Health and Economic Growth in Sub-Saharan Africa

By

Eric Kehinde Ogunleye

Department of Economics

University of Ibadan, Nigeria

AERC Research Paper 284
African Economic Research Consortium, Nairobi
October 2014

This Research Study was supported by a grant from the African Economic Research Consortium. The findings, opinions recommendations are those of the authors, however, and do not necessarily reflect the views of the Consortium, its individual members or the AERC Secretariat.

Published by: African Economic Research Consortium
P.O.Box 62882 – 00200
Nairobi, Kenya

Printed by: Signal Press Ltd.
Tel: 020 262 8600
Email: info@signalpress.co.ke
Nairobi 00200, Kenya

ISBN 978-9966-023-70-4

Contents

List of Tables

List of Figures

Abbreviations and Acronyms

ACACC	African Committee for Alcohol Consumption Control
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
GMM	Generalized Method of Moments
MDGs	Millennium Development Goals
NCACC	National Committee for Alcohol Consumption Control
NHIS	National Health Insurance Scheme
SAP	Structural Adjustment Programme
SSA	Sub-Saharan Africa
UNDP	United Nations Development Programme
UNICEF	United Nations Children Fund
WHO	World Health Organization

Acknowledgments

My sincere appreciation goes to the African Economic Research Consortium (AERC) for the research grant and technical support and inputs that made this work possible. I am grateful to all resource persons and researchers in the thematic group for their very helpful and constructive comments that helped improve the quality of this study. I especially acknowledge Professor Erik Thorbecke for his 'gentle nudging and timely interventions' at different stages of this work, especially when 'things appeared to be falling apart'. However, I take sole responsibility for the views expressed in this study and for any remaining errors and omissions.

Abstract

It is generally acknowledged that health is a form of human capital and a critical factor in the economic growth process. In turn, health production is a major determinant of health outcomes. While the former relationship has been explored extensively for the developed countries, there are very few studies that have attempted to examine this relationship in developing countries, especially Sub-Saharan Africa (SSA). Furthermore, very few studies have examined the relationship between determinants of health, health outcomes and economic growth in SSA. This study takes up the challenge of examining this tripartite relationship for SSA countries. Using the Arellano-Bond Dynamic GMM technique for 40 SSA countries, alcohol consumption, urbanization and carbon emission were found to be statistically significant determinants of child mortality, while all these variables and food availability are significant determinants of life expectancy. On the other hand, none of the health indicators are significant determinants of economic growth in the region, pointing to the need to improve health outcomes for it to have a significant effect on growth. The findings should provoke immediate policy actions that will help control the deleterious effects of alcohol consumption on health, promote urban health infrastructure, and improve health indicators to better stimulate health-led economic growth in SSA.

Keywords: Health production, infant mortality, life expectancy, economic growth, SSA

JEL Classification: I12, I18, O15, O41

1. Introduction

There is no gainsaying the maxim that health is wealth. The wealth and poverty of nations can, and have often been analysed in terms of the state of health of its citizens. Health is fundamental to economic growth and development and is one of the key determinants of economic performance both at the micro and macro levels. This is because health is both a direct component of human well-being and a form of human capital that increases capabilities of individuals (Bloom and Canning, 2003). The inclusion of health-related goals in the MDGs underscores the potential strong link between health and growth, and the importance of the former for economic growth and poverty reduction. To demonstrate the importance of health, specific targets are set for achieving improved health, namely: (1) a reduction in child mortality by two-thirds of the 1990 level by 2015; (2) a reduction in maternal mortality ratios by three-fourths of the 1990 level by 2015; and (3) end the rise in HIV/AIDS and other major disease prevalence no later than 2015. In addition, there are several other international initiatives demonstrating the importance of health for economic growth and development. These include the Roll Back Malaria jointly undertaken by WHO, UNDP, UNICEF, and the World Bank and the Stop TB programmes, a global partnership involving WHO, UNICEF and the World Bank, both of which aimed at halving the number of deaths from malaria by 2010.

Long before conceiving these initiatives and targets, Grossman (1972b) in a seminal work established that health is a form of human capital. Similarly, Schultz (1992) argued that population quality is the decisive factor of production and emphasized the merits of investing in education and health (see also Bloom and Canning, 2000 and 2003). Furthermore, Fogel (2002) in a long term historical study of England between 1790 and 1980 found that no less than one-third of the country's economic growth during the past two centuries emanated from improvements in nutrition. Other studies using data covering over a century of the history of the current developed countries established similar results for other health indicators (Arora, 2001).

Health and nutrition play a substantial role in economic growth. As a form of human capital, it enhances workers' productivity, whether skilled or unskilled, by improving general physical and mental capacities, such as vigour, fortitude, cognitive functioning and reasoning ability. In addition to the established evidence between health and growth at the micro level, a similar link is established at the macro level. Strong cross-country correlations between measures of aggregate health, such as life expectancy and child mortality, on the one hand, and per capita income, on the other, are well established. It is generally believed that higher incomes promote access to many of the goods and services that promote good health and long life, such as a nutritious diet, safe water

and sanitation, and quality health care. There is evidence of the possibility that the income-health nexus is also explained by a causal link running both ways, from health to income and from income to health.

