THE EFFECTS OF PHBLIC HEALTH EXPENDITURE ON CHILD MORTALITY IN NIGERIA 1980-2011.

BY

OKWOR, SUNDAY AMALUNWEZE

PG/M.SC/10/57754

EMAIL: nweze_online@yahoo.co.uk

A RESEARCH PROJECT SUMMITTED TO THE DEPARTMENT OF ECONOMICS FACULTY OF SOCIAL SCIENCES, UNIVERSITY OF NIGERIA, NSUKKA.

JUNE 2013

THE EFFECTS OF PUBLIC HEALTH EXPENDITURE ON CHILD MORTALITY IN NIGERIA 1980-2011.

BY

OKWOR, SUNDAY AMALUNWEZE

PG/M.SC/10/57754

EMAIL: nweze_online@yahoo.co.uk

A RESEARCH PROJECT SUMMITTED TO THE
DEPARTMENT OF ECONOMICS,
FACULTY OF SOCIAL SCIENCES ,
UNIVERSITY OF NIGERIA,
NSUKKA.

IN PARTIAL FULFILMENT OF THE REQUIRMENT FOR
THE A WARD OF MASTER OF SCIENCE (M.Sc)
(ECONOMICS)

JUNE, 2013.

CERTIFICATION

This is to certify that the project work on the effects of public health expenditure on child mortality in Nigeria (1980-2011) by Okwor Sunday Amalunweze with Registration number PG/M.SC/10/57754 is adequate both in scope and quality and has met the requirement for the award of Master of Science. (M.Sc)

_____ Date_____

PROF (ASS). O.E .ONYUKWU
(Project Supervisor)

_____ Date_____

DR. (MRS) .G . C . ANEKE
(Head Of Department)

_____

(External Examiner)

DEDICATION

This project is dedicated to Almighty God.

ACKNOWLEDGEMENT

I am eternally indebted to God Almighty, who has always been my source of help.I humbly wish to express my appreciation to my lecturers in Economic Department University of Nigeria Nsukka for their dedication and supervisory assistance. In special way , I am indebted to my supervisor Prof (ASS) .O.E. Onyukwu and other lecturers which include Dr (Mrs). G.C. Aneke (Head of Department), Dr. Amuka and many others

I remain respectful to Mr. and Dr (Mrs) Marcy Okwor for their moral and financial support which my mere words are not adequate enough to express my prefunded gratitude.

Finally, I also thank the members of my family and friends for their encouragement , support and interactive discussions which motivated me to see that this project has became successful.

June, 2013. Okwor Sunday Amalunweze

ABSTRACT

The study set out to investigate the effect of public health expenditure on child mortality in Nigeria using secondary data from 1980 to 2011. The study employed covariance structure methodology in modeling infant mortality rate, under-five mortality rate and neonatal mortality rate against per capita health spending and controlled for per capita income, access to health care facilities, per capita education expenditure and the percentage of delivery by a health professional in Nigeria. Results obtained show that per capita health expenditure has no significant effect on infant mortality rate and neonatal mortality rate in Nigeria. Results also show that per capita health expenditure has significant effect on under-five mortality rate in Nigeria. The study equally found that per capita education expenditure has significant effect on under-five mortality rate in Nigeria. More importantly, the study found that percentage of delivery by a health professional has significant effect on infant mortality rate, under-five mortality rate and neonatal mortality rate in Nigeria. Finally, the study concludes that health care expenditure is far from the optimum which at present cannot meet the teeming population health challenges and recommends that government should increase and sustain health expenditure especially on programmes aimed at reducing child mortality as it is this study's belief that child mortality could significantly reduce with increased health expenditure in Nigeria.

.

TABLE OF CONTENT

CHAPTER ONE
INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Infant and child mortality remain disturbingly high in developing countries despite the significant decline in most parts of the developed world (Ogunjuyigbe, 2004). The state of the world's children indicated that about 12.9 million children die every year in developing world (UNICEF, 2007). Also, the Nigeria Demographic and Health Survey (NDHS) (1990), reported that 87 of 1000 infants born in Nigeria die before their first birthday while 115 of 1000 children die before reaching age five. The 1999 NDHS reported an infant mortality rate of 75 deaths per 1000 live births and under five mortality rates of 140 deaths per 1,000 live births for the 1995 to 1999 period. For five years immediately preceding the 1999-2003 survey, the infant mortality rate was 100 deaths per 1,000 live births, while the overall under-five mortality rate was 201 deaths per 1,000 live births (National Population Commission (NPC), 2004). The level of improvement in infant and child mortality in Nigeria as a whole is significantly lower than the average of 34 percent for the sub-Saharan Africa.

Accordingly, Nigeria's overall health system performance was ranked 187th among the 191 members states by the World Health Organization (WHO World Health Report 2007). Whatever may be the draw-back of the process of this assessment, Nigeria health indicators rather confirmed the assessment. Nigeria has one of the worst human development indicators especially for women and children in sub-Saharan Africa and indeed the rest of the world. The country accounts for 10% of the world maternal deaths from pregnancy and child birth related causes but only represents 2% of the world population (Riman et al, 2005). In 1995, over 9 million children under five in developing countries died avoidable deaths. This staggering figure is more than the entire population of Sweden or of Zambia (Filmer and Pritchett, 2007).

However, (Ichoku, and Fonta, 2006) attributed the downward spiral movement of key health indicators in Nigeria to the poor medical provision in the delivery of health care services and inadequate number of qualified health professionals, accompanied by the attendant user charges for all treatments at the Primary Health Care (PHC) institutions. Analyses of the historical decline in childhood mortality rates in today's industrialised countries suggest that important

drivers of this decline were improved nutrition, public health, and medical technological progress (see Fogel 2004, Cutler and Miller 2005, Cutler et al. 2005, Deaton 2005).

Table 1: Childhooh Mortality Rates

Unit: Deaths per 1,000 live Births

INDICATOR	**NATIONAL**		**ZONE**					
	URBAN	RURAL	NC	NE	NW	SE	SS	SW
NEO-NATAL MORTALITY RATE	37	60	53	61	55	34	53	39
INFANT MORTALITY RATE	81	121	103	125	114	66	120	69
UNDER-FIVE MORTALITY RATE	153	243	165	260	269	103	176	113

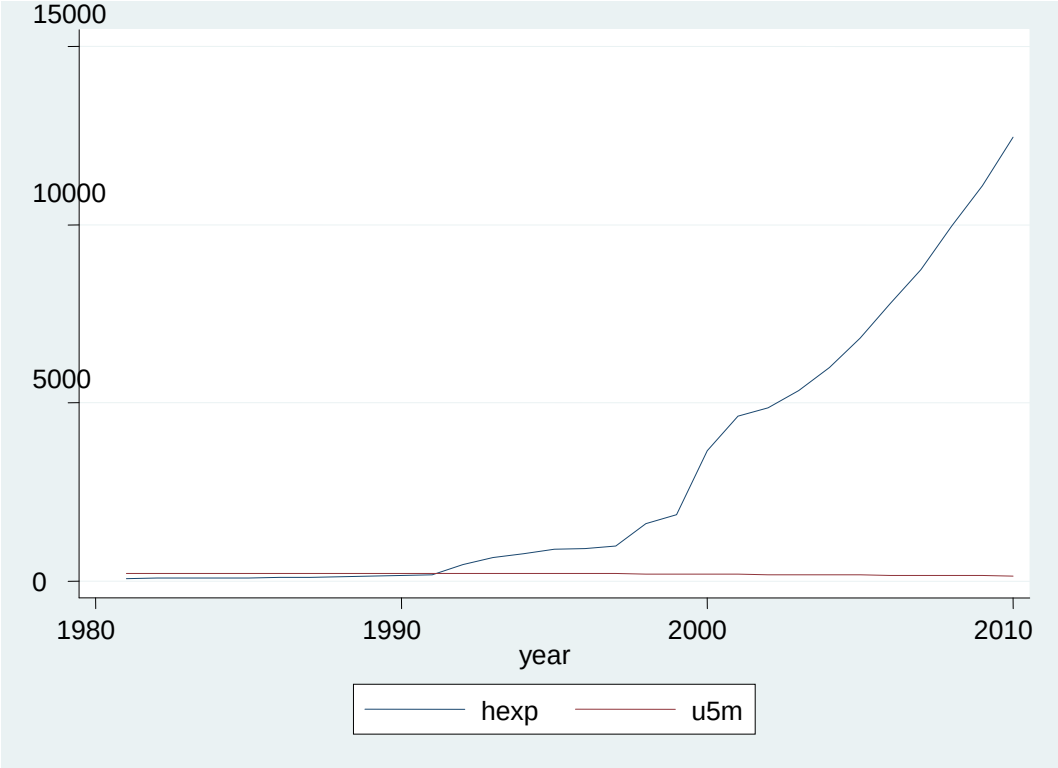
NBS: 2008

From table 1, Neo-natal mortality rate, infant mortality rate and under-five mortality rate are higher in rural areas than in urban areas with 60, 121 and 243 respectively against the urban counterpart at 37, 81 and 153 in the same order. North East has the highest neo-natal and infant mortality rates with 61 and 125 respectively while North West has the highest under-five mortality rate with 269. South East has the least neo-natal, infant and under-five mortality rates at 34, 66 and 103 followed by South West and South South with 39, 69, 113 and 53, 120, 176 respectively.

Common causes of child mortality and morbidity in Nigeria include diarrhea, acute respiratory infections, measles, and malaria. Studies have shown that many children in Nigeria die mainly from malaria, diarrhea, neonatal tetanus, tuberculosis, whooping cough and bronchopneumonia (Tomkins, 1981; Ayeni, 1980; Animashaun; 1977; Morley, 1973; Baxter-Grillo and Leshi, 1964; Ogunlesi, 1961). Mosley and Chen (1981) also viewed morbidity and mortality of the child as being influenced by underlying factors of both biological and socio-economic, operating through proximate determinants. Jinadu et al. (1991), in a study, found dirty feeding bottles and utensils, inadequate disposal of household refuse and poor storage of drinking water to be significantly related to the high incidence of diarrhea. Studies have also

shown maternal education to be a significant factor influencing child survival (Caldwell, 1979; Orubuloye and Caldwell, 1975; Meegama, 1980; Tawiah, 1979; Adewuyi and Feyisetan, 1988).

Figure 1: Relationship between health expenditure and under-five mortality rate



Source: CBN & World Bank; hexp=health expenditure, u5m=under-five mortality rate.

From the graph above, health expenditure and under-five mortality remain relatively unchanged from 1981 to 1991. In sharp contrast, health expenditure increased rapidly from N452.85million in 1992 to N12,464.58million in 2010 while change in under-five mortality rate remains insignificant.

However, the paramount issue in the health sector in Nigeria in the 1980s was the tightening financial constraints imposed upon public spending in health following a fiscal crisis and decline in the country's oil revenues (Bakare and Olubokun, 2011). Health spending as a proportion of federal government expenditures increased marginally from an average of 2% in the early 1970s to less than 3.5% in the 1980s and 1990s. Since 1986 there has not been marked expansion in the national Primary Health Care (PHC) programme, a measure designed to redress existing inequalities in health care provision (Ransome-Kuti 1987). Marginal improvement in the health status, in the face of increasing public expenditure, has been achieved partly by redirecting

resources from acute hospital services and partly through development assistance. For instance, hospital subventions, which accounted for up to 69% of the Federal Ministry of Health and Social Services' (FMOHSS) budget prior to the mid-1980s, surged to 85% in 1989, while overall spending on health services in 1991 was 44% of the value in 1981 (World Bank 1994). Such shifts in resource allocation have had major implications for public hospitals, which are almost entirely financed from government subventions. The surprising result (owing to mismanagement of fund) was the near-collapse of acute hospital services, characterized by frequent drug shortages, run-down physical structures and the efflux of highly skilled but demotivated medical specialists. Meanwhile the country's population has continued to grow at about 3% annually, placing additional strain on available resources available for health care.

In the last decade however, public revenues in Nigeria have increased fivefold and the new democratic governments has been eager to use the windfall to deliver so-called "democracy dividends" to the people. In particular, spending on primary health care has increased substantially. Funding for the National Programme of Immunization (NPI) for instance, has gone from N9 million in 1998, to close to N7.5 billion in 2010. Allocations for programs to control diseases such as malaria, guineaworm and so on increased to about 165 million in the 2010 budget, (World Bank, 2010). Revenues of Local Government Authorities (LGAs) that are primarily responsible for public spending on primary health care, has increased from an average of 5 percent of GDP between 1990 and 1998, to over 10 percent of GDP in 2011 (IMF, 2011). In spite of these recent increases in revenue and budgetary allocations to the health sector, the impact in terms of decline in child mortality rate still left much to be desired.

1.2 STATEMENT OF THE PROBLEM

Despite the fact that the major childhood diseases have been identified and modern technology to combat them developed, yet, children from African countries (Nigeria inclusive) die in large number from the attacks of these diseases (Filmer and Pritchett, 2007). The adduced reason is deeply rooted in poor health service delivery as a result of mismanagement of fund allocated to the health sector (Parry, 2008; Uboma-Jaswa, 2008; Feyisetan, 2009; Feyisetan and Adeokun, 2010). The Nigerian Health Policy recognizes the need to reduce the current high

childhood morbidity and mortality rates, but budgetary allocations to the health sector have not been adequately integrated into the health intervention programmes.

The state of the world's children indicated that, Vaccine Preventable Diseases (VPD) have been implicated in the deaths of more than 20 percent of children under - five (UNICEF/Nigeria, 2001). The study further indicates that the main causes of neonatal deaths are birth asphyxia, severe infection including tetanus and premature birth. While, common causes of child mortality and morbidity include diarrhea, acute respiratory infections, measles, and malaria. Mosley and Chen (1981) also viewed morbidity and mortality of the child as being influenced by underlying factors of both biological and socio-economic, operating through proximate determinants. Studies have also shown maternal education to be a significant factor influencing child survival (Ojewumi and Ojewumi, 2012).

One of the most fundamental, yet unresolved, issues in health policy is whether public spending on health yields health benefits, especially in the form of improved health outcomes. Economic considerations, such as the public good, externalities, catastrophic cost, the failure of the insurance market, and the existence of highly cost-effective public health measures, provide a rationale for the public provision of health services (Farahani et al, 2009). If these considerations were important we would expect to see a strong connection between health spending and child mortality. It is this connection that this study seeks to test. The study would note, however, that the public demand for health care, and ethical arguments, in which health can be considered a fundamental good that is required for human capabilities, have also been important driving forces for public spending on health (Musgrove 1999) and health care spending may depend on these factors as well as economic efficiency (Farahani et al, 2009).

Concerning the health expenditure, available evidence suggests that at low levels of development public expenditure on health has stronger effect on mortality rates compared with private expenditure while at high development levels the opposite is true (Issa and Ouattara, 2005). Gupta et. al. (2001) provide evidence from 70 countries that public spending on health is more important for the health of the poor in low-income countries than in the high-income ones suggesting higher returns on health spending in the former countries compared with the latter group. The cross-country study of 22 developing countries by Anand and Ravallion (1993) documents that public spending on health significantly matters for life expectancy at birth.

Hammer et. al. (2003) test the robustness of the determinants of infant and child mortality for a set of developing countries. Their results show that in addition to the level of per capita income, health and education variables are robust determinants as well. Turner (1991) in the case of Nicaragua found that better access to health care facilities is the most significant determinants of infant mortality.

However, it is increasingly being recognized that simply allocating greater public resources to basic health services is not enough to ensure that quality services are made available to the vast majority of poor citizens in the developing world (Odior, 2011). The impact of public spending on actual services in health service delivery depends critically on existing institutions and incentives in the public sector (Odior, 2011). In recent years, public revenues in Nigeria have increased substantially due to the boom in world oil prices, and some of this windfall is being channeled into increased spending on primary health care. There remains a concern whether the institutions of public accountability in the country will effectively allow these large spending programs to translate into improved services.

To this end, governments in Nigeria, over the years have been making frantic efforts at ensuring that there is an increase in the level of public expenditure on health. In 1970, recurrent expenditure on health was N12.48 million. This figure rose astronomically to N52.78 million and N132.02 million in 1980 and 1985 respectively. This trend continues as the expenditure rose steadily from N575.3 million in 1989 to N682 million in 1991 and further to N729 million and N982 million in 2007 and 2008 respectively. The aforementioned scenario clearly underscores the fact that health care expenditure in Nigeria has relatively been on the increase over the years (Bakare and Olubokun, 2011). However, there is still little known about whether the institutions and incentives in the public sector in Nigeria will actually allow large spending programs to effectively deliver basic services to the people (Gupta et al, 2010).

The above argument on the role of public health expenditure on Child Mortality Rates (CMRs) along the development process has important policy implications that matters both to government and concerned world organisations for the appropriate design of their health programs that aim to improve child health in general and reduce CMRs in particular. Given the importance of this argument, this study will add to existing knowledge by employing covariance structure model to examine empirically the effects of public health spending on CMRs in

Nigeria. This is a serious gap in the literature and there is an urgent need to fill it. This is because in spite of the observed increase in health expenditure, CMR is still high in Nigeria.

Against this background, this study is poised to answer the following research questions.

(1) What is the effect of health expenditure on infant mortality rate in Nigeria?

(2) What is the effect of health expenditure on under-five mortality rate in Nigeria?

(3) What is the effect of health expenditure on neonatal mortality rate in Nigeria?

1.3 OBJECTIVES OF THE STUDY

The broad objective of the study is to investigate the impact of health expenditure on child mortality in Nigeria. However, the specific objectives are:

(1) To investigate the effect of health expenditure on infant mortality rate in Nigeria.

(2) To determine the effect of health expenditure on under-five mortality rate in Nigeria.

