The impact of budgeting on health outcomes in public healthcare facilities: Evidence from the Kingdom of Eswatini

A research project submitted to the School of Economics University of Nairobi, in partial fulfillment of the requirements for the award of the degree of Master of Science in Health Economics and Policy

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DECLARATION

I hereby assert that the research project was never submitted to any University for academic award. The secondary sources employed herein have been acknowledged as borrowed ideas from authors and scholars in its completion.

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DEDICATION

This research project is dedicated to my family especially my partner Miss. Zandile Sharon Khulu and our beautiful sons Mohau Wayo Malambe, Lebohang Lusenathi Malambe and Teboho Kenya Malambe. Lastly, to my departed only daughter Amogelang Ngemihla Malambe.

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Table of Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

EU – European Union

GDP – Gross Domestic Product

GGE – General Government Expenditure

GHE – Government Health Expenditure

GLS – General Least Squares

GNP – Gross National Product

MEPD – Ministry of Economic Planning and Development

MoF – Ministry of Finance

MoH – Ministry of Health

MoPS – Ministry of Public Service

NHA - National Health Accounts

OECD – Organization for Economic Coo-operation and Development

PBC – Planning and Budgeting Committee

PCT – Primary Care Trust

PHU – Public Health Units

QALY's – Quality Adjusted Life Years

SAM – Service Availability Mapping

SDG – Sustainable Development Goals

SEM – Structural Equations Models

THE – Total Health Expenditure

UHC – Universal Health Coverage

UN – United Nations

WHO – World Health Organization

ABSTRACT

One of the effective mechanisms that governments can utilize to realize national aspirations is budgeting. In Eswatini, the principal instrument for mobilizing the required resources for funding programs is government budget and that budgeting has to operate within the framework of the country's unique socio-economic environment hence Eswatini uses the incremental budgeting mechanism. In many African countries especially developing countries like Eswatini the concept of incrementalism has dominated conceptualization, analysis and description of the budgetary process. Therefore, the study desired to examine the impact of budgeting on health outcomes in Eswatini utilizing Ordinary Least Squares (OLS). Estimation results shows that budget influences health outcomes. Policy implications include strengthening both the provider perspective in terms of financing structures and patient's perspective which include community involvement and participation in health issues.

CHAPTER 1

INTRODUCTION

1.1 Background of the study

A global effort for a holistic approach to achieve sustainable development for all 193 countries affiliated in the United Nations (UN) reassured their renewal to the UN Declaration. This declaration has led to the setting out of goals known as the Sustainable Development Goals (SDGs) which have multiple indicators to measure improvement through the period of 2015 to 2030. The health-related SDGs indicators target to decrease infant mortality to 12 per 1000, under-five mortality to 25 per 1000, maternal mortality by 70% and achieve universal health coverage[1]. Therefore, Gangadharan and Valenzuela (2001), together with Pritchett and Summers (1996), revealed that countries are assessing their health spending because the linkages in budgeting and health outcomes have been shown to exist in literature.

This spirit has compelled countries to assess their spending and budget since budgeting is seen to be effective in assisting governments to achieve national ambitions. In less developed countries like Eswatini the government's budget is the main tool for appropriating resources for sectors, programs and departments. Budgeting should operate within the framework of the country's socio-economic setting, hence Eswatini uses the incremental budgeting mechanism. Incrementalism is a form of budgeting and as stated by Schick (1969) refers to a normative theory. However, Davis *et al.*, (1971), Wanat (1974), Dempster and Wildavsky (1979), define it as a descriptive theory while Davis *et al.,* (1971) further refers to it as a theory that is predictive of the process of budgeting.

According to Schick (1983), incrementalism was introduced during the periods of 1940s until 1970s. This was during the time of economic growth and governments' expansion in the United States of America after their economy stagnated. Federal budget became decremental and there were cutbacks in programs and the theory of incrementalism had to be discarded or modified (Wright, 1980). However, in many African countries especially less developed countries like Eswatini the idea of incrementalism dominated formulation of concepts, examination and representation of the process of budgeting. This led to poor budget management and made it difficult for less developed countries to interpret spending to effective services (World Bank 2003).

[1]https://www.emerald.com/insight/content/doi/10.1108/AAAJ-05-2017-2929/full/html

According Rajkumar and Swaroop (2007), a reasonable assumption can then be made that proper management of public resources can promote development hence this study seeks to investigate the impact that the budgeting mechanism utilized by the country in disbursing public resources to producing improved services like the health outcomes. Jim Yong Kim the former President of the World Bank (WB), in his speech at Stanford in 2018, said "improved health outcomes yield better human capital that is productive and capable of driving up economic growth." Hence, the WB Group has produced a guide to assess the productivity of future workers from the contributions of human capital.

1.2 Stylized facts

State Budgeting

The Government uses incremental budgeting where in, the budget of the preceding year's determines the base for the upcoming year's budget ceilings with increments added for the new budget. The Ministry of Finance (MoF) issues a budget circular stipulating budget ceiling for that budgeting period. Then ministries officials internally interact through discussions and meetings to craft budgets that would be negotiated with the MoF. This is then followed by negotiations which have two sources of pressure. The first is technical, from budget officers in line ministries who interact with budget sector-specific specialists in the MoF. The second is political, from Principal Secretaries in line ministries, negotiating with the MoF Principal Secretary. There is no systematic review of these negotiations, and so there is no understanding of the cuts made or allowances given (Lievens *et al.,* 2017).

The Planning and Budgeting Committee (PBC) has the final say in these negotiations. The PBC is made up of three institutions; the Ministry of Economic Planning and Development (MEPD), which oversees capital spending; the Ministry of Public Services (MoPS), which is in charge of wages; and the MoF, which is responsible for recurrent spending. Each Principal Secretary goes in front of this committee to defend their budgets and to try and negotiate for extra funds. One responsibility of the PBC is to ensure budgets are aligned to planning priorities. After this, the budget goes to Cabinet and Parliament for approval. Usually these institutions do not implement big changes (Lievens *et al.,* 2017).

Health Sector Budget

The Total Health Expenditure (THE) was found to be (see table 1.1) USD$ 348 million, where government spent USD$ 159 million, donors spent USD$ 115 million, private spent USD$ 35 million and households spent USD$ 37 million. This represents an average spending of Total Health Expenditure (THE) of US $325.56 per capita and the Government Health Expenditure (GHE) of US$148.15 per capita. These figures are much higher than the World Health Organization (WHO) minimum of USD$84 per capita that is required for achieving Universal Health Coverage (UHC). The government contributed the largest share at 45.9% followed by donors at 33.1%, households at 10.9% and private companies at 10.1% (National Health Accounts, 2017/18).