The health status of African countries is remarkably low and below the aggregate average for most other developing regions. Infant and maternal mortality rates are very high. Life expectancy at birth is very low; this has been further worsened by the HIV/AIDS pandemic and civil wars and conflicts in the region. Malaria and tuberculosis are common occurrences in the region with untold negative effects on health. In 1960, while infant mortality rate per 1,000 live births was 160 in SSA, compared to other regions, the figure was 103 and 133 in Latin America and East Asia, respectively. By 2005, while Latin America and East Asia had both succeeded in significantly reducing the figure to 26, the figure for SSA remained at 96. In 1960, the adult mortality rates per 1,000 persons were 650, 547 and 304 for East Asia, SSA and Latin America, respectively. By 2005, East Asia had dramatically reduced the rate to 162, Latin America to 208, while SSA could only manage to reduce the figure to 483. Again, in 1960, SSA had a relatively high total life expectancy at birth of 41 years, higher than the figure for East Asia that stood at 39 years, though this figure was lower than that of Latin America that stood at 56. By 2005, the table had turned completely with East Asia and Latin America recording 71 and 72 years, respectively, while SSA recorded a slight rise to 47 years.

The existing and widening gap between the growth rate of SSA countries and other developing regions can be explained by a number of factors, prominent among them being health inequality. For instance, Bloom and Sachs (1998) attributed about 35% of the gap to variations in health outcomes such as life expectancy, which they found to have the highest impact among the health measures examined.

The implication of the picture painted above is that meeting the laudable UN health Millennium Development Goals (MDGs) of a reduction by two-thirds in the under-5 mortality rate and a reduction by three-quarters in maternal mortality, and halting and beginning to reverse the spread of HIV/AIDS, malaria and other major diseases by 2015 will be completely elusive for SSA if sufficient attention is not paid to health production in the region.

It appears, however, that in SSA, health production is seen as a cost rather than an investment. Yet, substantial attention is required in this respect to achieve the dual purpose of ensuring effective management of the illnesses plaguing the population and engendering sustainable health-led economic growth. This means that the region needs to engage in and encourage innovative and cost-effective health interventions that will help improve allocative efficiency and production of health, with the ultimate goal of making possible health-led economic growth and development. This study provides a basis for understanding the nature of health production in SSA countries with focus on its determinants. It proceeds further to articulate the effects of health on economic growth. The finding that alcohol consumption, urbanization and carbon emission are determinants of health in SSA countries, and that health does not have a positive statistically significant effect on economic growth should help inform policy choice and imperatives for improving health in SSA countries, and enhance its impact on economic growth.

Several studies have been undertaken to evaluate the relationship between health

and growth on a global level (Barro 1996; Barro and Lee, 1994; Benhabib and Spiegel, 1994; Caballé and Santos, 1993; Anand and Barnighausen, 2004; Bloom and Canning, 2000 and 2003; Bloom, Canning and Sevilla 2004; and Cutler and Miller, 2005). However, most of these studies focused on advanced economies. A few of them that considered SSA countries did not focus exclusively on the countries with a view to identifying the relationship. Those that focused on Africa did not consider the relationship between health and growth in an exhaustive manner, while others were either country-focused or gender-focused (Amouzou and Hill, 2004; Anyanwu, 1996 and 1998; Gyimah-Brempong and Wilson, 2004). This study seeks to bridge this gap.

Research objectives

This study aims to establish the determinants of health outcomes in SSA countries by using the health production technique and, in turn, verifying the impact of health outcomes on economic growth in SSA. The specific objectives of the study are to:

1. Establish the determinants of health outcomes in SSA by estimating a health production function for selected countries in the region; and
2. Determine the impact of health outcomes (infant mortality and life expectancy) on economic growth in the selected SSA countries.

Justification for the study

There are a few panel studies on the relationship between health and growth involving several countries, of which some SSA countries are sometimes included (See, for instance, Aguayo-Rico et al., 2005). However, these studies hide some important stylized facts about the peculiarity of health and economic growth in SSA. There is a need, therefore, for a study with exclusive focus on SSA. This study fills this existing gap in the literature by answering the question as to whether health is an important determinant of economic growth in SSA. By broadening our knowledge in this respect, this study will contribute to understanding the role of health and health production in meeting the health-related MDGs in SSA, with the ultimate aim of achieving sustained economic growth in the region.

Scope of the study

The geographical focus of this study is SSA over the period 1980-2007. The choice of this period is informed principally by data availability. By nature, health data are usually not available on time series. The analytical technique adopted, which takes cognizance of the lag with which health outcomes influence economic growth, further constrains the period of coverage. With these constraints in mind, we have stretched the data point to the limit to ensure a sufficient number of observations. Again, the choice of countries is dictated by data availability and covers 40 SSA countries.

2. Health outcomes and economic growth in Sub-Saharan Africa: Nature, structure and trends

In this section, we present background information on health outcomes and economic growth in SSA countries with emphasis on their nature, structure, and trends over time. Possible factors that might be driving this trend are also articulated.

Nature of economic growth in Sub-Saharan Africa

Economic growth across African countries has been relatively strong in recent times (Table 1). On average, GDP in SSA averaged about 5% between 2000 and 2007, with a peak of over 6% in 2007. Similarly, per capita GDP averaged about 3%, with a peak of over 3% during the same period. Despite this strong performance, growth in SSA countries fell far short of the annual average of 7.2% for East Asia and 4.3% for South Asia. The good news, though, is that overall most countries in SSA recorded positive GDP growth rates as opposed to the pervasive negative growth rates in previous decades. Economic performance of African countries during this period can be classified into strong performers[1] (those with 5% average and above), good performers[2] (those with growth rates between 3% and 4.99%), low performers[3] (those with growth between 1% and 2.99%) and poor performers[4] (less than 1% and negative growth). From this simple exercise, it is possible to identify countries that are driving the strong growth in SSA. Prominent among these are Angola, Chad, Equatorial Guinea, Ethiopia, Mozambique, Sierra Leone and Sudan, all of which recorded an average of over 7% growth rates during this period. It is clear from this list that most of the countries are resource-dependent. The strong economic performance in SSA countries has been attributed to several factors. These include benign external economic environment, favourable and rising global market prices of resources, favourable policies, stronger institutions, improvement in governance, and reduction in civil and armed conflicts. Further improvement in these policy variables and other exogenous factors are expected to help consolidate the gains made so far.