(3) To establish the effect of health expenditure on neonatal mortality rate in Nigeria.

For instance, the infant mortality rate is the number of infant deaths in a year divided by the number of live births in the year. Under-five mortality rate is the probability of a child dying before the age of 5, while the neonatal mortality rate, is the probability of a child dying during the first four weeks after birth.

1.4 HYPOTHESES OF THE STUDY

Ho_1: Health expenditure has no significant effect on infant mortality rate in Nigeria.

Ho_2: Health expenditure has no significant effect on under-five mortality rate in Nigeria.

Ho_3: Health expenditure has no significant effect on neonatal mortality rate in Nigeria.

1.5 POLICY RELEVANCE OF THE STUDY

This study is relevant from a policy perspective especially for developing country like Nigeria. The dynamic effect of changes in health spending on child mortality in Nigeria would be important in the formulation of national health policies. Estimating the effect of health spending on child mortality would be important for unmasking the disparities between expenditure allocation and actual outcome. Also this work would provide critical insights on how Nigerian government can impact more tangibly to realizing the global country-level targets.

Moreover, not only would researchers benefit from this study, it would also stimulate further study and research in this area. It is also aimed that this study will be a veritable tool for

economic analysis to students. On the whole, this study will be beneficial to policy makers, the government and the public in general.

1.6 SCOPE OF THE STUDY

This study is the effects of public health expenditure on child mortality in Nigeria: A covariance structure model. The data will span from 1980 through 2011. These years are chosen owing to the availability of time series data for the variables of interest (child mortality indicators: infant mortality rate, under-five mortality rate and neonatal mortality rate; expenditure variables: health expenditure, education expenditure and per capita income; control variables: access to healthcare facility and percentage of delivery by health professional). The study assumes that Out-Of-Pocket expenditure on health is zero. The study also assumes that institutional public accountability and incentives are constant.

CHAPTER TWO

LITERATURE REVIEW

This chapter deals with the review of related literature. The review was discussed under the following sub-headings:

- Conceptual Framework
- Theoretical Framework
- Empirical Evidences
- Summary of Findings and Limitations of Previous Studies

2.1 Conceptual Framework

The simple fact that more children die from poorer households than from richer ones is not due directly to their differentiated residential location. Rather, it is the outcome of differential clustering of the biomedical factors that directly produce ill-health and early death. There has, therefore, been an increased awareness of the need for research integrating the socioeconomic and biological factors in childhood morbidity and mortality. However, in Africa the data required for such analysis is rarely available (M'Backe and Van de Walle, 1987). Nevertheless, since the early 19808 various conceptual frameworks to guide such analyses have been put forward. The widely known Proximate Determinants Framework of child survival developed by Mosley and Chen (1984) has been adopted in this study. This is because it allows for careful tracing of the pathways through which socioeconomic factors impinge on child health and survival in the developing world.

Briefly, the framework presumes the following:

* Under optimal conditions, less than five percent of newborn infants will die during their first 60 months of life.

* A higher death probability in any society is due to the effects of social, economic, environmental and biological forces which necessarily operate through more basic (proximate) determinants of the risks of disease and the outcome of disease processes.

* Specific diseases and nutrient deficiencies are biological outcomes of the operation of the proximate determinants.

* A child's death is the cumulative consequence of multiple disease processes including their biosocial interactions.

The framework identifies five groups of mechanisms through which socioeconomic factors act to influence the risk of mortality, namely maternal factors (age, parity, and birth spacing); environmental contamination (air, food/water/fingers, skin and insect vectors); nutrient deficiency; personal illness control; and injury. It recognises the possibility of interactions among these factors, which are assumed to influence a child's transition from a healthy to a sick state and vice versa.

Maternal education can be thought of as influencing child health and survival through better health care practices, hygiene, preventive care and treatment, the allocation of more resources to child care, use of appropriate weaning foods, timely visits to prenatal clinics, optimal birth spacing, and maintenance of home hygiene. Women from low income households, relative to those from high income ones, may be exposed to greater risk of child death due to their own poor nutritional status and rapid childbearing, raising children in less sanitary environments and possessing more limited capacity to provide adequate nutrition to their children or to exploit available medical services in the event of a child's illness.

The usefulness of the Mosley-Chen framework here is that it enables a categorisation of the various possible determinants of child health and survival in a way that allows the integrative linking of environmental conditions, dietary status, health care, reproductive patterns and disease states, that is, the proximate determinants, on one hand, and the socioeconomic, that is, the ultimate factors, on the other (Ahonsi, 1992).

2.2 Theoretical Framework

2.2.1 Pure Theory of Public Expenditure

Public expenditure theory, traditionally, received only a scanty attention till recently. However, with the advent of welfare economics the role of the state has expanded and theory of public expenditure is attracting increasing attention. This tendency has been reinforced by the widening interest of economists in the problems of economic growth, planning, regional disparities, distributive justice, social welfare and the likes (Bhatia, 2006).

The theory of public expenditure may be discussed in the context of the range of public expenditure and/or in terms of the division of a given amount of public expenditure into different

items. The former of the two parts may also be conceived in terms of allocation of the economy's resources between providing public goods on the one hand and private goods on the other. Partly, the study has the occasion to discuss it in the context of the principle of maximum social advantage through a theory of supply of individual state services (such as, the discussion of Lindahl's solution). The second question facing the theory of public expenditure covers many diverse areas to which this theory has expanded. The theory, for example, has tried to address itself to the question of what public expenditure wants to achieve for the members of the society. In technical terms, it means specifying the objective function of a public expenditure project. This obviously involves the steps for identifying the restricting conditions upon the achievement of the objective function, the use of cost-benefit analysis, the use of important determining variables and uncertainty associated with any project. The abstract theory of public goods and public expenditure started with the recognition of the fact that in public expenditure areas the conventional theory of value breaks down (Bhatia, 2006).

As noted above, the starting point of the theory of public expenditure is the failure of the market mechanism to fully respond to the needs of the society. Or to put it differently, market mechanism is not able to bridge the gap between private and social costs on the one hand and private social benefits on the other (Bhatia, 2006).

As essential but hitherto unsolved problem of public expenditure theory is the specification or discovery of true needs and preferences of the society so that public expenditure may be allocated between them. Analysts have tried to solve this problem through devising some kind of voting mechanism or revealing of preferences by members of the society.

2.2.2 Demand-Supply of Government Services

An attempt has been made to develop a theory of growing public expenditure on the basis of a choice between privately and publicly produced goods. It is maintained that a growing demand for private goods necessitates a corresponding demand for public goods as well. Musgrave (1959) maintains that complementarity between the two sets of goods increases with an increase in per capita income. Examples include demand for education and similar other services. Further, growths of public services are found to generate externalities which encourage private investment. In this reasoning, therefore, a dimension of consumer theory is applied to explain the growth of public expenditure. We can however, locate certain limitations of this line of

reasoning. For example, public expenditure is not financed through voluntary contributions. The political forces including voting rights and preferences contribute to the pattern of public expenditure. There is admittedly a growing element of political decision-making in public expenditure. Voters do not pay directly for government services. Therefore, no group of voters has any incentive to reduce its own opportunities for gain from government services, though they all object to the imposition of additional taxation. Legislators show eagerness to please their voters by means of various public projects and subsidies etc. in other words, while every tax-payer resents additional taxation, he wants to enjoy more of public services which the authorities are compelled to provide under political pressure (Bhatia, 2006).

2.3 EMPIRICAL EVIDENCES

Beenstock and Sturdy (1990) studied the determinants of infant and child mortality rates across several Indian states and found important role for female literacy. Caldwell (1986) demonstrated that declining infant mortality rates depends on achieving several conditions almost all of them are about improving the health status and education level of the population. Female education and different health measures (e.g., vaccination coverage and number of nurses to total population) are shown by Hojman (1996) to be very important determinants of infant and child mortality in several Central American and Caribbean countries during the 1990s. Alves and Belluzzo (2005) estimated static and panel data models using census data from Brazil for the period 1970-2000 to investigate the determinants of infant mortality rates. The findings of their paper confirm that poor child health (in terms of mortality rates) in Brazil can be explained by the levels of education, sanitation and poverty. Moreover, the paper shows that education is the most important variable as for every additional year of schooling, average mortality rates declines by more than 7%. Pampel et. al. (1986) study the patterns and determinants of infant mortality in developed countries for the period 1950-1975, and found that female education is a strong explanatory variable. The deterioration in environmental quality during the early stages of the industrialisation (development) process in Europe and the USA is found to cause a decrease in overall health status and an upward trend in mortality (Steckel (2002), Costa and Steckel (1997) and Floud and Harris (1997)).

Concerning the health expenditure, available evidence suggests that at low levels of development public expenditure on health has stronger effect on mortality rates compared with private

expenditure while at high development levels the opposite is true. Gupta et. al. (2001) provide evidence from 70 countries that public spending on health is more important for the health of the poor in low-income countries than in the high-income ones suggesting higher returns on health spending in the former countries compared with the latter group. The cross-country study of 22 developing countries by Anand and Ravallion (1993) documents that public spending on health significantly matters for life expectancy at birth. Hanmer et. al. (2003) test the robustness of the determinants of infant and child mortality for a set of developing countries. Their results show that in addition to the level of per capita income, health and education variables are robust determinants as well. Turner (1991) in the case of Nicaragua found that better access to health care facilities is the most significant determinants of infant mortality.

2.3.1 Explaining Cross-national Variation in Health Status

Much of the intuitive appeal behind many proposed strategies to improve health status, such as Primary Health Care (PHC) or a "basic package" of cost-effective services comes from the simple but powerful observation that there are countries with exceptionally good health status for their level of income (World Bank, 1997). The relatively good health of Sri Lanka, China, Costa Rica, and Kerala, India is frequently cited as an indication of the potential benefits from PHC.4 However, it is impossible to jump from some countries' good health outcomes to the conclusion that all (or even that *any*) of the unexplained differences in mortality are due to health policy. While it is possible that these countries' good health outcomes is due to health sector strategy, it is equally plausible that they share non-health characteristics like high levels of female education (King and Hill, 1992), better nutrition, more equal income distribution (Bidani and Ravallion, 1997) that explain their better outcomes.

Kakwani (1993) uses functional forms that allow for varying income elasticity in cross-national data and finds a range of elasticities between -0.5 and -0.6. Pritchett and Summers (1996) use time series on changes in income and under-5 mortality from 1960 to 1980 and find the long-run elasticity to be between -0.43 and -0.76 (depending on the instruments used in the instrumental variables estimation). Pritchett (1997) uses time-series of 22 countries with data going back to 1870 to do fixed effects estimation and finds an infant mortality elasticity with income of -0.59. Jamison, Wang, Hill and Londono (1996) combine cross section and time series data and find an

income elasticity of -.65 in 1990/12. Anand and Ravallion (1993) find that average income does have an important impact on health status, but that it operates only through its effect on the share of the population in poverty (less than a --1985 PPP-- dollar a day) while we find that adding an estimate of the proportion of population in poverty leaves our income estimate unaffected.

2.3.2 Health Expenditure and Mortality rate

The available literature on the effects of public health expenditure on mortality (or other indicators of health) is surprisingly mixed. Paxson and Schady (2005) show that infant mortality spiked (it was 2.5 percentage points higher) during the Peruvian financial crisis, coincident with a 30% fall in per capita GDP between 1987 and 1990. They show that public health expenditure fell by 58% in this period, its budget-share falling from 4.3 to 3%. They conclude that this, together with a decline in private health expenditure, is a likely explanation of the rise in infant mortality in this period. While this analysis of trends broken by a big exogenous shock is persuasive, it is difficult to generalise from. In particular, changes in health expenditure might impact mortality only when they are very large.

In an influential study, Filmer and Pritchett (1999) however, investigate this relationship using cross-sectional data on 98 developing countries in 1992/3. They conclude that health expenditure has a very small and statistically insignificant effect on infant and under-5 mortality. They find that 95% of the variation in mortality across countries is explained by income per capita, income inequality, female education, ethnic fractionalisation, and whether the country is more than 90% Muslim, each of these variables showing a significant impact. This is an important study with striking results. But the results are not incontrovertible. Indeed, using cross-sectional data for 22 developing countries in 1985, Anand and Ravallion (1993) find that health expenditure raises life expectancy and that, conditional upon this, income has no effect.

A recent World Bank report includes an analysis of infant mortality and health expenditure using a panel of data for the Indian states during 1980-99 (World Bank 2004). This study finds no effect of health expenditure on mortality rates once state fixed effects and a linear time trend are included in the model.

2.3.3 Health and Economic Status

The role of health in influencing the nation's economic outcome of the nation has been severally understood at the micro level. For instance, it has been understood that healthier workers are

likely to be able to work longer and be generally more productive than their less healthy counterpart, and consequently, able to secure higher earnings than the latte all things being equal. It is well known that illness and disease shorten the working lives of the people, thereby reducing the life time earnings. Better health also has a positive effect on the learning attitude and abilities of children and leads to better educational outcomes (school completion rates, higher means years of school achievement) and increases the efficiency of human capital formation by individuals and household (Strauss and Thomas, 1998; Schultz, 1999).

For the health of a nation to be fully guaranteed, it is necessary to formulate and implement policies that will reduce the income margin between the rich and the poor, marginally and efficiently allocate resources between the tiers of health institutions, reduce the trickle down effect of poverty and promote the purchasing power of the dependent population. Empirical research by Strauss (1998) has also established that higher income potentially permit individual, and society to afford better nutrition, better healthcare and presumably achieve better health. Therefore, it could be deduced that the income level of the working population greatly determines the quality of healthcare services afforded by the population. Thus, policies that encourage health care accessibility without concurrently addressing the problem of income inequality will ultimately lead to a disproportionate and inequitable distribution of healthcare provisions. The wider the income disparity between the poor and the rich, the poorer the health conditions of the people (Kitagawa and Hauser, 1973; Barker, 1990; Preston and Tauban, 1994; Rogers, Hummer and Nam, 2000; Kaplan et al, 1996). Kawachi and Kennedy (1997) further observed that since many health policies that seek to address the health problems of the people does not target a reduction in income inequality; the income ability of the poor has been constantly eroded. Thus, for health policies to be effective such policies should therefore targeted at improving the purchasing power of the poor while reducing income inequality.

Further empirical findings have also focused on the role of health improvement among health worker in influencing another policy objective – poverty reduction. Improvement in health results in improvement in National Income. Poverty could decline on account of both the standard “trickledown” effect and an increase financial capacity of the nation to set up safety nets. Better health can be seen as factor that contributes to poverty reduction via some form of trickle-down mechanism. When health improvements are concentrated among people living

close to or below the poverty line, both a "trickle-down" mechanism and redistribution of income leads to poverty reduction. Thus, a rise in the health of the population leads to an impressive decline in poverty (Barro and Sal-i-Martin, 2004).

Gupta and Mitra (2003) while conducting a research on the relationship between health, poverty and economic growth in India using data from 1973/1974, 1977/1978, 1093, 1987/88, 19993/94, 1999/2000 based on 15 Indian States observed that per capita income and public health expenditure positively influences health status, poverty declines with better health, and that growth and health have a positive two-way relationship.

Fogel (1994) showed that about one-third of the increase in income in Britain during the nineteenth and twentieth centuries could be attributed to improvement in health and nutrition.

Improvement on health (following health system policies) when directed at the poor has the direct effect of reducing poverty as well as serve as an element of 'pro-poor' growth strategy. According to Duraisamy and Sathiyavan (1998) the poor bear a disproportionately higher burden of illness, injury and disease than the rich. The poor suffer ill health due to a variety of causes, poor nutrition for instance, which reduces the ability to work and weaken their resistance to disease. Illness reduces the income earning ability of the poor and further increases dependency. Bourguignon (2004) while examining theoretically the interaction between growth inequality and poverty also showed that both growth and changes in inequality contributes to changes in poverty. Hence, healthy people are strong enough to work, earn good income and afford better nutrition. When poor people get sick, they are often unable to afford treatment from clinics or hospital. Even when they can afford such treatment, they tend to sell off productive assets, or rely on borrowing. These tend to decrease their long-run earning capacity and the capacity to take advantage of any trickle-down labor market advantage usually offered by growing economies.

Sambo et al (2004) in their study on out-of-pocket health expenditure for under-five illness in a semi-urban community in Nigeria observed that factors that determine pattern of utilization of health care services include geographical and economic accessibility, literacy level and perceived derivable benefits. The study found out that people still accord high patronage to patent medicine vendors due to, not only lack of sufficient funds to attend instituted hospitals, but also lack of awareness of the consequences of such patronage.

A well educated society has the ability to identify and avoid situation that will pose further risk to their health. According to Zakir and Wunnava (1999) a well informed mother has the ability to take precautions against factors that will pose greater risk to her infant. Among other issues, she will remember to keep appointments with her doctor, attend ante and post-natal clinics as at when schedule, and maintain good hygiene conditions necessary for the good health of her baby. They further added that a population with diseased and unhealthy infants has the danger of decreasing enrolment of children, particularly where mothers are illiterate. Educated mothers are more likely to be aware of nutrition and their children's health (Gubhaju, 1986). Filmer and Pritchett (1999) while also investigating the effect of government health expenditure on infant and under-5 mortality using cross sectional data on 98 developing countries in 1992/3, confirmed that variation in mortality between countries is explained not only by per capita income inequality but female education and ethnic fractionalization also had significant effect on child mortality. However, Anand and Ravallion (1993) hold a varied opinion, that though health expenditure raises life expectancy, income level does not have such effect on life expectancy.