Table 1:General Health Financing Schemes

	Government	**Private**	**Households**	**Donors**	**Total**
THE (USD)	159, 971, 111.11	35,111, 851.85	37, 832, 592.59	115, 368, 888.89	**348, 285, 185.20**
THE Per Capita (USD	148.15	35.53	35.05	106.83	**325.56**
THE (%)	45.9%	10.1%	10.9%	33.1%	**100.0%**

Source: Eswatini National Health Accounts (2017/18)

The proportion of government spending allocated to the health sector in less and medium countries should be at least 15% according to the head of states commitment to the Abuja Declaration. The National Health Accounts (NHA) suggest that for the period 2017/18, the health sector budget has received around 11% of total General Government Expenditure (GGE). An analysis of Total Health Expenditures (THE) shows that Government Health Expenditure (GHE) makes up the majority of THE, (45.9%). A study on health systems and reforms in East and Southern African countries shows a wide variation in governments' health spending, where the share of GGE to health averaged 8.3%, from lows of 2.2% in Mozambique to highs of 14% in South Africa (see figure 1.1) (Moritz Piatti-Fünfkirchen *et al.*, 2018).

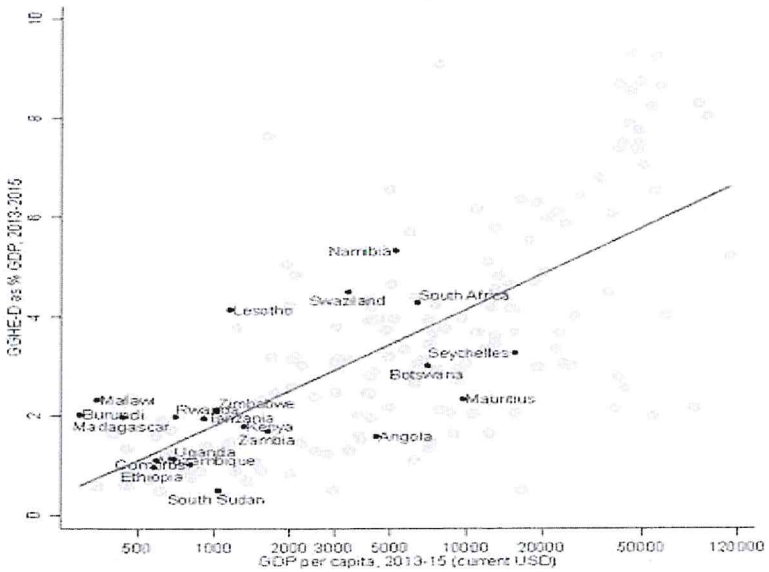

Figure 1: Southern and Eastern Africa GHE of 2013-2015

Health Outcomes

Maternal mortality constitutes a silent emergency in Africa, including Eswatini. WHO is defining maternal death as the woman deaths during pregnancy or termination of pregnancy within 42 days regardless of the length and place of the pregnancy which might be a result of whatever cause associated with or worsened by the pregnancy or the management during pregnancy and not from accidental or incidental causes" (WHO, 2007). Every year woman accounting for more than 287,000 die worldwide as a consequence of pregnancy and child associated complications and more of these deaths approximately 99% occur in developing countries[2].

This is the case in Eswatini, the maternal mortality is high. According to Lievens *et al.,* (2017) one of the pivotal interventions in reducing maternal deaths includes the promotion of institutional deliveries by a skilled birth attendant. As expected, the number of physicians per unit of population given in 1000 in this case is predicted by the average level of funding over the past decade and that about 60% of the differences in physicians per unit of population across the country is explained by the funding levels (Lievens *et al.,* 2017). The confidence enquiry and maternal deaths report of 2016 puts the maternal mortality ratio of Eswatini at (593/100 000) live births. The same

[2]https://www.who.int/news-room/fact-sheets/detail/maternal-mortality

report further mention that availability of skilled personnel recorded 88% and more than 80% of deliveries occurs in public institutions, with approximately 10% of the deliveries occurring outside institutions. Therefore, most of the deaths are occurring in the health facilities.

WHO has stated that the likelihood of a child death before reaching his/her fifth birthday is very high in the African Region translating to 76 children in every 1000 live births which surpass that of Europe Region 8 times that is standing at 9 children in every 1000 live births. Additionally, the inequities that exists in child mortality in highly developed and less developed countries is high. In less developed countries during the year 2018 the under-five mortality rates were standing at 68 deaths in every 1000 live births that was approximately 14 times more than the 5 deaths in every 1000 live births in developed countries[3].

This unfortunate reality is being experienced by Eswatini as well where she hit a record of (54/1000) under-five mortality rates in 2018[4]. According to the Ministry of Health (MoH) performance management reports of 2018, more children are dying from non-infective gastroenteritis and colitis followed by conditions emanating from disorders relating to short gestation and high birth weight. The report further states that malnutrition is also a cause for concern for children under-five as approximately 15% of all under-five deaths are due to nutrition related deficiencies including unspecified protein-calorie malnutrition, kwashiorkor, slow fetal growth and fetal malnutrition despite the fact that the country enjoys better coverage of nurses.

The Organization for Economic Co-operation and Development (OECD) has defined the infant mortality rate to be the number of children dying before attaining their first birthday in every 1 000 live births. Bachmann *et al.*, (1996) states that one of the key health indicators is infant mortality which shows the prevalence of babies experiencing weights at births and the level of impoverishment experienced by the birthing mothers and their infant babies, their access to healthcare too. According to WHO, in 2017, 75% of under-five deaths which accrues to 4.1 million happened during their first year of life. This scenario proved the high risk of children dying before attaining their first birthday in Africa compared to Europe. The risk was estimated

[3]https://www.who.int/gho/child_health/mortality/mortality_under_five_text/en/
[4]https://data.worldbank.org/indicator/SH.DYN.MORT?locations=BW

at 51 infant deaths in every 1000 live births in Africa compared with 8 infant deaths in every 1000 live births in Europe making African deaths to be more than 6 times higher than that of Europe. In global trends, there is a reduction in infant mortality rate currently standing at 29 infant deaths in every 1000 live births in 2017 from 65 infant deaths in every 1000 live births in 1990 and the yearly infant deaths showed a reduction to 4.1 million in 2017 from 8.8 million in 1990 [5].

According to the WB database Eswatini recorded (43/1000) in infant mortality rate in 2018, slightly above the trend-line in the pack of African countries[6]. Although causes of infant mortality vary by country, it is notable that Eswatini has high levels of spending, high levels of basic health services coverage and comparable numbers of health personnel, but performs toward the bottom end of African countries on infant mortality rates (Lievens *et al.,* 2017).

1.3 Problem Statement

The Kingdom of Eswatini continues to realize daunting health outcomes despite the government efforts in allocating a significant proportion of General Government Expenditure (GGE) to health. In sum, the NHA suggest that for the period 2017/18, the health sector budget has reached around 11% of total GGE. The proportion of government expenditure allocated to health in less and medium developed countries should be at least 15% according to the head of states commitment to the Abuja Declaration. A study on health systems and reforms in East and Southern Africa countries shows a wide variation in governments' health spending, where the share of GGE to health averaged 8.3%, from lows of 2.2% in Mozambique to highs of 14% in South Africa (Moritz Piatti-Fünfkirchen *et al.,* 2018). The NHA data suggest that government is contributing a greater than average proportion of GGE compared to peers who have an average Government Health Expenditure (GHE) per capita of US$ 148.15 yet realize poor health outcomes in mortality rates. Based on the information above the researcher is interested in examining the impact of the health spending on the health outcomes. In line with the research problem, this study seeks to explain the

[5] https://www.who.int/gho/child_health/mortality/neonatal_infant_text/en/
[6] https://data.worldbank.org/indicator/SP.DYN.IMRT.IN?locations=SZ

following question; "What are the impacts of budgeting on the health outcomes in the Kingdom of Eswatini?"

