



MHSC

Mine Health and Safety Council

**“Determine the Capacity of Mine Health Facilities to
Accommodate Surrounding Communities”**

Final Report

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ABBREVIATIONS AND NOMENCLATURE

- ART: Antiretroviral Therapy
- CSI: Corporate Social Investment
- CSR: Corporate Social Responsibilities
- DMRE: Department of Mineral Resources and Energy
- DoH: Department of Health
- DRC: Democratic Republic of the Congo
- FQM: First Quantum Minerals
- HIV: Human Immunodeficiency Virus
- GDP: Gross Domestic Product
- KCM: Konkola Copper Mines
- KZN: KwaZulu Natal
- MITHAC: Mining Industry TB and HIV Advisory Committee
- MHSAct: Mine Health and Safety Act of 1996
- MHSC: Mine Health and Safety Council
- MMPA: Mine Medical Professionals Association
- MRM: Montepuez Ruby Mining
- NCSS: Number Cruncher Statistical System
- NHI: National Health Insurance
- OHS: Occupational Health and Safety
- OHSAct: Occupational Health and Safety Act
- OHSI: Occupational Health and Safety Institute
- OLDM: Orapa, Letlhakane and Damtshaa Mines
- OMP: Occupational Medical Practitioners
- PDTC: Program Delivery Technical Committee
- rPHC: Re-engineering Primary Health Care
- SAMI: South African Mining Industry
- SLP: Social Labor Plan
- TB: Tuberculosis
- ToR: Terms of Reference
- USA: United States of America

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EXECUTIVE SUMMARY

Since the 19th century, mining has been pivotal to the South African economy and continues to contribute immensely to the country's Gross Domestic Product (GDP). Historically, the South African Mining Industry (SAMI) has relied on the migrant labor system for employment which subsequently led to the mushrooming of formal and informal communities and other non-mining work opportunities in and around mining operations (Balfour 2018). As with any functioning community, mining communities require adequate access to healthcare services in order to bring out a productive workforce required for a thriving mining industry. Section 2.5 of the South African Mining Charter defines a mining community as an area where mining is conducted and includes major labor sending areas and adjacent or surrounding communities within a local municipality, metropolitan municipality or district municipality (Mining Charter, 2018).

While major mining housing companies have historically provided health services to their employees, non-mining employees and the adjacent communities have depended on the already stretched public health services for their healthcare needs. Recent data has shown continued ill-health in the SAMI (DMRE 2021, MHSI 2021, MCSA 2021) and this has prompted the MHSC and strategic partners to constantly explore options to improve accessibility to quality healthcare including the prospect of utilizing existing mine health facilities to service neighboring communities. Although this option seems plausible, the capacity of mine health facilities to service surrounding communities is currently highly speculative.

It is therefore necessary to assess the capacity of mine health facilities to service adjacent communities in the SAMI by determining what healthcare services are available at mine health facilities, ownership, accessibility by mining communities, willingness by mining houses to extend health services to the communities and if there are any factors that would encourage or limit expansion possibilities.

Aim of the study

The aim of this research study was to determine the capacity of mine health facilities to accommodate surrounding communities and was delivered in five milestones presented in subsequent sections of this document.

Methodology

A combination of the exploratory and causal research study was conducted on selected mines to investigate and determine the type, scale and potential of mine health facilities to extend their health care services to surrounding communities in the SAMI and to explain the causal effects of the capacity or lack thereof. The exploratory method was used to survey the capacity of mine health facilities to service adjacent communities in the SAMI while the causal effects of the capacity or lack thereof, of mine health facilities to service surrounding communities was explained using the causal method of research.

Due to mobility restrictions imposed as a result of the Covid-19 pandemic, a data collection methodology was implemented to ensure compliance to social distancing regulations. This methodology provided for multiple data collection channels such as face to face interviews, telephonic interviews or email communications as preferred by respondents within the social distancing framework. The same methodology was used for follow-ups with respondents to ensure data quality and accuracy. Ethical clearance was out of scope for this survey study as there was no requirement to collect data from/or on individual human participants.

The target population was the mine operations in the SAMI which have an existing mine health facility. The target sample was at least ten mine health facilities selected from specific mines representing two gold mines, two platinum mines, four coal mines and four small scale mines from Free State, Gauteng, Northwest, Limpopo, Mpumalanga, KwaZulu Natal and Northern Cape provinces as set out in the Terms of Reference (ToR) for this research study.

The survey instrument for the study was a questionnaire consisting of the general information section and a section on the health service profile of mine health facilities in the SAMI. The general information section was used to identify the location, size, commodity, and type of the sampled mine health facilities. This information helped to analyse the sample and gave comparative insights into the capacity of mine health facilities to service surrounding communities in the SAMI. The section on the profile of mine health facilities was used to collect data on the capacity of health services offered and utility thereof including chronic medication and medical aid cover, accessibility of health facilities to surrounding communities, ownership of health

facilities and willingness to extend health service to surrounding communities and challenges faced by health facilities. This information was used to determine the capacity of mine health facilities to service surrounding communities.

Secondary data was also gathered from other sources such as the Minerals Council South Africa, the Department of Mineral Resources and Energy (DMRE) and published data for selected mining houses to draw complimentary insights into the analysis of the data collected from mining houses.

The survey was conducted between August 2020 and September 2020 with follow-ups in subsequent months. The target respondent at each mining operation was a resource responsible for the management of the mine health facility such as an Occupational Medical Practitioner (OMP) and/or Occupational Health Practitioner (OHP). In line with social distancing protocols and the proposed data collection approach for this study, 94% of the respondents preferred telephonic interviews and/or email communications while only 6% of the respondents preferred face to face interviews.

The data collected was consolidated and processed in Microsoft (MS) Excel where analysis was conducted using various statistical techniques. Pre-coding had been done for variables such as the size of the operation (i.e., small, medium or large), and the distance between the health facility and community (i.e., fully accessible, partially accessible and inaccessible).

Literature review findings

A comprehensive literature review was conducted to determine the provision and accessibility of health services by mining companies to adjacent communities nationally and internationally.

The literature review on South Africa showed that mining companies generally provide healthcare services to employees only in form of primary health care coverage, occupational health services, hospital in-patient care coverage, emergency care services, medical aid coverage and Tuberculosis (TB) screening and Human Immunodeficiency Virus (HIV) counselling services, (Rantanen 2005; Reiprich *et al.* 2016).

No evidence could be found of provision of health services to adjacent communities except for developmental projects in collaboration with the Department of Health (DoH) towards improvement of health services in the community.

It was found in literature that healthcare provision by mining companies globally is mainly driven by in-country regulatory frameworks and community needs according to Reiprich *et al.* (2016). Similar to South Africa, mining companies in the rest of Africa only contribute to developmental projects rather than provide direct healthcare to communities. Mining industries in developed countries are covered by national health insurance systems and mining companies do not have the obligation to provide healthcare services to surrounding communities.

Findings from the survey

The data for this survey study was collected from a total of thirteen (n=16) mine health facilities representing all provinces in South Africa except for the eastern cape province. The sample represented silica sand (aggregates), gold, coal, platinum and diamond commodity sectors.

Regarding the type of services that are currently provided by the mine health facilities, the survey results showed that occupational healthcare, basic and general care, chronic care, emergency response, mobile clinics and laboratory services as well as TB, HIV, hypertension, diabetes, cholesterol and chronic medication to their employees. None of these services are provided to the adjacent communities. The result further showed overutilization of resource capacity such as medical personnel, finances, bed capacity and infrastructure such as laboratory and medical facility space.

The potential expansion opportunities identified in the survey to increase capacity to service surrounding communities in the SAMI are such as increasing the number of medical personnel, expanding medical facility infrastructure, (such as consultation space and beds), to accommodate more patients, expanding/building laboratory infrastructure to increase test throughput capacity to service both employees and the community and expanding the mobile clinic service network as the alternative delivery model to reach neighboring communities. The survey results showed that the majority of mine health facilities are owned by mining houses and are generally accessible to the adjacent communities.

The major limitation to extending healthcare services to surrounding communities cited in the survey results was the issue of limited resource capacity in the form of finances, infrastructure, utilities, manpower and equipment. However, an overwhelming number of respondents indicated the willing to extend healthcare services to neighboring communities on condition that they were capacitated to do so. The researcher then proposed several models that could be adopted to facilitate resource capacity expansion to enable mine health facilities to extend healthcare services to surrounding communities.

The first model proposed was to develop a business case for a co-funding partnership operating model between mining operations, the government and private investors. The other model was to run awareness campaigns to promote mindset change and encourage mining companies to extend healthcare service such as HIV/Aids and TB to communities especially where there's resource capacity. Other models included extension of mobile clinics to neighboring communities, running scheduled health programs for the communities, piloting health service expansion at mines with identified excess capacity and extending health services at a cost to the communities.

Health services matrix

Matrices indicating health services currently available and potential expansion opportunities to surrounding communities were developed based on the survey results. The indicators used to assess the health services available at mine health facilities, the resource capacity available for health services and the potential expansion opportunities affirmed the conclusions found in the survey for the study.

Additionally, some capacity was identified in the coal mining sector in terms of comparatively more medical personnel, health care budget and laboratory infrastructure. It was recommended that one form of expansion could be leveraging off the existing availability of capacity for selected healthcare resources in the coal sector to pilot healthcare service expansion to neighboring communities before rolling out to other mining sectors. Mining operations could also consider offering healthcare services at cost to adjacent communities, similar to the cost model used at an identified coal mine health facility in KwaZulu Natal (KZN) province which currently offers healthcare services to the community at a fee.

Workshop with industry stakeholders

A workshop was conducted with industry stakeholders to facilitate broad participation in determining the potential opportunities available to capacitate mine health facilities to services surrounding communities in the SAMI. The workshop agenda was based on the literature review and survey findings for the study.

The workshop was characterized by robust interactive discussions about the possibilities available in the SAMI to extend health service to mining communities. It was indicated that the expansion models recommended based on the literature review and survey findings were constructive enough to facilitate extension of healthcare services to the mining communities.

The interactive discussions further resulted in additional recommendations for adoption to facilitate expansion of the required resource capacity to service surrounding communities. One recommendation was that a risk-based approach as be adopted as a strategy when addressing the expansion of healthcare services to neighboring communities by prioritizing mining operations with the highest impact on the welfare of the neighboring communities. The other recommendation was to run healthcare programs related to the environmental impacts of mining operations in order to promote awareness of possible health effects in neighboring communities.

Conclusion

Despite the mobility constraints imposed as a result of the Covid-19 pandemic, the survey study obtained conclusive facts regarding the capacity of mine health facilities to service surrounding communities. The literature review informed the proposition that mine health facilities in the SAMI, in their current state, do not have the capacity to provide healthcare services required by surrounding communities.

The results from the survey showed clear resource capacity limitations on the part of mine health facilities to accommodate neighboring communities in form of limited and overutilized medical personnel, facility and laboratory infrastructure, consultation space and admitting bed capacity and annual financial allocations. It was determined that mine health facilities in the SAMI do not have excess capacity which can be utilized by the community other than what is currently available to service the employees.

The survey results further showed that there are potential opportunities for mine health facilities to expand healthcare services to surrounding communities in the SAMI. This was expressed through willingness by the mining houses to extend health services to surrounding communities on condition that they were capacitated to do so. Several expansion models were then recommended by the researcher and presented at a workshop with the industry stakeholders in the SAMI for further deliberation and broader participation.

Overall, a clear and concise result was achieved from this study using the research methodology implemented as proposed and intended. Although delivered according to the stipulated ToR, the general limitation for the study was the impact of the COVID-19 pandemic which restricted data collection to mostly virtual interactions. It is widely assumed that face-to-face contact with respondents would have provided more insights and value into the research output.

Recommendations

Based on the findings from the survey study, the following models were recommended for adoption in the SAMI to facilitate expansion of the capacity for mine health facilities to enable them to extend health services to surrounding communities:

1. Develop a business case for a co-funding partnership operating model between mining operations, the government and private investors. Such funding partnerships could enable expansion of infrastructure, equipment, manpower, utilities and working capital that would result in extra capacity to service both employees and surrounding communities. The business case could also suggest how operating models for certain mine health facilities could be restructured to extend operating hours and shifts to increase capacity.
2. Run awareness campaigns to promote mindset change and encourage mining companies to extend healthcare service such as HIV/Aids and TB to communities especially where there's resource capacity.
3. Leverage off existing resource capacity identified in this survey in the coal sector to pilot healthcare service expansion to neighboring communities before rolling out to other mining sectors.

4. Adopt a risk-based approach as a strategy when addressing the expansion of healthcare services to neighboring communities by prioritizing mining operations with the highest impact on the welfare of the neighboring communities.
5. Offer healthcare services at cost to adjacent communities, similar to the cost model used at a coal mine health facility in KZN province represented in this survey study, which currently offers healthcare services to the community at a fee.
6. Propose mine healthcare service expansion through mobile clinics to neighboring communities. For example, implementation of TB, HIV, diabetes and hypertension screening, counselling and prevention services through mobile clinics.
7. Propose opening up of mine healthcare services to the community on an incremental basis for pre-determined periods cumulatively. An example of HIV healthcare services could be that mine health facilities start with prevention services for 6 months, then introduce testing services for a year and then treatment after another year, etc.
8. Propose that mine operations should run scheduled programs periodically. For example, these programs could run once a month or bi-weekly, to open up their health facilities to the community for selected screening, diagnosis and treatment activities.
9. Run healthcare programs related to the environmental impacts of mining operations in order to promote awareness of possible health effects in neighboring communities. Examples of such programs include screening for hearing loss in infants, children and community schools and awareness campaigns on management of air or water pollution and toxic waste.

Suggestions for further research

It was recommended that a comparative analysis research study be conducted on the cost and benefits of extending healthcare services to adjacent communities as an incentive for mining houses to expand health services to adjacent communities in the SAMI.

It was also recommended that a healthcare surveillance research study be conducted to determine the direct impact of mining activities on the welfare of neighboring communities such as the impact on children, pregnant women, the elderly, quality of water and air.

INTRODUCTION

1.1 Purpose of the study

Access to healthcare is entrenched in the Constitution of South Africa Act No.108 of 1996 under section 27 of the constitution which stipulates that everyone has the right to access of quality healthcare services, including reproductive healthcare services and no one may be refused emergency medical treatment.

However, South Africa has a dysfunctional health system historically and will take ages to correct according to Kleinert and Horton (2009). The following are identified as some of the challenges that have negatively impacted healthcare facilities and contributed to the generally strenuous healthcare system in South Africa and their ability to service surrounding communities in the SAMI, by extension:

- Policies from colonial subjugation and apartheid dispossession
- Racial and gender discrimination
- Migrant labor
- Destruction of family life
- Income inequalities
- Extreme violence

Additionally, access to quality healthcare services for everyone is often marred by proximity to healthcare facilities, overcrowding, costs and numerous other circumstances and challenges noted by Harris *et al.*, (2011).

Gevers (2009) further notes the failure on the part of management and leadership to adequately implement what are otherwise very good healthcare policies and interventions. There's generally lack of pivotal facets of primary healthcare and a substantial human resources crisis in the health sector nationally. The HIV epidemic has not helped matters either but accelerated challenges and further strained the already burdened healthcare system.

In response to these challenges, several health policies and principles have been adopted by the South African government through the DoH to improve access to quality healthcare services. One such principle is the World Health Organization's (WHO) Sustainable Development Goal #3 which advocates promotion of wellbeing

and health living for all (SDG3, 2020). This principle provides targets for improvement of health globally by year 2030.

The South African government has also adopted the United Nation (UN) guidelines on Universal Health Coverage (UHC 2020), which is equivalent to the adopted and soon to be implemented NHI aimed at ensuring that all South Africans have access to needed health services (including prevention, promotion, treatment, rehabilitation and palliation) of sufficient quality, regardless of their financial status, (NHI, 2020). Once the NHI system is implemented, mine health facilities will become part thereof according to Balfour (2018).

Furthermore, the DoH launched an initiative known as “Re-engineering Primary Health Care” (rPHC) in 2010 which would focus more on a health-promoting community-based type of approach rather than simply availing primary healthcare without due consideration of community needs (NDH 2010).

1.2 The South African mining context

The mining industry remains a major player in the South African economy and is one of the significant contributors to the country's GDP. In 2018, the mining industry contributed 7.2% or R356 billion to the South African GDP which translated in R22 billions in tax revenue, R21 billion in Pay as You Earn (PAYE) contributions and 453,543 employed workers as published by the Minerals Council South Africa (2018).

Historically, employment in the SAMI has been characterized by migrant labor dating back to the 1880's when a resource recruitment network pact was signed with countries in the Southern Africa Development Community (SADC) region to recruit people to work on gold mines (Jeeves, 1985). Other migrant laborers came from rural outskirts of South Africa to work on mines and created communities around the vicinity of those mine as observed by Bank (1999).

Such migration of labor is widely known to have created unplanned communities around mining operations as this resulted in makeshift abodes which consequently contributed to scarcity of crucial services such as health care, according to Harington *et al* (2004). Mining communities/towns/camps are described by Sherman and

Sherman (1969) as communities that houses miners and are usually created around a mine or a quarry.

Management of the effects of migrant labor requires resolute and dedicated governance. The Mining Industry Occupational Safety and Health (MOSH) and South African Chamber of Mines (COM) are mining authorities that govern policy and operational standards in South Africa. Their main objective and target with regards to safety and health in the SAMI, is total elimination of fatalities and injuries and to achieve constant and continuous health improvement equivalent to current international benchmarks (Becker 2010).

In resolving the challenge of quality health care services in the SAMI, MHSC stakeholders namely, DMRE, Organized labor and the Employers (mines), are constantly exploring options to improve health care accessibility including the prospect of utilizing mine health facilities to service neighboring communities.

To this end, the Mining Industry TB and HIV Advisory Committee (MITHAC) embarked on a project to profile mine health facilities in the SAMI through a survey carried out between November 2014 and February 2015 by way of a questionnaire that was circulated to the mining houses for completion. The objective of the survey was to investigate the capacity and possibility of mine hospitals extending health care services to surrounding communities focusing on the following health care services:

- Antiretroviral Therapy (ART) support programs to spouses of mineworkers, families and communities.
- Prevention services on TB and HIV to immediate communities.
- The feasibility of rolling out molecular technology.

The survey gathered basic information on the profile of mine health facilities, quantity and size of these facilities, services provided and location of these health facilities relative to the communities around the mines. Although the survey gave a snapshot of the profile of existing mine health facilities, health care services available and challenges mining houses face with regards to extending health care to neighboring communities, the result of the survey, (i.e., HATS 150102), was inconclusive due to amongst others the following:

- o Lower than anticipated response rate.

- Low data quality with several errors.
- Respondents did not answer all questions.
- Incongruent responses to the same question.

It was recommended then that the MHSC conducts a more comprehensive survey in order to close the information gaps on the feasibility of mine health facilities to extend healthcare services to neighboring communities. Thus, this research study was commissioned with the intention to investigate and determine the type, scale and potential of mine health facilities to extend their health care services to surrounding communities in the SAMI.

1.3 Problem statement

1.3.1 Main problem

It is not clear whether mine health care facilities have the ability and capacity to provide required health care services to surrounding communities in the SAMI.

1.3.2 Sub problem

- a) Establish the type of health service the mine's health facilities currently provide to employees.
- b) Establish the manner in which health service is delivered to mine employees and ownership of these health facilities
- c) Establish the type and manner of health services provided by mines to surrounding communities' needs in terms of health services required.
- d) Establish the gap between health services rendered by the mines and services required by the communities
- e) Establish the potential for mines to extend health services to surrounding communities
- f) Establish the accessibility of surrounding communities to mine health service facilities
- g) Establish the limitations on extending health services to surrounding communities
- h) Establish the mines' willingness to extend health services to surrounding communities and the factors that would ease the extension of health services to surrounding communities

1.4 Significance of the research study

This study will add to the existing body of knowledge on the capacity of health facilities to service surrounding communities. The study outcomes will provide new information that will enable the stakeholders in the SAMI to increase the capacity of mine health facilities to provide a service to adjacent communities. The ultimate benefit of this study will be the achievement of safety and zero harm in the SAMI due to the increased health care capacity.

1.5 Delimitations of the research study

The scope of this study is limited to mine operations in the SAMI with health facilities such as clinics, mobile clinics, health centres and hospitals.

LITERATURE REVIEW

2.1 Introduction

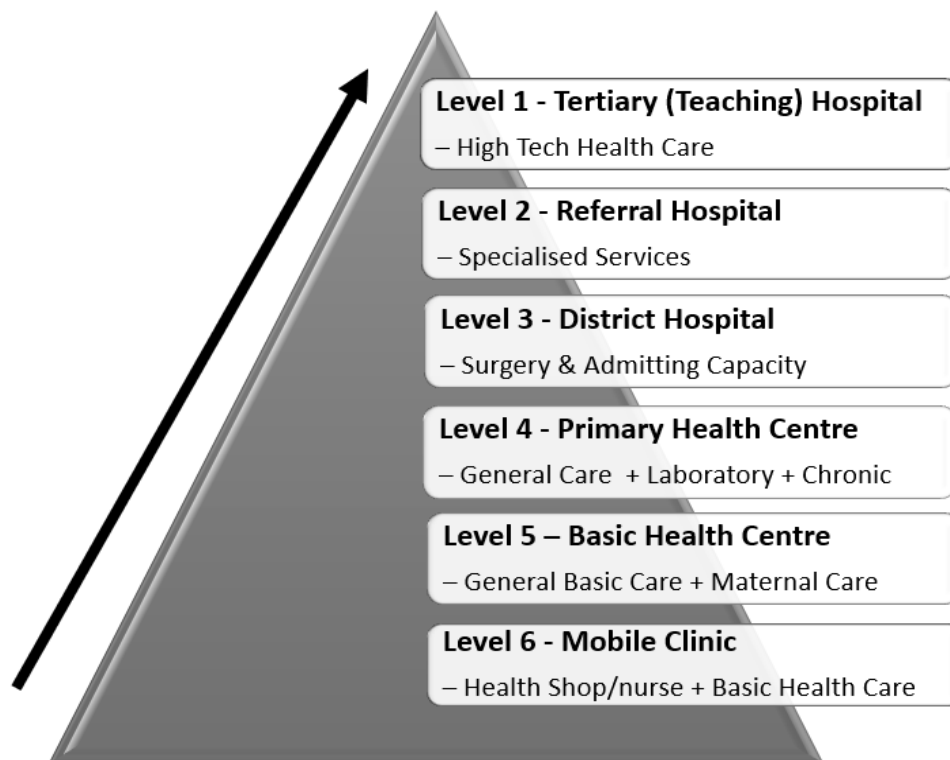
The provision of healthcare is widely documented in regulations and legislations across the world to guide on the minimum requirements for application in each country. This research presents an extension to the body of knowledge on the healthcare services available and healthcare provision by mining companies in the SAMI and internationally.

2.2 Health care services

Health care is described by Wax (2019) as the maintenance or improvement of health through the prevention, diagnosis, treatment, recovery or cure of any physical and mental impairments in people. Historically, mining operations that were dominated by communities of migrant labourers found themselves building and maintaining health infrastructure in form of mine hospitals and clinics to improve healthcare service capabilities of their workforce in the SAMI (Spicer 2003). However, the necessity of this provision has since become less mandatory with the capacitation of alternative healthcare provisions through increased public health facilities, healthcare outsourcing and other privately managed healthcare options such as medical aid cover schemes.

As with a previous survey study conducted by MITHAC on extension of mine healthcare services to surrounding communities conducted in 2014, (i.e., Project # HATS 150102), the healthcare service levels suggested by The SafeCare Foundation (2011) and presented in Figure 1 below have been adopted in this study.

Figure 1: Health care service levels



This tiered approach is a system of quality assurance standards to health service delivery ensuring that quality health services is efficiently distributed to cover the target population but also allows a referral system for complicated cases to be taken up the pyramid to specialist services that are usually located in district, referral or tertiary hospitals, Whittaker *et al* (1998).

The tiered approach to healthcare provision in Figure 1 can be summarized in 3 main components of healthcare service provision which are Primary Care (Level 4 – 6), Secondary Care (Level 3 & 2) and Tertiary Care (Level 1). It is expected that mining houses in the SAMI should make accessible health services equivalent to the category of primary health care, i.e., level 4-6, to their employees and to neighboring communities, potentially.