In their study, medical progress is measured by the quality and quantity of professional health personnel available in the health institutions. The quality of Human Capital has often been described as the pivotal point where the success of every institution depends. Dreger and Reimers (2005) while analyzing samples from 21 OECD countries accounted that health care expenditure are not only driven by income, but also by medical progress. Thus, medical progress of any country could also be measured by the evolution of other variables such as life expectancy and infant mortality (Bhalotra, 2007). Medical progress could be measured not only by the quality and quantity of health professional, but also by the number of beds, sophistication of equipment and the wages paid to medical workers. Moore et al (1992) specified a supply model for cross-country examination where per capita health care expenditure is a function of per capita income, per capita number of physicians, nurses and beds, the ratio of public expenditure to total health care expenditure as well as trend. Their result indicated that the number of per capita beds has a negative effect on health care spending. The study by Moore et al (1992) is significant in the sense that, investment in human capita, particularly in the health sector has a corresponding effect improving the health status of the people via improved quality of services rendered by health workers. Many practitioners of public health claim that policies that will address

investment in human capital development of the health workers and health-income inequalities are of priority in defining interventions to reduce ill health. (Acheson, 1998; Beaglehole and Bonita, 1998; Kaplan and Lynch, 1997; Kawachi and Kennedy, 1994). In the same vein, Gwatkin (2000) lays out a course for health care professionals to influence public health policies through advocating social and economic equality.

2.3.4 Health Capital and Aggregate Output

The empirical literature on the effects of health capital on growth is relatively thin. Conceptually, a healthy person can not only work more effectively and efficiently but also devote more time to productive activities. Based on microeconomic evidences, Strauss and Thomas (1998) argue that health explains the variations in wages at least as much as education. Research at the macro level can better capture the potential externalities of health sector interventions and the existing studies are supportive of the positive contribution of health capital to growth. Bloom and Canning (2003, 2004) and Gyimah-Brempong and Wilson (2004) find that health capital indicators positively influence aggregate output. They find that about 22 to 30 percent of the growth rate is attributed to health capital, and improvements in health conditions equivalent to one more year of life expectancy are associated with higher GDP growth of up to 4 percentage points per year.

Similarly, a number of studies find that the contribution of health spending to health status—as measured by infant mortality or child mortality—is either small or statistically insignificant (Musgrove, 1996; Pritchett,1996; Filmer and Pritchett, 1997 and Filmer et al, 1998). In contrast, Gupta et al, (2003) find a positive relationship between public spending on health care and the health status of the poor. As key pillars in forming human capital, education and health are interlinked in their contribution to growth. Higher levels of education increase public awareness and the capacity of families to address their own health needs. At the same time, better health enhances the effective and sustained use of the knowledge and skills that individuals acquire through education (Schultz, 1999).

Barro (1996) further argues that better health can reduce the depreciation of education capital, and thus increases the favorable effect of education on growth. Few studies, however, have examined social spending, social indicators, and growth in an intergrated system. Some cross-

country evidence suggests that total public spending on health has had a surprisingly low impact on average health services, relative to other socio-economic characteristics such as income per-capita and female education (Musgrove, 1996). New empirical evidence that the impact of public spending on basic health services depends upon the overall governance environment provides an important explanation for the observed weak relationship between public spending and services. Rajkumar and Swaroop (2002) find that greater public spending on health significantly lowers child and infant mortality rates only in countries with good governance, as measured by lower corruption and quality of the bureaucracy. Considerable attention has been paid to how much health and education has been targeted to the poor. "Expenditure incidence analysis" is part of many World Bank poverty assessments (e.g., for Nigeria), and World Bank research has clearly shown that most health and education subsidies, although they are progressive and reduce inequality, are not well targeted to the poor (World Bank, 1990). Evidence now exists at least for Côte d'Ivoire, Ghana, Guinea, Kenya, Madagascar, Malawi, South Africa, Nigeria, Tanzania and Uganda (van der Walle and Nead, 1995). Gerschenkron's perspective on the importance of state initiatives to implement industrialization (and sustained economic growth) in the case of backward economies (Gerschenkron, 1965), as well as the more technical approaches where endogenous growth models describe how cross-country differences in governmental economic policy account for differences in economic performance (Rebelo, 1991), seems adequate to approach both Portuguese economic growth in historical perspective in general, as a latecomer to modern economic growth, and, more specifically, the role of the Portuguese state, and of its public finance, in providing human resources of proper quality along the last two centuries.

Further, recent studies suggest that the allocation of public investment for human capital development in many developing countries, however, is often inefficient and inequitable. There is consensus that expansion in the skills knowledge, and capacities of individuals increasing human capital, that it is critical for economic growth and poverty reduction. However, despite increase in government health and education spending in recent decades as shares of both GDP and total government spending, human capital investments, particularly in Sub-Saharan Africa, are performing poorly with low school enrollments and growth child labour often performed at the expense of education and inadequate health.

2.3.5 Health Expenditure and Health Status

There is a fair amount of research on the relationship between public spending and outcomes. The research on endogenous growth in the 1990s had produced several models linking public spending with the economy's long-term growth rate. Aschauer (1989), Barro (1990, 1991), Levine and Renelt (1992), Easterly and Rebelo (1993), Devarajan et al. (1996), Mittnik and Neumann (2003), and De la Croix and Delavallade (2006), among others, have studied the relationship between public spending and economic growth. A number of these studies find conflicting results regarding the growth impact of different types of sectoral spending. For example, Easterly and Rebelo (1993) show that public investment in transport and communication in developing countries is positively correlated with growth with a very high coefficient. On the other hand, using data from 43 developing countries over 20 years, Devarajan et al. (1996) find that capital spending–in particular, public investments in transport and communication–has a negative correlation with real per capita GDP growth.

In addition to the work on the relationship between public spending and economic growth, many researchers have examined the link between sectoral public spending (mostly in the health and education sectors) and outcomes in those sectors. For example, Harbison and Hanushek (1992) examined 12 studies on developing countries that look at the association between public education spending and educational outcomes. Six of these studies report a statistically significant positive relationship between the two; others found no evidence of any measurable impact of spending on outcomes. Hanushek (1995), Mingat and Tan (1992, 1998), and Wolf (2004) also find that that there is little if any relationship between public education spending and educational outcomes. Using a sample of 70 countries, Gupta et al. (2001) note that the relationship between public spending and the health status of the poor is stronger in low-income countries than in higher-income countries. Filmer and Pritchett (1999) provide a good survey of studies linking public spending with health outcomes. In their own work, they find that the two are very tenuously related. According to their results, doubling public spending from three to six percent of GDP would improve child mortality by only nine to 13%.

The relationship between health status and health expenditure is not so simple, strong correlation have been observe between government expenditure on health and health outcomes. This relationship is well established in literature where socio-economic status had shown strong and

consistent negative correlation with morbidity and mortality rates (Blomqvist and Carter 1997, Bac and Le-pen 2000). The association between inequality in income distribution and health also appears to have strong and consistent negative correlation, where the greater the income inequality in health expenditure, the poorer the health status of the population (Kawachi and Kennedy, 1997) Inequality in budgetary distribution of sectoral funding, particularly as it effect the health sector further pushes the burden of funding health service to the peripheral dependent population with an attendant increase in the cost of obtaining medical services.

Gupta and Mitra (2004) undertook a cross country analysis of 56 countries. In their study they concluded that increasing public expenditure on health has the ability to reduce the mortality rates of infants and children in a population. Toor and Butt (2005) in determining health care expenditure in Pakistan had shown that the share of health expenditure to the total public sector expenditure is the most important variable affecting health status of a country. Moreover, literacy rate and gross domestic product growth rate are also essential variables that had positive relationship with Health Care Expenditure.

Other researchers have also established the retrogressiveness of incidence of public sector spending on health outcomes of countries. Norman (1985) had observed that increasing government expenditure on health had been found to benefit the upper income class rather than the lower class. This is apparent because the upper income class possesses the ability to meet up with the cost of such health care provision. Castro-Leal et al (2000) while analyzing curative care in several African countries also found that public sector spending on health favors mostly the better-off rather than the poor. This pro-rich public expenditure on heath was further observed by Hamid- et al (2003) while utilizing Benefit Incidence Approach (BIA) covering 56 countries found on the average a pro-rich spending on health in sub-Saharan African countries. While believing that health expenditure has the ability to improve health status of a population, it has also been evidently established that such expenditure had been pro-rich particularly, among African countries. Thus, the income elasticity of health care expenditure in African countries has been reported to be below unity. Gerdtham (1992) used pooled cross section and time series data for 22 OECD countries including Turkey and compared different models (Static Equilibrium Model, Error correcting Model, Dynamic model, ARDL growth rate and partial adjustment model). The result indicated short-run income elasticity below unity and a long-run income

elasticity of health care expenditure around unity in all their models estimated. Moore et al (1992) specified a supply model for cross country examination where per capital Health Care Expenditure is a function of per capital income. The result shows that health is a necessity good (with an elasticity below unity) in the short run and a luxury good in the long run.

Sogaard, Anderson and Jonsson (1992) investigated a similar relationship for 19 OECD countries using cross section data and generalized a model where Health Care Expenditure is a function of National Income, relative price of health care services, supplier induced demand, public financing, age distribution and urbanization. The result indicated that the income elasticity is greater than one. It remains yet to be established if the income elasticity of health care expenditure is unity or below unity is Nigeria. The characteristic behavior of income elasticity on expenditure on health will determine the direction of budgetary flow and re-distribution of public expenditure in Nigeria.

International cross-country studies of the relationship between public health spending and health outcomes, relying on aggregate health indicators, usually find little effect of public health spending on health outcomes. The level of income is often found to be the major determinant of a population's health status, while public health spending is a relatively poor predictor of cross-country differentials in health indicators (Kim and Moody 1992; McGuire, Parkin et al. 1993; Musgrove 1996; Filmer and Pritchett 1999; Gupta, Verhoeven et al. 2002). In their influential study, Filmer and Pritchett (1999) find that 95% of cross-national variation in mortality can be explained by a country's income per capita, inequality of income distribution, extent of female education, level of ethnic fragmentation, and predominant religion, while public health spending explained only one-seventh of 1% of the observed differences in mortality across countries. These results confirm the findings of previous studies that had concluded that poverty and income, rather than public health spending, are the crucial determinants of health status (Carrin and Politi 1995; Demery and Walton 1998).

Similar research limited to OECD countries also shows a very weak relationship between public spending on health care and premature mortality (Or 2000). In contrast, a few cross-country studies find that public health spending has a statistically significant effect on health status if the analysis is limited to poor countries (Anand and Ravallion 1993; Hojman 1996; Bidani and Ravallion 1997)

Bidani and Ravallion (1997) use the two-dollar-per-day poverty line to decompose health indicators into subgroup averages for 35 countries using a random coefficients model. They find that the poor have comparatively worse health status, and that they are affected more by public spending on health care, than the better off. Gupta et al. (2003) use King's methodology1 (1997) and demographic and health survey (DHS) data from 70 developing and transition economies, to extend Bidani and Ravalli's approach, finding similar results. These results suggest that public spending on health may have different effects on the health of people of different socio-economic status (SES), due to differing levels of need and ability to substitute private spending for public spending.

2.4 Nigerian Studies

The study has categorized Nigerian studies into three streams. The first stream focused on health expenditure and health outcomes using varying models, Fajemilehin and Odebiyi, (2011), Olaniyan and Lawanson, (2010), with conflicting results. Some results reveal that life expectancy rate is negatively correlated with health care expenditure both in the short and long-run and income elasticity of health care expenditure was below unity both in the short-run and long-run. While some other studies concluded that health expenditure is positively related to health outcome, Omoruan et al., (2009), Riman (2010), Yoloye (1976) and that health is a necessary good in Nigeria.

The second stream; Adebiyi, (2005), Olaniyi and Adams (2008), descriptively analysed the adequacy of the levels and composition of public expenditures and conclude that education and health expenditures have faced lesser cuts than external debt services and defense, but allocations to education and health sectors are inadequate when related to the benchmark and the performance of other countries. However, Uzochukwu and Kanayo, (2010), found that primary education was absolutely progressive for both sexes while primary healthcare subsidies were just progressive. Interestingly, secondary education was only progressive for female while tertiary education and healthcare for both male and female were regressive and not pro poor.

The third stream focused on the interactions between health care expenditure and economic growth, Bakare and Olubokun, (2011), Chete and Adeoye (2002), Odusola (1998). They used ordinary least square multiple regression analytical method to examine the relationship between

health care expenditures and economic growth. Their results show that a significant and positive relationship exists between health care expenditures and economic growth. However, Nurudeen and Usman, (2010), found that government expenditure on education has negative effect on economic growth.

Ichoku (2008) reviewed public expenditure of the health sector in Anambra state using both qualitative and quantitative analysis. The results reveal that over 60 percent of available health sector budget is used to pay for personnel costs and less than 5 percent of total health budget is used for overheads while the rest is used for capital programmes. Results also show that health indicators of Anambra state population, though relatively better than many other states of the country, is still very poor. The study posits that infant and child mortalities in Anambra state are estimated to be about 66/1000 and 103/1000 respectively.

Eboh (2009) examines whether autonomy of state governments bolstered achievement of Millennium Development Goals (MDGs) in Nigeria. The work x-rays Nigeria MDGs status at the national and state levels and explores the extent to which differentiation across states can be explained based on political, economic and institutional conditions. The work submits that policy and spending autonomy is a necessary but not sufficient condition for state and local governments to significantly impact on the achievement of the MDGs in Nigeria.

2.5 Summary of Findings and Limitations of Previous Studies

A review of the literature suggests the following summary and limitations. Some works argued that education is the most important variable affecting mortality rates and that for every additional year of schooling, average mortality rates decline, Hojman (1996), Belluzzo (2005), Pampel et. al. (1986). While (Steckel (2002), Costa and Steckel (1997) and Floud and Harris (1997)) argued that environmental quality is found to cause a decrease in overall health status and an upward trend in mortality.

Concerning health expenditure, some available evidences Gupta et. al. (2001), Anand and Ravallion (1993), Hanmer et al. (2003) suggest that at low levels of development public expenditure on health has stronger effect on mortality rates compared with private expenditure while at high development levels the opposite is true. Moreover, some researchers have argued that, the wider the income disparity between the poor and the rich, the poorer the health

conditions of the people (Kitagawa and Hauser, 1973; Barker, 1990; Preston and Tauban, 1994; Rogers, Hummer and Nam, 2000; Kaplan et al, 1996). However, Anand and Ravallion (1993) hold a varied opinion, that though health expenditure raises life expectancy, income level does not have such effect on life expectancy.

While explaining cross-national variation in health status, it is possible that these countries' good health outcomes is due to health sector strategy, it is equally plausible that they share non-health characteristics like high levels of female education (King and Hill, 1992), better nutrition, more equal income distribution (Bidani and Ravallion, 1997), (World Bank, 1997a) that explain their better outcomes. Kakwani (1993), Pritchett and Summers (1996), Pritchett (1997), Jamison, Wang, Hill and Londono (1996) used functional forms that allow for varying income elasticity in cross-national data and finds a range of under-5 and infant mortality elasticities between -0.4 and -0.76. Similarly, Gupta, Verhoeven and Tiongson (1999) using data for 50 developing and transition countries observed in 1994, find that health expenditure reduces childhood mortality rates. Non-robustness may be expected for at least two reasons. First, as the authors recognise, the data on both mortality rates and public health expenditure are unlikely to be comparable across countries. Second, these studies suffer the problems common to cross-country regressions, most eminently, unobserved heterogeneity that might be correlated with the variables of interest.

The studies established the existence of widespread inequality in the health care financing as well as wide disparity in child mortalities. A major weakness in much of the existing literature is that some studies have avoided the difficulties imposed by data heterogeneity inherent in cross country international analyses by using sub-national data (Pierre-Yves Crémieux 1999; Bhalotra 2007; Deolalikar 2005). Some studies, for example, report that mortality is higher for girls (Kishor 1993) and for rural, low-income, agricultural households (Schultz 1993). Urban areas may also provide better access to health facilities (Stanton 1994).

Obviously, their methodologies as well as the scope are limited to panel and time series analysis. For instance, Beenstock and Sturdy (1990), Caldwell (1986), Hojman (1996), Alves and Belluzzo (2005), Pampel et. al. (1986), Steckel (2002), Costa and Steckel (1997) and Floud and Harris (1997) estimated static and panel data models. Also the works of Adebiyi, (2009) employed Vector Autoregressive (VAR) model with annual time series data spanning 1970

through 2000. While, Uzochukwu and Kanayo, (2010) employed welfare dominance tests using 19,158 households drawn from Nigerian Living Standard Survey (NLSS).

More importantly, the results and views of previous researchers are conflicting and would require a synthesis. The gap is clear and unambiguous, none of the Nigerian works reviewed employed **covariance structure model** to estimate the relationship between child mortality and health care expenditure in Nigeria. This work is poised to fill this gap in the literature by using **covariance structure model (CSM)** which would equally help to achieve a synthesis. Actually, **CSM** is superior to other competing models because it is a synthesis of two different models (Long, 1983b): (i) a measurement or confirmatory factor model, which has been widely used in social sciences; and (ii) a standard structural equation model, where the relevant variables are not affected by measurement errors, as in the standard regression analysis.

CHAPTER THREE

METHODOLOGY AND DATA

3.1 Methodological Framework

The conventional approach to estimating the relationship between health status and government spending is to treat social indicators as outputs and public spending on social programs as an input in a social production function. The problem with this approach is that the true outputs in this production function are not observable and, therefore, the use of intermediate health and education indicators as direct proxies for outcomes biases parameter estimates to the extent that these proxies are poor correlates with the unobservable output variable (Jack, 1999). The use of nonparametric estimators in the empirical analysis does not solve this problem, because it does not address the issue of how to correctly measure the dependent variable.