1.4 Study Objective

The objective of the study is to investigate the impact of budgeting on health outcomes in the Kingdom of Eswatini.

1.5 Study Significance

The study will unearth the relationship and influence that budgeting has on health outcomes. This will guide decision making in the financing of health in a manner that will yield improved health outcomes. It will, therefore, inform policy on areas of focus in an effort to improve health outcomes. It will further contribute to the achievement of Eswatini Vision 2022 by increasing assess to quality healthcare to all Emaswati. The Kingdom of Eswatini endeavor to achieve first world country status by 2022 a place where all citizens have equitable assess to quality healthcare. The study will serve to provide detailed perspective on the impact of budget allocation by the MoF to achievement of improved health outcomes by the MoH. The insights of the study will clarify the ambiguity and uncertainty engulfing the MoF and the MoH on the impact of budgeting on health outcomes as they currently share differing opinions and views.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter seeks to review the theoretical and the empirical literature on the impact of budgeting on health outcomes. It is divided into three parts comprising of theoretical, empirical reviews and an overview of the literature. The theoretical review outlines the themes on budgeting and health outcomes while the empirical section reviews studies done using data, lastly concludes by outlining the empirical literature.

2.2 Theoretical Literature

Theory on budgeting is largely founded on the marginal utility function. The scholars in economics are defining marginal utility as the derived level of satisfaction an individual get from the consumption a good. Hence the marginal utility of a good or service will be the change in the utility of consuming that particular good or product. The incremental budgeting models used in Eswatini uses last year's budget allocation as independent variables.

Where:

$$Y = bX + e$$

Therefore, Y denotes the present allocation of budget, b is the parameter denoted as a percentage, X is last year's budget allocation, and e is a stochastic term. The equation refers to the budgeting process in which the ongoing allocation is the fixed percent of a last year's allocation adding or subtracting to the previous allocation.

Lewis (1952), argues that due to the scarcity of resources, the economic test that is applied should be that of return on investment where spending must be worth the cost sacrificed to alternatives costs. Therefore, budget analysis compares the corresponding advantages of the alternative use of the resources. The economic phenomenon of diminishing utility of the consumption of goods and services is essential in incremental analysis. The comparison of relative advantages should be made in relation to the effectiveness in achieving a common goal.

Wildavsky (1988) puts that political culture provides motivation for the use of resources because by invoking political culture we bring into budgeting values and preferences that contain the deferring motives for particular use of resources in a given society.

2.3 Empirical Literature

In literature, we have found that Newhouse (1977), Leu (1986), Parkin *et al.,* (1987) and Hitiris *et al.,* (1992) contended that the corresponding influence of spending on health outcomes has proven evasive, mostly due to data heterogeneity found in research reviews. For example, Leu (1986) research failed to locate the precise influence of medical care spending on changes in mortality rates. Their studies continued to suffer inbuilt differences attributed with various studies despite the inclusion of huge time-series analysis which have been corrected in pre-estimation tests like heteroskedasticity and autocorrelation tests. This, therefore, led to difficulty in making comparisons of healthcare spending within and between different countries and settings. Hence, the determination of the health spending impact on outcomes became less optimal (Cremieux *et al.,* 1999).

This lack of precise influence between medical care spending and mortality rates is because health is influenced by individual choices for their lifestyle or nutrition. Additionally, a board range of other variables that include socio-economic, demographic, hereditary and environmental characteristics, might influence the health status of individuals. The fact that researchers are unable to determine if there is an existing influence of health spending on outcomes does not mean this relationship does not exist. Actually, a clear and accurate estimate of the influence of health outcomes on health care spending might be established when utilizing an in-depth homogenous data and incorporation of related variables of health status (Cremieux *et al.,* 1999).

A crucial issue in health decision making hinges on the degree to which an extra health care spending produces patient welfare expressed in improvement in health outcomes. A study by Stephen *et al.,* (2007) through the Centre for Health Economics examined the corresponding influence of health spending on the mortality rates of at least two disease areas across three-hundred English Primary Care Trusts (PCT). The dataset presented spending on twenty-three programmes of care and embraced a lot of items that are funded with public resources. They included community, inpatient and outpatient care, together with pharmaceutical prescriptions.

This data facilitated the investigation of the relationship in achieved health outcomes and spending in a programme of care using mortality rates (Stephen *et al.,* 2007).

Stephen's *et al.,* (2007) model assumed that each PCT was allocated a yearly budget from the MoH and disburse these funds to the twenty-three programmes to maximize the health welfare related to that spending. In each of the programme they modelled spending as a justification of the need for health care and outcomes as a justification of spending and need. In utilizing the data on budgeting for the financial year 2004/2005 the study revealed that spending was categorically linked to income and outcomes became better due to spending but largely related to the need. This perhaps has led to some countries disbursing resources on the notion of anticipated health needs. This method is done subjectively on views of needs or statistically on indicators need. In less developed countries, the approach is often a combination of both methods. When moving to pro-poor distribution approach tied on health needs, it resembles a disjoint with locally used methods. However, in low and medium developed countries there is a challenge of data availability which is highly unreliable, untimely which then prevents the development of effective disbursement formulae (Mol, 1988).

Though the results of health and independent variables on health outcomes is found in literature, we need to employ regression analysis for such production function (Notle and McKee, 2004). Hence, Cochrane *et al.,* (1978) utilized a regression analysis in a cross-sectional study of eighteen countries to estimate the link in mortality rates and the per capita Gross National Product (GNP) while also estimating the consumption per capita of inputs like healthcare provision. The outcomes of the study indicated that the healthcare indicators were not associated with outcomes. Therefore, Notle and McKee (2004), Young (2001) and St Leger (2001) argued that after controlling for related variables the is still lack of association and impact of health spending on outcomes. This has since become a subject of matter in health spending and outcomes literature contrasting socio-economic characteristics which are usually good determinates of health outcomes.

There are troubles connected with the empirical inquiry of the determinates of mortality rates and has been highlighted by Gravelle and Backhouse (1987). These difficulties include the existence of simultaneous equations which are bias and the related endogeneity issue that has the inherent lag for spending and outcomes. Though Cremieux *et al.,* (1999) tried to elude these hindrances poised by the differences in data through the examination of the influence of spending on outcomes

in some Canadian provinces from 1978 – 1992. The study revealed the improvement in infant mortality and the reduction in life expectancy was linked to small amounts of healthcare spending. When challenging Cremieux study which used an estimation equation that consisted the number of available physicians, spending in health, income, population size and consumption of alcohol and tobacco for the estimation technique (General Least Squares) and could not permit for autonomy leading to bias of the coefficients (Nixom and Ulmann, 2006).

