frameworks during the late 19th and early 20th centuries (Giaino and Manow, 1999). In contrast, the UK introduced a more centralised, state-directed system in 1911, leading to the formation of the National Health Service (NHS) in 1948. Since the 1980s, the UK has shifted toward strategic purchasing and internal market reforms to improve efficiency and accountability (Greer et al, 2019).

The Introduction of Medicare and the shift to managed care in the USA

The USA's early approach to healthcare financing was rooted in private health insurance, which began to emerge in the 1930s. Notably, Blue Cross and Blue Shield originated from hospital-based initiatives to guarantee payment for services and from employer-based schemes in industries such as mining and logging (Starr, 1982). Further to advancements in medical technology during World War II and the associated rise in life expectancy, the demand for healthcare services increased significantly (Fuchs, 1996). By the early 1960s, it had become clear that a growing portion of the American population, particularly the elderly, lacked sufficient access to funded healthcare. In response, the federal government introduced Medicare in 1965, under President Lyndon B Johnson, as a universal health insurance programme for individuals aged 65 and older, regardless of income or health status (Oberlander, 2003).

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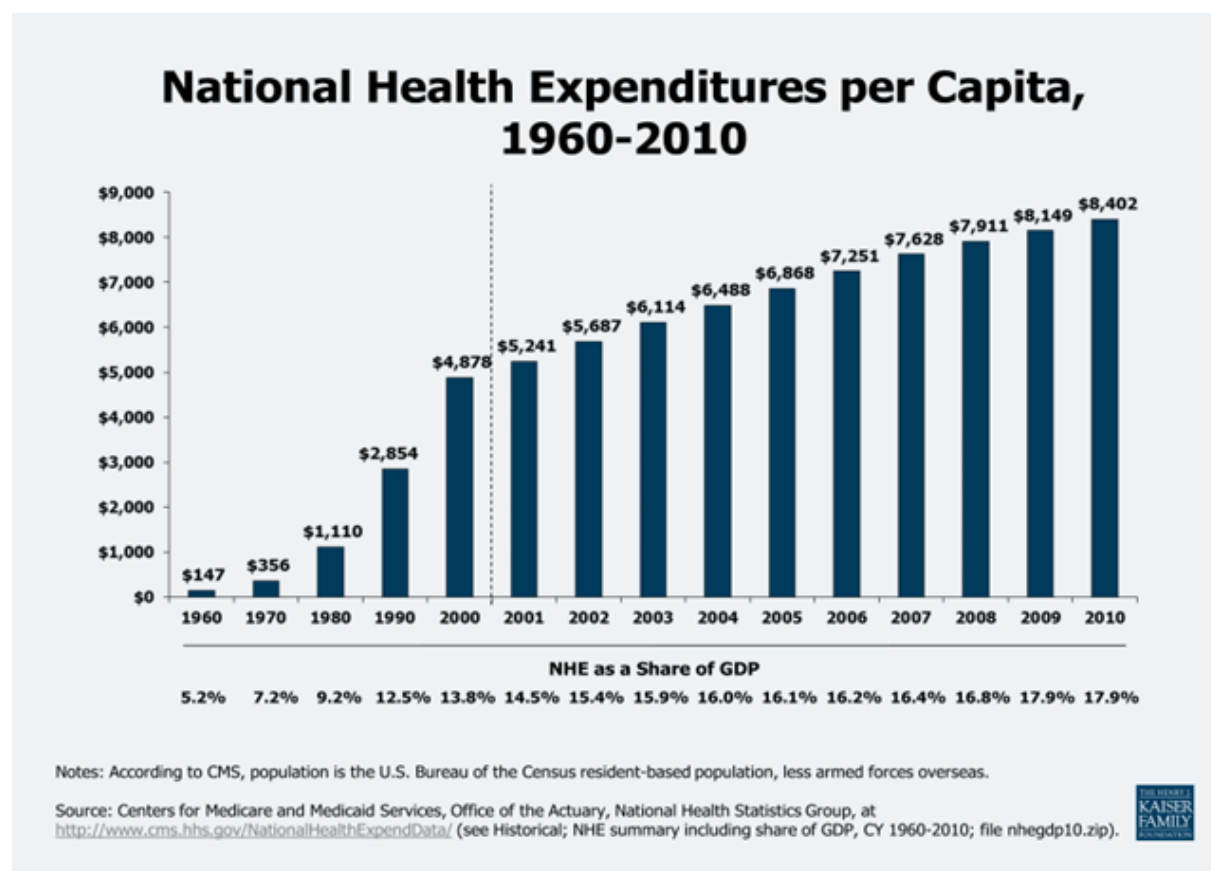
Medicare represented a transformative development in the American healthcare landscape, dramatically increasing public healthcare spending and contributing to the rapid development of medical technologies and pharmaceuticals targeted at managing chronic illness in aging populations (Moon, 2006).

Initially, the programme operated under a fee-for-service (FFS) model, a passive funding approach in which providers were reimbursed for each service delivered. However, as the programme expanded and the aging population grew, healthcare expenditures escalated sharply, exacerbated by inefficiencies and overutilisation associated with FFS reimbursement (Davis, 2001).

The graph below shows how the USA national health expenditure per capita rose sharply from \$147 to \$8 402 from 1960 to 2010, consuming an increasing share of gross domestic product from 5.2% to 17.9%. This growth placed a significant strain on public programmes like Medicare and Medicaid and prompted calls for cost-containment strategies such as capitation models. In the private sector, rising healthcare costs impacted employer-sponsored insurance and contributed to inefficiencies caused by market fragmentation and a lack of pricing transparency.

In response to rising costs, the 1980s saw the introduction of managed care organisations (MCOs) into the Medicare programme. MCOs marked a shift towards active management of healthcare delivery, employing a range of cost-control mechanisms such as gatekeeping (requiring referrals from primary care providers), restricted provider networks and a strong emphasis on preventive care to reduce hospital admissions and costly interventions (Iglehart, 1999). This model subsequently expanded into the private insurance sector.

Graph 1: National Health Expenditures per Capita, 1960-2010



Reasons for the failure of MCOs

While MCOs initially slowed cost growth, they have been widely criticised for limiting patient choice and failing to deliver long-term improvements in care quality and efficiency (Mechanic & McAlpine, 2010). Restrictions such as preauthorisation and mandatory referrals often created barriers to timely treatment, leading to patient dissatisfaction and perceptions of inadequate care (Consumer Reports, 2007; Journal of Health Economics, 2009).

MCOs also struggled with care fragmentation, particularly for patients with chronic conditions, due to poor coordination between primary and specialist care, undermining continuity and outcomes (The Commonwealth Fund, 2008). Despite their aim to control costs, many MCOs inadvertently contributed to rising expenses through hospital readmissions and inefficient service use.

In addition, capitation models and underpayment discouraged comprehensive care, reducing consultation time and overall provider engagement (Mechanic & McAlpine, 2010).

Administrative complexity, including convoluted billing and referral systems, increased burdens on both providers and patients, further inflating costs (Santamaria, 2008). Consequently, patient satisfaction under MCOs remained consistently lower than in traditional insurance models, especially due to restricted access and reduced autonomy (Journal of Health Economics, 2009).

EMERGENCE OF STRATEGIC PURCHASING

Strategic purchasing refers to the deliberate use of financial mechanisms by healthcare funders such as government agencies and insurers to influence the quality, efficiency and equity of healthcare services. This approach aims to improve patient outcomes while maintaining cost control by encouraging system-wide improvements. The method by which services are funded has a direct impact on how healthcare delivery is structured and incentivised (Figueras et al, 2005).

Key components of strategic purchasing

Payment reforms: Traditional FFS models have been criticised for incentivising volume over value. Strategic purchasing shifts toward value-based payment mechanisms, including capitation (a fixed payment per patient regardless of services rendered), bundled payments (a single payment for all services within an episode of care) and pay-for-performance models that tie provider compensation to quality and efficiency metrics (Porter & Kaplan, 2016; Miller, 2009).

Provider performance: Performance-based contracts are central to strategic purchasing. These contracts set expectations for care quality, patient satisfaction and cost-containment, and include financial rewards or penalties based on the provider's ability to meet established benchmarks. This creates a continuous feedback loop that encourages improvement (Cashin et al, 2014).

Coordination of care: Strategic purchasing supports coordinated and integrated care across the continuum of services. This includes multidisciplinary teams and patient-centred models designed to link case severity with the appropriate level of care. They also reduce duplication and medical errors. Through these approaches, outcomes are improved, particularly for those with chronic conditions (OECD, 2020; Tsiachristas et al, 2016).

WHO recommendations on strategic purchasing

The WHO strongly advocates for strategic purchasing as a critical lever in achieving UHC, aiming to ensure equitable access to essential healthcare services and financial protection for patients. Strategic purchasing is viewed as a mechanism to improve efficiency, equity and quality in health systems (WHO, 2017).

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The WHO recommends that healthcare systems move toward VBC, shifting focus from service volume to health outcomes. This includes:

- Incentivising preventive care to reduce long-term healthcare expenditures;
- Promoting data-driven decision-making to support continuous monitoring and improvement of service quality;
- Strengthening primary healthcare to decrease reliance on more costly and specialised interventions (WHO, 2021; Sparkes et al, 2019).

Table 1: Summary of key principles of strategic purchasing

PRINCIPLE	SUMMARY
Needs-based allocation	Funds aligned with population health needs and disease burden
Selective contracting	Partner with high-quality, cost-effective and accessible providers
Performance-based payment	Pay based on quality, efficiency and outcomes
Data-driven decisions	Use evidence and data to guide purchasing and service production
Purchaser-provider split	Separate funding from service delivery for accountability

KEY ENABLERS OF HEALTHCARE SYSTEM REENGINEERING

In the NHI and UHC implementation context, strategic contracting offers a critical pathway for redefining the purchaser role as distinct from that played by most medical schemes and other private healthcare funders, whose focus remains on tariff price negotiations and not on promoting better structuring of the delivery system. The role of the 'purchaser' is to actively realign financial incentives to promote efficiency, equity and integrated care, rather than merely acting as passive payers for healthcare services. Funders must be able to support coordinated service delivery across the care continuum, strengthening collaboration among primary, secondary and tertiary providers by adopting value-based contracting models (Cashin et al, 2014).

Integrating population health needs and provider accountability

Risk-adjusted population-based capitation presents a fair and viable model for managing high-need groups, such as elderly individuals and patients with chronic conditions. These funding arrangements ensure that resource allocation is based on population health needs while promoting preventive care and early intervention (Tsiachristas et al, 2016). Furthermore, integrating outcome-linked incentives into provider contracts aligns funders with national health goals (OECD, 2020).

Medical schemes as partners in post-NHI service delivery

In a post-NHI environment, medical schemes that have embraced and implemented strategic purchasing principles could be well-positioned to play a funding role, if they were already successful in restructuring the system to be better integrated. However, current legislation restricts them to covering only services excluded from the NHI benefits package. Without policy reform to expand their role, their influence may decline, and their sustainability will hinge on offering added value through innovation, specialised services, or efficiency aligned with national health goals.

The successful implementation of purchaser scheme principles relies on competent purchasing agencies possessing the capacity, autonomy, and technical expertise to translate health policy into effective contractual mechanisms that enhance healthcare system performance.

Patient-centred care and collaborative teams in a UHC context

In a future defined by UHC and NHI, strategic purchasing must prioritise patient-centred, team-based care models. Primary care providers should be positioned as care coordinators, leading multidisciplinary teams including nurses, social workers and specialists, to deliver care that is tailored to individual needs and preferences (Jackson et al, 2013). These models enhance shared decision-making while also improving health outcomes and patient satisfaction, especially among individuals with complex and chronic conditions. (Bodenheimer & Sinsky, 2014).

Enabling service integration through data and transitions of care

Effective care integration requires real-time data sharing among professionals within multidisciplinary teams to ensure coordinated and responsive service delivery. Technologies like electronic health records (EHRs) and interoperable health information systems enhance communication between care settings, reduce duplications and improve the continuity of care (Vest & Gamm, 2010; Adler-Milstein et al, 2017). These systems are especially critical during care transitions, where vulnerable patients, such as those recently discharged from hospitals, benefit from seamless handovers to primary care providers or home-based services. Embedding these transition responsibilities into strategic contracts helps reduce readmissions and close gaps in care (Naylor et al, 2011; Coleman et al, 2006).

As private and public healthcare funders evolve under NHI/UHC reforms, investing in collaborative care infrastructure, both digital and organisational, will be essential to achieving equitable, high-quality and efficient healthcare delivery.

Population health management

Population health management is a critical enabler of strategic purchasing, particularly when strategic contracting is aligned with broader goals of improving health outcomes at the population level. Unlike models focused solely on individual or episodic care, population health management adopts a proactive, data-driven approach that prioritises prevention, early intervention and coordinated care, especially for those with chronic conditions. By addressing the health needs of a defined population group, this framework aims to improve outcomes, reduce disparities, and optimise resource use (Kindig and Stoddart, 2003). Integrating population health strategies with strategic contracting enhances the ability of health systems to allocate resources effectively while delivering value-based, patient-centred care.

Operational independence

Purchasing bodies must be governed by a robust governance framework that includes transparent decision-making processes and a clear public interest mandate. Such a structure safeguards against undue political or commercial influence, ensuring that decisions prioritise population health outcomes over vested interests (WHO, 2017).

Staff expertise and understanding

Effective purchasing agencies require highly skilled personnel who:

- Possess a thorough understanding of contractual obligations, particularly regarding quality standards, cost controls and performance indicators embedded in provider agreements.
- Are trained to monitor provider performance, resolve contractual disputes and evaluate outcomes using robust evidence.
- Understand the nuances of healthcare delivery, service pricing and the impact of clinical decisions on patient outcomes.

Analytical capabilities

Advanced data analytics and population health management tools are essential for evidence-informed purchasing. Through population case mix segmentation, agencies can:

- Identify the health needs and risk profiles of specific groups;
- Design targeted benefit packages and fund proven preventive interventions;
- Select and fund providers with the capacity and infrastructure to deliver care that meets the diverse needs of the population (Kutzin et al, 2017; Sparkes et al, 2019).

Data-driven decision making: robust analytical tools support evidence-based purchasing decisions, aligning services with the specific health needs of different population segments.

Understanding of supply-side characteristics

Provider market analysis: Strategic purchasing requires an appropriate resource allocation based on the population demands, matching demand to supply. A thorough understanding of the supply side, including the capacities, capabilities and performance histories of healthcare providers, is critical to ensure that purchasing agencies make informed choices about where to allocate resources. Healthcare decisions by individuals are difficult because of information asymmetries and third party-funded moral hazard, so mismatched supply inevitably leads to overservicing or denial of care.

Performance improvement: Continuously evaluating the performance of providers allows agencies to implement targeted interventions aimed at enhancing service quality and efficiency.

Regulatory uncertainty around NHI raises questions about the future of medical schemes. The Council for Medical Schemes is expected to guide this transition, but concerns remain about equity, as schemes currently serve a wealthy minority. Without clear integration plans, medical schemes risk being marginalised.

THE EVOLVING ROLE OF MEDICAL SCHEMES AND PRIVATE HEALTHCARE FUNDERS

From payer to strategic purchaser

While FFS remains the most widely used model in South Africa's private sector, it incentivises volume over value, contributing to fragmentation, inefficiencies and cost escalation. Capitation offers a more cost-contained alternative but requires safeguards to prevent under-provision of care.

In contrast, strategic purchasing in VBC, though still emerging, offers the most promise for aligning provider incentives with health outcomes, efficiency and equity. It is increasingly emphasised in NHI reform plans, but full implementation will require investment in digital infrastructure, data interoperability and regulatory reform.

- In the NHI era, private funders could transition into strategic purchasers by adopting contract models to support organised healthcare provider teams like The Value Care Team (TVCT). TVCT realigns professional incentives toward patient outcomes through teamwork, care coordination, and prevention. TVCT comprises GP-led, multidisciplinary clinical teams operating under value-based care (VBC) contracts to serve medical scheme members. Supported by PPO Serve, a management company with nearly a decade of experience implementing VBC in South Africa. TVCT strengthens primary care delivery and rebalances

the healthcare system between primary and hospital-based care. In partnership with the Government Employees Medical Scheme (GEMS), TVCT integrates general practitioners, nurses, social workers, allied health professionals, and selected specialists to deliver coordinated, population-based care.

This approach demonstrates how medical schemes can:

- Contract for team-based care rather than individual services;
- Incentivise prevention and early intervention through capitation and performance-based payments;
- Reduce fragmentation and enhance quality through coordinated, patient-centred care.

ENABLING CONTINUITY AND EQUITY

Private schemes could drive a better structured commercial supply side towards ultimate convergence with a more productive public system as income inequality in South Africa narrows. The TVCT model's success in delivering proactive, population-based care highlights how private funders can support continuity across levels of care, especially during transitional phases of NHI rollout.

Leveraging data and innovation

Through IT investment like the Intelligent Care System, an integrated digital platform used within TVCT, private funders can enable real-time data sharing, clinical audits and outcome tracking, aligning their operations with the UHC principle of evidence-based, efficient healthcare delivery.

TVCT model provides a practical and scalable blueprint for how medical schemes and private healthcare funders can remain relevant and even become essential partners in an NHI/UHC future.

By adopting the role of active purchasers of value, these entities can help build a more equitable, efficient and integrated healthcare system, while reducing cost pressures and improving health outcomes for all South Africans.

STRATEGIC PURCHASING CHALLENGES

While strategic purchasing is touted as one of the best tools for health system reform and cost-containment, bold steps are needed to overcome the challenges we face, including limited institutional and technical capacity, weak health information systems and a fragmented provider landscape that hinders care integration.

Regulatory uncertainty and resistance from stakeholders further complicate implementation, while inadequate risk adjustment mechanisms and constrained financial autonomy at local levels undermine effective purchasing and accountability.

CONCLUSION

Strategic contracting is a powerful tool for shifting healthcare systems from volume-based to value-driven, outcome-focused models. By aligning incentives with patient outcomes and promoting coordinated, multidisciplinary care, it improves efficiency, equity and population health outcomes (Cashin et al, 2014; OECD, 2020).

When implemented by competent, autonomous purchasing agencies, it becomes more than a financing tool; it is a lever for sustainable and effective healthcare transformation.

RECOMMENDATIONS

To maintain relevance in the post-NHI era, medical schemes should leverage the current environment to demonstrate their capacity to add value and better position themselves as potential purchasers for the NHI through the following strategic actions:

1. Establish and strengthen independent purchasing agencies: Invest in building autonomous, technically skilled purchasing institutions capable of designing and managing strategic contracts that prioritise health outcomes over service volumes.
2. Integrate value-based incentives into provider contracts: Shift away from FFS models by adopting risk-adjusted capitation and performance-based payments that support teamwork and reward providers for delivering high-quality, coordinated and patient-centred care.
3. Prioritise multidisciplinary, team-based care models: Encourage contracting arrangements that support collaborative care delivery across primary, community and specialist services, especially for chronic disease management.

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The role of predictive analytics and big data IN HEALTHCARE DECISION-MAKING

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CONTEXT

PPO Serve operates a public health care programme called The Value Care Team (TVCT) in South Africa, with a contract from the Government Employees Medical Scheme (GEMS) for delivery of its population medicine benefit. It started at the end of 2019 as a pilot project in Pretoria North with five GPs and approximately 2 300 members, and was converted to a national programme in April 2023. It has since grown across the country and now has over 180 GPs in nine hubs of varying maturity with nearly 120 000 patients in the programme.

TVCT is a value-based care programme that aims to improve outcomes, lower costs and improve both the provider and patient experience by leveraging the power of multidisciplinary clinical teams called 'hubs' with care coordinators. Data plays a central role in the programme, with customised care plans being informed by patient demand-side data and outcomes measurement key to driving performance.

PPO Serve is accumulating a growing amount of data, which is used to better characterise the programme members to direct the teams' interventions.

INTRODUCTION

Predictive analytics have been used in the health sector since the 1950s, and models have become more sophisticated over time as structured data availability increased and statistical modelling improved. More recently unstructured 'big data' has been used to supplement traditional data sources to further enhance predictive models. Big data in the health sector refers to the large volume of unstructured data that exists, e.g. data from electronic health records, wearable devices and socio-economic sources.

The purpose of this paper is to explore an approach that a population medicine programme can use to better understand the variation in economic outcomes (supply-side resources and costs) between the different geographical regions in which it operates. It is learning from the variation between the best and worst regional system performance that drives improved outcomes.

ECONOMIC MODELLING IN HEALTHCARE

Modelling economic performance requires defining systems and characterising their populations, i.e. the 'demand side', including the age and gender distribution and their specific 'case mix' or 'disease burden index' (DBI). This risk-adjustment of their outcomes – including spending, hospital usage and mortality – permits understanding of some of the variance in these outcomes. The residual or unexplained variation is the 'supply-side' ineffectiveness and inefficiency. It is this variation between region/system performance that drives 'data-driven improvement' – the worst can learn from the best in an iterative process.

Improved, better-directed value efforts are informed by the findings of these models, and include relative resource allocation and process management. This may be by better matching of healthcare system capacity (facilities, staffing, funding) to the regional patient load, or better organisation and process management of the existing capacity to improve productivity and achieve better outcomes.

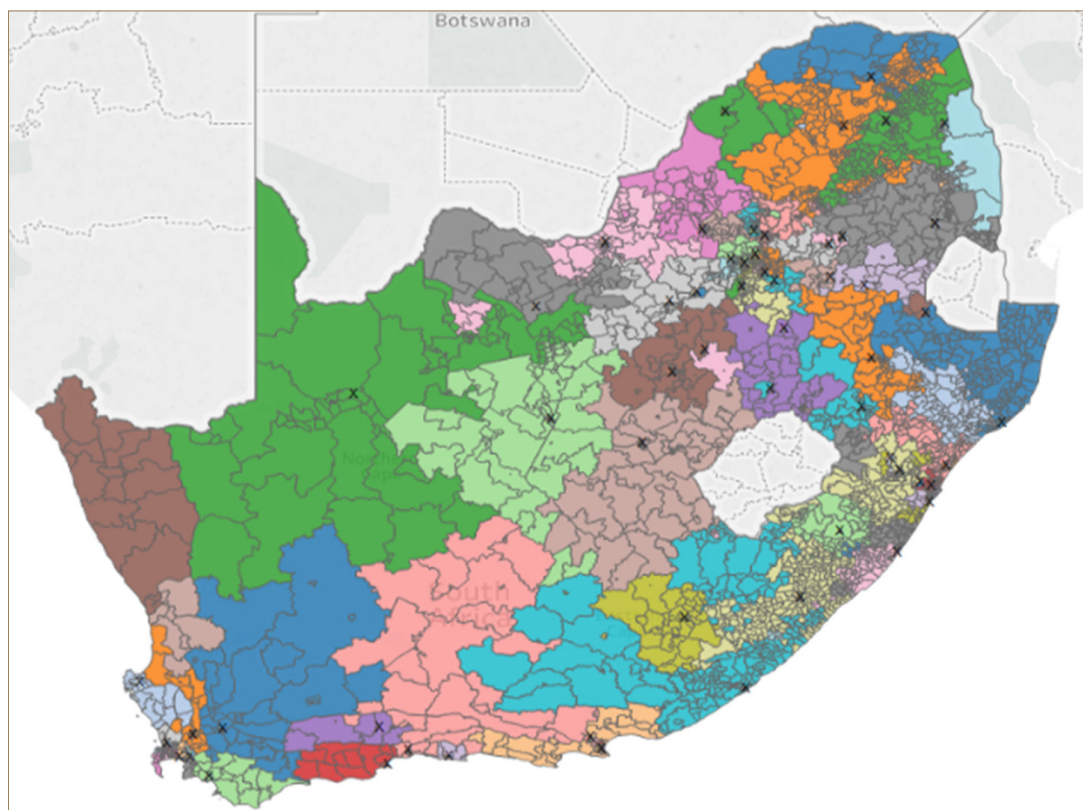
CHARACTERISING REGIONAL HEALTHCARE DEMAND

Referral mapping and population case-mix tools

Referral mapping tools

The Dartmouth Atlas is a tool for defining hospital referral areas in the USA, based on the usage of cardio-thoracic and neurosurgical services to map populations to hospitals, which become the denominators for health system performance models.

Figure 1: South Africa divided into 136 primary regions using the Dartmouth Atlas methodology



Working with Insight Actuaries, PPO Serve applied this approach to South African medical scheme data to create a mapping tool with 22 tertiary regions, and added 65 secondary (internal medicine, surgery, orthopaedics, O&G, psychiatry) and 136 primary regions (the remainder) within consistent boundaries. These regions are the building blocks of the model. Regional benchmarks are also used to risk-adjust local team outcomes.

THE EPISODE POPULATION GROUPER (EPG)

Developed by PPO Serve and Insight Actuaries

Actuaries typically characterise scheme populations using age, gender and chronic disease counts. While adequate for crude analysis, it ignores the huge resource use and morbidity differences between cohorts of patients with chronic illnesses. An episode of care approach, using medical schemes' diagnosis and related service and procedure data, better categorises patients based on their demographic and detailed clinical characteristics to more completely characterise the actual patient disease burden, distinguishing between chronic illness severity and including important non-chronic diagnoses episodes of care that influence spending such as major trauma, mental illness and frailty.

Episodes characterise steps on the path of progressing degenerative disease. Patient risk is understood based on where they are in the predictable journey from first diagnosis to end-stage disease. The final EPG algorithms were a balance between clinically meaningful and homogenous groups, using ANOVA (analysis of variance) measures for the in-episode modelling and a calculated R² for the best statistical fit to evaluate the EPG model.

