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Load Shedding and Community Health Centres in South Africa: A Conceptual Scholarship (2014 – 2016)

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ABSTRACT Electricity supply in health centres is very imperative; a cut in electricity could lead to the degeneration of a patient's health or result in the death of a patient or may compromise surgical procedures. The essence therefore of this study is to examine the effect of load shedding on community health centres in South Africa. A desktop method was used in gathering information, while it was analysed using a combination of content analysis, narrative analysis and themes analysis. It emphasizes that load shedding has caused a lot of damages ranging from the loss of 150 lives in hospital, to poor sanitation, and to interrupted water supply. In conclusion, the prevailing circumstance of load shedding have crippled the health sector and has resulted in pandemonium in the public health sector leading to social, economic and infrastructural quagmires and negative growth to South Africa.

INTRODUCTION

The context of load shedding was reintroduced to the South African public in 2014. When it became expedient that the demand on electricity have tremendously increased outweighing Eskom's capacity (Matona 2015). According to Eskom, load shedding is "Eskom's last resort for preventing a total collapse of the national power grid in South Africa" (SA) (Matona 2015). Ismail (2015) states that load shedding have implications on the overall running of the public hospitals and clinics within the entire nation. This study investigates the effects of load shedding of electricity in Hospitals in Buffalo City Metro Health District in East London.

Electricity constitutes one of the most important factors in daily living. Load shedding became necessary when the demand for electricity in the country qua-tripled beyond the provision of the state owned power-firm Eskom (Ismail 2015). According to Matona (2015), Eskom used this measure when there is insufficient power station capacity to supply demanded capacity to customers. This caused a void on the electricity system in SA. Electricity system becomes unbalanced when there is high demand for electricity to serve their client. This often led to trip out of power or total blackout in the country. The implication of this could lead to partial economic collapse in the country. According to Van der Nest (2015), load shedding causes a lot of damages in the overall operation of the public health sectors not only within the Buffalo City Metropolitan Municipality but the continent and the globe (Wolf and Wenzel 2014). According to Ismail (2015), load shedding could be deadly for those patients who are undergoing emergency treatment, surgery and those in intensive care unit. Likewise, organism, parasites, vaccines and medication that need to be refrigerated can get spoilt. The effect on (ordinary) clinics receptions tells the significance in relation to surgery and those on life support. Hospital receptionist finds it difficult to locate, create and print labels for patient's folders. It's also impossible to access laboratory results electronically and capture work done until power is restored (Ismail 2015). In developing countries such as Uganda, load shedding has caused a lot of damages ranging from the loss of 150 lives in hospital, to poor sanitation, and to interrupted water supply (CEHURD 2012). The negative effects of load shedding have been felt even here in South Africa, for instance Ismail (2015) argues that, at one time, load shedding caused the death of four lives of premature babies at Cecilia Makiwane Hospital in East London.

Objective

To examine the effect of load shedding on community health centres in South Africa.

Load Shedding and Public Health: An Overview

Electricity supply in health centres is very imperative, a cut in electricity could lead to de-

generation of patient's health, death, and compromised surgical operations. The effect of load shedding on the economy is "unimaginable," as well as on the health sector (Bisseker 2015a). Surgical operations involve 24 hours uninterrupted power supply. A cut in power supply resulted in the death of four premature babies at a Hospital in East London. This and other isolated case in Jo'burg, Gauteng, Western Cape and other developing countries, such as the loss of 150 lives in Uganda are some of the fatal menace that load shedding could cause. More subtle though devastating are the degeneration of hospital equipment, drugs and other medical facilities in the public health centres.

The SA generating and distribution public utility is known as Eskom. Eskom as a South African electricity public utility was established in 1923, as the Electricity Supply Commission (ESCOM) by the Electricity Act of 1992. It was also known in Afrikaans as Elektrisiteisvoorsieningkommissie (EVKOM) (Van der Meulen 2011). These two abbreviations were combined in 1986 to form what is today known as ESKOM. Eskom operates a number of power stations, which comprises of Kendal power station and Koeberg nuclear power station. Koeberg nuclear power station is the only nuclear power plant in Africa. Eskom generates nearly ninety-five percent of electricity used in South Africa (Van der Meulen 2011). Due to the over burden of the national grid ESKOM decided to shed power (load shedding) to avoid total collapse or blackout in the nation. Electricity load shedding by Eskom is recently common in South Africa.

Load shedding is considered when power usage demands to fluctuate substantially and load leveling is feasible because of a substantial controllable loads. Load shedding has been used widely in the steel industry, though the principles of load shedding could be applied in any large industry or organization (Thumann and Dunning 2011). The nature of load shedding has manifested itself in different continents all over the world.