A research on the disparities in mortality rates of twenty-one OECD countries from 1970 and 1995 by Gravelle and Backhouse (1987) suffered similar weakness as Cremieux *et al.,* (1999) research. They found that the number of physicians to improving mortality in the OECD countries exists though the estimation technique assumes that the physicians are outside the health system. Also, Nixon and Ulmann (2006) reviewed sixteen studies on the correlation in healthcare inputs and outcomes. The study used data from fifteen EU countries for a period of fifteen years starting from 1980 to 1995 and utilized life expectancy, infant mortality, patients' hospitalization, available physicians, number of hospital beds, admission rate, nutritional status, environmental indicators, alcohol and tobacco consumption as health outcomes measures. The research further revealed that as much as spending on health and the number of physicians had a huge improvement in infant mortality, spending in health created a minor increase in the life expectancy of the EU countries for the period under investigation.

Nixon and Ulmann (2006) in reviewing the sixteen studies were not flexible in allowing that some of the independent variables could be endogenous. This notion of a health production function is based on a traditional research study which are less informed by theoretical models. Though, this production function process is usually acceptable because observing health outcomes could be complex. The flip side of this production function is that it led to a theoretical search for initiatives showing a remarkable association with outcomes. However, Nixon and Ulmann (2006) research study was trying to influence an empirical model using a theoretical model because they were of the view that it will lead to a better model for health outcomes.

Perhaps, the challenges of evaluating the influence of spending on health and the achieved outcomes are rampant. It is seen that if researchers rely on time series data, they encounter entanglement in the impact of spending from other health related variables such as advancement in technology, epidemiological profiles and varying economic factors. The same challenges arise

if researchers try to utilize cross sectional contrast of various systems especially when drawing conclusions from other external comparisons. In most instances' researchers have difficulties in transforming from the external effects (Stephen *et al.,* 2007).

2.4 Overview of Literature

In a quest for improving health outcomes, establishing the influence of spending on health outcomes is essential since changes in spending is amongst the simplest to make and often amongst the earliest and most visible. However, founding this influence is proving to be elusive in most instances though that does not necessarily mean the influence does not exist. In studies that have been conducted such as that by Gravelle and Backhouse (1987) shows that spending has led to rise in life expectancy. However, the estimation techniques have limitations in relation to the endogeneity of the independent variables for example Nixon and Ulmann (2006) research study where spending and the number of physicians made a remarkable improvement in mortality rates. Therefore, researchers should be careful in choosing the estimation technique to avoid the limitations faced by Gravelle and Backhouse (1987) study.

CHAPTER 3

METHODOLOGY

3.1 Introduction

In this chapter, the theoretical framework, the empirical model, the definition and measurement of variables, the econometric model and sources of data will be discussed.

3.2 Theoretical Framework

The selected theoretical framework for the study is taken from Stephen *et al.,* (2007). The study assumes that the MoH receives a yearly budget (y_t) from the MoF, and the total spending cannot exceed the budget. The ministry then decides on the allocation of the budget to all the programmes. There is a 'health production function' f_t (.) for every programme of care which shows the correlation in health spending x_t for each programme and outcomes for that particular programme h_t.

The production function of the specific programme depends on two factors namely, clinical needs n_t and environmental factors z_t. The population needs and the environmental characteristics are suitable to the delivery of the programme of care which includes costs, geographical characteristics and relevant influencing factors to the outcomes. Hence, increase in budgeting produces improvements in health outcomes shown in mortality rates improvement at a declining rate.

Therefore;

$$h_t = f_t(x_t, n_t, z_t); \frac{df_t}{dx_t} > 0; \frac{\partial^2 f_t}{\partial^2 x_t} < 0 \qquad (1)$$

The theory taken form Stephen *et al.,* (2007) assumes that a welfare function W(.) exists which contains outcomes in the programmes. It assumes that there is no interaction in the programmes of care. It furthers by assuming that the ministry allocates the budget subject to limitations in a fashion that will maximize the total welfare.

$$\max W(h_{t1}, h_{t2} \dots \dots h_{tn})$$

$$\text{subject to: } \sum_t X_t \leq Y_t \qquad (2)$$

where $h_t = f_t(x_t, n_t, z_t);\ t = 1 \dots \dots \dots \dots \dots . T$

It is often asserted that those who make decision do not prejudice in outcomes of differing programmes hence W is just the sum of the outcomes. Perhaps, this assertion in our model is not necessary. Adopting Anderson (1984) likelihood-ratio test, says the MoH allocates spending to all the programmes of care in a such a manner that a slight improvement of each dollar utilized in each programme is similar to the other programmes of care.

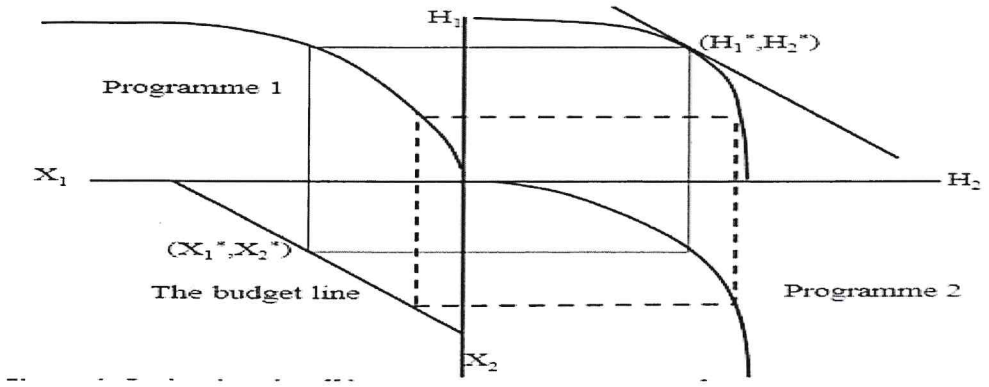

Figure 2: Two programmes of care trades-off

The above scenario can be best illustrated diagrammatically like in Figure 2 as it looks at trade-offs in two programmes of care. Whereat, the production function for programme one is shown at the left upper quadrant while the production function for programme two is illustrated at the right lower quadrant. The lower quadrant shows the budget limitations which is in the form of spending and rests on the budget line. The scenario indicates the achievable sets of spending which are the cases on the budget limitation line. The production possibility frontier in the right upper quadrant is traced by a pair of outcomes in programme two. The MoH is expected to prefer and select the set on this frontier because it maximizes the welfare. A maximizing approach leading to some optimum outcomes (H1*, H2*) and spending (X1*, X2*) has been shown in our example.

In effectively dealing with the restrained maximization problem, the choice should yield some optimum spending results for each category x_t*, which is a justification of the need for health in each division (n_{t1}, n_{t2},...,n_{tn}), the production of outcomes in each division that is affected by environmental characteristics (z_{t1}, z_{t2},..., z_{tn}), aswel as MoH budget (y_t).