Figure 2a: Episode progression

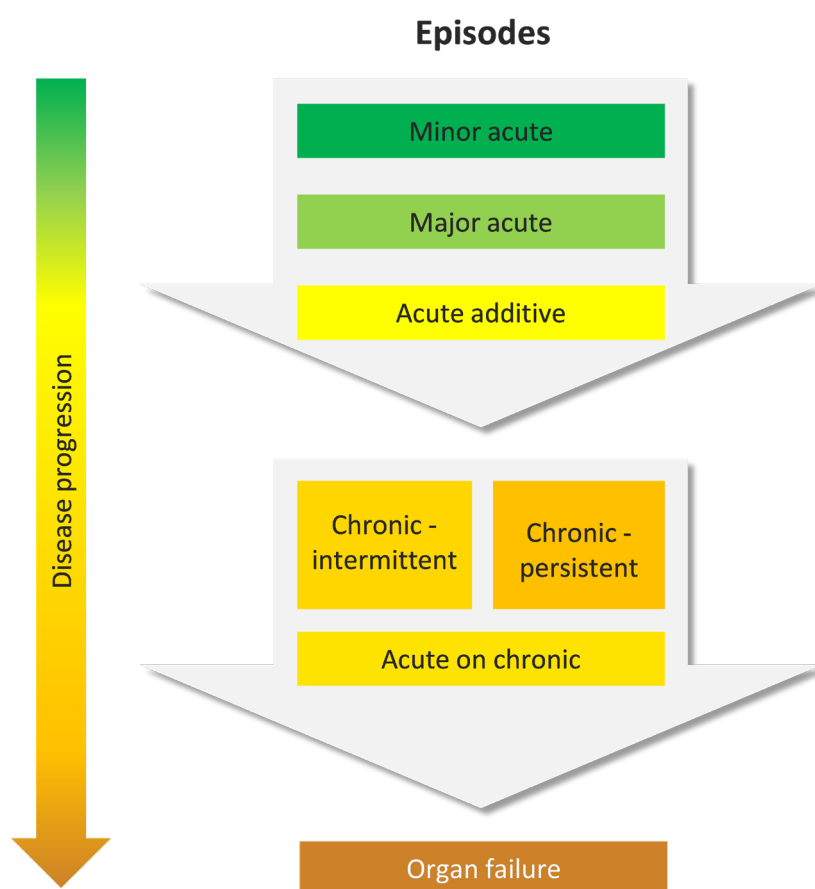
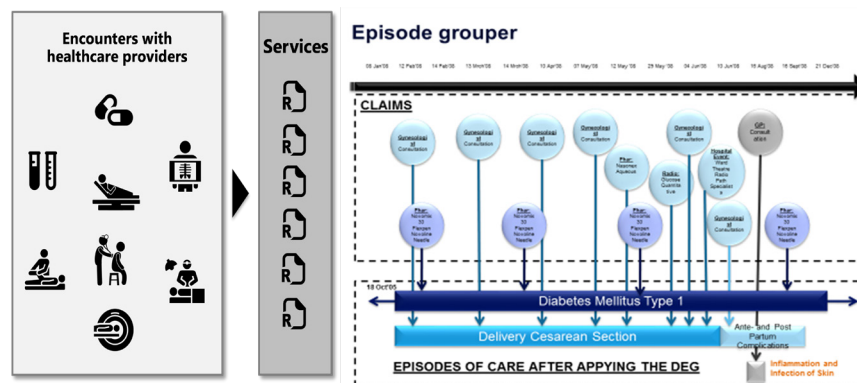


Figure 2b: Episode grouper methodology



RISK-ADJUSTED COMPARATIVE PRODUCTIVITY MODELS

The current baseline model: Using PLPM DBI weights derived from the PPO Serve/Insight Actuaries EPG, we can identify outlier regional systems admission rates with savings and dis-savings relative to the expected. Improvement intervention efforts, as per the distribution of actual vs predicted admission rates, is shown in the table below:

Table 1: Example of a simple predictive model using the EPG – top 20 admission rate regions using scheme data for the year 2024

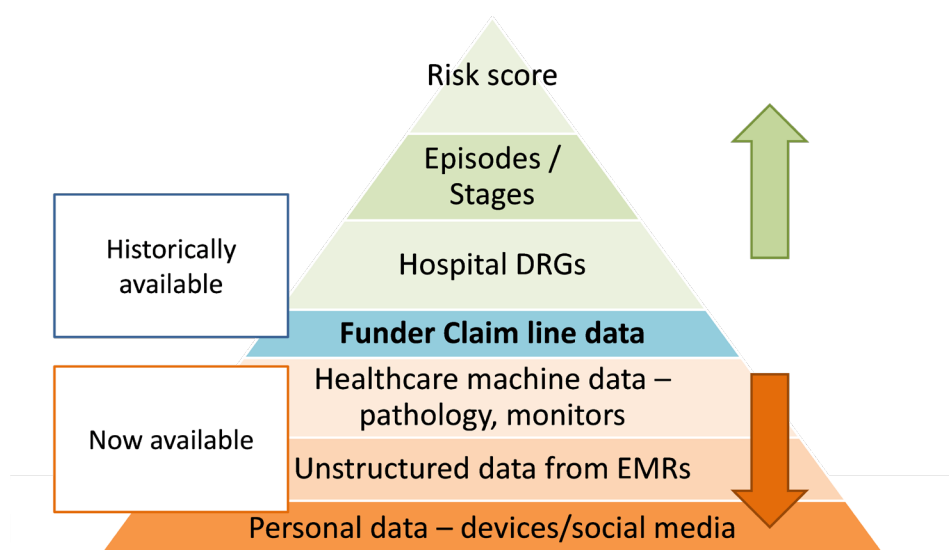
PrimaryRegion	Region_DBI	Admit Rate	DBI predicted AR	% diff Admit rate
Durbanville	1,99	0,44	0,46	4%
Tygerberg	1,85	0,41	0,42	4%
Chatsworth	1,73	0,41	0,40	-2%
Mossel bay	1,92	0,37	0,44	16%
Ballito	1,28	0,34	0,29	-15%
Umhlanga	1,49	0,34	0,34	1%
Durban - Parklands	1,35	0,34	0,31	-9%
Cape Gate	1,51	0,34	0,35	3%
Durban South	1,23	0,34	0,28	-20%
Durban - Westville	1,19	0,33	0,27	-20%
Hermanus	1,73	0,33	0,40	18%
Blaauwberg	1,26	0,32	0,29	-10%
Umlazi	0,95	0,32	0,22	-45%
Durban North Beach	1,06	0,32	0,24	-30%
Pietermaritzburg	1,08	0,32	0,25	-28%
Scottsburg	1,14	0,31	0,26	-18%
Hillcrest	0,98	0,31	0,22	-38%
Kuils River	1,42	0,31	0,33	6%
Emfuleni	1,14	0,31	0,26	-18%
Kimberley	1,11	0,30	0,25	-20%

IMPROVING EXPLANATORY POWER THROUGH DETAILED DATA INTEGRATION

Data – the aim

‘Big data’ permits us to map unstructured but detailed new patient level data to the current model to improve its explanatory power:

Figure 3: Data sources for predictive modelling – relative size and availability



The new data includes disease specific measures generated by our clinical team, e.g. NYHA scores for cardiac failure, MMSE for mental acuity, Bartel for frailty, social isolation. Other data includes pathology laboratory results, radiology findings, as well as PROMS – patient-reported outcome measures.

This paper begins to explore whether the model’s usefulness and predictive power can be improved by more detailed characterising of the population by the addition of the big data now available. Can we make it more practical and does it reduce overall variability and have a better fit when applied to either new data sets or random subsets of the existing scheme data sets? This will improve analysis and focus TVCTs interventions to improve patient outcomes.

Data – the baseline model

We used a 2019 combined medical schemes population database to develop our initial predictive model. A 2024 sample showed little regional change. The aggregated admission rate data was available for each of the 136 primary regions in South Africa from the referral map.

The data was aggregated by risk segment, which was made up of the following variables: age band, gender, chronic count and the EPG DBI. We aggregated the data at the primary region for modelling purposes, which yielded 136 data points.

Approach

The first step was to develop a predictive outcomes model using the standard data used in this type of predictive modelling, i.e. risk cell data. After initial exploratory data analysis, we chose to develop and test the following three models:

- Ordinary least squares (OLS): OLS estimates the best-fit linear relationship by minimising the sum of squared residuals.
- Beta regression: we used a Gaussian generalised linear model applied to the logit-transformed admission rate to approximate the beta regression for proportions.
- Random forest: this is an ensemble learning method that constructs multiple decision trees during training and outputs the average prediction. It captures complex, nonlinear relationships and interactions without requiring prior assumptions about data distribution.

The next step was to apply these models to a sample of our members under care to determine how well they predicted admissions.

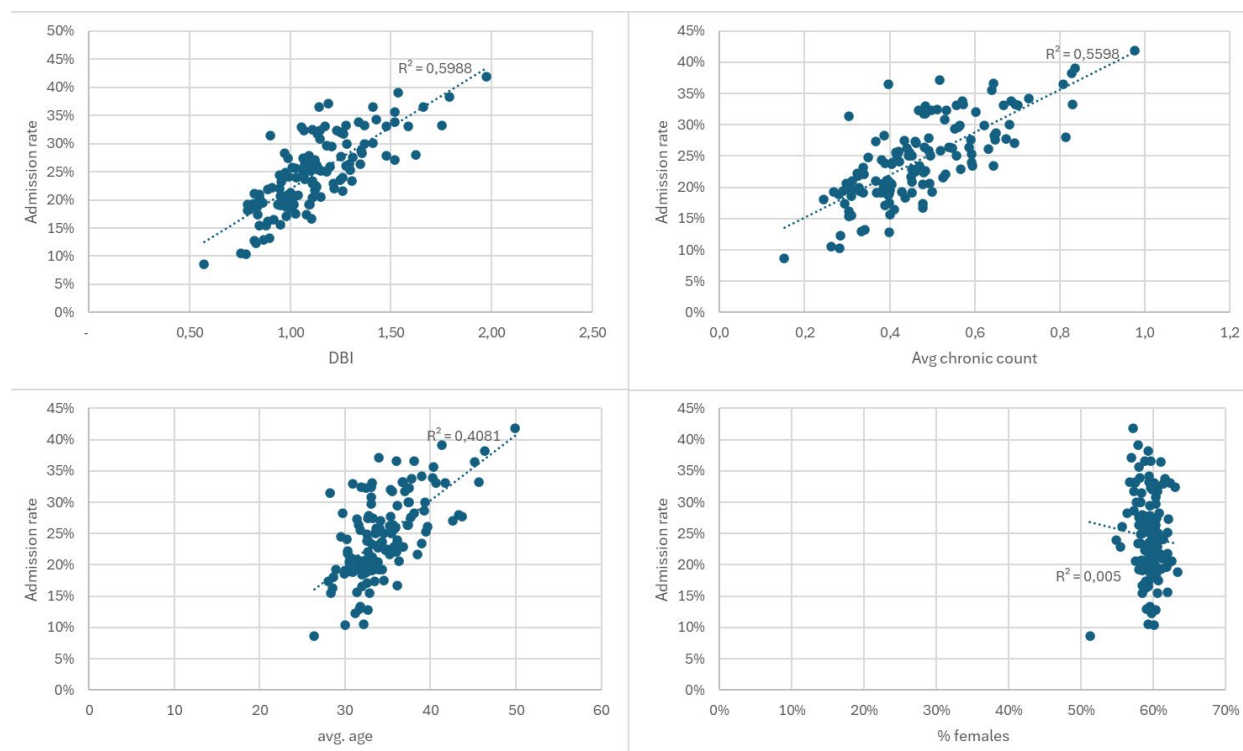
Findings

Initial data analysis

The scatter plots below show strong relationships between hospital admissions and three of the four explanatory variables: DBI, chronic count and age.

Correlation coefficients below show strong positive relationships between age and chronic count, age and DBI, and chronic count and DBI (as expected). We thus had to be aware of multi-collinearity when specifying the models.

Figure 4: Dependent (admission rate) and independent variables scatter plots



[4] THE ROLE OF PREDICTIVE ANALYTICS AND BIG DATA IN HEALTHCARE

Table 2: Correlation coefficients of independent variables used in traditional modelling

	AVG AGE	%F	CHRONIC	DBI
avg age	1.00			
%F	0.28	1.00		
chronic	0.91	0.29	1.00	
DBI	0.95	0.26	0.96	1.00

Traditional models

OLS: The best performing OLS model uses age, gender and DBI as explanatory variables – they are all statistically significant and together explain 69% of the variation in the admission rate. The adjusted R-squared shows that the model has not been overfitted (Modelling done in Excel).

Table 3: OLS results

Explanatory variables	R-squared	Adjusted R-squared	age: p-value	gender: p-value	chronic count: p-value	DBI: p-value	comment
age & gender	0,42	0,41	0,00	0,09			gender not statistically sig
age, gender & chronic count	0,59	0,58	0,13	0,01	0,00		age not statistically sig
age, gender, chronic count & DBI	0,69	0,69	0,00	0,05	0,92	0,00	chronic count not statistically sig
age, gender & DBI	0,69	0,68	0,00	0,04		0,00	best fit

Beta regression: The best performing beta regression model uses age, gender and DBI as explanatory variables – they are all statistically significant and together explain 85% of the variation in the admission rate (Modelling done in python).

Table 4: Beta regression results

Explanatory variables	R-squared (pseudo)	Adjusted R-squared	age: p-value	gender: p-value	chronic count: p-value	DBI: p-value	comment
age & gender	0,49		0,00	0,03			gender not statistically sig
age, gender & chronic count	0,49		0,00	0,03	0,76		chronic count not statistically sig
age, gender, chronic count & DBI	0,86		0,00	0,14	0,06	0,00	highest R-squ BUT gender and chronic count not statistically sig
age, gender & DBI	0,85		0,00	0,02		0,00	best fit

[4] THE ROLE OF PREDICTIVE ANALYTICS AND BIG DATA IN HEALTHCARE

Random forest: The random forest performs well when using age, gender, chronic count, DBI. For the latter these variables explain 80% of the admission rate, and on average the predicted admission rates are within 3% of the actual values. (Modelling done in python. RMSE is the Root Mean Squared Error).

Table 5: Random forest results

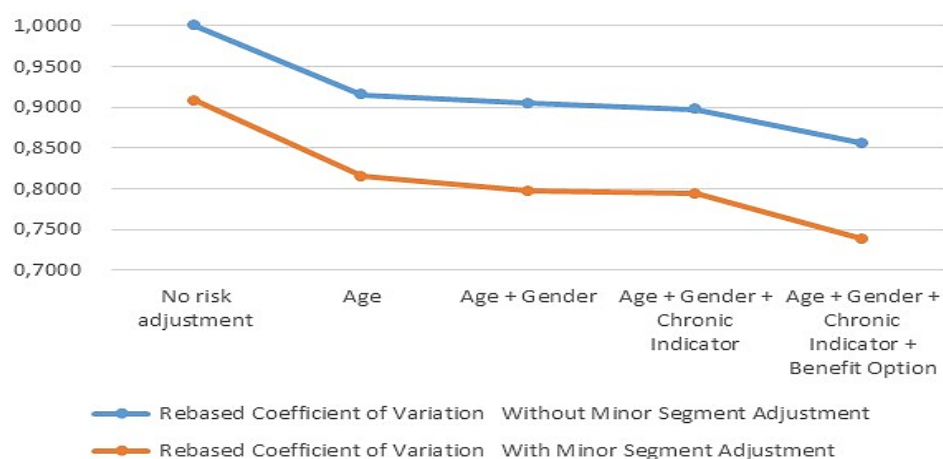
Explanatory variables	R-squared	RMSE	comment
age & gender	0,22	0,06	
age, gender & chronic count	0,23	0,06	
age, gender, chronic count & DBI	0,79	0,03	
age, gender & DBI	0,80	0,03	best fit

Coefficient analysis

Table 6: Coefficient analysis

Risk Adjustment	Rebased Coefficient of Variation		Reduction in the Variation from the Mean
	Without Minor Segment Adjustment	With Minor Segment Adjustment	
No risk adjustment	1,0000	0,9084	-9,2%
Age	0,9152	0,8152	-10,9%
Age + Gender	0,9052	0,7974	-11,9%
Age + Gender + Chronic Indicator	0,8979	0,7940	-11,6%
Age + Gender + Chronic Indicator + Benefit Option	0,8559	0,7387	-13,7%

Figure 5: The effect of the EPG on explaining regional variation



Testing the traditional models

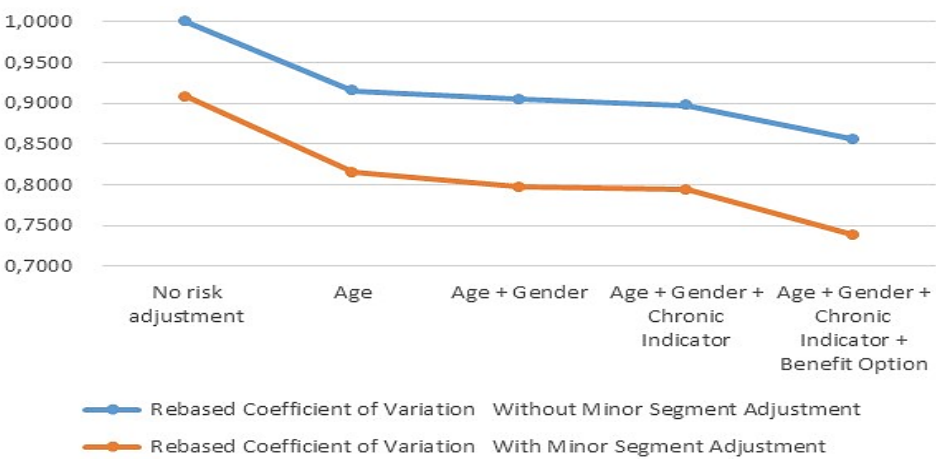
We tested the above models using actual risk data for the Pretoria North East TVCT hub population from September 2023 and the admission rate for that population in September 2024.

In September 2024, the actual admission rate was 20%. Predictive outputs from traditional models varied significantly, with OLS estimating 16%, beta regression overshooting at 28% and random forest producing a closer estimate of 23%. This variability in predictions underscores the limitations of traditional approaches, particularly under changing or complex conditions. It strengthens the case for incorporating richer, more granular data and advanced modelling techniques — such as those enabled by big data platforms — to improve predictive power.

Table 7: Model predictions

	Values as at Sep 2023	OLS Coefficients	Beta regress Coefficients	Random forest
Intercept	1	-0,0318015	-3,7515	
avg age	39,47	-0,0140949	0,0259	
% F	0,60	0,41845218	1,5133	**
DBI	1,08	0,46077548	0,651	
Predicted admission rate		16%	28%	23%

Figure 5: The effect of the EPG on explaining regional variation



** Prediction generated by averaging outcomes across many decision trees trained on the input variables

ENHANCING THE MODEL USING BIG DATA

The sample data is from members from the 15 practices in the TVCT hub: Pretoria North East (including the five pilot-stage practices).

Step 1 – Baseline: We extracted data from the ICS for just under 8 000 Pretoria North hub members in September 2023, and modelled this against their admissions from October 2023 to September 2024. These are the starting EPG major segment labels:

Table 8: EPG major segment labels with admission rates

Segment	No. of admissions	No. of members	Admit rates
Healthy	529	4 500	12%
Major acute or non-life-threatening chronic	395	1 785	22%
Significant condition	484	1 341	36%
Maternity	42	72	58%
High risk	145	210	69%
Unknown	4	9	47%
Total	1 599	7 917	20%

TVCT Pretoria North East hub covers an area characterised by many pensioners.

Step 2 – Unstructured data: The ICS system captures a wide range of unstructured health-related information, providing a comprehensive view of patient well-being and healthcare utilisation. The data can be broadly categorised as follows:

Table 9: Unstructured data

CATEGORY	EXAMPLES OF DATA COLLECTED	DESCRIPTION
Clinical Measures	Blood pressure, weight, height, BMI, MUAC	Includes vital signs and anthropometric data, critical for assessing physical health status.
Activities of Daily Living	Functional status (e.g. bathing, feeding), mobility, use of assistive devices	Tracks the level of independence and mobility, relevant for assessing frailty and care needs.
Medical & Family History	Past diagnoses, surgical history, hereditary conditions, family history of chronic diseases	11,8%
	Captures relevant individual and familial medical background to inform risk profiling and clinical decision-making.	15,7%
Medical Diagnoses	Diabetes, hypertension, HIV, mental health conditions	Clinical diagnoses sourced from ICD coding or clinician records.
Psychosocial Data	Living situation, social support, substance use	Provides context for health outcomes and care planning.
Screening & Risk Assessments	TB screening, depression scales (e.g. PHQ-9), frailty scoring, fall risk	Structured tools used for early detection and preventative interventions.
Service Utilisation	Hospital admissions, GP visits, care-coordinator health services	Records of health service use, key for cost and outcomes analysis.

[4] THE ROLE OF PREDICTIVE ANALYTICS AND BIG DATA IN HEALTHCARE

Approximately 3 000 of the 8 000 members had this additional data available. We added this to the baseline EPG model (described above) in our AI tool.

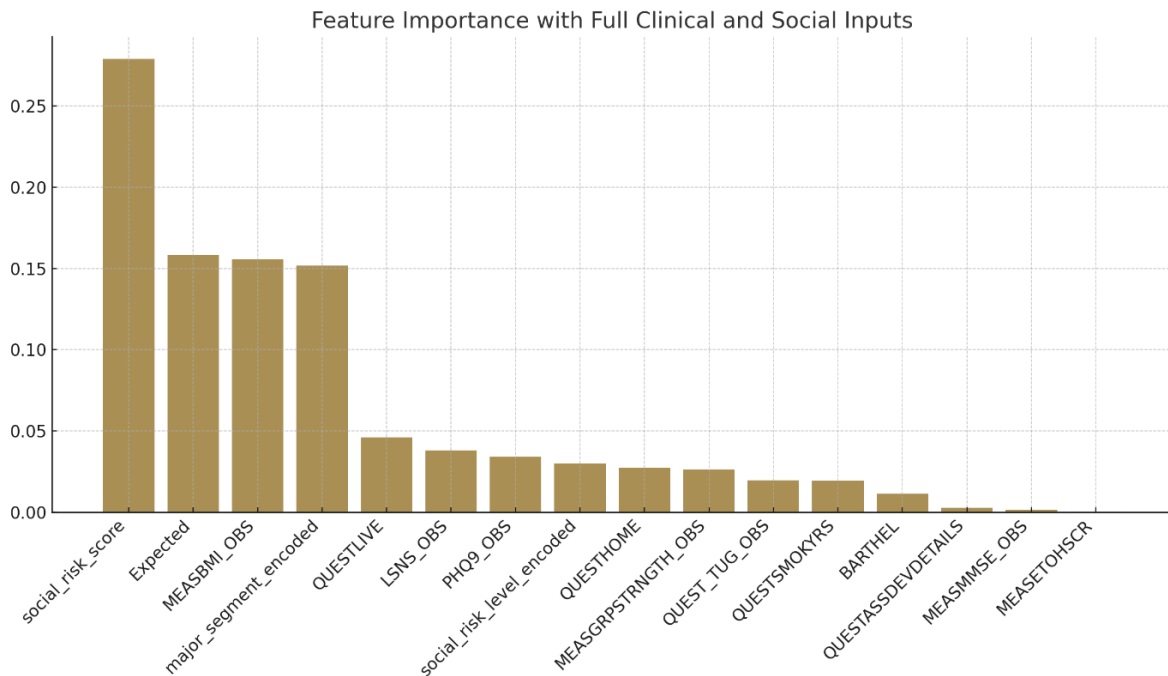
- a.) We first added the data in the form of a combined social risk index – a score we had previously created by combining the above unstructured data, based on clinical and general first principles, including the weightings between them. The AI tool found new risk sub-categories within the major segments with different admission rates. This was the result:

Table 10: Major segment enhanced with the social risk score – admission rates

Segment	Social risk score	No. of admissions	No. of members	Admit rates
Healthy	Unknown	303	2941	10%
	Low	227	1569	14%
	Moderate	1	1	53%
Major acute or non-life-threatening chronic	Unknown	189	1045	18%
	Low	197	728	27%
	Moderate	10	15	64%
Maternity	Unknown	26	47	56%
	Low	15	25	61%
Significant condition	Unknown	195	587	33%
	Low	279	740	38%
	Moderate	13	20	64%
High risk	Unknown	50	69	72%
	Low	90	129	70%
	Moderate	5	12	44%
Unknown	Low	4	9	47%
Total		1 604	7937	20%

It found the following data added significantly to the model:

Figure 6: Feature importance



Points:

- The social risk score we created performed well;
- The useful measures we fed into the model in order: BMI; LSNS (for social isolation); the PHQ9 (depression screen); living arrangement; grip strength and TUG (for frailty); smoking status; Barthel score (rolled up frailty score); assistant device use; MMSE (mini mental test).