The history of load shedding can be traced to November 9, 1965, when the blackout in Northeast affected a total of seven north-eastern states and some province in Ontario in Canada, New Jersey, Connecticut, New Hampshire, Massachusetts, New York, Vermont and Rhode Island in the United States. The power was first recorded to have been shed for more than 30 million people springing over 80,000 square miles for 13 hours (Cormier n.d.).

Most of the nations of the world have experienced one form of load shedding. From 1976-2007, Quebec, New England, Taiwan, Lisbon in Portugal (Energias de Portugal), Auckland, Canada, Carlifornia, Ontario, Denmark, Sweden, Opal: Great Storm between UK and France, Tennessee, Italy, Malaysia, Greece, Australia: Sydney and Melbourne. All these nations and city have experienced one form of load shedding ranging from an hour to 90 hours, and from 1000 to 4.3 million people (Weeks 1985; Al-Mahmood 2014; Sparrow 2012; Cormier n.d.).

Load shedding is often unexpected and most of the time scheduled activity. It reflects badly on governance and socio-economic failure and also has impacts on health care services (Khan 2011). The majority of people living in BCMM for health services usually go to clinics and community health centres of their own residential areas, as this is relatively quick, easily accessible and costless. Electricity load shedding has an effect on performance Community Health Centres within Buffalo City Metropolitan Municipality (Ismail 2015), although little or no empirical study have been carried out in BCMM on the effects of load shedding on CHC in these areas nor have any significant empirical study been conducted to evaluate its effect in South Africa. Therefore, this study seeks to examine if load shedding has any effect on Hospitals in Buffalo City Metro Health District to be studied.

METHODOLOGY

All the research known to mankind are premised on certain underlying philosophies of what constitutes as reliability and validity. In social science research reliability and validity is frequently tasked. The notion of measurement in social research differs, in that, most research are related to quantitative abstractions, but in some or most cases, unobservable and intangible constructs are critical in social research and social analysis. It is within this perspective that this paper uses desktop research in gathering data, data was analysed using theme analyssis.

RESULTS AND DISCUSSION

Public health refers to "the science and art of preventing disease, prolonging life and pro-

moting health through organized efforts and informed choices of society, organizations, public and private, communities and individuals" (Winslow 2015). It can also refer to all organized measures (whether public or private) to prevent disease, promote health, and prolong life among the population as a whole. Its activities aim to provide conditions in which people can be healthy and focus on entire populations, not on individual patients or diseases (WHO 2015). The aim of public health is to protect and improve the health of individuals, families, communities, and populations, locally and globally (ASPPH 2015).

Some of the functions of Public Health officials include: monitor the health status of a community to identify potential problems; diagnose and investigate health problems and hazards in the community; inform, educate, and empower people about health issues, particularly the underserved and those at risk; mobilize community partnerships to identify and solve health problems; develop policies and plans that support individual and community health efforts; enforce laws and regulations that protect health and ensure safety; link people to needed personal health services and ensure the provision of health care when otherwise unavailable; ensure a competent public health and personal health care workforce; evaluate effectiveness, accessibility, and quality of personal and population-based health services; and research new insights and innovative solutions to health problems (ASPPH 2015; WHO 2015).

Population-based approach to health on the other hand, promotes healthy lifestyles to prevent chronic diseases such as cancer, heart disease, and diabetes; facilitates community action to improve mental health and reduce substance misuse and social violence; assures our drinking and recreational waters are safe; eradicates life threatening diseases such as smallpox and polio; controls and prevents infectious diseases and outbreaks such as measles, HIV/AIDS, tuberculosis, and SARS; reduces death and disability due to unintentional injuries through the formulation of policies designed to protect the safety of the public, such as seat belt and worker safety laws; educates populations at risk to reduce sexually transmitted diseases, teen pregnancy, and infant mortality; promotes oral health; prevents pollution of our air and land through enforcement of regulatory controls and management of hazardous wastes and; evaluates the effectiveness of clinical and community-based interventions (Drupal 2015).

Load shedding in South Africa is a process whereby Eskom's National Control Centre directs its Distribution Regional Control Centres, in 126 Municipalities on the key Industrial Customers on the Megawatts to be shed (Eskom 2015; Leahy and Tol 2011). It becomes expedient when there is not enough electricity available to meet the demand from all Eskom's customers, it could be necessary to interrupt supply in certain areas. This is called load shedding (Eskom 2015).

It should be noted that the duration of load shedding will depend on the specific Eskom region or on the Municipality based on local circumstances.

