

The 4IR-Health Service Delivery Nexus: Can AI Address Challenges Facing South Africa's Healthcare Services That Affect Domestic Politics?

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ABSTRACT

The delivery of quality healthcare services to citizens is not only a constitutional right, but also the task and obligation of every government. However, bribery, lack of financial accountability and counterfeit drugs, a shortage of human resources, poor hygiene and ineffective infection control measures, and poor medical record keeping have been identified as major challenges for the implementation of a successful public healthcare system. Fraudulent orders, tender irregularities, fiscal dumping, and over-pricing have also been identified as additional challenges. Due to the lack of quality healthcare services, people have lost trust and hope in the African National Congress (ANC). The paper found that to deliver adequate healthcare services, government needs to establish mechanisms that promote efficiency, quality, transparency, and safety. AI is a mechanism that can increase transparency, efficiency, and detect diseases before they become critical. The paper adopted a qualitative research methodology with an exploratory approach.

KEYWORDS

Artificial Intelligence (AI), Domestic Politics and South Africa, Fourth Industrial Revolution (4IR), Health Services Delivery, Healthcare System

INTRODUCTION

This paper aims to examine the effects of poor healthcare services delivery on domestic politics, and the nexus between Fourth Industrial Revolution (4IR) technologies and the provision of adequate and sustainable healthcare services. It focuses on one of the 4IR technologies, namely artificial intelligence (AI), to understand its ability to transform the healthcare industry and promote the provision of adequate healthcare services that enable citizens to overcome diseases and achieve good health (Organisation for Economic Cooperation and Development, 2020). Globally, local political governance is the main benchmark of national government because it directly serves all spheres of the community. All government institutions are based on successful political governance because it determines the efficacy of immediate intervention, which provides sustainable services to citizens, thus affecting social order and stability. The failure of political institutions of governance in delivering

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adequate service ignite rebellions, revolutionary movements, and the intensification of civil wars. In Africa for example, the prevalence of conflicts, civil wars, and social disorders are fuelled by the provisions of inadequate or poor healthcare services to citizens by African governments and their institutions. This is the case in South Africa, where the prevalence of social protests is linked to the delivery of poor healthcare services to the citizens.

There is direct linkage between healthcare delivery and politics (Coburn, 2004). The delivery of poor healthcare services affects politics because it affects electoral behaviour and makes citizens' lack of trust in their political leaders (Borrell et al., 2007). Past studies showed that protests, conflicts, and civil wars feed health inequalities (Bambra et al., 2008; Borrell et al., 2007; Hutchinson et al., 2019; Naher et al., 2020). The prevalence of poor healthcare services delivery in South Africa has had a negative effect on domestic politics and election outcomes in many local municipalities. The delivery of poor healthcare services by the post-apartheid regime have resulted in citizens losing their trust and hope in the current political leadership, thus affecting the outcomes of political elections. AI technologies have the ability to transform the healthcare industry and can lead to the delivery of adequate healthcare services to citizens. The author argues that AI is very effective in the healthcare industry, with the possibility of enabling citizens to achieve good health and well-being. Unfortunately, the delivery of poor health services (i.e., services that cannot alleviate the burden of diseases of the people in South Africa) is due to the failure of understanding the role of AI in healthcare as well as the lack of technological skills to apply those technologies in South Africa's healthcare system.

As a political party that was benefitted from the failure of the apartheid regime to deliver quality services to all citizens, the African National Congress (ANC) regime, controlled by the Black community, has also failed in delivering quality services to all citizens. Lack of good governance to ensure a sustainable and successful service delivery has caused many community protests that have, in turn, negatively affected the perception citizens have about the political leaders, thus effecting domestic politics and election results. For example, many issues, such as inequality, still have a negative effect on the delivery of quality healthcare services in South Africa. A case in point is the poor standards of the delivery of healthcare services. Obuaku-Igwe (2015) presented that the delivery of healthcare services is affected by the existence of deep-rooted inequality. Inequality in public healthcare is determined by social factors that include race, education, ethnicity, gender, geographical location, and income, amongst others (Obuaku-Igwe, 2015). These social factors are a reflection of and affect political leadership, domestic politics, and election outcomes. Indeed, these factors lead to an unjust healthcare system that intensifies the poor delivery of healthcare services, which, in turn, increase mortalities and financial losses.

Accordingly, governments that suffer financial difficulties because of the softening of revenue may feel pressured to cut back on nonessential functions and outsource them, instead (Aik, 2016). However, Kinyua (2015) argued that some duties must remain responsibilities of the state, including services of good quality and transparency, social equity, and accountability. Until now, few studies analysed the effects of poor healthcare services on domestic politics and political elections outcomes. Additionally, few studies examined the nexus between 4IR technologies and healthcare services, as well as the role and effects of AI technology, when addressing the challenges that face healthcare systems in South Africa. Maphumulo and Bhengu (2019) examined the challenges facing South Africa's public healthcare systems, and Jalghoum et al. (2019) examined the role of information communications and technologies in the healthcare industry to promote e-healthcare services to citizens.

However, these studies did not focus on the role of the 4IR in promoting sustainable healthcare services, or the effects of poor healthcare services on domestic politics and elections outcomes. The studies have not also examined how AI technology, if applied to the public healthcare industry in South Africa, would improve the quality of healthcare services and promote good health and well-being. Against this background, the research questions the author seeks to answer are: To what extent is poor healthcare service delivery affecting domestic politics and election outcomes? And how can

the application of AI technologies to the healthcare system address challenges that affect healthcare services delivery in South Africa?

The paper is structured into six main sections. While the first section was an introduction, the second section provides the theoretical framework underpinning the study. The third section illustrates the methodology and, thus, the techniques the author used to collect and analyse data. The fourth sections offers the author's literature review on the role of AI in the healthcare industry and on the factors that lead to poor healthcare services affecting domestic politics and influencing the political elections outcomes. The fifth section provides the findings from this study and their discussion. The sixth section consists of concluding remarks and recommendations.

THEORETICAL FRAMEWORK

The author applied a social contract theory to understand that the delivery of quality healthcare services is a contract between the government and the citizens. The social contract helped the author understand that delivering poor healthcare services affects domestic politics and political elections outcomes, and helped understand that delivering adequate high-quality healthcare services is the object of a contract between the citizens and state, thus making it a right. Rousseau (2004) presented that a social contract is a formation of a new state that guarantees people's rights, liberty, freedom, and equality. The post-apartheid South African regime acknowledges that delivering quality healthcare services is a right to which each citizen is entitled. Cloutier et al. (2021) argued that a social contract is an agreement between the state and the citizens with regard to their mutual roles and responsibilities. The contract is characterised by citizen-to-state negotiations and dialogues including social outcomes and contract resilience. Thus, from a healthcare perspective, in this study, a social contract is citizens' democratic right to receive quality healthcare services from the state. It demonstrates a democratic connection between the citizens and the state, and the need to allocate health resources democratically and equitably in society.

A social contract enables government officials to understand that AI increases the delivery of adequate healthcare services to citizens in less time. It is clear that AI technologies in healthcare systems enhance citizen mobilisation, engagement, association, and participation. As a result, failure to provide adequate healthcare services brings about disappointments that intensify political confrontations between the citizens and the state (Ndinga-Kanga et al., 2020). Furthermore, in order to reform healthcare industry and promote adequate healthcare services, the state needs to adopt AI technologies. Hence, based on the social contract theory, the author argued that delivering poor healthcare services to citizens changes their attitudes towards the ruling government and promotes electoral authoritarianism and violent democracy (Cloutier et al., 2021).