According to White (2015), Primary Health Care, also referred to as “Essential Health Care”, is the day-to-day healthcare given by a healthcare provider as the first point of contact and principal point of continuing care for patients within a healthcare system. The primary health care provider is then responsible for coordinating subsequent specialist care that the patient might need through a referrals system.

In the context of Occupational Health and Safety (OHS), occupational health care is the application of primary health care principles in an occupational setting, as explained by Rantanen (2005). Occupational health care is referred to as the services that assist the employers, workers, or their representatives to ensure that the workplace is safe and healthy according to accepted occupational safety and health guidelines and requirements, (Safeopedia, 2019).

2.3 Health care provision by mining companies in the SAMI

The provision of healthcare service at mines in South Africa is regulated by the Mine Health and Safety Act of 1996 (MHSAAct). Section 11 of the MHSAAct details responsibilities of the employer to provide occupational health screening and medical services. This entails provision of basic and primary occupational healthcare services to miners either on-site at mines or outsourcing such services to managed healthcare service providers such as private hospitals, specialist networks, emergency medical response teams, provincial and district health hospitals, according to Reiprich *et al* (2016).

Evidence can be found of provisioning of health services by South African mining companies mainly to employees and their immediate families and not to surrounding communities. Healthcare services commonly provisioned to surrounding communities is largely in the form of developmental and supportive projects done in partnership with the DoH through initiatives like the rPHC as is notable through a few published Social Labor Plan (SLP) reports of mining companies detailed later in this section.

A three-yearly study by the Minerals Council South Africa conducted in 2015 on its members to understand the shift in how health service is provisioned in South African mines pending the implementation of the NHI was captured by Balfour (2018). The following statistics and findings were published:

- ✓ Number of employees represented = 331,262

- ✓ Percentage of all mine workers covered = 74%
- ✓ Percentage of workers covered by Occupational Health Services = 100%
- ✓ Coverage of Emergency Care Services = 92.7%
- ✓ Primary Health Care Services coverage
 - 97.4% (Permanent Employees)
 - 54.5% (Contractors)
- ✓ Hospital In-patient Care coverage
 - 90.7% (Permanent Employees)
 - 38.3% (Contractors)
- ✓ Percentage of employees on medical aid = 61%
- ✓ Coverage of TB screening and HIV counselling services = 100%

The result from the sampled survey indicates that occupational healthcare and emergency services are provided to all employees either directly or in form of contributions to medical aid schemes. The study further shows that primary health care, hospital in-patient care, TB screening and HIV counselling services are provided to employees and contractors. This study conclusively shows that where mining operations provide health care services in South Africa, most if not all the workers at these operations have access to such services.

The case of Anglo-American, the world's largest producer of platinum, provides an absolute scenario of healthcare service provision by large mining companies in South Africa. This company provides direct access to healthcare for their employees and contractors through on-campus occupational healthcare facilities, health promotion programs, disease management initiatives, on-site emergency medical care and public health to families of employees. Anglo America also engages in support and developmental projects and activities to promote healthcare in neighboring communities, (AAPIC 2020).

For instance, Anglo American declared ongoing projects, in their 2017 SLP, to improve health services in schools through procurement and establishment of mobile clinics, supply of emergency and planned patient transport (Ambulances), capacitation of community home base care programs and primary health care clinics around the

Mogalakwena and Twickenham mining communities in Limpopo province, (AASLP 2017).

Other similar support and developmental projects by Anglo American were declared in the 2015 SLP for their Rustenburg PSA mining community regarding the procurement of patient transport for maternal and obstetrics as well as contribution to the expansion of health promotion and disease prevention programs in HIV, TB, hypertension and diabetes, (AASLP 2015).

Another classic example of the model for provisioning of healthcare services by large South African mining companies can be found at Sibanye Stillwater, the largest individual producer of gold from South Africa. As the case with Anglo American, they too provide direct healthcare to their employees and their families through their medical stations and also support developmental projects towards healthcare improvement of neighboring communities. Employees have access to occupational health resources, shaft clinics close to the workplace, satellite primary healthcare clinics, 24/7 primary healthcare centers, emergency medical services, hospital networks offering specialized care and medical aid schemes (SSW 2020).

Similarly, Sibanye Stillwater declared projects aimed at improving healthcare services in neighboring communities in their 2019 SLP. Such projects include provision of two mobile clinics and procurement of emergency patient transport for maternity and obstetric (Ambulances) in Rustenburg, construction of a Forensic Pathology Service (Mortuary) in Brits and conversion of Marikana Clinic into a community health center, (SSWSLP 2019).

The model of healthcare service provision by South African mining houses such as Anglo-American and Sibanye Stillwater discussed above is consistent across the SAMI for other large-scale mining companies like BHP Billiton, Rio Tinto, Anglo-American and Kumba Iron Ore, which are all members of the Minerals Council. Evidence of healthcare service provision by small-scale mining companies is not readily available except for instances of strategic social investment contribution to community health and environmental projects where they operate. An example can be found at Lafarge Holcim where the company corroborated with the community and the DoH to finance mobile clinics in 2016, (Lafarge 2016).

Although mining companies do not generally provide healthcare services to surrounding communities, the advent of the Covid-19 pandemic at the beginning of year 2020 has seen some mining houses pledging and indicating willingness to offer their health infrastructure and services to surrounding communities in South Africa.

Hall (2020) reported that AngloGold Ashanti had donated two hospitals to the provincial governments of the Northwest and Gauteng, respectively, to help the DoH as they battle with the Covid-19 pandemic. The two hospitals would create a combined capacity of over 500 beds and the much-needed fully-fledged intensive care unit facilities, (Dintwa 2020). The other mining house which has since opened its health infrastructure and services to its employees and the neighboring community for Covid-19 medical treatment is the Royal Bafokeng Platinum in collaboration with the Northwest provincial DoH, (Phiri 2020).

2.4 Health care provision by mining companies in other developing countries

Cognate to the South African mining context, provision of healthcare services by mining companies to neighboring communities is largely driven by the regulatory framework of individual jurisdictions and overall, in-country health system requirements in developing countries. The OHS mandate is governed by different authorities specific to in-country regulations such as the ministry of health, labor, home affairs and OHS authorities, according to Reiprich *et al* (2016). In cases where health care services are extended to communities, mining houses usually do so in collaboration and coordination with in-country authorities and based on socio-economic needs of neighboring communities. In most instances, this is done on a project-by-project basis and is usually in fulfilment of some form of commitment to Corporate Social Responsibilities (CSR) and/or Corporate Social Investment (CSI).

An example of such activities and collaborations is that of Debswana Diamond Company owned by the government of the Republic of Botswana and the De Beers group of companies in equal shares. Through the company's Orapa, Letlhakane & Damtshaa Mines (OLDM) Health Services department and the Jwaneng Hospital & Clinics, Debswana is mandated to provide affordable and quality health care to their employees, their dependents and the general community, (Debswana 2020). These hospitals also serve as referral hospitals to less capacitated health facilities around them. Debswana further invests in health and welfare programs around Botswana as

is available in their declaration of 1.5 million Pula in expenditure on such projects in 2013, (Debswana 2013).

It can be argued though that Debswana's provision of health care services to surrounding communities is due to the 50% ownership interest that the Republic of Botswana's has in the company and not so much as a result of common CSR. This argument is backed by unavailability of evidence to show provision of healthcare services to surrounding communities by other diamond mines such as Korowe Diamond Mine and the recently liquidated Lerala Diamond Mine which are wholly privately owned. If that were the norm in Botswana, evidence of provision of health care to surrounding communities would have been published.

Another piece of evidence can be found in Namanhumbir, northern Mozambique, where Montepuez Ruby Mining (MRM), a subsidiary of the Gemfields Group of companies recently inaugurated two mobile health clinics to provide free medical care for locals as part of the group's commitment to community development in areas where they operate and in partnership with the government of Mozambique, according to the MRM (2018). The deal between the government of Mozambique and MRM was for the later to acquire the mobile clinics, the necessary equipment and cover the operating costs, while the government provides the medical team, medicines and consumables (MRM (2018).

Zambia provides a good example of a centralized and regulated health system in which healthcare provision is done is coordination between the Occupational Health and Safety Institute (OHSI) and the Ministry of Health. OHSI is both a regulatory body and service provider under the Ministry of Health and is wholly owned by the government of the Republic of Zambia, (OHSI 2020). Since mining accounts for over 12% of GDP on average and contributes significantly to Zambia's employment, mining houses are expected to provide accessible health care to the general public over and above their own workforce (Chongo 2018).

Mining companies such as Konkola Copper Mines (KCM) PLC and Kansanshi Mining PLC, a subsidiary of First Quantum Minerals Ltd (FQM) provide healthcare to their employees and surrounding communities through Nchanga South Hospital (KCM 2020) and Kansanshi Mine Clinic (FQM 2013) respectively. Kansanshi Mine has

further built several other health facilities like urban and rural health centers, rural health posts, urban clinics and renovated prison health facilities for use by neighboring communities (FQM 2013).

Katanga Mining Ltd in the Democratic Republic of the Congo (DRC) has adopted more of a community development project initiatives approach in collaboration with government. Such initiatives include rehabilitation of existing health facilities, training of medical staff found in referral hospitals and local health centers, awareness initiatives in communities, periodic drugs donation and assistance to vaccination campaigns in urban and rural areas, (Katanga, 2020). A similar approach is adopted by Golden Star Resources of Ghana where they have contributed to health care provisioning through funding of health facility infrastructure and wellbeing programs for their employees and stakeholder communities, (WGC 2012).

2.5 Health care provision by mining companies in developed countries

Provision and accessibility of healthcare in the mining industry presents a different scenario for first worlds like Canada, the United States of America (USA) and Australia. As indicated earlier, provision of health care by mining operations to employees and communities is guided by the regulatory environment of each country alongside the health care landscape.

Healthcare for miners and mining communities is covered under national health insurance in both Canada (Noble 2015) and in USA as detailed in section 27 of the American Miners Act of 2019 (AMA 2019). Mining companies are not mandated by regulation to provide healthcare for neighboring communities. The community contribution to health care development is done according to the Ontario Mining Association's community engagement declaration made in 2012 (OMA, 2012).

The mining industry in the first worlds is more focused on the responsible mining kind of approaches that engage with surrounding communities, drive world class environmental practices and commit to occupational safety and health of employees and neighboring communities (TSM 2020). Such approaches are believed to lessen the burden of ill-health that mining operations might impact on communities and the general health care system.

2.6 Conclusion of literature review

The review of literature presented in preceding sections of this document has provided insights into key elements of healthcare, healthcare service, healthcare delivery and overarching guidelines for provision and accessibility of healthcare service in the SAMI.

It has been determined from the literature that provision of health care services by mining companies to neighboring communities is largely driven by the regulatory framework of individual jurisdictions and the overall functioning of in-country health systems available at national level in each country globally.

Mining companies in developed economies have less responsibility towards provision of health care to surrounding communities compared to those in developing economies due to the self-sufficiency of their health care systems. In cases where health care service is extended to communities, mining companies usually do so through developmental projects in collaboration and coordination with resident authorities and based on individual socio-economic needs of neighboring communities.

The review of literature indicates that mining companies in the SAMI generally provide primary health care for employees and their immediate families through health facilities, hospitals, clinics, medical aid cover schemes and various healthcare programs within and around mining operations. No evidence can be found in literature of mine health facilities being open to neighboring communities for accessibility of healthcare services in the SAMI except for the recently announced pledges by some mining companies to extend their health infrastructure and services to surrounding communities to battle the Covid-19 pandemic.

However, evidence can be found in literature of willingness by mining companies to participate in socio-economic activities through community-development led projects. This is done through infrastructure funding of public health initiatives in collaboration with the DoH for surrounding mining communities away from mining operations. In most instances, this is done in fulfilment of CSR and CSI commitments or to honor declarations made in the SLP for compliance purposes on the part of mining companies.

2.7 Proposition

It is clear from the literature review that mining houses in the SAMI do not offer healthcare services to the community, except through community development programs. While the main reason for not providing healthcare services to surrounding communities could be due to the fact that health service provision is non-core business to mining houses, it could also be due to lack of capacity. It is therefore proposed that:

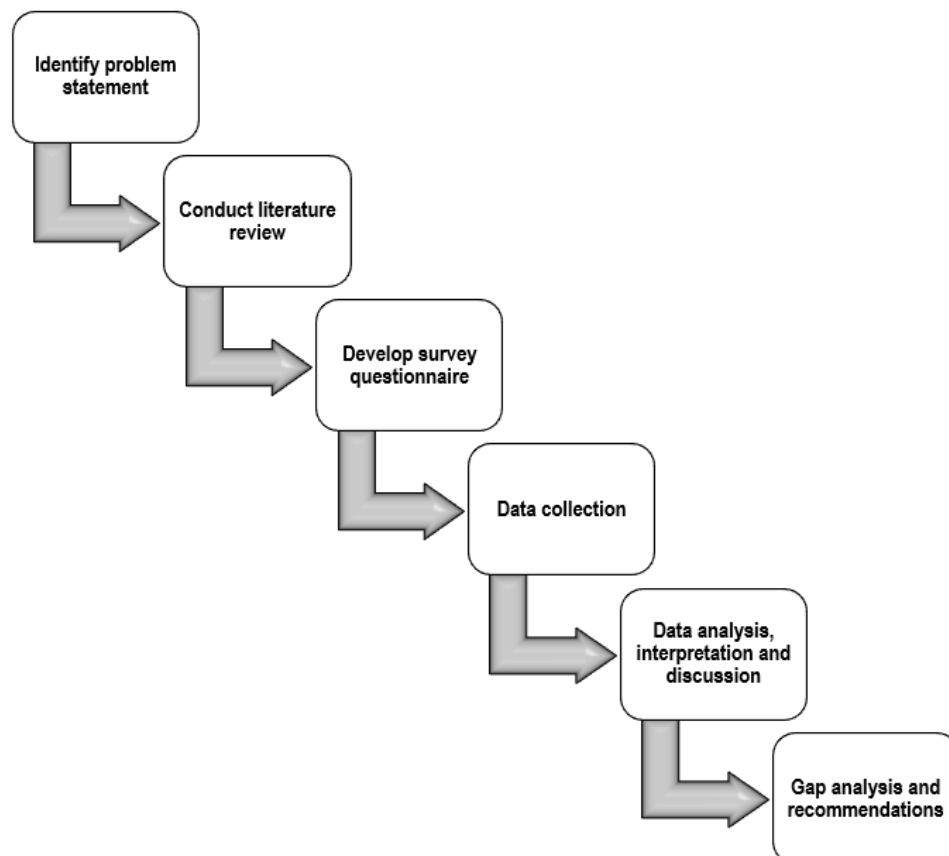
Proposition 1 - Mine health facilities in the SAMI, do not have the capacity to provide healthcare services required by surrounding communities.

RESEARCH METHODOLOGY

3.1 Research process

As presented diagrammatically in Figure 2 below, the first step in the research process, after identifying the problem statement, was to comprehensively review the literature available on the provision of healthcare services by mining companies to adjacent communities globally.

Figure 2: The research process



It was necessary to go through this step to understand the empirical evidence and knowledge available in this field to help explain the result. Literature review sources for the study were from peer-reviewed academic journals in order to prove authenticity of available theory. Other sources included textbooks, medical journals, and health authorities in the SAMI.

The literature review led to the formulation of a proposition which needed to be tested in the SAMI. The following step then was to establish the most appropriate research method that would evaluate the proposition. This step included designing appropriate survey and interview questions to collect data for the study at hand.

The collection of data was then implemented using telephonic interviews, email communications and face to face interviews. The next step was to analyze the collected data followed by presentation, interpretation, and discussion thereof. The Number Crunching Statistical System version 12 (NCSS) was used predominantly for statistical analysis. The interpretation of results was purely based on the outcomes of the analysis of the collected data and input from the literature review. Recommendations were drawn from the interpreted results that had shown some gaps in the provision of healthcare services by mining companies to adjacent communities.

3.2 Research design

A combination of the exploratory and causal research study was conducted on to investigate and determine the type, scale and potential of mine health facilities to extend their health care services to surrounding communities in the SAMI and to explain the causal effects of the capacity or lack thereof.

According to Van Wyk (2014) exploratory research is designed for those projects that are addressing a subject about which there are high levels of uncertainty and lack of clarity about a phenomenon. In the case of this study, it was not clear how much capacity exists at mine health facilities and their ability to service surrounding communities. The exploratory nature of the study provided clarity into this uncertainty. The causal effect of the capacity or lack thereof of mine health facilities and their ability to service surrounding communities was explained using the causal method of research. Causal research attempts to reveal the cause and effects of given variables (Fluid Surveys Team (2014).

The quantitative method of research was implored in this study due to the credibility and appropriateness given the constraints introduced by the COVID-19 pandemic. This method was used to quantify the capacity of mine health facilities to service adjacent communities in the SAMI. The quantitative method was particularly chosen due to its inherent quality of objectivity, measurability, reliability, and validity with very little room for subjectivity (Johnson and Christensen 2008; Litchman 2006).

To affirm findings from the quantitative survey, the qualitative method was used to solicit an in-depth understanding of all the variables in the study pertaining to the capacity of mine health facilities in as far as their ability to accommodate surrounding communities. The qualitative research method probes the why's and how's of a specific action thereby providing insight into what governs certain outcomes (Litchman 2006).

The information collected was used to profile the participating mining operations, the healthcare services offered and not offered, the manner in which healthcare services are provided, ownership of health facilities, accessibility of mine health facilities to the communities, willingness to extend healthcare services and limiting and enabling factors to extension of mine healthcare services to adjacent communities.

3.3 Population and sample for the survey study

As the focus of this study is on the primary health care services that could potentially be extended to neighbouring communities, the target population was mine operations in the SAMI with health facilities such as clinics, mobile clinics, health centres and hospitals.

The target sample for the study was prescribed in the ToR for this research project and was a minimum of ten mines represented as follows:

- 2 Gold mines: 1x in Free State (FS) and 1x in the West Rand Gauteng (GP)
- 2 Platinum mines: 1x in Northwest (NW) and 1x in Limpopo
- 4 Coal mines: 2x in Mpumalanga (MP); 1x in KwaZulu Natal (KZN) and 1x in Limpopo (LP)
- 2 Small scale mines: 2x in Northern Cape (NC)

The actual number of mining operations surveyed was a total of twelve mining houses with sixteen mine health facilities representing three gold mine operations, three platinum mine operations, five coal mine operations, three diamond mine operations, one aggregates mine operation, and one zinc mine operation from eight provinces as presented in Table 1 below. All the mine operations represented in the sample have health facilities such as clinics, mobile clinics and health centres.

Judgemental sampling had been used to select mining operations which operate health facilities such as clinics, mobile clinics and health centres. Judgemental sampling involves selecting a target group which has traits required to answer a research question (FairFax County 2003).

The sampled mining operations responded to the questionnaire satisfactorily achieving a 100% rate of return which is way beyond the 30% minimum recommended satisfactory questionnaire rate of return according to Emory and Cooper (1991).

Despite the potential mobility limitation that the COVID-19 pandemic paused, the survey exercise resulted in the collection of the data required for this research study. Overall, the representative sample was broad enough to yield results that can be generalized to the rest of the mining operations.

Table 1: Mine health facilities surveyed

No.	Mining Group	Mine Health Facility	Contact Person	Contact Number	Email Address	Collection Date
1	Sasol Mining (Pty) Ltd	Sasol Health Secunda	Papi Mzizi (OH)	017 614 8100/; 083 469 3136	papi.mzizi@sasol.com	25 th Aug 2020
2	Tharisa Minerals (Pty) Ltd	Tharisa Health Facility	Dr Mel Mentz (OMP)	087 463 0660; 083 653 1080	mel.mentz@platinumhealth.co.za	4 th Sep 2020
3	Lafarge Mining SA	Occupational Clinic	Maryna Louw (OHP)	021 904 1600; 083 740 4014	maryna.louw@lafargeholcium.com	8 th Sep 2020
4	Harmony Gold Mining Company	Moab Khotsong Medical Hub	Tandi Mashupi (OHP)	018 478 4725; 082 564 4883	tandi.mashupi@harmony.co.za	11 th Sep 2020
5	Petra Diamonds SA	Koffiefontein Mine Clinic	Jacques Oosthuyzen (OH)	012 305 2911; 060 570 7399	jacques.oosthuyzen@petradiamonds.com	14 th Sep 20
6	Sasol Mining (Pty) Ltd	Sasol Medical Center	Dr Rammutla-Chechi OMP	016 920 5513; 076 856 3500	tlourammutla-chechi@sasol.com	25 th Aug 20
7	Exxaro Minerals and Resources	Grootegeeluk Occ Health Centre	Nomthetho Mpepe (CHF)	014 763 9714; 083 453 5647	nomthetho.mpepe@exxaro.com	19 th Aug 20
8	Anglo American Platinum	Mogalakwena Mine Clinic	Retha Wolmarans (OH)	015 418 2014; 082 771 1707	retha.wolmarans@angloamerican.com	17 th Nov 20
9	Exxaro Minerals and Resources	Medicare Clinic	Poupienah Makgatho (OH)	012 307 4653; 067 883 6319	poupienah.makgatho@exxaro.com	25 th Aug 20
10	Royal Bafokeng Platinum	Bafokeng Rasemone Platinum	Dr Ridwaan Ibrahim (OMP)	014 573 1323; 083 444 0021	ribrahim@bafokengplatinum.com	27 th Aug 20
11	Petra Diamonds SA	Lime Acres Medical Centre	Jacques Oosthuyzen (OH)	012 305 2911; '060 570 7399	jacques.oosthuyzen@petradiamonds.com	14 th Sep 20
12	Vedanta Resources	Life Healthcare	Emmanuel Mudzviti (OH)	061 674 0211; 084 567 7476	mudzvitie@blackmountain.co.za	11 th Sep 2020
13	Sibanye Stillwater	Betrix Clinic	Maggy Mahlasela (OH)	057 232 2165; 083 300 7774	maggy.mahalasela@sibanyestillwater.com	21 st Sep 20
14	Blyvoor Gold Mining Co Ltd	Medical Station	Motsumi Thlapi (OH)	018 013 0041; 072 193 9178	motsumi@blyvoorgold.com	28 th Sep 20
15	Petra Diamonds SA	State Clinic Cullinan	Jacques Oosthuyzen (OH)	012 305 2911; 060 570 7399	jacques.oosthuyzen@petradiamonds.com	14 th Sep 20
16	Buffalo Coal Dundee	Occupational Health Centre	Lefty Mkwana (OH)	034 212 1455 ; 083 443 8577	lefty.mkhwanazi@buffalocoal.co.za	10 th Sep 20

3.4 Research instrument

For consistency's sake, the similar research instrument used in a 2014 MITHAC study was used in the current study, albeit enhanced to cover all the research outputs stipulated in the ToR for this study. The data was collected from the mine health facilities using the "Data Collection Framework" or questionnaire attached as Annexure 1. The questionnaire was classified under the following subsections:

1. General Information
2. Health service profile of mine health facilities

The general information section was used to identify the location, size, commodity, and type of the sampled mine health facilities in the study. This information helped to analyse the sample and gave comparative insights into the capacity of mine health facilities to service surrounding communities in the SAMI.

The section on the profile of mine health facilities was used to collect data on the health services offered and utilisation thereof, including chronic medication and medical aid cover, accessibility of health facilities to surrounding communities, ownership of health facilities and willingness to extend health service to surrounding communities and challenges faced by health facilities. This information was used to determine the capacity of mine health facilities to service surrounding communities.

3.5 Questionnaire administration process

It was necessary to administer the research in order to maximise responses from respondents. An introductory letter attached as Appendix A, issued by the MHSC was provided and explained to the respondents at initial contact. The introductory letter detailed what the study was all about and explained the use of the data requested and encouraged the respondents to assist by provisioning data for the study.