Table 1: Economic growth in selected SSA countries and other developing regions, 1961-2007 (%)

	Per capita GDP								Nominal GDP							
	61-69	70-79	80-89	1990-99	00-07	2005	2006	2007	61-69	70-79	80-89	90-99	00-07	2005	2006	2007
Angola	N/A	N/A	-0.35	-1.73	9.09	17.17	15.26	20.09	N/A	N/A	2.67	0.99	12.22	20.61	18.56	23.44
Benin	1.09	-0.38	-0.22	1.11	0.96	-0.33	0.61	1.52	3.08	2.28	3.13	4.54	4.20	2.90	3.80	4.60
Botswana	4.88	11.93	8.00	3.74	4.10	3.66	2.17	2.54	7.73	15.70	11.46	6.06	5.42	4.85	3.41	3.83
Burkina Faso	1.47	1.11	1.08	0.90	1.99	3.10	2.38	1.03	3.27	3.28	3.64	3.77	5.21	6.35	5.50	3.98
Cameroon	-0.18	4.39	1.07	-2.07	1.36	0.08	1.07	1.30	2.05	7.29	4.00	0.41	3.66	2.30	3.22	3.30
CAR	-0.10	-0.13	-1.62	-1.08	-0.96	0.44	2.21	2.31	1.93	2.01	0.93	1.29	0.75	2.10	4.00	4.20
DRC	0.84	-2.78	-1.16	-8.20	0.17	3.16	1.79	3.49	3.73	0.27	1.81	-5.48	3.12	6.46	5.08	6.49
Cote d'Ivoire	4.48	2.91	-4.43	-0.33	-2.06	-0.50	-2.00	-0.11	8.71	7.61	-0.24	2.62	-0.28	1.18	-0.26	1.76
Ethiopia	N/A	N/A	-0.91	-0.06	4.79	8.90	8.01	8.39	N/A	N/A	2.13	2.28	7.63	11.82	10.86	11.10
Gabon	5.89	7.04	-1.29	-0.23	-0.04	1.38	-0.37	4.03	6.71	9.86	1.88	2.76	1.70	3.02	1.18	5.57
Gambia	N/A	1.57	0.31	-0.41	1.69	1.99	3.55	4.27	N/A	4.96	3.94	3.11	4.83	5.00	6.49	7.01
Ghana	-0.06	-0.82	-1.13	1.64	2.92	3.65	4.21	4.25	2.30	1.45	1.99	4.27	5.20	5.90	6.40	6.30
Guinea	N/A	N/A	N/A	0.95	0.77	1.38	0.18	-0.64	N/A	N/A	N/A	4.21	2.72	3.33	2.17	1.51
Kenya	2.32	3.32	0.45	-0.59	1.35	2.97	3.34	4.12	5.72	7.16	4.22	2.24	4.03	5.72	6.11	6.90
Lesotho	3.57	6.13	1.30	2.73	2.62	2.17	6.42	4.32	5.54	8.50	3.56	3.99	3.62	2.95	7.17	4.89
Liberia	1.89	-0.01	-6.22	-3.15	-0.13	2.45	3.67	4.32	4.72	2.97	-4.49	1.17	3.26	5.30	7.80	9.40
Madagascar	0.20	-1.17	-2.43	-1.34	0.77	1.74	2.06	3.69	2.78	1.51	0.37	1.62	3.64	4.59	4.89	6.46
Malawi	2.76	3.01	-2.44	1.98	0.06	-0.27	5.16	4.70	5.30	6.26	1.72	4.13	2.72	2.30	7.90	7.40
Mali	N/A	2.59	-1.84	0.86	2.32	2.92	2.16	-0.25	N/A	5.21	0.56	3.58	5.41	6.08	5.30	2.80
Mauritania	5.68	0.20	-0.15	-0.04	1.56	2.57	8.74	-0.63	8.15	2.65	2.21	2.57	4.46	5.45	11.70	1.90
Niger	-0.01	-0.87	-3.02	-1.40	-0.05	3.72	1.55	-0.13	2.88	2.16	0.04	1.88	3.51	7.41	5.17	3.20
Nigeria	0.44	4.13	-1.86	0.35	3.53	2.90	3.73	3.97	2.85	7.00	0.93	3.06	6.11	5.40	6.20	6.32
Senegal	-1.38	0.31	-0.42	0.38	1.52	2.95	-0.25	1.93	1.26	3.02	2.50	3.06	4.22	5.63	2.32	4.79