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b.) we then added all the unstructured additional data from the cohort to the EPG base, allowing the AI tool to suggest its own new labels too. This is the result:

Table 11: New segment & old segment – admission rates

Old Segment	New Segment	New Expected	Old Expected	Difference
Healthy	Healthy - Low Functional Risk + Strong Social Support	0%	12%	-12%
Healthy	Healthy	11%	12%	-1%
Healthy	Healthy - Moderate Risk + Some Depression	14%	12%	2%
Healthy	Healthy - Severe Functional Impairment + Cognitive Decline	18%	12%	6%
Healthy	Healthy - Mild Risk + Smoking History	20%	12%	8%
Major acute or non-life-threatening chronic	Major acute or non-life-threatening chronic	20%	22%	-2%
Major acute or non-life-threatening chronic	Major acute or non-life-threatening chronic - Moderate Risk + Some Depression	27%	22%	5%
Major acute or non-life-threatening chronic	Major acute or non-life-threatening chronic - Severe Functional Impairment + Cognitive Decline	27%	22%	5%
Major acute or non-life-threatening chronic	Major acute or non-life-threatening chronic - Low Functional Risk + Strong Social Support	33%	22%	11%
Major acute or non-life-threatening chronic	Major acute or non-life-threatening chronic - Mild Risk + Smoking History	34%	22%	12%
Major acute or non-life-threatening chronic	Major acute or non-life-threatening chronic - High Social Risk + Physical Frailty	59%	22%	37%
Significant condition	Significant condition	34%	36%	-2%
Significant condition	Significant condition - Low Functional Risk + Strong Social Support	34%	36%	-2%
Significant condition	Significant condition - Mild Risk + Smoking History	39%	36%	3%
Significant condition	Significant condition - Severe Functional Impairment + Cognitive Decline	40%	36%	4%
Significant condition	Significant condition - Moderate Risk + Some Depression	42%	36%	6%
Significant condition	Significant condition - High Social Risk + Physical Frailty	59%	36%	23%
High risk	High risk - High Social Risk + Physical Frailty	30%	69%	-39%
High risk	High risk	66%	69%	-3%
High risk	High risk - Moderate Risk + Some Depression	66%	69%	-3%
High risk	High risk - Severe Functional Impairment + Cognitive Decline	78%	69%	9%
High risk	High risk - Low Functional Risk + Strong Social Support	85%	69%	16%
High risk	High risk - Mild Risk + Smoking History	113%	69%	44%
Maternity	Maternity - Moderate Risk + Some Depression	26%	58%	-32%
Maternity	Maternity - Mild Risk + Smoking History	53%	58%	-5%
Maternity	Maternity	61%	58%	3%
Maternity	Maternity - Severe Functional Impairment + Cognitive Decline	79%	58%	21%

[4] THE ROLE OF PREDICTIVE ANALYTICS AND BIG DATA IN HEALTHCARE

Selected new categories with useful admission prediction differences include:

Healthy:

- Very low: low function risk plus strong social support
- Moderate: depression, functional impairment, cognitive decline
- High: Mild risk plus smoking history

At risk (major acute or non-life threatening chronic):

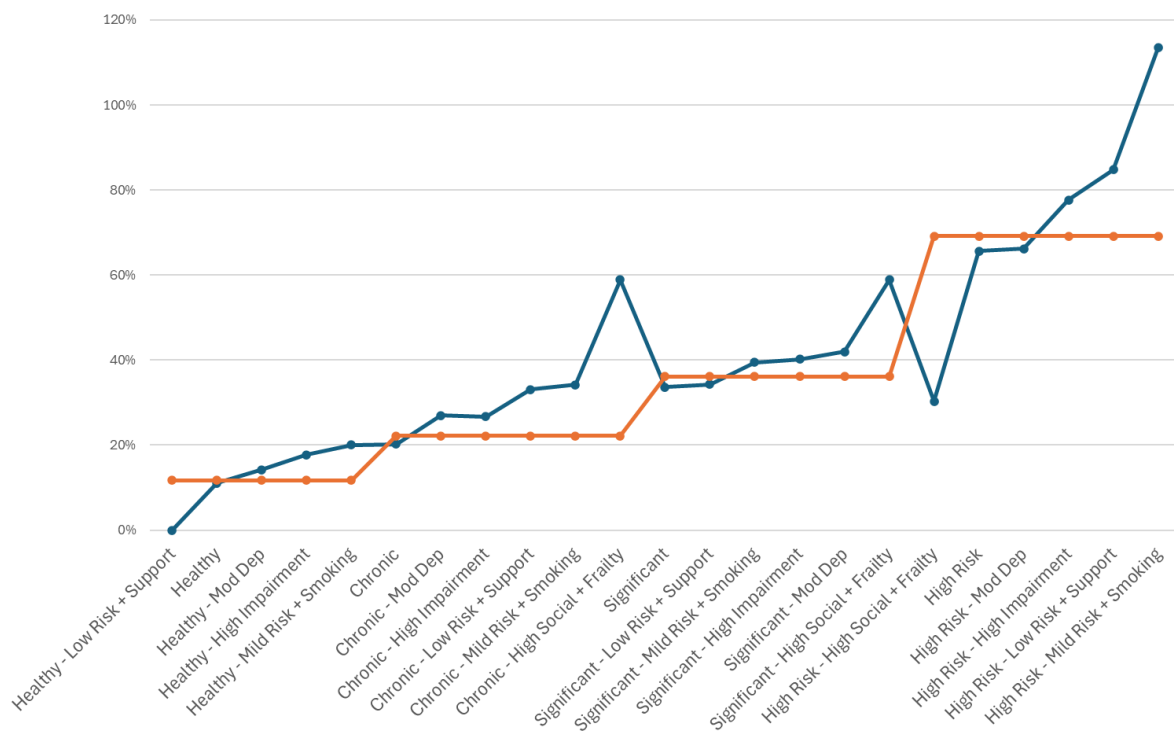
- High: High social risk + Physical frailty

Significant chronic:

- High: High social risk + physical frailty

[High Risk: unhelpful categories due to sparse data.]

Figure 7: Variation in admission rates using the new risk segment label
(label shortened; see appendix 1 for label mapping)



The result is new suggested risk categories with significantly different admission rates. Most of the categories are practically useful and make sense, though some with few data points do not.

Nonetheless, it demonstrates that the unstructured data permits better identification of meaningful groups of patient-specific admission rate risk. This insight will result in better targeting of interventions in TVCT for discrete groups of patients. This will improve the efficacy of the interventions as well as the 'return on investment' from the programme's resources.

[4] THE ROLE OF PREDICTIVE ANALYTICS AND BIG DATA IN HEALTHCARE

Based on the existing framework and the iterative guidance given to it by the operators, the AI tool was able to clean the data and suggest the results in a remarkably short time, around two hours.

CONCLUSION

Better data reflecting patients' frailty and psychosocial needs improves our models and data-driven decision-making in healthcare.

Summary of key insights

Data availability:

- Up to now, healthcare economic models have been built on information derived from diagnosis and procedure coding, then grouped into homogenous clinical and resource use. This is done by 'groupers' – DRGs and Episode groupers. While useful, these models are restricted by their access to analysable data, which was costly and time consuming to generate.
- More data and quickly available: AI tools can convert widely available unstructured clinical data – written and typed notes, documents and images into analysable information:
 - NLP (natural language processing): computer vision (OCR) and speech recognition
 - LLMs (large language models): interpret text, recognise patterns and produce coherent and contextually relevant responses.

Analytic models:

- Economic models are built using statistical approaches such as regression analysis and decision trees.
- Machine learning systems learn from data patterns and relationships without being explicitly programmed. However, their performance depends on data volumes and experience, and the context given to the AI tool, which can make the difference between a meaningful and useful result or nonsense.
- We have started building on a successful existing model (built on structured data and predetermined groups), using unstructured data generated by clinical staff as part of their everyday work in better managing their patients, with promising results.

Our next steps include:

- Adding additional data to the model including:
 - Data derived from medical notes available to us via our system and other doctors' documentation
 - Other digital data such as pathology results and scripting information.
- Statistical fit: judging the success of the enhancements at every step based on a balance between the improved fit of the models produced and the homogeneity of the categories, which are used for better targeting improvement interventions for patients.

APPENDIX 1: FULL LABEL MAPPING

FULL LABEL	SHORTENED LABEL
Healthy - Low Functional Risk + Strong Social Support	Healthy - Low Risk + Support
Healthy	Healthy
Healthy - Moderate Risk + Some Depression	Healthy- Mod Dep
Healthy - Severe Functional Impairment + Cognitive Decline	Healthy - High Impairment
Healthy - Mild Risk + Smoking History	Healthy - Mild Risk + Smoking
Major acute or non-life-threatening chronic	Chronic
Major acute or non-life-threatening chronic - Moderate Risk + Some Depression	Chronic - Mod Dep
Major acute or non-life-threatening chronic - Severe Functional Impairment + Cognitive Decline	Chronic - High Impairment
Major acute or non-life-threatening chronic - Low Functional Risk + Strong Social Support	Chronic - Low Risk + Support
Major acute or non-life-threatening chronic - Mild Risk + Smoking History	Chronic - Mild Risk + Smoking
Major acute or non-life-threatening chronic - High Social Risk + Physical Frailty	Chronic - High Social + Frailty
Significant condition	Significant
Significant condition - Low Functional Risk + Strong Social Support	Significant - Low Risk + Support
Significant condition - Mild Risk + Smoking History	Significant - Mild Risk + Smoking
Significant condition - Severe Functional Impairment + Cognitive Decline	Significant - High Impairment
Significant condition - Moderate Risk + Some Depression	Significant - Mod Dep
Significant condition - High Social Risk + Physical Frailty	Significant - High Social + Frailty
High risk - High Social Risk + Physical Frailty	High Risk - High Social + Frailty
High risk	High Risk
High risk - Moderate Risk + Some Depression	High Risk- Mod Dep
High risk - Severe Functional Impairment + Cognitive Decline	High Risk- High Impairment
High risk - Low Functional Risk + Strong Social Support	High Risk- Low Risk + Support
High risk - Mild Risk + Smoking History	High Risk - Mild Risk + Smoking

SOCIOECONOMIC DETERMINANTS AND MENTAL HEALTH OUTCOMES

An analysis from 2019 to 2023

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EXECUTIVE SUMMARY

Socioeconomic factors significantly influence mental health outcomes and healthcare access. This study examines the impact of income, employment and education on mental health trends among beneficiaries of the Government Employees Medical Scheme (GEMS) from 2019 to 2023. Using claims data analysis, we assessed the prevalence of conditions such as depression, anxiety and substance abuse, alongside financial trends in mental healthcare expenditures. We also determined the socioeconomic determinants of mental health. Findings indicate persistent disparities in the mental health burden among lower socioeconomic groups, with higher rates of depression (8.1%, 95% CI: 7.5%-8.7%) and anxiety (6.3%, 95% CI: 5.8%-6.9%) among low-income beneficiaries. Healthcare expenditure for mental health services increased significantly, with spending on depression rising from R926 million in 2019 to R1.75 billion in 2023 ($p < 0.01$). Additionally, inpatient care continued to dominate mental health expenditure, accounting for 70% of total expenditure. The prevalence of depression and substance use is increasing, with excessively high costs associated with in-hospital care. Based on these findings, we recommend a fair and cost-effective shift in healthcare policy that focuses more on prevention, early diagnosis and outpatient care. This will help save money and improve people's health in the long run.

INTRODUCTION

Mental health disorders are a leading cause of morbidity and disability worldwide, affecting over 970 million people as of 2019 (Global Burden of Disease Collaborators, 2022). Socioeconomic determinants, including income, education, employment and geographic location play a critical role in shaping mental health outcomes and access to care (Kirkbride et al, 2024). The impact of socioeconomic status (SES) on mental health has been extensively documented, with lower-income individuals experiencing higher prevalence rates of conditions such as depression and anxiety due to financial instability, social stressors and limited healthcare access (Oliveros et al, 2022). Mental health challenges are further compounded by inadequate healthcare infrastructure, particularly in low- and middle-income countries (LMICs), where resources for mental health services remain significantly constrained (World Health Organization, 2022).

Within South Africa, mental health conditions are a growing concern, with approximately one in six individuals experiencing a mental disorder (Sorsdahl et al, 2023). In sub-Saharan Africa, mental health conditions are often underdiagnosed due to stigma, poor healthcare access and financial constraints (Gbadamosi et al, 2022).

Mental healthcare remains highly uneven, with 75% of individuals in need of treatment not receiving adequate care (Docrat et al, 2019). The South African healthcare system faces significant challenges in addressing mental health needs, with a disproportionate allocation of resources to specialised inpatient care rather than preventive or community-based treatment (Docrat et al, 2019; Sorsdahl et al, 2023). This imbalance exacerbates cost inefficiencies, as hospitalisation costs account for 70% of mental health expenditure, despite international recommendations favouring outpatient and community-based interventions (World Health Organization, 2022). High-income countries such as the United Kingdom, Germany and Canada have successfully implemented integrated mental health policies that emphasise early intervention and decentralised service delivery, leading to improved health outcomes and cost reductions (Chan et al, 2023). In contrast, South Africa continues to rely on outdated models of institutionalised mental healthcare, limiting the accessibility of services for vulnerable populations (Castelpietra et al, 2022).

Understanding the interaction between SES and mental health outcomes is essential for informing policies that promote equitable access and efficient resource allocation. Research suggests that interventions targeting social determinants, such as employment support, financial assistance and education-based mental health literacy programmes, can significantly improve mental health outcomes in low-income populations. Additionally, the availability or lack of healthcare benefits, particularly coverage for outpatient mental health services, can influence hospitalisation rates, as inadequate access to preventative and early treatment options may lead to more severe cases requiring inpatient care (Oliveros et al, 2022). By integrating these approaches into South Africa's mental healthcare framework, policymakers can bridge the existing gaps in service delivery and ensure that mental health interventions reach those who need them most. This study aims to analyse these associations within the GEMS beneficiary population and provide evidence-based recommendations for improving mental health service delivery in South Africa.

METHODS

A retrospective analysis was conducted using GEMS claims data from 2019 to 2023, employing a mixed-methods approach that integrated quantitative claims analysis with contextual socioeconomic assessments.

Data sources

Data sources included GEMS claims data, which were used to track trends in mental health service utilisation, prevalence rates and financial expenditures, as well as GEMS membership data, which provided demographic indicators such as age, income and geographic location to assess disparities in healthcare access.

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Additionally, socioeconomic indicators were obtained from national and international health reports, including the World Health Organization (WHO), the South African Medical Research Council and the Council for Medical Schemes, offering further context with regard to the influence of SES on mental health outcomes.

Analytical methods

The study utilised several statistical techniques to analyse the data. Prevalence rates were calculated as the proportion of individuals diagnosed with each condition in a given year relative to the total study population for that year. Each year's prevalence reflects newly identified cases as well as ongoing cases from previous years, provided the condition remained active or met diagnostic criteria. However, a diagnosis from an earlier year (e.g. depression in 2019) was not automatically carried forward unless the individual still met the diagnostic criteria during subsequent assessments.

Trend analysis was conducted to examine annual prevalence rates of mental health conditions, financial expenditure patterns and the distribution of inpatient versus outpatient utilisation. A multivariate regression model was applied to assess the relationship between SES variables and mental health claims, providing insight into how income, employment and education levels influenced service utilisation.

Additionally, we compared our study's findings to regional and global trends in mental health service delivery, utilising international mental health studies such as the Global Burden of Disease Study (Global Burden of Disease Collaborators, 2022) and WHO reports (World Health Organization, 2019).

The socioeconomic data used in this analysis were sourced from the most recent GEMS membership files available at the time of study. While updates occur periodically, potential discrepancies due to outdated records were accounted for in the model's sensitivity analysis.

Income level was defined as the beneficiary's reported gross monthly salary, as recorded in the GEMS membership file. The data are updated periodically through employer payroll records and were analysed based on the most recent available update at the time of the study. Unemployment rate was defined as the proportion of unemployed adults within the household of the beneficiary, as self-reported during scheme enrolment and periodic updates.

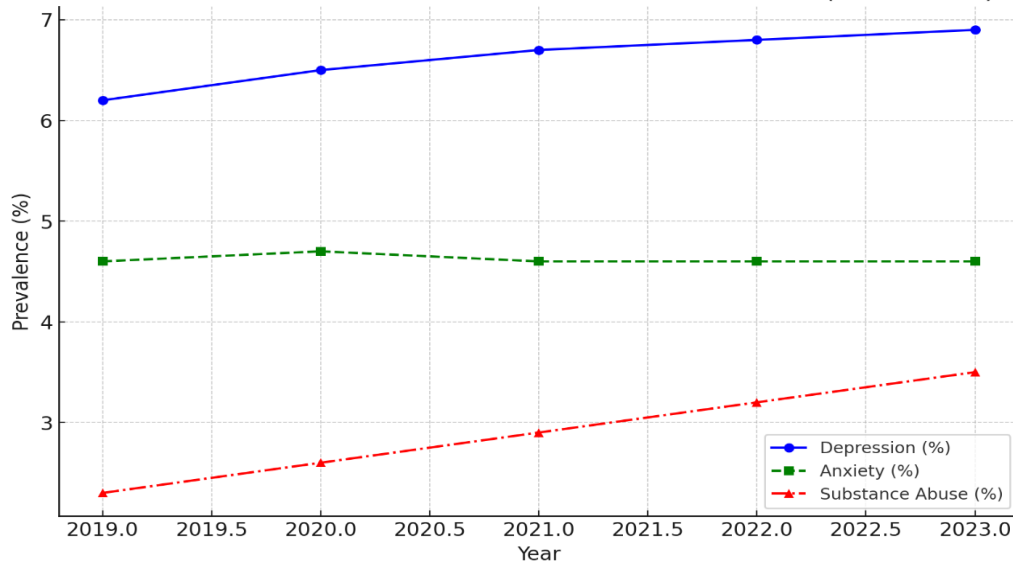
Since GEMS members are government employees, unemployment rate calculations were based on dependents within the household rather than the primary member. Lastly, education level was defined as the highest level of formal education completed by the primary member, as recorded in the GEMS membership database. This information is self-reported at the time of scheme enrolment and updated upon request by members.

RESULTS

Annual prevalence rates of mental health conditions (2019-2023)

The trend analysis reveals a steady increase in depression prevalence from 6.2% in 2019 to 6.9% in 2023 (95% CI: 6.7%-7.1%, $p<0.01$). Anxiety prevalence remained stable at approximately 4.6% (95% CI: 4.4%-4.8%, $p=0.23$), while substance abuse prevalence exhibited a significant increase from 2.3% in 2019 to 3.5% in 2023 (95% CI: 3.2%-3.8%, $p<0.05$).

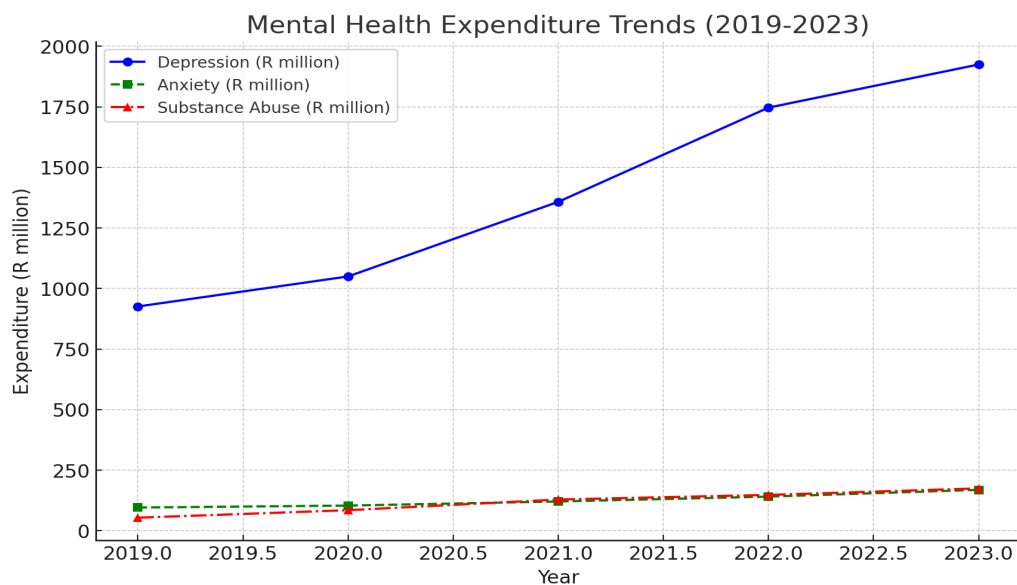
Figure 1: Annual prevalence rates of mental health conditions (2019-2023)



Financial expenditure trends (2019-2023)

Mental health expenditure has risen sharply over the years, with spending on depression treatment growing from R926 million in 2019 to R1.75 billion in 2023. Expenditure on anxiety disorders has also increased, from R96 million to R169 million. The most significant increase was seen in substance abuse treatment, which rose from R54 million in 2019 to R175 million in 2023.

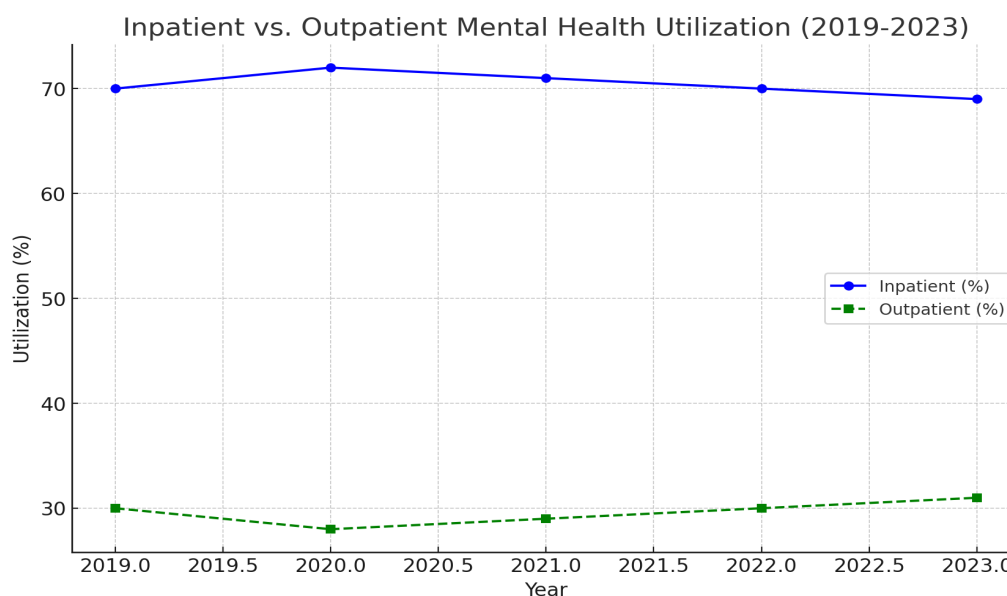
Figure 2: Mental Health Expenditure Trends (2019-2023)



Inpatient vs outpatient utilisation and cost trends (2019-2023)

The study finds that inpatient care consistently accounts for the majority of mental health expenditure, ranging from 70% in 2019 to 69% in 2023. Conversely, outpatient utilisation has shown a modest increase, rising from 30% in 2019 to 31% in 2023.

Figure 3: Inpatient vs outpatient utilisation and cost trends (2019-2023)



Multivariate regression analysis: SES and mental health service utilisation

A multivariate regression model was used to assess the relationship between socioeconomic factors and mental health service utilisation.

PREDICTOR VARIABLE	COEFFICIENT (B)	95% CONFIDENCE INTERVAL	P-VALUE
Income level	-1.8	(-2.5, -1.1)	<0.001
Unemployment rate	3.2	(2.6, 3.8)	<0.001
Education level	-2.1	(-3.0, -1.2)	<0.01

Income level: A one-unit increase in income level is associated with a 1.8-point decrease in mental health claims per 1 000 beneficiaries ($p < 0.001$), indicating that higher income is protective against mental health service utilisation. **Unemployment rate:** A 1% increase in household unemployment corresponds to a 3.2-point increase in mental health claims per 1 000 beneficiaries ($p < 0.001$), emphasising the strong link between joblessness and mental health distress. **Education level:** Each additional year of post-secondary education is associated with a 2.1-point reduction in mental health claims per 1 000 beneficiaries ($p < 0.01$), reinforcing the protective effects of education against mental health conditions.

DISCUSSION

The increasing prevalence of mental health conditions in our study aligns with regional and global trends. In sub-Saharan Africa, mental health conditions remain underdiagnosed due to limited resources and high stigma (World Health Organization, 2019). Globally, mental health disorders contribute to 5% of the total disease burden, with depression ranked as a leading cause of disability (Global Burden of Disease Collaborators, 2022).

A comparison with other LMICs reveals that economic constraints, stigma and limited access to healthcare providers contribute to the treatment gap in mental healthcare. For example, in South America, particularly Brazil, the decentralisation of mental health services has improved access to outpatient care and reduced reliance on inpatient services (Castelpietra et al, 2022). South Africa, however, continues to lag behind in implementing similar reforms, as only 25% of individuals with mental health conditions receive the recommended standard of care (Sorsdahl et al, 2023).

In contrast, high-income countries (HICs) have made significant strides in community-based mental healthcare, resulting in lower inpatient admissions and improved mental health outcomes. European nations such as the United Kingdom and Germany have shifted towards integrated outpatient models that prioritise early intervention, therapy and medication management (Chan et al, 2023). These approaches have led to reduced hospitalisation rates, improved patient outcomes and lower overall healthcare costs (Kirkbride et al, 2024). The USA and Canada have also implemented robust mental health policies that ensure coverage for outpatient treatments through insurance schemes, a model that South Africa could consider for GEMS beneficiaries.