3.6 Data collection procedure

Due to limitations imposed by the impact of the COVID-19 pandemic, the following data collection procedure was adopted for the survey to ensure that all social distancing regulations were observed:

1. Contact details of participants at target mine were sourced.

2. The researcher then contacted the respondents telephonically to introduce the research project and what was required of them.
3. The telephonic introduction was followed by an email reiterating the telephonic communication and attaching the introductory letter as well as the questionnaire.
4. The researcher allowed a day or two for the respondents to peruse through the questionnaire after which the researcher contacted the respondents telephonically again to discuss how the respondents preferred to respond to the questionnaire. The available options were to respond either via email after completion of the questionnaire, or by telephonic interview or through face-to-face interview.
5. Based on the option preferred by the respondents, the researcher then proceeded to collect the required data accordingly.
6. Secondary data was also collected from other research sources and government departments such as the minerals council South Africa, the DMRE and published data for selected mining houses.

In line with social distance protocols, fifteen respondents preferred telephonic interviews and email communications while only one respondent from a platinum mine health facility in Northwest province preferred face to face interviews. The designation of respondents at all sixteen mine health facilities was the resource responsible for the day-to-day operations of the health facility.

The survey was conducted between August 2020 and September 2020 with follow-ups in subsequent months. Table 2 below shows the key variables included in the data survey.

Table 2: Key data variables surveyed

Data Components		Key Variables	Response Rate
Health Services Available	Health Service Levels Available	Mobile Clinic	100% (n=16)
		Basic Healthcare	
		Primary Healthcare	
		District Hospital (Outsourced)	
		Referral Hospital (Outsourced)	
		Tertiary Hospital (Outsourced)	
	Health Services Offered	TB & HIV Services	
		Diabetes & Hypertension Services	
		Chronic Medication	
		Emergency Services	
	Medical Aid Cover	Optional	
Compulsory			
Willingness to Expand Health Service		Absolute willingness	100% (n=16)
		Conditional Willingness	
		Unwillingness	
Health Facility Challenges		Limiting factors to expansion	100% (n=16)
		Services not provided	
		Expansion possibilities	
Accessibility of Health Facilities		Less than 5km	100% (n=16)
		Between 6km and 10 km	
		More than 11km	
Facility Ownership		Private	100% (n=16)
		Outsourced	

3.7 Data processing

Once all the data was collected, it was transposed onto MS Excel and NCSS for processing. To ensure completeness of data in cases where the respondents responded via email and omitted some detail, the researcher contacted the interviewee telephonically to follow up and clarify the missing data.

All variables were consolidated as per the Data Collection Framework except for the “Number of Permanent Employees” and the “Number of Contractors” variables which were coded in form of range to denote the size of the operation. Operations with less than 1000 employees were categorised as small. Operations with employees between 1001 and 10,000 were categorised as medium with operations of more than 10,001 employees were categorised as large. The distance between the nearest public hospital and the mining community and between the mine health facility and the nearest adjacent community were also coded in ranges of less than 5km, between 6km and 10km and more than 11km.

Regarding the general details of each mine health facility, respondents were requested to indicate what type of the facility it was and what level of health care service was available. Options included whether a facility was a hospital or a mine health facility and whether the service available was at any of the following levels:

- Tertiary level with high-tech health care
- Referral level with specialised services
- District hospital level with surgery and admitting capacity
- Primary health care level with general care, laboratory and chronic care
- Basic health care level with general basic care and maternal care
- Mobile clinic with a health shop, a nurse and basic health care

Respondents were requested to indicate availability of health care services at the facility ranging from TB screening, diagnostic, counselling and treatment services, HIV prevention, counselling, testing and ART treatment services, emergency response and provision of chronic medication. Interviewees needed to respond in affirmation whether these health care services were available onsite, through mobile services or outsourced and the rate of utilisation of those services. They also needed to affirm whether these services were available to employees, families of employees, to the communities free of charge or at cost.

On the extension of services to surrounding communities, questions regarding challenges and opportunities were open ended and qualitative in nature except for where a facility was asked to indicate the willingness to extend health services to communities. Available options were absolute willingness, conditional willingness or unwillingness.

The data collected was analysed using the following statistical techniques:

- Multivariate analysis method was used to clarify the various variables related to the health services available in the SAMI
- Inference statistics method was used to infer the capacity of mine health facilities to service surrounding communities based on the distribution of key variables for the study
- Comparative statistics method was used to compare datasets across the mine health facilities represented in the sample to determine consistency amongst them

- Confirmatory statistics method was used to validate the survey result against the literature review base presented in milestone 2 of this study
- Frequency distributions method was used to display the frequency of outcomes for all the variables in the survey

Where some variables were not provided, i.e., percentage number of employees covered or not covered under medical aid, it was inferred that 100% of employees were covered if medical aid cover is compulsory.

3.8 Limitations of the study

The only limitation identified in this study was the constraints imposed as a result of the Covid-19 pandemic. As indicated earlier, the majority of the respondents in this study preferred other methods of interaction with the researcher than face to face in order to observe social distancing. While the data collected in this manner provided insights into the capacity of mine health facilities to service surrounding communities in the SAMI, the likelihood that the sample might have shown a different result had the researcher collected the data face to face cannot be ruled out especially that some variables such as accessibility of mine health facilities and health facility challenges required validation by observation by the researcher.

3.9 Validity and reliability

Measures were taken to ensure that reliability, internal and external validity of this research study was upheld. External validity is the degree to which conclusions in a particular study would hold for other situations in other places and at other times, according to Wainer and Braun (1998). In this study, two issues had been identified as potential threats to the external validity of the outcome, one of which is alluded to in the limitations section earlier. Firstly, the fact that the majority of the data collected virtually with no face to face contact due to the Covid-19 social distancing protocols from respondents who were willing to engage would reduce generalisability to the rest of the SAMI and therefore the validity of the study. However, this risk was mitigated by including a fair representation of all types of mining operations stipulated in the ToR which represented all major commodity sector types in the SAMI.

Internal validity explains the extent to which the design of the instrument and the data produced by the instrument can accurately allow the researcher to conclude the cause,

effect and other relationships within the data collected and analysed (Wainer and Braun 1998). Internal validity in this study was achieved by constructing questionnaires and interviews in such a manner that there was no ambiguity in the interpretation and that questions were not vague or leading. This made it easy for the respondents to understand what was required of them and responded appropriately. The outcome was that the responses from questionnaires enabled the researcher to decipher the data and answer the research question.

Reliability of research output is referred to by Kirk and Miller (1986) as firstly, the degree to which a measurement gives the same response repeatedly; secondly, the stability of a measure over time and thirdly, the similarity of measurement within a given time period. The reliability of result in this study is specific and only true for a time frame by which it may not be applicable thereafter as mining houses might improve capabilities in their health care facilities to service surrounding communities thereby negating findings in this study. The result will remain constant if nothing changes in the current status quo.

3.10 Ethical considerations

The survey was conducted within specified research guidelines of the MHSC. The nature of research did not require soliciting sensitive information and had no environmental implications whatsoever. There was no personal identification of individuals with some of the variables being presented in terms of ranges. While there was potential for omission, reasonable attempts were made beforehand to inform the respondents what the information would be used for.

SURVEY RESULTS PRESENTATION AND ANALYSIS

4.1 Introduction

Results obtained from statistical analysis of questionnaires and interviews are presented in this section. The statistical information collected from questionnaires and interviews was used to analyze the capacity of mine health facilities to service neighbouring communities in the SAMI. Results from Descriptive Statistics, Frequency Distributions and Interpretive Statistics are also presented in this section.

As indicated earlier, although the target population for this survey study was a minimum of 10 mines based on the ToR for project, the actual total number of mines sampled were 16 which was a response rate of 160% representing the following commodities and provinces:

- 3 Gold mines: 1x in Free State; 1x in the West Rand and 1x in Northwest
- 3 Platinum mines: 2x in Northwest and 1x in Limpopo
- 5 Coal mines: 2x in Mpumalanga; 1x in KwaZulu Natal (KZN); 1x in Limpopo and 1x in Free State
- 2 Diamond mines: 1x in Free State and 1x in Gauteng
- 3 Small scale mines: 2x in Northern Cape and 1x in Western Cape

4.2 Profile of mine health facilities

The data collected on the profile of mine health facilities consisted of information on the type of commodities by province, the type of mine in terms of operations, the size of the mine in terms of the total number of permanent employees and contractors, ownership of the mine health facility and medical insurance cover available to employees.

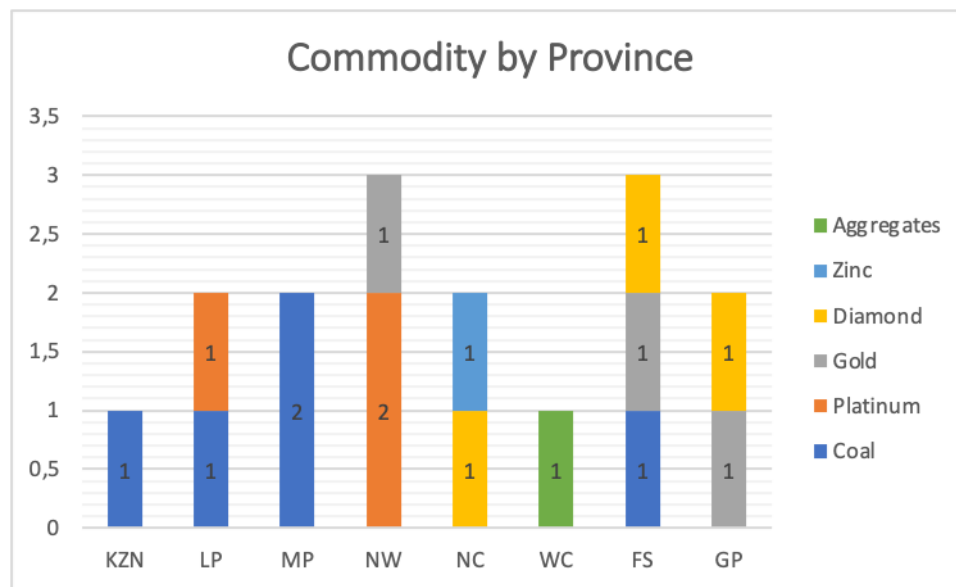
The statistics collected on the mine health facility profile are presented in Figures 3-7 below. The type of mine, size of the mine operation, ownership of the mine and the medical insurance cover available to employees are presented by commodity and location of mining operation.

Commodity by province

Figure 3 shows the distribution of commodities by province available for the mine health facilities represented in the sample collected. The spread of the commodities in the sample indicates that the highest representation is coal (n=5; 31%), followed by gold (n=3; 19%), platinum (n=3; 19%) and diamond (n=3; 19%) with the least representation being zinc (n=1; 6%) and aggregates (n=1; 6%).

The majority representation of coal, gold, platinum and diamond in the sample was expected as this is consistent with the facts issued by the Minerals Council SA (2020) showing that coal, gold, platinum and diamond are the major mining sectors in South African. As such, it is probable that communities surrounding these mining sectors are concentrated and need basic services such as quality healthcare.

Figure 3: Commodity by province

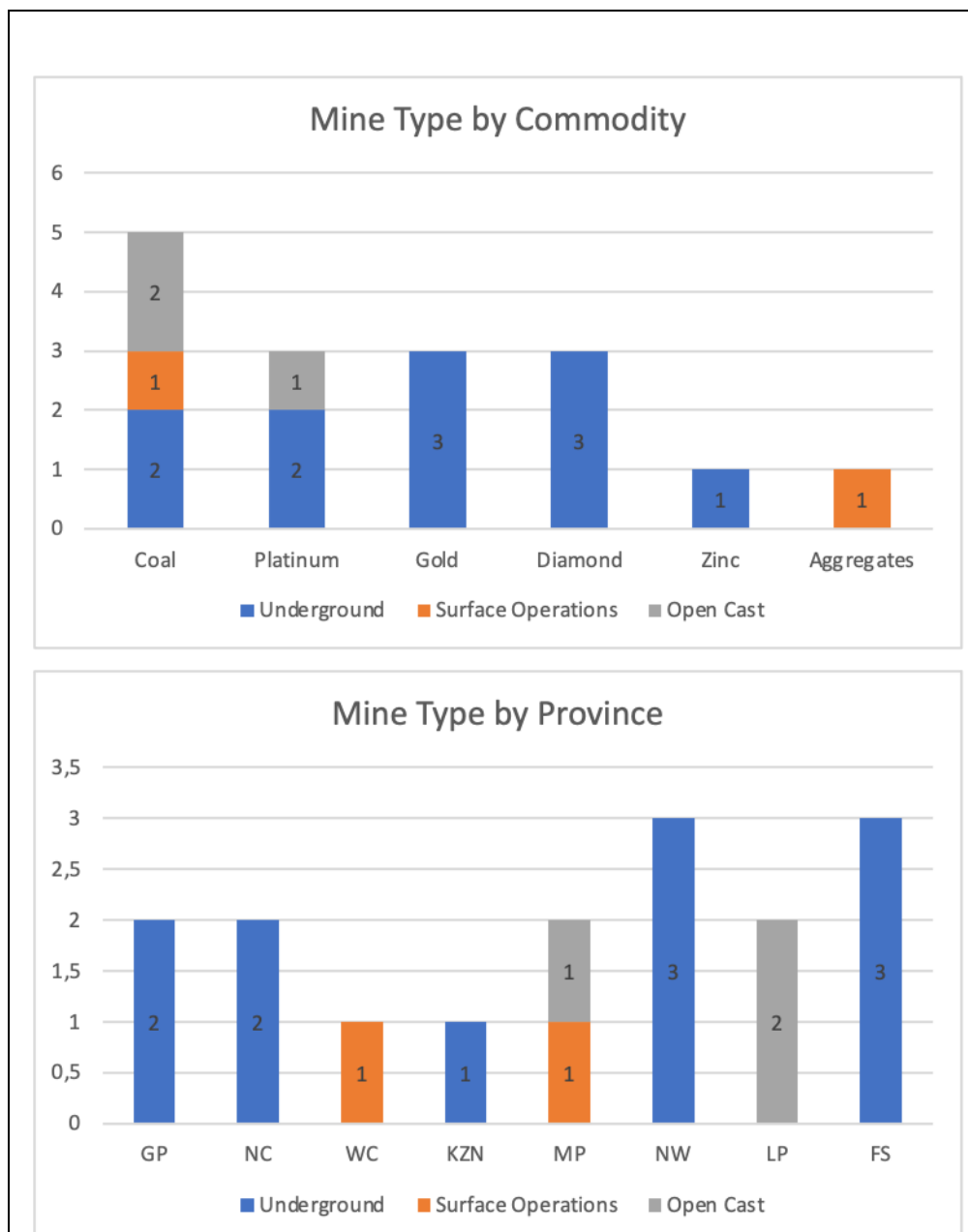


Mine type

Figure 4 shows that the highest representation of mine types included in the sample is underground (n=11) followed by open cast (n=3) and surface operations (n=2). It would be expected that underground mining would be the most frequently sampled mining type in South Africa given that this method is used to mine gold, diamond, platinum and coal, in some instances, according to Siyavula (2020). The highest representation is spread across Free State, Northwest, Gauteng and Northern Cape provinces.

Underground mining is exceedingly dangerous compared to open cast and surface mining due to the risk of high exposure to mining dust which has negative impacts on the health of both employees and their surrounding communities (Stewart 2020). Due to the health impact on surrounding communities, mining operations should assist in the provision of quality healthcare in remediation.

Figure 4: Mine type

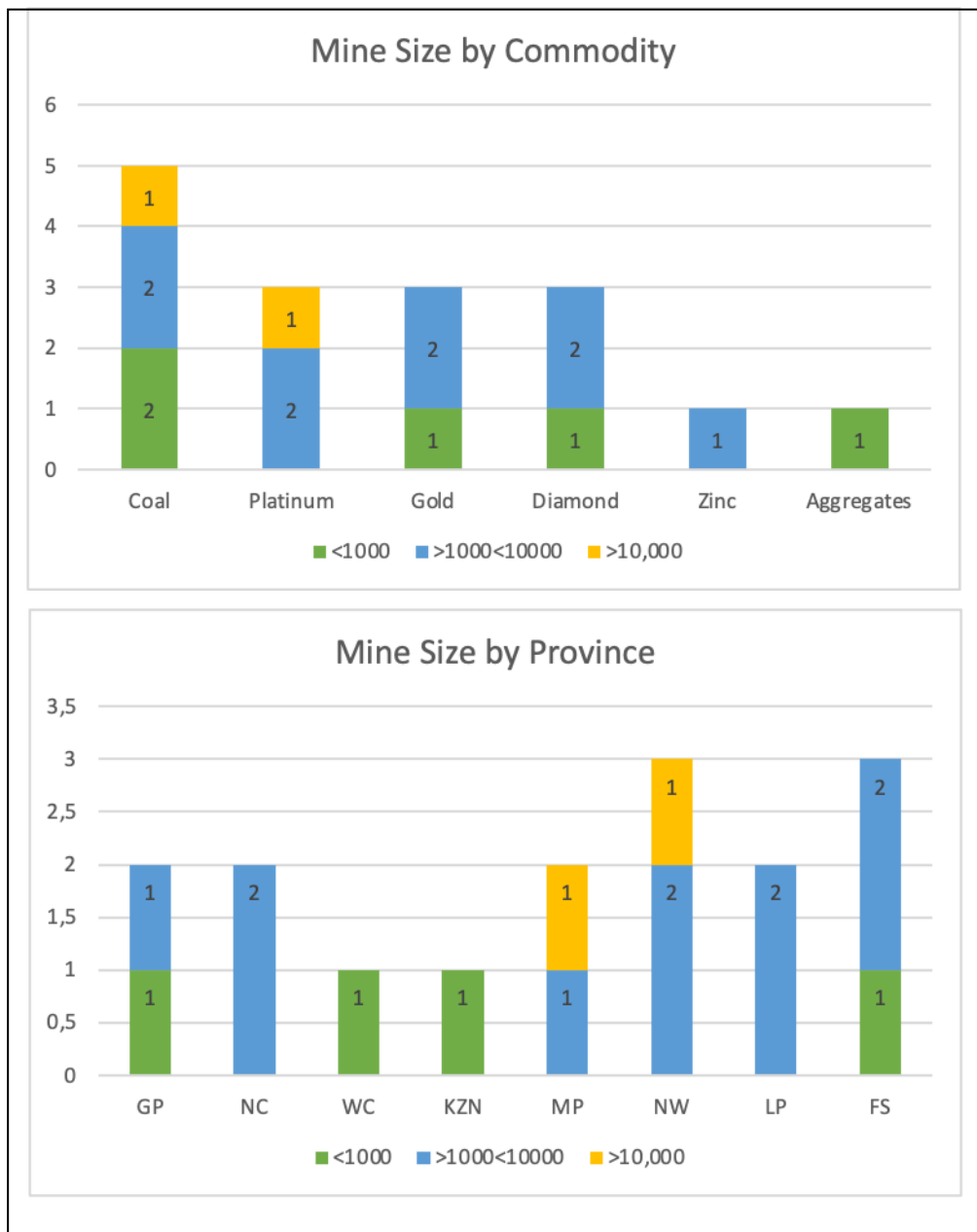


Mine operation size

Figure 5 shows the sample distribution of mining operations by size in terms of total number of employees and contractors.

The results show that the size of 56% (n=9) of the sample is between 1,000 and 10,000 employees and contractors. This bracket represents the majority of mining operation in South Africa. This could be attributed to the fact that South Africa is an upper-middle economy (Bloomberg 2009).

Figure 5: Mine operation size

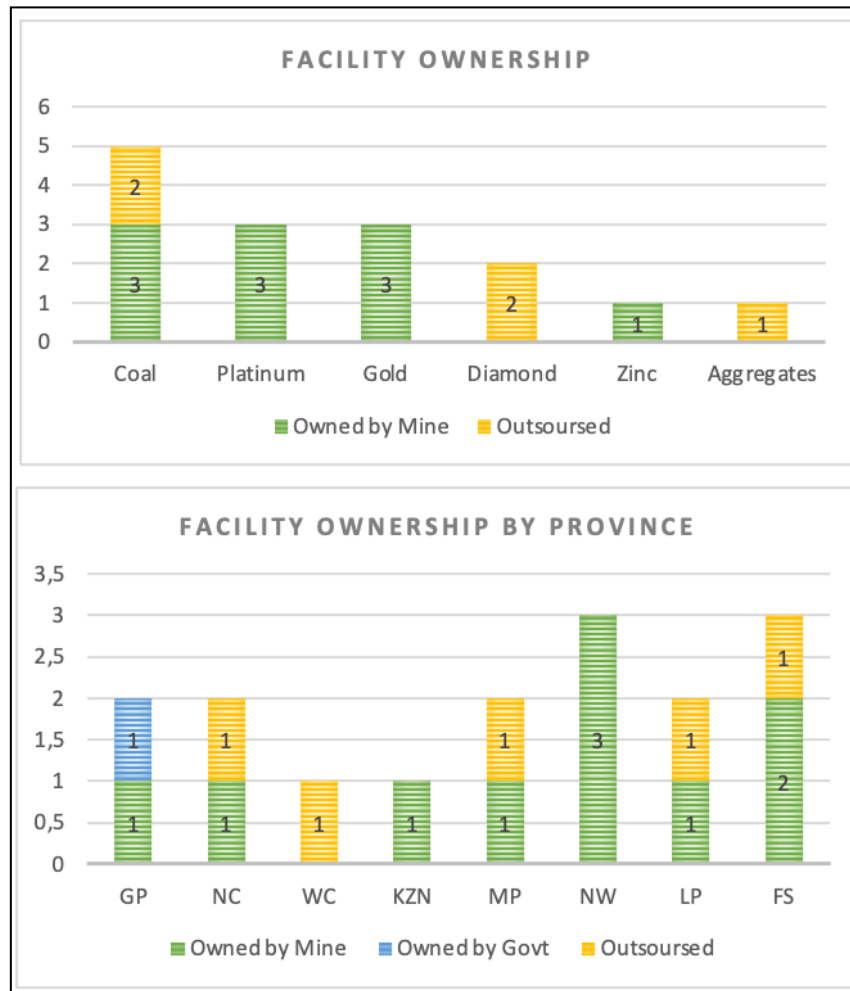


The sample also includes 31% (n=5) and 13% (n=2) of mines with less than 1,000 and over 10,000 employees and contractors, respectively. There is no bias in the distribution of the mine operation sizes included in the sample which implies that the mining operations mostly impacted by the need to extend healthcare services to surrounding communities are represented.

Mine health facility ownership

Figure 6 below shows the ownership of mine health facilities represented in the sample.

Figure 6: Mine ownership



The health facilities represented in the sample are either owned by the mining houses, the state or outsourced by mining houses. Outsourcing is an agreement in which a company hires another company to provide healthcare services on behalf of the mine (Longman Business Dictionary 2020).

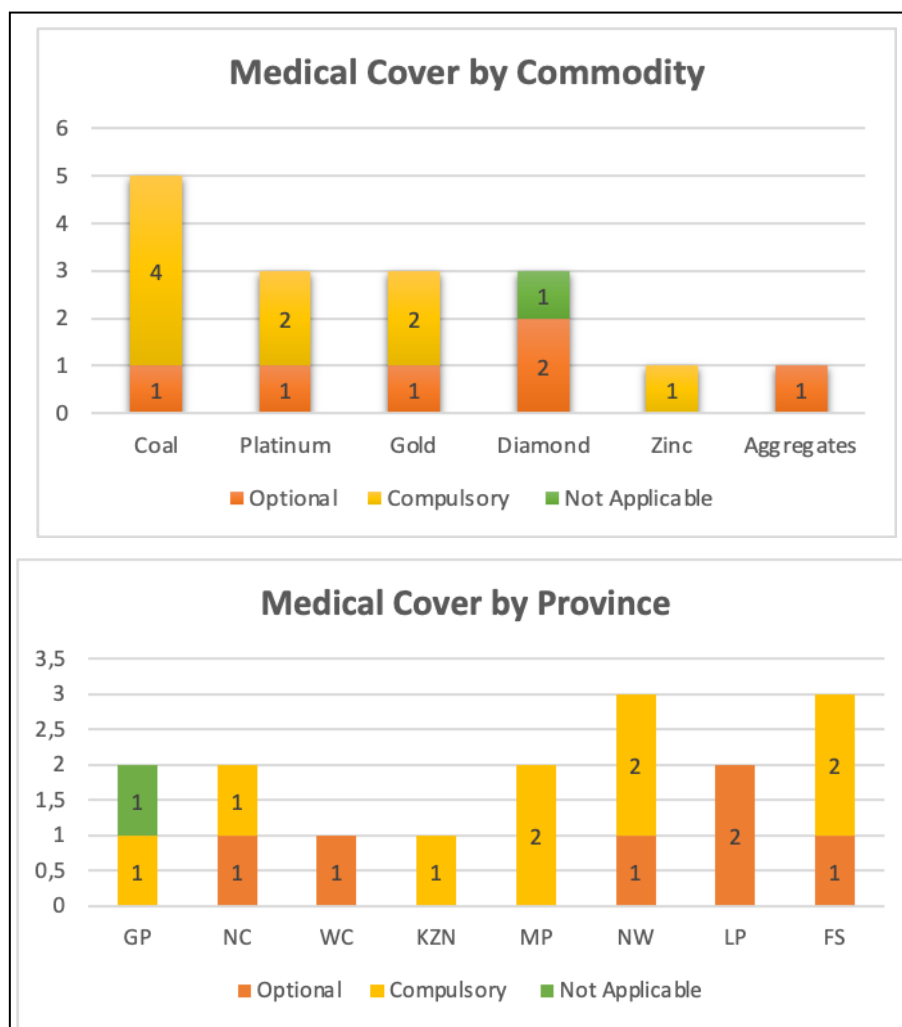
When presented by both commodity and location, the result of healthcare facility ownership indicates that the majority are owned by mining houses at 63% (n=10) while 31% (n=5) are outsourced and only 6% (n=1) owned by the state. This result was expected as mining in South Africa is historically owned by mining companies and provide healthcare to their employees in-house by running their own health facilities

(Matthews 2007). There's an opportunity for mine health facilities to consider extending healthcare services to include surrounding communities.