Continued next page

Table 1: Continued

Sierra Leone	1.97	0.85	-1.20	-5.17	6.95	3.51	4.45	4.60	3.80	2.69	1.13	-4.34	10.91	7.28	7.37	6.53
South Africa	3.54	1.00	-0.26	-0.80	2.84	3.87	3.88	4.37	6.06	3.25	2.24	1.39	4.17	5.10	4.99	4.80
Sudan	-1.20	1.19	0.57	2.11	5.27	4.13	8.92	7.78	1.22	4.28	3.39	4.52	7.50	6.30	11.30	10.20
Swaziland	N/A	2.60	3.56	0.56	-0.01	1.35	2.20	1.74	N/A	5.68	6.82	3.75	1.44	2.36	2.83	2.36
Tanzania	N/A	N/A	N/A	0.15	3.87	4.66	4.08	4.52	N/A	N/A	N/A	3.14	6.52	7.37	6.74	7.10
Togo	5.87	0.43	-0.94	-0.42	-0.86	-1.42	1.31	-0.54	9.05	3.20	2.62	2.62	2.05	1.30	4.10	2.10
Uganda	N/A	N/A	N/A	3.54	2.35	3.29	1.73	2.94	N/A	N/A	N/A	6.88	5.67	6.68	5.07	6.50
Zambia	0.61	-1.81	-1.82	-2.15	2.97	3.29	4.22	4.01	3.80	1.63	1.44	0.37	4.96	5.20	6.20	6.00
Zimbabwe	1.27	0.67	1.37	0.63	-6.48	-5.98	N/A	N/A	4.68	4.13	5.22	2.63	-5.75	-5.30	N/A	N/A
SSA	2.03	1.19	-0.76	-0.54	2.25	3.08	3.22	3.79	4.63	4.06	2.18	2.05	4.83	5.65	5.78	6.25
South Asia	1.81	0.61	3.42	3.32	4.33	6.94	N/A	N/A	4.22	2.67	5.62	5.38	6.12	8.65	N/A	N/A
East Asia	1.57	5.02	6.02	6.82	7.21	8.03	N/A	N/A	3.77	6.53	7.79	8.22	8.15	8.95	N/A	N/A
Latin America	2.46	3.12	-0.35	1.32	1.24	3.13	N/A	N/A	5.25	5.59	1.24	3.02	2.64	4.49	N/A	N/A

Source: World Development Indicators (2009) CD-ROM and Africa Development Indicators, 2008/09, CD-ROM

However, the downside to the sustainability of this brilliant performance is the ongoing financial and economic crisis rocking the global economy, with strong negative implications for African countries. The risk here is that the crisis is negatively impacting on all the sources of economic growth in African countries, namely, trade, commodity prices, FDI inflows, aid inflows, and remittances. If not quickly addressed, this could erode all the gains made over the past few years and return SSA countries to another decade of slump economic performance, as economic growth is already projected to drop over the next few years.

In the 1990s, economic growth in SSA countries was less impressive. In fact, this decade and the previous one (1980-89) are believed to be the period of the worst economic growth ever witnessed in Africa. Economic growth was so bad in the 1980s that the decade is labelled the lost decade for Africa. Warnings about looming gloomy economic performance began in mid-1970s, pointing specifically at structural problems associated with the countries. These projections were products of the conviction that earlier development strategies based on unfulfilled promises of the European Community in the First and Second Yaoundé Conventions had failed, invoking untold negative shock on African development efforts. Several home-grown, self-designed and self-reliant growth and development initiatives were developed for the purpose of correcting, in an urgent manner, the perceived structural imbalance and avert the impending economic woes. Some of the prominent initiatives included the Monrovia Declaration of Commitments, Lagos Plan of Action, and Final Act of Lagos. To a large extent, lean financial resources limited the implementation of these programmes, and thus success was limited.

In the early 1980s, the World Bank conducted an independent assessment of the economies of African countries and came up with the conclusion that the problem with these economies was structural (World Bank, 1981). Several policy prescriptions based on the neo-liberal philosophy were recommended for implementation across all SSA countries. This became the basis for the World Bank/IMF intervention popularly known as the Structural Adjustment Programme (SAP). There are diametric opinions on the impact of this policy on economic performance of African countries. While some believe the programme recorded some level of success, others believe that it was a complete failure. Despite these divergent views, one thing is clear: the policy did not succeed as anticipated, nor did it have the intended impact. This view is borne out of a cursory look at macroeconomic data, especially growth during this period. If the earlier country classification used is applied, over 60% of African countries fell under the low and poor performance categories. Moreover, most SSA countries still demonstrate clear features of structural problems.

The 1960-75 period has been described as "Africa's golden era" (Adedeji, 2002). The reason for this conclusion is not far-fetched. As countries emerged from independence with strong determination and optimism, the region performed excellently well in almost all macroeconomic variables. There were visionary, dedicated and committed leaders building developmental state for the growth of their economies. During this period, GDP, exports, agricultural production and manufacturing grew at annual rates of 4.5%, 2.8%, 1.6% and 6.0%, respectively (Adedeji, 2002). Again, following earlier country classification, about 70% of the countries can be classified as strong and good

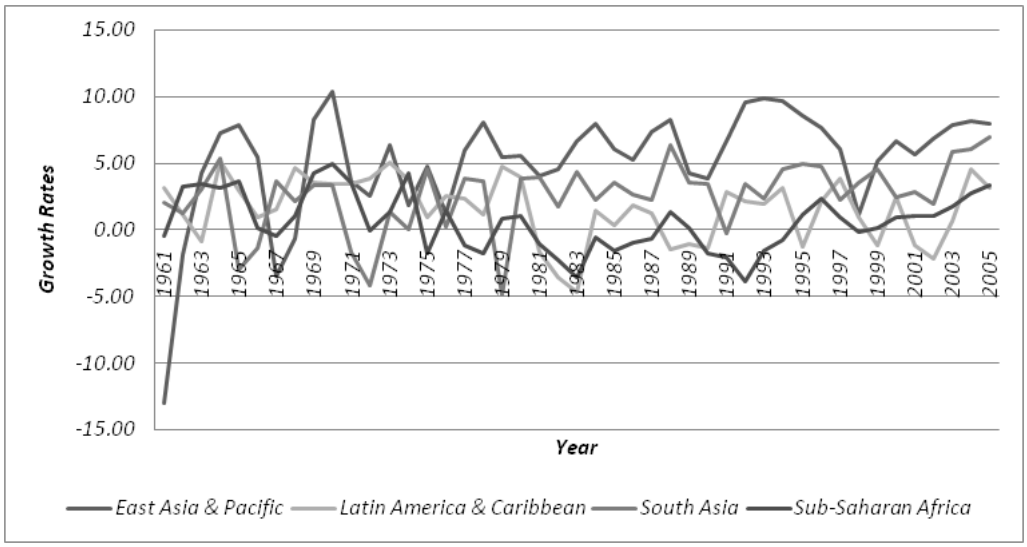
performers. Agriculture was the dominant driver of the economies, employing a greater percentage of the population and generating substantial foreign exchange. However, towards the end of the 1970s, the table turned and the region began experiencing symptoms of social, economic, political and governance crisis.