RESEARCH METHODOLOGY

The author adopted a qualitative research methodology with an exploratory approach (Creswell & Plano, 2011) to establish that there is nexus between the 4IR and healthcare services, and the effects of poor healthcare services on domestic politics and electoral behaviour. The author opted for qualitative methods because they are growingly used in social and health sciences (Turner et al., 2016). These methods evidenced the improvements that AI technologies can bring to the provision of healthcare services, and the effects that the delivery of poor healthcare services have on domestic politics in South Africa. The use of the exploratory approach made it easier to understand why people develop negative attitudes towards the government and the ruling political party (Sijuwade, 2009) when inadequate poor health services are delivered to them.

The use of both the qualitative method and the exploratory approach revealed that the negative attitudes following the delivery of poor healthcare services result in emotions and judgments that

affect domestic politics (Eagly & Chaiken, 2007; Greenhalgh et al., 2016). Indeed, the ANC is a revolutionary and Black-controlled political party that delivers poor healthcare services to citizens, which translates to the betrayal of the cause. The exploratory approach made it easier to examine the complex relations between the healthcare system and domestic politics, as well as public policy and governance in South Africa. The researcher collected data from secondary sources (e.g., documents, articles, and books), including secondary data extracted from the Internet (Virgillito & Polidoro, 2017). Vartanian (2010) argued that secondary data include previously published data that can be reused and studied again to address new questions.

The author analyzed data through the technique of document analysis because document analysis is appropriate for research about healthcare (Denzin, 1970). Document analysis resulted in the examination and interpretation of healthcare systems, domestic politics, AI technologies, and people's attitudes after the provision of healthcare services.

LITERATURE REVIEW

4IR technologies such as blockchain, AI, robots, augmented reality, three-dimensional printing, and cloud computing are digitalizing the public and private sector to improve the provision of basic services (e.g., housing and settlements, education, healthcare, social welfare, transport, electricity and energy, water and sanitation, as well as refuse and waste removal) (Muller, 2002). These technologies have shaped the modern world. AI is a computer program that performs human tasks in the same way as human intelligence does. The algorithms have the ability to address problems in any sector and understand and exercise logical reasoning, predict problems, and adapt to any challenging situation. The application of AI technology has transformed the healthcare industry, leading to the provision of sustainable healthcare solutions in medical care and clinical research (Rehman & Pandey, 2021).

Artificial Intelligence and Healthcare Industry

The applications of AI technology in the healthcare industry have the potential to speed up the diagnosis of diseases. AI can be used to analyze clinical and/or medical data and research publications (Dilsizian & Siegel, 2013). The applications of AI can also hasten the decision-making processes on patients' medical treatment (Dilsizian & Siegel, 2013). In developing countries, healthcare systems have been facing issues such as delays in the decision-making processes regarding healthcare, inefficient self-evaluation, inequitable healthcare access, uneven delivery of healthcare services, high costs, and a lack of transparency (Maphumulo & Bhengu, 2019).

The use of AI applications in healthcare empowers people to evaluate their own symptoms and care for themselves, when possible (Sharkey & Sharkey, 2012). AI systems increase people's sense of dignity, independence, and quality of life, and enable hospitalized patients to receive immediate medical attention (Sharkey & Sharkey, 2012). During the COVID-19 pandemic, patients used AI for self-evaluation, diagnoses, and treatment decisions (Van der Schaar et al., 2021). AI was further used for delivering medical drugs to people's homes, without them travelling far distances (Vaishya et al., 2020; Van der Schaar et al., 2021). In addition, the application of AI technology in healthcare has enabled pharmaceutical companies to speed up their drug and illness discovery processes (O'Mara-Eves et al., 2015; Van der Schaar et al., 2021). For example, an AI "robot scientist" called Eve has made drug discovery processes faster, more accurate, and more economical (Williams et al., 2015).

AI technology can enable manufacturers to repurpose and manufacture (Díaz et al., 2019) high-quality medical drugs that address diseases, and promotes good health for citizens. AI has been used in drug discovery and streamlining drug delivery processes (Chan et al., 2019). AI technology protects medical data records, and enhances cross-border collaboration between medical doctors and scholars (Luengo-Oroz et al., 2020). AI simplifies the use of and access to medical data records and make it available to any medical doctor from one hospital to another without any delays (Prabu, 2021). Furthermore, AI technology has enabled computers to discover illness patterns and abnormalities from

massive amounts of medical data records (Agrawal, 2018). AI technology has been used to analyze and identify patterns in complex datasets faster and more precisely than any human intelligence is capable of (Leung et al., 2016). AI technology has also been used to make predictions about new targets for the development of cancer drugs (Al-Lazikani, 2013). Moreover, the application of AI technology has been valuable in medical research, as it helps to match suitable patients for clinical studies (Alder Hey Children's NHS Foundation Trust, 2016).

Nexus Between Domestic Politics and Healthcare Services

Service delivery means the extent to which the services the state or any other private actor provide meet or exceed the expectations of the citizens (Shittu, 2020). The services can be private, when delivered by a private actor, or public, when provided by a state. This study focuses on the public service, which includes the services delivered by the state to the public at low or no cost. The provision of adequate and equitable healthcare services is vital for the survival of every citizen (Shittu, 2020). However, the provision of such healthcare services in local municipalities in South Africa has been politicized, leading to the failure of equal distribution of quality services.

Ndudula (2013) defined politics as "being the aspirations for and, more importantly, the retention of power over residents of a particular jurisdiction by certain individuals or groups of individuals" (p. 6). Good governance entails allocating equal resources to meet people's expectations, in order to avoid unhappiness that might worsen conflicts and political violence. Services are among the resources that must be shared and distributed to the people. Thus, social protests in local municipalities evidence the close connection between these protests and politics.

Politics also encompass the allocation of the available resources. There are critical disagreements regarding basic services and how to distribute them equally and efficiently. Various forms of inequality in the management and distribution of services have prevented the local government in South Africa from being efficient in this area. Furthermore, the lack of services that meet people's expectations is also a problem. Inequality and the poor quality of services have adversely affected municipalities' ability to prevent social protests. As in other African states, South African politics have affected the quality of services to citizens and the way in which these services need to be distributed to everyone (Booyesen, 2012).

In South Africa, municipal governments are of crucial significance, as they provide grassroots governance and local democracy (Ndudula, 2013). This democratic governance at municipal level is considered to be of utmost importance to the people, and, more importantly, its success is crucial to the equal distribution of basic services (Ndudula, 2013). Govender and Reddy (2012) argued that municipalities are regarded as the custodians of public funds that must be allocated for the delivery of services that meet people's expectations, thereby addressing the basic needs of local communities, notably healthcare services, which are fundamental for sustainable development. Govender and Reddy also pointed out that politicising services as well as their delivery to the people signify poor governance, inappropriate planning, inadequate social infrastructure, and massive service backlogs. Therefore, according to these authors, this has led to social protests in municipalities and has hindered poverty reduction and economic growth endeavours.

Domestic Politics-Service Delivery Dichotomy

South Africa is at high risk in terms of the ruling political party ANC selecting and deploying cadres within municipalities, and this practice indicates that politicians abuse their power. The level of risk in local government is high because politicians do not apply a merit system in the selection of employees. Different authors have conducted research on the outsourcing of public services by local authorities and its effects on the quality of service delivery. Poutvaara (2014) investigated the effects of outsourcing of public services and concluded that this strategy in some states, particularly in the USA, improved the quality of services delivered. Those that fail to deliver quality services run the risk of becoming a dysfunctional government captured by interest in wealth.