Medical aid cover

Figure 7 below shows the distribution of medical aid cover in the sample.

Figure 7: Medical aid cover



Medical aid cover/insurance is one of the employee benefits currently funded by the employer to ensure that every employed miner has access to quality health care in cases of adverse health (Spicer 2003).

There's an identical pattern in the distribution of mine health facility ownership and medical aid cover options available to employees at these facilities. As with private ownership of mine health facilities, medical aid cover is compulsory at 56% (n=9) of the facilities in the sample while medical aid cover is optional at 38% (n=6) of the facilities and not applicable at 6% (n=1) as the mine is publicly owned.

The frequency of compulsory medical aid cover was expected due to the available of alternative healthcare provisions through privately managed healthcare options such as medical aid cover schemes in the SAMI (Spicer 2003).

Summary of findings on the profile of the sampled mine health facilities: The results show that the sample collected is representative of all available types of mining operations in South Africa with no bias. It is confirmed from this subsection of the results that the potential for mine health facilities to increase capacity to service surrounding communities can be unlocked in the small, medium and large sized, gold, platinum, coal and diamond mining sectors in the SAMI. These sectors are mostly owned by mining houses and offer medical aid cover to their employees on either a compulsory or optional basis.

4.3 Health services offered

The data collected on the health services offered by mine health facilities to both employees and the community consist of information on the health service levels available, health services offered and not offered, utilization of existing healthcare resources (i.e., medical personnel, beds, budget and laboratory infrastructure), accessibility of mine health facilities to the community, chronic medication offered and manner of healthcare service delivery. The statistics on health services offered across these categories are provided below.

Health service levels available

The health levels considered in this study are the levels suggested by The SafeCare Foundation (2011) summarised as follows:

Level 1 – Tertiary (Teaching) Hospital - with high tech healthcare

Level 2 – Referral Hospital - offering specialised services

Level 3 – District Hospital – offering surgery and admitting capacity

Level 4 – Primary Healthcare – general care, laboratory and chronic treatment

Level 5 – Basic Healthcare – offering general basic care and maternal care

Level 6 – Mobile Clinic – health shop/nurse and basic health care

It should be noted that occupational healthcare was considered as the application of primary health care principles in an occupational setting (Rantanen 2005). Needless to mention that occupational healthcare is available to employees at all mine health

facilities as regulated by the Occupational Health and Safety Act (OHSAct), 1993 (Act No. 85 of 1993).

Other than occupational healthcare, all the sampled mine health facilities (n=16) provide primary healthcare and referral services to their employees. Primary health care is not offered to adjacent communities except for one diamond health facility (n=1) which offers primary healthcare and referral services to the community free of charge as it is a government owned facility (public clinic) while one (n=1) other coal health facility in KZN province offers primary healthcare to the community at cost. Healthcare at district hospital level and tertiary level is outsourced for employees by all health facilities.

Basic healthcare services are offered to employees by all (n=16) health facilities while only five (n=5) facilities offer mobile clinic services to employees only. One (n=1) facility provides basic healthcare and mobile clinic services to the community free of charge because it is a state facility. The other One (n=1) facility which provides basic healthcare and mobile clinic services to the community at cost is a coal mine in KZN province.

This representation of healthcare service levels in the result was expected as provision of healthcare services is not core business for mining operations and they could not be expected to offer higher healthcare service at the level that is more than what is required for OHS purposes of their employees.

Health services offered/not offered

As this was a follow-up study on a previous study commissioned by the Mining Industry TB and HIV Advisory Committee (MITHAC) of the MHSC as detailed in the ToR, this study profiled the health services offered by mine health facilities around TB and HIV related services as follows:

- TB Screening diagnosis, counselling and treatment
- HIV prevention, counselling, testing and treatment
- Diabetes screening and diagnosis
- Hypertension Screening, Diagnosis & Treatment
- Emergency response and other services

Figure 8 below shows the distribution of health services provided.

Figure 8: Health services offered



The result shows that HIV prevention, counselling and testing services, diabetes screening and diagnosis and hypertension screening and diagnosis are offered to employees by all (n=16) health facilities represented in the sample. These services are only provided to families of employees and the community by two (n=2) facilities all in the diamond commodity sector.

Services such as TB screening, diagnosis, counselling and treatment, HIV/ART treatment services and emergency response services are provided to employees by 94% (n=15) of the sampled facilities except for the 6% (n=1) in the aggregates commodity sector. These services are only provided to families of employees and the community by three (n=3) facilities except for five (n=5) facilities who offer TB screening and diagnosis services to families of employees.

This result was expected because screening, diagnosis and treatment of HIV, TB and associated diseases such as diabetes and hypertension are mandatory services under the “Re-engineered Primary Health Care” (rPHC) initiative launched by the Department of Health (DoH) in 2010 (NDH 2010).

The result shows that services needed by the community but not provided by mine health facilities are such as maternal care and child healthcare. As indicated above, high-tech healthcare, specialized services, admitting capacity and surgery are not provided by mine health facilities but are outsourced.

Utilization of existing healthcare resources

Table 3 below shows a summarized version of the healthcare resource statistics and the utilization thereof for ten mine health facilities in the sample. A detailed version of these statistics is attached as Annexure 2. The statistics presented in this section only represent those mine health facilities which are owned and funded by the mining houses across all provinces represented in the sample. The statistics exclude the state facility (n=1) and mine health facilities which are outsourced (n=5).

Table 3: Utilization of healthcare resources

Resource Variables	Platinum	Gold	Coal	Zinc
Average Resource Statistics				
Nursing Staff (Avg)	20	24	18	10
Doctors (Avg)	2	2	2	2
Consultation Beds (Avg)	9	11	10	5
Laboratory Infrastructure	3	2	2	0
Health Annual Budget (Avg/Mil)	R33m	R18m	R22m	R22m
Employees (Permanent & Contractors (Avg)	7,785	4,212	4,397	5,300
Resource Utilisation Per Miner				
Health Expense/Miner (Avg)	R3,738	R3,222	R4,671	R4,151
Miners/Nursing Staff (Avg)	351	278	193	530
Miners/Doctor (Avg)	4,373	1,855	1,563	2,650
Miners/Bed/ (Avg)	745	422	306	1,060
Laboratory Utilization	100%	100%	80%	N/A

The results show that the average number of nursing staff is twenty (n=20) in platinum mines, twenty-four (n=24) in gold mines, eighteen (n=18) in coal mines and ten (n=10) in zinc mines. This translates to a ratio of 338 nursing staff per 5,424 miners or 16 miners per 1 registered nurse. This nurse/patient ratio is lower than the national range for public hospitals which is a minimum of 18 patients per nurse, according to Bateman

(2009). The responding mine health facilities indicated that nursing staff are fully utilized under a scheduled appointments system with patients, except for emergency cases, due to limited medical facility space.

The average representation of doctors in the sample is two ($n=2$) per 5,424 miners across all commodities. This statistic implies that one doctor services approximately 2,700 miners compared to 2,457 in public hospitals and 500 in private hospitals (Medical Brief 2018). As with the result for nursing staff, the responding mine health facilities indicated that utility of doctors is at 100% under a scheduled appointments system with patients.

As indicated under health service levels available in the SAMI, all mine health facilities in the sample do not have admission capabilities and refer their employees to nearby district hospitals for this service. As such, only beds for patient consultation purposes were found in the sampled mine health facilities. The results for consultation on beds shows an average of nine ($n=9$) beds in platinum mines, eleven ($n=11$) beds in gold mines, ten ($n=10$) beds in coal mines and five ($n=5$) beds in zinc mines. This result correlates with the number of nursing staff and doctors at approximately 5 medical staff per consultation bed.

The results on laboratory infrastructure in the sample showed that only seven mine health facilities have a health laboratory, i.e., platinum mines $n=3$, gold mines $n=2$ and coal mines $n=2$. The average utilization of laboratory services is at 100% in the platinum and gold mines and at 80% in coal mines. The remaining three mine health facilities in the sample (i.e., one each in gold, coal and zinc mines), do not have a health laboratory, but sub-contract laboratory services to specialists for their employees.

The results on health budget allocation at the sampled mine health facilities shows an average allocation of R33m for platinum mines, R18m for gold mines and R22m each for coal and zinc mines. This translates to an average of R22m budget allocation per annum and approximately R3,900 per miner. The allocation per miner is much lower than the HIV and TB expenditure per capita reported for South Africa, which is approximately R4,000 (Guthrie *et al.* 2018). The respondents indicated that the allocation to health facilities is fully utilized with no excesses as the health budget is

planned and used for payroll expenses, operational expenses, utilities and maintenance for the mine health facilities.

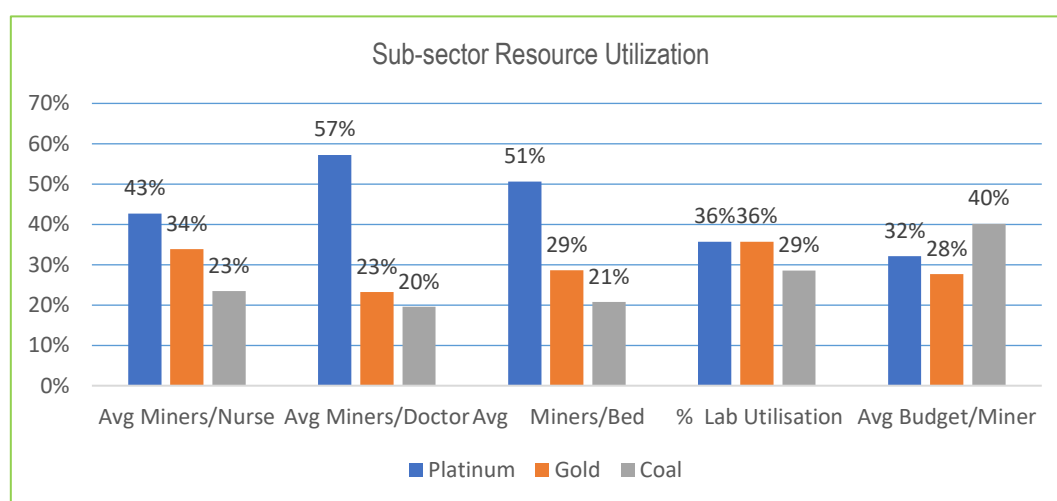
SAMI sub-sector comparative healthcare resource utilization

Figure 9 below shows comparative statistics of healthcare resource utilization in the platinum, gold and coal mining sub-sectors.

The comparison of the miners per nurse variable shows that the platinum sector has the highest utilization of 43% followed by the gold sector at 34% utilization and the least utilization being the coal sector at 24%. The interpretation of this statistic is that the platinum sector has fewer nursing staff to service a given set of miners than the gold and coal sectors, with the latter having more nursing staff than the other sectors.

The comparison of the miners per doctor and bed variables follow a similar pattern to the nursing staff variable. Platinum sector has the highest miners per doctor utilization at 57% and 51% miners per bed utilization followed by the gold sector at 23% miners per doctor utilization and 29% miners per bed utilization. The least miners per doctor and bed utilization is the coal sector at 20% and 21% respectively.

Figure 9: SAMI Sub-sector healthcare resource utilization



Similarly, the interpretation of this statistic is that the platinum sector has fewer doctors and beds to service a given set of miners than the gold and coal sectors, with the latter having more doctors and beds than the other sectors.

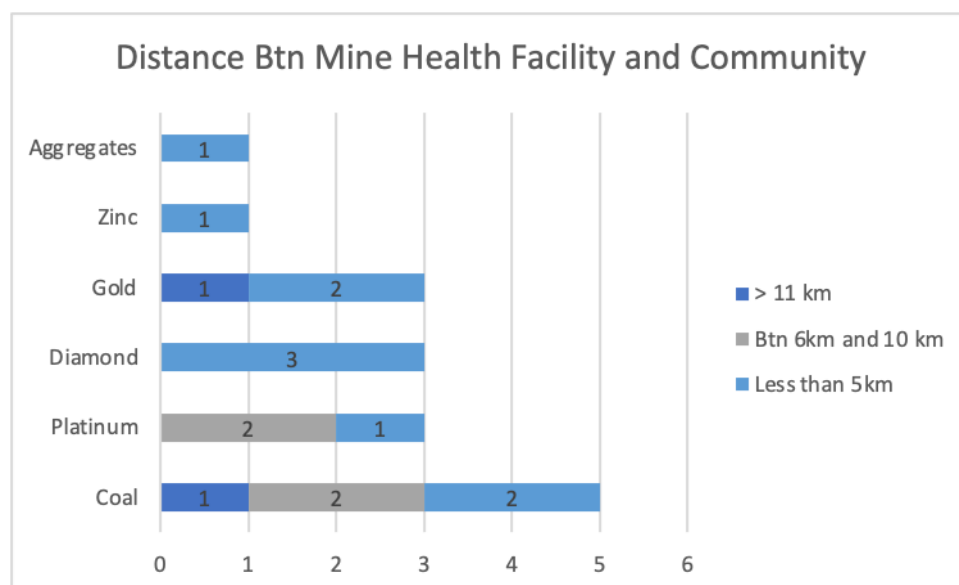
The comparison of laboratory infrastructure shows that both platinum and gold sectors have equal utilization at 36% each while the coal sector is utilized at 29%. This statistic indicates that laboratory services are less utilized in the coal mining sector compared to the platinum and gold sectors.

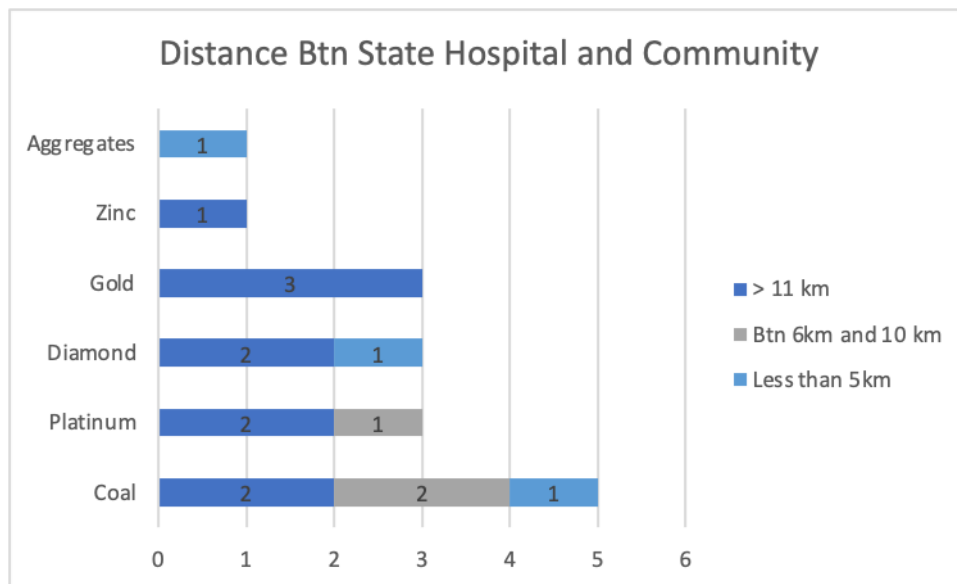
The allocation of budget per miner shows a higher percentage for the coal sector at 40% than the platinum sector at 32% with the least allocation being the gold sector at 28%. This statistic implies that the utilization of healthcare resources would be more elastic in the coal sector compared to platinum and gold sectors.

Accessibility of mine health facilities

Figure 10 below shows the accessibility of healthcare services by communities surrounding mining operations in the sample in terms of distance between the mine health facility and the community and the distance between a public hospital and the community. The distance of less than 5km are deemed to be accessible on foot or walking while distances between 6km and 10km are partially accessible on foot/walking or transportation depending on the severity of the health condition. Distances of over 11km are deemed inaccessible on foot/walking and only accessible through transportation.

Figure 10: Accessibility of mine health facilities





The result shows that 63% of communities adjacent to the mining operations can access healthcare service from either the mine health facilities or public hospitals fully or partially as they fall within the 5km and between 6km to 10km respectively. 38% of the communities in the sample are located more than 11km from either the mine health facilities or public hospitals and are therefore inaccessible.

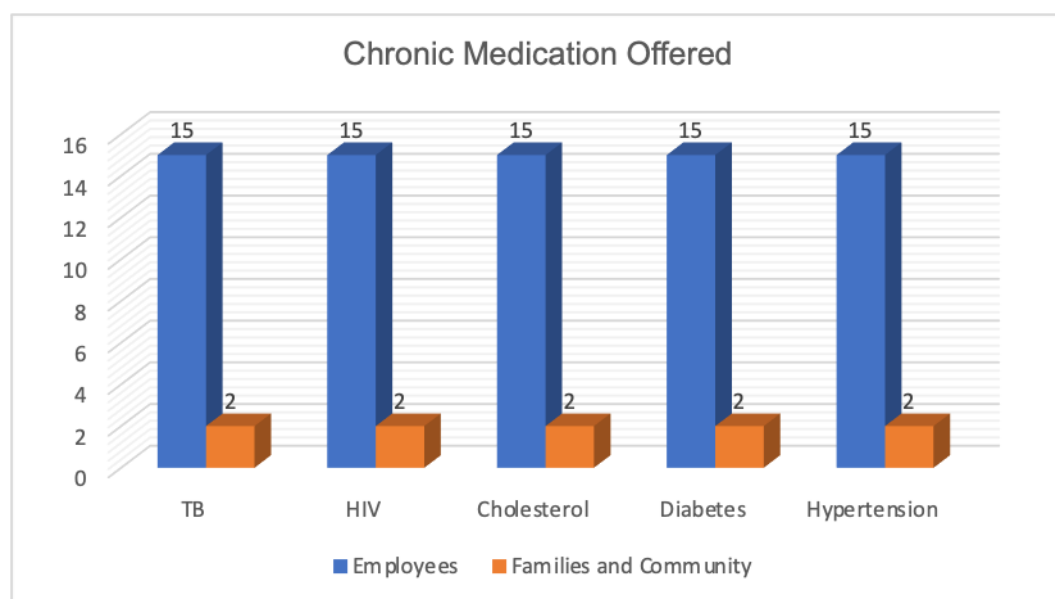
A view of representation by commodity shows that fourteen (n=14; 87%) mine health facilities that in all commodity types are accessible to the community as they are situated within the 5km and between 6km to 10km respectively. Only two (n=2; 13%) mine health facilities are inaccessible to the community as they are located more than 11km away. There's an inverse representation of accessibility across all commodities, except Aggregates, between state hospitals and the community with the majority being inaccessible at 63% (n=10) located more than 11km away. Only 37% (n=6) state hospitals are accessible to the community.

It was expected that the majority of the sample could show that the communities adjacent to mining operations can access healthcare service mostly from mine health facilities and/or from state hospitals. Such healthcare can be accessed through mobile clinics or facility walk-ins. This is in line with the Constitution of South Africa Act No.108 of 1996 under section 27 of the constitution which stipulates that everyone has the right to access of quality healthcare services, including reproductive healthcare services and no one may be refused emergency medical treatment.

Chronic medication offered

Figure 11 below shows the distribution of the chronic medication offered by mine health facilities to employees, families of employees and the community in the sample. The result of the survey shows that chronic medications for TB, HIV/ART, hypertension, cholesterol and diabetes are offered to employees by fifteen (n=15) mine health facilities except for one facility in the Aggregates commodity sector. Two (n=2) out of the fifteen facilities also offer such chronic medication to families of employees and the community.

Figure 11: Chronic medication offered

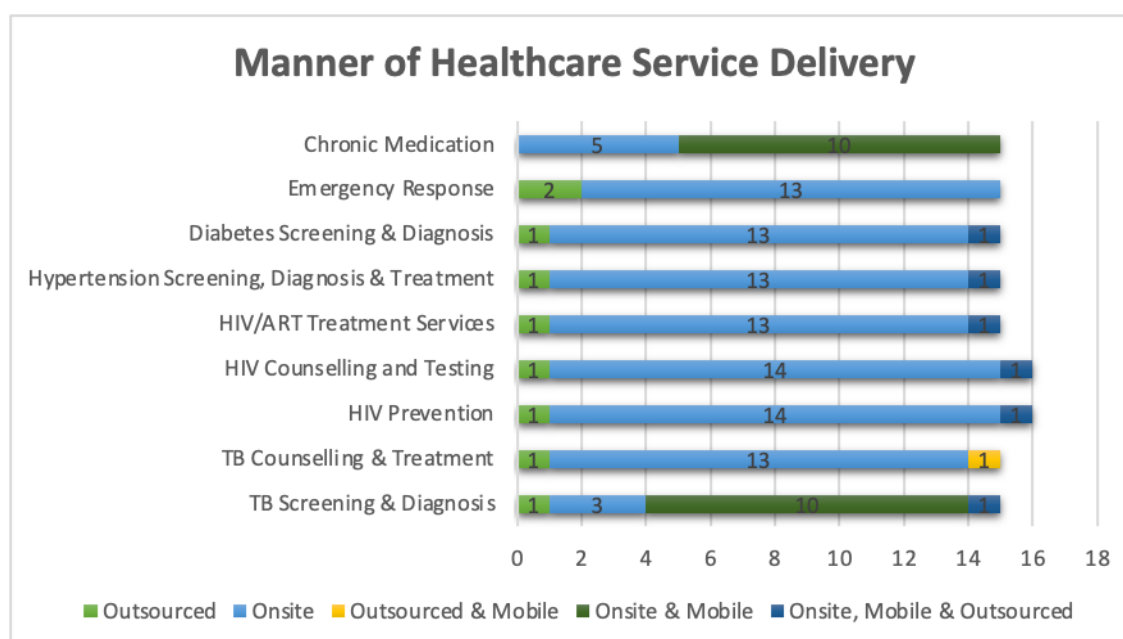


Manner of health service delivery

Figure 12 below shows the distribution of the manner in which healthcare service is provided by mine health facilities in the sample.

The result indicates that all the healthcare services provisioned by mine health facilities are done onsite. Chronic medication and TB screening & diagnosis are mostly conducted through mobile clinics compared to onsite. A small number of services are either outsourced or use mixed channels of delivery such as outsourcing and mobile clinics or onsite, mobile clinics and outsourcing. As indicated earlier, outsourcing is an agreement in which a company hires another company to provide healthcare services on behalf of the mine.

Figure 12: Manner of healthcare service delivery



The frequency of onsite healthcare service delivery was expected given the occupational nature of mine health facilities whose healthcare services are focused on quick OHS response for employees at work, within the premises.