To Eskom load shedding is regarded as the last resort/measure, if total blackout is to be averted. This measure is taken when all other means at Eskom's disposal have been exhausted: running maximum capacity at its power stations and interrupting supply to industrial customers with special contracts to cut supply to other customers. This controlled medium of rotating the available electricity between all customers is Eskom's way of ensuring equity in distribution. The schedules for load shedding are drawn up to ensure that a few areas do not bear the brunt of the shortages (England 2015b; Choi et al. 2002). By spreading the impact to all sectors in the society, therefore creates a problem for CHCs especially in Buffalo City Metropolitan Municipality of the Eastern Cape.

Load Management

The concept of load management is an umbrella term to describe the methods and technologies of a unity to timeously control the peak of customers power use. Its idea is to reduce the demand for electricity during peak periods and increase the demand off-peak periods (Thumann and Dunning 2011: 92).

Empirical Literature

The disturbance caused by load shedding in South Africa (Deloitte 2011) is largely due deficiency in the decentralized system or micro grid (Bisseker 2015b). The effect of load shedding or load management or local control can be

categorized into two major subgroups: distribution (Eskom) and end users (CHCs (Eskom 2015; City of Cape Town 2015). In that, load shedding reduces the profit of Eskom, while also affecting the CHCs in devise ways as stated initio.

Load shedding is only considered when the demands on the power usage fluctuates substantially and load levelling premised on substantial uncontrollable loads. Load shedding then becomes the last result to avoid total blackout of electricity (Thumann and Dunning 2011: 90-93).

Process of Load Shedding

ESKOM sets procedures which governs the modus operandi for load shedding in five phase – tight supply, which involves the demand of electricity in high demand, thereby increasing the demand on supply. Emergency resources and technical issues. The essence of this phase of load shedding is to balance the demand on supply, while striving to save for emergencies in depleting power WATTs, and unexpected eventss on major power lines. The second phase is the vontracted or voluntary emergency demand reduction phase, which emphasise the need for emergency demand and demand response to customers to reduction their demand or consumption of the power utilised to avoid a blackout. The third phase is the load shedding phase – as a last resort after emergency warning, load shedding is taken as a medium to cut off supply of electricity to customers on a temporary basis, usually between 2-4 hours to protect the grid from collapse. The fourth phase is the blackout phase – in a case where preventive and warning measures failure, blackout is enviatable, as a means towards avoiding the collapse of the power grid in the area. It must be understood that a blackout is unexpected and therefore is a complete failure of the system operator. The fifth phase is the recovery phase from the failed power grid. The recovery is dependent on the nature of damage caused by overload and inadequate supply (BDO Consulting 2018).

Application of Load Shedding

Load shedding is typically used by Eskom to drop individual packets randomly, based on timestamps or usage priority basis (Nascimento et al. 2004: 319). In that it is performed proportionally within power distribution systems. Because between Eskom and the distribution units small power are ruled out for a particular district to avoid overloading of the national grid which could lead to blackout (Kim et al. 2011). It is important to know that every load shed is due to data resulting from the usage of electricity at that time.

Load shedding is an effective way to avoid total blackout in South Africa by Eskom. Shortages on the electricity system unbalance the network, which can cause it to collapse. By rotating the load in a planned and controlled manner, the system remains stable. Rotation is necessary when the demand of electricity reaches its peak thereby shedding the load on the system to avert spoil of the power plant/system. Figure 2 also shows that when the demand for electricity reaches its peak, electricity is then redistributed while also showing the major times when electricity is most needed as seen in Figure 2 (MacKinnon 2008). Figure 1 shows that there are two major steps of load shedding:

The first step deals with applying load shedding to establish targeted demands, premised on the load analysis per time and/or load readings per time (Thumann and Dunning 2011: 93).

The second step identifies controllable loads which could be put off to obtain the desired limits. Examples includes: electric boilers, geysers, electric furnace, compressors, air conditioner, electric cookers, heating and ventilating fans, snow melters, and noncritical "batch processes." This tend to ensure that the usages of electricity is reduced (Thumann and Dunning 2011: 94).

The Nature of Load Shedding

The nature of load sheding is in three stages, input (Watthour Meter), logic (logically demand) and output (Thumann and Dunning 2011), this tends to demonstrate how electric demand control system functions. The demand controller is essential in electric power distribution. It compares the clients' actual rate of energy consumption to a predetermined ideal rate of energy consumption at any interval (demand). Thereby, creating a visibly scope of the demands of electricity per time.

Inputs

The same meters which Eskom uses for billing its clients is also used to supply information

to the load demands on the control system. The Watthour meter represents the kilowatts on the use of electricity per hour. The information is supplied in the form of pulses. The demand meter supplies information on the end demand usage interval usually between 15, 30 or 60 minutes.