Poor healthcare services delivery at local government level, attributed to the politicization of administrative components in municipalities, results in poor local governance. The delivery of poor healthcare services to the people deprives them of human dignity and is a violation of their fundamental human rights. The following examination can highlight the place of service delivery as one of the tasks of the state. Service delivery includes protection by an accepted governing body. In exchange for being governed and protected, citizens expect the governing body to maintain an orderly community. This agreement confirms the governing body's responsibility to rule on behalf of the citizens of such communities and to protect their interests (Du Toit & Van der Walddt, 1999). This responsibility further implies that the governing body is responsible for service delivery to the community. Having a sustainable public service delivery system that delivers sustainable services to citizens is the most important ways of achieving sustainable livelihoods that promote poverty reduction.

Domestic Politics: Factors Affecting Healthcare Services Delivery

Murimoga and Musingafi (2014) stated that public services standards support the economic development of local areas, while a poor level of service delivery undermines the quality of life in society. Poor level of service delivery hinders economic growth and creates a lack of trust between the citizens and the state. Sustainable and adequate quality service delivery is a key aspect of the poverty reduction strategy and enhances economic growth as well as sustainable income. In Nigeria, for instance, poor healthcare services delivery is caused by corruption tendencies from officials, institutional capacity constraints about limited required skills and personnel, lack of transparency, ward committees that are not functioning well, lack of accountability by council officials, lack of public consultation in governance issues, failure to comply with municipal laws and other legislation, failure to prioritize community needs and nonaligned budgeting procedures, and conflicts between the administrative sections of the municipalities and the political field (Majekodunmi, 2012, p.91).

In Kenya, Barasa and Eising (2010) noted that poor infrastructure in most local authorities and their inability to plan to cater for increased numbers of people living in the cities resulted in poor healthcare services delivery. Barasa and Eising further identified some of the internal problems and challenges with regards to poor healthcare services delivery in Kenya as an inadequate resource base, mismanagement, as well as poor technological and institutional ability to expand service coverage.

Incompetent Human Resources

According to Isaacs (2016), well-trained and competent employees who can deliver services effectively and efficiently are important in ensuring integrity, objectivity, transparency, and receptiveness regarding the requirements of the ordinary people. Capacity building and skills development are essential in these institutions for employees and management to become more innovative in the delivery of services. Meyer and Venter (2014) indicated that the lack of human resource management systems which are not conducive to recruiting and retaining personnel means that the recruitment process is more often than not compromised. It is in this context that Ssonko (2013) recommended that performance management is a key tool for managers and employees to set targets, achieve results and incentivize good performance, and provide interventions such as mentoring and coaching to overcome poor performance.

Poor Healthcare Governance Systems

Kakumba (2009) stated that good governance seeks to achieve different goals, such as improving the well-being of its people, promoting economic development, promoting the political stability of its citizens, ensuring that democracy prevails and guaranteeing overall accountability for its actions, as well as monitoring the actions of the government in society. Leadership plays an important role in public service delivery, since effective leadership contributes to good governance by promoting transparency, collaboration, clear roles, involvement, and responsibility with regards to service delivery. In return, good governance fosters the commitment of leadership and management to be

held accountable for their actions and decisions. Effective leadership and good governance are vital for organizational performance, particularly with regards to the local authority to perform as per mandate (Helao & Naidoo, 2016).

Lack of Accountability in Healthcare Industry

According to Odaro (2012), empirical studies have highlighted a high correlation between the availability of service and citizens' choice of their own governments. As such, the availability of services is also strongly connected to the quality of governmental regulations (Mamba, 2008). This therefore implies that the failure to provide public services can be attributed, at least in part, to low accountability environments, in which politicians are able to misallocate public funds. Additionally, division among voters on social and ideological grounds could also be a contributing factor in the failure to provide public services (Odaro, 2012). Corruption results in input shortages, increased price, decreased spending on maintenance, and reduced government revenue (United Nations, Economic Commission for Africa - Trade, Finance, and Economic Development Division, 2007). Strong political accountability will improve public services and reduce corruption.

Poor Management and Maintenance of Infrastructure in Healthcare Industry

Mazele and Amoah (2021) noted that infrastructure plays a pivotal role in social and economic development in people's lifetime. When it infrastructure not properly developed and managed, it will have a significant impact on those who are meant to benefit from it. According to Gaal and Afrah (2017), social infrastructure helps empower the general public politically, socially, and economically—thereby enhancing the quality of their life with positive effects on the country's efficient use of resources and the alleviation of poverty. However, when infrastructure is poorly managed and maintained, it will definitely affect service delivery. For instance, Palmer et al. (2016) noted that South Africa faces continued structural deterioration of its infrastructure and the decline of potential land development due to poor management and neglect. Also, many African countries have been affected by infrastructure degradation, inefficient services, railways and roads of poor quality, and inadequate information and communication technology that are supposed to be the backbone of a country's economic growth and competitiveness (Mazele & Amoah, 2021).

Dysfunctional of Healthcare Systems

The Public Servants Association (PSA) (2015) reported that a major cause for the failure of delivering services in sufficient measure is the result of institutional deficiencies characteristic of the lack of resources, capacity, and structure. With regards to resources, PSA emphasized that, with the advent of democracy and toppling the white minority rule, the ANC government had to effectively expand basic infrastructure that had not previously been available to the Black majority. Weak economic growth has constrained in part resources to fund a large-scale infrastructure roll-out. Moreover, high debt levels and dozens of other pressing priorities have hard-hit South Africa (Calitz et al., 2011).

The PSA (2015) further noted that the crisis regarding the availability of resources is the most pressing concern of municipalities. Some of these municipalities, especially those located in rural areas, are not financially self-sufficient; nonetheless, they must often take the lead in the implementation of developmental initiatives. In most cases, the budget that is allocated for the development of municipalities is underutilised. For instance, in the 2013/14 financial year, R1.9 billion that had been allocated for the Municipal Infrastructure Grant was chronically left unused (Auditor-General of South Africa, 2023). These are pervasive underspending points to a chronic lack of capacity.

South Africa does not have enough qualified and experienced public servants, who are essential in turning government plans, particularly at local government level, into action (PSA, 2015). The skilled professionals that are employed in South Africa usually end up working in the more prestigious positions in central government and are attracted to the large metros, while smaller municipalities function without the requisite talent in areas where strong technical capability is needed (PSA, 2015).

Finally, the very structure of government itself is to blame. As the PSA (2015) argued that there are too many government departments and too many government layers (e.g., national, provincial, municipal, special agencies, and state enterprises), sometimes with no clear of who is in authority and who should be held accountable. This extremely complex structure of government makes it difficult to fix problems, because getting only one department or municipality to function properly may have a limited impact on the bigger picture. The structure of government also complicates accountability, with service delivery responsibilities split between government at local, provincial, and national levels. With so many levels in charge of delivery, the lines of authority are often blurry. Efforts to align the various levels of government often have little impact on departments with weak capacity (PSA, 2015).