Summary of findings on health services offered: The result above confirms that the highest level of healthcare service provisioned by mine health facilities in the SAMI is the equivalent of primary healthcare. TB, HIV, diabetes, hypertension and emergency response services are offered to employees by all mine health facilities with only a fraction of mine health facilities offering such services to families of employees and the community. High-tech healthcare, specialized services, admitting capacity and surgery are not conducted at mine health facilities but are provided to employees and to families of employees and the community, in some instances, on a referral basis.

Regarding the utilization of healthcare resources, the result on medical staff shows that nursing staff and doctors are 100% utilized with high patient/doctor or nurse ratios using a scheduled appointments system with patients due to limited medical facility space. Since mine health facilities do not have admitting capacity, only consultation beds were found in the sample, and these are proportionally aligned with the number of medical staff. The mine health facilities which have a health laboratory operate at

full capacity with only one laboratory operating at 80% capacity while those health facilities which do not have a health laboratories sub-contract laboratory service for their employees. The annual financial allocation to mine health facilities is fully utilized with no overage.

Further analysis on healthcare resource utilization by sub-sector in the SAMI shows that resources in form of nursing staff, doctors and bed capacity are more stressed out in the platinum sector than they are in the gold sector with the coal sector the least stressed. Laboratory infrastructure comparison shows 20% capacity in the coal sector and full utilization in the platinum and gold sectors. The elasticity of the allocated annual healthcare budget is higher in the coal sector due to a higher allocation per miner compared to the platinum and gold sectors.

Chronic medication for TB, HIV/ART, cholesterol, hypertension and diabetes is offered to employees by all mine health facilities. Only a fraction of mine health facilities offer such services to families of employees and the community. All healthcare services offered by mine health facilities are conducted onsite. Only a small number of facilities offer services through mobile clinics or outsourced over and above onsite services. The result also shows that the communities adjacent to mining operations can access healthcare service either from mine health facilities or from public hospitals.

4.4 Mine health facility willingness to services surrounding communities

The data collected on the willingness of mine health facilities to extend their services to adjacent communities consisted of information on the potential expansion opportunities based on the capacity situation presented in the previous section, limiting factors and the willingness to expand health services. The distribution of the collected samples across these categories is provided below in charts.

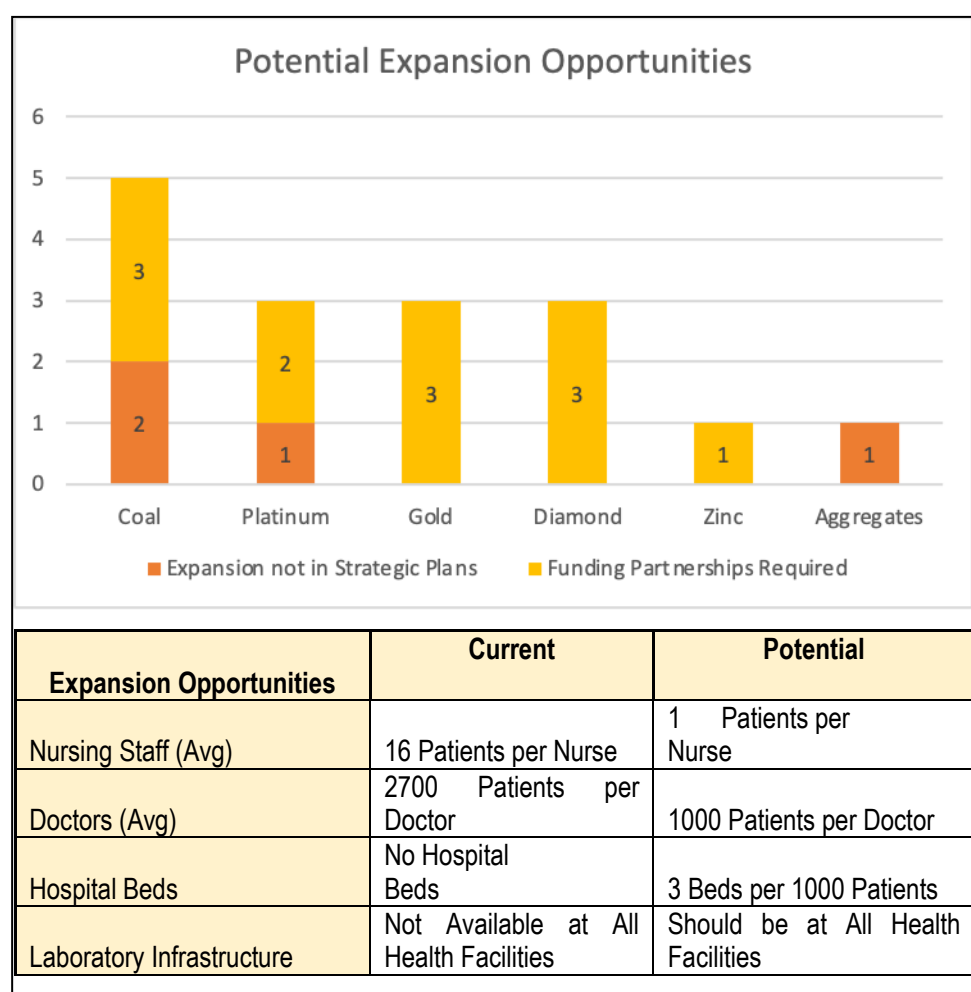
Potential expansion opportunities

Figure 13 below shows the distribution of the potential expansion opportunities indicated by the mine health facilities in the sample. 75% (n=12) of the mine health facilities represented in the sample indicated that there's great expansion opportunity in the mining sector for funding partnerships with investors, both private and public, to expand healthcare beyond occupational related healthcare service and capacitate the industry to provide quality healthcare services to adjacent communities. The other

25% (n=4) of the sample indicated that healthcare extension to surrounding communities was not in their strategic plans.

The frequency of the funding partnership opportunity was expected given that provision of healthcare service is not core business for the mining sector according to Stewart (2020). Hence, they need investors to partner with them in the provision of healthcare to adjacent communities.

Figure 13: Potential expansion opportunities



The results presented earlier regarding the utilization of existing healthcare resources showed full utilization of resources such as medical personnel, finances, lack of bed capacity and limited infrastructure, i.e., laboratory and medical facility space. It was also established that healthcare services available at mine health facilities are only sufficient for employees and not the communities. Opportunity exists for mine health facilities to expand capacity to service neighboring communities.

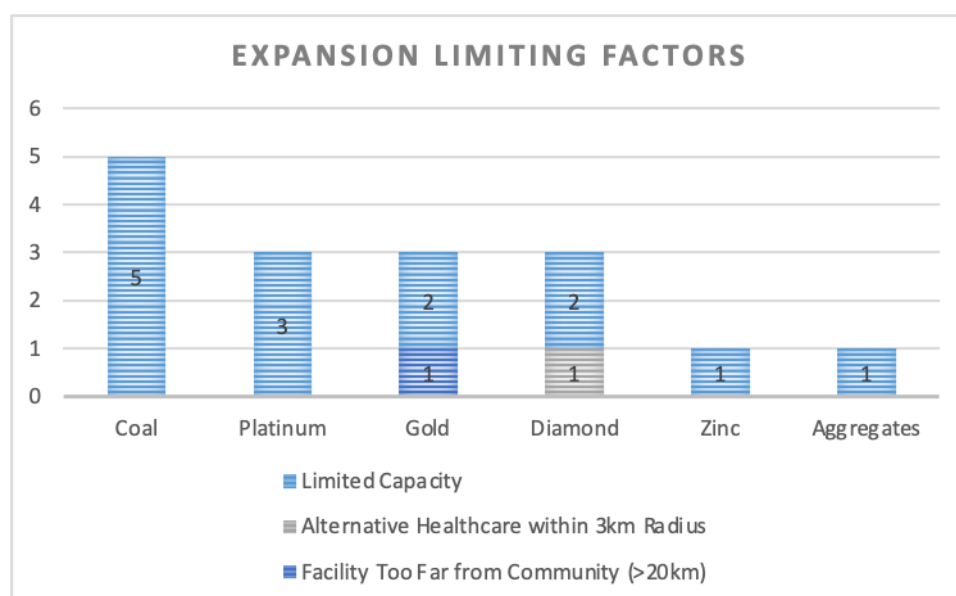
The following expansion opportunities are available in the SAMI to increase resource capacity to service surrounding communities:

- The number of nurses and doctors must be increased to reduce the patient ratio in line with the global standards such as 1 nurse for 8 patients (Bateman 2009) and 1 doctor for 1000 patients (WHO 2018).
- Facility infrastructure must be expanded to increase consultation space, beds and introduce admitting bed capacity of at least 3 beds per 1000 patients in line with minimum global standards of hospital beds ratio to patient (WHO 2018).
- Where mine health facilities have laboratory infrastructure, these must be expanded to increase test throughput capacity to service both employees and the community. There's an opportunity to build laboratory infrastructure at mine health facilities which currently don't have.
- Mine health facilities should expand the mobile clinic service as a delivery model to reach neighboring communities.

Factors contributing to facility's limitations to expansion possibilities

Figure 14 below shows the distribution of factors contributing to the mine health facility's limitations to expansion possibilities in the sample.

Figure 14: Expansion limiting factors



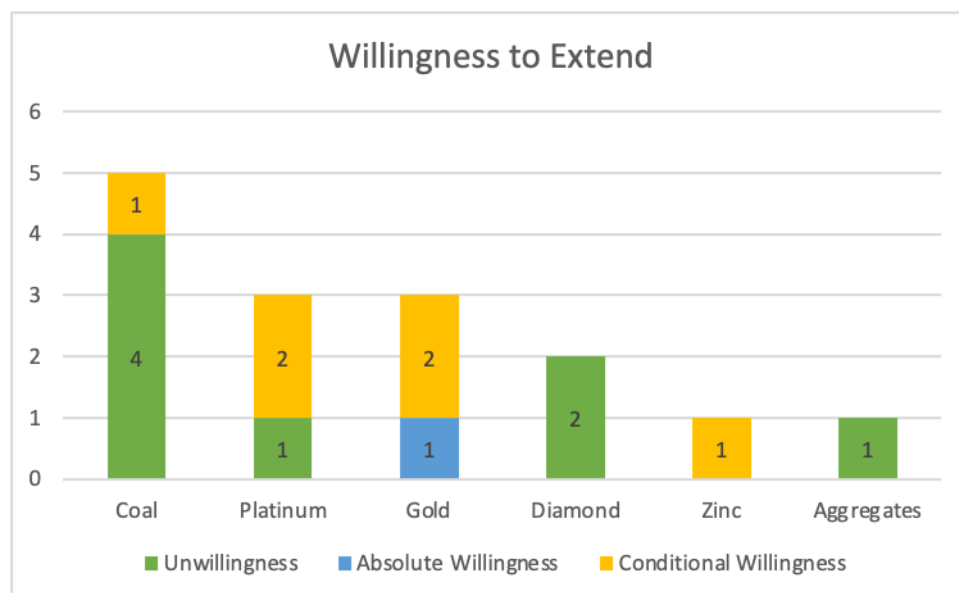
The results show that for one (n=1) mine health facility, the adjacent community is too far by 20km, and this is a major limitation as accessibility is a challenge. For one (n=1)

other mine health facility, there are alternative health facilities available to the community, both private and public, within 3km. For the majority of the mine health facilities (n=14), the major limiting factor to expansion of healthcare services to adjacent communities is limited capacity in form of resources, finances, equipment, medication and the range of services offered.

Willingness to expand health services

Figure 15 below shows the willingness by the mine health facilities in the sample to expand healthcare services to surrounding communities. Willingness is categorized in terms of absolute willingness, conditional willingness and unwillingness. Absolute willingness means that the facility will provide healthcare services to the surrounding community of their own accord without any reservations. Conditional willingness means that a certain condition will need to be met before a facility can provide healthcare services to the surrounding community. Unwillingness means that a facility neither has the inclination nor a motivation to provide healthcare services to the surrounding community.

Figure 15: Willingness to extend health services



The highest frequency of responding mine health facilities at 53% (n=8), are those facilities unwilling to extend healthcare services to surrounding communities. Five (n=5) of these facilities are unwilling to extend healthcare services to surrounding communities because their existing facilities are outsourced. The other three (n=3)

are unwilling to extend healthcare services because expansion is not in their strategic plans.

40% (n=6) are willing to extend healthcare services to surrounding communities on condition that they are capacitated to do so through funding partnerships. These facilities have capacity constraints regarding medical personnel, finances, lack of bed capacity and limited infrastructure such as laboratory and medical facility space. Only one (n=1) mine health facility is absolutely willing to extend healthcare services to surrounding communities.

A pattern linked to the issue of capacity can be observed between willingness to expand healthcare services and the previously discussed variables in this subsection on the potential expansion opportunities and the factors contributing to facility's limitations to expansion possibilities. The result seems to suggest that mine health facilities are willing to extend healthcare services to the surrounding community on condition that they are capacitated to do so through funding partnerships.

Summary of findings on the willingness by mine health facilities to expand: It has been confirmed from this subsection of the results that healthcare service expansion opportunities are available in the mining sector through funding partnerships with investors, both private and public, to expand healthcare beyond occupational related healthcare service. Potential expansion opportunities are available to increase numbers of medical personnel, bed capacity, medical facility and laboratory infrastructure and expand mobile services to service both the employees and surrounding communities. It has also been confirmed that the most prominent limitation experienced by mine health facilities to extending healthcare services to the surrounding community is capacity in form of resources, finances, equipment, medication and the range of services offered. Consequently, mine health facilities are willing to extend healthcare services to the surrounding community on condition that they are capacitated.

DISCUSSION OF THE RESULTS

5.1 Introduction

The purpose of this section is to discuss the results presented in the preceding section of this report. The results are interpreted and evaluated against each of the nine set outputs of the ToR for this project to determine the capacity of mine health facilities to accommodate surrounding communities. The discussion of results is done under each survey output.

5.2 Output 1: Type of health service the mine's health facilities currently provide to employees

The data variables considered to be linked to providing insights into this survey output include variables on provision and utilization of medical aid cover, healthcare service levels available, healthcare service offered, and chronic medication provided by the mine health facility to employees.

Medical aid cover

Regarding medical aid cover, it was found that all mine health facilities offer medical aid cover to their employees with the majority on a compulsory basis and on an optional basis albeit proportionately lower than the compulsory offer. This could be interpreted in conjunction with the proportion of permanent employees and contractors where compulsory medical aid cover is only available to the former group of employees and not the latter. However, medical aid cover is only one method used by mining companies to fulfil OHS requirements for their employees at mining operations (Rantanen 2005). Whether employees have medical aid or not, mining companies are required by the OHS Act to ensure that OHS for employees is achieved.

Healthcare service levels available

Healthcare service levels found in the results include services such as general care, laboratory and chronic treatment. Notably, these are occupational healthcare services. This is indicative of the commitment by mining operations to ensure quality OHS for their employees as is shown by Sibanye Stillwater (SSW 2020), Anglo American (AAPIC 2020), for an example. Healthcare service at the level of surgery, hospital admissions, specialised services and high-tech healthcare are outsourced for all employees

Healthcare service offered to employees

The health services offered to employees were profiled around TB and HIV related services as prescribed by the ToR for this study. It was found in the results that amongst other occupational healthcare services offered to employees, TB screening diagnosis, counselling & treatment, HIV prevention, counselling, testing & treatment, diabetes screening & diagnosis, hypertension screening, diagnosis & treatment and emergency response are also offered. TB and HIV related services offered by mining operations in this study reflect coordinated efforts by all strategic partners in the mining industry to reduce the prevalence of TB and HIV as reported annually by the Minerals Council of South Africa.

The average budget allocation for health services is R22m per annum on an average of 5,000 employees which translates to approximately R3,900 per miner. This allocation per miner is much lower than the HIV and TB expenditure per capita reported for South Africa, which is approximately R4,000 (Guthrie *et al.* 2018). As can be expected, the respondents confirmed that the budget allocation is fully utilized for each financial year with no excess capacity rolling over.

Chronic medication provided to employees

The survey results indicate that chronic medications offered to employees are TB, HIV, cholesterol, diabetes and hypertension. Offering chronic medications to employees is commendable because TB, HIV and associated conditions are fatal if left untreated. From an occupational health point of view, such conditions render employees incapable to work effectively if not controlled (Reiprich *et al.* 2016). Therefore, mining operations are bound to offer chronic medication to employees where needed to ensure productivity in their operations as a result of quality healthcare.

5.3 Output 2: The manner in which health service is delivered to mine employees and ownership of these health facilities

The data variables considered for this survey output include the mode of healthcare service delivery and facility ownership.

Mode of service delivery

It was found in the survey results that the most common method of health service delivery to mine employees is onsite at the premises of the mine health facility. All

services such as emergency response, screening, diagnosis, treatment, counselling, prevention and testing are conducted onsite. Except for emergency services, all other onsite services are delivered on a scheduled appointments basis to manage limited resources such as medical staff and consultation space whose capacity is fully utilized in line with national standards (Peltzer 2009).

Mine health facilities also utilize other healthcare service delivery modes such as onsite & mobile or onsite, mobile & outsourcing or mobile & outsourcing. Services normally delivered through mobile clinics are such as chronic medication and TB screening and diagnosis. Similarly, to onsite utilization, mobile clinics are fully utilized as confirmed by the respondents

The nature of occupational healthcare in mining operations requires a quick turnaround timeline in case occupational emergency. It is for this reason that all services are delivered to employees onsite as confirmed in the result. Evidently, the use of mobile clinics to deliver healthcare services is conducted through community social investment projects (AASLP 2017; Lafarge 2016).

Health facility ownership

The survey result shows that the majority of the mine health facilities (i.e., n=10), are owned by the mining houses represented in the sample, i.e., 3 health facilities each in coal, platinum and gold mines and 1 health facility in the zinc mine. One (n=1) health facility is owned by the state while five (n=5) facilities are outsourced, i.e., 2 each in coal and diamond mines and 1 aggregate mine. Ownership of mine health facilities by mining houses could be interpreted in light of the historic legacy in the SAMI where mining operations built and maintained their own health facilities (Balfour 2018). Recently, a trend is emerging where businesses are moving towards outsourcing services that are non-core to them (Reiprich *et al* 2016). Outsourcing of health facilities was found in the results by 31% of the mining operations.

The factor of mine health facility ownership will impact the decision by mining operations to extend or not to extend healthcare services to surrounding communities. It cannot be expected of mining operations with outsourced health facilities to service surrounding services. As indicated earlier, all mine health facilities surveyed are designed to only service employees and all resources such as medical personnel and facility infrastructure are currently fully utilized.

5.4 Output 3: The type and manner of health services provided by mines to surrounding communities' needs in terms of health services required

To address this output, the data variables considered are healthcare service levels available, healthcare service offered to communities and chronic medication provided by the health facility to communities.

It was shown in the results that although the mine health facilities offer healthcare services at the level of primary healthcare, it is generally offered to their employees and the families of employees and not to the community. Other than the state clinic represented in the sample, only one other health facility in coal mining KZN offer TB, HIV, diabetes, hypertension and emergency response services to the community. Healthcare services other than TB, HIV, diabetes, hypertension and emergency response are not offered by mine health facilities to the community. It could not be confirmed in the sample that mine health facilities offer chronic medication to the adjacent communities.

Employers are mandated by the OHSAct to ensure the safety and wellbeing of their employees. It is not surprising then that mine health facilities are designed to offer occupational healthcare services only to their employees and not the surrounding communities. The mine health facilities would need to be redesigned to expand their healthcare service offering to service communities.

5.5 Output 4: The gap between health services rendered by the mines and services required by the communities

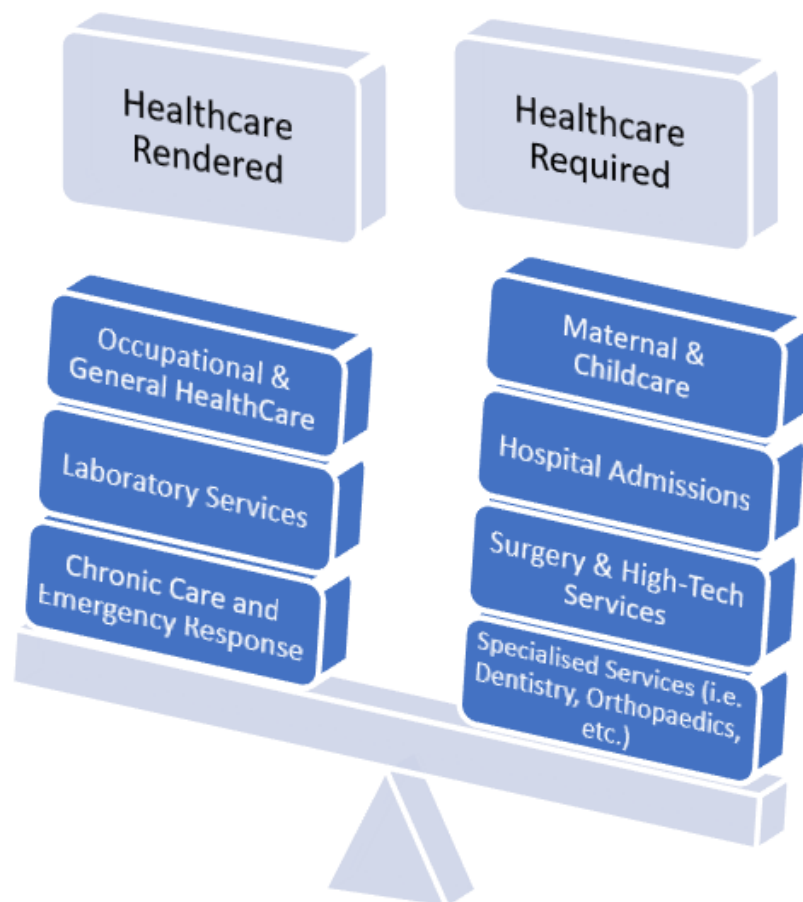
The gap between healthcare services rendered by the mine health facilities and the services required by the communities found in the survey result are captured in Figure 16 below.

Healthcare services rendered by the mines include occupational healthcare, general care, chronic care, emergency response and laboratory services. These services are only offered to employees and their families, but not to the community. Mines offering primary healthcare services to the community would do so at a cost to the patient.

The health service required by the communities is assumed to be at the level of primary healthcare, as a minimum, which includes general care, childcare, maternal

care, emergency services, laboratory and chronic treatment. The communities would presumably also require hospital admissions, surgery and specialized care. The options available to communities to access such healthcare could either be self-funded if affordable, or public health facilities.

Figure 16: Healthcare services provided vs required



The gap between health services rendered by the mines and services required by the communities is therefore health services such as general care, emergency services, laboratory and chronic treatment.

Access to quality healthcare is a necessity legislated by the government under section 27 of the Constitution of South Africa Act No.108 of 1996, which stipulates that everyone has the right to access of quality health care services, including reproductive health care services and no one may be refused emergency medical treatment.

There's therefore an opportunity to gauge mines to determine if they can expand healthcare service to adjacent communities.

5.6 Output 5: The potential for mines to extend health services to surrounding communities

The results presented earlier regarding the utilization of existing healthcare resources at mine health facilities showed full utilization of resources such as medical personnel, finances, lack of bed capacity and limited infrastructure such as laboratory and medical facility space. It was also established that healthcare services available at mine health facilities are only sufficient for employees and not the communities. Evidently, there's great potential opportunity for mine health facilities to expand capacity to be able to extend their health services to surrounding communities.

The potential expansion opportunities identified in the survey to increase capacity to service surrounding communities in the SAMI are such as increasing the number of medical personnel, expanding medical facility infrastructure, (such as consultation space and beds), to accommodate more patients, expanding/building laboratory infrastructure to increase test throughput capacity to service both employees and the community and expanding the mobile clinic service as the alternative delivery model to reach neighboring communities.