Logic

This element compares the input information to a predetermined ideal rate, which tends to signal if shed load mode be activated when the actual rate as indicated is exceeded. It also signals to restore load whenever the signal goes down on the grid. Loads are usually shed within the last few minutes of a demand interval in order to avoid unnecessary blackout as seen in Figure 3.

Outputs

Signals from the logic elements activates contractors, relays and/or motor starter to either shed or restore loads. Demonstrating a position when loads are not shed appropriately which could lead to an entire breakdown in the system (power grid of a nation). Reason why Eskom has decided come to the resolution of load shedding is to avoid a total blackout of the system which would degenerate the economy and the health institutions nation-wide (England 2015a). It is necessary to state herein that load shedding simply implies reducing the loads on the control system to avoid total blackout in the country.

Difference between Load Shedding and Saving Electricity

Load shedding simply means removing load from the power system when there is an imbalance between the demand for electricity supply and the available electricity generation capacity. In a situation where there is need to shed load, then the whole national power system would switch off and no one would have electricity for the period under review (based on location of the power generation station). Load shedding is therefore done to protect the national power system from total collapse.

Saving electricity (by using energy-efficient appliances, switching off equipment when not in use, using alternative sources of energy such as solar geysers) has benefits such as reduced pollution, cost, the better use of natural resources (coal, water and fuel) and less wear and tear on the power stations, transmission and distribution systems, which tends to save monies for customers and clients.

In these times of capacity constraints, saving electricity also means that the load on the national power system is reduced. This helps to stabilize the balance between the available generation and the demand, in this way reducing the risk of load shedding.

Load Management

The concept of load management is an umbrella term to describe the methods and technologies of a unity to timeously control the peak of customers power use. Its idea is to reduce the demand for electricity during peak periods and increase the demand off-peak periods (Thumann and Dunning 2011: 92). Load management can also be said to be, the process of balancing electricity supply on the network with the electrical load by adjusting and/or controlling the load rather than the power station output. It therefore, allows utilities to reduce demand on electricity during peak period, which can, in turn, reduce costs by eliminating the need for peaking power plants.

This is due to the assumption that the electric utility industry is trying to cope with significant changes: deregulation, increase in the usage of electricity, increased customer base, industry restructuring, consumer choice, and increasing costs of net generation capacity. The primary concern of load management likewise load shedding is matching consumer loads with capacity to supply energy in an economical and reliable manner (Pansini and Smalling 1998: 10-18).

Reasons for Load Shedding

According to Eskom there are three major reasons for load shedding in South Africa:

1. Eskom must continue with the planned maintenance of Generation plant during this winter. This will enable a sustainable Generation plant going forward.
2. This means that the national power system will be particularly strained during the evening peak between 5pm and 9pm

in winter, and during any time of the day in the summer months

3. Eskom has published the load-shedding schedules to enable customers to be better prepared in the event of load shedding (Eskom 2016).

LIMITATIONS

No matter how meticulous a research pretends or intends to be, he/she might not be able to cover all the sectors of a topic (whether topical or trivial). However, the most the researcher is expected to do is make the research of scientific merit by ensuring that such a research is repeatable. Thus, this paper in no way pretend nor does it intend to cover all the sectors relating to load shedding in the energy sector in SA. Although, it gives strong conviction that load shedding in health centres in SA is hazardous and results in the loss of lives, which contravenes the primary responsibility of the healthcare practitioners globally. The paper is a conceptual paper that tends to stir awareness of the decay in this sector and its cost on the economy. Therefore, some historical antecedents required in paper presentation is exempted but will be expunged in future correspondence as, analysis, data presentation, and an implicit and tacit recommendation.

CONCLUSION

The prevailing circumstance brought about by load shedding have crippled the health sector and has resulted in pandemonium in the public health sector leading to social, economic and infrastructural quagmires and negative growth to South Africa's populace. The economic demand for electricity in health faculty is intended to equal or be proportional to the supply derived. However, where supply exceeds demand tremendously then there is a break or a disaster. This was the case presented to the South African public during the load shedding period. The load shedding saga created a greater cost for medicare in the country, which is as a result of an increase in expenditure for the purchase and use of alternative power. The consequent effect on this hike on over fifty-two percent of the households in abject poverty in the country is worrisome.

RECOMMENDATIONS

CHC being the first point of call for medicare in communities in poor black communities must be granted special funds to procure a standby generating set which is able to adequately without stress power every equipment in the CHC. This is because a minute without adequate power in a CHC is dangerous because it could lead to loss of life or a permanent damage to a promising future.

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