To overcome this problem we argue in this paper that the social production function should be estimated using a latent variable model. In a nutshell, this methodology differs from the traditional approach, because instead of regressing unobservable social indicators on government spending and control variables, it uses these indicators as determinants of observable, latent variable. Subsequently, the information available in the covariance matrix of both the usual explanatory variables and the social indicators is used to estimate the empirical association between government spending and the unobservable output variable. Covariance structure models are useful statistical tools in the estimation of structural relationships involving unobservable variables, such as well-being, trust, and happiness, and when the relevant variables define multidimensional concepts, such as poverty or, as in the case at hand, the population's health and education status.

In particular, covariance structure models can be interpreted as a synthesis of two different models (Long, 1983): (i) a measurement or confirmatory factor model, which has been widely used in social sciences; and (ii) a standard structural equation model, where the relevant variables are not affected by measurement errors, as in the standard regression analysis. The factor model assumes that a vector of ρ observed variables $\varkappa$ can be generated by a corresponding vector ξ of ϥ unobserved variables with an error term δ:

$$K\,\varkappa = \Lambda\xi + \delta \quad \text{……...…. (3.1)}$$

where Λ is a matrix of factor loadings in which each $\lambda_{i,j}$ measures the correlation between

the latent variable ξ_j and the observed variable $\varkappa_i$, i = (1,……..,ρ) and j = (1,……. Ч).

For two vectors of observable variables ($\varkappa$ and y), equation (1) can be defined as a system:

$$\varkappa = \Lambda_x \xi + \delta \text{ and } y = \Lambda_y \eta + \varepsilon \quad \text{..... (3.2)}$$

where the observable variables in vectors $\varkappa$ and y are defined as deviations from their means and the unobserved variables in vectors ξ and η are uncorrelated with the error terms. In addition, the error terms are assumed to be uncorrelated across the equations in the system.

The second part of the covariance structure model (the structural equation model) consists of defining the causal relationships among the latent variables defined in equation (3.2), the description of the causal effects, and the assignment of the explained and unexplained variances. The structural equation model can be written as:

$$\eta = \boldsymbol{B}\eta + \Gamma\xi + \omega \quad \text{..... (3.3)}$$

where η and ξ are the vectors of, respectively, endogenous and exogenous latent variables, defined in equation (3.2); **B** is a matrix of regression coefficients associated with the endogenous latent variables, with zero diagonal elements, and let I - B be non-singular; Γ is a matrix of parameters, capturing the effect of the exogenous latent variables on the endogenous latent variables; and ω is a vector of random disturbances. All variables are defined in equation (3.3) as deviations from their means and the vector of exogenous latent variables is assumed to be uncorrelated with the random error terms. The variance-covariance matrix of $\varkappa$ and y can be expressed in terms of all the parameters of the system, given some necessary overall identification restriction (Jo¨reskog and So¨rbom, 1989). The usual identification restrictions for structural equation models apply to equation (3.3) in the absence of measurement errors.

The covariance structure model (3.2)–(3.3) can be estimated for a covariance matrix Σ defined as $\boldsymbol{E}$ [$\chi\chi'$], where χ is a vector constructed by stacking the variables in y on the top of those in $\varkappa$. The predicted covariance matrix can be defined as:

$$\sum \begin{pmatrix} \boldsymbol{\Lambda_y A(\Gamma\Phi\Gamma' + \Psi)\, A'\Lambda'_y + \Theta_\varepsilon} & \boldsymbol{\Lambda_y A\Gamma\Phi\Lambda'_y} \\ \boldsymbol{\Lambda_x\Phi\Gamma'A\Lambda_x} & \boldsymbol{\Lambda_x\Phi\Lambda'_x + \Theta_\delta} \end{pmatrix} \quad \text{..... (3.4)}$$

where A = I-*B*, Φ is the covariance matrix of ξ, Ψ is the covariance matrix of ω, and Θ_δ and Θ_ε are the covariance matrices of δ and ε, respectively.

Assuming that all variables are normally distributed, the parameters in equation (3.2) can be estimated by maximum likelihood, by minimizing the following expression:

$tr(\Sigma^{-1} S) + [\log|\Sigma| - \log|S|] - (r+s)$, ……..….. (3.5)

where r and s denote, respectively, the number of endogenous and exogenous latent variables, and S is the observed covariance matrix.

Goodness-of-fit measures include (1) an χ^2 statistic, which can be used to test the estimated model against the alternative that the covariance matrix is unconstrained; (2) an adjusted goodness-of-fit statistic, which measures the share of total variance explained by the model; and (3) the root mean squared error, defined as the average of the fitted residuals, which can be used when the relevant variables are standardized.

3.2 Model Specification

This study adopts and improves on Baldacci (2003) model. This work introduces new variables (per capita savings and ratio of healthcare professionals to patients) in the building of the model as suggested by literature.

3.2.1 Pre-Estimation Test

Stationarity Test

This is to test whether the mean value and variance of the stochastic term are constant overtime. The Augmented Dickey – Fuller (ADF) test would be applied. The study shall therefore estimate the following equation:

$$\Delta Y_t = \beta i + \delta Y_{t-1} + \sum_{i=1}^{m} \alpha_i \Delta Y_{t-i} + \mu_t \quad \text{……..…..……} \quad (3.6)$$

This is simple enough, to ensure that the variables attain stationarity, all the study needs to do is to take the first difference of the variables if they are not stationary at level form and regress them on their lags. Where Y is a vector of all the variables and μ_t is a white noise error term.

Definition of Variables

IMR = Infant Mortality Rate

UMR = Under-five Mortality Rate

NMR = Neonatal Mortality Rate

HEX = Per Capita Health Expenditure

PCI = Per Capita Income

HCF = Access to Healthcare Facilities

EDX = Per Capita Education Expenditure

DHP = Percentage of Delivery by a Health Professional

$\alpha_{i,}$ β_i, γ_i, δ_i and λ_i = Parametric coefficients (i=1,2,3)

μ_i = vector of random error terms

3.2.2 Model 1

Model 1 of this study expresses infant mortality rate as a function of healthcare expenditure, per capita income, access to healthcare facilities and percentage of delivery by healthcare professionals with per capita education expenditure as a control variable.

IMR = F(HEX, PCI, HCF, EDX, DHP) ……..……..…… (3.7)

The model can be specified econometrically as:

$IMR_t = \alpha_1 + \beta_1 HEX_t + \gamma_1 PCI_t + \delta_1 HCF_t + \lambda_1 EDX_t + \phi_1 DHP_t + \mu_1$ …… (3.8)

3.2.3 Model 2

Model 2 of this study expresses under-five mortality rate as a function of healthcare expenditure, per capita income, access to healthcare facilities and percentage of delivery by healthcare professionals with per capita education expenditure as a control variable.

UMR = F(HEX, PCI, HCF, EDX, DHP) ……..…… (3.9)

The model can be specified econometrically as:

$UMR_t = \alpha_2 + \beta_2 HEX_t + \gamma_2 PCI_t + \delta_2 HCF_t + \lambda_2 EDX_t + \phi_2 DHPt + \mu_2$ ……..…..… (3.10)

3.2.4 Model 3

Model 3 of this study expresses neonatal mortality rate as a function of healthcare expenditure, per capita income, access to healthcare facilities and percentage of delivery by healthcare professionals with per capita education expenditure as a control variable.

NMR = F(HEX, PCI, HCF, EDX, DHP) ……..……..…… (3.11)

The model can be specified econometrically as:

$NMR_t = \alpha_3 + \beta_3 HEX_t + \gamma_3 PCI_t + \delta_3 HCF_t + \lambda_3 EDX_t + \phi_3 DHP_t + \mu_3$ ..……...…… (3.12)

The vectorized estimating equation can be defined as:

$Y = \alpha_{it} + \beta_i HEX_t + \gamma_i PCI_t + \delta_i HCF_t + \lambda_i EDX_t + \phi_i HPP_t + \mu_{it}$ …… (3.13)

where Y denotes health indicators (that is, infant mortality rate, under-five mortality rate and neonatal mortality rate), μ_{it} is a vector of random error term and 't' is the time variable and 'i' is the equation coefficient identifier.

3.3 A priori Expectation

$\alpha_i, \beta_i, \gamma_i, \delta_i, \lambda_i$ and $\phi_i > 0$

3.4 Method of Data Analysis

To motivate the empirical analysis, the relationship between health spending and child mortality rates is estimated first using the conventional social production function approach in which, as discussed above, health indicators are treated as outputs and public spending ratios are treated as inputs. Other exogenous variables, such as per capita income, per capita education expenditure, access to healthcare facility and percentage of delivery by healthcare professionals are included in the equations to control for additional determinants of child mortality rates. The issue of multidimensionality of the outcome indicators may not be dealt with explicitly and separate regressions would be estimated for each indicator.

3.5 Sources of Data

A major hurdle to analytical work on health policy in Nigeria is the scarcity of meaningful and consistent data on health outcomes. With this caveat in mind, a pragmatic effort is made to build a secondary data set for this study. The secondary data consists of time series data spanning 1970 through 2011 in Nigeria. The variables of interest on mortality rates (outputs) are: infant mortality rate, under-five mortality rate and neonatal mortality rate while expenditure variables (inputs) are: per capita health expenditure, per capita income and per capita education expenditure while the control variables are access to healthcare facility and percentage of delivery by healthcare professional. The data on health variables are sourced from social statistics from National Bureau of Statistics (NBS) 2011, while the expenditure variables are sourced from Central Bank of Nigeria (CBN) statistical bulletin 2011 publication.

CHAPTER FOUR

PRESENTATION OF EMPIRICAL RESULT

The results of the ordinary least squares regression are presented below:

4.1 Pre-Estimation Test

4.1.1 Unit Root Test Result

The test is carried out to know whether the mean value and variances of the variables are time invariant, that is, whether they are constant over time. The unit root test for stationarity is applied using the Augmented Dickey Fuller (ADF) Test.

The null hypothesis is stated thus,

H_0: $\delta = 0$ or $P = 1$ (The variables are non-stationary)

Against,

H_1: $\delta \neq 0$ or $P < 1$ (The variables are stationary)

We assume 5% critical value (5% level of significance), to compare with the ADF result.

Decision Rule

Reject H_0 if the absolute values for the calculated ADF for any of the variables are greater than the absolute value of the 5% critical values.

Table 4.1

Integrated of order 1(1) (First Differencing)

Variables	ADF test Statistic	Mackinnon Critical Value 5%	Constant	Trend	Lag	None
IMR	-3.657703	-2.9665	Yes	No	1	No
UMR	-3.021970	-2.9705	Yes	No	2	No
NMR	-4.230796	-2.9665	Yes	No	1	No
HEX	-3.822592	-3.5867	Yes	Yes	3	No
PCI	-3.991868	-3.5731	Yes	Yes	1	No
HCF	-6.004203	-3.5670	Yes	Yes	0	No
EDX	-3.615908	-3.5670	Yes	Yes	0	No
DHP	-5.272181	-3.5670	Yes	Yes	0	No

From table 4.1, it is observed that all the variables are stationary after taking their first difference. From the Augmented Dickey Fuller (ADF) test results (see appendix), intercept is included in all the variables because their line graphs (see appendix) did not start from origin.

4.2 MODEL 1

The Effect of Health Spending on Infant Mortality Rate in Nigeria

Estimation Command:
==========
LS LOG(D(IMR)) C LOG(D(HEX)) LOG(D(PCI)) LOG(D(HCF)) LOG(D(EDX)) LOG(D(DHP))

Estimation Equation:
==========
LOG(D(IMR)) = C(1) + C(2)*LOG(D(HEX)) + C(3)*LOG(D(PCI)) + C(4)*LOG(D(HCF)) + C(5)*LOG(D(EDX)) + C(6)*LOG(D(DHP))

Substituted Coefficients:
==========
LOG(D(IMR)) = -33.56006416 + 1.06188018*LOG(D(HEX)) + 0.07624120812*LOG(D(PCI)) + 4.81787347*LOG(D(HCF)) - 1.092937585*LOG(D(EDX)) - 1.760129056*LOG(D(DHP))

Table 4.2: The Effect of Health Spending on Infant Mortality Rate in Nigeria

Dependent Variable: Infant Mortality Rate

Variable	Coefficient	Std. error	t-statistics	Prob. Value
C	-33.56006	15.28831	-2.195145	0.0373
LOG(D(HEX))	1.061880	0.740813	1.433399	0.1637
LOG(D(PCI))	0.076241	0.146971	0.518750	0.6083
LOG(D(HCF))	4.817873	1.846312	2.609457	0.0148
LOG(D(EDX))	-1.092938	0.752333	-1.452731	0.1583
LOG(D(DHP))	-1.760129	0.512882	-3.431837	0.0020

R-squared = 0.379718

Adjusted R-squared = 0.260432. Durbin-Watson statistics = 1.9842

Per Capita Health Expenditure (HEX)

The coefficient of per capita health expenditure is positive but statistically insignificant. The value of the coefficient is 1.061880. This means that increase in per capita health expenditure by 1% will lead to an increase in infant mortality rate in Nigeria to the tune of 101%. This could be

because of very low per capita health expenditure in Nigeria. This finding is in contrast with the findings by (Fogel 2004, Cutler and Miller 2005, Cutler et al. 2005, Deaton 2005, Filmer and Pritchett 1999).

Per Capita Income (PCI)

The result of this study did not support the hypothesis of inverse relationship between infant mortality rate and per capita income in Nigeria. From the t-test, per capita income is insignificant which implies that per capita income has insignificant effect on infant mortality rate in Nigeria. Again, this could be because the effects of national income do not often trickle-down to households in Nigeria.

Access to Health Care Facilities

The result of this study also did not support the hypothesis of negative relationship between access to health care facilities and infant mortality rate. The t-test, result shows that access to health care facilities is statistically significant which implies that access to health care facilities has strong positive effect on infant mortality. The coefficient value of access to health care facilities is 4.817873. This means that if access to health care facilities increases by 1%, infant mortality rate will increase by about 104%. This is astonishing because the result falls short of the 'a priori' expectation. However, this could be explained by the inadequate health care facilities and the accompanying poor attitude to access health care facilities.

Per Capita Education Expenditure

The coefficient of per capita education expenditure is negative and statistically insignificant but conforms to 'a priori' expectation. The value of the coefficient is -1.092938. This implies that increase in per capita education expenditure by 1% will lead to a decrease in infant mortality by about 101%. This result is in tandem with the findings by Zakir & Wunnava (1999) and (Gubhaju, 1986).

Percentage of Delivery by a Health Professional

The coefficient of percentage of delivery by a health professional is negative (-1.760129) and statistically significant. This means that increase in percentage of delivery by a health professional by 1% will reduce infant mortality by about 102%. Increase in health professional care at the point of delivery on the average will reduce infant mortality rate. This conforms to 'a priori' expectation.

Constant

The constant term of the equation is negative and statistically significant. The constant term represents autonomous infant mortality rate. This implies that infant mortality rate would decrease by 134% when other variables are not operational (that is, when all the expenditure and control variables are kept constant). This means that infant mortality rate could be affected by other variables other than the variables included in the model (like, environmental and nutritional factors).

Coefficient of Determination (R^2)

The R^2 value is 0.379718 and R^{-2} (adjusted for loss in degree of freedom) is 0.260432. The value of R^2 shows that the model explains variations in infant mortality to the tune of 38%.

The F-Test

Decision Rule

Reject H_0 if $F_{cal} > F_{0.05}$ (v_1/v_2)d.f

Accept if otherwise.

From the regression result, F_{cal} = 3.183278. From the F-distribution table $F_{0.05}$ (4, 27) = 2.16. Since $F_{cal} > F_{tab}$ the study rejects H_0 and conclude that the overall regression is statistically significant at 5% level. This means that the linear combination of the individual independent variables significantly impact on infant mortality.

Test for Autocorrelation

This is carried out in this study using the Durbin-Watson t-statistic to test for autocorrelation. Thus, the hypothesis tested is as written below:

H_0: No autocorrelation

H_1: Autocorrelation exists

Level of significance = 0.05

Decision Rule

If computed d-value is less than d_L, there is evidence of positive first–order serial correlation; if it is greater than du, there is no evidence of positive first-order serial correlation; but if d_{cal} lies between the lower and the upper limit, there is inconclusive evidence regarding the presence of positive first-order serial correlation.

The summary of the decision rule is presented in table (4.3) below.

Table 4.3 Durbin–Watson Test: Decision Rule

Null hypothesis	**Decision**	**If**
No positive autocorrelation	Reject	$0<d<d_L$
No positive autocorrelation	No decision	$d_L \leq d \leq d_u$
No negative autocorrelation	Reject	$4- d_L<d<4$
No negative autocorrelation	No decision	$4-d_u \leq d \leq 4-d_L$
No autocorrelation, positive or negative	Do not reject	$d_u<d<4-d_u$

From the regression result (see appendix), we could observe that the Durbin-Watson statistics d = 1.9842. Also, the significant points of d_L and d_u from Durbin Watson table at 0.05 level of significance are; $d_L = 1.109$; $D_u = 1.819$

Using the fifth decision rule, we have; $d_u<d<4-d_u$

→ $1.819 <1.9842< 4 - 1.819$

→ $1.819<1.9842<2.181$

(with k = 5 and n = 32)

From the result above, the study observes that d = 1.9842 > d_u = 1.819 and that $1.819<1.9842<2.181$, hence, the study do not reject the null hypothesis of no autocorrelation positive or negative and conclude that there is no evidence of positive or negative first-order serial correlation.

