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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 hospitals, 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 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 spoil. 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 (CE-HURD 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 analysis.

**RESULTS AND DISCUSSION**

Public health refers to “the science and art of preventing disease, prolonging life and pro-
moting health through organized efforts and in-
formed choices of society, organizations, public
and private, communities and individuals” (Win-
slow 2015). It can also refer to all organized mea-
ures (whether public or private) to prevent dis-
ease, 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 offi-
cials include: monitor the health status of a com-
munity to identify potential problems; diagnose
and investigate health problems and hazards in
the community; inform, educate, and empower
people about health issues, particularly the un-
dererved and those at risk; mobilize communi-
ty partnerships to identify and solve health prob-
lems; 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, accessi-
bility, 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 pre-
vent chronic diseases such as cancer, heart dis-
ease, and diabetes; facilitates community action
to improve mental health and reduce substance
misuse and social violence; assures our drink-
ing and recreational waters are safe; eradicates
life threatening diseases such as smallpox and
polio; controls and prevents infectious diseas-
es and outbreaks such as measles, HIV/AIDS,
tuberculosis, and SARS; reduces death and dis-
ability due to unintentional injuries through the
formulation of policies designed to protect the
safety of the public, such as seat belt and work-
er safety laws; educates populations at risk to
reduce sexually transmitted diseases, teen preg-
nancy, and infant mortality; promotes oral health;
prevents pollution of our air and land through
enforcement of regulatory controls and manage-
ment 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 di-
rects its Distribution Regional Control Centres,
in 126 Municipalities on the key Industrial Cus-


tomers on the Megawatts to be shed (Eskom
2015; Leahy and Tol 2011). It becomes expedi-
tent when there is not enough electricity avail-
able to meet the demand from all Eskom’s cus-
tomers, it could be necessary to interrupt sup-
ply 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 re-

gion or on the Municipality based on local cir-
cumstances.

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 exhaust-
ed: running maximum capacity at its power sta-
tions and interrupting supply to industrial cus-
tomers with special contracts to cut supply to
other customers. This controlled medium of ro-
tating the available electricity between all cus-
tomers is Eskom’s way of ensuring equity in dis-
tribution. 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 sec-
tors in the society, therefore creates a problem
for CHCs especially in Buffalo City Metropoli-
tan Municipality of the Eastern Cape.

Load Management

The concept of load management is an um-

brella term to describe the methods and technol-
gies 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 shed-
ding 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 events on major power lines. The second phase is the contracted 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 envitable, 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 black out (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, geyers, 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 shedding 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). Therefore, 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
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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 sig-
nals 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 or-
der 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 shed-
ding 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 shed-
ding 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 imbal-
ance between the demand for electricity supply
and the available electricity generation capaci-
ty. In a situation where there is need to shed
load, then the whole national power system
would switch off and no one would have elec-
tricity for the period under review (based on lo-
cation of the power generation station). Load
shedding is therefore done to protect the na-
tional 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 resour-
ces (coal, water and fuel) and less wear and tear
on the power stations, transmission and distribu-
tion systems, which tends to save monies for
customers and clients.

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

Load Management

The concept of load management is an um-
brella term to describe the methods and technol-
ogies 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 elec-
tricity supply on the network with the electrical
load by adjusting and/or controlling the load
rather than the power station output. It there-
fore, allows utilities to reduce demand on elec-
tricity during peak period, which can, in turn,
reduce costs by eliminating the need for peak-
ing power plants.

This is due to the assumption that the elec-
tric utility industry is trying to cope with signif-
icant changes: deregulation, increase in the us-
age of electricity, increased customer base, in-
dustry restructuring, consumer choice, and in-
creasing 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 sys-
tem 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 worsome.

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.

REFERENCES


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89-11e4-bf55-00144 fecbdc0.html# axzz3Yv3 MDIB8> (Retrieved on 29 June 2018)