Thus;

$$x_t * = g_t(n_{t1}, \dots n_{tn}, z_{t1}, \dots z_{tn}, y_t);\ t = 1, \dots, T \qquad (3)$$

Cragg-Donald (1993) and Stock and Yogo (2002) stated that for each of the programme of care, a spending equation (3) will exists explaining the spending selection of the ministry and the health outcome equation (1) that represents the influence of outcomes obtained.

3.3 Empirical Model

The above theoretical model expresses a stipulation of a system of equations, which includes the budget and outcome equation for each and every health outcome. Though, this proposition is tedious and makes impractical data demands which are usually not available in less developed countries. It requires the identification of a lot of variables including spending, need, environmental characteristics and outcomes for each and every programme. Eswatini is using incremental budgeting which does not require persuasive data of all the needs and environmental characteristics expected to impact the production of health care. The equation is modelled to suit the Eswatini context where the health outcomes are modelled individually.

Normally, we use certain measure of the level of need for every health outcome, but these too are not available. We, therefore, exclude the health needs and environmental characteristics in each of the health outcomes because of the incremental budgeting formula that is adopted and used by Eswatini. A statistic by Cragg-Donald (1993), stipulates a test for instruments and the study anticipates a strong and positive relationship between budget and life expectancy and improved mortality rates, but at a declining rate (h_t). It also expects a link between budget and health outcomes. Hence a multiple linear regression model was used to assess the influence of budget on life expectancy and maternal, under-five and infant mortality separately.

That is;

$$h_t = f_t(B_t, GDP_t, P_t, PH_t, N_t, \acute{\varepsilon}_t) \quad (4)$$

A transformation of equation (4) and expressing h_t as a linear relation of the different interventions leads to the following estimable equation.

$$h_t = \ln\beta_0 + \ln\beta_1 B_t + \ln\beta_2 GDP_t + \ln\beta_3 P_t + \ln\beta_4 PH_t + \ln\beta_5 N_t + \acute{\varepsilon}_t \quad (5)$$

Where h_t is life expectancy, maternal, under-five and infant mortality rates at time $_t$, which is the measure of health outcomes.

β_0 = captures all other explanatory variables which affect health outcomes but are not captured in the model.

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ which are the coefficients of explanatory variables.

B_t = health spending at time t

GDP_t = national production at time t

P_t = population size at time t

PH_t = physicians available at time t

N_t = nurses available at time t

3.4 Definition and Variables Measurement

Table 2: Definition and Variables Measurement

Variable	Measurement
GGE per capita (B)	measured as the sum of government health spending per person
GDP per capita (GDP)	measured as the country's total productivity per person
population (P)	measured as the number of people in the country
Physicians per capita (PH)	measured as the number of physicians available to provide public healthcare per patient
Nurses (N)	measured as the number of nurses available to provide public healthcare per patient
Life expectancy	measured as the average number of years that a person will live from birth
Maternal mortality ratio	measured as the number woman dying during pregnancy or termination of pregnancy within 42 days per 100 000 live births
under-five mortality ratio	measured as the total number of children dying prior to reaching five years per 1000 live births
Infant mortality ratio	measured as the total number of babies dying prior to reaching one year per 1000 live births

3.5 Estimation and Testing

In estimating the results, an econometric equation was carried out for the time series analysis. A descriptive summary statistic was done, illustrating the average, standard deviation, minimum and maximum values of the selected variables. In these variables, the study was interested in showing the average spending, longevity and the mortalities. A correlation analysis was also undertaken to illustrate the direction and strength of the variables being estimated. In order to carry out the regression analysis the study introduced natural logarithms (ln) and differenced the data to correct

for stationarity. The study further undertook diagnostic tests to triage the data in the bid to ensure that the analysis does not bring spurious results.

3.6 Data

The study used secondary data from the year 1999 to 2019 and it considered four health outcomes namely life expectancy, maternal, under-five and infant mortalities. These health outcomes were selected because they are the main indicators of health outcomes. The data was sourced from the WHO and WB databases and additional data was captured from the MoF and MoH reports. The frequency of the data is annual figures to adequately measure the matric of health outcomes which are commonly expressed in yearly averages.

CHAPTER 4

EMPERICAL FINDINGS

4.1 Introduction

This chapter will present the empirical findings of the study in providing the influence of budget on health outcomes. The empirical analysis used annual data from 1990 to 2019 covering 30 observations which are the years for which data is available for the country. According to Iacobucci (2009) on his work in Structural Equations Models (SEM), many researchers do not feel confident about SEM due to the conviction that the sizes of the sample should be in hundreds. It is, therefore, accurate that the lager the sample size the better, but SEM behaves the same way as regression and they use the same approach in the introduction of moderators which are interaction terms. Therefore, since this study has employed a regression, 30 observations suffice.

4.2 Descriptive Statistics

A descriptive analysis was performed on the variables using summary statistics and the results are illustrated in table 3.

Table 3: Summary Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Budget	30	195.268	83.408	101.069	323.352
Population	30	1015628.4	87265.965	822420	1148130
Physicians	30	.185	.071	.101	.388
Nurses	30	3.446	1.39	1.205	6.869
Life Expectancy	30	51.762	6.739	42.518	61.95
Maternal Mortality	30	510.5	65.715	426	624
Under-Five Mortality	30	93.61	26.73	53	132.7
Infant Mortality	30	63.083	12.593	40	81.7

The study found that the average government per capita spending is US$ 195.26 with a minimum of US$101.06 to a maximum of US$323.35. As discussed earlier in the study that this spending far surpasses the WHO minimum per capita spending for the achievement of UHC. This scenario demonstrates the commitment that the Government of the Kingdom of Eswatini has towards the citizens health and the health sector with a population of approximately 1 015 628. Furthermore, according to the study, Eswatini enjoys a comparable physicians/ patient ratio to the Southern African counterparts of an average of 0.18 physicians per 1000 patients. The same scenario applies for the nurse/patient ratio which is at an average of 3.44 nurses per 1000 patients. Though the

country still requires additional medical personnel to fulfill its vison to become a first-world country by 2022, a place where all citizens have equitable access to health (Vision 2022).

The table further describe the health outcomes variables under the period of analysis. The study found that the average longevity for the citizens of Eswatini is 51.7 years with minimums of 42.5 to maximums of 61.9 years. Additionally, the descriptive analysis states that on average 510 maternal deaths per 100 000 live births are experienced by Eswatini from minimums of 426 to maximums of 624 deaths. In relation to under-five mortalities Eswatini on average loses 93 babies per 1000 live births and 63 infants per 1000 live births.

4.3 Correlation Analysis

The study began by running a correlation test between dependent and independent variables, as illustrated in Table 4. The empirical results of the correlation test between independent and dependent variables is negative, showing an inverse association between budget and health outcomes. The study showed existence of multicollinearity between the budget and GDP. The study, therefore, dropped the GDP to resolve the multicollinearity problem.