The following potential expansion models could be adopted to increase the capacity required to service surrounding communities:

1. Healthcare service expansion through mobile clinics to neighboring communities could be introduced. For example, mines could implement TB, HIV, diabetes and hypertension screening, counselling and prevention services through mobile clinics
2. Mine health facilities could open up service to the community on an incremental basis for a period of time cumulatively. For example, on HIV management, mine health facilities could start with prevention services for 6 months, then introduce testing services for a year and then treatment after another year
3. The results show that healthcare resources in the coal mining sector are less utilized compared to resources in the gold and platinum mining sectors. As such, the extra capacity required to expand healthcare services to the community would be lesser in the coal sector compared to platinum and gold sectors. Stakeholders in the SAMI should leverage off the existing capacity opportunity in the coal sector

to pilot healthcare service expansion to neighboring communities before rolling out to other mining sectors

4. Offering healthcare services at cost to adjacent communities, similar to the cost model used at a coal mine health facility in KZN province represented in this survey study, which currently offers healthcare services to the community at cost
5. Mine operations could run scheduled programs periodically, i.e., once a month or bi-weekly, to open up their health facilities to the community for selected screening, diagnosis and treatment activities

5.7 Output 6: Accessibility of surrounding communities to mine health service facilities

Regarding the accessibility of mine health facilities to adjacent communities, it was found from the survey results that 63% of communities adjacent to the mining operations could fully or partially access mine health facilities and public health facilities on foot/walking or transportation as they were less than 10km apart. The result showed that 37% of the communities are located further than 11km from mine health facilities and public health facilities and are therefore deemed inaccessible.

While this may be a healthcare challenge for communities, it is also an opportunity for those mines that are deemed inaccessible to nearby communities to explore available possibilities to extend their healthcare services to the communities.

5.8 Output 7: Limitations on extending health services to surrounding communities

The most popular limitation cited in the survey results on extending healthcare services to surrounding communities was the issue of limited capacity. The following are some of the responses from participating mine health facilities taken verbatim:

- No capacity, employees are on own medical aid
- External company to assist
- Private facility for employees only
- Only occupational health service provided
- More than enough other health facilities around
- Limited equipment, staff, medication
- Financial problems and budget issues
- Expansion not a priority

- Communities too far from our facility

Limitations provided by mine health facilities on extending health services to surrounding communities can be categorized in four parts. The major limitation seems to be lack of resources in form of finances, infrastructure, utilities, manpower and equipment. This is evidenced in the results indicated earlier, that medical personnel are overutilized at an average of 1 nurse for every 16 miners, 1 doctor for every 2700 miners, limited consultation space and beds, limited facility and laboratory infrastructure and 100% utilization of budget allocations.

The second common limitation seems to be the sole mandate of mine health facilities to provide a service only to employees as these facilities are privately funded predominantly for return on equity purposes. This includes facilities where medical aid membership is compulsory.

The less common limitations seem to be that either there's no need to cater for neighboring communities as they already have access to healthcare or that servicing surrounding communities is not in their foreseeable plans or that the nearest communities are very far. A typical example of communities that are far from the mine health facility can be found at Beatrix Clinic where the nearest communities are 44km and 20k from Welkom and Virginia respectively.

5.9 Output 8: The mines' willingness to extend health services to surrounding communities

Conditional willingness by mines to extend healthcare services to surrounding communities was overwhelming in the survey results at 46% of the surveyed mine health facilities. The primary condition provided by mine health facilities was that capacitation of existing facilities, through partnerships (private or public), is required to expand the limited healthcare capacity in the mining sector in order to service surrounding mining communities. Similar to most businesses venturing in activities that are non-core to the business, (Reiprich *et al* 2016), such partnerships would resolve the capacity issues raised in the previous section.

An example of funding partnerships was provided by Royal Bafokeng platinum where they had provided beds for patients while government provided capacity in form of medication and staffing resources in response to the Covid-19 pandemic.

Although this specific kind of partnership was only targeted for Covid-19, many facilities felt that partnerships that could result in the capacitation of mine health facilities to extend service to communities could be achieved through this model for other types of healthcare on a permanent basis. There's therefore an opportunity and potential for investment partners, both private and public, to partner with mines to extend healthcare service to surrounding communities.

33% of the surveyed mine health facilities were unwilling to extend healthcare services to surrounding communities because their existing facilities are outsourced. Outsourcing has contractual implications which includes tenor constraints. Perhaps these facilities could re-consider health service expansion on maturity of the outsourcing agreement.

For the other 20% of mine health facilities, expansion of the existing health service offering is not in their strategic plans in the foreseeable future. The possibility of extending health services to surrounding communities is out of scope for these mine health facilities.

5.10 Output 9: Factors that would ease the extension of health services to surrounding communities

Linked to the willingness to extend healthcare services to surrounding communities in the survey results, was the need to capacitate mine health facilities to do so. This was indicated under the variable relating to the factors that would encourage expansion to the communities. It was found in the survey results that mine health facilities were willing to extend healthcare services to surrounding communities if their capacity was increased through funding partnerships or investments from both private and public entities.

5.11 Proposition outcome

There are clear capacity limitations on the part of mine health facilities to service neighboring communities in form of limited and overutilized medical personnel, facility and laboratory infrastructure, consultation space and admitting bed capacity and annual financial allocations. These limitations have manifested in the reluctance by mining operations to willingly extend their services to surrounding communities indicating that they could do so under conditions of funding partnerships with

investors, both private and public. Based on the findings from the survey study, the proposition that mine health facilities in the SAMI, do not have the capacity to provide healthcare services required by surrounding communities was therefore **ACCEPTED**.

HEALTH SERVICES MATRIX

6.1 Introduction

From the survey results, it was necessary to conduct further analysis of the data to derive a matrix of health services in the SAMI. This section of the report presents the matrix indicating Health Services and resources currently available and the utilization thereof as well as the potential expansion opportunities to service surrounding communities. Although the data for this survey study was collected from a total of sixteen (n=16) mine health facilities, the public health facility was excluded from the matrix due to it being out of scope for expansion prospects. Only fifteen (n=15) mine health facilities were included in the matrix as shown in Table 4 below.

Table 4: Mine health facilities in the matrix

	Mine Health Facility	Commodity	Province	Ownership	Employees
1	Lafarge Occupational Clinic	Aggregates	Western Cape	Outsourced	104
2	Sasol Health Secunda	Coal	Mpumalanga	Mine Owned	12,000
3	Sasol Medical Centre	Coal	Free State	Mine Owned	1,004
4	Grootegeeluk Complex	Coal	Limpopo	Outsourced	3,800
5	Exxaro Medicare Clinic	Coal	Mpumalanga	Outsourced	2,149
6	Buffalo Dundee OH Centre	Coal	KwaZulu Natal	Mine Owned	186
7	Koffiefontein Mine Clinic	Diamond	Free State	Outsourced	643
8	Lime Acres Medical Centre	Diamond	Northern Cape	Outsourced	1,542
9	Moab Khotsoeng Medical Hub	Gold	North West	Mine Owned	5,956
10	Betrix Clinic	Gold	Free State	Mine Owned	6,200
11	Blyvoor Medical Station	Gold	Gauteng	Mine Owned	481
12	Tharisa Health Facility	Platinum	North West	Mine Owned	2,880
13	Mogalakwena Mine Clinic	Platinum	Limpopo	Mine Owned	4,976
14	Bafokeng Rasemone Platinum	Platinum	North West	Mine Owned	15,500
15	Vedanta Life Healthcare	Zinc	Northern Cape	Mine Owned	5,300

6.2 Health services available matrix

Table 5 below presents a matrix indicating health services currently available at the surveyed mine health facilities.

Table 5: Health services available in the SAMI

Health Service Variables		Indicators						
		Coal Mines	Platinum Mines	Gold Mines	Diamond Mines	Zinc Mines	Aggregates	Totals
1	TB Screening and Diagnosis	5	3	3	3	1		14
2	TB Counselling and Treatment	5	3	3	3	1		14
3	HIV Prevention	5	3	3	3	1	1	15
4	HIV/ART Treatment Services	5	3	3	3	1		14
5	HIV Counselling and Testing	5	3	3	3	1		14
6	Diabetes Screening/Treatment	5	3	3	3	1		14
7	Hypertension Screening/Treatment	5	3	3	3	1	1	15
8	Emergency Response Services	5	3	3	3	1	1	15
9	Basic Health Care	5	3	3	3	1	1	15
10	Primary Health Care	5	3	3	3	1	1	15
11	Referral Services	5	3	3	3	1	1	15
12	Mobile Clinics	3	1	3	3	1		10
13	Medical Aid Cover	5	3	3	2	1	1	14
14	Chronic Medication Services	5	3	3	3	1		14

As indicated earlier in the report, this study was a follow-up study on a previous study commissioned by the Mining Industry TB and HIV Advisory Committee (MITHAC) of the MHSC as detailed in the ToR. As such, the study profiled the health services offered by mine health facilities around TB and HIV related services as well as a holistic view of primary health care (including occupational health care). The health service variables found at the mine health facilities are the following:

- TB Screening diagnosis, counselling and treatment
- HIV prevention, counselling, testing and ART treatment
- Diabetes screening, diagnosis and treatment
- Hypertension Screening, diagnosis and treatment
- Emergency Response Services
- Basic health care (General Basic Care)
- Primary health care / Occupational healthcare (General Care, Laboratory, Chronic Care)
- Referral Services (Surgery, Admissions, Specialised Services, High Tech Care)
- Mobile Clinics
- Medical Aid Cover
- Chronic Medication Services

The indicator used to assess the health service variables currently available was the sum of responses affirming availability of health services at each mine health facility from a total of fifteen (n=15) coal, platinum, gold, diamond, zinc and aggregates mining operations. As can be seen in the matrix, health services such as HIV prevention, hypertension services, emergency response services basic and primary health care and referral services are available at all health facilities.

Other services such as TB services, HIV/ART testing and treatment, diabetes services, chronic medication services and medical aid cover are available at fifteen (n=14) health facilities while mobile clinic services are only available at eleven (n=10) health facilities. All these services are only available to employees and not to the community, except for the one KZN coal mine represented in the sample which has opened up healthcare service to the community at a fee as the nearest public health facility is more than 10km from the mining operation.

The availability of these services was expected because screening, diagnosis and treatment of HIV, TB and associated diseases such as diabetes and hypertension are mandatory services under the “Re-engineered Primary Health Care” (rPHC) initiative launched by the Department of Health (DoH) in 2010 (NDH 2010). Occupational healthcare is also available to employees at all health facilities as regulated by the Occupational Health and Safety Act (OHSAct), 1993 (Act No. 85 of 1993).

6.3 Resource capacity available for health services matrix

The resource capacity variables used in this matrix only represent the mine health facilities which are owned and funded by the mining houses across all provinces represented in the sample, which are a total of ten (n=10) mine health facilities . The statistics for this matrix exclude the state facility (n=1) and mine health facilities which are outsourced (n=5).

Table 6 below presents a matrix indicating the resource capacity available for health services at the surveyed mine health facilities.

Table 6: Resource capacity available matrix

Resource Variables		Indicators				
		Coal Mines	Platinum Mines	Gold Mines	Zinc Mines	Totals
1	Nursing Staff	54	60	71	10	195
2	Doctors	6	5	6	2	19
3	Consultation Beds	30	28	32	5	95
4	Laboratory Infrastructure	2	3	2	N/A	
5	Health Facility Budget Allocation (Est.)	R65.8 Mil	R97.5 Mil	R53 Mil	R22 Mil	R238.3 Mil
Resource Utilisation						Grand Avg
1	No. of Miners per 1 Nursing Staff (Avg)	193	351	278	530	338
2	No. of Miners per 1 Doctor (Avg)	1,563	4,373	1,855	2,650	2610
3	Number of Miners per 1 Bed (Avg)	306	745	422	1,060	663
4	Health Expense per Miner (Avg)	R4,671	R3,738	R3,222	R4,151	R3,946
5	Laboratory Infrastructure Utilisation	80%	100%	100%	N/A	R94%
6	Employees (Permanent & Contractors)	4,397	7,785	4,212	5,300	5,424

The resource capacity variables found at the mine health facilities are nursing staff, doctors, consultation beds, laboratory infrastructure and health facility budget allocation. The matrix further presents utilisation of these resources as follows:

- Number of miners per 1 nursing staff
- Number of miners per 1 doctor
- Number of miners per 1 bed
- Health expense per miner
- Laboratory infrastructure utilisation.

The indicator used to assess the resource capacity available for health service was the quantities of each variable provided by responding mine health facilities from the coal (n=3), platinum (n=3), gold (n=3), and zinc (n=1) mining operations. The variables for the utilization of health service resources were assessed by averaging resource inputs per number of employees, both permanent and contractors. Further analysis of healthcare resource utilization by SAMI sub-sectors was conducted to determine if there was more resource capacity in some mining sectors.

The nursing staff variable shows that 1 nurse services approximately 16 miners (i.e., 338 nurses for 5424 miners). This nurse/patient ratio is much lower than the national range for public hospitals which is a minimum of 213 patients per nurse, according to the South African Nursing Council (Strydom 2021). The responding mine health

facilities indicated that the utility of nursing staff is 100% under a scheduled appointments system with patients, except for emergency cases, due to limited medical facility space.

The sub-sector comparison of the nursing staff variable shows that the platinum sector has the highest utilization at 43% followed by the gold sector at 34% utilization and the least utilization being the coal sector at 24%. The interpretation of this statistic is that the platinum sector has fewer nursing staff to service a given set of miners than the gold and coal sectors, with the latter having more nursing staff than the other sectors.

The doctors variable shows that 1 doctor services approximately 2,610 miners (i.e., 2 doctors for 5,424 miners. This statistic compared with 1 doctor for every 2,457 patients in public hospitals and 500 patients in private hospitals (Medical Brief 2018) shows severe under resourcing of doctors in the mines. As with the result for nursing staff, the responding mine health facilities indicated that utility of doctors is at 100% under a scheduled appointments system with patients. The sub-sector comparison of the miners per doctor and bed variables follows a similar pattern to the nursing staff variable. Platinum sector has the highest miners per doctor utilization at 57% and 51% miners per bed utilization followed by the gold sector at 23% miners per doctor utilization and 29% miners per bed utilization. The least miners per doctor and bed utilization is the coal sector at 20% and 21% respectively.

As indicated earlier, all mine health facilities in the sample do not have admitting capabilities and refer their employees to nearby district hospitals for admissions. As such, only beds for patient consultation purposes are represented in the matrix. The results for the consultation beds variable shows that 1 consultation bed is used by up to 5 nurses at any given point in time, compared to the global standard of 1 consultation bed for one nurse on duty (WHO 2020).

The laboratory infrastructure variable shows that only seven mine health facilities have a health laboratory, i.e., platinum mines $n=3$, gold mines $n=2$ and coal mines $n=2$. The average utilization of laboratory services is at 100% in the platinum and gold mines and at 80% in coal mines. The mine health facilities which do not have a health laboratory sub-contract laboratory service to specialists for their employees. The sub-

sector comparison of laboratory infrastructure shows that the 20% capacity is in the coal mining sector. Both platinum and gold sectors have equal laboratory infrastructure utilization at 100%. This statistic indicates that laboratory services are less utilized in comparison to the platinum and gold sectors.

The health budget allocation variable shows an average of R22m budget allocation per annum which translates to approximately R3,900 per miner. The sub-sector comparison of the allocation of budget per miner shows a higher percentage allocation for the coal sector compared to the platinum and gold sectors. This implies that the utilization of healthcare resources would be more elastic in the coal sector compared to platinum and gold sectors. The budget allocation per miner is much lower than the HIV and TB expenditure per capita reported for South Africa, which is approximately R4,000 (Guthrie *et al.* 2018). The respondents indicated that the allocation to health facilities is fully utilized with no excesses as the health budget is planned and used for payroll expenses, operational expenses, utilities and maintenance for the mine health facilities.

Summary of findings on health services available and resource capacity: The matrix on health services available shows the presence of health service at the level of primary health care including specific health services for TB, HIV, diabetes, hypertension, chronic medication, medical aid cover, mobile clinics, referral services and emergency response services. All these services are only available to employees. Resource capacity for health services shown in the matrix include medical personnel, laboratory infrastructure, bed capacity and health facility budget allocation.

It was shown that compared to national figures, there are capacity limitations in form of limited and overutilized medical personnel, laboratory and facility infrastructure, consultation space and admitting bed capacity as well as annual financial allocations. Except for the one coal mine health facility in FS province which runs at 80% laboratory capacity, it can safely be concluded that most mine health facilities do not have excess capacity other than what is currently available to service the employees. The healthcare services that could be easier to extend to surrounding communities are those services that require less capital outlay such as HIV/Aids and TB prevention and counselling services which could be delivered through mobile clinics.

Further analysis on healthcare resource utilization by sub-sector in the SAMI shows that resources in form of nursing staff, doctors and bed capacity are more stressed out in the platinum sector than they are in the gold sector with the coal sector the least stressed. Laboratory infrastructure comparison shows 20% capacity in the coal sector and full utilization in the platinum and gold sectors. The elasticity of the allocated annual healthcare budget is higher in the coal sector due to a higher allocation per miner compared to the platinum and gold sectors. These statistics imply that the coal mining sector would be the easiest to pilot expansion of healthcare services to neighboring communities than it would be for the platinum and gold mining sectors.

6.4 Potential expansion opportunities matrix

Table 7 below presents a matrix indicating the variables used to assess the potential expansion opportunities to extend health services to surrounding communities.

The variables used to assess potential expansion opportunities are based on the mine health facilities owned by mining companies who indicated that they were willing to extend their health services to adjacent communities. Coincidentally, these health facilities indicated that they had limited resource capacity and that expansion opportunities needed to be supported by funding partnerships.

Table 7: Potential expansion opportunities matrix

Potential Expansion Opportunities Variables		Indicators			
		Coal Mines	Platinum Mines	Gold Mines	Zinc Mines
1	Willingness to Expand (Conditional & Absolutely)	14%	29%	43%	14%
2	Factors Limiting Expansion Possibilities	14%	29%	43%	14%
3	Expansion Opportunities (Funding Partnerships)	1/7	2/7	3/7	1/7

The indicator used to assess the potential expansion opportunities variables was the number of mine health facilities who are willing to expand health services to neighboring communities. Of the facilities willing to expand healthcare services, the majority are gold mines at 43% followed by platinum mines at 29% and coal and zinc mines at 14% each. The matrix shows that a total of 7 mine health facilities are willing

to expand health services to the community. This is an opportunity for strategic partners in the mining industry to engage with these health facilities further to chart an implementation plan forward. This set of health facilities indicated that the overarching limiting factor to expansion possibilities is the issue of limited resource capacity. They are willing to extend health services to surrounding communities if their resources are capacitated to do so.

Of the seven (n=7) mining operations who indicated that they'd need funding partnerships with both private and government investors to build the required capacity to extend health services to surrounding communities, three (n=3) were gold mines, two (n=2) were platinum mines and one (n=1) each was a coal and a zinc mine. Given the limited resource capacity for health services discussed earlier, funding partnerships are necessary as this would increase resource capacity in the following manner:

- a) The number of nurses and doctors can be increased to reduce the patient ratio in line with the global standards, such as 1 nurse for 8 patients (Bateman 2009) and 1 doctor for 1000 patients (WHO 2018).
- b) Facility infrastructure can be expanded to increase consultation space, beds and introduce admitting bed capacity of at least 3 beds per 1000 patients in line with minimum global standards of hospital beds ratio to patient (WHO 2018).
- c) Where mine health facilities have laboratory infrastructure, these can be expanded to increase test throughput capacity to service both employees and the community. There's an opportunity to build laboratory infrastructure at mine health facilities which currently don't have.
- d) Mine health facilities can increase the mobile clinic fleet and service capacity as a delivery model to reach neighboring communities.

Other expansion opportunities could be in the utilization of existing available capacity for selected healthcare resources in the coal sector to pilot healthcare service expansion to neighboring communities before rolling out to other mining sectors. Mining operations could also offer healthcare services at cost to adjacent communities, similar to the cost model used at a coal mine health facility in KZN province represented in this survey study, which currently offers healthcare services to the community at a fee.

Summary of findings on potential expansion opportunities: The matrix shows that there are potential opportunities to expand health service capacity to accommodate surrounding communities in form of the willingness by some mine health facilities to do so as well as opportunities for funding partnerships between mining houses, government and private investors. Such funding partnerships can enable expansion of resources that could result in extra capacity to service both employees and surrounding communities. The healthcare services that could be easier to extend to surrounding communities are those services that require less capital outlay such as HIV/Aids and TB prevention and counselling services which could be delivered through mobile clinics.

Additionally, other expansion opportunities could be in the form of leveraging off the existing availability of capacity for selected healthcare resources in the coal sector to pilot healthcare service expansion to neighboring communities before rolling out to other mining sectors. Mine health facilities could also consider opening up healthcare service to the community on an incremental basis for a period of time cumulatively. For example, on HIV management, mine health facilities could start with prevention services for 6 months, then introduce testing services for a year and then treatment after another year.

Mining operations could consider offering healthcare services at cost to adjacent communities, similar to the cost model used at a coal mine health facility in KZN province represented in this survey study, which currently offers healthcare services to the community at a fee. Furthermore, mine operations could run scheduled programs periodically, i.e., once a month or bi-weekly, to open up their health facilities to the community for selected screening, diagnosis and treatment activities.

WORKSHOP WITH INDUSTRY STAKEHOLDERS

7.1 Introduction

In fulfilment of the requirements prescribed in the ToR for this research study, a workshop was conducted with industry stakeholders to facilitate broader participation in determining the potential opportunities available to capacitate mine health facilities to services surrounding communities in the SAMI.

7.2 Workshop methodology

Similar to the data collection methodology, the workshop was conducted virtually using the Microsoft (MS) Teams platform due to the Covid-19 social distancing regulations. A month prior to the workshop, an invitation had been sent out to a minimum number of fifty participants representing the following stakeholders:

- Department of Mineral Resources and Energy (DMRE)
- Mine Health and Safety Council (MHSC)
- Mine Medical Professionals Association (MMPA)
- Department of Health (DoH)
- Occupational Hygienists (OH)
- Occupational Medical Practitioners (OMP)
- Interested Persons

The workshop was conducted on 25th June 2021 from 09h30 to 11h30 as shown on the invitation and agenda attached as Annexure 3. A total number of seventeen participants attended the workshop representing the MHSC, MMPA, OH, OMP and interested persons. Although the workshop attendance was lower than expected, critical stakeholders were represented. These stakeholders included one representative from the MHSC, three from the MMPA, two from academia, seven from employers and the remaining four were workshop facilitators from Munde Business Consultancy. Participants from the MHSC, the MMPA, employers and academia were either OMP's or OH's which made the attendance representative enough of key stakeholders required for the workshop. A list of workshop participants is attached as Annexure 4.

A gap in representation was the absence of delegates from the DMRE, the DoH and unions. However, this gap could be closed through representation by the MHSC and employers since the MHSC are strategic partners of the DMRE and the DoH and the employers are partners with unions. The workshop attendance was therefore deemed representative enough of required stakeholders.

The workshop was facilitated by professional consultants from Munde Business Consultancy. The workshop was highly interactive, and deliberations were in form of online discussions on MS Teams. Substantive attention was focused on ensuring that

ample time was provisioned for comprehensive interactive engagement and in-depth discussion of the issues at hand. The sequence of the workshop was highly structured and pre-defined with the first half of the program being dedicated to sharing the results of the survey conducted on the capacity of mine health facilities in the SAMI and the second half being dedicated to interactive discussions. The content of the output from the workshop was largely shaped by the participants' discussions and contributions.

7.3 Workshop presentation

The presentation for the workshop was conducted using MS PowerPoint slides. The workshop participants were taken through the background of the project to provide context to the activities that later ensued. The following topics were included in the presentation attached as Annexure 5:

- ✓ The profile of Mine health Facilities
- ✓ Healthcare Services Provide/Not Provided in the SAMI
- ✓ Healthcare Resource Capacity & Utilization
- ✓ Willingness to Extend Healthcare Services
- ✓ Potential Expansion Opportunities
- ✓ Recommendations Presented to Industry Stakeholders

7.4 Interactive discussions

As indicated earlier, much focus was placed on ensuring that ample time was provisioned for comprehensive interactive engagement and in-depth discussion of models that can be used to facilitate expansion of healthcare services to adjacent communities. The researcher presented the following expansion models for adoption to capacitate mine health facilities to accommodate surrounding communities in the SAMI, which were recommended based on the results from the literature review and survey study:

1. Develop a business case for a co-funding partnership operating model between mining operations, the government and private investors. Such funding partnerships could enable expansion of infrastructure, equipment, manpower, utilities and working capital that would result in extra capacity to service both employees and surrounding communities.