The multivariate regression analysis further emphasises the link between SES and mental health claims, with lower income levels ($\beta=-1.8$, $p<0.001$) and higher unemployment rates ($\beta=3.2$, $p<0.001$) being significant predictors of increased service utilisation. These results align with global literature indicating that economic hardship exacerbates mental health issues and limits access to care (Oliveros et al, 2022). Education level also showed a protective effect, with higher education associated with lower mental health service utilisation ($\beta=-2.1$, $p<0.01$), suggesting that increased awareness and access to resources may mitigate mental health risks (Kirkbride et al, 2024).

There is a strong association between SES and mental health service utilisation in South Africa. Similar trends have been reported in other LMICs, where economic instability, high unemployment rates and inadequate mental healthcare systems contribute to a disproportionate burden of mental health disorders (Docrat et al, 2019; World Health Organization, 2019).

Recommendations

These findings highlight the need for South Africa to shift towards a more sustainable and community-oriented mental healthcare model. Strengthening primary healthcare services, expanding mental health literacy programmes and increasing funding for outpatient mental health interventions can help bridge the existing treatment gap. Additionally, incorporating successful elements from HIC models, such as integrated care networks and digital mental health interventions, could improve access and affordability for lower-income populations.

Expanding outpatient services through increased investment in community-based mental health programmes could reduce the current reliance on costly inpatient care. Targeted interventions should be designed to support unemployed and low-income beneficiaries, addressing the socioeconomic disparities that contribute to mental health challenges. Policy adjustments, including a review of reimbursement

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models, could incentivise cost-effective outpatient services, ensuring that beneficiaries receive timely and appropriate care. Strengthening primary healthcare screening, diagnosis and treatment would allow for earlier detection and management of mental health conditions, ultimately improving long-term outcomes. Additionally, addressing shortages of mental health professionals, particularly in underserved areas, is crucial for enhancing service accessibility and quality. By implementing these recommendations, South Africa can move towards a more equitable and sustainable mental healthcare system.

LIMITATIONS

This study has several limitations that should be considered when interpreting the findings. The reliance on claims data (for those claiming for mental health benefits) means that undiagnosed mental health conditions are not captured, potentially underestimating the true burden of disease.

Additionally, socioeconomic indicators were inferred from available demographic data, which may not fully represent all determinants influencing mental health outcomes. Furthermore, the study does not account for individual behaviours and comorbidities that could contribute to variations in mental health conditions and healthcare utilisation. Despite these limitations, the findings provide valuable insights into mental health disparities and the need for targeted interventions.

In addition to national-level policy recommendations, GEMS can play a pivotal role by piloting integrated mental health programmes within its own network. This could include enhancing benefit design to better cover outpatient and preventative mental health services, facilitating partnerships with community-based mental health providers and launching targeted member education campaigns to reduce stigma and encourage early care-seeking behavior. GEMS can also leverage its data to identify high-risk members and proactively offer tailored support, thereby mitigating the long-term cost implications of untreated mental health conditions.

CONCLUSION

Socioeconomic disparities significantly impact mental health outcomes and healthcare utilisation within GEMS. The reliance on inpatient care suggests the need for a policy shift toward cost-effective, community-based interventions. Addressing these disparities through targeted interventions will improve mental health resilience and optimise healthcare expenditures.

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Assessing POLMED's contribution to occupational health in the South African Police Service

MENTAL HEALTH AND WELLNESS PROGRAMME OUTCOMES (2022-2024)

AUTHORS

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EXECUTIVE SUMMARY

This study explores the benefits of occupational health partnerships in enhancing employee well-being and driving productivity within the South African Police Service (SAPS) by focusing on health screening and mental health support. These partnerships leverage the strengths of both parties: medical aid schemes bring expertise in healthcare management and resources, while employers provide access to the workforce and financial support.

A quantitative research approach was used to evaluate the effectiveness of POLMED's partnerships with employer-based wellness programmes and their impact on the occupational health of SAPS members. This involved analysing secondary data from 2022 to 2024 wellness programme records to assess health outcomes, participation rates and cost savings. The Charlson Comorbidity Index (CCI) was utilised to evaluate the impact of comorbid conditions on member outcomes.

The results reveal significant differences between screened and non-screened populations. Screened individuals consistently had lower admission rates and healthcare costs compared to non-screened

individuals. In 2022, admission rates per 1000 for screened individuals were 2.29 lower (15.13 vs 17.42 per 1000 lives), and the average costs per life per month were R1 309 lower (R2 307 vs R3 616). In 2023, these differences widened, with admission rates being 6.36 per 1000 lower, and costs R2 106 lower. By 2024, admission rates were 5.04 per 1000 lower, and costs were R2 106 lower. The uptake of wellness screenings varied significantly among provinces. KwaZulu-Natal, with only 0.5% of members screened and higher CCI scores, had the highest rates of 26.44 per 1000 lives, with an average cost per life of R5383.

Collaborations between medical schemes and employer wellness programmes are crucial for a healthy, productive workforce. These partnerships lead to cost savings and better health outcomes. Policy coherence in the health sector is needed to strengthen these collaborations and improve occupational health outcomes.

INTRODUCTION

In today's dynamic workplace, maintaining the health and well-being of employees is paramount for organisations striving to achieve sustained economic productivity. Medical aid schemes were initiated as employer benefits within the South African context.

The progression of medical schemes from sick funds, friendly societies and private health funding has taken over a hundred years in South Africa. In the beginning, this was an employer initiative. The provision of healthcare for the workforce has its origin in the employer's concern to protect the workforce and ensure its health and safety. (Verhoef, 2006).

This process is inherently multifaceted, involving components that interact across a wide spectrum — from individual contexts to broader societal and environmental contexts. Moreover, delivering effective member-centred care requires addressing the intricate dimensions of health, functioning and disability. This is achieved not only through targeted interventions but also by leveraging information technology that encapsulates the complexity of healthcare, ensuring that all stakeholders are well-informed.

The fragmented evolution of the regulatory framework mirrors that of the political structures involved. The National Department of Health is responsible for health legislation, while occupational health is a Department of Labour competency. As a result, the management of health for the workforce has remained fragmented.

The South African Police Service Medical Scheme (POLMED) was established as a benefit to fund the healthcare needs of members of the South African Police Service (SAPS) appointed under the South African Police Act, Act No. 68 of 1995, as amended. The scheme is a non-profit restricted medical scheme registered in terms of the Medical Schemes Act, Act No. 131 of 1998, as amended (MSA) and its rules are registered with the Council for Medical Schemes in terms of the MSA. The purpose of the scheme is to provide quality and cost-effective healthcare for SAPS members and their dependants.

One effective strategy that has garnered interest is the formation of partnerships between POLMED and SAPS. These partnerships aim to create a synergistic approach to employee health, addressing both preventive care and ongoing medical support. This research paper seeks to explore the benefits of such occupational health partnerships in enhancing employee well-being and driving productivity within SAPS. Despite the evident benefits, implementing effective occupational health partnerships can be challenging. It requires a strategic approach, commitment from medical schemes, employer groups and employees, as well as an understanding of the specific health needs of the workforce.

This paper will explore the various components of these partnerships, namely wellness initiatives and mental health initiatives, and assess the financial impact of such initiatives.

METHODOLOGY

A quantitative research methodology was utilised to assess the effectiveness of the partnerships between POLMED and employer-based wellness programmes, as well as POLMED's impact on the occupational health of SAPS members. This involved analysing secondary data from 2022 to 2024 wellness programme records to assess health outcomes, participation rate and cost savings.

To evaluate the impact of comorbid conditions on patient outcomes, the Charlson Comorbidity Index (CCI) was employed as a key analytical tool to predict the 10-year mortality risk for patients with multiple comorbid conditions (Charlson et al, 2023). The CCI assigns weighted scores to various comorbidities based on their severity and associated risk of mortality (Charlson et al, 2023).

A CCI score of 0 points indicates no comorbid conditions and a lower risk of mortality (Charlson et al, 2023). Scores of 1-2 points suggest a low risk of mortality, but that some comorbid conditions are present (Charlson et al, 2023). Scores of 3-4 points indicate a moderate risk of mortality with multiple comorbid conditions (Charlson et al, 2023). Scores of 5 or more points represent a high risk of mortality, indicating significant comorbid conditions (Charlson et al, 2023). The data from CCI scores are used to develop interventions that address the needs of members with high comorbidity burdens.

Descriptive statistics summarised the demographic characteristics and key variables, while the comparative analysis compared health outcomes and organisational benefits (cost reduction) between different groups.

ANALYSIS AND KEY FINDINGS

Overview of POLMED medical scheme profile:

The average scheme population decreased from 504 758 in 2020 to 495 155 in 2024, marking a total decline of 9 603 people. This equates to an approximate percentage decrease of 1.90%. The population experienced a decline from 2020 to 2022, followed by slight increases in 2023 and 2024. Despite these recent increases, the overall trend over the five years remains a decline.

The average monthly membership termination rate remained below 1% throughout the years, ranging from 0.2% to 0.6%. The highest termination rates were observed in 2021 and 2022. However, a significant decline in membership termination was noted in 2024 (Table 1).

Table 1: Population growth

YEAR	AVERAGE POPULATION	% CHANGE IN POPULATION	AVERAGE MONTHLY MEMBERSHIP TERMINATION
2020	504 758	-0.50%	0.5%
2021	496 411	-1.7%	0.6%
2022	491 509	-1.0%	0.6%
2023	494 449	0.6%	0.5%
2024	495 155	0.1%	0.2%

In 2024, the distribution of beneficiaries was as follows: Gauteng hosts 27% of the total beneficiaries. KwaZulu-Natal and the Western Cape each account for 15%, while the Eastern Cape comprises 12%. The provinces of Limpopo, Mpumalanga, Free State and the Northern Cape each account for less than 10% of the population (Figure 1).

Figure 1: Beneficiaries per province

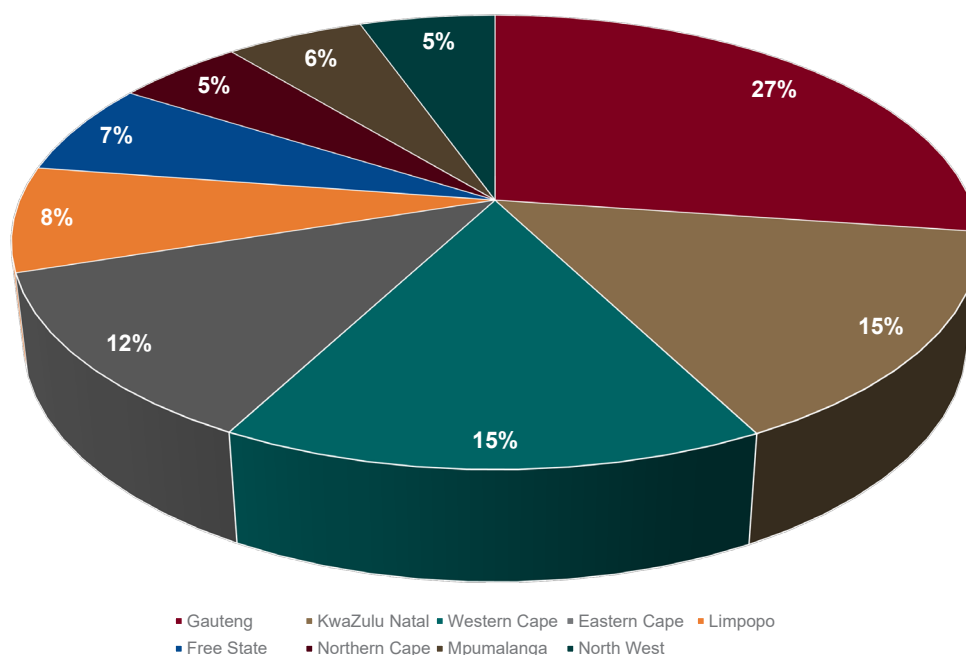
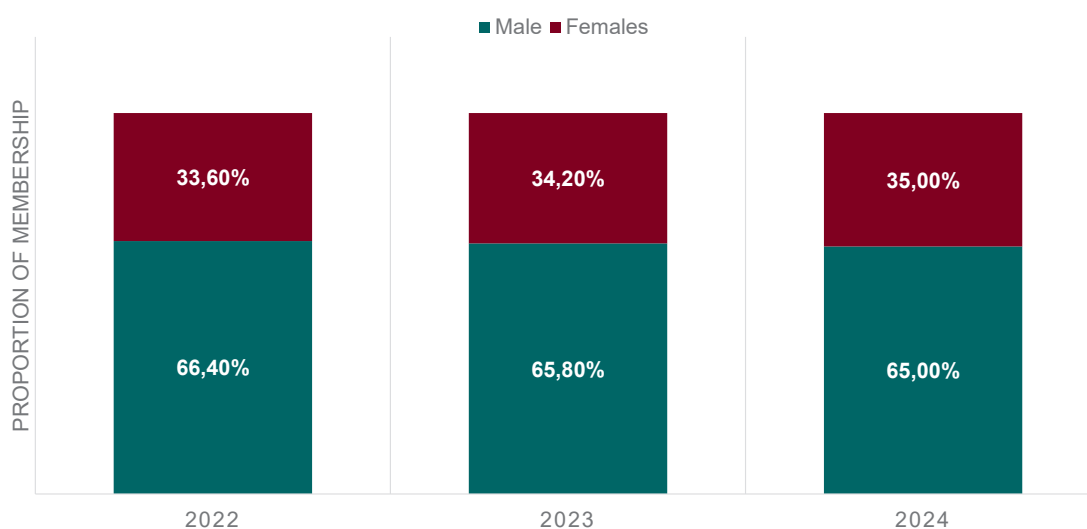


Figure 2 illustrates a gradual shift in gender distribution over the course of three years. In 2022, males represented 66.40% of the POLMED population, while females made up 33.60%. This trend remained relatively stable in 2023, with males slightly decreasing to 65.80% and females increasing to 34.20%. By 2024, the gender gap continued to narrow, as males accounted for 65.00% and females reached 35.00%. This suggests a consistent, albeit small, rise in the proportion of females compared to male members over the period, highlighting a trend toward greater gender balance in the POLMED risk pool.

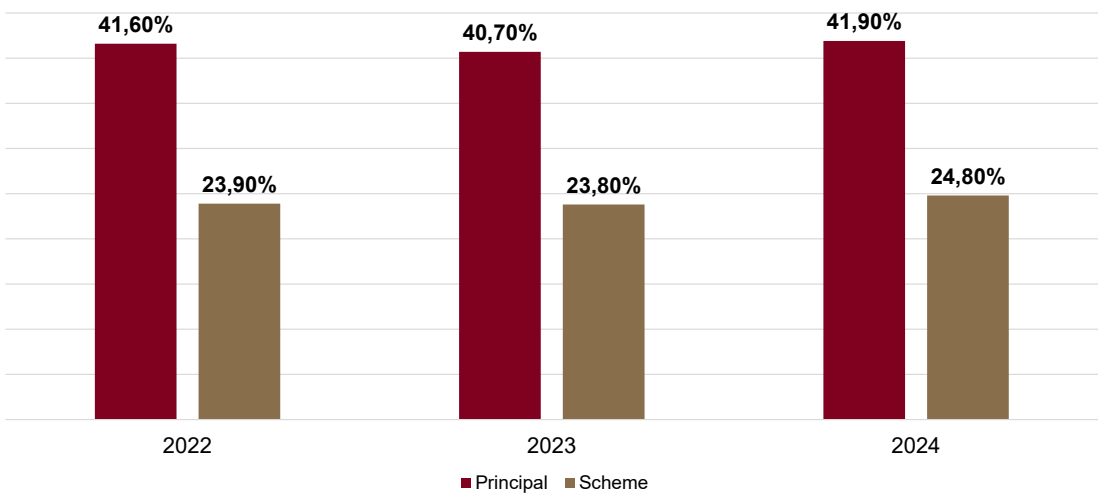
Figure 2: Gender distribution per year



Health profile analysis

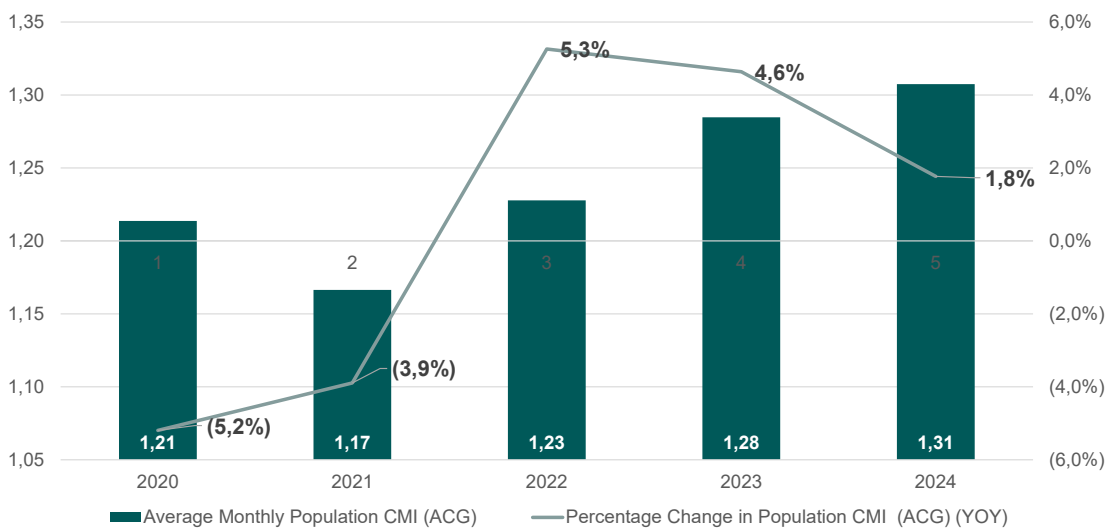
The prevalence of chronic conditions within the scheme rose from 23.9% in 2022 to 24.8% in 2024. There was a slight decline in 2023 compared to 2022, followed by a slight increase in 2024 (Figure 3). Additionally, the prevalence of chronic conditions was higher among principal members compared to all beneficiaries (scheme).

Figure 3: Percentage of beneficiaries living with chronic condition



Over the past two years, the population has increased slightly along with the rise in morbidity since 2020 (Figure 4). However, since 2022, the morbidity rate within the scheme has been improving.

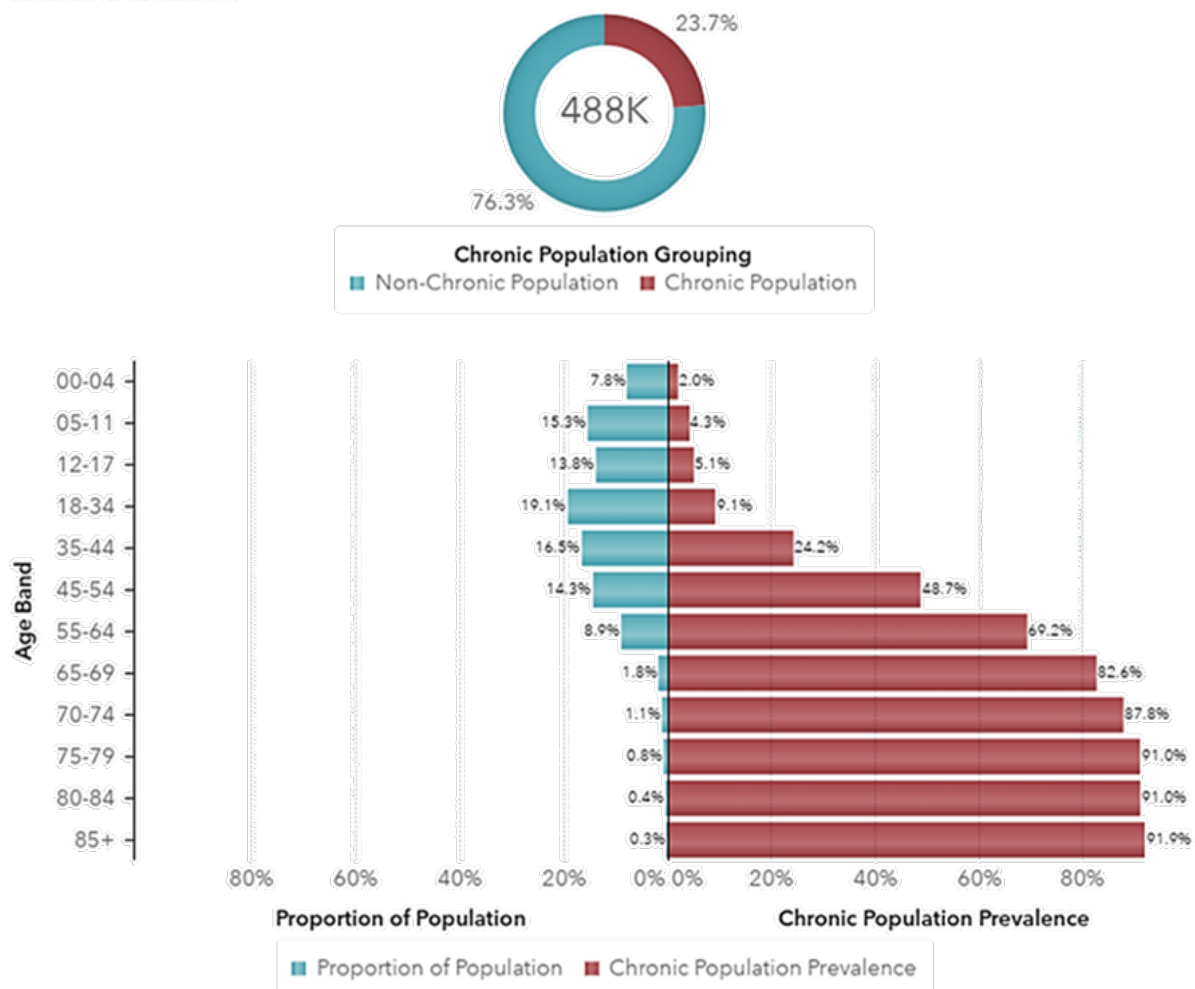
Figure 4: Population morbidity



Overall, 76.3% of the beneficiaries were non-chronic, compared to 23.7% who were living with chronic conditions. Chronic conditions were most prevalent among elderly beneficiaries aged 55 years and above, in contrast to younger beneficiaries. The highest proportion of non-chronic members was observed in the 18- to 34-year age group, accounting for 19.1%, followed by the 35- to 44-year age group at 16.5%. The data indicate a positive correlation between age and the prevalence of chronic conditions, with older beneficiaries exhibiting a higher prevalence thereof (Figure 5).

Figure 5: Prevalence of chronic conditions

Number of Individuals



Expenditure analysis

The top five most prevalent conditions are hypertension, hyperlipidaemia, diabetes, depression and asthma, in that order. Despite hypertension being the most prevalent condition, it ranks fourth in terms of cost among the top five conditions. Hyperlipidaemia, followed by depression and diabetes, are the costliest to manage, with each costing the scheme more than R6 000 per life per month on average (Figure 6).

Figure 6: Top five chronic conditions

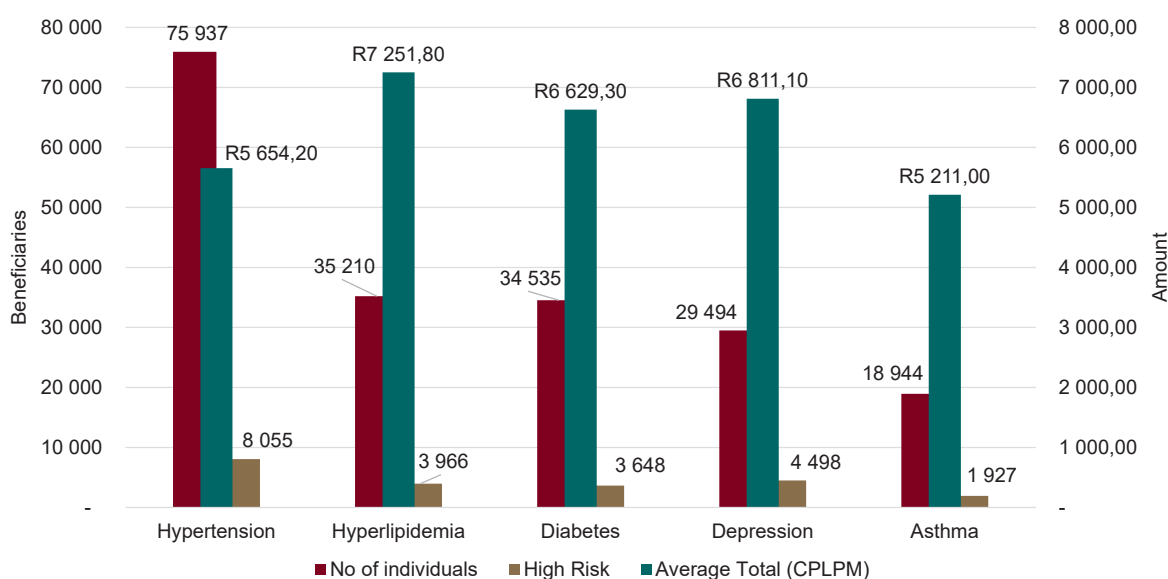


Table 2 illustrates the incidence of comorbidity among members. On average, non-chronic beneficiaries account for 39.9% of the total expenditure, costing the scheme R1 064.30 per life per month, and they constitute 76.3% of the total population. In contrast, 3% of the beneficiaries with five or more chronic conditions account for 17.0% of the total expenditure, translating to R11 836.40 per life per month. Thus, beneficiaries with five or more chronic conditions cost the scheme 11 times more than non-chronic beneficiaries. This demonstrates cross-subsidisation among members, with younger and healthier beneficiaries subsidising older and sicker beneficiaries. Notably, as the number of chronic conditions or comorbidities increases, the cost per life also rises.