Table 4:Pairwise Correlation Matrix

Variables	Budget	GDP	Pop.	Phys.	Nurs.	Life E.	Mat.	Under5	Infa
Budget	1.000								
GDP	0.947	1.000							
Population	0.830	0.936	1.000						
Physicians	0.464	0.572	0.640	1.000					
Nurses	-0.210	-0.027	0.130	0.323	1.000				
Life Expectancy	-0.231	-0.244	-0.360	0.137	0.359	1.000			
Maternal Mortality	-0.883	-0.969	-0.939	-0.571	-0.055	0.170	1.000		
Under-Five Mortality	-0.414	-0.406	-0.204	-0.400	-0.255	-0.764	0.436	1.000	
Infant Mortality	-0.505	-0.478	-0.275	-0.458	-0.195	-0.701	0.489	0.987	1.0

Table 4 illustrates a negative correlation between health budget and life expectancy. This may be, due to various habits and life-styles individuals exhibit including smoking and consumption of alcohol and these results are against the expected sign for this variable. The health budget has a negative correlation with the mortalities as expected. This means that the health budget has a negative association with the mortalities. This observation has also been revealed by other researchers like Nixon and Ulmann (2006).

4.4 Stationarity Test

The study carried out a stationarity test using the Augmented Dickey-Fuller test, which is built on H_0 that the data has a unit root. The variables that were found to be non-stationary were differenced to make them stationary. The ADF test statistic was found to be greater than the critical value 0.05, then we rejected H_0 that the data is non-stationary. However, the infant mortality data remained non-stationary even after differencing.

Table 5: Unit Root test for Stationarity

Variable	ADF (T-Statistic)	1% critical value	5% critical value	10% critical value
Budget	-2.354	-2.492	-1.711	-1.318
Population	-2.463	-2.492	-1.711	-1.318
Physicians	-4.271	-2.492	-1.711	-1.318
Nurses	-3.020	-2.492	-1.711	-1.318
Life Expectancy	-4.729	-2.492	-1.711	-1.318
Maternal Mortality	-2.342	-2.492	-1.711	-1.318
Under-Five Mortality	-1.952	-2.485	-1.708	-1.316
Infant Mortality	-3.445	-4.362	-3.592	-3.255

4.5 Estimation Results

The impact of budget on life expectancy

The study implemented a regression analysis to establish the influence of budget on life expectancy and the findings are reported in Table 6.

Table 6: Multivariate regression results for Life Expectancy

	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Budget	.275	.08	3.44	.002	.11	.44	***
Population	-2.253	.421	-5.35	0	-3.12	-1.386	***
Physicians	.184	.065	2.85	.009	.051	.317	***
Nurses	.183	.049	3.75	.001	.083	.283	***
Constant	33.771	5.505	6.13	0	22.433	45.109	***
Mean dependent var		3.938	SD dependent var			0.131	
R-squared		0.615	Number of obs			30.000	
F-test		9.974	Prob > F			0.000	
Akaike crit. (AIC)		-56.443	Bayesian crit. (BIC)			-49.437	

*** $p<.01$, ** $p<.05$, * $p<.1$

The R^2 value of 0.615 indicates that 61.5% of the variation in life expectancy could be clarified by the budget, population, availability of the physicians and nurses. The findings had a *p*-value of 0.002 with a positive coefficient of 0.27 showing that high budget positively influences life

expectancy. Therefore, the MoF should strengthen the budgeting system to ensure it addresses the priority health issues instead of basing budget appropriations on previous allocations. This finding lends credence to Rahman *et al.,* (2017) Zaman *et al.,* (2017) and Lu *et al.,* (2010).

The impact of budget on maternal mortality

Table 7 presents the estimation results on the influence of budget on maternal mortality.

Table 7: Multivariate regression results for Maternal Mortality

	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Budget	-.113	.036	-3.16	.004	-.187	-.039	***
Population	-.906	.189	-4.80	0	-1.295	-.517	***
Physicians	.012	.029	0.42	.676	-.047	.072	
Nurses	-.02	.022	-0.92	.364	-.065	.025	
Constant	19.387	2.469	7.85	0	14.301	24.472	***
Mean dependent var		6.227	SD dependent var			0.129	
R-squared		0.920	Number of obs			30.000	
F-test		71.452	Prob > F			0.000	
Akaike crit. (AIC)		-104.543	Bayesian crit. (BIC)			-97.537	

*** $p<.01$, ** $p<.05$, * $p<.1$

The R^2 value of 0.920 shows that 92.0% of the variation in maternal mortality could be interpreted by the budget, population, availability of the physicians and nurses. Estimation results shows higher budget leads to a decline in maternal mortality. As such it would be prudent for the MoH to consider creation of a program that would specifically target maternal mortality reduction interventions. These results are consistent with a study by Maruthappu *et al.,* (2014), Koblinsky *et al.,* (2014), Chirowa *et al.,* (2013).

The impact of budget on under-five mortality

The study conducted another estimation on the relationship between budget and under-five mortality. The aim was to examine how the health budget impacts under-five mortality and the results are illustrated in Table 8.

Table 8: Multivariate regression results for Under-Five Mortality

	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Budget	-1.01	.17	-5.92	0	-1.36	-.659	***
Population	4.606	.897	5.14	0	2.759	6.453	***
Physicians	-.321	.138	-2.33	.028	-.604	-.038	**
Nurses	-.439	.104	-4.22	0	-.652	-.225	***
Constant	-54.014	11.728	-4.61	0	-78.168	-29.861	***

Mean dependent var	4.498	SD dependent var	0.297
R-squared	0.659	Number of obs	30.000
F-test	12.092	Prob > F	0.000
Akaike crit. (AIC)	-11.066	Bayesian crit. (BIC)	-4.060

*** $p<.01$, ** $p<.05$, * $p<.1$

The R^2 value of 0.659 denotes that 65.9% of the variation in under-five mortality could be clarified by the budget, population, availability of the physicians and nurses. Estimation results showed that the budget has a negative and remarkable impact on under-five mortality. The MoH should consider strengthening the child growth monitoring interventions and the MoF of should ensure that the is adequate resources to finance the immunization programmes. These findings corroborate Novignon *et al.,* (2017), Farag *et al.*, (2013), Akinkugbe and Mohanoe (2009).

The impact of budget on infant mortality

Table 9 presents estimation results on the impact of budget on infant mortality.

Table 9: Multivariate regression results for Infant Mortality

	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Budget	-.721	.108	-6.67	0	-.944	-.498	***
Population	3.175	.569	5.58	0	2.003	4.346	***
Physicians	-.255	.087	-2.93	.007	-.435	-.076	***
Nurses	-.271	.066	-4.11	0	-.407	-.135	***
Constant	-36.172	7.439	-4.86	0	-51.494	-20.85	***

Mean dependent var	4.124	SD dependent var	0.206
R-squared	0.717	Number of obs	30.000
F-test	15.815	Prob > F	0.000
Akaike crit. (AIC)	-38.375	Bayesian crit. (BIC)	-31.369

*** $p<.01$, ** $p<.05$, * $p<.1$

The R^2 value of 0.717 indicates that 71.7% of the variation in infant mortality could be clarified by the budget, population, availability of the physicians and nurses. Estimation results reveals that higher budget reduces infant mortality. Again here, the MoH should consider strengthening the child growth monitoring interventions and the MoF of should ensure that the is adequate resources to finance the immunization programmes. These results are consistent with Paxson and Schady (2005), Anyanwu and Erhijakpor (2007) and Bernet *et al.,* (2018).