Effects of Poor Healthcare Services Delivery on Political Elections Outcomes

As domestic politics impact on service delivery, it also impacts on political election outcomes. Lack of quality services to the people results in citizens losing trust in the ruling party, thus affecting political campaigns together with election outcomes. The lack of accountability in service delivery leads to the lack of electoral accountability. It influences the way in which people respond to political campaigns and the way they cast their vote (Stasavage, 2005). This is because, in a multiparty system of governance where the majority has the say, citizens are a crucial and central part of democracy, hence the lack of quality services to them influences their voting behavior. Citizens then use their voting capacity to influence government action and demand change. In democratic institutions, a state's legitimacy and effectiveness rely on citizens' expectations of government and the quality of public service delivery (Baird, 2011).

For example, the lack of efficient healthcare to citizens influenced the local municipal elections in 2021, whereby the ANC as the Black-controlled ruling party failed miserably at the polls. Due to the failure of the ANC government to provide adequate and sustainable healthcare services, citizens have lost trust in the political party. This was the result of the citizens' disillusionment with the way the ruling party had politicised the delivery of healthcare services to the citizens. It is important to note that service delivery is a contributing factor in electoral behaviour and the outcomes of elections (Haggard & Kaufman, 2008). It can be said that both security and social order depend on the delivery of services that meets people's expectations. Due to corrupt practices, which lead to fewer accountable and less effective public services that are not adequately fulfilling the needs of those they are intended to serve, citizens would rather commit crimes than die from hunger to survive (Baird, 2011). The lack of adequate and sustainable healthcare services delivery to the citizens influences the type and severity of criminality in society (Global Initiative Against Transnational Organized Crime, 2015). This is because citizens are left with hollow democratic state institutions that are not capable of delivering better lives for them (Baird, 2011).

On the other hand, when the government offers quality and good services to the people that meet their expectations, the political party in power easily observes that voters perceive their own lives as having improved, voters credit the government for such improvements, and, most importantly, voters favor the incumbent in the electoral arena (Ross, 2006).

DISCUSSION OF THE FINDINGS

In this study, the author sought to examine the effects of poor healthcare services on domestic politics, and the nexus between 4IR technologies in healthcare services delivery. The author sought to answer the following two questions:

1. How does the provision of poor healthcare services to citizens influence domestic politics and political elections outcomes in South Africa?

2. Can AI technology help address challenges facing South Africa's healthcare services that affect domestic politics?

The author identified nexus between AI technologies and healthcare services in promoting adequate and sustainable healthcare services. The researcher also identified different effects of poor healthcare services on domestic politics and citizens' electoral behaviour. According to Lee and Yoon (2021), the role of AI systems has both utopian and dystopian effects on healthcare service delivery. The "utopian perspective includes many new opportunities to treat diseases more effectively, provide better quality care and patient experience, encourage patients' participation in the treatment process, reduce medical errors and healthcare costs, and improve the managerial efficiency of care providers" (Sunarti et al., 2021, p. 68). It can also assist healthcare facilities and promote recruitment and retention in rural areas (Sunarti et al., 2021, p. 68). The dystopian perspective, however, presents numerous complexities that are daunting. The expanded use of patient data for analytics can be tempered with hackers via in online systems thus increasing risks (Coventry & Branley, 2018), decrease accountability of medical errors (Abomhara & Kjøien, 2015), and escalate the likelihood of losing jobs (Musa, 2018).

Firstly, the findings showed that the application of AI technology in the healthcare systems improves disease treatments and diagnosis. AI application in healthcare plays a vital role in enhancing the ability of medical staff in almost every area of patient treatment (Lee & Yoon, 2021). For example, Dawes et al. (2017) noted that patients with high blood pressure and lung disease can be treated with more precise data based on an AI-supported magnetic resonance imaging-based algorithm of cardiac motion. Moreover, the 3Billion developed an AI algorithm that diagnoses rare DNA-based diseases in 2019 (Lee & Yoon, 2018). Guo and Li (2018) also highlighted that AI-based technology can significantly improve patient care services in the rural farm communities of developing economies. As such, if AI-based software can improve the accuracy of patient diagnoses, then it will not only help patients, but also benefit the work of medical personnel (Guo & Li, 2018).

Artificial neural networks advanced forms of machine learning of AI technology are now undergoing trials for their use in medical diagnoses, and appear to be more capable of predicting and diagnosing medical conditions of the patients than clinicians (Amato et al., 2013). In comparison to traditional clinical decisions, support systems based on traditional software engineering, ANNs are expected to have a higher capacity for predicting numerous diseases such as cancer, cardiovascular disease, and diabetes risk. In the same vein, ANNs can be used for radiological and histopathological diagnoses (Reddy et al., 2018).

Secondly, the findings showed that the application of AI technology in healthcare industries improves patients' engagement and participation, which is necessary to achieve quality and sustainable healthcare services. Patient involvement in the medical treatment process is vital for accurate disease diagnoses and patient safety. Furthermore, patients realize the necessity of personally taking part in sessions with medical staff and regard this as a valuable and positive experience for their own sake (Kolovos et al., 2016). When patients are encouraged to be fully involved in their medical treatment, they tend to be entirely engaged in executing their own part in the process, which will have a positive impact on their satisfaction with the care quality. Boulding et al. (2011) stressed that patients' positive experience of their engagement in the treatment process has yielded positive results regarding treatment results and patients' safety. Thus, to deepen the patient experience as a means to improve care quality, patient engagement and participation should be a strategic goal of healthcare providers (Lee, 2018). With the rapid advancement of AI and AI-imbedded medical systems, healthcare systems have developed strategies that inform and educate patients about their health conditions. The South African government needs to offer civic awareness to the public that informs citizens of the significance of the 4IR technologies in the healthcare system and to ensure that citizens' ability to use these technologies is assured. This is necessary because well-informed patients would more enthusiastically participate in the use of AI medical systems and, hence, increase the flexibility of their treatment options (Lee & Yoon, 2021).

Thirdly, the findings showed that the application of AI technology has the ability to improve and reduce medical errors that influence the provision of quality and sustainable healthcare services. Recent developments have proven that smart AI systems can further reduce the error rate and are expected to further improve the care service quality. For instance, a research team at the University of Tokyo Medical School reported the development of an AI system based on new algorithms and order parameters. When this system was integrated with a deep-learning AI medical program, the highest accuracy rate was 83.5%, when applied to a sample patient group. However, after the system was interfaced with a deep learning and decision tree AI system, the accuracy rate increased to 87.3% (Sato et al., 2019).

Fourthly, the findings showed that the use of AI technology in the healthcare industry improves operational efficiency and reduces medical costs. The author found that the use of AI allows medical researchers to easily access and examine large amounts of information, thus improving the quality of the manufacturing of drugs that promotes quality treatments. Moreover, it can enable hospitals and healthcare plan administrators to optimize performance, increase productivity, and improve resource utilization, resulting in time and cost efficiencies. In addition, AI can deliver a personalized experience by facilitating conversations with patients via virtual assistants. With the use of statistical analysis, healthcare plan companies now have the opportunity to detect and reduce improper billing practices for streamlined member billing. This will go a long way to efficiently and proactively deal with issues with regards to fraud—especially improper payments made to healthcare providers, waste, and abuse (Center for Open Data Enterprise 2019; Chebrolu et al., 2020).