In recent years, there has been some form of shift in the structure and composition of GDP in some SSA countries away from agriculture towards services, and towards industry in some few countries, notably Mauritius. In 2007, for instance, the African Development Bank - AfDB (2008) shows that services accounted for the largest share (44.3%) of GDP in SSA, followed by industry (41.7%) and agriculture (14.0%). Compared to 2000, the relative shares of agriculture, manufacturing and services declined in 2007. This shortfall was compensated for by increasing mineral and oil output in the resource-endowed countries. In terms of growth performance, all sectors showed improved growth, with services leading and followed by manufacturing and agriculture.

The overall picture of economic growth in African countries reveals volatile and unsustainable growth patterns. In many countries, strong growth in a year is usually followed by very poor growth performance the following year, and negative growth in many cases. For most of the countries, it is very difficult to understand and form a pattern for economic performance and growth. This is a cause for worry. It implies that policies aimed at influencing economic growth performance are still not having the desired impact. It also suggests that African countries are still not able to mitigate and leverage the negative effects of exogenous shocks on their economies.

Juxtaposing economic growth in SSA with those of other developing regions of the world, it is clear that performance in SSA has not always ranked below other developing regions. Per capita GDP growth was relatively good compared to other developing regions from 1960 until about 1974 (Figure 1). The growth pattern was also relatively stable compared with other developing regions. Beginning 1975, a steady downward pattern set in, which became worse in the early 1980s with growth rates staying almost permanently negative throughout. A rebound set in from 1999 with a slow but steady rise. Though the global economic meltdown presents a major risk to the sustainability of this growth, it is hoped that pragmatic actions being taken globally and by African countries will help mitigate this risk and re-launch the economies to a sustainable growth path.

Figure 1: Per capita GDP growth pattern in SSA and other developing regions, 1961-2005 (%)



Source: Based on World Development Indicators (2007) CD-ROM

Several issues emerge from this brief exposé on growth and economic performance of African countries. One, while Africa's poor economic performance has been long recognized, the region is yet to fully comprehend the nature of factors constraining economic growth and the appropriate policy prescriptions to tackle them. Two, economic growth in Africa is characterized by high volatility and has been greatly unsustainable. This is partly due to policy inconsistencies, policy reversals and exogenous shocks emanating from international politics, and commodity prices.

Nature of health outcomes in Sub-Saharan Africa

Sub-Saharan Africa remains the region with the worst health outcomes in the world, though, in aggregate, improvements were recorded between 1960 and 2007 (Table 2). For example, between 1960 and 2005, the region experienced improvements in crude death per 1,000 persons from 24 to 17.4, life expectancy from 40.6 years to 46.7 years, adult mortality rate per 1,000 persons from 547 to 482, child mortality rate per 1,000 children from 160 to 96, and under-5 mortality rate per 1,000 children from 275 to 163. However, the pattern of performance differs markedly among the countries during this period, making it possible to classify the countries as those that experienced improvements in all the health outcomes, those that experienced a decline in all their health status, those that experienced improvement in some of the outcomes, and decline in others. Some countries that have done relatively well on all the health variables include South Africa, Madagascar and Botswana. However, the HIV/AIDS pandemic in some of these countries poses serious threats to sustainability of these performances.

On life expectancy at birth, some countries[5] can be classified as good performers, consistently recording higher life expectancy relative to the regional average. Among these countries, South Africa is exceptional. It is well known that HIV/AIDS is taking a toll on lives and significantly reducing life expectancy in the country, in fact the whole

Southern Africa region. In 2007, for example, 5.7 million people were estimated to be living with HIV/AIDS and 350,000 deaths were recorded during the year, as only 28% of the people living with the virus were receiving anti-retroviral treatment (UNAIDS, 2008). Despite this pandemic, the country is still able to maintain life expectancy that is consistently higher than the regional average. This is impressive. However, here lies a very big risk for the country that may make it fall far below the regional average. It is hoped that the situation will get better as deliberate efforts are being made to improve access and use of anti-retroviral drugs. Botswana also presents a very interesting picture. While the initial shock of HIV/AIDS might have been the factor behind the country falling behind the regional average in 2000, there was a quick recovery such that by 2007, it had risen above the regional average. This is a model for other African countries such as Lesotho and Swaziland, which are facing a similar challenge.