Heteroscedasticity

The study carried out a White test to ascertain if the variance of the error term in the regression model is constant. The test statistic was greater than critical value of 0.05 therefore, the variance of the error term is constant, there is no heteroscedasticity.

Autocorrelation

The study tested for autocorrelation because it is typical in time-series data and it means the error term of current period have similarities with previous periods. A Durbin-Watson test was carried out and it was found that there is no serial correlation.

Normality test for residuals

This study conducted a normality tests for residuals in the post-estimation test. A regression analysis was conducted to create the residuals and a Jarque-Bera test for the residuals was done to check for the normality of the data. The data was found to conform to the criteria of normal distribution.

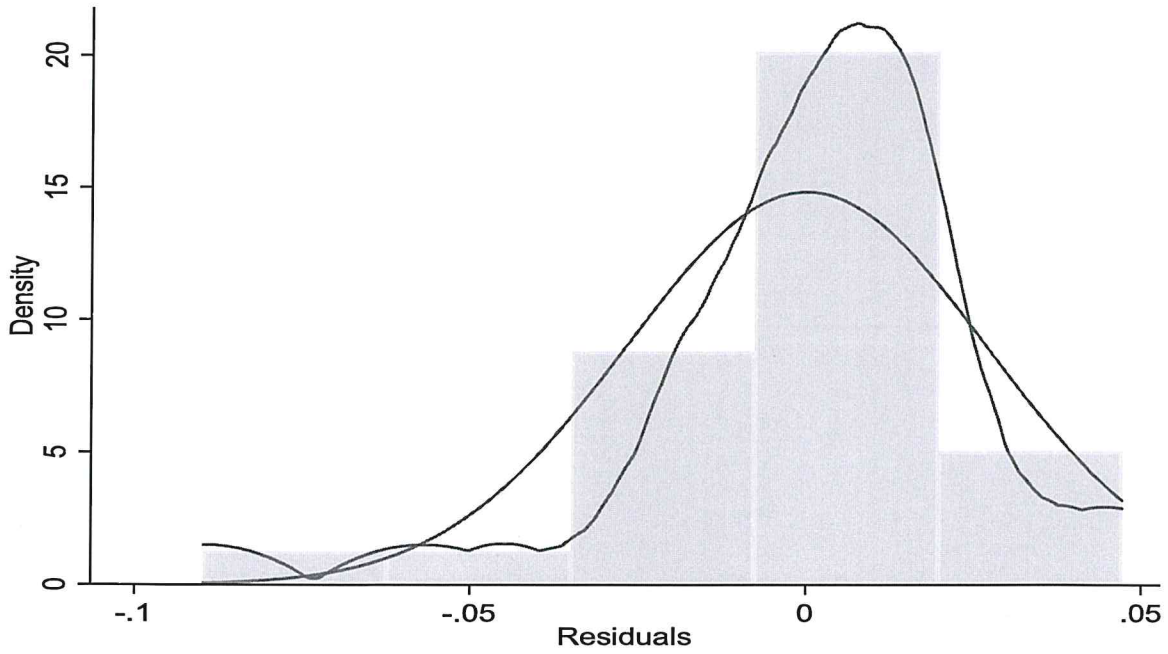

Figure 3: Graphical representation of the distribution of the data

CHAPTER 5

CONCLUSION

5.1 Introduction

This chapter outlines the abstract of the key results, draw policy implications and presents areas for further research.

5.2 Summary of the key findings

This study investigated the impact of budget on health outcomes namely, life expectancy, maternal, under-five and infant mortality. The estimation findings revealed that increasing health budget assists to improve life expectancy. The study further explored the influence of increasing budget on maternal mortality and the results showed that with a budget increase by one unit, maternal mortality decreases by 0.11 points. The analysis found similar results for under-five mortality where a budget increase by one unit reduces under-five mortality by 1.0 points. Lastly, the study considered the influence of budget improvement on infant mortality and it was found that with a budget increase by one unit, infant mortality decreases by 0.7 points. The results show that budget is more sensitive to life expectancy and mortalities in Eswatini.

5.3 Policy implications

This study draws some policy recommendations to delineate the influence of budget on health outcomes. Life expectancy has the potential of being lengthened by improving health system, as such, health financing and health spending throughout the health system requires quality public health leadership. Again, an increase in health spending by government might result in an improved maternal mortality rates through the provision of high-quality services like family planning, abortion care and obstetric care at delivery. Furthermore, increase in spending for healthcare, might improve emergency care systems funding. It also has a positive impact on education and training of birth attendants, and increase the availability of uterotonics, which are shown to successfully reduce maternal mortality. The health spending significantly influences under-five and infant mortality rates in Eswatini. Therefore, increasing health spending at targeted financing interventions like growth monitoring, scheduled immunizations and post-partum care should be considered in addressing these mortality rates.

The study has shown that proving the relationship between budget and health outcomes is elusive mainly because the estimated variables are provider related yet there is need to consider the patient inputs, like, adherence to regular health check-ups, medication for chronic diseases, schedules for growth monitoring, family planning, antenatal care (ANC) and general health hygiene. Perhaps, an additional recommendation would be to strengthen community involvement and education in health issues.

5.4 Areas for further research

A key issue in this study is the weak robustness of available macro and micro data to be utilized in estimating the precise influence of budget on health outcomes. The study also acknowledges the fact that the size of the available sample was quite minimal. Furthermore, the study did not conduct test for the possible existence of any lag structure in the explanatory variables, potentially relevant to socio-economic, demographic, hereditary and environmental characteristics which has influence on health outcomes. Therefore, further research areas should consider exploration on these variables.

References

Anderson, J, A., (1984) "Existence of maximum likelihood estimates in logistic regression models" *Laboratoria de chimie medicale, Universite de Liege, Belgium*

Akinkugbe, O., & Mohanoe, M., (2009). "Public health expenditure as a determinant of health status in Lesotho". *Journal of Social Work in Public Health*, vol. 24, no. 1-2, pp. 131-147.

Anyanwu, J, C., & Erhijakpor, A, E, O., (2007). "Health expenditures and health outcomes in Africa. Economic research working paper No. 91".

Bachmann, M, London, L, and Barron, P., (1996). "Infant Mortality Rate Inequalities in the Western Cape Province of South Africa".