Fifthly, the findings showed that the application of AI technologies in the healthcare industry promotes patient monitoring and evaluations. According to Saria (2014), the increased use of electronic healthcare records and proliferation of smartphones and fitness monitoring devices have created unique access to digital data and the possibility to utilize AI techniques for monitoring patients. This has allowed to have details on patients' sleep patterns, blood pressure, heart rate, and other information in new ways. AI-enabled software can be used in intensive care units for cardiovascular and respiratory monitoring through the interpretation of vital signs (Reddy et al., 2018). Agah (2017) noted that, after a hospital visit, healthcare services can use natural language processing-enabled virtual assistants to communicate appropriate healthcare and medication information and schedule follow-up visits for patients. Contreras and Vehi (2018) argued that the use of such computer-generated healthcare assistants has been found to increase medication compliance and reliable follow-up visits.

The findings also showed that the application of AI technology can promote data bias. According to Angwin et al. (2016), studies in other contexts revealed that AI models exaggerate the risk of crime among members of a certain racial group. In the healthcare context, biased AI models may overrate or underrate healthcare risks in a particular group of patient populations. Angwin et al. (2016) found, for instance, that AI technology may engage in stereotyping and exhibit gender or racial bias. It is therefore possible that bias in AI models might also occur when datasets are not representative of the target population, or incomplete and inaccurate data are used by AI systems for decision-making (Vayena et al., 2018).

In addition, the training of the AI model requires undivided efforts regarding healthcare data or others. Such bias may occur when the data used for training do not reflect the target population. An additional concern is that, when insufficient or incomplete data are used to train AI models, there may be unreliable data, due to social discrimination (i.e., lack access to services health) and relatively small samples (e.g., minority groups) (Akmal et al., 2020).

In addition, the findings showed that the use of AI technology in the healthcare industry promotes protection of patients' medical data within the industry. This means that it can increase privacy, which is a significant factor in providing sustainable healthcare services. Reddy et al. (2020) argued that healthcare service data are the most sensitive information that can be in the possession of an individual about someone else. In healthcare, the respect of the privacy of an individual is a sacrosanct ethical principle because privacy is bound by patient autonomy or self-government, personal identity, and

well-being. Therefore, it is ethically imperative to respect patients' confidentiality, their healthcare records, to prevent the secondary use of data and to ensure due processes for obtaining correct consent (Sunarti et al., 2021). Moreover, if patients' privacy needs are not respected, patients will be affected by psychological and reputational harm (Dawson et al., 2019). Esmailzadeh (2020) noted that the breach of confidentiality associated with the disrespecting data will lead to a surge in risk beliefs associated with AI models designed to share personal healthcare information. AI technology in public healthcare requires large data sets. Thus, collection, storage, and sharing of medical data raise ethical questions not only related to privacy, but also to security and governance (Zandi et al., 2019).

The findings showed that the application of AI technology in the healthcare industry promotes accountability, transparency, and liability concerns. Accountability and liability are additional complexities that come with the use of AI in the healthcare sector. According to Gupta and Kumari (2017), earlier studies in public healthcare had established that there are legal concerns with regards to who will account for AI-based decisions when inaccuracies occur when using AI systems. Wirtz et al. (2019) underscored the challenges that are associated with the responsibility and accountability of AI systems. As such, blurred lines still exist on how regulatory concerns around responsibility and accountability of using solutions by AI systems can be formally handled. Wirtz et al. (2019) found that health outcomes are complex and require statistical accuracy of patients, the disease treated, and which diseases resisted treatment. AI technology can improve transparency between patients and medical staff to avoid any confusion. Liability intricacies increase, since it is not clear to what extent AI systems are able to provide guidance and control clinical practices. Furthermore, accountability concerns are not only limited to incidents in which AI may generate errors. Another aspect of liability risk refers to the situation where appropriate treatment options recommended by AI are mistakenly dismissed. Hence, the higher the perceived liability issues, the greater the risk beliefs associated with AI will be (Esmailzadeh, 2020).

The results confirmed Sundquist and Yang's (2007) findings that poor healthcare services influence domestic politics and political elections outcomes. The paper found that higher rates of social protests in South Africa are mostly due to lack of provision of adequate and quality healthcare services. These findings agree with Pacheco and Fletcher's (2015) results; they found that delivery of poor healthcare services affect domestic politics and result in poor political governance. Poor healthcare services negatively affect voting processes and outcomes. Thus, personal health serves as an influential factor that affects political elections, voting processes, and outcomes.

According to Pacheco and Fletcher (2015), the impacts of poor health on voting are key predictors of political elections and outcomes, because it affects the provision and reception of civic education and communities that, in turn, affect domestic politics. This is because people with good health are more likely to vote in favour of the ruling party, while those with disease burden have lost trust in the ruling party, thus would vote in the ruling party's favor. For example, Gollust and Rahn (2015) asserted that people with cancer are more likely to vote during political campaigns, compared with people with heart disease. The findings therefore strongly support the idea of applying AI technology to promote the achievement of adequate and quality healthcare services that would positively affect domestic politics and strengthen democratic governance in South Africa.

CONCLUSION AND RECOMMENDATIONS

The author found that applying AI technology to healthcare industry can address the challenges facing South Africa's healthcare services that affect domestic politics and voting outcomes. In every country, citizens hold state officials and political leaders accountable for the provision of quality and sustainable healthcare services. Delivering quality and exceptional healthcare services to citizens remain a major theme regarding the electorate not only in South Africa, but also worldwide. The researcher found that service delivery has the capacity to either promote security or intensify insecurity. This is because those who fight mostly fight over basic services and how to deliver them effectively.

Services delivery affects political election outcomes and the delivery of good quality services to everyone on an equal level leads to sustainable peace.

However, the author found that any breakdown in services delivery can have detrimental effects on election outcomes, thus affecting social order and stability. Effective and efficient delivery of services, especially the delivery of public goods such as healthcare, that is at the core of every human life in society, is critical and significant in terms of safeguarding social order and security in society. The author found that AI is important because it enables the delivery of good quality services and ensures that discrimination is not given a platform. AI can ensure transparency, rule of law, and accountability during the delivery of healthcare services. It can also ensure correct diagnoses of disease and guarantee that everyone is getting their healthcare services efficiently and on the same level. Therefore, AI is able to address all the challenges facing healthcare services that affect domestic politics and election outcomes that guarantee social order and security. There is need for future studies in AI technologies in the healthcare sector and other sectors as well that would inform South African policy makers factors leading to successful implementation of digital technology in healthcare services. Scholars should conduct their future studies in AI technologies and their use in healthcare sector to enable the delivery of smooth and adequate healthcare services to all citizens.