Table 2: Proportions of members with chronic conditions

Number of Chronic reg conditions ▲	Proportion of Population	Proportion of Total Spend	Average Total CPLPM
Total	100.0%	100.0%	R2,057.1
0	76.3%	39.9%	R1,064.3
1	10.3%	15.6%	R3,099.8
2	4.9%	10.8%	R4,533.0
3	3.3%	9.0%	R5,557.4
4	2.3%	7.8%	R6,809.1
5 or more	3.0%	17.0%	R11,836.4

[6] ASSESSING POLMED'S CONTRIBUTION TO OCCUPATIONAL HEALTH...

Table 3 below presents a comparison of member screening, detailing both the overall admission rate and the medical admission rate per 1,000 lives. The overall admission rate includes all types of admissions (surgical cases, emergency cases, maternity cases, etc.), whereas the medical admission rate pertains specifically to medical cases. The yearly comparison of healthcare data from 2022 to 2024 reveals significant differences between screened and non-screened populations. In 2022, the admission rate per 1000 was 2.29 lower for screened individuals (15.13 per 1000) compared to non-screened ones (17.42 per 1000), and the average costs per life per month were R1 309 lower (R2 307 vs R3 616). In 2023, these differences widened, with admission rates per 1000 being 6.36 lower, with the average costs per life per month of R2 106 lower (R1 827 vs R3 933). By 2024, the admission rate per 1000 for screened individuals was 5.04 lower (12.58 vs 17.62 per 1000) with medical admission rates per 1000 being 2.28 lower (6.13 vs 8.41 per 1000) and the average costs per life per month were R2,106 lower (R2,231 vs R4,337).

Although the overall admission rate for screened individuals increased by 8.82% in 2024, and the medical admission rate increased by 12.89%, the rates for non-screened individuals decreased slightly by approximately 1.67%. Despite these fluctuations, the overall trend indicates that screening positively impacts healthcare outcomes and cost efficiency, highlighting its importance in healthcare management (Table 3).

Table 3: Member screening comparison

Wellness Screened Indicator ▲	Year ▲	Number of Unique Individuals	Admission Rate per 1000 lives	Medical Admission Rate per 1000 lives	Average CPLPM
Wellness Not Screened	2022	515550	17.42	8.26	 R3,616
	2023	516318	17.92	8.55	 R3,933
	2024	515628	17.62	8.41	 R4,337
Wellness Screened	2022	6551	15.13	6.66	 R2,307
	2023	13472	11.56	5.43	 R1,827
	2024	22796	12.58	6.13	 R2,231

Table 4 on the next page illustrates the benefits of wellness screening among members. The top three provinces with the highest proportion of wellness screenings are the Eastern Cape (1.1% of members screened), Gauteng (1.0%) and Limpopo (0.9%). These provinces also exhibited a low number of hospital admissions. Additionally, the average cost per life per month in these provinces was notably low, particularly in the Eastern Cape and Limpopo, where the average amount was less than R4 000.

In contrast, the Free State, KwaZulu-Natal (KZN) and the Western Cape had a high number of hospital admissions, ranging from 20.43 to 26.44 per 1000 lives. KZN had the highest number of admissions, with 26.44 per 1,000 lives (all admissions), and medical admissions at 14.73 per 1,000 lives. The average cost per life was R5,383., with an average cost per life of R5383.

[6] ASSESSING POLMED'S CONTRIBUTION TO OCCUPATIONAL HEALTH...

Table 4: Screening per province

Province ▲	Wellness Screening Prevalence	Admission Rate per 1000 lives	Medical Admission Rate per 1000 lives	Average CPLPM
Eastern Cape	1.1%	16.49	7.80	R3,720
Free State	0.4%	21.83	10.07	R5,557
Gauteng	1.0%	17.67	7.87	R4,637
KwaZulu-Natal	0.5%	26.44	14.73	R5,383
Limpopo	0.9%	10.82	4.92	R3,387
Mpumalanga	0.5%	13.01	5.75	R3,612
North West	0.5%	17.66	8.23	R3,933
Northern Cape	0.3%	17.43	8.92	R3,623
Western Cape	0.6%	20.43	9.01	R4,271

Regarding overall scheme expenditure per province, healthcare spending for members in the Free State was highest at R1977.20 per life per month, compared to R1520.20 in the Eastern Cape. Mpumalanga and North-West also had lower expenditures relative to the Free State and other provinces (Figure 7).

Figure 7: Expenditure per province

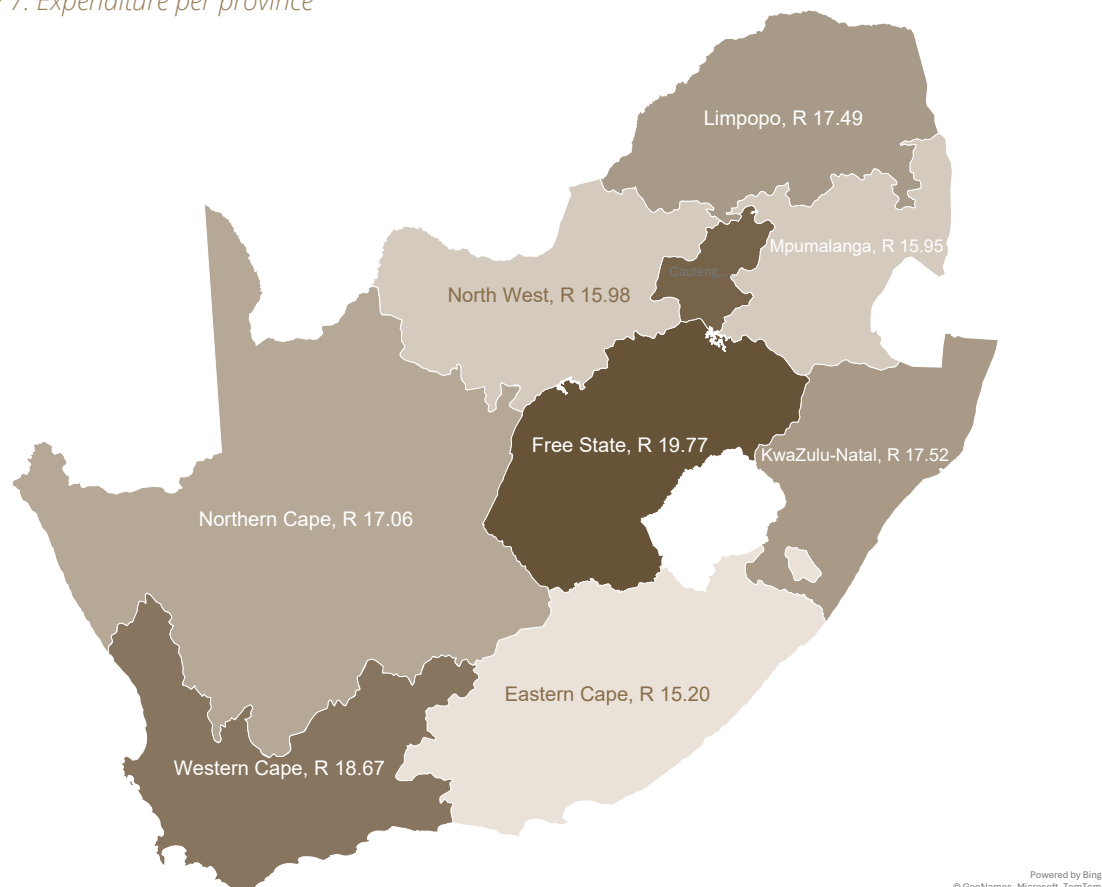


Figure 8 illustrates the relationship between wellness screening uptake and the CCI, which is used to predict mortality risk for patients with multiple comorbid conditions. Overall, provinces with lower wellness screening uptake exhibited higher CCI scores compared to those with higher screening proportions.

The Free State had a low proportion of wellness screening uptake, with an outlier of 5.5%, and an increasing CCI score ranging from 1.5 to 1.7. Similarly, KwaZulu-Natal had the highest CCI scores, ranging from 1.6 to 1.9, coupled with low wellness screening uptake; this trend has been increasing over time.

Conversely, Gauteng demonstrated better wellness screening uptake compared to the Free State and KwaZulu-Natal, with it being predominantly above 0.1%. Gauteng's CCI scores ranged from 1.2 to 1.3, indicating a lower risk relative to KwaZulu-Natal and the Free State. The Western Cape also had better CCI scores than KwaZulu-Natal and Free State, between 1.3 and 1.4, and wellness screening uptake predominantly above 0.1%.

Figure 8: Comorbidity index

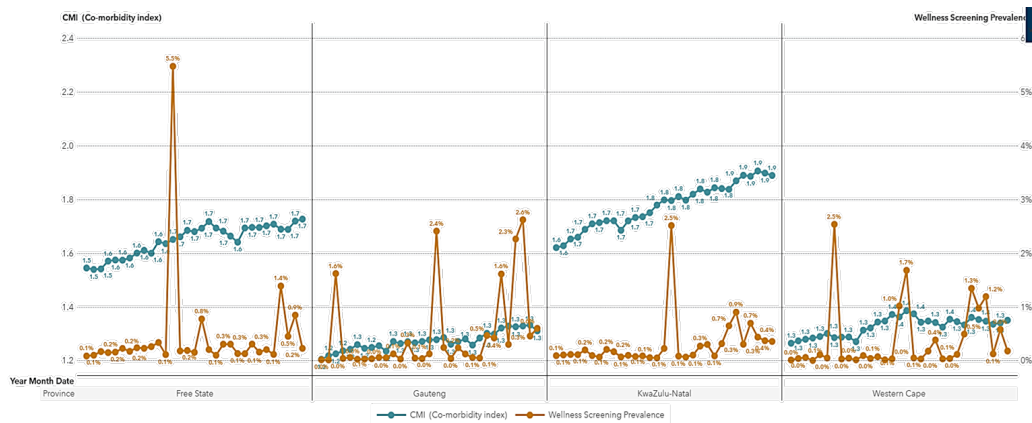
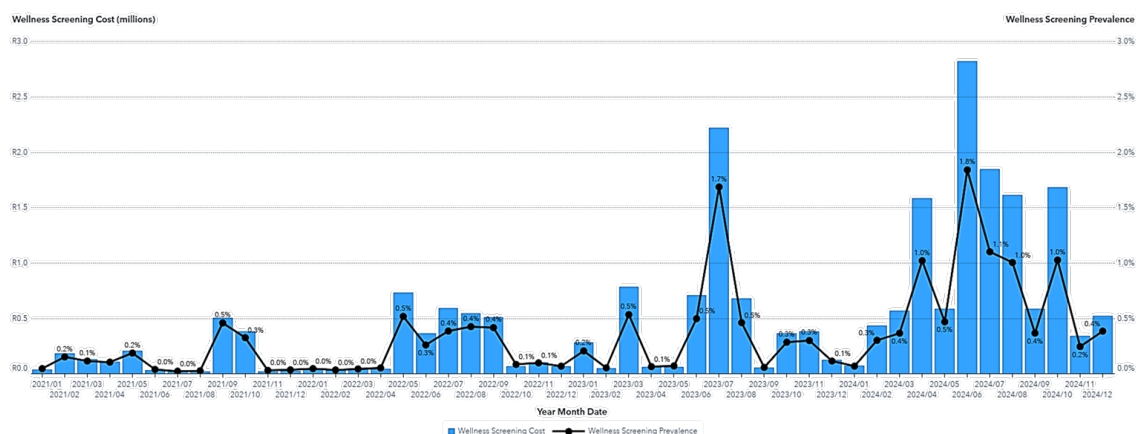


Figure 9 illustrates the positive correlation between wellness screening uptake and expenditure over time. The scheme's investment in wellness increased progressively, with expenditures rising from less than half a million rand in 2021 to over R2.5 million in 2024. This increase in investment corresponded with a higher percentage of the population undergoing wellness screening, exceeding 2.5%. The graph demonstrates a return on investment, as higher expenditures are associated with increased wellness screening uptake and, ultimately, reduced risk of mortality, as depicted in Figure 8.

Figure 9: Wellness screening expenditure over time



Benefits coverage

POLMED offers comprehensive mental health benefits to ensure the well-being of its beneficiaries.

Each beneficiary is entitled to an annual health risk assessment, which includes a mental health screening (POLMED, 2024). Additionally, beneficiaries can access up to four mental health debriefing sessions per year, either individually or in a group setting. The scheme provides a comprehensive ambulatory mental health programme where healthcare services to manage mental health conditions are outlined on an annual basis and reimbursed from risk benefits (POLMED, 2024).

Beneficiaries also receive advice and support from professionally trained care managers (nurses) and have access to the psychosocial network for further assistance (POLMED, 2024). There is an annual limit of 21 days for hospital admissions related to mental health conditions as per PMB regulations (POLMED, 2024).

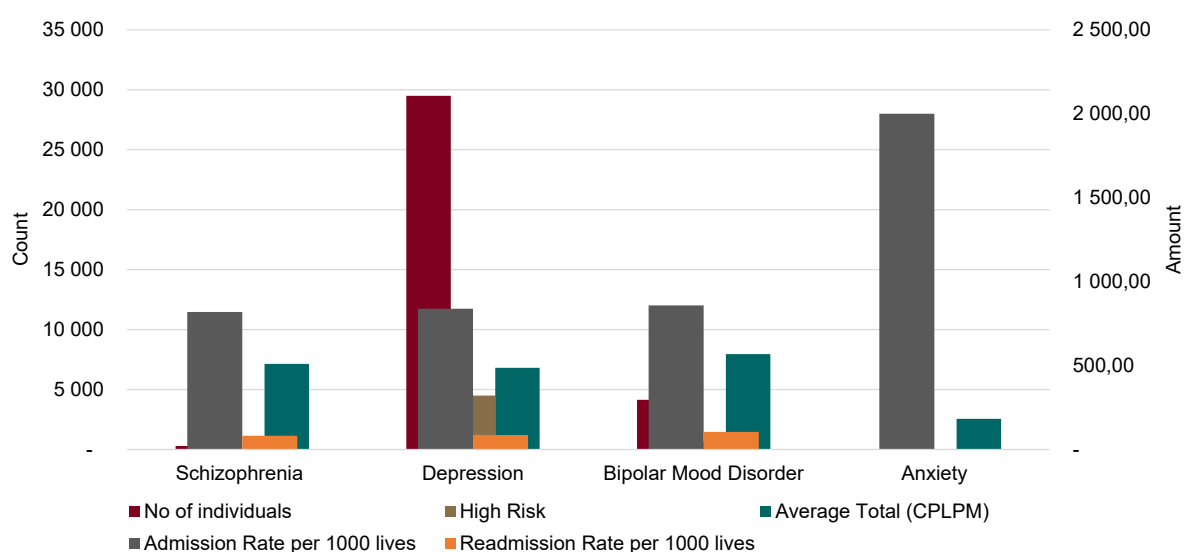
The SAPS, through its employee health and wellness division, coordinates members' access to the services provided by the scheme, and also provides complementary psychosocial services, such as clergy services.

Mental health conditions

In 2024, a total of 33 936 beneficiaries were diagnosed with mental health conditions, namely depression, bipolar mood disorder (BMD), schizophrenia and anxiety, excluding those who accessed mental health services provided within SAPS.

Depression was the most prevalent condition, affecting 29 494 beneficiaries; 4 498 were identified as high-risk. The scheme spent an average of R6 811.10 per depression episode, with an admission rate of 838.60 per 1000 lives and a readmission rate of 86.10 per 1000 lives. BMD affected 4 147 beneficiaries, with 688 identified as high-risk, costing the scheme an average of R7 950.40 per member per month, with an admission rate of 858 per 1000 lives and a readmission rate of 104.70 per 1000 lives. Schizophrenia affected 293 beneficiaries, with 23 identified as high-risk, and an admission rate of 819.10 per 1000 lives and a readmission rate of 81.90 per 1000 lives, costing an average of R7 140.90 per member per month. Anxiety affected the fewest individuals, only two patients, costing an average of R2 558.60 per member per month (Figure 10).

Figure 10: Mental health conditions



DISCUSSION OF FINDINGS

The analysis of the scheme's healthcare data from 2022 to 2024 demonstrates that screened populations consistently exhibit lower admission rates and healthcare costs compared to non-screened populations. Despite an increase in admission and medical admission rates for screened individuals in 2024, the overall trend indicates that screening contributes to reduced healthcare utilisation and costs. These results align with the American Journal of Managed Care's findings that personalized preventive care improves healthcare costs and patient outcomes (American Journal of Managed Care, 2025)

The 2024 analysis of mental health conditions among beneficiaries uncovers important insights into the prevalence, risk levels and financial impact on the medical scheme of these conditions. Depression emerged as the most common mental health condition, affecting a substantial number of beneficiaries, with a notable portion identified as high-risk. The high admission and readmission rates for depression indicate a considerable burden on healthcare resources.

BMD also presented a significant challenge, with high costs per member and elevated admission and readmission rates, highlighting the need for effective management strategies. Schizophrenia, while less prevalent, still showed high admission and readmission rates, underscoring the complexity of managing this condition. Anxiety affected the fewest individuals, resulting in lower overall costs. These findings emphasise the importance of targeted health interventions and comprehensive care plans to manage high-risk individuals and reduce the financial strain on the medical scheme.

The scheme, in response to the mental health and non-communicable disease burden, established the member experience and engagement unit, the objective of which is to drive member education, health promotion and awareness and to identify high-risk beneficiaries and perform targeted interventions.

The findings of this study suggest that implementing regular screening programmes could be a valuable strategy for healthcare systems aiming to lower admission rates and medical costs. By identifying and addressing health issues early, screened individuals may require fewer hospital admissions and medical interventions, ultimately leading to cost savings and more efficient resource allocation. This underscores the importance of investing in preventive healthcare measures to improve population health outcomes and reduce financial burdens on healthcare systems.

CONCLUSION AND RECOMMENDATIONS

Health promotion and screening programmes are instrumental in the early detection and treatment of disease as well as the prevention of complications and adverse events. Consequently, these initiatives contribute to improved health outcomes, extended working life and the ability of individuals to care for their dependents. Moreover, because of decreased demand for healthcare services, individuals benefit from lower contribution premiums. A holistic approach to the health of SAPS employees requires a focus on prevention, early intervention and continuous support to improve outcomes and reduce costs.

Fragmentation in workplace healthcare systems often leads to inefficiencies, unequal access to care and compliance risks. To improve efficiencies, access to care and compliance within medical schemes, it is crucial to focus on data standardisation, regulatory consolidation and the fostering stronger partnerships between employers and medical schemes.

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OUTCOME MEASUREMENT IN THE MANAGEMENT OF DIABETES AND HYPERTENSION

Insights from the Cimas Health Group experience

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EXECUTIVE SUMMARY

Cimas Health Group, a medical aid and healthcare provider in Zimbabwe, is committed to value-based healthcare (VBH). Value determination requires the measurement of agreed-upon and objectively quantifiable outcomes. Cimas partnered with Nordic Healthcare Group (NHG), an implementation partner of the International Consortium for Health Outcomes Measurement (ICHOM), which develops standardised patient-centred outcome measure sets. Cimas targeted diabetes and hypertension, based on the prevalence of the two conditions, suboptimal outcomes and financial impact, after establishing an understanding of project objectives and staff buy-in.

NHG facilitated training workshops, covering outcome measure selection, data collection methodologies, data visualisation for clinical and management decision-making and the application of data for continuous quality improvement. Cimas deployed a dashboard that enables real-time monitoring of selected metrics, yielding dual benefits: enhanced patient care and improved management support. Clinicians gained access to real-time patient data, facilitating individualised target setting and management strategies, while management got insights into disease burden and costs across clinics and physicians, enabling efficient resource allocation and identification of training needs. While refinement and optimisation of the dashboard are ongoing, the benefits are evident in improved patient outcomes and the potential for value-based remuneration models. The Cimas ecosystem provides a controlled environment for implementation and validation before extending these practices to external service partners.

INTRODUCTION

Non-communicable diseases (NCDs), particularly cardiovascular diseases, cancers, respiratory diseases and diabetes are the leading cause of mortality, accounting for 71% of annual global deaths, 77% of which are in low- and medium-income countries (World Health Organization, 2025). In sub-Saharan Africa, the prevalence of NCDs increased from 24% in 1999 to 37% in 2019 and are set to overtake infectious diseases by 2030 (Health Poverty Action, 2024).

Within the Cimas Medical Aid Society, the largest medical scheme in Zimbabwe covering 180 000 lives, data show that the number of patients submitting chronic disease drug claims increased consistently from 2020 to 2024. Hypertension claims alone grew from 14 900 in 2020 to 21 800, diabetes claims surged from 1 200 in 2020 to 2 300 while the claims of diabetes and hypertension comorbid patients increased from 3 300 in 2020 to 5 100. Approximately 18% of hypertension patients also have diabetes, and 71% of diabetes patients have hypertension. According to the Journal of Health Economics and Outcomes Research (2022), globally, diabetes-related expenditure increased 316% from USD232 billion in 2007 to USD966 billion in 2021, while outcomes have remained largely suboptimal. In 2023, Cimas Medical Aid Society spent USD50 million on hypertension and USD18.6 million on diabetes, a worrying increase from a respective USD12 million and USD4.5 million in 2020, necessitating a rigorous evaluation of outcomes to ascertain the efficacy of the financial allocations.

According to the World Health Organization (2018), outcome measures are a 'change in the health of an individual, group of people, or population that is attributable to an intervention or series of interventions'. These measures, taken over time and standardised over individuals and groups, help assess the quality of health-care systems and can be benchmarked and compared across geographical regions and periods. Defining a successful outcome in healthcare is complex, as there are different and often conflicting interests between patients, healthcare workers and funders (Kaplan et al, 2021). Outcome measurement has evolved from the rudimentary measurement of mortality to include other pertinent factors such as patient safety, effectiveness, timeliness and the patient experience (Porter, 2010; Kaplan et al, 2021). Improved outcomes necessarily come with investment in resources, which determines how different stakeholders perceive 'value'. Value equates to the outcomes achieved for a dollar spent (Porter, 2010); therefore VBH is the rational use of resources to achieve the best possible overall results, aiming to achieve the best outcomes at the optimal cost. Value determination is predicated on the objective measurement of outcomes, and clinical value is measured by the predetermined outcomes, which can be assessed over time. Outcomes need to be objective, measurable and be actual or direct proxies of the variable; they should be agreed upon from inception (Nano et al, 2020; International Consortium for Health Outcomes Measurement, accessed 16/04/2025).

The Cimas Health Group, a wholly owned subsidiary of the Cimas Medical Aid Society, is vertically integrated to operate a comprehensive network of facilities, encompassing clinics, laboratories, pharmacies, radiology services, hospitals, wellness centres and an ambulance service. The group's strategic vision is to establish a presence across the entire healthcare value chain within Zimbabwe. Cimas prioritises quality outcomes, patient experience and provider performance and is committed to VBH for efficient resource utilisation and ultimately better outcomes.

The objective of this paper is to share the CIMAS experience in introducing a real-time patient management system for outcomes measurement. In 2022, Cimas embarked on the Outcomes Measurement Project, which aimed to:

1. Provide real-time access to healthcare workers for patient management
2. Measure and track diabetes and hypertension outcomes of patients within the Cimas ecosystem over time
3. Identify areas for improvement of the patient experience and care enhancement.

Recognising the need for standardised measurement, Cimas partnered with Nordic Healthcare Group (NHG), a certified implementation partner of the International Consortium for Health Outcomes Measurement (ICHOM). ICHOM advances patient-centred healthcare by developing standardised patient-centred outcome measure sets for over 40 conditions ('Sets of Patient-Centered Outcome Measures', accessed 16/04/2025). These sets emphasise the clinical and quality-of-life outcomes deemed most salient by patients, thereby redefining healthcare through the utilisation of patient-centric data, encompassing functional, psychosocial and quality-of-life dimensions.

METHODOLOGY

To operationalise the ICHOM sets, Cimas, with guidance from NHG, initiated an implementation strategy, targeting diabetes and hypertension. A critical first step was to establish an understanding of project objectives to obtain staff buy-in in the Cimas universe, comprising medical aids, clinics, laboratories, pharmacies, managed care, IT and data analytics and customer experience. Next was a series of training workshops covering outcome selection, data collection methodologies, data visualisation for clinical and managerial decision-making and application of data for continuous quality improvement.

OUTCOME MEASURE SELECTION

The ICHOM standard set provides guidelines on the data to be collected for specific outcomes. The workshop discussed and selected outcomes that were collectible from the internal electronic health records, such as the clinic and laboratory information systems. For diabetes, these data were divided into four categories: demographics, clinical, laboratory and patient-reported measures - all of them under the broad set of diabetes categories of survival, chronic complications, acute events, glycaemic control, patient-reported outcomes, survival and healthcare utilisation as illustrated in Figure 1.