Table 2: Selected health outcomes in SSA and other developing regions, 1960-2007

	Total Life Expectancy at Birth (Years)						Adult Mortality Rate per 1,000(Male)						Child Mortality Rate per 1,000					
	1960	1970	1980	1990	2000	2007	1960	1970	1980	1990	1997	2005	1960	1970	1980	1990	2000	2007
Angola	33	37	40	40	40	43	567	563	569	514	512	505	208	180	158	154	154	132
Benin	42	46	50	53	54	57	561	478	486	447	314	309	176	149	127	111	95	98
Botswana	51	55	62	65	43	51	538	472	341	N/A	548	841	118	99	62	45	74	47
Burkina Faso	40	43	47	48	47	52	586	526	467	429	463	407	183	170	143	123	116	104
Cameroon	40	45	50	52	47	50	602	544	489	430	454	508	151	127	105	85	88	88
CAR	39	43	48	48	41	45	519	571	540	485	597	658	198	141	121	114	120	97
DRC	41	45	48	46	42	55	N/A	N/A	N/A	N/A	515	486	174	148	133	129	129	70
Cote d'Ivoire	44	49	53	52	47	48	594	526	421	352	458	474	N/A	158	115	105	95	117
Ethiopia	36	40	42	45	42	53	475	483	491	448	443	451	162	142	126	122	92	87
Gabon	40	47	55	60	56	57	532	521	474	402	349	438	N/A	N/A	73	60	60	54
Gambia	32	37	43	50	55	59	578	655	584	530	340	320	204	180	133	103	94	74
Ghana	46	49	53	56	57	60	514	459	400	334	338	344	126	110	92	76	72	57
Guinea	35	39	42	48	53	56	526	636	589	529	314	324	N/A	202	167	139	111	103
Kenya	47	53	58	58	48	54	547	467	417	357	484	479	122	96	73	64	77	64
Lesotho	47	49	53	57	41	43	450	365	371	N/A	610	853	151	140	101	81	86	65
Liberia	40	42	44	43	42	46	479	341	268	N/A	521	535	190	180	157	157	157	133
Madagascar	40	44	48	51	55	59	377	351	353	434	337	337	112	109	106	103	84	66
Malawi	38	41	45	46	40	48	522	479	429	479	591	635	218	204	158	131	95	89
Mali	34	37	42	46	48	55	589	538	454	434	362	358	285	225	176	140	124	129
Mauritania	39	43	47	49	52	64	587	539	505	441	372	341	182	151	108	85	79	63
Niger	37	38	39	40	44	57	N/A	611	562	515	374	368	211	197	191	191	159	111

Continued next page

Table 2: Continued

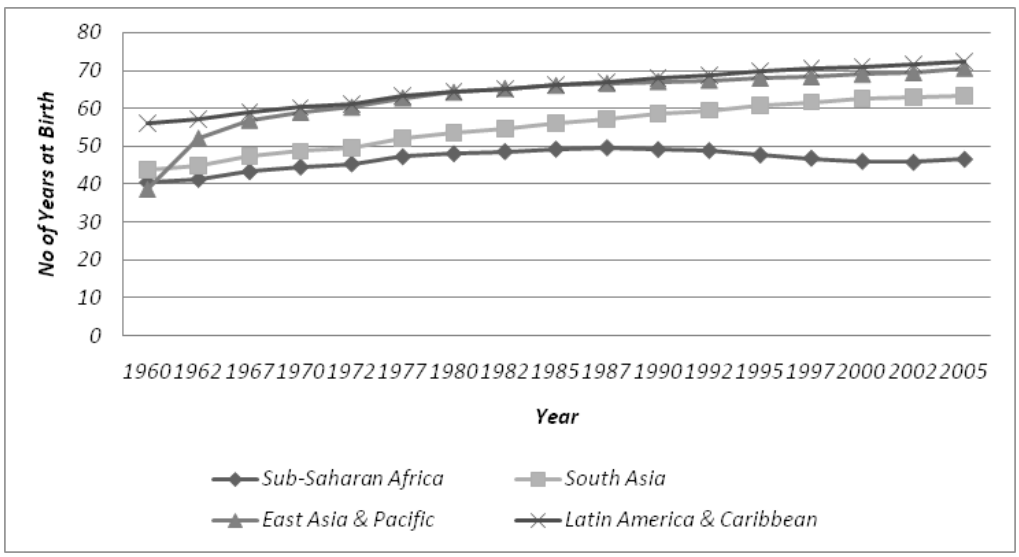
Nigeria	39	42	45	46	44	47	N/A	605	535	476	474.3	499	165	140	117	120	107	110
Senegal	36	39	47	53	55	63	570	572	586	488	327	310	124	114	94	72	66	66
Sierra Leone	32	35	38	39	40	42.6	585	552	540	601	439	432	221	208	183	169	162	160
South Africa	49	53	57	62	48	49.3	568	516	N/A	N/A	444	658	N/A	N/A	64	45	50	45
Sudan	40	44	49	53	56	58.6	N/A	615	537	464	331	339	123	104	86	74	65	65
Swaziland	40	46	52	56	45	39.6	604	448	321	260	667	885	150	132	99	78	98	71
Tanzania	44	49	54	54	47	52.5	606	513	451	444	480	507	142	129	106	102	88	73
Togo	43	49	55	57	55	58.4	548	529	457	389	347	369	156	123	100	88	78	89
Uganda	44	50	50	46	45	51.5	549	447	463	526	620	459	133	100	107	93	85	77
Zambia	42	49	52	46	38	42.4	607	546	482	434	667	672	126	109	90	101	102	93
Zimbabwe	52	55	59	59	40	43.5	571	469	389	305	684	772	96	84	70	52	68	58
SSA	41	45	48	49	46	47	547	530	486	446	463	483	160	140	116	109	100	96
South Asia	44	49	54	59	63	63	420	530	486	248	242	230	133	85	56	43	35	26
East Asia	39	59	64	67	69	71	650	343	278	183	186	162	148	130	115	86	72	62
Latin America	56	60	65	68	71	72	304	286	222	196	229	208	103	86	61	43	30	26

Source: World Development Indicators (2007) CD-ROM and AfDB (2008)

Several African countries[6] performed very well on child mortality. This strong performance can be attributed to several factors, prominent among which are improved public interventions through vaccination, improved maternal education, availability and access to healthcare services, and availability of anti-retroviral drugs for HIV/AIDS sufferers. While the good performances of most countries in child mortality are noteworthy and commendable, the adult mortality rate performance is less desirable. Most countries fall consistently below the regional average. More is required to be done to consolidate the gains being made in the child mortality rate. Ghana is worthy of special mention as it prides itself as the only country with overall good performance in all the indicators that are consistently higher than the regional average. This is a role model worthy of emulation by other countries such as Nigeria, whose performances are consistently below the regional average.