4.3 MODEL 2

The Effect of Health Spending on Under-Five Mortality Rate in Nigeria

Estimation Command:
==========
LS LOG(D(UMR)) C LOG(D(HEX)) LOG(D(PCI)) LOG(D(HCF)) LOG(D(EDX)) LOG(D(DHP))

Estimation Equation:
==========
LOG(D(UMR)) = C(1) + C(2)*LOG(D(HEX)) + C(3)*LOG(D(PCI)) + C(4)*LOG(D(HCF)) + C(5)*LOG(D(EDX)) + C(6)*LOG(D(DHP))

Substituted Coefficients:
==========
LOG(D(UMR)) = -25.59597617 + 1.500146134*LOG(D(HEX)) + 0.1210931341*LOG(D(PCI)) + 3.919434711*LOG(D(HCF)) - 1.373484381*LOG(D(EDX)) - 1.572948837*LOG(D(DHP))

Table 4.4

Dependent Variable: Under-Five Mortality Rate

Variable	Coefficient	Std. Error	t-Statistics	Prob. Value
C	-25.59598	11.67772	-2.191865	0.0375
LOG(D(HEX))	1.500146	0.565857	2.651104	0.0135
LOG(D(PCI))	0.121093	0.112261	1.078673	0.2906
LOG(D(HCF))	3.919435	1.410274	2.779200	0.0100
LOG(D(EDX))	-1.373484	0.574657	-2.390095	0.0244
LOG(D(DHP))	-1.572949	0.391757	-4.015118	0.0004

R-squared = 0.834396

Adjusted R-squared = 0.802549. Durbin-Watson statistics = 1.9842.

Per Capita Health Expenditure (HEX)

The coefficient of per capita health expenditure is positive and statistically significant. The value of the coefficient is 1.500146. This means that increase in per capita health expenditure by 1% will lead to an increase in under-five mortality rate in Nigeria to the tune of about 101%. This could be because of very low per capita health expenditure in Nigeria. This finding is in contrast with the findings by (Fogel 2004, Cutler and Miller 2005, Cutler et al. 2005, Deaton 2005, Filmer and Pritchett 1999).

Per Capita Income (PCI)

The result of this study did not support the hypothesis of inverse relationship between under-five mortality rate and per capita income in Nigeria. From the t-test, per capita income is insignificant which implies that per capita income has insignificant effect on under-five mortality rate in Nigeria. Again, this could be because the effects of national income do not often trickle-down to households in Nigeria.

Access to Health Care Facilities

The result of this study also did not support the hypothesis of negative relationship between access to health care facilities and under-five mortality rate. The t-test, result shows that access to health care facilities is statistically significant which implies that access to health care

facilities has strong positive effect on infant mortality. The coefficient value of access to health care facilities is 3.919435. This means that if access to health care facilities increases by 1%, under-five mortality rate will increase by about 104%. This is astonishing because the result falls short of the 'a priori' expectation. However, this could be explained by the inadequate health care facilities and the accompanying poor attitude to access health care facilities.

Per Capita Education Expenditure

The coefficient of per capita education expenditure is negative and statistically significant and this conforms to 'a priori' expectation. The value of the coefficient is -1.373484. This implies that increase in per capita education expenditure by 1% will lead to a decrease in under-five mortality by about 100%. This result is in tandem with the findings by Zakir & Wunnava (1999) and (Gubhaju, 1986).

Percentage of Delivery by a Health Professional

The coefficient of percentage of delivery by a health professional is negative to the tune of -1.572949 and it is statistically significant. This means that increase in percentage of delivery by a health professional by 1% will reduce under-five mortality by about 101%. Increase in health professional care at the point of delivery on the average will reduce under-five mortality rate. This is in conformity to the 'a priori' expectation.

Constant

The coefficient of the constant term of the under-five mortality rate equation is negative and statistically significant. The constant term represents autonomous under-five mortality rate. This implies that under-five mortality rate would decrease by about 125% when other variables are not operational (that is, when all the expenditure and control variables are kept constant). This means that under-five mortality rate could be affected by other variables other than the variables included in the model (like, culture, environmental and nutritional factors).

Coefficient of Determination (R^2)

The R^2 value is 0.834396 and R^{-2} (adjusted for loss in degree of freedom) is 0.802549. The value of R^2 shows that the model explains variations in under-five mortality to the tune of 38%.

The F-Test

Decision Rule

Reject H_0 if $F_{cal} > F_{0.05}$ (v_1/v_2)d.f

Accept if otherwise.

From the regression result, F_{cal} = 26.20027. From the F-distribution table $F_{0.05}$ (4, 27) = 2.16. Since $F_{cal} > F_{tab}$ the study rejects H_0 and conclude that the overall regression is statistically significant at 5% level. This means that the linear combination of the individual independent variables significantly impact on infant mortality.

Test for Autocorrelation

This is carried out in this study using the Durbin-Watson t-statistic to test for autocorrelation. Thus, the hypothesis tested is as written below:

H_0: No autocorrelation

H_1: Autocorrelation exists

Level of significance = 0.05

Decision Rule

If computed d-value is less than d_L, there is evidence of positive first–order serial correlation; if it is greater than du, there is no evidence of positive first-order serial correlation; but if d_{cal} lies between the lower and the upper limit, there is inconclusive evidence regarding the presence of positive first-order serial correlation.

The summary of the decision rule is presented in table (4.5) below.

Table 4.5 Durbin–Watson Test: Decision Rule

Null hypothesis	**Decision**	**If**
No positive autocorrelation	Reject	$0<d<d_L$
No positive autocorrelation	No decision	$d_L \leq d \leq d_u$
No negative autocorrelation	Reject	$4- d_L<d<4$
No negative autocorrelation	No decision	$4-d_u \leq d \leq 4-d_L$
No autocorrelation, positive or negative	Do not reject	$d_u<d<4-d_u$

From the regression result (see appendix), we could observe that the Durbin-Watson statistics d = 1.9842. Also, the significant points of d_L and d_u from Durbin Watson table at 0.05 level of significance are; $d_L = 1.109$; $D_u = 1.819$

Using the fifth decision rule, we have; $d_u<d<4-d_u$

→ 1.819 <1.970965< 4 - 1.819

→ 1.819<1.970965<2.181

(with k = 5 and n = 32)

From the result above, the study observes that d = 1.9842 > d_u = 1.819 and that 1.819<1.970965<2.181, hence, the study do not reject the null hypothesis of no autocorrelation positive or negative and conclude that there is no evidence of positive or negative first-order serial correlation.

4.4 MODEL 3

The Effect of Health Spending on Neonatal Mortality Rate in Nigeria

Estimation Command:
==========
LS LOG(D(NMR)) C LOG(D(HEX)) LOG(D(PCI)) LOG(D(HCF)) LOG(D(EDX)) LOG(D(DHP))

Estimation Equation:
==========
LOG(D(NMR)) = C(1) + C(2)*LOG(D(HEX)) + C(3)*LOG(D(PCI)) + C(4)*LOG(D(HCF)) + C(5)*LOG(D(EDX)) + C(6)*LOG(D(DHP))

Substituted Coefficients:
==========
LOG(D(NMR)) = -19.40964158 + 0.3414268644*LOG(D(HEX)) - 0.02583647678*LOG(D(PCI)) + 3.061986764*LOG(D(HCF)) - 0.4029614061*LOG(D(EDX)) - 1.259925304*LOG(D(DHP))

Table 4.6

Dependent Variable: Neonatal Mortality Rate

Variable	Coefficient	Std. Error	t-Statistics	Prob. Value
C	-19.40964	6.156530	-3.152692	0.0040
LOG(D(HEX))	0.341427	0.298322	1.144492	0.2628
LOG(D(PCI))	-0.025836	0.059184	-0.436541	0.6660
LOG(D(HCF))	3.061987	0.743501	4.118335	0.0003
LOG(D(EDX))	-0.402961	0.302961	-1.330077	0.1950
LOG(D(DHP))	-1.259925	0.206535	-6.100290	0.0000

R-squared = 0.919587

Adjusted R-squared = 0.904123. Durbin-Watson statistics = 1.969388.

Per Capita Health Expenditure (HEX)

The coefficient of per capita health expenditure is positive but statistically insignificant. The value of the coefficient is 0.341427. This means that increase in per capita health expenditure by 1% will lead to an increase in neonatal mortality rate in Nigeria to the tune of 34%. This could be because of very low per capita health expenditure in Nigeria. This finding is in contrast with the findings by (Fogel 2004, Cutler and Miller 2005, Cutler et al. 2005, Deaton 2005, Filmer and Pritchett 1999).

Per Capita Income (PCI)

The result of this study supports the hypothesis of inverse relationship between neonatal mortality rate and per capita income in Nigeria. The study suggests that increase of per capita income by 1% would lead to about 3% decrease in neonatal mortality rate. However, from the t-test, per capita income is insignificant which implies that per capita income has insignificant effect on neonatal mortality rate in Nigeria.

Access to Health Care Facilities

The result of this study also did not support the hypothesis of inverse relationship between access to health care facilities and neonatal mortality rate. The t-test, result shows that access to health care facilities is statistically significant which implies that access to health care facilities has significant effect on neonatal mortality. However, the coefficient value of access to health care facilities is 3.061987. This means that if access to health care facilities increases by 1%, infant mortality rate will increase by about 103%. This is astonishing because the result falls short of the ‘a priori’ expectation. However, this could be explained by the inadequate health care facilities and the accompanying poor attitude to access health care facilities.

Per Capita Education Expenditure

The coefficient of per capita education expenditure is negative but statistically insignificant. However, this conforms to ‘a priori’ expectation. The value of the coefficient is -0.402961. This implies that increase in per capita education expenditure by 1% will lead to a decrease in

neonatal mortality rate by about 40% though insignificant. This result is in tandem with the findings by Zakir & Wunnava (1999) and (Gubhaju, 1986).

Percentage of Delivery by a Health Professional

The coefficient of percentage of delivery by a health professional is negative and statistically significant. The coefficient value is -1.259925. This means that increase in percentage of delivery by a health professional by 1% will reduce neonatal mortality by about 101%. This conforms to 'a priori' expectation.

Constant

The constant term of the equation is negative and statistically significant. The constant term represents autonomous neonatal mortality rate. This implies that neonatal mortality rate would decrease by 119% when other variables are not operational (that is, when all the expenditure and control variables are kept constant). This means that neonatal mortality rate could be affected by other variables other than the variables included in the model (like, environmental and nutritional factors).

Coefficient of Determination (R^2)

The R^2 value is 0.919587 and R^{-2} (adjusted for loss in degree of freedom) is 0.904123. The value of R^2 shows that the model explains variations in neonatal mortality rate to the tune of 92%.

The F-Test

Decision Rule

Reject H_0 if $F_{cal} > F_{0.05}$ (v_1/v_2)d.f

Accept if otherwise.

From the regression result, F_{cal} = 59.46623. From the F-distribution table $F_{0.05}$ (4, 27) = 2.05. Since $F_{cal} > F_{tab}$ the study rejects H_0 and conclude that the overall regression is statistically significant at 5% level. This means that the linear combination of the individual independent variables significantly impact on neonatal mortality rate.

Test for Autocorrelation

This is carried out in this study using the Durbin-Watson t-statistic to test for autocorrelation. Thus, the hypothesis tested is as written below:

H_0: No autocorrelation

H_1: Autocorrelation exists

Level of significance = 0.05

Decision Rule

If computed d-value is less than d_L, there is evidence of positive first–order serial correlation; if it is greater than du, there is no evidence of positive first-order serial correlation; but if d_{cal} lies between the lower and the upper limit, there is inconclusive evidence regarding the presence of positive first-order serial correlation.

The summary of the decision rule is presented in table (4.7) below.

Table 4.7 Durbin–Watson Test: Decision Rule

Null hypothesis	**Decision**	**If**
No positive autocorrelation	Reject	$0<d<d_L$
No positive autocorrelation	No decision	$d_L \leq d \leq d_u$
No negative autocorrelation	Reject	$4- d_L<d<4$
No negative autocorrelation	No decision	$4-d_u \leq d \leq 4-d_L$
No autocorrelation, positive or negative	Do not reject	$d_u<d<4-d_u$

From the regression result (see appendix), we could observe that the Durbin-Watson statistics d = 1.969388. Also, the significant points of d_L and d_u from Durbin Watson table at 0.05 level of significance are; $d_L = 1.109$; $D_u = 1.819$

Using the fifth decision rule, we have; $d_u<d<4-d_u$

→ 1.819 <1.969388< 4 - 1.854

→ 1.819<1.969388<2.181

(with k = 5 and n = 32)

From the result above, the study observes that d = 1.9842 > d_u = 1.819 and that 1.819<1.969388<2.181, hence, the study do not reject the null hypothesis of no autocorrelation positive or negative and conclude that there is no evidence of positive or negative first-order serial correlation.

4.5 Evaluation of Research Hypotheses

The hypotheses of this study can be evaluated from the results of the estimated models.

Ho_1: Health expenditure has no significant effect on infant mortality rate in Nigeria.

From the t-tests carried out on each of the variables on model 1, Per capita health expenditure, per capita income and per capita education expenditure are statistically insignificant though increase in per capita education expenditure reduces the incidence of infant mortality rate in Nigeria. This means that public health expenditure has no significant impact on infant mortality rate in Nigeria.

For the first hypothesis, we accept the null hypothesis that public health expenditure has no significant effect on infant mortality rate in Nigeria and reject the alternative hypothesis.

Ho_2: Health expenditure has no significant effect on under-five mortality rate in Nigeria.

From the t-tests carried out on each of the variables on model 2, per capita health spending and per capita education expenditure are statistically significant though per capita health spending is under-five mortality augmenting while per capita education expenditure reduces under-five mortality rate in Nigeria. However, per capita income has no significant effect on under-five mortality in Nigeria. On the whole, this means that per capita health spending has significant effect on under-five mortality rate in Nigeria after controlling for other variables.

For the second hypothesis, we reject the null hypothesis that health spending has no significant effect on under-five mortality rate in Nigeria and accept the alternative hypothesis.

Ho_3: Health expenditure has no significant effect on neonatal mortality rate in Nigeria.

From the t-tests carried out on each of the variables on model 3, Per capita health expenditure, per capita income and per capita education expenditure are statistically insignificant though increase in per capita income reduces the incidence of neonatal mortality rate in Nigeria. This means that public health expenditure has no significant impact on neonatal mortality rate in Nigeria.

For the third hypothesis, we accept the null hypothesis that public health expenditure has no significant effect on neonatal mortality rate in Nigeria and reject the alternative hypothesis.

4.6 Summary of Major Findings

The major findings emanating from this study include the following:

- The study found that per capita health spending has no significant effect on infant mortality rate and neonatal mortality rate in Nigeria.
- The study found that per capita health spending has significant effect on under-five mortality rate in Nigeria.
- The study found that per capita education expenditure has significant effect on under-five mortality rate in Nigeria.
- The study equally found that percentage of delivery by a health professional has significant effect on infant mortality rate, under-five mortality rate and neonatal mortality rate in Nigeria.

CHAPTER FIVE

SUMMARY, POLICY RECOMMENDATIONS AND CONCLUSION

5.1 SUMMARY OF FINDINGS

This study has investigated and elaborated on empirical issues pertaining to the effect of public health expenditure on child mortality in Nigeria. Thus, the study modeled infant mortality rate, under-five mortality rate and neonatal mortality rate against per capita health spending and controlled for per capita income, access to health care facilities, per capita education expenditure and the percentage of delivery by health professional in Nigeria.

It is evident from the discussion of the results that health expenditure has no significant effect on infant mortality rate in Nigeria. This outcome has established the first objective of the study. However, much is left to be desired. Why? The answer to this question is not far-fetched. The current health expenditure cannot sustain the health challenges of the population in terms of abating the rising infant mortality. Another reason could still be deduced, there has not been marked expansion in the national Primary Health Care (PHC) programme, a measure designed to reach out to the vast rural populace in Nigeria. The second objective which was set out to determine the effect of health spending on under-five mortality has been ascertained, in that health spending has significant impact on under-five mortality rate in Nigeria. Surprisingly, there is a positive relationship between health spending and under-five mortality rate. This is symbolic of high corrupt practices in the country whereby there is a big gulf between health care allocation and actual health care spending. Several studies (Parry, 2008; Uboma-Jaswa, 2008; Feyisetan, 2009; Feyisetan and Adeokun, 2010) have asserted that poor health service delivery is as a result of mismanagement of fund allocated to the health sector. Thus, budgetary allocations to the health sector have not been adequately integrated into the health intervention programmes. More so, on the third objective, the study observed that per capita health expenditure has no significant effect on neonatal mortality rate in Nigeria. However, what is worrisome is the positive relationship observed between per capita health expenditure and neonatal mortality rate. But available evidence suggests that at low levels of development public expenditure on health has stronger positive relationship on mortality rates while at high development levels the opposite is true (Issa and Ouattara, 2005).

5.2 POLICY RECOMMENDATIONS

Based on the findings of this study, the major policy recommendations are as follows:

In Nigeria, there have been indications that there are serious fluctuations in child mortality rates owing to fluctuations in health expenditure even though arguments exist on the positive effects of health expenditure and the indirect feedback effects on economic growth and development. There is, therefore, the need for sustained effort in implementing sound health policies that would ameliorate the incidence of child mortality in Nigeria.

- Government should increase and sustain health spending especially on programmes aimed at reducing child mortality as it is this study's believe that health care expenditure is far from the optimum which at present cannot sustain the teeming population health challenges. Government should spend well above the 1981 alleged World Health Organization (WHO) recommendation that countries should spend 5 percent of gross domestic product (GDP) on health which currently hovers around 2%.
- Government should set up committee to monitor health spending in order to make sure that allocation-expenditure gap is plugged.
- Government should involve herself more in the training of more health care professionals as percentage of delivery by health professionals has shown significant effect in reducing infant, under-five and neonatal mortality rates in Nigeria and most importantly improve health care infrastructure since the trained health care professionals would use these facilities to work.
- Government should increase education expenditure since it has the potency to drastically reduce infant, under-five and neonatal mortality rates in Nigeria. Female child education should be encouraged since child mortality is seen to be less for mothers with higher level of education.
- Authorities in Nigeria should redirect income policy towards improving households' income because per capita income has shown no prospect of ameliorating child mortality in Nigeria. This study could infer that while per capita income plays no role in reducing child mortality, out-of-pocket health expenditure could be indispensable in measuring child health outcomes in Nigeria. Thus, it is the view of this study that increased

household income would reduce infant, under-five and neonatal mortality rates in Nigeria.