REFERENCES

- Abomhara, M., & Kjøien, G. (2015). Cyber security and the Internet of Things: Vulnerabilities, threats, intruders, and attacks. *Journal of Cybersecurity*, 4, 65–88.
- Agah, A. (2017). *Medical applications of artificial intelligence*. CRC Press.
- Agrawal, P. (2018). Artificial intelligence in drug discovery and development. *Journal of Pharmacovigilance*, 6(2), 80–93. doi:10.4172/2329-6887.1000e173
- Aik, A. M. (2016). Using quality of service delivery to evaluate federal government of Nigeria policy on public service outsourcing: A case of public healthcare institutions in Nigeria. *International Journal of Academic Research in Business & Social Sciences*, 6(5), 76–87. doi:10.6007/IJARBS/v6-i5/2165
- Akmal, A., Greatbanks, R., & Foote, J. (2020). Lean thinking in healthcare: Findings from a systematic literature network and bibliometric analysis. *Healthcare Policy*, 124(6), 615–627. doi:10.1016/j.healthpol.2020.04.008 PMID:32456781
- Al-Lazikani, B. (2013, November 11). *Artificial intelligence uses biggest disease database to fight cancer*. <https://theconversation.com/artificial-intelligence-uses-biggest-disease-database-to-fight-cancer-20050>
- Alder Hey Children's NHS Foundation Trust. (2016, May 11). *Alder Hey children's hospital set to become UK's first "cognitive" hospital*. <https://alderhey.nhs.uk/contact-us/press-office/latest-news/alder-hey-childrens-hospital-set-become-uks-first-cognitive-hospital>
- Amato, F., López, A., Pea-Méndez, E. M., Vañhara, P., Hampl, A., & Havel, J. (2013). Artificial neural networks in medical diagnosis. *Journal of Applied Biomedicine*, 11(2), 47–58. doi:10.2478/v10136-012-0031-x
- Angwin, J., Larson, J., Mattu, S., & Kirchner, L. (2016). Machine bias. In J. Angwin, J. Larson, S. Mattu, & L. Kirchner (Eds.), *Ethics of data and analytics* (pp. 254–264). Auerbach Publications.
- Auditor-General of South Africa. (2023). *MFMA general reports: National*. Auditor-General of South Africa. <http://www.agsa.co.za/Reporting/MFMAReports/MFMAgeneralreports-national.aspx>
- Baird, M. (2011). *Service delivery in fragile and conflict-affected states*. World Bank. <https://openknowledge.worldbank.org/handle/10986/9203>
- Bambra, C., Smith, K., & Kennedy, L. (2008). Politics and health. In J. Naidoo & J. Wills (Eds.), *Health studies* (2nd ed., pp. 257–287). Palgrave Macmillan London.
- Barasa, T., & Eising, W. (2010). *Reforming local authorities for better service delivery in developing countries: Lessons from RPRLGSP in Kenya*. Institute of Policy Analysis and Research. <https://www.devolutionhub.or.ke/file/b97f2781c73a2f7cd3d4e99ba360b8dd.pdf>
- Booyesen, S. (2012). Sideshow or heart of the matter? Local politics and South Africa's 2011 local government elections. In S. Booyesen (Ed.), *Local elections in South Africa: Parties, people, and politics* (pp. 1–10). Sun Press.
- Borrell, C., Espelt, A., Rodríguez-Sanz, M., & Navarro, V. (2007). Politics and health. *Journal of Epidemiology and Community Health*, 61(8), 658–659. doi:10.1136/jech.2006.059063 PMID:17630361
- Boulding, W., Glickman, S., Manary, M., Schulman, K., & Staelin, R. (2011). Relationship between patient satisfaction with inpatient care and hospital readmission within 30 days. *The American Journal of Managed Care*, 17(1), 41–48. PMID:21348567
- Calitz, E., Du Plessis, S., & Siebrits, K. (2011). An alternative perspective on South Africa's public debt, 1962-1994. *The South African Journal of Economics*, 79(2), 161–172. doi:10.1111/j.1813-6982.2011.01261.x
- Center for Open Data Enterprise. (2019). *Sharing and utilizing healthcare data for AI applications*. Center for Open Data Enterprise. <https://www.hhs.gov/sites/default/files/sharing-and-utilizing-health-data-for-ai-applications.pdf>
- Chan, H. C. S., Shan, H., Dahoun, T., Vogel, H., & Yuan, S. (2019). Advancing drug discovery via artificial intelligence. *Trends in Pharmacological Sciences*, 40(8), 592–604. doi:10.1016/j.tips.2019.06.004 PMID:31320117

- Chebrolu, K., Ressler, D., & Varia, H. (2020). Smart use of artificial intelligence in healthcare: Seizing opportunities in patient care and business activities. *Deloitte Insights*. <https://www2.deloitte.com/us/en/insights/industry/health-care/artificial-intelligence-in-health-care.html>
- Cloutier, M., Harborne, B., Isser, D., Santos, I., & Watts, M. (2021). *Social contracts for development: Bargaining, contention, and social inclusion in Sub-Saharan Africa*. Africa Development Forum, World Bank. <https://openknowledge.worldbank.org/handle/10986/36777>
- Coburn, D. (2004). Beyond the income inequality hypothesis: Class, neo-liberalism, and health inequalities. *Social Science & Medicine*, 58(1), 41–56. doi:10.1016/S0277-9536(03)00159-X PMID:14572920
- Contreras, I., & Vehi, J. (2018). Artificial intelligence for diabetes management and decision support: Literature review. *Journal of Medical Internet Research*, 20(5), 1–21. doi:10.2196/10775 PMID:29848472
- Corbin, J., & Strauss, A. (2008). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (3rd ed.). Sage. doi:10.4135/9781452230153
- Coventry, L., & Branley, D. (2018). Cybersecurity in healthcare: A narrative review of trends, threats, and ways forward. *Maturitas*, 113, 48–52. doi:10.1016/j.maturitas.2018.04.008 PMID:29903648
- Creswell, J. W., & Plano Clark, V. L. (2011). *Designing and conducting mixed methods research* (2nd ed.). Sage Publications.
- Dawes, T., de Marvao, A., Shi, W., Fletcher, T., Watson, G., Wharton, J., Rhodes, C., Howard, L., Gibbs, J., Rueckert, D., Cook, S. A., Wilkins, M. R., & O'Regan, D. P. (2017). Machine learning of three-dimensional right ventricular motion enables outcome prediction in pulmonary hypertension: A cardiac MRI imaging study. *Radiology*, 283(2), 381–390. doi:10.1148/radiol.2016161315 PMID:28092203
- Dawson, D., Schleiger, E., Horton, J., McLaughlin, J., Robinson, C., Quezada, G., Scowcroft, J., & Hajkovicz, S. (2019). *Artificial intelligence: Australia's ethics framework*. University of Melbourne. https://about.unimelb.edu.au/__data/assets/pdf_file/0031/99184/UoM_response_Data61_AI_Ethics_Framework.pdf
- Denzin, N. K. (1970). *The research act: A theoretical introduction to sociological methods*. Aldine.
- Díaz, Ó., Dalton, J. A. R., & Giraldo, J. (2019). Artificial intelligence: A novel approach for drug discovery. *Trends in Pharmacological Sciences*, 40(8), 550–551. doi:10.1016/j.tips.2019.06.005 PMID:31279568
- Dilsizian, S. E., & Siegel, E. L. (2013). Artificial intelligence in medicine and cardiac imaging: Ethical, social, and political challenges of artificial intelligence in health. *Current Cardiology Reports*, 16(441), 1–8.
- Du Toit, D. F. P., & Van der Waldt, G. (1999). *Public Administration and Management: The Grass Roots*. Juta.
- Eagly, A. H., & Chaiken, S. (2007). The advantages of an inclusive definition of attitude. *Social Cognition*, 25(5), 582–602. doi:10.1521/soco.2007.25.5.582
- Esmaeilzadeh, P. (2020). Use of AI-based tools for healthcare purposes: A survey study from consumers' perspectives. *BMC Medical Informatics and Decision Making*, 20(1), 1–19. doi:10.1186/s12911-020-01191-1 PMID:32698869
- Gaal, H. O., & Afrah, N. A. (2017). Lack of infrastructure: The impact on economic development as a case of Benadir region and Hir-Shabelle, Somalia. *Developing Country Studies*, 7(1), 49–55.
- Global Initiative Against Transnational Organized Crime. (2015). *New frontiers or old boundaries? Reconsidering approaches to the security and development nexus in the context of responses to organized crime, conflict and insurgency*. Global Initiative. <https://globalinitiative.net/wp-content/uploads/2015/09/2015-crime-1.pdf>
- Gollust, S., & Rahn, W. (2015). The bodies politic: Chronic health conditions and voter turnout in the 2008 election. *Journal of Health Politics, Policy and Law*, 40(6), 1115–1155. doi:10.1215/03616878-3424450 PMID:26447024
- Govender, J., & Reddy, P. S. (2012). Failing the public through public policy: A review of the local government experience in South Africa. *African Journal of Public Affairs*, 5(1), 69–82.