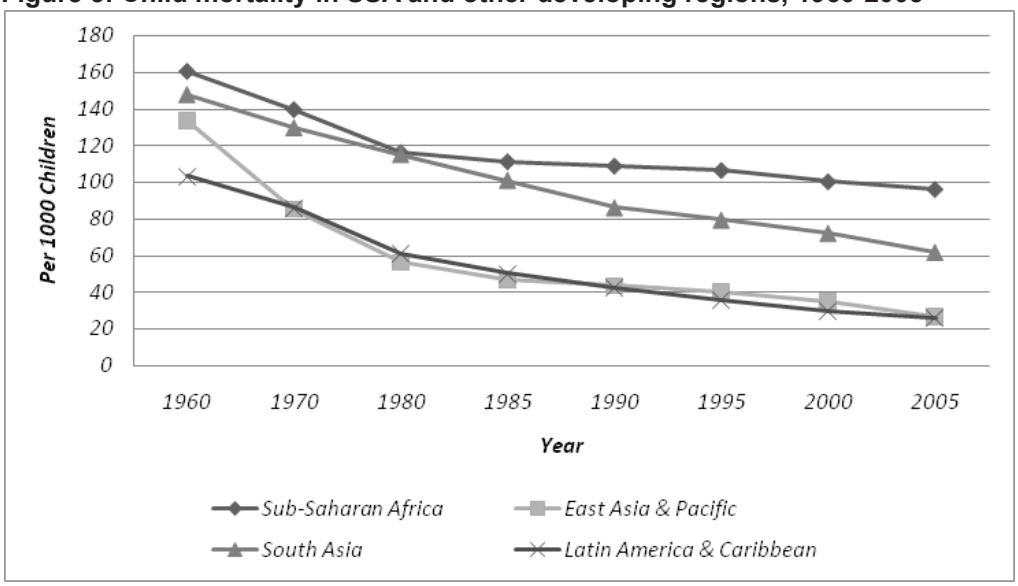
Comparing some health indicators of SSA with other developing regions of the world, it is clear that the region has been consistently lagging behind other developing regions (Figures 2 and 3). A puzzling and worrying observation is that SSA had a life expectancy that was higher than that of East Asia in 1960. By 2005, while East Asia had almost doubled the figure, recording 71 years of life expectancy at birth, SSA had only succeeded in adding just 6 years over a period of 45 years. This is a less than desirable performance that requires immediate policy action.

Figure 2: Total life expectancy in SSA and other developing regions, 1960-2005



Source: Africa Development Indicators 2008/2009, CD-ROM

Figure 3: Child mortality in SSA and other developing regions, 1960-2005



Source: Africa Development Indicators 2008/2009, CD-ROM

3. Literature review

In this section, the literature survey on the relationship between health and economic growth is presented. This begins by focusing attention, first on determinants of health and later on the nature of relationship between health and growth. The latter is further disaggregated into a group of literature that sees the relationship running from health to growth, with further disaggregation into micro and macro studies. Also examined are the literature that established the relationship to run from growth to health, and those that believe there is a feedback and complex relationship between them.

Determinants of health

Substantial improvements in health status that cut across most regions of the world in the past 50 years are often evident in declines in mortality rates and improvements in life expectancy. These health outcomes are influenced by several factors. Some of these are improvements in food and nutrition, increases in public health investments, lifestyle and individual medical services. Cognitive and non-cognitive education attainments are also believed to deeply affect the predisposition to illness, and the ability to ward off and manage illness in adulthood (Jack and Lewis, 2009).

Focusing on causes and determinants of declines in child mortality in England and Wales during the eighteenth and nineteenth centuries, McKeown and Brown (1955), McKeown and Record (1962), and McKeown, Record and Turner (1962 and 1975) have found that advances in hygiene and education are perhaps more important determinants of mortality compared to advances in medicine. The study established that lower exposure to infection, expanded access to piped water and sanitation, and better nutrition were the major factors explaining the rising survival rate as opposed to immunization. Specifically, mortality from water-borne and food-borne diseases was traced to improved hygiene and better nutrition, thus demonstrating their importance in the child mortality reduction process. In a similar vein, Fuchs (1974) found that education, and lower fertility as opposed to medical advances were the major drivers of reduction in infant mortality in New York over a 30-year period spanning 1900 and 1930.

Insufficient intake of calories and proteins resulting from very low food productivity of peasant farm households can lead to suppressed immune system. This, in turn, would make such households more susceptible to infectious diseases and the associated consequences. One of such consequence is permanent physical and cognitive development disability. To demonstrate the issue of food and nutrition, Fogel (2002) showed that until the late eighteenth century, UK agricultural production could only feed 80% of the population. However, as agricultural output improved, nutritional

status also improved, leading to longer working hours. This was complemented by investment in public health, which ultimately improved the utilization of the calories consumed (Fogel, 2002). The study concluded that about 40% of the decline in mortality rates in UK since 1700 can be accounted for by improvements in nutrition.

Fogel (1986) found that since 1700 in England, sharp rises in nutritional status experienced during periods of abundant food, mostly in the twentieth century, have led to major improvements in health, especially mortality, demonstrating that food availability was an important determinant of health. Comparing determinants of morbidity levels in the United States between the post-Civil War and the latter part of the twentieth century, Fogel (2002) found that a significant fall in morbidity during the latter period was due to changes in lifestyle, in addition to medical interventions. Education was another important factor as demonstrated by Lleras-Muney (2005), who found that each year of education increased life expectancy at age 35 by as much as 1.7 years in the United States.