2. Run awareness campaigns to promote mindset change and encourage mining companies to extend healthcare service such as HIV/Aids and TB to communities especially where there's resource capacity.
3. Leverage off existing resource capacity identified in this survey in the coal sector to pilot healthcare service expansion to neighboring communities before rolling out to other mining sectors.
4. Offer healthcare services at cost to adjacent communities, similar to the cost model used at a coal mine health facility in KwaZulu Natal province represented in this survey study, which currently offers healthcare services to the community at a fee.
5. Propose mine healthcare service expansion through mobile clinics to neighboring communities, such as implementation of TB, HIV, diabetes and hypertension screening, counselling and prevention services through mobile clinics.
6. Propose opening up of mine healthcare services to the community on an incremental basis for pre-determined periods cumulatively. An example of HIV healthcare services could be that mine health facilities start with prevention services for 6 months, then introduce testing services for a year and then treatment after another year.
7. Propose that mine operations should run scheduled programs periodically, such as once a month or bi-weekly, to open up their health facilities to the community for selected screening, diagnosis and treatment activities

The outcome of the discussions was that the industry stakeholders accepted each of the recommendations presented for adoption.

Additional comments and recommendations

Various themes were discussed as additional input to the survey study during the workshop. The major point of discussion raised was the issue of the environmental impact of mining on the communities and the expected response from mining houses. It was indicated that mining activities result in air and water pollution, acid mine drainage, toxic waste and abandoned mines which pose serious risks to neighboring communities. The dilemma faced in South Africa is that mining companies are not held accountable for the damage their operations cause to society. Many companies consider any form of contribution to the community as hand-outs rather than corporate

social responsibility to reverse the environmental damages caused to the communities.

It was pointed out that the environmental impact of mining has direct and indirect physical and socio-economic effects on neighboring communities. Specific examples of the effects of mining were made regarding hearing impairment in infants and children who then struggle through school and adulthood and end up being unproductive and unemployed adults who might resort to crime to make ends meet. Another example was made regarding the lack of healthcare services such as childcare and maternal care which are very essential for any thriving community and have long term effects on the health of society in the long run.

Emphasis was made that the environmental impacts of mining have a negative bearing on the productivity of mining employees and the subsequent overall productivity of the mining operations themselves. This is because mining employees are members of mining communities and the welfare of the community is reflective of the welfare of the employees. It was therefore in the best interest of the mining companies to manage the negative impacts caused by their operations.

To address the health impact of mining activities on the community, a few suggestions were made. One such suggestion was for mining companies to perform a cost-benefit analysis into the expansion of healthcare services to adjacent communities. It was envisaged that the outcome of the cost-benefit analysis would show a positive return on investment and this would motivate the mining houses to consider expanding healthcare services to neighboring communities.

A further suggestion made was that mining companies could start running healthcare programs related to the environmental impacts of their operations in order to promote awareness of possible health effects in neighboring communities. For example, mining companies could run screening programs for hearing loss in infants, children and community schools or they could run awareness programs in the community on how to manage situations of air and water pollution, toxic waste, etc. This could be a direct response to the environmental impact caused on the community. It was indicated that such activities could stimulate growth and create additional employment

in communities as community members would need to be recruited to run such healthcare programs.

Another suggestion raised regarding the environmental impact of mining activities on the communities was that specific community healthcare surveillance studies must be conducted to determine the direct impact of mining activities on the welfare of neighboring communities. This would quantify the actual impact attributable to mining activity which would then place the responsibility on mining companies to manage the impact by extending healthcare services to the communities.

The other point of discussion raised was the issue of a risk-based approach towards addressing the expansion of healthcare services to neighboring communities. The risk-based approach is directly linked to the environmental impacts of mining in the sense that the health risk on neighboring communities is higher in some mining sectors than others. The type of mine is a major factor in assessing how risky the mining operations are and their impact on the community. For instance, the health risks associated with underground mines are different from those in surface mines. Different types of mines have certain impacts on the quality of air and water, dust emission and control and blasting activities, all of which impact the neighboring communities differently in form of disease such as pneumoconiosis (such as TB and Silicosis) and noise induced hearing loss.

A suggestion was further made that the mining operations with the most impact on the welfare of the neighboring communities must receive higher priority to extend healthcare services to surrounding communities. Going by the current statistics published by the DMRE and the Minerals Council SA, the gold and platinum sectors have continued reporting the highest numbers of disease in the mining industry. While this could be attributed to the scale of mining activity, the fact remains that these sectors have a higher bearing on the welfare of adjacent communities and must consider extending healthcare services as a matter of urgency.

Limitations and lessons learned from the workshop

Limitations

The major limitation of the workshop was the virtual nature thereof which made it difficult for participants to interact optimally. The other limitation was the absence of

stakeholders such as the DMRE, unions and the DH and other tripartite partners. It is assumed that participation from these stakeholders would have added to the robustness of discussions and recommendations.

Lessons learned

Due to the virtual nature of the workshop, contact details for some participants were not recorded accurately and this provided a challenge of obtaining feedback from them. The lesson learned is that it is important to ensure that contact details of the attendees are recorded accurately.

7.5 Conclusions from the workshop

The interactive discussions with stakeholders provided additional insights into the models that can be adopted to facilitate expansion of healthcare services to mining communities. The general consensus from all participants was that the presentation was very informative and comprehensive having covered all possible aspects of the survey study. It was also indicated that the expansion models recommended in the presentation were insightful and could go a long way in facilitating extension of healthcare services to the mining communities. These recommendations were therefore approved for adoption by the industry stakeholders.

The workshop was characterized by robust discussions about the environmental impact of mining activities on adjacent communities and suggestions of how such impact can be managed. The merits of the risk-based approach as an expansion strategy of healthcare services to surrounding communities was also contemplated.

The outcome of the interactive discussions from the stakeholder workshop was that the following additional recommendations were proposed to assist with the expansion of healthcare services to mining communities:

1. A risk-based approach must be adopted as a strategy when addressing the expansion of healthcare services to neighboring communities by prioritizing mining operations with the highest impact on the welfare of the neighboring communities.
2. Run healthcare programs related to the environmental impacts of mining operations in order to promote awareness of possible health effects in neighboring communities. Examples of such programs include screening for hearing loss in

infants, children and community schools and awareness campaigns on management of air or water pollution, toxic waste, etc.

3. Commissioning of a comparative analysis study of the cost and benefits of extending healthcare services to adjacent communities as a strategy to encourage mining houses to consider expansion as the benefits are likely to outweigh the cost.
4. Commissioning of healthcare surveillance studies to determine the direct impact of mining activities on the welfare of neighboring communities, i.e., impact on children, pregnant women, the elderly, quality of water, air, etc. This would quantify the actual impact attributable to mining activity which would then place the responsibility on mining companies to manage the impact by extending healthcare services to the communities.

CONCLUSIONS AND RECOMMENDATIONS

8.1 Introduction

The summary of the main findings of this research is presented in this section. Within the confines of the research limitations, this study sought to determine the capacity of mine health facilities to service surrounding communities in the SAMI.

A questionnaire consisting of sections on the general information and the profile of mine health facilities was designed to collect data on the health services offered, chronic medication available, medical aid cover, accessibility of health facilities to surrounding communities, ownership of health facilities and willingness to extend health service to surrounding communities and challenges faced by health facilities. The research aimed to accept or reject the research propositions formulated from the literature review.

The results from this study will be insightful to the industry stakeholders in the SAMI to facilitate the expansion of existing mine health facilities to develop capacity to service surrounding communities. The results are especially important in the process of enhancing health and safety and achieving zero harm in the SAMI.

8.2 Summary of the main findings

The literature reviewed for this survey study revealed that mining companies in the SAMI only provide healthcare services to their employees and not to the adjacent

communities. Instead, mining companies in the SAMI contribute to developmental projects through healthcare infrastructure capacitation, maintenance, procurement, and maintenance of healthcare services. The health services available are at primary health care level which includes general care, laboratory services and emergency response services. Specific services such as TB, HIV, diabetes, hypertension, chronic medication, medical aid cover, mobile clinics and referral services are also available. It was further determined from the literature that provision of health care services by mining companies to neighboring communities are largely driven by the regulatory framework of individual jurisdictions and the overall functioning of in-country health systems available at national level in each country globally.

The survey results showed clear capacity limitations on the part of mine health facilities to service neighboring communities in form of limited and overutilized medical personnel, facility and laboratory infrastructure, consultation space and admitting bed capacity and annual financial allocations. These limitations manifested in the reluctance by mining operations to willingly extend their services to surrounding communities indicating that they could do so under conditions of funding partnerships with investors, both private and public.

Despite resource capacity constraints, the survey results showed potential opportunities for mine health facilities to expand healthcare services to surrounding communities in the SAMI. This was expressed through willingness by the mining houses to extend health services to surrounding communities on condition that they were capacitated to do so. Several expansion models were then recommended by the researcher and the industry stakeholders for adoption in the SAMI.

Overall, a clear and concise result was achieved from this study using the research methodology implemented as proposed and intended.

8.3 Recommendations

On the basis of the findings of this research, the following recommendations are proposed to the MHSC and its stakeholders to facilitate expansion of capacity by mine health facilities to extend health services to surrounding communities in the SAMI:

1. Develop a business case for a co-funding partnership operating model between mining operations, the government and private investors. Such funding

partnerships could enable expansion of infrastructure, equipment, manpower, utilities and working capital that would result in extra capacity to service both employees and surrounding communities. The business case could also suggest how operating models for certain mine health facilities could be restructured to extend operating hours and shifts to increase capacity.

2. Run awareness campaigns to promote mindset change and encourage mining companies to extend healthcare service such as HIV/Aids and TB to communities especially where there's resource capacity.
3. Leverage off existing resource capacity identified in this survey in the coal sector to pilot healthcare service expansion to neighboring communities before rolling out to other mining sectors.
4. Adopt a risk-based approach as a strategy when addressing the expansion of healthcare services to neighboring communities by prioritizing mining operations with the highest impact on the welfare of the neighboring communities.
5. Offer healthcare services at cost to adjacent communities, similar to the cost model used at a coal mine health facility in KZN province represented in this survey study, which currently offers healthcare services to the community at a fee.
6. Propose mine healthcare service expansion through mobile clinics to neighboring communities, such as implementation of TB, HIV, diabetes and hypertension screening, counselling and prevention services through mobile clinics.
7. Propose opening up of mine healthcare services to the community on an incremental basis for pre-determined periods cumulatively. An example of HIV healthcare services could be that mine health facilities start with prevention services for 6 months, then introduce testing services for a year and then treatment after another year and so on.
8. Propose that mine operations should run scheduled programs periodically, such as once a month or bi-weekly, to open up their health facilities to the community for selected screening, diagnosis and treatment activities
9. Run healthcare programs related to the environmental impacts of mining operations in order to promote awareness of possible health effects in

neighboring communities. Examples of such programs include screening for hearing loss in infants, children and community schools and awareness campaigns on management of air or water pollution and toxic waste.

8.4 Concluding remarks

The business environment of the SAMI is a huge contributor to GDP both locally and internationally. While providing a large percentage of the country's employment and income, safety and disease continue to be a major challenge within the SAMI. Thus stakeholders in the SAMI actively engage in occupational health and safety interventions, such as capacity enablement for mine health facilities to service adjacent communities to minimize loss and achieve zero harm.

Although the mining companies operate healthcare facilities aimed at servicing their employees in the SAMI, the service is predominantly occupational health related and do not have capacity to offer the health services required by neighboring communities due to limited capacity. The results of this survey have provided models that can be implemented to increase the capacity of mine health facilities to service surrounding communities in the SAMI.

Even though this study focused on the capacity of mine health facilities to service surrounding communities, there is plenty of room for further research on other approaches that industry stakeholders can explore to meet the health care needs of communities adjacent to mining operations in the SAMI.

8.5 Suggestions for further research

The following areas are recommended for further study to encourage mining houses to expand health services to adjacent communities in the SAMI:

1. A comparative analysis research study on the cost and benefits of extending healthcare services to adjacent communities.
2. A healthcare surveillance research study to determine the direct impact of mining activities on the welfare of neighboring communities, such as the impact on children, pregnant women, the elderly, quality of water and air.

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APPENDIX A – Introductory Letter



MHSC

Mine Health and Safety Council

Established in terms of Section 41(1) of the Mine Health and Safety Act, 1996 (Act 29 of 1996)
Woodmead Office Park, B7 Maple North, 145 Western Service Road, Woodmead
Tel. No. (011) 656 1797 | Fax: (011) 656 1796

Enquiries:
Email:

Nkhensani Masekoa
nmasekoa@mhsc.org.za

16 July 2020

To whom it may Concern

Introductory letter: Project COE 180906 "Determine the Capacity of Mine Health Facilities to Accommodate Surrounding Communities"

This letter serves to confirm that the MHSC appointed Mundele Business Consultancy to conduct research project *COE 180906 "Determine the Capacity of Mine Health Facilities to Accommodate Surrounding Communities"*. The research study requires Mundele Business Consultancy to access mines and other relevant organisations in order to gather information and stakeholders' perspective on the subject matter. The information obtained from stakeholders will be used to determine the capacity that South African mine health facilities have in accommodating surrounding communities and make recommendations thereof.

The MHSC kindly requests permission for Mundele Business Consultancy to gain access to your mine/organisation to access the required information. The information/data received will be handled with care and depending on the nature of sensitivity, confidentially will be applied by the researcher. Confidential information will be reproduced in reports in a manner where no reference is made to specific operations or organisations. To this end, MHSC would greatly appreciate your participation and invaluable contribution on the study and we believe your effort will bring us a step closer to reaching our goals. Any queries related to this project may be directed to the project leader from the Mundele Business Consultancy:

Mrs Deborah Mhura
082 908 3211

Yours faithfully,

Mr. Thabo Dube
Chief Executive Officer

ANNEXURE 1 – Data Collection Framework (Questionnaire)



MHSC
Mine Health and Safety Council

Data Collection Framework (Questionnaire)

Project Title

“Determine the Capacity of Mine Health
Facilities to Accommodate Surrounding
Communities”

Project Number

MHSC Project CoE 180906

1. GENERAL INFORMATION

1.1	Name of Mine		
1.2	Mining Group		
1.3	SAMRASS Mine Code		
1.4	Main Commodity		
1.5	Other Commodities Mined		
1.6	Mine Type <i>(Tick appropriate box)</i>	Underground	
		Surface Operations	
		Refinery	
		Aquatic	
		Opencast	
		Surface Mining	
1.7	Telephone Number		
1.8	Physical Address		
1.9	Number of Permanent employees		
1.10	Medical Aid Cover <i>(Tick appropriate box)</i>	Optional	
		Compulsory	
		Percent Number Covered	
		Percent Number Not Covered	
1.11	Number of contractors		

2. HEALTH FACILITY DETAILS

2.1	Name of the Health Facility		
2.2	Type of the Facility <i>(Tick appropriate box)</i>	Mine Health Facility	
		Mine Hospital	
2.3	Facility Ownership <i>(Tick appropriate box)</i>	Private	
		Public	
		Outsourced	
2.4	Name of District		

3. HEALTH SERVICES CURRENTLY OFFERED BY THE FACILITY

Service	Onsite	Mobile Services	Outsourced	To Employees	To Employees' Families	To Communities Free	To Communities at Cost
	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	Yes/No
Healthcare Service Levels Available							
Level 1: Tertiary (Teaching) Hospital – (High-Tech Health Care)							
Level 2: Referral Hospital – (Specialised Services)							
Level 3: District Hospital – (Surgery and Admissions)							
Level 4: Primary Health Centre – (General Care + Laboratory + Chronic Care)							
Level 5: Basic Health Centre – (General Basic Care + Maternal Care)							
Level 6: Mobile Clinic – (Health Shop/Nurse + Basic Health Care)							
Healthcare Service Offered							
a) TB screening & diagnostic services							
b) TB counselling and treatment services							
c) Diabetes screening & diagnostic services							
d) HIV prevention services							
e) HIV counselling and testing							
f) HIV/ART treatment services							
g) Emergency response (Ambulance/Paramedic)							
h) Other (s)							

4. ACCESSIBILITY OF HEALTH FACILITY

4.1	Distance between the public hospital and the mining community <i>(Tick appropriate box)</i>	Less than 5km	
		Between 6km and 10km	
		More than 11km	
4.2	Distance between the mine health facility and the adjacent community <i>(Tick appropriate box)</i>	Less than 5km	
		Between 6km and 10km	
		More than 11km	

5. CHRONIC MEDICATION PROVIDED BY THE HEALTH FACILITY

5.1	Provision of drugs by the health facility to chronic disease patients <i>(Tick appropriate box)</i>	Disease	
		TB	
		HIV	
		Cholesterol	
		Diabetes	
		Other(s)	
5.2	How is Chronic Medication delivery?		

6. HEALTH FACILITY WILLINGNESS TO EXTEND SERVICES TO SURROUNDING COMMUNITIES

6.1	Healthy facility willingness to extend services to surrounding communities <i>(Tick appropriate box)</i>	Absolute Willingness	
		Conditional Willingness	
		Unwillingness	

7. HEALTH FACILITY CHALLENGES

7.1	Factors contributing to facility's limitations to providing required services to the communities	
7.2	List of health services not provided by the facility	
7.3	Factors impacting expansion possibilities	
7.4	Factors that would encourage expansion to the communities	

ANNEXURE 2 – Utilization of Healthcare Resources

Platinum			
Mine Health Facility	Mogalakwena Mine Clinic	Bafokeng Platinum	Tharisa Health Facility
Mining Group	Anglo American Platinum	Royal Bafokeng	Tharisa Minerals
Province	Limpopo	Northwest	Northwest
Nursing Staff	20	30	10
Doctors	2	2	1
Consultation Beds	9	14	5
Laboratory Infrastructure	Yes	Yes	Yes
Health Annual Budget	19 500 000	70 000 000	8 000 000
Employees	4 976	15 500	2 880
Health Expense/Miner	3 919	4 516	2 778
Nurse/Miner	249	517	288
Dr/ Miner	2 488	7 750	2 880
Bed/Miner	553	1 107	576

Coal			
Mine Health Facility	Occupational Health Centre	Sasol Health Secunda	Sasol Medical Center
Mining Group	Buffalo Coal	Sasol	Sasol
Province	KZN	Mpumalanga	Free State
Nursing Staff	1	45	8
Doctors	1	3	2
Consultation Beds	1	25	4
Laboratory Infrastructure	No	Yes	Yes
Health Annual Budget	750 000	60 000 000	5 000 000
Employees	186	12 000	1 004
Health Expense/Miner	4 032	5 000	4 980
Nurse/Miner	186	267	126
Dr/ Miner	186	4 000	502
Bed/Miner	186	480	251

Gold			
Mine Health Facility	Betrix Clinic	Blyvoor Medical Station	Moab Khotsoong Medical Hub
Mining Group	Sibanye StillWaters	Blyvoor Gold	Harmony Gold
Province	Free State	Gauteng	Northwest
Nursing Staff	40	1	30
Doctors	2	1	3
Consultation Beds	16	1	15
Laboratory Infrastructure	Yes	No	Yes
Health Annual Budget	28 500 000	500 000	24 000 000
Employees	6 200	481	5 956
Health Expense/Miner	4 597	1 040	4 030
Nurse/Miner	155	481	199
Dr/ Miner	3 100	481	1 985
Bed/Miner	388	481	397

Zinc	
Mine Health Facility	Life Healthcare
Mining Group	Vedanta Group
Province	Northern Cape
Nursing Staff	10
Doctors	2
Consultation Beds	5
Laboratory Infrastructure	No
Health Annual Budget	22 000 000
Employees	5 300
Health Expense/Miner	4 151
Nurse/Miner	530
Dr/ Miner	2 650
Bed/Miner	1 060

ANNEXURE 3 – Workshop Invitation & Agenda



Mundele Business Consultancy cordially invites you to a virtual workshop on the

Capacity of Mine Health Facilities to Accommodate Surrounding Communities



Mine Health and Safety Council Project:

The MHSC commissioned Project (CoE 180906) to determine the capacity of Mine Health Facilities to accommodate surrounding communities. The outcome of this study will assist stakeholders to plan the possibility to extend healthcare services to cover surrounding communities, thereby improving the quality of life in the SAMI

Aim of the workshop:

To facilitate broad participation in determining the potential opportunities to capacitate healthcare services to cover surrounding communities in the SAMI.

What to expect:

- Health Services Available in the SAMI
- Health Services Not Available in the SAMI
- Healthcare Resource Capacity and Utilization
- Willingness by Mining Houses to Service Surrounding Communities

Date:	25 th June 2020
Time:	09:30 – 13:00
Platform:	Google Meet
Workshop Link:	Click here to join
RSVP By:	23 rd June 2020

**Google Chrome and Mozilla Firefox work better with Google Meet. Kindly test the link before the meeting.*

Who should attend:

- Department of Mineral Resources and Energy
- Mine Medical Professionals Association members
- Department of Health
- Occupational Hygienists
- Occupational Medical Practitioners
- Interested Persons





COE 180906: “Determine the Capacity of Mine Health Facilities to Accommodate Surrounding Communities”

WORKSHOP AGENDA **25th JUNE 2021 09:30 – 13:00**

Time	Agenda Item
09:30	Session opens for participants to test access
09:45	Welcome & House Rules
	Brief overview of the project
	Purpose of today's workshop
10:00	Health Services Provided in the SAMI
10:45	Health Services Not Provided in the SAMI
11:00	Comfort break (5 minutes)
11:05	Resource Capacity and Willingness to Accommodate Surrounding Communities
11:50	Comfort break (5 minutes)
11:55	Potential Expansion Opportunities
12:30	Recommendations
	Questions and Comments
13:00	Closing of Workshop

Thank you for your participation and your valued contributions!