Bernet, P, M., Gumus, G., & Vishwasrao, S., (2018). "Effectiveness of public health spending on infant mortality in Florida, 2001–2014". *Social Science & Medicine*

Chirowa, F., Atwood, S., Putten, M., (2013). "Gender inequality, health expenditure and maternal mortality in sub-Saharan Africa" *A secondary data analysis*

Cochrane, A., St Leger, A.S, and Moore, F. (1978). Health service 'input' and mortality 'output' in developed countries. *Journal of Epidemiology and Community Health*, 32, 200-205.

Cremieux, P, Ouellette, P and Pilon, C (1999). "Health care spending as determinants of health outcomes". *Health Economics*, 8, 627-639.

Davis, O. A., M. A. H. Dempster, and A. Wildavsky (1971). "On the Process of Budgeting II: An Empirical Study of Congressional Appropriations. " *In R. F. Byrne et al., Studies of Budgeting. Amsterdam:* North Holland.

Davis, O. A., M. A. H. Dempster, and A. Wildavsky (1966). "A theory of the budgetary process." *The American Political Science Review. Vol 3.*

Dempster, M. A. H., and A. Wildavsky (1979). "On Change: or, The is No Magic Size for an Increment." *Political Studies* 27: 371-89.

Farag, M., NandaKumar, A, K., Wallack, S., Hodgkin, D., Gaumer, G., & Erbil, C., (2013). "Health expenditures, health outcomes and the role of good governance".

Foster, M. and A. Fozzard, 2000. "Aid and Public Expenditure: A Guide", *ODI Working Paper 141.*

Gangadharan, L, and Valenzuela, R., (2001) "Interrelationships between income, health and the environment; extending the environmental Kuznets curve hypothesis" *Department of Economics, Uni6ersity of Melbourne, Melbourne, Vic. 3010, Aus*

Gragg, J, G., and Donald, S, G., (1993) "Testing identifiable and specification in instrumental variables models". *Econometric Theory 9, 222-240*

Gravelle, H and Backhouse, M (1987). International cross-section analysis of the determination of mortality. *Social Science Medicine*, 25, 5, 427-441.

Hitiris, T. and Posnett, J. (1992). "The determinants and effects of health expenditure in developed countries". *Journal of Health Economics*; 11: 173–181.

Iacobucci, D., (2009). "Structural Equations Modelling" Fit Indices, sample size and advanced topics. *Department of Marketing, Owen Graduate School of Management,* Vanderbilt University, 401 21st Avenue South, Nashwille TN 37202, USA

Koblinsky, M., Conroy, C., Kureshy, N., Stanton, M., Jessop, S., (2014). "Issues in programming for safe motherhood".

Leu, R.E. (1986). The public–private mix and international health care costs. In: Culyer, A.J. and Jo¨nsson, B. (eds.), *Public and pri6ate health ser6ices*. Oxford: Basil Blackwell, pp. 41–63.

Lievens *et al.*, (2017). "Health Financing Project" *Kingdom of Swaziland*

Lewis, Verne B. (1952). "Toward a Theory of Budgeting." *Public Administration Review*, 12: 43 – 54.

Lu, C., Schneider, M, T., Gubbins, P., Leach-Kemon, K., Jamison, D., Murray, C, J., (2010). "Public financing of health in developing countries" *a cross-national systematic analysis.*

Maruthappu, M., Williams, C., Atun, R., Agrawal, P., Zeltner, T., (2014) "The association between government healthcare spending and maternal mortality in the European Union, 1981–2010: a retrospective study"

Mol, P. (1988). De Allocatiefunctie Van De Overheidsbegroting Faculteit der bestuurskunde, Universiteit Twente, Enschende, Nederland

Moritz, M, and Hashim., (2018). "Lessons from Reforming Financial Management Information Systems: *A Review of the Evidence*

Maurice Wright (ed.) (1980). "Public Spending Decisions: Growth and Restraint in the 1970s". *London, George Allen & Unwin.*

Meyers, T. (1994). "Strategic Budgeting", *Ann Arbor*: University of Michigan Press.

Newhouse, J.P. (1977). Medical-care expenditures: a cross national survey. *Journal of Human Resources*; 12: 115–125.

Nolte, E and McKee, M (2004). Does health care save lives? *The Nuffield Trust*, London.

Novignon, J., & Lawanson, A, O., (2017). "Health expenditure and child health outcomes in Sub-Saharan Africa". *Department of Economics, Kwame Nkrumah University of Science and Technology*

Parkin, D., McGuire, A. and Yule, B. (1987). Aggregate health care expenditures and national income—is health care a luxury good? *Journal of Health Economics*; 6: 109–127.

Pritchett, L., and Summers, L.H., (1996). "Wealthier is healthier. J. Hum." *Resour. XXXI (4), 841–868*

Paxson, C., & Schady, N., (2005). "The child health and economic crises in Peru." *Published by Oxford University Press on behalf of the International Bank for Reconstruction and Development*

Nixon, J. and Ulmann, P (2006). The relationship between health care expenditure and health outcomes. *European Journal of Health Economics*, 7, 7-18.

OECD, (1995). "Assessing Financial Management Reforms", *Overview. PUMA/SBO (95)4. Paris:* OECD.

Rubin, I. S. 1997. "The Politics of Budgeting: Getting and Spending, Borrowing and Balancing". *3rd Ed. Chatham*, NJ: Chatham House Publishers.

Rahman, A, E., Iqbal, A., Hoque, D, E., Moinuddin, M., Zaman, S., Rahman, Q, S., (2017). "Managing Neonatal and Early Childhood Syndromic Sepsis in Sub-District Hospitals in Resource Poor Settings". *Improvement in Quality of Care through Introduction of a Package of Interventions in Rural Bangladesh*

Rajkumar, A, S, and Swaroop, V., (2007) "Public spending and outcomes; does governance matter?" Journal of Development Economics 86

Schick, A. (1983). "Incremental Budgeting in a Decremental Age." *Policy Sciences*, Vol. 16, No. 1, pp. 1-25.

Schick, A. (1969). "Systems Politics and Systems Budgeting." *Public Administration Review 29:* 137-51.

St Leger, S (2001). The anomaly that finally went away. *Journal of Epidemiology and Community Health*, 55, 79.

Stephen, M., Nigel, R. and Peter, C. (2007). "Further evidence on the link between health care spending and health outcomes in England"; 1-2.

Stock, J, H, and Yogo, M., (2002) "Testing for weak instruments in linear regression" *Technical working papers, No. 284*

Wanat, J. (1974). "Bases of Budgetary Incrementalism." *American Political Science Review 58:* 1224-28.

Wildavsky, Aaron. (1988) "Political Implications of Budgetary Reform" *Public Administration Review*: 183 – 190.

World Bank annual report (2003) Volume 1

World Health Organization report (2007). "A safer future" *Global public health security in the 21st century*

Young, F W (2001). An explanation of the persistent doctor-mortality association. *Journal of Epidemiology and Community Health*, 55, 80-84.

Zaman, S, B., Hossain, N., Ahammed, S., Ahmed, Z., (2017). "Contexts and Opportunities of e-Health Technology in Medical Care". *Journal of Medical Research and Innovation.*