- Greenhalgh, T., Annandale, E., Ashcroft, R., Barlow, J., Black, N., Bleakley, A., Boaden, R., Braithwaite, J., Britten, N., Carnevale, F., Checkland, K., Cheek, J., Clark, A., Cohn, S., Coulehan, J., Crabtree, B., Cummins, S., Davidoff, F., Davies, H., & Ziebland, S. et al. (2016). An open letter to the BMJ editors on qualitative research. *British Medical Journal*, 352, 352–563. doi:10.1136/bmj.i563 PMID:26865572
- Guo, J., & Li, B. (2018). The application of medical artificial intelligence technology in rural areas of developing countries. *Health Equity*, 2(1), 174–181. doi:10.1089/heap.2018.0037 PMID:30283865
- Gupta, R. K., & Kumari, R. (2017). Artificial intelligence in public health: Opportunities and challenges. *Journal of Medical Education & Research*, 19(4), 191–192.
- Haggard, S., & Kaufman, R. (2008). *Development, democracy, and welfare states: Latin America, East Asia, and Eastern Europe*. Princeton University Press.
- Helao, T., & Naidoo, G. (2016). A perspective on services delivery in the Oshana Region of Namibia: Lessons for governance. *Journal of Public Administration*, 51(2), 246–264.
- Hutchinson, E., Balabanova, D., & McKee, M. (2019). We need to talk about corruption in health systems. *International Journal of Health Policy and Management*, 8(4), 191–194. doi:10.15171/ijhpm.2018.123 PMID:31050963
- Isaacs, J. (2016). *The impact of transformational leadership on performance management: A South African local government case study* [Unpublished Master dissertation]. Stellenbosch University.
- Jalghoum, Y., Tahtamouni, A., Khasawneh, S., & Al-Madadha, A. (2019). Challenges to healthcare information systems development: The case of Jordan. *International Journal of Healthcare Management*, 14(8), 1–9.
- Kakumba, U. (2009). *External control systems in the enhancement of accountability in local government: The case of Uganda* [Unpublished doctoral Thesis]. University of Pretoria.
- Kolovos, P., Kaitelidou, D., Lemonidou, C., Sachlas, A., & Sourtzi, P. (2016). Patients' perceptions and preferences of participation in nursing care. *Journal of Research in Nursing*, 21(4), 290–303. doi:10.1177/17449871166633498
- Lee, D. (2018). Strategies for technology-driven service encounters for patient experience satisfaction in hospitals. *Technological Forecasting and Social Change*, 137(C), 118–127. doi:10.1016/j.techfore.2018.06.050
- Lee, D., & Yoon, S. N. (2021). Application of artificial intelligence-based technologies in the healthcare industry: Opportunities and challenges. *International Journal of Environmental Research and Public Health*, 18(1), 271. doi:10.3390/ijerph18010271 PMID:33401373
- Leung, M., DeLong, A., Alipanahi, B., & Frey, B. J. (2016). Machine learning in genomic medicine: A review of computational problems and data sets. *Proceedings of the IEEE*, 104(1), 176–197. doi:10.1109/JPROC.2015.2494198
- Luengo-Oroz, M., Pham, K. H., Bullock, J., Kirkpatrick, R., Luccioni, A., Rubel, S., Wachholz, C., Chakchouk, M., Biggs, P., & Nguyen, T. (2020). Artificial intelligence cooperation to support the global response to COVID-19. *Nature Machine Intelligence*, 2(6), 295–297. doi:10.1038/s42256-020-0184-3
- Majekodunmi, A. (2012). The state of local government and service delivery in Nigeria: Challenges and prospect. *Africa's Public Service Delivery & Performance Review*, 1(3), 85–98. doi:10.4102/apsdpr.v1i3.37
- Mamba, B. (2008). *An appraisal of basic infrastructural service delivery and community participation at the local level* [Unpublished master's dissertation]. Rhodes University.
- Maphumulo, W. T., & Bhengu, B. R. (2019). Challenges of quality improvement in the healthcare of South Africa post-apartheid: A critical review. *Curationis*, 42(1), 1–9. doi:10.4102/curationis.v42i1.1901 PMID:31170800
- Mazele, O., & Amoah, C. (2021). The causes of poor infrastructure management and maintenance in South African municipalities. *Property Management*, 40(2), 192–206. doi:10.1108/PM-06-2021-0042
- Meyer, D., & Venter, A. (2014). An analysis of effectiveness of local government turnaround strategy (LGTAS). *African Journal of Public Affairs*, 7(1), 80–93.
- Muller, M. (2002). *The National Water and Sanitation Programme in South Africa: Turning the right to water into a reality*. Water and Sanitation Program - African Region.

Murimoga, R., & Musingafi, M. C. (2014). Local governance and service delivery in Zimbabwean local authority: The case of Harare and Masvingo urban municipality. *International Journal of Public Policy and Administration Research*, 1(2), 94–107.

Musa, M. (2018, June 25). *Opinion: Rise of the robot radiologists*. <https://www.the-scientist.com/news-opinion/opinion--rise-of-the-robot-radiologists-64356>

Naher, N., Hoque, R., Hassan, M. S., Balabanova, D., Adams, A. M., & Ahmed, S. M. (2020). The influence of corruption and governance in the delivery of frontline health care services in the public sector: A scoping review of current and future prospects in low and middle-income countries of south and south-east Asia. *BMC Public Health*, 20(880), 1–16. doi:10.1186/s12889-020-08975-0 PMID:32513131

Ndinga-Kanga, M., Van der Merwe, H., & Hartford, D. (2020). Forging a resilient social contract in South Africa: States and societies sustaining peace in the post-apartheid era. *Journal of Intervention and Statebuilding*, 14(1), 22–41. doi:10.1080/17502977.2019.1706436

Ndudula, M. R. (2013). *An analysis of the politics-administrative interface and its impact on delivery of municipal services: A case of the Mnquma local municipality* [Unpublished master's dissertation]. University of Fort Hare.

O'Mara-Eves, A., Thomas, J., McNaught, J., Miwa, M., & Ananiadou, S. (2015). Using text mining for study identification in systematic reviews: A systematic review of current approaches. *Systematic Reviews*, 4(5), 1–22.

Obuaku-Igwe, C. (2015). Healthcare inequality in South Africa: A systematic review. *African Sociological Review*, 19(2), 96–131.