ANNEXURE 4 – Workshop Participant List

No.	Name	Institution	Email Address
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4	Dr Daniel Mmereki	Wits Medical School	Daniel.mmereki@wits.ac.za
5	Siphiwe Zwane	Buffalo Coal Dundee	siphiwe.zwane@buffalocoal.co.za
6	Elford Mayixale	Kangra Coal (Pty) Ltd Werk	elford.mayixale@kangracoal.co.za
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11	Maxwell Mhura	Mundele Business Consultancy	Maxwell.mhura@mundele.co.za
12	Dr Thomas Nyirenda	European and Developing Countries Clinical Trials Partnership (EDCTP)	nyirenda@edctp.org
13	Deborah Mhura	Mundele Business Consultancy	deborah.mhura@mundele.co.za
14	Debbie Mchenga	Independent Consultant	Dtruko7@gmail.com
15	Noxolo Buthelezi		
16	Dineo Nyambose		
17	Gabi Mphehle		

ANNEXURE 5 – Workshop Presentation



MHSC
Mine Health and Safety Council

Stakeholder Workshop – Capacity of Mine Health Facilities in the SAMI

Mundeley Business Consultancy
25th June 2021



Mundeley
Trusted Partner



Workshop Agenda

- 1 Welcome (5 Minutes)
- 2 Purpose of the Workshop and a Brief Project Overview (15 Minutes)
- 3 Survey Study, Health Services Provided/Not Provided in the SAMI (45 Minutes)
- 4 Comfort Break (5 Minutes)
- 5 Resource Capacity and Willingness to Extend Services (45 Minutes)
- 6 Comfort Break (5 Minutes)
- 7 Potential Expansion Opportunities (35 Minutes)
- 8 Recommendations, Questions and Interactive Discussions (30 Minutes)
- 9 Workshop Closure

Welcome

Team Presentation



Deborah Mhura
Project Coordinator



Debbie Mchenga
Presenter

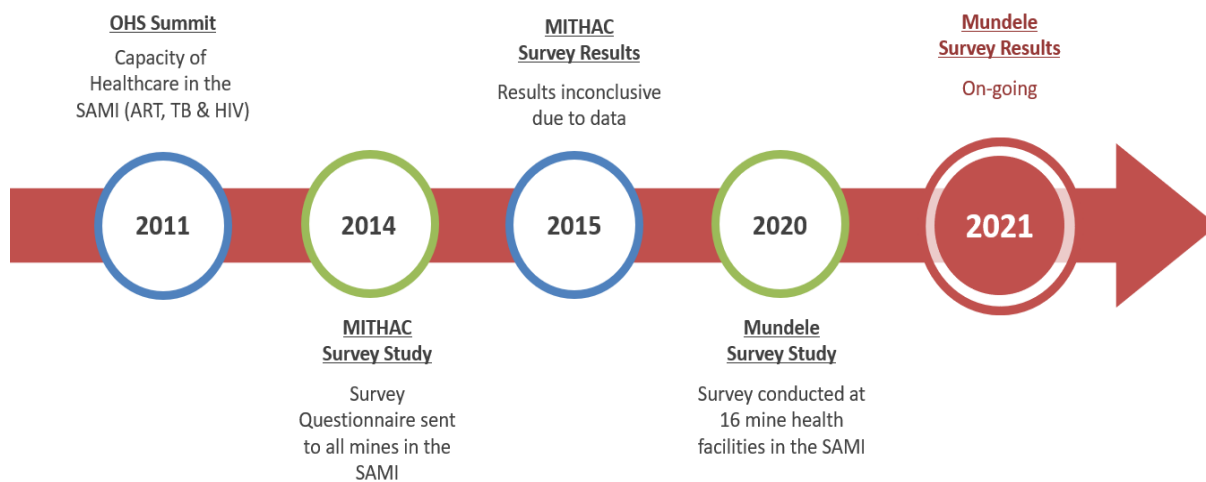


Dr Thomas Nyirenda
Research Consultant

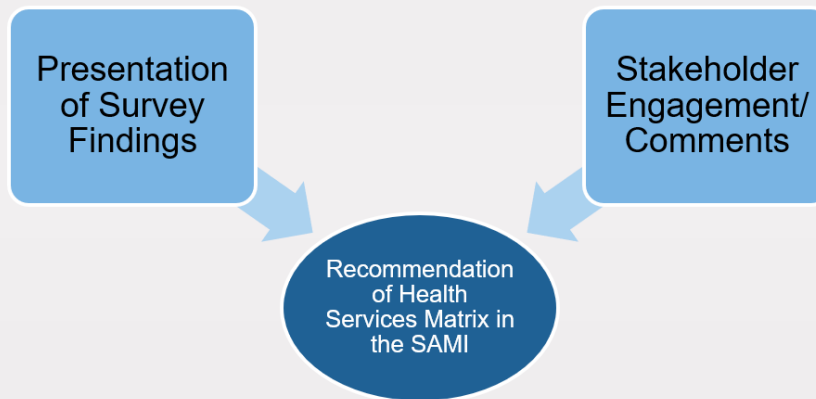


Maxwell Mhura
Managing Consultant

Project Background



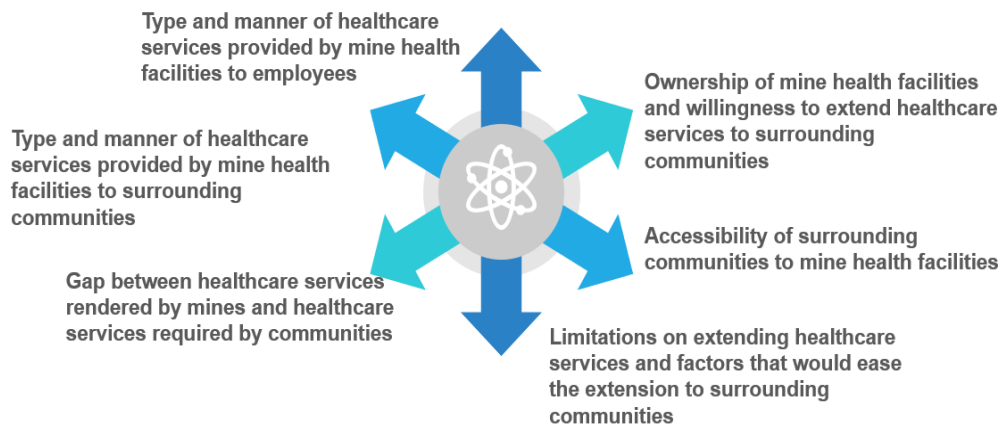
Purpose of the Workshop



Project Overview

Objective

– To determine the capacity of mine health facilities to service neighbouring communities in the SAMI under the following themes:

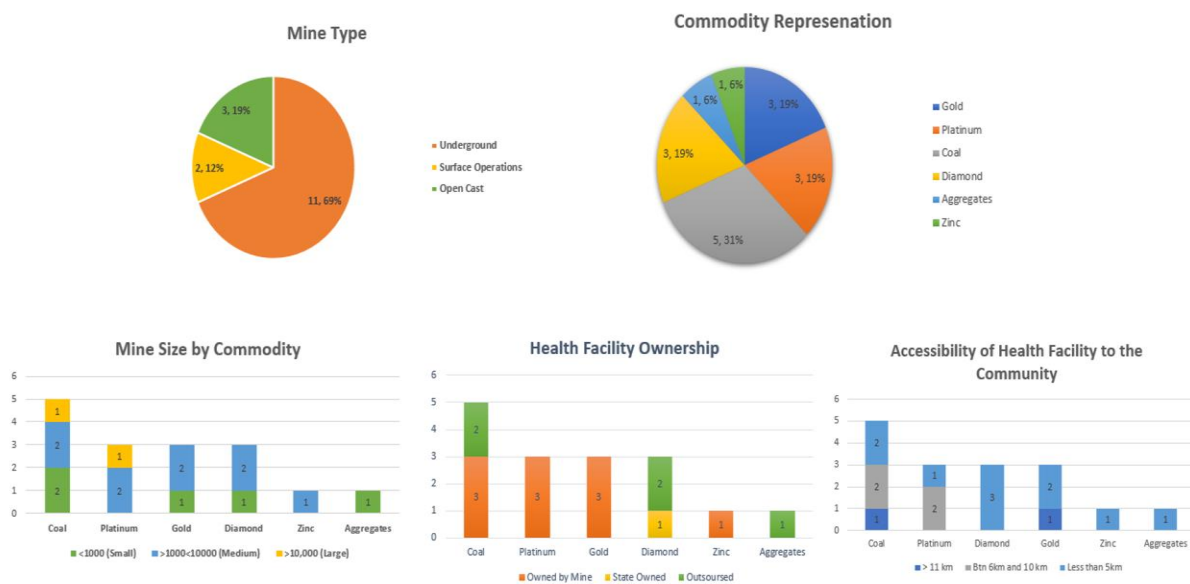


The Survey Study

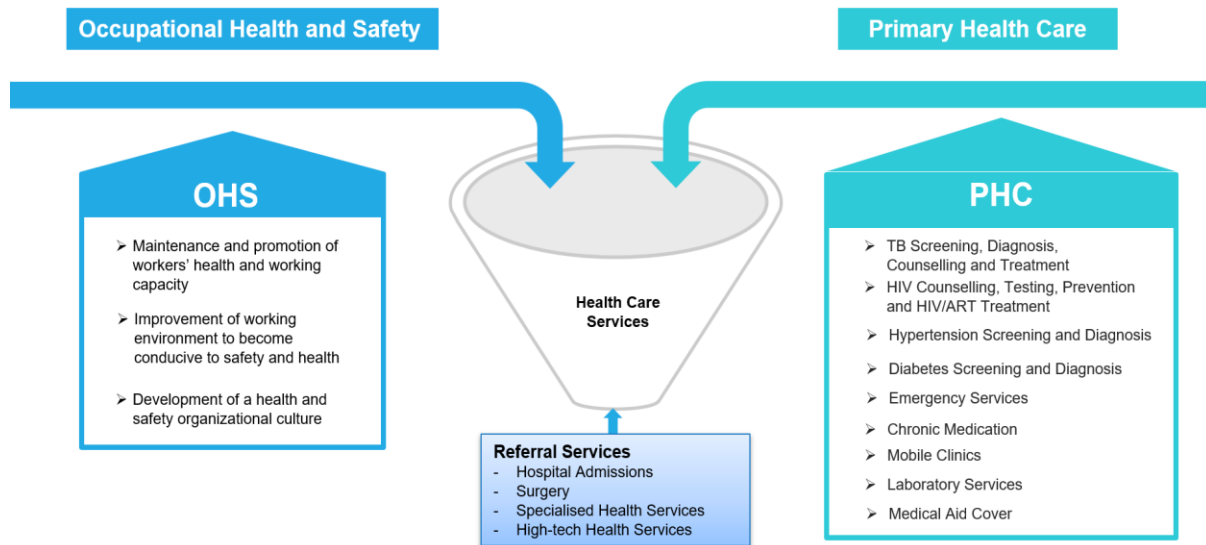
Survey study on 16 mine health facilities



Profile of Surveyed Mine Health Facilities



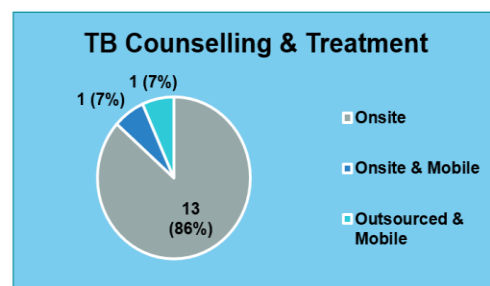
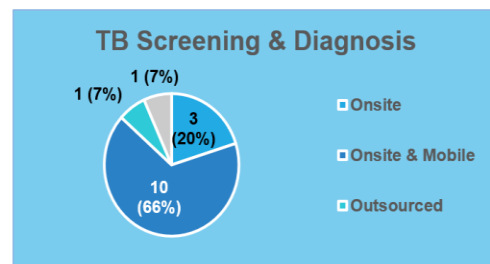
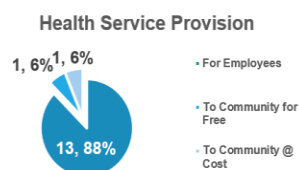
Health Services Provided in the SAMI



Health Services Provided Cont..

TB Healthcare Services

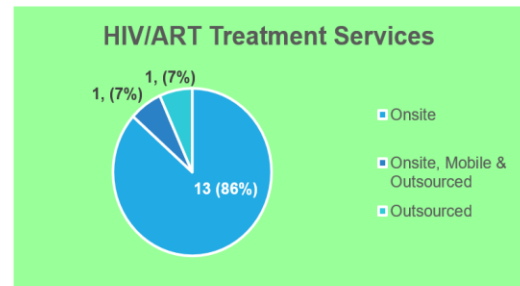
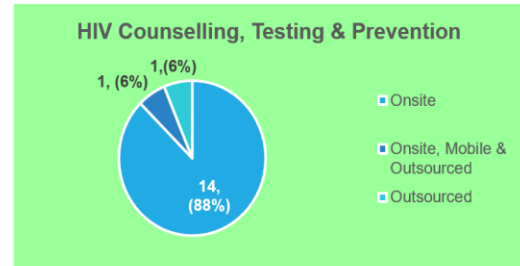
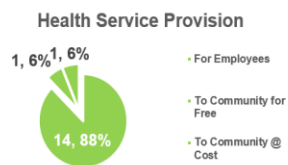
	TB Screening & Diagnosis	TB Counselling & Treatment
Coal (x5)	✓	✓
Platinum (x3)	✓	✓
Diamond (x3)	✓	✓
Gold (x3)	✓	✓
Zinc (x1)	✓	✓
Aggregates (x1)	X	X



Health Services Provided Cont..

HIV/ART Healthcare Services

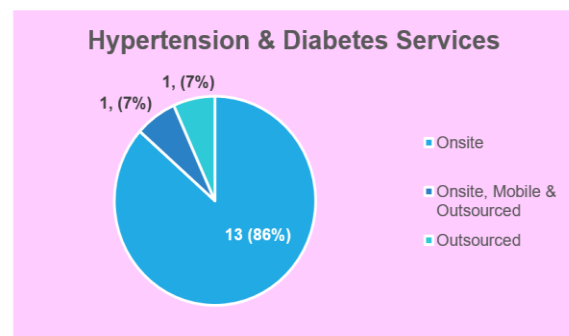
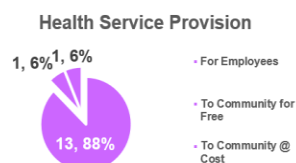
	HIV Counselling, Testing and Prevention	HIV/ART Treatment
Coal (x5)	√	√
Platinum (x3)	√	√
Diamond (x3)	√	√
Gold (x3)	√	√
Zinc (x1)	√	√
Aggregates (x1)	√	X



Health Services Provided Cont..

Hypertension and Diabetes Services

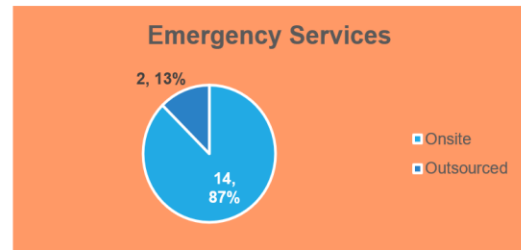
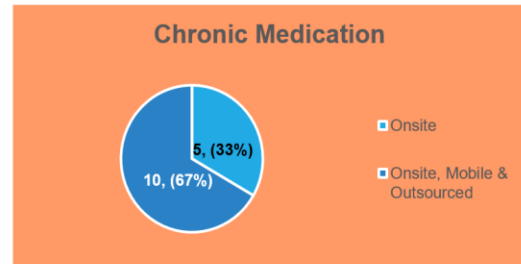
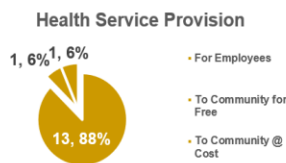
	Hypertension Services	Diabetes Services
Coal (x5)	√	√
Platinum (x3)	√	√
Diamond (x3)	√	√
Gold (x3)	√	√
Zinc (x1)	√	√
Aggregates (x1)	X	X



Health Services Provided Cont..

Chronic Medication & Emergency Services

	Chronic Medication	Emergency Services
Coal (x5)	✓	✓
Platinum (x3)	✓	✓
Diamond (x3)	✓	✓
Gold (x3)	✓	✓
Zinc (x1)	✓	✓
Aggregates (x1)	✗	✓

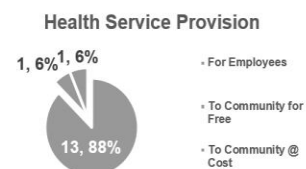
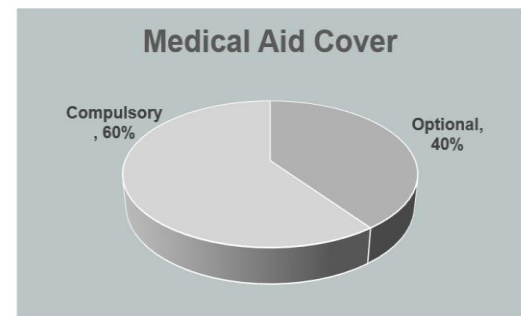


Chronic Medication – HIV, TB, Cholesterol, Diabetes & Hypertension

Health Services Provided Cont..

Other Healthcare Services

	Mobile Services	Laboratory Infrastructure	
		Yes	No
Coal (x5)	✓	✓ (x2)	✓ (x3)
Platinum (x3)	✓	✓ (x3)	
Diamond (x3)	✓		✓ (x3)
Gold (x3)	✓	✓ (x2)	✓ (x1)
Zinc (x1)	✓		✓ (x1)
Aggregates (x1)	✗		✓ (x1)



Health Services **NOT** Provided



Child Healthcare



Specialised Healthcare



Maternal Healthcare

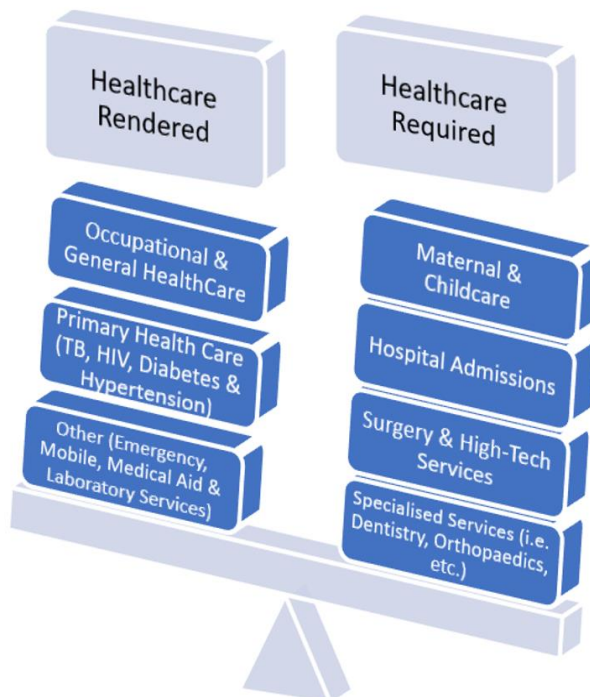


Surgery/High-tech Health Services



Hospital Admissions

Gaps in Health Services Provided



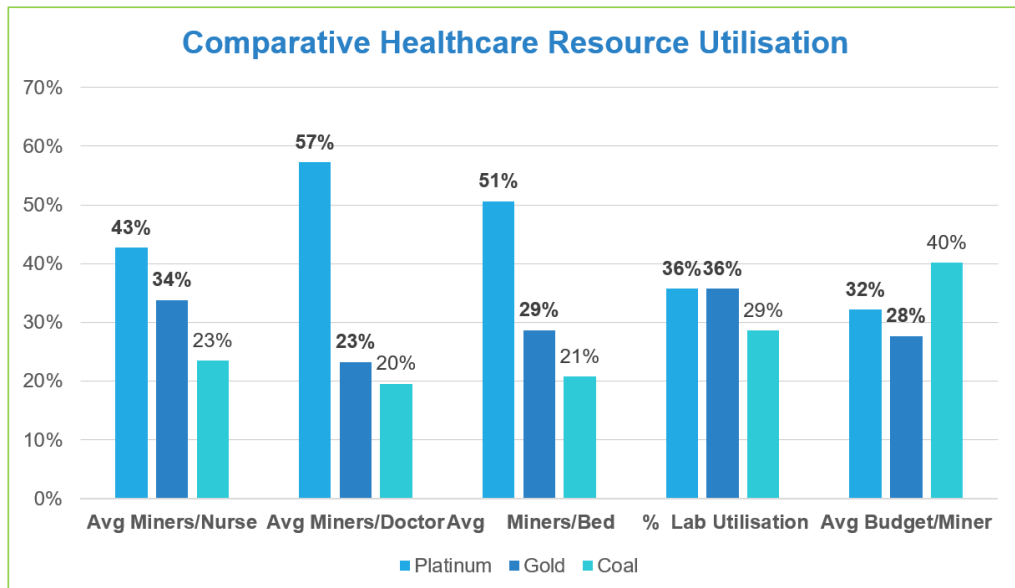
Healthcare Resource Capacity

Resource Variables	Platinum	Gold	Coal	Zinc
Average Resource Statistics				
Nursing Staff (Avg)	20	24	18	10
Doctors (Avg)	2	2	2	2
Consultation Beds (Avg)	9	11	10	5
Laboratory Infrastructure	3	2	2	0
Health Annual Budget (Avg/Mil)	R33m	R18m	R22m	R22m
Employees (Permanent & Contractors (Avg)	7,785	4,212	4,397	5,300
Resource Utilisation Per Miner				
Health Allocation/Miner (Avg)	R3,738	R3,222	R4,671	R4,151
Miners/Nursing Staff (Avg)	351	278	193	530
Miners/Doctor (Avg)	4,373	1,855	1,563	2,650
Miners/Bed/ (Avg)	745	422	306	1,060
Laboratory Utilisation	100%	100%	80%	N/A

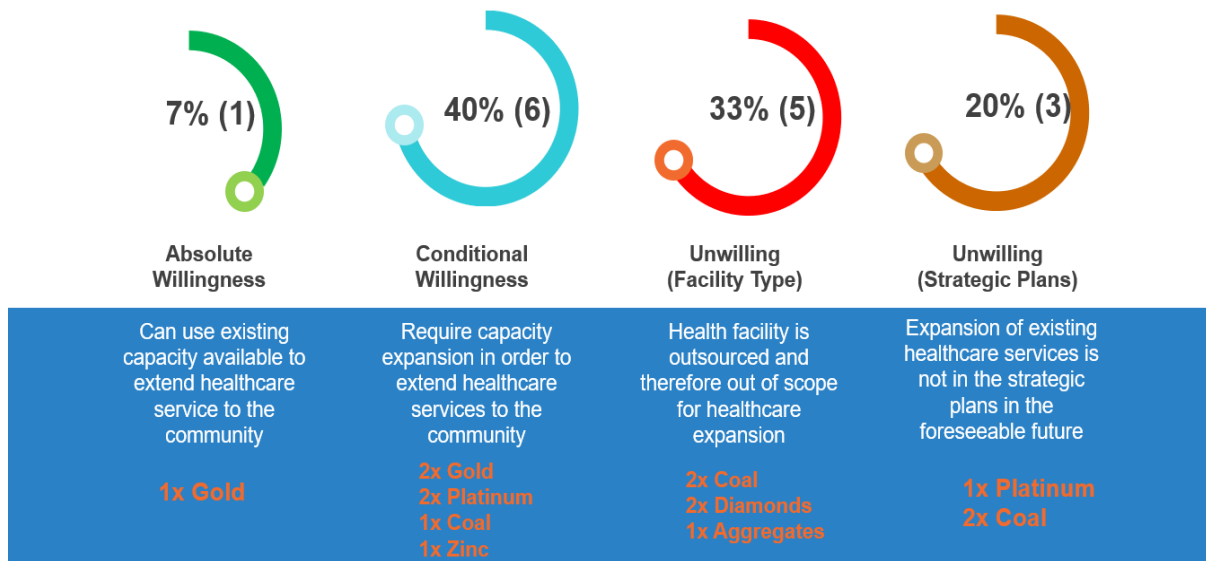
	Mining Sector	SA Avg 2020
Miners/Nursing Staff (Avg)	16	18
Miners/Doctor (Avg)	2,700	2,457
Health Allocation/Miner (Avg)	3,900	950

Healthcare Resource Capacity Cont..

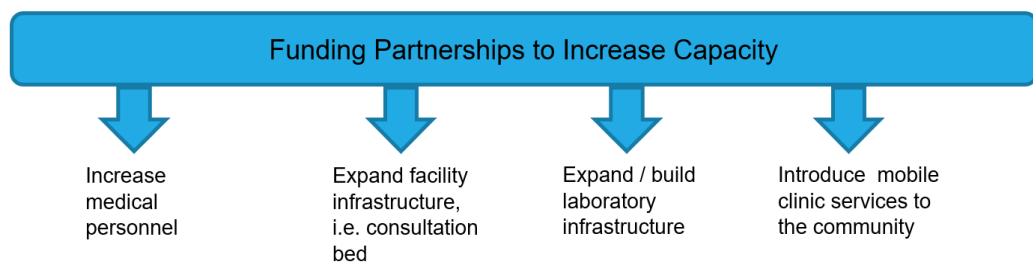
Subsector Comparative Healthcare Utilization



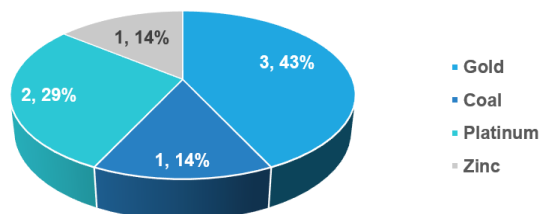
Willingness to Extend Health Service



Potential Expansion Opportunities



Potential Expansion Opportunities



Recommendations

-  **1** A co-funding partnership operating model between mining operations, the government and private investors
-  **2** Awareness campaigns to promote mindset change and encourage mining companies to extend healthcare service such as HIV/Aids and TB to communities especially where there's resource capacity
-  **3** Pilot healthcare service expansion to neighbouring communities by leveraging off the existing capacity identified in the coal sector before rolling out to other mining sectors
-  **4** Offer healthcare services at cost to adjacent communities, similar to the cost model used at a coal mine health facility in KZN province
-  **5** Use of mobile clinics to expand healthcare service to neighbouring communities, i.e. implementation of TB, HIV, diabetes and hypertension screening, counselling and prevention services through mobile clinics
-  **6** Expansion of healthcare services to the community on an incremental basis per pre-determined periods cumulatively
-  **7** Run scheduled programs to open health facilities to the community for selected screening, diagnosis and treatment services periodically, i.e., bi-weekly, monthly, etc.

Questions and Interactive Discussions

Workshop Closure

Thank You