Figure 1: ICHOM Diabetes Standard Set

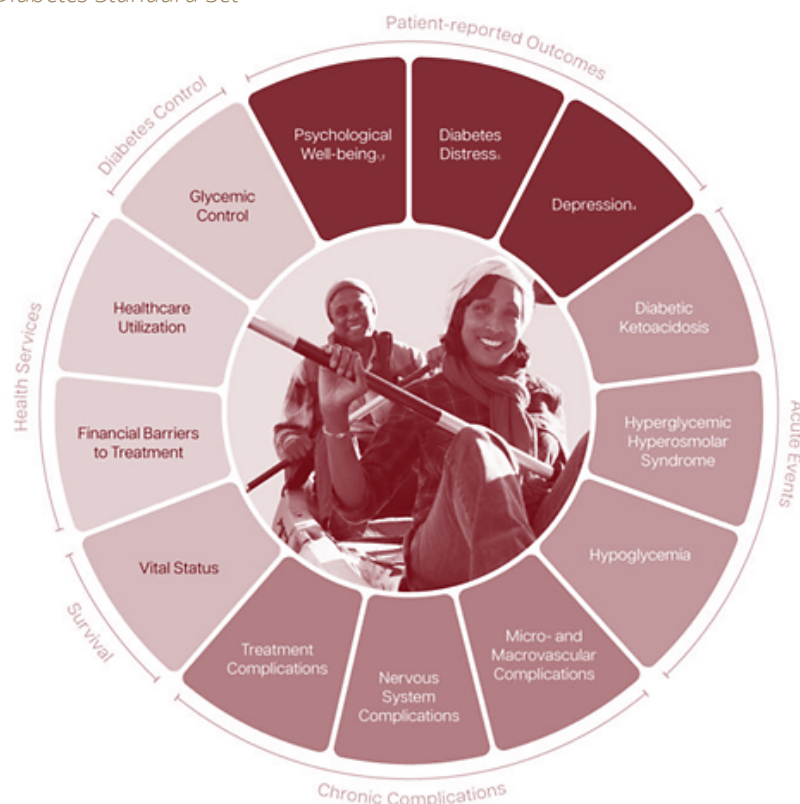


Figure 9 illustrates the positive correlation between wellness screening uptake and expenditure over time. The scheme's investment in wellness increased progressively, with expenditures rising from less than half a million rand in 2021 to over R2.5 million in 2024. This increase in investment corresponded with a higher percentage of the population undergoing wellness screening, exceeding 2.5%. The graph demonstrates a return on investment, as higher expenditures are associated with increased wellness screening uptake and, ultimately, reduced risk of mortality, as depicted in Figure 8.

Figure 2: ICHOM Hypertension Standard Set



DATA VISUALISATION FOR CLINICAL AND MANAGERIAL DECISION-MAKING

The Cimas project team agreed on variables to be tracked in real-time on the project dashboard for each of the two conditions, including the cost of care via claims tracking. Commencing in 2023, Cimas deployed an outcomes dashboard that showed clinical variables such as glycosylated haemoglobin (HbA1c), blood pressure and body mass index (BMI). Cost of care is tracked through claims submitted for all healthcare services accessed by the patients. This dashboard was accessible to all project members, including consulting doctors, who were able to track the patient indicators for individualised patient treatment and quick decision-making. The doctors also had a whole-person view of the patients that enabled them to treat and/or refer patients as necessary. The wellness teams used the dashboard data as basis for follow-up of patients who needed further consultations, including physical and behavioural coaching. All patient data were stored on secure servers, and all access to patient data was restricted to the project team to ensure patient data privacy.

DATA APPLICATION FOR CONTINUOUS QUALITY IMPROVEMENT

The dashboard enabled users to access and assess real-time patient data and statistics over several dimensions of patient care, including laboratory results, specialist referrals, hospitalisation, mental health consultations and physical wellness activities. It was and continues to be reviewed and iterated to ensure that it addresses the needs of the Outcome Measurement Project.

RESULTS

The dashboard was useful for real-time reference by doctors and management. The homepage is shown in Figure 3 and the data can be queried by patient, clinic and doctor.

Figure 3: Cimas Outcome Measurement Project homepage



As of 31 December 2024, 1 624 diabetic, 9 192 hypertensive and 1557 comorbid patients were enrolled (Figure 4), out of a total of 3181 diabetic, 27 377 hypertensive and 5100 comorbid patients in the Cimas membership (Figure 5). Most of the patients (83.4%) were above the age 45 (Figure 5) and 51.4% were female and 48.7% male.

Figure 4: Age distribution of participants

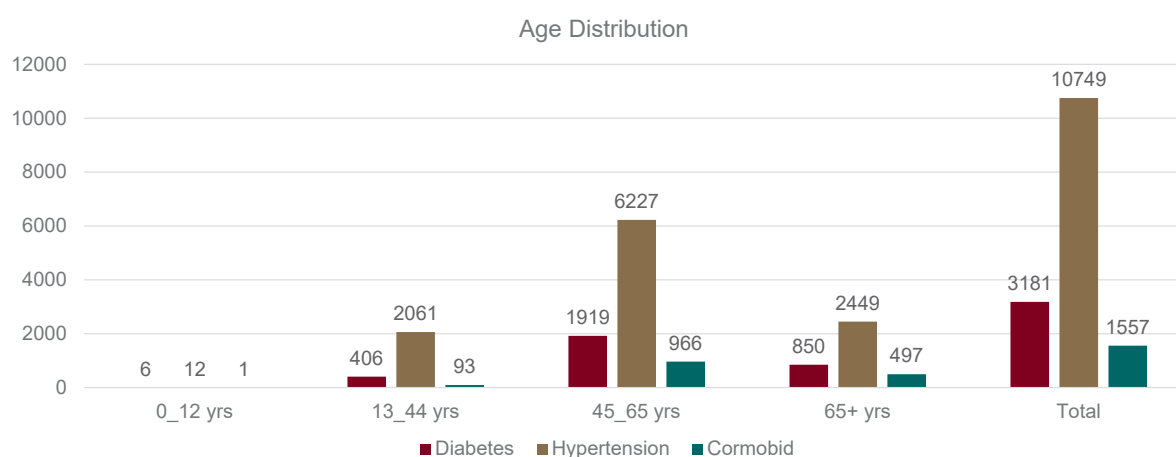
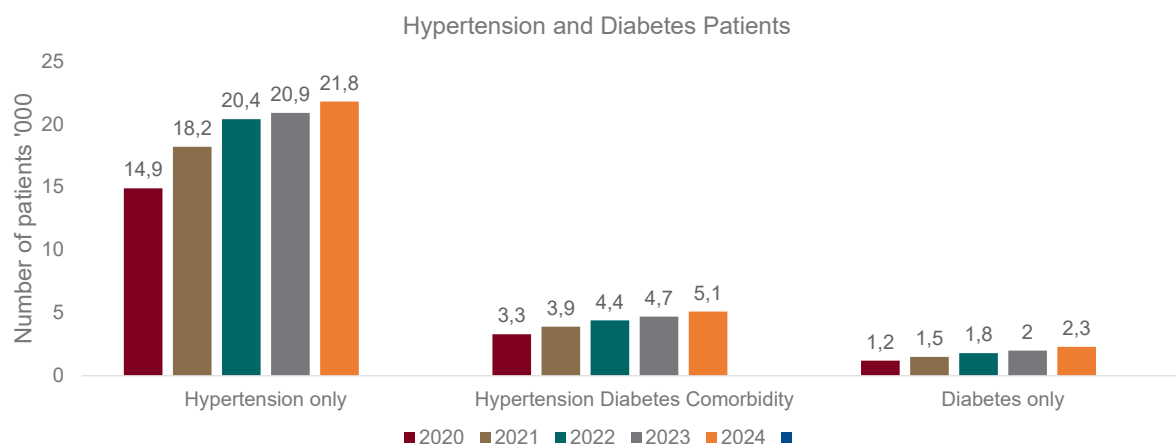
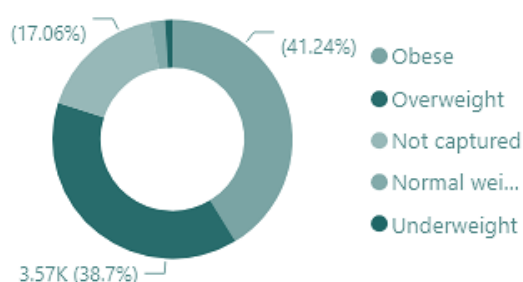


Figure 5: Distribution of diabetes and hypertension patients in Cimas' membership



BMI data showed that 1% of the enrolled patients were underweight, 2% had normal weight, 39% were overweight and 41% were obese, while 17% had missing weight records (Figure 6).

Figure 6: Summary of BMI statistics – No of Patients by BMI



Figures 7 and 8 show the diabetes and hypertension dashboards, respectively.

Figure 7: Diabetes dashboard

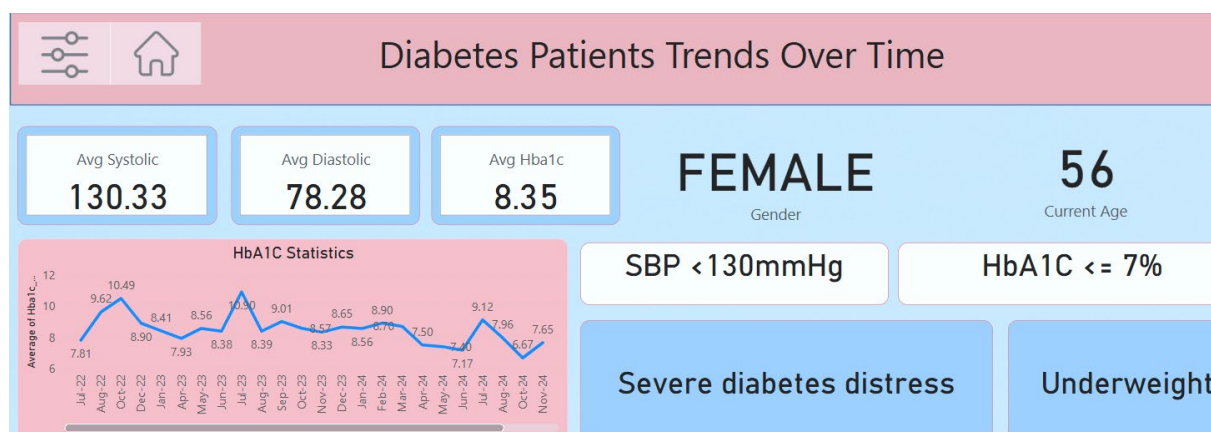
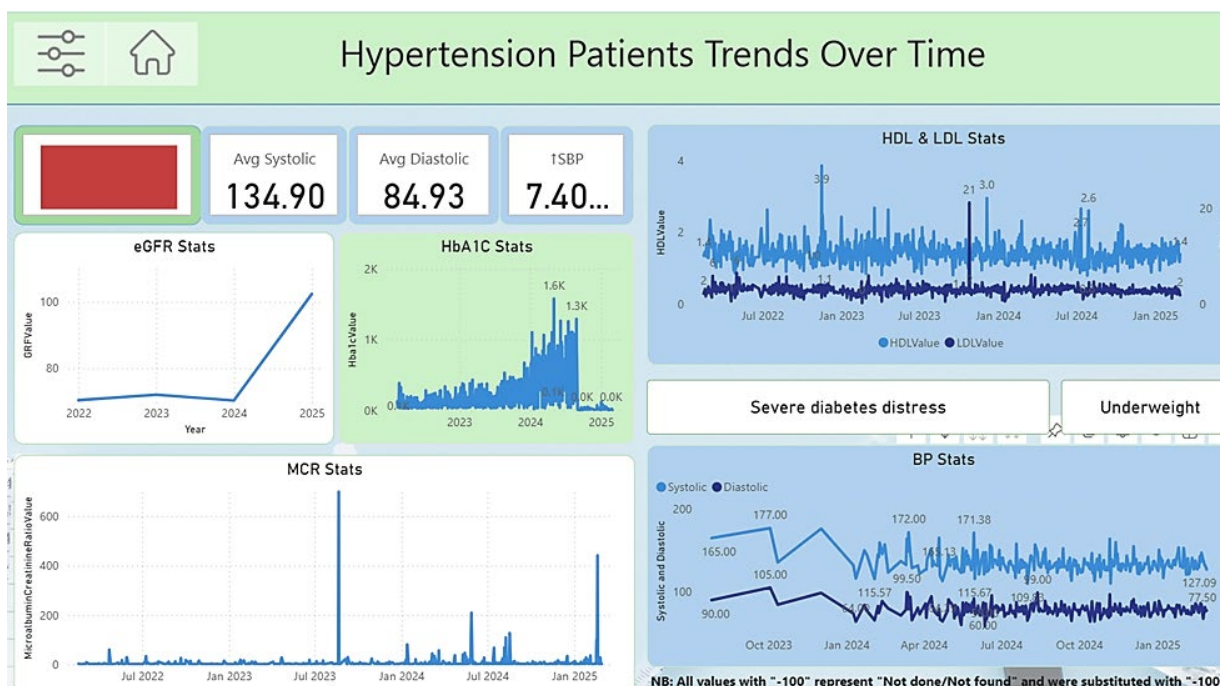


Figure 8: Doctors' view of hypertensive patient data trends



The cost of care for the two conditions was also tracked via claims submitted to the medical aid fund. Figure 9 shows that the top four disciplines are pharmacies, hospitals, clinics and pathology, each accounting for 37%, 13%, 9% and 7% of the total cost, respectively, a similar to the total membership claims pattern (Figure 10).

Figure 9: Cost of care by discipline

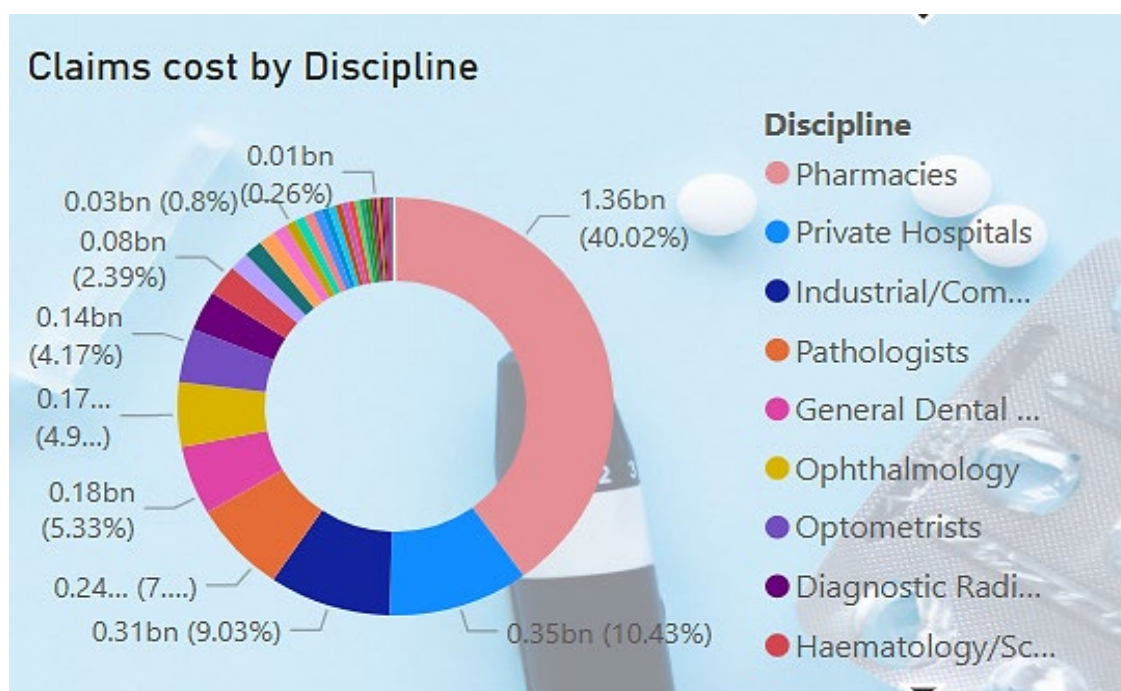
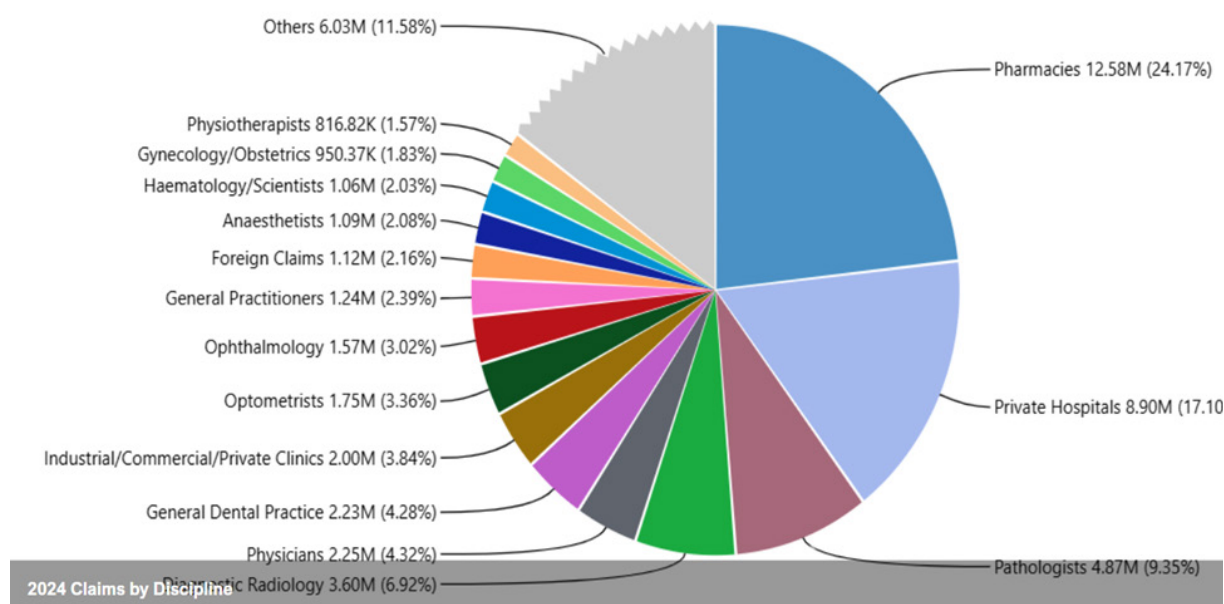


Figure 10: Cimas membership's claims distribution by discipline



At the end of 2024, a mental health aspect was added to the dashboard through the introduction of the Problem Areas in Diabetes (PAID) tool, a 20-item questionnaire used to assess emotional distress related to living with diabetes (Polonsky et al., 1995). This patient-reported measure will complement clinical data and contribute a valuable dimension to a holistic understanding of the individual's experience with diabetes.

DISCUSSION

The Outcome Measurement Project yielded dual benefits: enhanced patient care and improved management support. Firstly, clinicians gained access to real-time patient outcome data during their consultations for individualised target-setting and tailored management strategies. The enrolled patients represented 42.6% of the 7 460 diabetic and 39.2% of the 27 377 hypertensive patients in the total Cimas membership as derived from the claims data. Cimas members are not restricted to in-house facilities; some accessed service at their private providers and therefore could not be enrolled on the programme. The proportion, however, indicates the potential of the project to be impactful on chronic disease management in the membership. The membership prevalence rates of diabetes and hypertension were 4.1% and 15.2%, respectively, compared to a national diabetes rates of 1.5% (International Diabetes Federation, 2024) and hypertension prevalence of 42% (World Health Organisation, 2023). The higher than national diabetes rates can be attributed to higher screening rates, while the asymptomatic nature of hypertension leads to its underdetection, as individuals may remain unaware of their condition in the absence of active screening. Cimas iGo Wellness, the Cimas wellness department has embarked on a campaign to encourage screening among members.

The World Health Organization (2024) reports that global diabetes prevalence doubled from 7% to 14% between 1990 and 2022. Within the Cimas membership, the overall incidence of diabetes rose from 2.5% in 2020 to 3.7% in 2024, reflecting the global upward trend. Pheiffer et al (2021) and Motala et al., (2022) attributed lower rates in Africa and other low-income countries to service inaccessibility and a weak screening culture. The study population would not ordinarily experience cost barriers as their medical scheme covers these costs and private-sector healthcare is generally accessible.

[7] OUTCOME MEASUREMENT IN THE MANAGEMENT OF DIABETES AND HYPERTENSION

The age distribution confirms that over 90% of the participants were over 45 years old and mainly in the 45-65-year age group, in line with global trends (Taheri et al, 2024). These data enabled doctors and wellness coaches to target prevention and treatment adherence correctly to the right subpopulation through their preferred channels, such as radio and Facebook. The high prevalence of overweight and obesity (80%) observed within the participant cohort aligns with established literature identifying adiposity as a significant risk factor for both diabetes and hypertension (Motala et al., 2022; Taheri et al., 2024). Recognizing this critical intersection, the iGo Wellness team has integrated dietary and physical activity coaching into their patient follow-up protocols to mitigate this risk and foster improvements in the participants' overall health status.

Claims data showed that while pharmacies accounted for the most claims, the Outcome Measurement Project participants utilised a smaller proportion of hospitals (10%) than the general diabetes and hypertension population (17% of total cost) and accessed more services at general clinics. This underscores the role of primary care clinics and general practitioners as the first point of care in disease management and their role in ensuring efficient navigation of the healthcare system and cost control (Schmalstieg-Bahr et al, 2021; Breivold et al, 2022).

The recent introduction of the PAID scale, still in its infancy, added a much-needed mental health aspect for holistic patient care. iGo coaches monitored the dashboard and followed up on patients with high scores, which indicated poor emotional well-being and coping mechanisms.

The dashboard concurrently provided management with insights into disease burden across clinics and physicians, enabling efficient resource allocation commensurate with the clinics' disease burden. For example, clinics with a higher prevalence of diabetes received additional resources, such as wellness coaches and specialised equipment. The dashboard also enabled identification of training needs as outcomes can be analysed per patient, clinic and doctor. Combined with the performance per doctor and clinic, and the tracking of cost per patient, the model provides a prototype of outcomes-based remuneration, which is a critical cog in value-based reimbursement models (Stamm et al., 2021; Cossio-Gil et al., 2022). For example, doctors with a high percentage of patients who have reached their target HbA1c and blood pressure could receive a higher remuneration incentive.

CHALLENGES AND LIMITATIONS

Despite guidance from NHG, the outcomes measurement implementation faced internal and external challenges. Internal challenges included high staff turnover, as Zimbabwe has been experiencing significant brain drain. Cimas has not been spared, and this has necessitated constant training of new staff, leading to delays in data entry and analysis. Low utilisation by doctors due to uneasiness over monitoring is a challenge experienced and anticipated at the inception of the VBH reimbursement model. Robust change management strategies will need to be implemented, supported by assurances of data accuracy and fairness.

Initially, information sharing across the units was not efficient. Meetings and regular updates enabled the project members to collaborate more efficiently and to focus on the goal of achieving outcomes that matter most to the patient. The challenge of incomplete data, especially data collected manually, is currently being addressed through data validation checks and additional training for data entry staff. Some patients refused to have their weight recorded for cultural reasons and concerns about body image. Nurses and wellness coaches are available to educate patients. Dashboard implementation required doctor behaviour change, as they constantly tracked the patients' outcomes. This study was conducted on Cimas members; therefore the results may not be generalisable to the overall population of Zimbabwe.

CONCLUSION

The active use of outcomes information creates direct value for both the patient and the clinician, ensuring value-based care. While refinement and optimisation of the dashboard are ongoing, the benefits of this implementation are evident in improved patient outcomes and the potential for value-based remuneration models. The Cimas ecosystem provides a controlled environment for implementation and validation before extending these practices to external service partners. Future directions for this initiative include expanding the programme to other NCDs and incorporating patient-reported experience measures. This initiative has the potential to improve the quality of healthcare delivery within the Cimas Health Group and serve as a model for other healthcare providers in Zimbabwe.

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TRANSFORMING PALLIATIVE CARE THROUGH VALUE-BASED PARTNERSHIPS

A case study by Alignd and the Government Employees Medical Scheme (GEMS) in South Africa

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EXECUTIVE SUMMARY

In South Africa, the lack of effective structured options for end-of-life care severely restricts access to palliative care. This imposes a significant financial burden on medical schemes, while the focus on delivering patient-centred care may not be fully realised.

This paper examines the innovative partnership between Alignd, a value-based care organisation and an enabler of palliative care provision for medical schemes, and GEMS, the largest closed medical scheme catering to 2.4 million beneficiaries. This collaboration focuses on enhancing delivery of a value-based palliative care model that addresses poor care planning, inappropriate interventions and insufficient provider coordination.

The methodology aimed to create delivery models for remote areas to address the shortage of specialists through Telehealth integration. Expanding the provider network allowed hospices, nurses, and palliative

care doctors to establish new private practices in underserved regions. Enhanced funding models were developed to support care delivery and assess patient outcomes, costs, and overall experience

Significant value and return on investment have been demonstrated, with over 60% of deaths occurring at home or in hospices instead of in hospitals. Clinical metrics improved, showing a 25% reduction in surgeries and a 35% reduction in chemotherapy compared to the counterfactual cohort in the final month of life. Economic analysis indicated a substantial return on investment of R26.1 million in reduced costs. The value of patient-reported measures also confirmed higher satisfaction rates in respect of care, pain management and provider support.