- National Orientation Agency (NOA) should increase their campaign and extension services to all nooks and cranny of the federation on the importance of accessing health care facilities to over-turn its counter-productive nature since access to health care facilities has shown to be significant in reducing child mortality in Nigeria.

5.3 CONCLUSION

The primary aim of this study was to see the effect of public health spending on child mortality and the progress made since 1980, which will serve as a wake -up call towards achieving the global minimum mortality targets. It also examined those non expenditure factors that contribute to the lack of projected decline in mortality rates in Nigeria. The expectation is that child mortality rates will continue to drop and may even plummet to a moderate figure of 55/1000 by the year 2015. Meanwhile, the recent decrease in child mortally between 2004 till date shows that Nigeria has the capacity to meet the minimum standards by 2015.

Therefore, it should be noted that the challenges we face today regarding the health of Nigerian children cannot be put off, since they are not insurmountable. That is, we have the tools, resources, and knowledge to address our nation's most critical child survival problems and build on the considerable achievements that we have made since the World Summit for Children in 1990. In general, progress in reducing child mortality rates depend on the commitment by academics, governments, international agencies, health care professional associations, and non-governmental organizations to work together towards achieving low child mortality rates.

It is important to mention that because of urbanization, quality health care services are concentrated in urban areas. In this sense, balanced rural and urban health care services can be seen as a good measure for short run and long run improved health status of the citizenry. Finally, the study concludes that child mortality could significantly reduce with increased health spending in Nigeria as far as health care allocation is judiciously expended.

As a caveat, this study is by no means an exhaustive treatment of the impact of health expenditure on child mortality in Nigeria, but will serve as a prelude for promoting further taught of the topic.

REFERENCES

Acheson W.C. (1998), What should macroeconomists know about health care policy? A primer. IMF Working Paper 00/136. International Monetary Fund: Washington.

Adebiyi, M.A. (2005), Debt Service-Education Expenditure Nexus: The Nigerian Experience. In: Human Resource Development in Africa: Selected Papers for the Year 2002 Annual Conference, The Nigerian Economic Society (NES), Part Three, 243-267

Ahonsi, B.A. (1992), Developmental Implications of Early Mortality Factors in Nigeria. *Journal of Social Development in Africa (1992), 7, (1), 67-85*

Alves, D.and Belluzzo, W. (2005), Child Health and Infant Mortality in Brazil Inter-American Development Bank Research Network Working Paper R-493.

Anand, S. and Ravallion.M., (1993), Human Development in Poor Countries: On the Role of Private Income and Public Services, *Journal of Economic Perspectives.* 1(3), 133-503]

Aschauer, D. (1989), Is Government Spending Productive? *Journal of Monetary Economics 23, 177–200.*

Bakare A. S. and Olubokun .S. (2011), HealthCare Expenditure and Economic Growth in Nigeria: An Empirical Study. *Journal of Emerging Trends in Economics and Management Sciences* (JETEMS) Vol. 2 (2): 83-87.

Baldacci E. (2003), Social Spending, Human Capital and Growth in Developing Countries: Implications for Achieving the MDGS. *IMF Working paper* no. wp/04/217, Washington DC.

Barker, J. (1990), Instrumental Variables Regression with Weak Instruments. *Econometrica*, 65**,** 557-586.

Barro, R. J. (1996), Health, Human Capital and Economic Growth, Paper for the Program on Public Policy and Health, Pan American Health Organization and World Health Organization (Washington: Pan American Health Organization).

Barro, R.. S.and Martin, X. (2004), Economic Growth, 2nd Ed. New Delhi, Prentice Hall of India.

Barro, R..J. (1990), Three Models of Health and Economic Growth. Preliminary Draft, September

Barro, Robert J. and Jong-Wha. .L.(1991), International Measures of Schooling Years and Schooling Quality. American Economic Review, Papers and Proceedings 86 (2): 218-23.

Beaglehole, R, Afridi and Bonita, H. (1998), Determinants of Expenditure on Health in Pakistan The Pakistan Development Review 34 (4) 959-970

Beenstock, M. and Sturdy, P. (1990), The Determinants of Infant Mortality in Regional India World Development, Vol. 18, No. 3, pp. 443-453.

Bhalotra, S. (2007), Spending to save? State Health Expenditure and Infant Mortality in India. *Health Economics,* 16**,** 911-928.

Bhalotra, S. (2007), Spending to Save? State Health Expenditure and Infant Mortality inIndia. IZA Discussion Paper No. 2914, July 2-28

Bhatia, H. L. (2006), Public Finance, Twenty-fifth Edition. Vikas Publishing House.

Bidani, B. and Martin .R. (1997), Decomposing Social Indicators using Distributional Data, *Journal of Econometrics, 77:125-139.*

Blomqvist, A. G. and Carter, R.A.L. (1997), Is Health Care Really a Luxury? *Journal of Health Economics 16, 207-229*

Bloom, D. and Canning. D. (2003), The Health and Poverty of Nations: From Theory to Practice, *Journal of Human Development*, Vol. 4, No. 1, pp. 47–71.

Bourguignon, F. (2004), The Poverty-Growth-Inequality Triangle. Working Paper No. 125 ICRIER; New Delhi

Caldwell, John C. (1986), Routes to Low Mortality in Poor Countries, Population and Development Review, 12(2):171-220.

Carrin, G. and Politi, C.(1995), Exploring the Health Impact of Economic Growth, Poverty Reduction, and Public Health Expenditure. *Tijdschrift voor Economie en Management*, 40**,** 227- 246.

Castro-Leal,F., Demery .J. and Mehra .K. (2000), Public Spending on HealthCare in Africa: Do the Poor Benefit? Bulletin of the World Health Organisation 78:1.

Chete L. and Adeoye. B.(2002), Human Resources Development in Africa. The Nigerian Economic Society Selected Papers for the 2002 Annual Conference PP 79-102.

Costa, D. L. & Steckel, R. H. (1997), Long-Term Trends in Health, Welfare, and Economic Growth in the United States in Steckel, R. H. & Floud, R. (editors) Health and Welfare during Industrialization 1997 Series: (NBER-PR) National Bureau of Economic Research Project Report.

De la Croix, D and Delavallade, C. (2006), Growth, public investment and corruption with failing institutions. Working paper 2007-61, Society for the Study of Economic Inequality.

Demery, L. and Walton, M. (1998), Are Poverty Reduction and Other 21st Century Social Goals Attainable? Washington, DC, World Bank.

Deolalikar, A. (2005), Attaining the Millennium Development Goals in India: How Likely and What Will it Take to Reduce Infant Mortality, Child Malnutrition, Gender Disparities and Hunger-Poverty and to Increase School Enrollment and Completion? . New Delhi, Oxford University Press.

Devarajan, S., Swaroop, V. and Zou, H., (1996),The composition of Public Expenditures and Economic Growth. Journal of Monetary Economics 37, 313–344.

Dreger Christian and Reimers, Hans-Eggert (2005), Healthcare Expenditures in OECD Countries: A Panel Unit Root and Co-integration Analysis. *International Journal of Applied Econometrics and Quantitative Studies. Vol 2-2 5-18*

Duraisamy, P.and Sathiyavan, D. (1998), Impact of Health Status on Wage and Labour Supply of men and women. *India Journal of Labour Economics*. 4: 67-84)

Durlauf, S, Johnson .P.and Temple .J., (2005), Growth Econometrics, chapter 8 in P. Aghion and S. N. Durlauf (Eds.) Handbook of Economic Growth, Volume 1A, North-Holland: Amsterdam, 2005, pp. 555-677.

Easterly, W.and Rebelo, S. (1993), Fiscal Policy and Economic Growth. *Journal of Monetary Economics 32 (3), 417–458.*

Eboh E. (2009), Has Autonomy of State Government Bolstered Achievement of MDCs in Nigeria. United Nations Economic Commission for Africa Expert Meeting. Abuja.

Fajemilahin B. R. and Odebiyi A. I. (2011), Predictors of Elderly Persons' Quality of Life and Health Practices in Nigeria. *International Journal of Sociology and Anthropology.* Volume 3(7): 245-252.

Filmer, D. and Pritchett .L., (1999), The Impact of Public on Health: Does Money Matter? Social Science and Medicine, 49(10), 1309-1323

Filmer, D. and Pritchett .L. (1997), Child Mortality and Public Spending on Health: How Much Does Money Matter? World Bank Policy Research Working Paper No. 1864 (Washington: World Bank).

Filmer, D., Hammer. J. and Pritchett .L.(1998), Health Policy in Poor Countries: Weak Links in the Chain, World Bank Policy Research Working Paper No. 1874 (Washington: World Bank).

Floud, R. and Harris, B., (1997), Health, Height, and Welfare: Britain, 1700-1980 in Steckel, R. H. & Floud, R. (editors) Health and Welfare during Industrialization 1997 Series: (NBERPR) National Bureau of Economic Research Project Report.

Fogel, R. (2004), The Escape from Hunger and Premature Death, 1700-2100- Europe, America and the Third World, Cambridge: Cambridge University Press, 191 p.

Gerdtham, U. G. (1992), Pooling International Healthcare Expenditure Data Health Economics 1, 217-231

Gerschenkron, A., (1965), Economic backwardness in historical perspective, A book of Essays, New York, Praeger.

Gubhaju, B.B.(1989), Health Problems in Nepal: With Special Reference to Infant and Child Health, Asian Profile, 14, 165-74

Gupta I and Mitra.. A. (2004), Economic Growth, Health and Poverty, An exploratory study for India. Development Policy Review, vol 22, 193 – 206, March

Gupta, S., Verhoeven, M. and Tiongson, E. R. (2002), The Effectiveness of Government spending on Education and Health Care in Developing and Transition Economies. *European Journal of Political Economy,* 18**,** 717.

Gupta, S. Verhoeven. M. and Tiongson .E., (1999), Does higher government spending buy better results in education and healthScare?, Working Paper 99/21, Washington DC: International Monetary Fund.

Gupta, S., Verhoeven, M., and Tiongson, E. (2001), Public Spending on HealthCare and the Poor IMF Working Paper, Fiscal Affairs Department.

Gupta, S. Verhoeven,.M. and Tiongson.E.(2003), Public Spending on Health Care and the Poor, *Health Economics*, Vol. 12, pp. 685–96, Also reprinted in Sanjeev Gupta, Benedict Clements, and Gabriela Inchauste, eds., *Helping Countries Develop: The Role of Fiscal Policy* (Washington: International Monetary Fund, 2004)

Gwatkin, D. (2000), Health Inequalities and the Health of the Poor: What do we know? What can we do? Bulleting of the World Health Organisation, 78(1)

Gyimah-Brempong. K, and Wilson. M. (2004), Health Human Capital and Economic Growth in Sub-Saharan African and OECD Countries, *The Quarterly Review of Economics and Finance*, Vol. 44, No. 2, pp. 296–320

Hamid, R., Davoodi. R., Tiongson .E., and Sawitree S. Asawanuchit (2003), How Useful Are Benefit Incidence Analyses of Public Education and Health Spending? (IMF Working Paper 227, WP/03/227.)

Hanmer, L., Lensink, R., and White, H., (2003) Infant and Child Mortality in Developing Countries: Analysing the Data for Robust Determinants Journal of Development Studies, Vol. 40, No 1, pp 101-118

Hanushek, E. (1995), Interpreting recent Research on Schooling in Developing Countries. The World Bank Research Observer 10 (2), 227–246.

Harbison, R.,and Hanushek, E., (1992). Educational performance of the poor: Lessons from Rural Northeast Brazil. Oxford University Press, Oxford.

Hojman, D. (1996), Economic and other Determinants of Infant and Child Mortality in Small Developing Countries: The Case of Central America and the Caribbean Applied Economics, 28, pp. 281-290.

Ichoku, H. E. (2008), Public Expenditure Review (PER) of the Health Sector in Anambra State Consultant Report *Global financial Commitment* No (9 CP UNI 007).

Jack W. (1999), Principles of Health Economics for Developing Countries, World Bank Institute Development Studies. World Bank: Washington.

Jamison, Dean T., Jia Wang, Kenneth Hill, and Juan-Luis Londoño, (1996), Income, Mortality and Fertility Control in Latin America: Country-Level Performance 1960-90, mimeo, LAC Technical Department, The World Bank. Washington, DC.

Jo¨reskog, K.G, and Dag S. (1989). LISREL 7: User's Reference Guide. Scientific Software Inc: Mooresville, Indiana.

Kakwani, N., (1993), *Performance in Living Standards: an International Comparison, Journal of Development Economics. 41:307-336.*

Kaplan, P, Scott B., Julia A., and Kenneth S. Warren sed., (1996), Good Health at Low Cost (Conference Report), The Rockefeller Foundation. New York: The Rockefeller Foundation.

Kaplan, P. and Lynch, S. (1997), Macroeconomic Policies and Poverty Reduction: Some Cross-Country Evidence. Finance and Development, vol. 38, No. 2, June.

Kawachi, I. and Kennedy. B. P. (1997), The relationship of Income Inequalities to Mortality; Does the choice of Indicator matter? Social Science and Medicine, Oct 45, (7) 1121 - 1127

Kim, K. and Moody, P. M. (1992), More Resources better Health? A cross-national perspective. *Social Science & Medicine*, 34**,** 837.

King .G. and Hill, A. (1992), Child Mortality in the Developing World Population and Development Review, Vol. 15, No. 4, pp.657-687.

King, G. (1997), A solution to the ecological inference problem : reconstructing individual behavior from aggregate data. Princeton University Press.

Kishor, S. (1993), May God give Sons to All: Gender and Child Mortality in India. *American Sociological Review*, 58**,** 247.

Kitagawa, L and Hauser, P. (1973), Remarks [on Good Health at Low Cost], in Haltead et al eds.(1985)

Levine, R.,and Renelt, D. (1992), A Sensitivity Analysis of Cross-country Growth Regressions. American Economic Review 82 (4), 942–963.

Long J.S. (1983), Covariance Structure Models: An Introduction to LISREL, Quantitative Applications in the Social Sciences Series, No. 34. Sage Publications: Beverly Hills, California.

M'Backe . C. and Van de Walle. E. (1987) "Socioeconomic Factors and Access to Health Services as Determinants of Child Mortality" in USS Seminar on Mortality and Society in SubSaharan Africa, Yaounde, Cameroun, lUSSP, Liege.

Mcguire, A., Parkin, D., Hughes, D. and Gerard, K. (1993), Econometric Analyses of National Health Expenditures: Can positive economics help to answer normative questions? *Health Economics,* 2**,** 113-126.

Mingat, A. and Tan, J. (1998), The Mechanics of Progress in Education: evidence from cross-Country data. Policy Research Working Paper 2015. Human Development Department, Education Group, World Bank, Washington, D.C.

Mittnik, S. and Neumann, T., (2003), Time-series Evidence on the Nonlinearity Hypothesis for Public Spending. Economic Inquiry 41 (No. 4).

Moore, W.J. Newman, R.J. & Fheili, M. (1992), Measuring the Relationship Between Income and National Health Care Expenditure. Health Care Financing Review, 14, 133-144

Mosley, W.H. and I.C. Chen (1984), An Analytical Framework for the Study of Child Survival in Developing Countries. *Population and Development Review*, A supplement to Vol.10.

Musgrave, R. A. (1959). The Theory of Public Finance. New Haven. Yale University Press.

Musgrove, Philip, (1996). Public and Private Roles in Health: Theory and Financing Patterns, World Bank Discussion Paper No. 339. Washington, DC.

Norman, G. (1985), The incidence of Government Expenditure and Redistribution in the United Kingdom. Economica, London School of Economics and Political Science 52 (27)

Nurudeen, A. and Usman A., (2010), Government Expenditure and Economic Growth in Nigeria, 1970-2008: A Disaggregated Analysis. *Business and Economic Journal*. Volume 2010: BEJ4

Odusola, A. E. (1998), Rekindling Investment and Economic Development in Nigeria. NES selected Papers for the 1998 Annual Conference.

Ojewumi, T. K. and Ojewumi, J. S. (2012), Trends In Infant and Child Mortality in Nigeria: A Wake-Up Call Assessment for Intervention Towards Achieving the 2015 MDGS. Science *Journal of Sociology & Anthropology, 12(2)*

Olaniyan O. and Lawanson. A. (2010), Health Expenditure and Health Status in Northern and Southern Nigeria: A Comparative Analysis Using NHA Framework. Paper Presented at the 2010 CSAE Conference Held at St Catholics College, University of Oxford, Oxford, UK. 2-3.

Olaniyi O. O. and Adams A. A. (2008), Public Expenditures and Human Development in Nigeria Human Resource Development in Africa. 2002 Annual Conference Papers, NES, U. I Ibadan. 157-198.

Omoruan, A. I. (2009), Social Health Insurance and Sustainable Health Care Reform in Nigeria. *Ethno-Med*, 3(2): 105-110.

Pampel F. C., Jr.,and Pillai, V. (1986), Patterns and Determinants of Infant Mortality in Developing Nations, 1950-1975 Demography, Vol. 23, No. 4, pp. 525-542.