OdaroE. D. (2012). Causes of poor service delivery in Africa and their impact on development. *Consilience: The Journal of Sustainable Development*, 7(1), 34–45. 10.7916/consilience.v0i7.4583

Organisation for Economic Cooperation and Development. (2020). *Trustworthy Artificial Intelligence in Health*. <https://www.oecd.org/health/trustworthy-artificial-intelligence-in-health.pdf>

Pacheco, J., & Fletcher, J. (2015). Incorporating health into studies of political behavior: Evidence for turnout and partisanship. *Political Research Quarterly*, 68(1), 104–116. doi:10.1177/1065912914563548 PMID:30008544

Palmer, I., Graham, N., Swilling, M., Robinson, B., Eales, K., Fisher-Jeffes, L., Käsner, S., & Skeen, J. (2016). *Contribution to the integrated urban development framework: South Africa's urban infrastructure challenge*. https://www.cogta.gov.za/cgta_2016/wp-content/uploads/2016/05/IUDF-INFRASTRUCTURE-PAPER.pdf

Poutvaara, P. (2014). Public-sector outsourcing. *IZA World of Labor: Evidence-Based Policy Making*, 1–10. https://www.researchgate.net/publication/273217096_Public-sector_outsourcing/link/5638cbd608ae7f7eb185deaf/download

PrabuA. (2021). SmartScope: An AI-powered digital auscultation device to detect cardiopulmonary diseases. TechRxiv. Preprint. 10.36227/techrxiv.14921268.v1

Public Servants Association. (2015). *The challenge of service delivery in South Africa*. Public Servants Association. https://www.psa.co.za/docs/default-source/psa-documents/psa-opinion/psa_service_delivery.pdf?sfvrsn=8ce4a8_3

Rapley, T. (2007). *Doing conversation, discourse, and document analysis*. Sage (Atlanta, Ga.).

Reddy, S., Allan, S., Coghlan, S., & Cooper, P. (2020). A governance model for the application of AI in healthcare. *Journal of the American Medical Informatics Association*, 27(3), 491–497. doi:10.1093/jamia/ocz192 PMID:31682262

Reddy, S., Fox, J., & Purohit, M. P. (2019). Artificial intelligence-enabled healthcare delivery. *Journal of the Royal Society of Medicine*, 112(1), 22–28. doi:10.1177/0141076818815510 PMID:30507284

Rehman, M. U., & Pandey, A. (2021). Review on artificial intelligence in healthcare. *Innovations*, 28(66), 915–926. https://www.researchgate.net/publication/355855821_Review_on_Artificial_Intelligence_in_Healthcare

Ross, M. (2006). Is democracy good for the poor? *American Journal of Political Science*, 50(4), 860–874. doi:10.1111/j.1540-5907.2006.00220.x

Rousseau, J. J. (2004). *The Social Contract*. Penguin Great Ideas.

- Saria, S. (2014). A \$3 trillion challenge to computational scientists: Transforming healthcare delivery. *IEEE Intelligent Systems*, 29(4), 82–87. doi:10.1109/MIS.2014.58
- Sato, M., Morimoto, K., Kajihara, S., Tateishi, R., Shiina, S., Koike, K., & Yatomi, Y. (2019). Machine-learning approach for the development of a novel predictive model for the diagnosis of hepatocellular carcinoma. *Scientific Reports*, 9(7704). doi:10.1038/s41598-019-44022-8 PMID:31147560
- Sharkey, A., & Sharkey, N. (2012). Granny and the robots: Ethical issues in robot care for the elderly. *Ethics and Information Technology*, 14(1), 27–40. doi:10.1007/s10676-010-9234-6
- Shittu, A. K. (2020). Public service and service delivery. In A. Farazmand (Ed.), *Global Encyclopedia of public administration, public policy, and governance* (pp. 1–8). Springer. doi:10.1007/978-3-319-31816-5_4005-1
- Sijuwade, P. O. (2009). Attitudes towards Old Age. *Studies on Home and Community Science*, 3(1), 1–5. doi:10.1080/09737189.2009.11885268
- Ssonko, D. K. (2013). Decentralisation and development: Can Uganda now pass the test of being a role model? *Commonwealth Journal of Local Governance*, 13(14), 30–45. doi:10.5130/cjlg.v0i13/14.3722
- Stasavage, D. (2005). Democracy and education spending in Africa. *American Journal of Political Science*, 49(2), 343–358. doi:10.1111/j.0092-5853.2005.00127.x
- Sunarti, S., Rahman, F., Naufal, M., Risky, M., Febriyanto, K., & Masnina, R. (2021). Artificial intelligence in healthcare: Opportunities and risk for future. *Gaceta Sanitaria*, 35(1), 67–70. doi:10.1016/j.gaceta.2020.12.019 PMID:33832631
- Sundquist, K., & Yang, M. (2007). Linking social capital and self-rated health: A multilevel analysis of 11,175 men and women in Sweden. *Health & Place*, 13(2), 324–334. doi:10.1016/j.healthplace.2006.02.002 PMID:16584907
- Turner, S., Ramsay, A., Perry, C., Boaden, R., McKeivitt, C., Morris, S., Pursani, N., Rudd, A., Tyrrell, P., Wolfe, C., & Fulop, N. (2016, July). Lessons for major system change: Centralization of stroke services in two metropolitan areas of England. *Journal of Health Services Research & Policy*, 21(3), 156–165. doi:10.1177/1355819615626189 PMID:26811375
- United Nations Economic Commission for Africa - Trade, Finance, and Economic Development Division. (2007). *Public expenditure and service delivery in Africa: Perspectives on policy and institutional framework*. United Nations, Economic Commission for Africa. <https://repository.uneca.org/handle/10855/14923>
- Vaishya, R., Javaid, M., Khan, I. H., & Haleem, A. (2020). Artificial Intelligence (AI) applications for COVID-19 pandemic. *Diabetes & Metabolic Syndrome*, 14(4), 337–339. doi:10.1016/j.dsx.2020.04.012 PMID:32305024
- Van der Schaar, M., Alaa, A. M., Floto, A., Gimson, A., Scholtes, S., Wood, A., McKinney, E., Jarrett, D., Lio, P., & Ercole, A. (2021). How artificial intelligence and machine learning can help healthcare systems respond to COVID-19. *Machine Learning*, 110(1), 1–14. doi:10.1007/s10994-020-05928-x PMID:33318723
- Vartanian, T. P. (2010). *Secondary data analysis*. Oxford University Press. doi:10.1093/acprof:oso/9780195388817.001.0001
- Vayena, E., Blasimme, A., & Cohen, I. G. (2018). Machine learning in medicine: Addressing ethical challenges. *PLoS Medicine*, 15(11), 1–4. doi:10.1371/journal.pmed.1002689 PMID:30399149
- Virgillito, A., & Polidoro, F. (2017). Big data techniques for supporting official statistics: The use of Web scraping for collecting price data. In T. Prodromou (Ed.), *Data Visualization and Statistical Literacy for Open and Big Data* (pp. 253–273). IGI Global. doi:10.4018/978-1-5225-2512-7.ch010
- Williams, K., Bilsland, E., Sparkes, A., Aubrey, W., Young, M., Soldatova, L. N., De Grave, K., Ramon, J., de Clare, M., Sirawaraporn, W., Oliver, S. G., & King, R. D. (2015). Cheaper faster drug development validated by the repositioning of drugs against neglected tropical diseases. *Journal of the Royal Society, Interface*, 12(104), 1–9. doi:10.1098/rsif.2014.1289 PMID:25652463
- Wirtz, B. W., Weyerer, J. C., & Geyer, C. (2019). Artificial intelligence and the public sector-applications and challenges. *International Journal of Public Administration*, 42(7), 596–615. doi:10.1080/01900692.2018.1498103
- Zandi, D., Reis, A., Vayena, E., & Goodman, K. (2019). New ethical challenges of digital technologies, machine learning and artificial intelligence in public health: A call for papers. *Bulletin of the World Health Organization*, 97(1), 2. doi:10.2471/BLT.18.227686