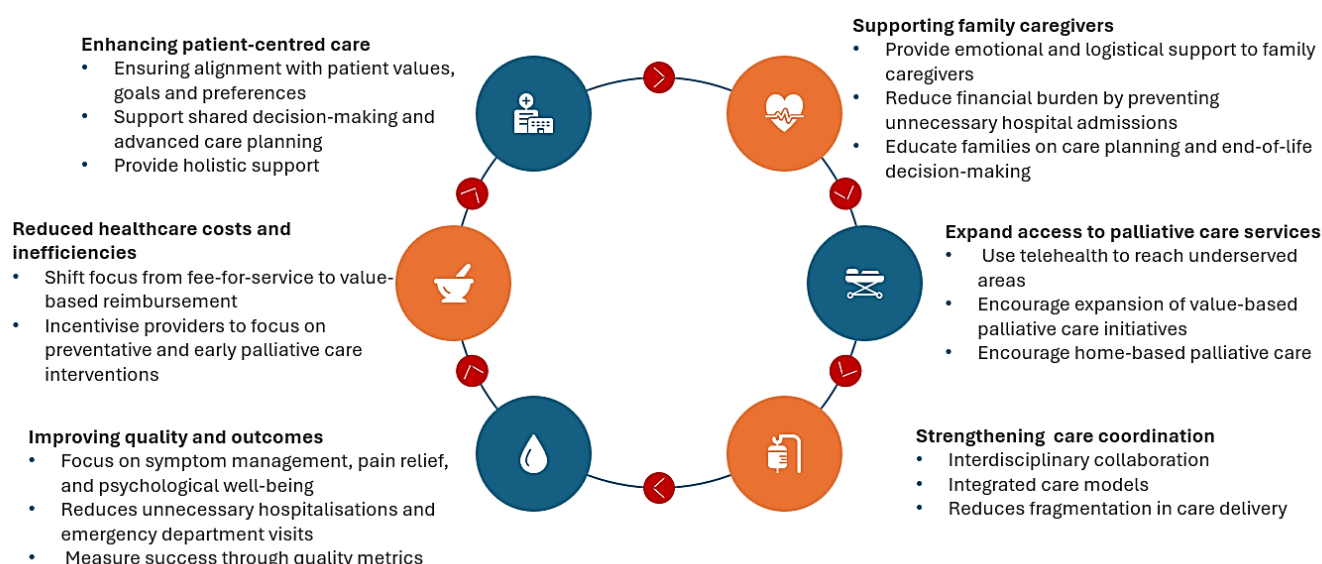
This partnership illustrates the value of palliative care by promoting coordinated outcome-based healthcare delivery models.

BACKGROUND AND LITERATURE REVIEW

The notion of 'value' in healthcare is centred on optimising patient outcomes within a financial envelope (Leung and van Merode, 2018). It emphasises a population health perspective, aiming to enhance patient outcomes for individuals and the entire healthcare system (Shahzad et al, 2019). This approach inherently focuses on equity and access to care.

To ensure access to quality care for all, it is crucial to define what 'quality' means, how to measure it, and how to incentivise improvements. By prioritising value, we can reshape the reform process, starting with measurement, then focusing on delivery, and finally considering payment mechanisms. This 'Leapfrog to Value' approach is tailored for low and middle-income countries (Inclusive Society Institute, 2020; Maru et al., 2020). The impact of value-based partnerships in palliative care is shown in Figure 1.

Figure 1: Value-based chain in palliative care



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A study conducted by the University of Cape Town revealed that end-of-life care costs medical schemes over R20 billion in today's terms (Ranchod, Abraham and Bloch, 2015). The study also found that patients typically spend their last year of life undergoing invasive treatment, often dying in hospital after spending at least 14 days there, mostly in the intensive care unit or high care unit. Despite this, over 70% of patients express a preference for dying at home (Seymour, French and Richardson, 2010).

Furthermore, early exposure to the concept of palliative care empowers patients to make alternative choices and fundamentally shifts the care trajectory (Hui and Bruera, 2016). In the earlier days of palliative care, most people viewed it solely as end-of-life care, referring patients very late in their disease trajectory. Integrating palliative care early in the disease trajectory improves the various desired outcomes and thus shifts the paradigm of cancer management. The early introduction of palliative care alongside oncology treatment can be beneficial, especially as patients become sicker and approach death; palliative care would then become the primary objective (Hannon et al, 2016).

From the provider's perspective, there are fewer than 100 trained palliative care doctors in South Africa and even fewer palliative care-trained nurses. Most hospices operate as non-profit or donor-funded organisations. As is true for the private healthcare system in general, many providers work as solo practitioners, relying on limited day-to-day benefits and regulations that do not enable effective team care. Further, a trust deficit exists between providers and funders, where providers perceive funders' approaches as 'intrusive and burdensome attempts to micromanage medicine from afar' (Sandy, Pham and Levine, 2019).

Most medical schemes either lacked palliative care benefits entirely or had benefits that were poorly structured to cater to patient needs (Welgemoed and Lerm, 2020). In this dispensation, patients, funders and providers were all disadvantaged. Alignd, therefore, created a programme to address the complex challenges of palliative care through a value-based care approach. The programme intentionally focuses on creating a solution that benefits all stakeholders, ensuring that no one wins at the expense of others.

In a paper published in the Harvard Business Review, The Strategy that Will Fix Healthcare (Porter and Lee, 2013), the authors describe how a multi-layered approach focused on clear design and system change could achieve this. Alignd drew inspiration from this and other literature on value-based care to design its solution.

Given the challenge of accessing palliative care early and the rising prevalence of cancer and in-hospital costs in the industry, the partnership between GEMS and Alignd represents a mutually beneficial collaboration. This partnership allows for the provision of palliative care services and enables the necessary scale to implement significant supply-side changes that can lead to sustainable improvements in the access and funding of palliative care in South Africa.

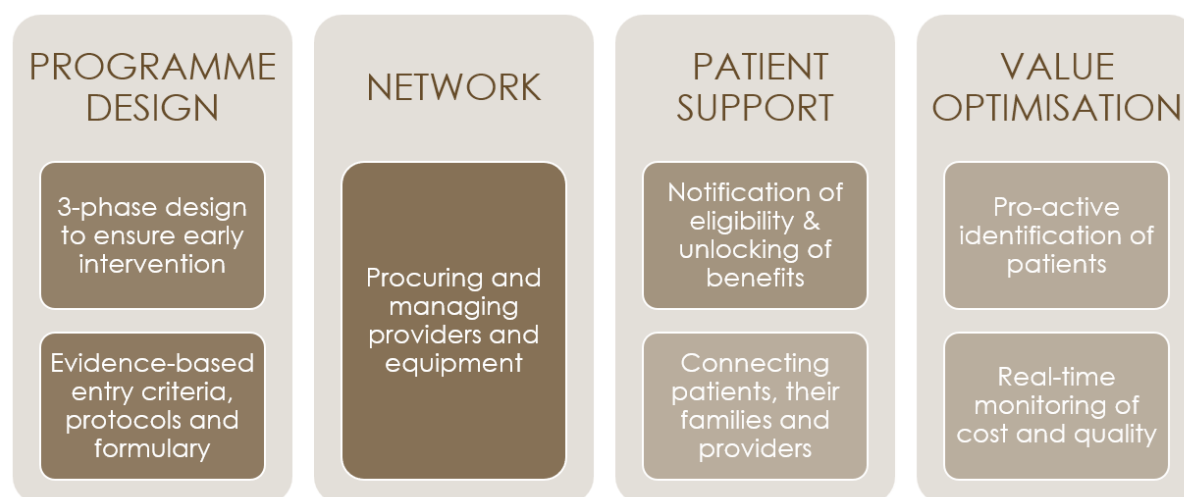
PURPOSE

This paper explores the innovative partnership between Alignd and GEMS, the largest closed medical scheme serving 2.4 million beneficiaries. It focuses on implementing a value-based palliative care model to improve patient outcomes, enhance quality of life and ensure cost-effective care through collaboration among healthcare providers, funders and patients. This partnership is crucial to transforming palliative care by aligning incentives, strengthening collaboration and expanding access. It prioritises holistic, patient-centred care and utilises a value-based reimbursement model instead of a traditional fee-for-service model, aligning incentives with meaningful health outcomes.

METHODOLOGY

The palliative care programme and the outcomes it measures are designed to address the barriers and elements related to creating value for the system. The four pillars of the programme are illustrated in Figure 2.

Figure 2: Pillars of the palliative care programme



The impact of the palliative care initiative is evaluated by comparing the cost and quality of care for participating patients with that of those who do not participate, known as the counterfactual cohort. The metrics for participating patients may differ due to extraneous factors such as varying risk profiles. To ensure valid comparisons, clinical and demographic factors are controlled for (including age, gender and cancer type).

Patient enrolment

The aim is to enrol patients as close to a diagnosis of metastatic disease as possible to allow patients and families time to plan for quality of life until the end and prevent unnecessary invasive care. Patients are referred to the programme by healthcare providers through the GEMS oncology programme or identified by the Alignd algorithm, which uses claims and clinical data. Potential patients are then contacted to obtain consent for enrolment; once enrolled, patients are linked to a multidisciplinary team (MDT) of healthcare providers. After the initial consultation, the patient will be enrolled on one of the programme's phases (ongoing and intensive phase) based on clinical entry criteria.

Outcome measures

The Leapfrog to Value playbook recommends that well-defined outcomes serve as the 'North Star' around which a value-based care solution is developed. Alignd measures various outcomes, including patient-reported experience measures, quality of care metrics and cost-saving metrics. These outcomes are weighted and calibrated to produce comprehensive results. Additional incentive fees may be awarded depending on Alignd's performance against these outcomes.

Provider network

Effective palliative care requires a core team consisting of a palliative care doctor, a nurse and a social worker. Other providers, such as spiritual counsellors or physiotherapists, may be added. To enhance communications, MDTs use a platform to collaborate with Alignd care partners, who coordinate care needs.

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As care is patient-centred, the provider network expansion tracks the patient's location. Initially, it was assumed that all providers would primarily meet patients face to face, but many patients reside outside metropolitan areas. Therefore, Alignd developed a remote access solution, enabling at least one provider to meet with the patient face to face while the palliative care doctor could join virtually. Furthermore, in some rural areas, only hospices were available, which required support to function as private healthcare providers, including assistance in obtaining practice numbers and setting up billing systems. Nurses were also assisted in setting up the same way and received training and support on palliative care.

The patient journey was mapped to facilitate home-based care, and appropriate coding was developed and costed by the partners to ensure that care could be delivered. The network also includes other providers such as oxygen and equipment suppliers and home nurses, ensuring that patients receive the necessary holistic care at home.

Design elements

A barrier to care was the inadequate tariff structures for home-based care services versus consultation room-based services. Palliative care consultations typically lasted 1-2 hours, and fees were based on much shorter sessions without coding for MDTs or global fees. Alignd and GEMS collaborated to address the problems related to billing structures and provide solutions.

Alternatives to hospital and palliative care benefit process structures were also a focus area. Previously, benefits like oxygen, home nursing and social work consultations were all separate benefits managed by different teams, and the palliative care programme integrates and coordinates these through a structured care plan and designed tariffs. Care coordination was complicated by multiple providers, who often did not communicate, leaving patients to deal with this complexity themselves. Alignd care partners addressed this by sourcing and ensuring timely delivery of care elements defined by the MDT.

One often neglected but crucial factor contributing to poor system delivery is the alignment of incentives among all the stakeholders involved. The programme design focused on establishing a clear reimbursement model among the providers, Alignd and GEMS. This model aims to ensure accountability and fair compensation while focusing on desired outcomes by eliminating perverse incentives.

RESULTS

The results are based on the 2023 experience assessed by Alignd and GEMS. Outcomes for 2024 await claims run-off and validation by Alignd and GEMS' independent actuaries. Since its inception, 1175 patients have participated in the programme, and this analysis includes 217 patients from 2023 who participated in the palliative care initiative and have since passed away.

Table 1 reflects the comparison between the enrolled patients and the counterfactual cohort:

Table 1: Comparison between the enrolled patients and the counterfactual cohort

Outcome Metrics	Enrolled patients	Counterfactual patients
Care setting (passed away at home)	65.4% (142 of 217)	42.0%
Chemotherapy (last month of life)	18.4% (40 of 217)	24.7%
Surgery (last month of life)	9.2% (20 of 217)	15.0%
Cost of care (on average)	R281 370	R401 895

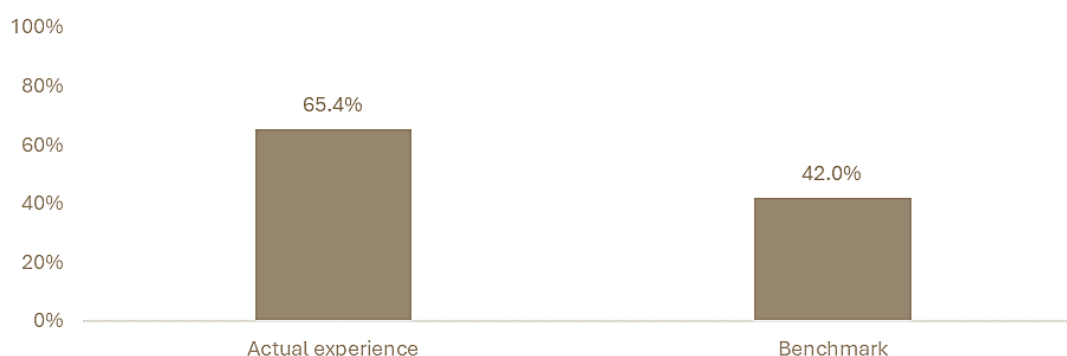
Measuring the impact of the palliative care programme

The palliative care programme aims to reduce healthcare costs and improve patient outcomes. The initiative's impact on cost and quality of care is measured according to four core metrics, which are outlined below:

Care setting

Palliative care patients typically pass away either at home or in hospital. Most patients prefer to pass away at home, as being in a familiar environment surrounded by loved ones makes the process less distressing for both patients and their families. A higher proportion of patients passing away at home rather than in hospital indicates better quality of care. Of the participants, 65.4% passed away at home (142 out of the 217), while the remaining 34.6% passed away in hospital. The programme significantly outperformed the benchmark, where only 42.0% of participants were expected to pass away at home, translating to an additional 51 additional deaths at home (Figure 3).

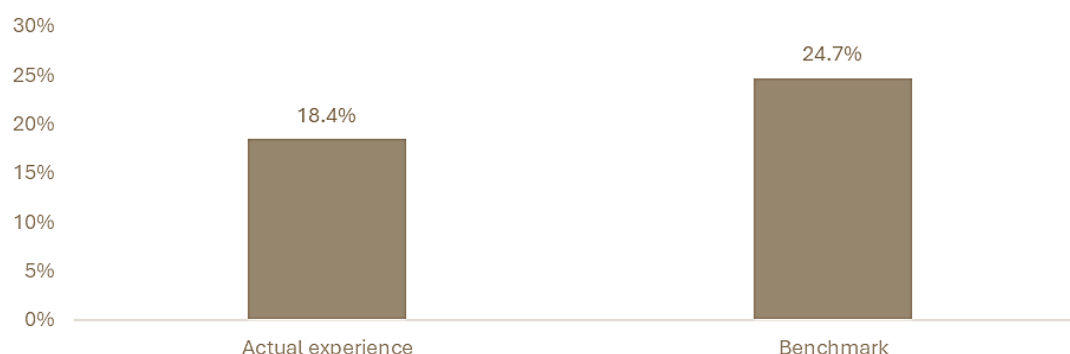
Figure 3: Patients who passed away at home



Chemotherapy in the last month of life

Palliative care patients should not ordinarily undergo chemotherapy in the last month of life, as such treatment is futile and wasteful. It typically provides little to no clinical benefit and increases suffering while diminishing quality of life. A lower proportion of patients received chemotherapy in the last month of life, which indicates superior quality of care; 18.4% of participants (40 out of the 217) received chemotherapy in the last month of life, compared to 24.7% of counterfactual patients. The programme outperformed the benchmark by 25.3%, resulting in 14 fewer patients receiving chemotherapy. This translates to a more than 35% reduction in chemotherapy use in the last month of life (Figure 4).

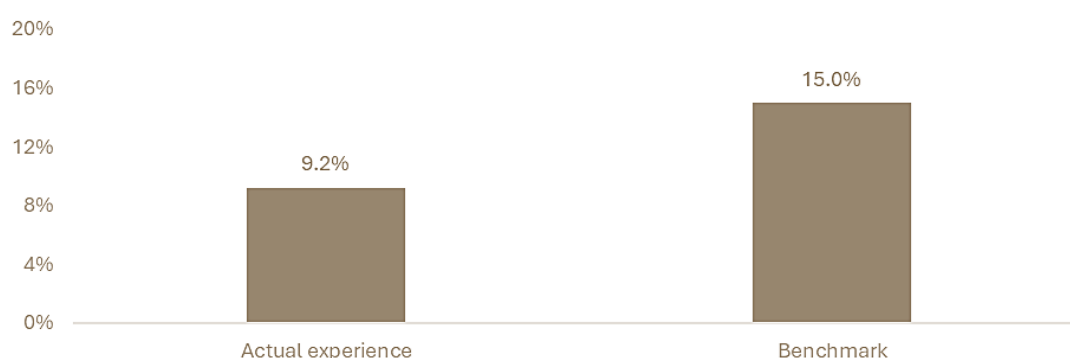
Figure 4: Chemotherapy in the last month of life



Surgery in the last month of life

As is the case with chemotherapy, palliative care patients should not ordinarily undergo surgery in the last month of life (except under extraordinary clinical circumstances such as when banding of oesophageal varices or shunt procedures in end-stage liver cancer are required). Such procedures often provide minimal clinical benefit and can exacerbate clinical suffering, thus reducing quality of life. A lower proportion of patients undergoing surgery in the last month of life signifies superior quality of care. In this programme, 9.2% of participants underwent surgery in the last month of life (20 out of the 217 participants), while 15.0% of counterfactual patients did. The programme, therefore, outperformed the benchmark by 38.5%, resulting in 13 fewer patients undergoing surgery (Figure 5).

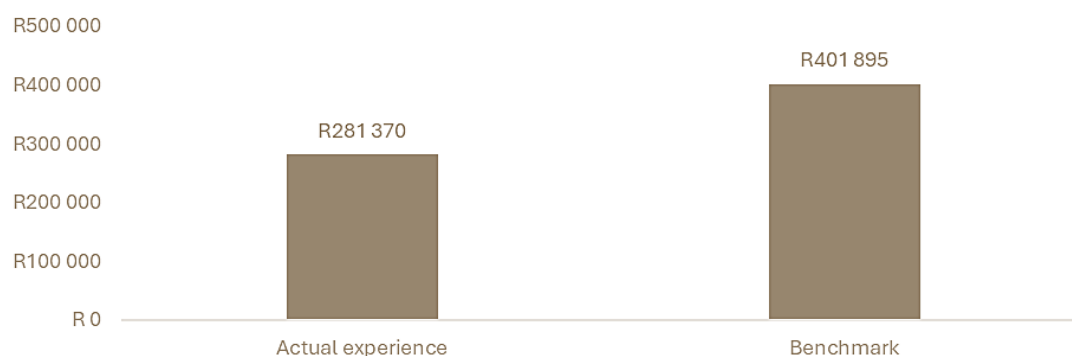
Figure 5: Surgery in the last month of life



Cost of care

The cost of care is measured with reference to the total healthcare costs incurred three months before a patient's passing. Lower costs are indicative of improved cost-effectiveness. Participants incurred, on average, R281 370 in healthcare costs during the last three months of life. In contrast, counterfactual patients incurred an average of R401 895 in healthcare costs. Consequently, the programme outperformed the benchmark by 30.0%, resulting in R26.1 million in reduced costs (Figure 6).

Figure 6: Cost per patient

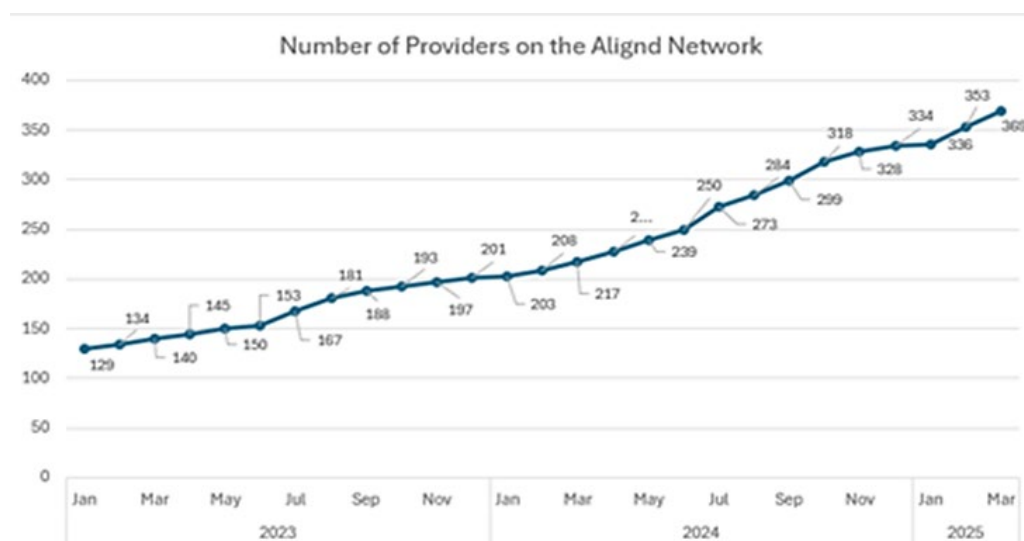


[8] TRANSFORMING PALLIATIVE CARE THROUGH VALUE-BASED PARTNERSHIPS

Demonstrating the expansion of the provider network

The Alignd network has grown by 70% in the past year, expanding from over 100 to more than 350 providers. This growth demonstrates the effectiveness of the model where registered nurses form the core of the MDT, supported by palliative care doctors. It has also expanded to provinces like Limpopo, North-West and Mpumalanga, which had no providers previously (Figure 7).

Figure 7: Growth of the provider network since the GEMS/Alignd palliative care programme's inception



CONCLUSION

In conclusion, a transformative approach that unlocks the value of palliative care, combined with innovative partnership solutions, has achieved what once seemed unrealistic: a remarkable balance of cost-containment, quality healthcare and member satisfaction, all underscored by a methodical measurement tool and payment structure.

The key insight is entrenched in the data, which reflects an information-driven approach. In this context, data-driven coordination activities and outcomes empower managing financial burdens and bridging the gap in delivering the best beneficial care. This perspective goes beyond merely paying for services.

The value-based partnership between Alignd and GEMS, layered with insights, demonstrates the tangible value of palliative care when measured against agreed-upon healthcare data and outcomes. It also illustrates that collaboration is crucial for developing successful value-enhancing initiatives. Therefore, establishing value-based partnerships in palliative care is instrumental in delivering compassionate, high-quality, goal-orientated and patient-centred care. By aligning the efforts of various stakeholders, such partnerships can ensure that comprehensive support is provided while individual patient preferences are met. The programme's success relies on building trust and cultivating an innovative mindset. Ultimately, harnessing the expertise of this partnership can break barriers by setting a new standard for delivering palliative care for everyone.

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TYPE 2 DIABETES REVERSAL

An innovative digital solution

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ABSTRACT

Noncommunicable diseases, particularly type 2 diabetes (T2D), represent a significant health challenge in South Africa, where T2D is the leading natural cause of death in women and the second-highest underlying cause of death for the whole population (Statistics South Africa, 2016). The growing burden of T2D has led to an alarming increase in disability, as well as rising healthcare costs, both in the public and private health-care sectors.

Since poor dietary habits, particularly the over-consumption of sugar and ultra-processed foods, contribute significantly to T2D, traditional acute care models often fail to address the complex biopsychosocial factors involved and which influence patient outcomes in T2D (Rasgon & McEwen, 2016).

Digital health offers a promising solution to these challenges by enabling the design of cost-effective, accessible and personalised care (Rangraze et al, 2025). Digital interventions allow for enhanced self-care, sustainable behavioural change and the provision of ongoing support, offering a more flexible and scalable approach to chronic disease management (Hill, 2018).

The introduction of a novel digital health solution localised for use in South Africa by Triba Health ApS of Denmark in collaboration with Medshield, draws on the success of Triba Health in Denmark in achieving significant improvements in clinical outcomes, including significant reductions in medication use. Medshield is one of South Africa's fastest growing open medical aid schemes currently ranked as the sixth largest.

Unpublished data from Triba Health show that among 202 participants, 89% reduced their haemoglobin A1c (HbA1c) by an average of 12mmol/mol (1.1 %) within a period of six months.

INTRODUCTION

Non-communicable diseases (NCDs), particularly type 2 diabetes (T2D), pose a significant public health challenge in South Africa, contributing to rising mortality, disability and escalating healthcare costs (Hofman, 2014). T2D is the leading natural cause of death among women and the second-highest cause of mortality overall in the country (WHO, 2023; Statistics South Africa, 2017). The economic burden of T2D affects both public and private healthcare sectors due to increased hospitalisations, medication costs and disability-related expenses (Rasgon & McEwen, 2016; Wu et al, 2014).

Alongside T2D, other NCDs such as cardiovascular diseases, cancer and chronic respiratory conditions account for over 80% of the global disease burden (WHO, 2017). These conditions share common risk factors, including unhealthy diets, physical inactivity, tobacco use and excessive alcohol consumption, all of which are exacerbated by urbanisation, globalisation, aging populations and increased consumption of processed foods (Zimmet et al, 2001; Zimmet & Alberti, 2006).