Paxson, C.H. and N. Schady (2005), Cognitive Development among Young Children in Ecuador: The Roles of Wealth, Health and Parenting, Policy Research, Working Paper, No. 3605, Washington (D.C.), World Bank, May. *Forthcoming in Journal of Human Resources.*

Pierre-Yves, P. O. and Crémieux C. P., (1999), Health care spending as determinants of Health Outcomes. *Health Economics*, 8**,** 627-639.

Preston, K. and Tauban, M. (2003), Poverty Reduction Services in Education and Health: Public Expenditure and Aid Centre for Aid and Public Expenditure, Overseas Development Institute, 111 Westminster Bridge Road London SE1 7JD UK

Pritchett, L. (1996), Divergence, Big Time, *Journal of Economic Perspectives*. (Summer)

Pritchett, L. and Lawrence S., (1996), Wealthier is Healthier, *Journal of Human Resources, 31(4):841-868.*

Rajkumar, A. S. and V. Swaroop (2002), Public Spending and Outcomes: Does Governance Matter? World Bank Working Papers No. 2840 (Washington: World Bank

Rebelo, S. (1991), Long-run Policy Analysis and long-run Growth, *in Journal of Political Economy 99(3)*

Riman M.,(2010), Higheer Education Outcomes, Graduate Employment and University Performance Indicators. *Journal of the Royal Statistical, Society, Series A (Statistics in Society)* Vol. 167, No3,

Rodgers, S., Hummer, A. and Nam, J. (2000), GMM Estimation of Empirical Growth Models Centre for Economic Policy Research Discussion Paper 01/525

Sambo, M..N., Ejemb.C.L.,Adamu,Y.M and Aliyu.A.A.,(2004), Out-of-Pocket Health Expenditure for Under-Five illness in a Semi-Urban Community in Northern Nigeria. *Journal of Community Medicine and Primary Health Care. 16(1) 29-32*

Schultz, T. P. (1993), Mortality decline in the low Income World: causes and consequence. Economic Growth *American Economic Review,* 83**,** 337-342.

Schultz, T.P., (1999), Health and Schooling Investment in Africa. *Journal of Economics Perspectives, 13: 67-88*

Sogart, F., Anderson, G, and Jonsson, E. (1992), Health spending and Outcomes: trends in OECD Countries, 1960–98. Health Affairs 19(May–June): 150–157.

Stanton, B. (1994) Child Health: Equity in the non-Industrialized Countries. *Social Science & Medicine,* 38**,** 1375.

Steckel, R. H. (2002), Health and Nutrition in the Pre-Industrial Era: Insights from a Millennium of Average Heights in Northern Europe *Paper distributed for discussion at the NBER Cohort Studies meeting, May 17, 2002.*

Strauss, J and Thomas, D (1998), Health, Nutrition and Economic Development. *Journal of Economic Literature, 36: 766-817*

Strauss, J. (1999), Human Resources: Empirical Modeling of Household and Family Decisions,in J. Behrman and T.N. Srinivasan,, eds., Handbook of Development Economics, Vol 3.: Amsterdam: North Holland Press: 1883-2023.

Temple, J. R. W. (1999), The new Growth evidence, *Journal of Economic Literature, March 1999, 37(1), 112-156.*

Toor, I. A. and Butt, M .S. (2005), HealthCare Services and Government Spending in Pakistan Economic and Social Review 43:1, 133–150.

Turner, R. (1991), Better Access to Health Services in Nicaragua Lowered Infant Mortality International Family Planning Perspectives, Vol. 17, No. 2, pp. 77-78.

United Nations Children's Fund (UNICEF) / Nigeria, (2001), Federal Government of Nigeria and UNICEF Master Plan of Operations for a Country Programme of Cooperation for Nigerian Children and Women-2002-2007. Lagos: UNICEF.

Uzochukwu and Kanayo (2010), Distributional Impact of Public Expenditure on Education and Health Care in Nigeria: A Gender Based Welfare Dominance Analysis. *International Journal of Business and Management* vol. 5, No 12.

Van Der Walle, S,and Nead, V. (1995), Budgetary Subsidies to the Health Sector among Selected States in India. *Journal of Health Management,* 3**,** 261-281.

Wolf, B. (2004), Health Status and Medical Expenditures: Is there a Link? Social Science and Medicine 22(10), pp 993-999.

World Bank (1990), Nigeria: Poverty in the Midst of Plenty, the Challenge of Growth with Inclusion, A World Bank Poverty Assessment, World Bank, Washing, D.C

World Bank, (1997), Sector Strategy: Health, Nutrition, and Population. Human Development Network, The World Bank, Washington, DC.

World Bank. (2000), World Development Report 2000/2001: Attacking Poverty. Oxford University Press for the World Bank: New York.

Yoloye, E. A. (1976), Causes of Poor Academic Performance in Northern Nigeria. A Monograph. Institute of Education. University of Ibadan, Ibadan.

Zakir, M . and Wunnava, P. (1999), Factors Affecting Infant Mortality Rates:

APPENDIX I
UNIT ROOT TEST RESULTS

Unit Root Test Result for Infant Mortality Rate

ADF Test Statistic	-3.657703	1% Critical Value*	-3.6752
		5% Critical Value	-2.9665
		10% Critical Value	-2.6220

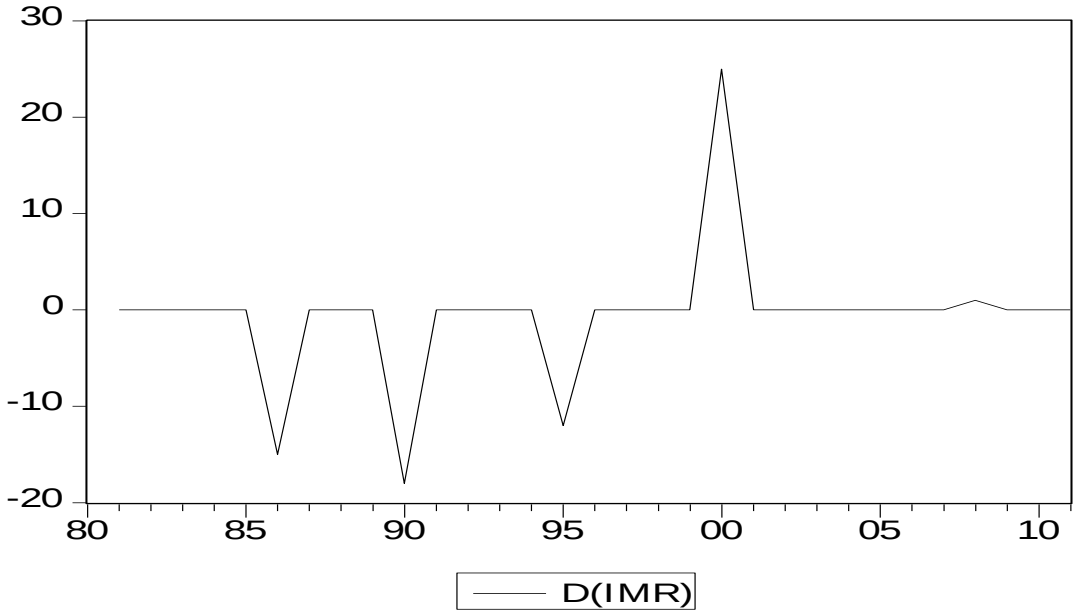
*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(IMR,2)
Method: Least Squares
Date: 06/11/13 Time: 12:21
Sample(adjusted): 1983 2011
Included observations: 29 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(IMR(-1))	-1.019238	0.278655	-3.657703	0.0011
D(IMR(-1),2)	0.009619	0.196107	0.049051	0.9613
C	-0.667777	1.328849	-0.502523	0.6195

R-squared	0.504810	Mean dependent var	0.000000
Adjusted R-squared	0.466718	S.D. dependent var	9.706404
S.E. of regression	7.088214	Akaike info criterion	6.852441
Sum squared resid	1306.312	Schwarz criterion	6.993886
Log likelihood	-96.36040	F-statistic	13.25253
Durbin-Watson stat	2.000187	Prob(F-statistic)	0.000108

Unit Root Line Graph for Infant Mortality Rate



Unit Root Test Result for Under-Five Mortality Rate

ADF Test Statistic	-3.021970	1% Critical Value*	-3.6852
		5% Critical Value	-2.9705
		10% Critical Value	-2.6242

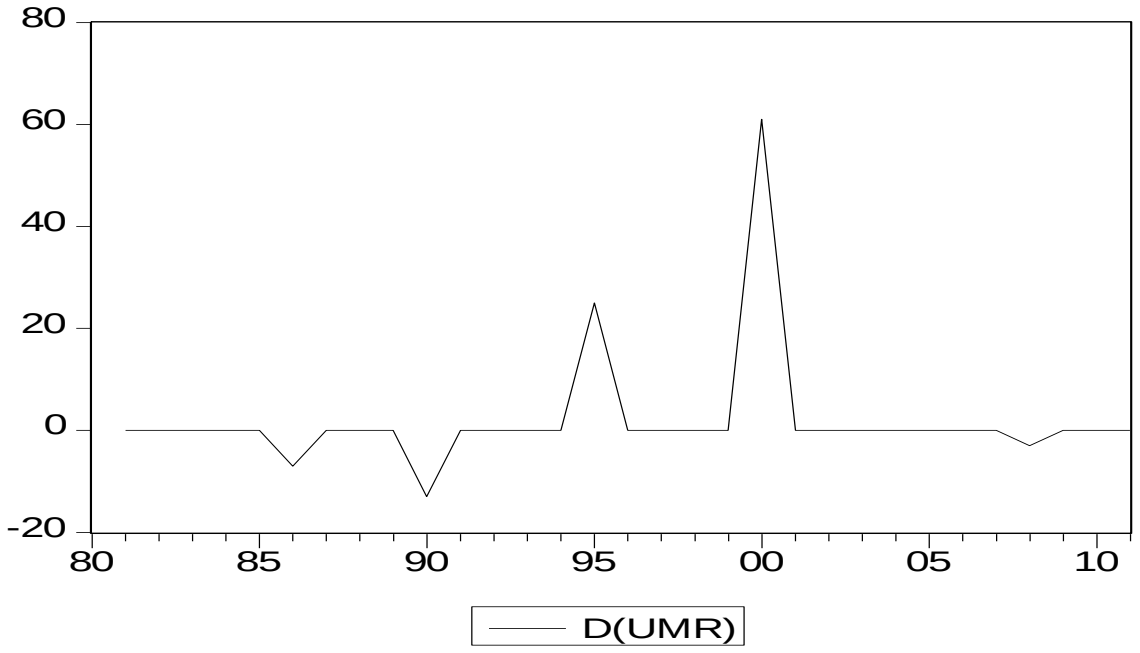
*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(UMR,2)
Method: Least Squares
Date: 06/11/13 Time: 12:25
Sample(adjusted): 1984 2011
Included observations: 28 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(UMR(-1))	-1.102525	0.364837	-3.021970	0.0059
D(UMR(-1),2)	0.068350	0.293235	0.233091	0.8177
D(UMR(-2),2)	0.034175	0.204005	0.167521	0.8684
C	2.480682	2.691903	0.921535	0.3659

R-squared	0.517088	Mean dependent var	0.000000
Adjusted R-squared	0.456724	S.D. dependent var	18.40491
S.E. of regression	13.56576	Akaike info criterion	8.184539
Sum squared resid	4416.717	Schwarz criterion	8.374854
Log likelihood	-110.5835	F-statistic	8.566151
Durbin-Watson stat	2.001008	Prob(F-statistic)	0.000482

Unit Root Line Graph for Under-Five Mortality Rate



Unit Root Test Result for Neonatal Mortality Rate

ADF Test Statistic	-4.230796	1%	Critical Value*	-3.6752
		5%	Critical Value	-2.9665
		10%	Critical Value	-2.6220

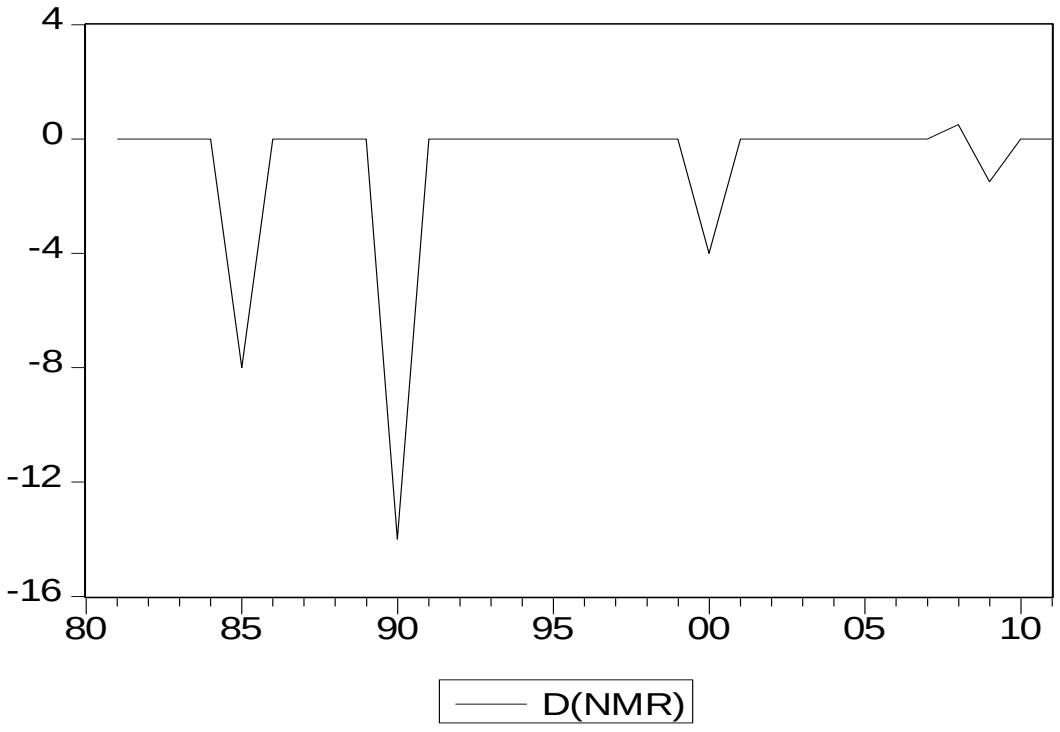
*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(NMR,2)
Method: Least Squares
Date: 06/11/13 Time: 12:29
Sample(adjusted): 1983 2011
Included observations: 29 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(NMR(-1))	-1.224315	0.289382	-4.230796	0.0003
D(NMR(-1),2)	0.110815	0.194908	0.568548	0.5745
C	-1.139879	0.633263	-1.800010	0.0835

R-squared	0.556601	Mean dependent var	0.000000
Adjusted R-squared	0.522494	S.D. dependent var	4.466142
S.E. of regression	3.086186	Akaike info criterion	5.189446
Sum squared resid	247.6381	Schwarz criterion	5.330891
Log likelihood	-72.24697	F-statistic	16.31899
Durbin-Watson stat	2.027507	Prob(F-statistic)	0.000026

Unit Root Line Graph for Neonatal Mortality Rate



Unit Root Test Result for Per Capita Health expenditure

ADF Test Statistic	-3.822592	1%	Critical Value*	-4.3382
		5%	Critical Value	-3.5867
		10%	Critical Value	-3.2279

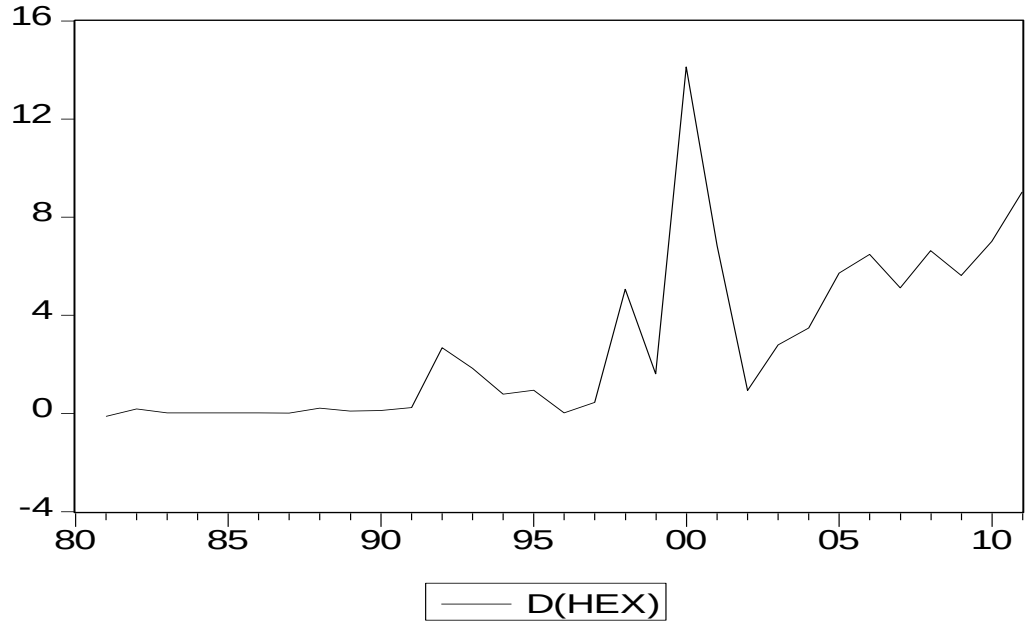
*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HEX,2)
Method: Least Squares
Date: 06/11/13 Time: 12:35
Sample(adjusted): 1985 2011
Included observations: 27 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(HEX(-1))	-1.613653	0.422136	-3.822592	0.0010
D(HEX(-1),2)	0.613096	0.342068	1.792321	0.0875
D(HEX(-2),2)	0.481564	0.276570	1.741201	0.0963
D(HEX(-3),2)	0.320692	0.205899	1.557520	0.1343
C	-3.947023	1.613125	-2.446818	0.0233
@TREND(1980)	0.481287	0.133306	3.610384	0.0016