Several key risk factors contribute to the growing T2D crisis in South Africa. One of the most significant factors is poor dietary habits, as the consumption of ultra-processed foods, refined carbohydrates and sugary drinks has increased significantly in recent years (Muzigaba et al, 2021). South Africa has one of the highest per capita sugar consumption rates in Africa, which has contributed to rising levels of obesity and insulin resistance across the population. Nearly 68% of women and 31% of men in South Africa are either overweight or obese, which are primary risk factors for developing T2D (Shisana et al, 2021). Another major factor is physical inactivity. As more South Africans adopt sedentary lifestyles as a consequence of urbanisation, the levels of physical activity have significantly decreased, exacerbating the risk of T2D (Malaza et al, 2022).

Given the critical role of these lifestyle and behavioural risk factors in disease prevention and reversal, conventional diabetes management strategies that rely primarily on medication have proven insufficient (Buchanan et al, 2025).

THE LIMITATIONS OF TRADITIONAL CARE MODELS

Traditional healthcare approaches to T2D often emphasise pharmacological management and acute care interventions, with limited focus on sustainable lifestyle modifications. This leads to managing the symptoms of the disease rather than addressing the modifiable causes of T2D. Despite growing evidence supporting dietary and behavioural interventions for diabetes remission, many healthcare systems struggle to integrate these strategies into routine care (Grandes et al, 2008).

Traditional care models also fail to take into account individual variations in lifestyle and adequately address social and socioeconomic determinants of health to ensure effectiveness of treatment.

Another significant challenge is the issue of patient engagement and adherence to diabetes care plans. Many South Africans face barriers to long-term adherence due to a lack of proper education, limited resources and inadequate continuous support. The overburdened healthcare system, characterised by understaffed clinics, hospitals and a shortage of specialised T2D care providers, further exacerbates these difficulties, hindering effective disease monitoring and long-term care management.

Additionally, healthcare inequalities and infrastructure limitations in South Africa create barriers to effective diabetes care. Many patients face challenges such as limited access to the specialised care, diagnostic services and diabetes education programmes that have a direct impact on patient outcomes (Pillay & Peer, 2020).

These challenges highlight the urgent need for innovative, patient-centred and scalable interventions that can be tailored to the unique needs of diverse populations and not only improve disease management and patient care, but also empower individuals to take an active role in reversing their condition.

Empowering individuals through evidence-based lifestyle interventions – such as therapeutic dietary changes, physical activity and behavioural modifications – offers a sustainable path toward improved health outcomes (Lean et al, 2019).

Given the strong link between lifestyle habits and T2D, research highlights the importance of self-care in diabetes management and treatment. Despite its effectiveness, self-care is often neglected in healthcare strategies.

THE POTENTIAL OF DIGITAL HEALTH INTERVENTIONS

Digital health solutions have revolutionised chronic disease management, including T2D, by providing accessible and cost-effective interventions and offer an opportunity to support self-care.

Such digital solutions leverage technology to facilitate personalised coaching, remote monitoring, real-time feedback and behaviour modification support (Grandes et al, 2008). Mobile health (mHealth) tools and health coaching have demonstrated success in enhancing patient education, facilitating disease monitoring and promoting long-term adherence to healthy behaviours (Beratarrechea et al, 2014). The advantages of digital health interventions include:

- **Personalisation:** Digital platforms can tailor dietary, exercise and medication recommendations based on individual health profiles and preferences.
- **Accessibility:** Patients can engage with healthcare professionals and support networks without geographical constraints.
- **Enhanced patient engagement:** Interactive tools, such as mobile apps and wearable devices, promote self-monitoring and adherence to treatment plans.
- **Scalability:** Digital programmes allow for widespread implementation with relatively low incremental costs.

Over the past decade, numerous smartphone applications have been introduced to facilitate disease management, enhance patient education and provide behavioural support (Hill, 2018). By leveraging these technologies, healthcare systems can empower individuals to adopt healthier behaviours, ultimately leading to better clinical outcomes and reduced healthcare costs.

Studies highlight the effectiveness of digital health interventions in improving clinical outcomes for T2D management (Wu et al, 2014). Notably, digital programmes that emphasise dietary modifications have demonstrated significant reductions in haemoglobin A1c (HbA1c) levels, weight loss and decreased medication dependency.

THERAPEUTIC CARBOHYDRATE RESTRICTION AS A KEY STRATEGY

One of the most evidence-based dietary approaches for T2D care is therapeutic carbohydrate restriction (TCR). Several meta-analyses have shown that TCR can lead to significant improvements in glycaemic control, weight loss and even diabetes remission (Feinman et al, 2015; Saslow et al, 2017; Athinarayanan et al, 2019; Goldenberg et al, 2021; Snorgaard et al, 2017). TCR reduces postprandial glucose spikes, enhances insulin sensitivity and promotes fat oxidation, leading to improved metabolic health.

A recent meta-analysis by Goldenberg et al (2021) reviewed 23 randomised controlled trials and found that low-carbohydrate diets resulted in a greater reduction in HbA1c compared to standard diets. Similarly, a systematic review by Snorgaard et al (2017) highlighted that carbohydrate restriction leads to sustained improvements in blood glucose levels and weight loss over the long term.

THE TRIBA MHEALTH PROGRAMME AND ITS LOCALISATION IN SOUTH AFRICA

In response to the growing T2D burden, Triba Health, a Danish digital health company, developed a digital T2D reversal programme (DRP) based on TCR that has shown promising results in clinical settings.

Early data indicate improvements in HbA1c levels, suggesting the potential for both enhanced T2D management and even reversal. Unpublished data from Triba Health indicate that among 235 participants, 89% achieved a reduction in HbA1c within 3-6 months, with an average decrease of 12 mmol/mol (1.1%) over six months. This suggests a strong potential for reversing T2D through digital intervention.

Building on this success, Medshield Medical Scheme is in collaboration with Triba Health, piloting a localised version of the DRP in South Africa. The programme integrates evidence-based dietary and lifestyle interventions with continuous digital support, providing patients with personalised guidance and monitoring. Key components of the localised DRP include:

1. Culturally adapted dietary plans: Nutritional recommendations are tailored to reflect local food availability and traditional eating patterns, incorporating TCR principles.
2. Mobile app for patient education: Patients can go through weekly educational video content to increase the empowerment that comes with successful lifestyle changes.
3. Remote coaching and support groups: Virtual consultations with healthcare professionals and peer support networks enhance accountability and motivation.
4. Behavioural modification strategies: Cognitive behavioural therapy techniques are integrated to help patients identify and change negative thought patterns and behaviours that contribute to unhealthy lifestyle choices to promote long-term adherence to lifestyle changes.

By integrating this digital solution into T2D care, healthcare systems may bridge gaps in access, improve patient engagement and reduce the long-term burden of T2D in South Africa.

THE ROLE OF THE BIOPSYCHOSOCIAL MODEL IN T2D CARE

The biopsychosocial model offers a comprehensive framework for understanding and managing T2D by considering a combination of biomedical, psychological and social factors. This model goes beyond the purely biomedical approach, acknowledging that effective diabetes care must address a range of influences that contribute to the condition.

From a biomedical perspective, factors such as medication, insulin resistance, obesity and dietary influences are central to the management of T2D. These elements are critical in controlling the physiological aspects of the disease. However, psychological factors also play a significant role, as stress, depression, motivation and health literacy all have a profound impact on a patient's ability to adhere to treatment plans and engage in effective self-care behaviours (Bodenheimer, 2002).



Social factors, which include economic status, social support, cultural influences and access to healthcare, significantly shape lifestyle behaviours and influence treatment outcomes.

Equally important are the social factors, which include economic status, social support, cultural influences and access to healthcare. These social determinants significantly shape lifestyle behaviours and influence treatment outcomes. By addressing all of these interconnected factors, the biopsychosocial model provides a more holistic and effective approach to managing T2D (Goldstein et al, 2004; Wagner, 1998).

Studies have shown that integrating the biopsychosocial model into T2D care leads to better patient engagement, improved mental well-being and more effective glycaemic control (Gonzalez et al, 2016). Digital health interventions that incorporate psychological support and community engagement are particularly beneficial in fostering long-term adherence and improving health outcomes.

Triba Health's digital DRP aligns with the biopsychosocial model by integrating TCR with behavioural and social support mechanisms. The Triba app facilitates:

- **Biomedical support:** Through education and guided low-carbohydrate meal plans, users can make informed dietary choices that directly impact their metabolic health.
- **Psychological support:** The app incorporates behavioural coaching, motivational tools and personalised feedback to address emotional and cognitive barriers to adherence.
- **Social support:** Online community groups and peer support mechanisms provide encouragement, accountability and shared experiences, reinforcing adherence to lifestyle changes.

By addressing these interconnected factors, Triba Health's DRP maximises the likelihood of long-term success in diabetes reversal, making it a powerful and scalable solution for South Africa.

THE SHIFT FROM PROVIDER-CENTRED TO PATIENT-CENTRED CARE

The provision of healthcare has traditionally been structured around a paternalistic, provider-centred model, particularly in acute care settings where patients are expected to comply with medical instructions. This approach, while effective in emergency interventions, is less suitable for managing chronic conditions such as T2D. Research suggests that directive counselling styles — where patients are simply told what to do — achieve long-term behavioural changes in only about 10% of cases (Rollnick, 1999). Unsolicited advice often leads to resistance rather than motivation for lifestyle changes.

In contrast, patient-centred care emphasises collaboration between healthcare providers and individuals, ensuring that healthcare decisions align with patients' values, preferences and needs (Laine & Davidoff, 1996). This model fosters active participation in self-care and chronic disease management, shifting the focus from provider-driven compliance to patient empowerment. Studies indicate that self-care support, combined with monitoring and active follow-up, is essential for preventing complications in chronic conditions (Von Korff & Tiemens, 2000).

Glasgow et al (2002) highlight the importance of self-care in chronic disease care. The study emphasises that successful diabetes care extends beyond medication and clinical interventions; it requires structured behavioural change strategies and ongoing patient engagement. Self-care programmes implemented within T2D and heart failure teams demonstrated improved patient outcomes by fostering collaborative goal setting, continuous monitoring and structured problem-solving approaches.

Key principles from these studies align with the digital health model adopted by Triba Health. The digital platform offers structured guidance, real-time feedback and peer support, which are essential elements for sustaining long-term behaviour change. By integrating evidence-based behavioural strategies, digital interventions ensure that patients actively participate in their care, leading to improved metabolic control and overall health outcomes.

[9] TYPE 2 DIABETES REVERSAL: AN INNOVATIVE DIGITAL SOLUTION

Given the time constraints and resource limitations faced by healthcare providers, digital health solutions offer a scalable method to support patient-centred care. Digital platforms such as Triba Health's DRP facilitate personalised coaching, continuous monitoring and behavioural interventions that empower patients to take control of their health. This structured, technology-driven approach aligns with the principles of collaborative care, ensuring that patients are equipped with the necessary skills and knowledge to manage their condition effectively.

CONCLUSION

The rise of T2D in South Africa demands innovative and scalable solutions beyond traditional healthcare approaches. Digital health interventions, such as the localised Triba Health DRP, offer a promising pathway for reversing diabetes, reducing healthcare costs and improving patient outcomes. By integrating TCR, behavioural coaching and digital self-monitoring, these interventions provide a sustainable and cost-effective alternative to conventional care. Addressing implementation challenges and expanding accessibility will be crucial for maximising their impact in South Africa and beyond.

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THE APPLICABILITY OF TELEDENTISTRY IN AFRICA

A systematic review of systematic reviews

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ABSTRACT

Introduction: Teledentistry, the integration of telecommunications and dental care, has gained prominence as a means to enhance access to oral healthcare, particularly in remote and underserved areas. Despite its potential, there is a notable low adoption of this technology in African countries. This systematic review aims to explore the implementation and impact of teledentistry across various dental specialties, highlighting its benefits and limitations.

Methodology: An extensive search of relevant literature was conducted on multiple databases. Included studies were analysed thematically to appraise areas of similarity and differences in the application of teledentistry on the continent.

Results: The utility of teledentistry has been recorded in dental disciplines, including maxillofacial surgery, oral medicine, prosthodontics and conservative dentistry. This technology was effective in teleconsultation, tele-education, tele-diagnosis and tele-administration, as well as in improving access to specialised care. Teledentistry was viewed as necessary and useful by the professionals; however, high costs remain prohibitive concerns to overcome. Training and support are critical to improve the adoption of teledentistry.

Conclusion: Teledentistry has the potential to significantly enhance oral healthcare delivery, especially in underserved communities. Successful adoption requires collaboration and investments in digital infrastructure and legislative support. African countries cannot be excluded from this digital transformation in the pursuit of global health equity.

INTRODUCTION

Teledentistry entails the use of electronic telecommunications, information and technological tools or other electronic means to administer oral health services across geographically separate locations (Health Professions Council of South Africa, 2014) (Talla and Rodrigues, 2024). Mobile devices like smartphones, tablets and laptops are used as platforms to deliver and facilitate interactions with patients, dental professionals and management in various settings. To date, remote oral health services have been provided via innovative oral health messaging, social media platforms and other activities developed for online consumption (El Tantawi et al, 2023). The application of teledentistry in clinical settings involves exchange of data and information to enable remote consultations, especially with specialists, the sharing of diagnostic processes and findings, and referral of patients remotely across the value chain (Malpe et al, 2024). The advent of the Covid-19 pandemic spurred interest in and the evolution of teledentistry, leading to exponential adoption, growth and utilisation (Fortich-Mesa and Hoyos-Hoyos, 2020).

The high prevalence of oral diseases justifies the use of these innovations aimed at improving oral health outcomes. According to the World Health Organization (2024), 3.5 billion people are affected by oral health diseases, with dental caries being the most prevalent non-communicable disease globally. Oral health diseases cost the global economy USD 442 billion annually (Seeberger, 2020). The African region has the highest burden of oral diseases globally, with dental caries, periodontal disease and edentulism being the most prevalent (Gallagher et al, 2023) (World Health Organization, 2023). As many as 480 million people in sub-Saharan Africa suffer from oral health diseases (Kanoute et al, 2022). Across Africa, the number of oral disease cases grew by 257 million between 2019 and 2023 (World Health Organization, 2023). This represents the steepest rise in oral disease over the last 30 years by region (World Health Organization, 2023).

This review was conducted to appraise the views on and application of teledentistry across Africa. Furthermore, the study sought to examine the barriers impeding the adoption of this technology.

METHODOLOGY

Search strategy

Four electronic databases (Pubmed/Medline, Cochrane Library, BMC Oral Health, Directory of Open Access Journals (DOAJ)) were searched for relevant literature. The following MeSH terms and phrases were used in various combinations to locate peer-reviewed articles: “dental” “telehealth”, “teledentistry”, “information systems” dentistry”, “Africa” and “remote consultation”.

Inclusion and exclusion criteria

Only English language articles about teledentistry in Africa were included in the study.

Data analysis

The eligible articles were reviewed and their content analysed and summarised under various themes, as described in the results section.

RESULTS

A total of 52 records (43 articles and 9 abstracts) were identified from various databases. The author assessed the articles and removed nine duplicates, 28 articles did not meet the inclusion criteria and were ineligible. Ultimately two articles were included in this review (Figure 1).

Figure 1: An overview of the analysis obtained from database searching

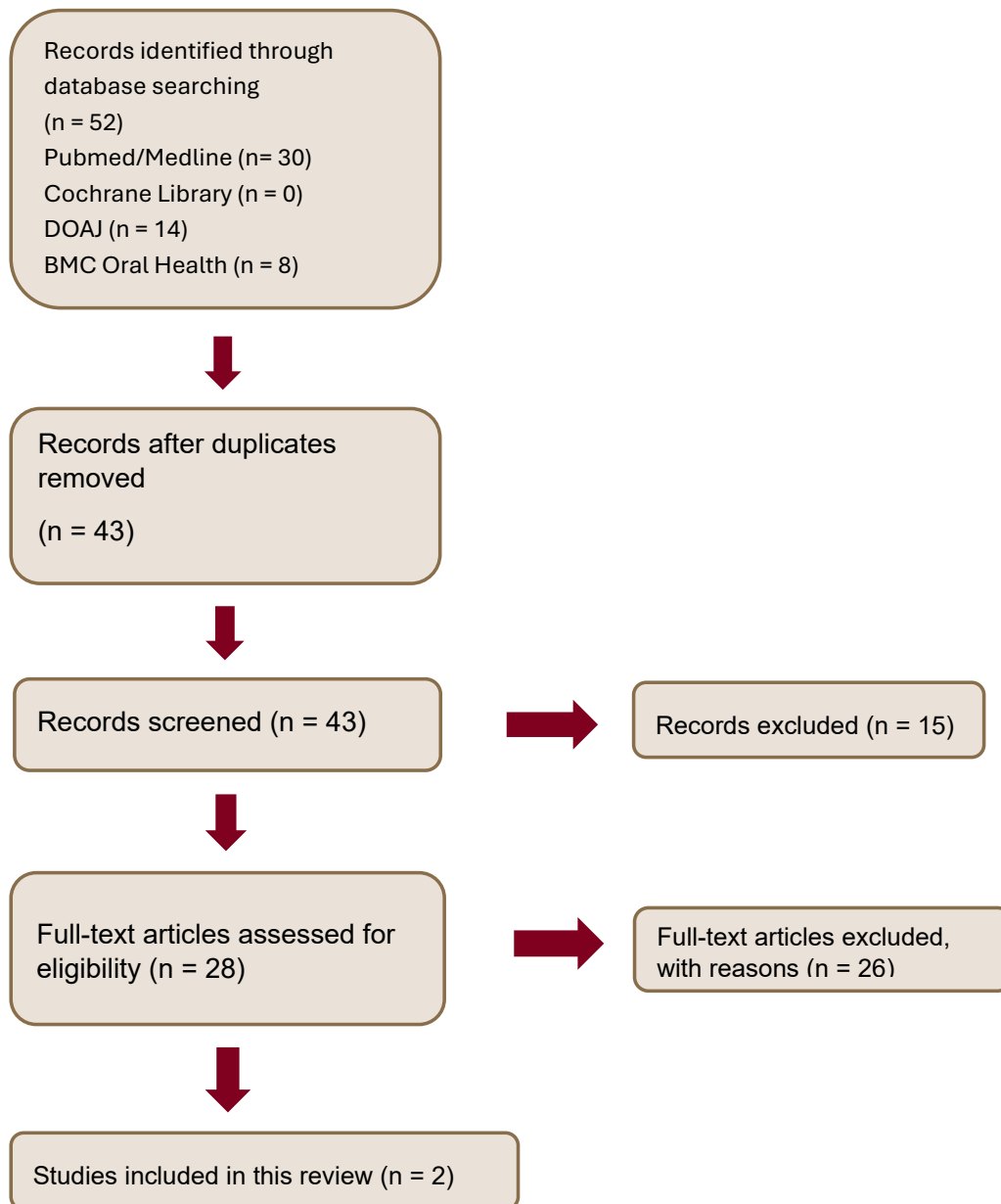


Table 2: Correlation coefficients of independent variables used in traditional modelling

STUDY	AUTHORS	OBJECTIVE	METHODS	KEY FINDINGS	COUNTRIES STUDIED
Teledentistry: A systematic review of the literature	Garma et al	To conduct a systematic review of teledentistry, detailing international experiences, benefits and feasibility.	Systematic review of 62 articles from 1994 to 2017 using Medline database.	Teledentistry is feasible and improves access to dental care, with applications in various specialties. Challenges include high costs and technical issues.	USA, Europe, Asia, Africa
Oral health system strengthening in fragile and conflict-affected states: A systematic review	Bogale et al	To explore oral health system strengthening in fragile and conflict-affected states.	Systematic review of 23 papers from 12 countries using multiple databases.	Initiatives include workforce development, mobile dental services and integration of oral health into national health systems. Challenges include resource limitations and the need for coordinated external aid.	Cambodia, India, South Africa, Rwanda, Indonesia, Haiti, Mozambique, Turkey, Bosnia and Herzegovina, Croatia, Israel, Iran

Data analysis

An inductive approach was followed: according to this framework, data determine the themes, unlike with the inductive approach in which themes are determined a priori.

1. Theme One: Types of approaches to teledentistry

Various applications and approaches were adopted as part of teledentistry, which were delivered both synchronously and asynchronously to patients and professionals. Platforms used for these processes included WhatsApp, Zoom and Microsoft Teams. Additionally, mobile health units and primary health centres equipped with mobile health devices supported oral healthcare activities such as health information access, disease management and emergency response coordination.

2. Theme Two: Clinical applications of teledentistry

Teledentistry was utilised in multiple dental specialties, including maxillofacial and oral surgery, oral medicine, prosthodontics and conservative dentistry. Functions included teleconsultation, tele-education, tele-diagnosis, and tele-administration, facilitating access to specialised oral care services. It enabled virtual preoperative

and postoperative management, identification of oral lesions and impacted third molars, oral hygiene promotion, visual identification of dental caries and pharmacological management of oral health diseases.

3. Theme Three: Perception and attitudes of dental professionals towards teledentistry

Dental professionals generally demonstrated a positive attitude towards teledentistry, enthusiastically embracing the learning and use of technology to improve oral healthcare delivery, especially in remote and underserved communities.

Benefits and limitations of teledentistry

Training practitioners on teledentistry platforms is essential, as it enhances their proficiency in technological manipulation and maximises the effective use of e-health solutions. Teledentistry promotes access to oral healthcare services, reducing healthcare inequalities by eliminating geographical barriers, lengthy commutes and financial constraints. It can be implemented in schools and primary health centres to foster continuous oral health education, ultimately improving oral health outcomes.

Teledentistry faces challenges such as technical and mechanical issues, high installation and maintenance costs, patient privacy concerns and region-specific medicolegal concerns.

DISCUSSION

Globally, countries utilise both synchronous and asynchronous teledentistry. High income countries have developed secure communication platforms capable of integrating high-resolution inputs from intra-oral photography, microscopy, digital x-rays, wearable health devices and electronic health record systems (Fortich-Mesa & Hoyos-Hoyos, 2020; Gurgel-Juarez et al, 2022; Tun et al, 2024).

The literature documents numerous clinical applications of teledentistry. It is effective in managing maxillofacial conditions such as fractures, temporomandibular joint disease and the identification of oral lesions (Gurgel-Juarez et al, 2022). Tele-monitoring of orthodontic patients undergoing fixed and removable orthodontic treatment has shown improved treatment outcomes (Torres et al, 2023). In oral medicine, teledentistry has proven effective in identifying periodontal disease, enamel defects and dental wear (Fortich-Mesa & Hoyos-Hoyos, 2020). Across various studies, teledentistry consistently plays a crucial role in providing dental consultations, assisting with patient referrals, improving access to specialist care and promoting oral health education (Garma et al, 2019; Bogale et al, 2024; Gurgel-Juarez et al, 2022; Fortich-Mesa & Hoyos-Hoyos, 2020; Emami et al, 2022). Teledentistry is not intended to replace clinical dentistry but to serve as an adjunct in the delivery of oral care; manual intervention remains essential in this specialty.

According to Lin et al (2022), 72.5% of dental practitioners have a positive perception of teledentistry. Positive attitudes are also noted among patients (Alsalman, 2023). Patient satisfaction ranged from 63% to 78%, with highs of 80% and 92.7% in rural Tanzania and India, respectively (Emami et al, 2022). Negative perceptions among practitioners may be due to under-exposure to teledentistry, age variations, concerns about patient confidentiality and privacy, infrastructure issues and lack of remuneration (Lin et al, 2022). Training for oral care workers is recommended, and patients should be educated on the benefits and limitations of e-health services.

While teledentistry in Africa is primarily implemented in outreach programmes, schools and primary healthcare centres, it is utilised in various settings across other regions, including geriatric centres, prisons and patients' homes (Tun et al, 2024; Priyank et al, 2023). Benefits to the end-user include reduced travel time and associated costs, decreased patient anxiety and ease of administration (Alsalman, 2023). Tun et al (2024) highlighted how the integration of teledentistry with in-person dentistry improved patient outcomes. E-health platforms connect specialists, thereby enhancing patient care. In addition to the previously mentioned limitations, lack of legisla-

[10] THE APPLICABILITY OF TELEDENTISTRY IN AFRICA

tion has been identified as a key barrier to the widespread adoption of teledentistry (Jin-Yu et al, 2024). Further research is needed on teledentistry and its application in dental schools and broader public use (Jin-Yu et al, 2024). Reimbursement systems also need to be established in certain regions (Jin-Yu et al, 2024).

This review highlights the significant under-representation of African countries in systematic reviews looking at the adoption of teledentistry. This reflects a disparity with the well-established teledentistry services in high-income nations and increasing usage in middle-income countries. However, there is a notable lack of data from low-income countries (Tun et al, 2024). The uneven implementation of teledentistry across different nations raises concerns about global health equity (Tun et al, 2024).

CONCLUSION

Teledentistry has the potential to play a pivotal role in providing low-cost, efficient and far-reaching oral health access to underserved communities across Africa. Successful adoption of teledentistry requires a multifaceted approach that encourages collaboration among various stakeholders.

RECOMMENDATION

It is crucial to prioritise research on teledentistry in Africa. Universities can expand on existing literature and facilitate training in teledentistry for undergraduate students and dental professionals alike. Additional investment into mobile technology and its associated infrastructure, particularly in under-resourced areas, will bring meaningful change. From a funding perspective, limited teledentistry consultations may be offered in traditional and new-generation benefit plans. As the industry looks towards alternative funding models for long-term sustainability, teledentistry aligns well with value-based care models that incentivise improved patient outcomes. In dentistry, these models encourage preventative care, early intervention to address potential issues, patient empowerment, self-accountability and improved oral health. Large-scale implementation of teledentistry requires collaboration among regulators, clinicians, academics, funders and patients.

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