R-squared	0.541993	Mean dependent var	0.333333
Adjusted R-squared	0.432944	S.D. dependent var	3.420434
S.E. of regression	2.575694	Akaike info criterion	4.923245
Sum squared resid	139.3182	Schwarz criterion	5.211209
Log likelihood	-60.46381	F-statistic	4.970166
Durbin-Watson stat	1.998041	Prob(F-statistic)	0.003700

Unit Root Line Graph for Per Capita Health Expenditure



Unit Root Test Result for Per Capita Income

ADF Test Statistic	-3.991868	1%	Critical Value*	-4.3082
		5%	Critical Value	-3.5731
		10%	Critical Value	-3.2203

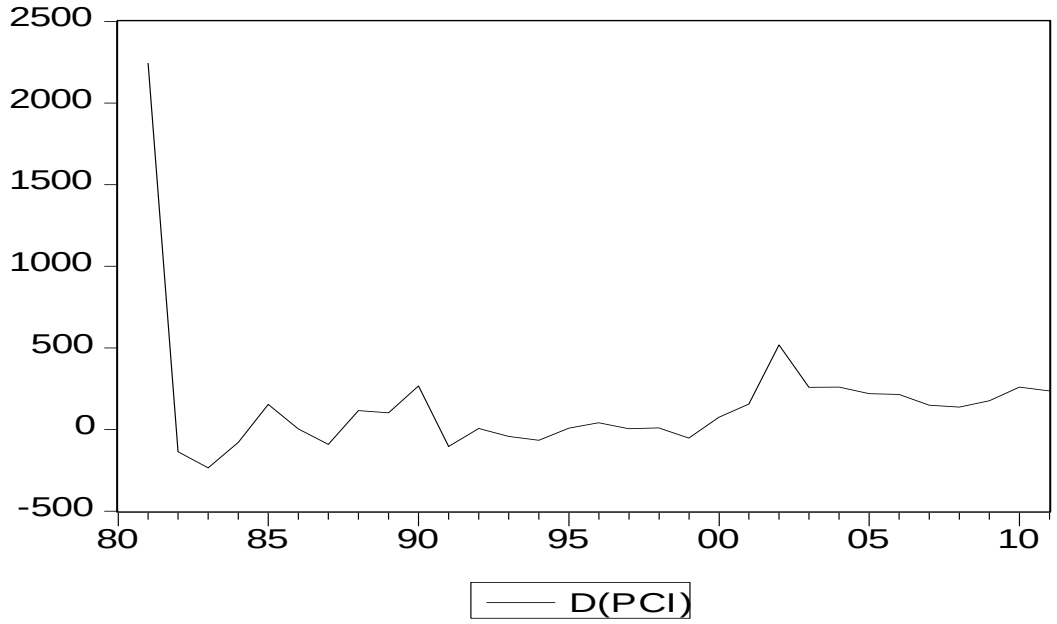
*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(PCI,2)
Method: Least Squares
Date: 06/11/13 Time: 12:38
Sample(adjusted): 1983 2011
Included observations: 29 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(PCI(-1))	-0.756459	0.189500	-3.991868	0.0005
D(PCI(-1),2)	0.071901	0.052533	1.368670	0.1833
C	-43.91640	56.14059	-0.782257	0.4414
@TREND(1980)	7.176987	3.419777	2.098671	0.0461

R-squared	0.391214	Mean dependent var	12.88241
Adjusted R-squared	0.318160	S.D. dependent var	144.8777
S.E. of regression	119.6307	Akaike info criterion	12.53414
Sum squared resid	357787.8	Schwarz criterion	12.72273
Log likelihood	-177.7450	F-statistic	5.355115
Durbin-Watson stat	2.064392	Prob(F-statistic)	0.005481

Unit Root Line Graph for Per Capita Income



Unit Root Test Result for Access to Health Care Facilities

ADF Test Statistic	-6.004203	1%	Critical Value*	-4.2949
		5%	Critical Value	-3.5670
		10%	Critical Value	-3.2169

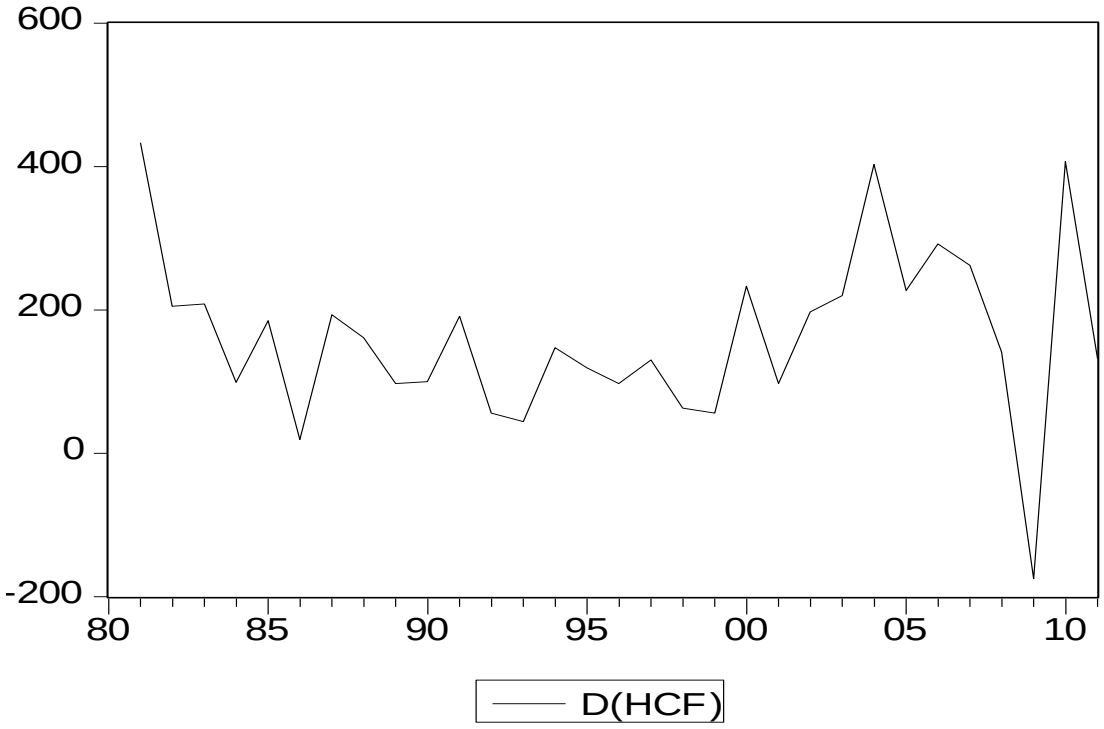
*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HCF,2)
Method: Least Squares
Date: 06/11/13 Time: 12:41
Sample(adjusted): 1982 2011
Included observations: 30 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(HCF(-1))	-1.035533	0.172468	-6.004203	0.0000
C	119.1942	52.03992	2.290438	0.0300
@TREND(1980)	2.433401	2.420730	1.005234	0.3237

R-squared	0.574930	Mean dependent var	-10.03333
Adjusted R-squared	0.543443	S.D. dependent var	169.5994
S.E. of regression	114.5966	Akaike info criterion	12.41535
Sum squared resid	354574.3	Schwarz criterion	12.55547
Log likelihood	-183.2303	F-statistic	18.25947
Durbin-Watson stat	2.127735	Prob(F-statistic)	0.000010

Unit Root Line Graph for Access to Health Care Facilities



Unit Root Test Result for Per Capita Education Expenditure

ADF Test Statistic	-3.615908	1%	Critical Value*	-4.2949
		5%	Critical Value	-3.5670
		10%	Critical Value	-3.2169

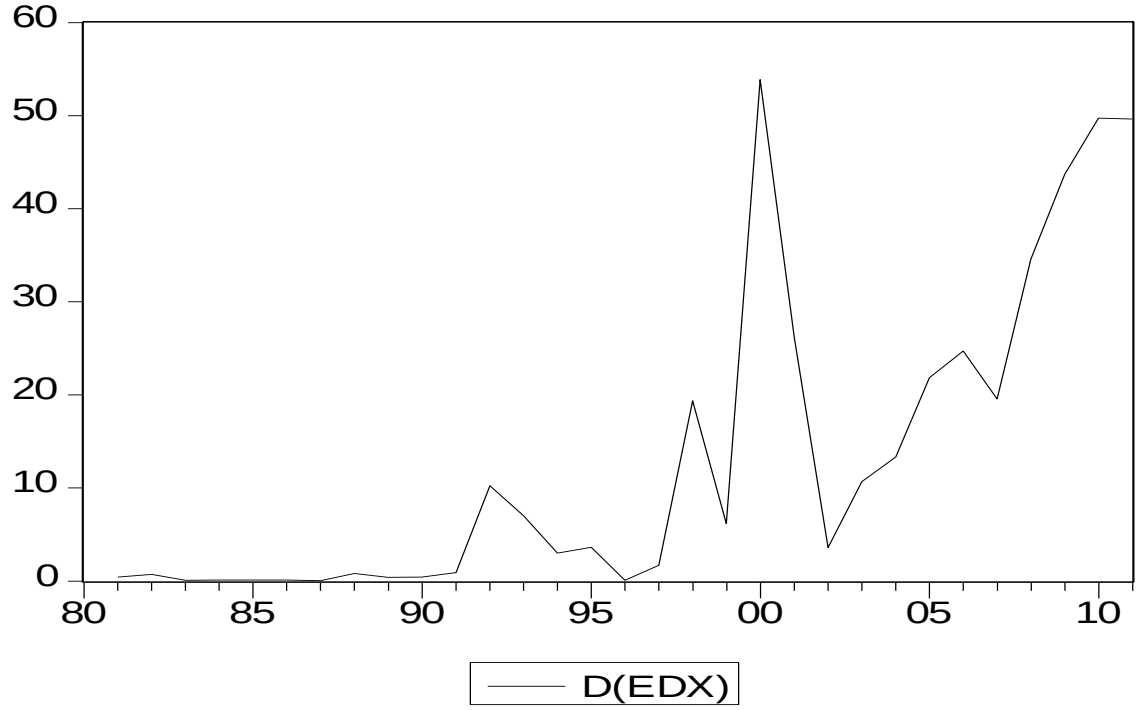
*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EDX,2)
Method: Least Squares
Date: 06/11/13 Time: 12:49
Sample(adjusted): 1982 2011
Included observations: 30 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EDX(-1))	-0.676409	0.187065	-3.615908	0.0012
C	-7.990149	4.598802	-1.737441	0.0937
@TREND(1980)	1.071493	0.336607	3.183217	0.0036

R-squared	0.335165	Mean dependent var	1.640000
Adjusted R-squared	0.285918	S.D. dependent var	12.59215
S.E. of regression	10.64079	Akaike info criterion	7.661907
Sum squared resid	3057.115	Schwarz criterion	7.802026
Log likelihood	-111.9286	F-statistic	6.805784
Durbin-Watson stat	2.007076	Prob(F-statistic)	0.004042

Unit Root Line Graph for Per Capita Education Expenditure



Unit Root Test Result for Percentage of Delivery by a Health Professional

ADF Test Statistic	-5.272181	1% Critical Value*	-4.2949
		5% Critical Value	-3.5670
		10% Critical Value	-3.2169

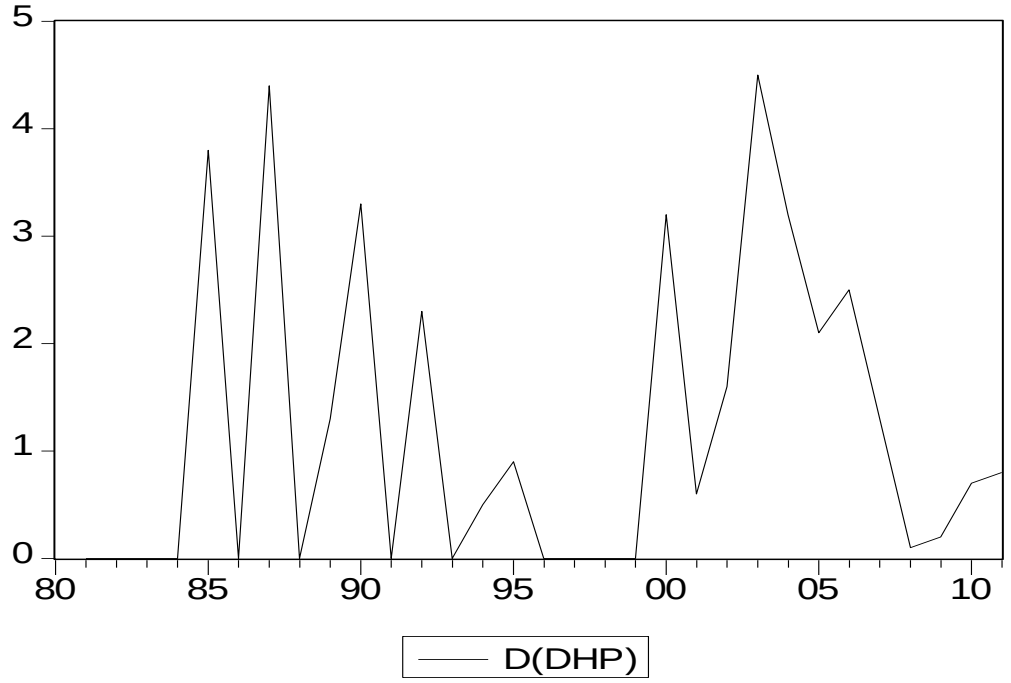
*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DHP,2)
Method: Least Squares
Date: 06/11/13 Time: 12:54
Sample(adjusted): 1982 2011
Included observations: 30 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DHP(-1))	-1.010818	0.191727	-5.272181	0.0000
C	1.059719	0.622647	1.701956	0.1003
@TREND(1980)	0.011926	0.032571	0.366153	0.7171

R-squared	0.508320	Mean dependent var	0.026667
Adjusted R-squared	0.471899	S.D. dependent var	2.105646
S.E. of regression	1.530185	Akaike info criterion	3.783294
Sum squared resid	63.21962	Schwarz criterion	3.923414
Log likelihood	-53.74942	F-statistic	13.95686
Durbin-Watson stat	2.005330	Prob(F-statistic)	0.000069

Unit Root Line Graph for Percentage of Delivery by a Health Professional



APPENDIX II
The MODEL RESULTS

The Effect of Health Expenditure on Infant Mortality Rate in Nigeria

Dependent Variable: LOG(D(IMR))
Method: Least Squares
Date: 06/11/13 Time: 12:15
Sample: 1980 2011
Included observations: 32

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-33.56006	15.28831	-2.195145	0.0373
LOG(D(HEX))	1.061880	0.740813	1.433399	0.1637
LOG(D(PCI))	0.076241	0.146971	0.518750	0.6083
LOG(D(HCF))	4.817873	1.846312	2.609457	0.0148
LOG(D(EDX))	-1.092938	0.752333	-1.452731	0.1583
LOG(D(DHP))	-1.760129	0.512882	-3.431837	0.0020

R-squared	0.379718	Mean dependent var	4.579988
Adjusted R-squared	0.260432	S.D. dependent var	0.150252
S.E. of regression	0.129214	Akaike info criterion	-1.087333
Sum squared resid	0.434103	Schwarz criterion	-0.812508
Log likelihood	23.39733	F-statistic	3.183278
Durbin-Watson stat	1.984248	Prob(F-statistic)	0.022551

The Effect of Health Expenditure on Under-Five Mortality Rate in Nigeria

Dependent Variable: LOG(D(UMR))
Method: Least Squares
Date: 06/11/13 Time: 13:03
Sample: 1980 2011
Included observations: 32

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-25.59598	11.67772	-2.191865	0.0375
LOG(D(HEX))	1.500146	0.565857	2.651104	0.0135
LOG(D(PCI))	0.121093	0.112261	1.078673	0.2906
LOG(D(HCF))	3.919435	1.410274	2.779200	0.0100
LOG(D(EDX))	-1.373484	0.574657	-2.390095	0.0244
LOG(D(DHP))	-1.572949	0.391757	-4.015118	0.0004

R-squared	0.834396	Mean dependent var	5.026630
Adjusted R-squared	0.802549	S.D. dependent var	0.222115
S.E. of regression	0.098698	Akaike info criterion	-1.626145
Sum squared resid	0.253273	Schwarz criterion	-1.351320
Log likelihood	32.01833	F-statistic	26.20027
Durbin-Watson stat	1.970965	Prob(F-statistic)	0.000000

The Effect of Health Expenditure on Neonatal Mortality Rate in Nigeria

Dependent Variable: LOG(D(NMR))
Method: Least Squares
Date: 06/11/13 Time: 13:05
Sample: 1980 2011
Included observations: 32

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-19.40964	6.156530	-3.152692	0.0040
LOG(D(HEX))	0.341427	0.298322	1.144492	0.2628
LOG(D(PCI))	-0.025836	0.059184	-0.436541	0.6660
LOG(D(HCF))	3.061987	0.743501	4.118335	0.0003
LOG(D(EDX))	-0.402961	0.302961	-1.330077	0.1950
LOG(D(DHP))	-1.259925	0.206535	-6.100290	0.0000

R-squared	0.919587	Mean dependent var	4.011958
Adjusted R-squared	0.904123	S.D. dependent var	0.168046
S.E. of regression	0.052034	Akaike info criterion	-2.906484
Sum squared resid	0.070396	Schwarz criterion	-2.631658
Log likelihood	52.50374	F-statistic	59.46623
Durbin-Watson stat	1.969388	Prob(F-statistic)	0.000000