Focusing on child mortality, literacy of mothers has been found to be an essential determining factor (see, for example, Murthi, Guio and Drèze, 1995 and Drèze and Murthi, 2001). More educated mothers will have healthier babies since they will smoke less (Meara, 2001; Currie and Moretti, 2003). Caldwell (1979 and 1991) established that the mother's level of education is a robust determinant of infant and child survival in Nigeria and Bangladesh, while similar findings were documented by Kovsted, Pörtner and Tarp (2002) for Guinea-Bissau.

It should be noted, however, that literacy of mothers is itself a product of an education system that guarantees widespread access to all without gender bias or discrimination or preference for a particular class of people. This suggests that a functional, widespread and non-discriminatory education system is an important determinant of child mortality. In addition to formal education, home education about abstinence from premarital sex and safe sexual practices is important for youths, especially vulnerable girls who are often confronted by men demanding sexual favours from them. Along this line, the WHO (2003) identified a set of risk factors for mortality in poor countries, which include unsafe sex, unsafe drinking water, and a variety of other factors such as under-nutrition and indoor smoke from burning solid fuels.

Simple proper hygiene can also impact on health. For example, washing hands properly with soap and often can drastically reduce the incidence of diarrhea and cholera, which are significant sources of child mortality annually. Also important is safe potable water. Culture is another important factor. In Africa, for example, it is often considered abnormal to educate young ones about sex and sexuality matters. Thus, many children do not receive sex education. This breeds ignorance and lack of insight on what action to take when confronted with life-threatening sex issues.

Health care and health-related investments are additional determinants of health. Over the past three decades, significant investment has been made on various immunization campaigns and child survival strategies around the world with special focus on developing SSA countries. These have tremendously reduced childhood infectious diseases that could result in high infant mortality. Change in lifestyle, especially smoking and alcohol consumption, has also significantly improved adult mortality. This fact is borne out by Chick et al (1986) and Choquet and Ledoux (1989) who posit that alcohol consumption is a major risk factor for most chronic illnesses.

Health delivery and its quality in both public and private sectors could have significant influence on health in any society. Low quality health delivery in both public and private sectors could breed low quality health outcomes (Banerjee, Deaton and Duflo, 2004; and Das and Hammer, 2004). Preston (1980) attributed about 50% of the gain in life expectancy in developing countries (excluding China) from the 1930s to the late 1960s to a gamut of factors that include changes in income, in literacy, and the supply of calories.

In both time-series and cross-section data analysis of determinants of health over time, over countries, and across groups within countries, Cutler, Deaton and Lleras-Muney (2006) tentatively identified the application of scientific advancement and technical progress (some of which was induced by income and facilitated by education) as the ultimate determinants of health. This finding provided a consistent interpretation of the historical, cross-country, and within-country evidence. In addition, the study established a strong correlation between income per capita and mortality rates, a correlation that also existed within countries, where richer, better-educated people live longer.

Using cross-country regression analysis, Pritchett and Summers (1996) argued that income is the most important determinant of health. Based on this argument, the authors recommended that any policy aimed at improving health must also take cognizance of income enhancement. This fact was corroborated by Dollar (2001).

Medical advancements such as development of vaccines, penicillin, and other antibiotics have also been established as important determinants of health. Also established as important are development of pesticides that help control disease-carrying insects such as mosquitoes, as well as the work of institutions such as the World Health Organization, which has helped publicize the use of these techniques. However, analyzing the direct effects of these techniques on health improvements is difficult, since successful application depends on several other factors (Commission on Macroeconomics and Health, 2001).

Health intervention has also been recognized as an important determinant of health, especially child mortality. For example, Preston (1975) attributed the improvements in child mortalities between 1930 and 1960 to the spread of anti-malaria programmes that were vigorously pursued during this period. Similar submissions were made by Hanmer and White (1999). In a similar analysis, Hanmer, Lesink and White (2003) indicated that, among other things, health interventions, especially immunizations were not just important determinants of health in terms of life saving, but were also cost effective.

The HIV/AIDS scourge is another major setback on global health, especially in SSA countries as established by Imam and Koch (2004). In an earlier analysis, Hanmer and Naschold (2001) in a cross-sectional study of developing countries using 1990 data had found that the HIV/AIDS prevalence rate significantly aggravated both infant and child mortality rates. Similar findings were made for Uganda (Ntozi and Nakanaabi, 1997).

Urbanization has also been identified as another essential determinant of health. Thornton (2002) submitted that this variable was important because it served as a proxy for several positive and negative health issues. While the positive effects could be in the form of improved livelihood and better access to health-improving infrastructure and

health facilities, its negative side could take the form of accidents and pollution through carbon emission, gas flaring and effluents. However, the study concluded that whether the net effect of urbanization on health will be positive or negative would depend on which of these effects is larger.

This literature review on the determinants of health reveals that determinants of health are numerous and involve both direct health-related issues and indirect factors that may be social in nature and sometimes environmental. Second, the extent to which these factors are significant in determining health vary across country, across time and across regions. Third, most of the studies are global in scope, with others focusing on all developing countries across the world. Lastly, none of the studies provided exclusive focus on SSA countries.

Relationship between health and economic growth

Health to growth

Earlier thoughts were that the relationship between health and economic growth runs from health to growth, and there exists burgeoning literature on this. Alleyne (2009) identified four phases of evolution in the literature on the relationship between health and economic growth. The first phase involved the period when the relationship was perceived in terms of the effect of disease on labour productivity, especially at the individual level, thus making policy focus to be concentrated on disease reduction. The second phase was the historical retrospective approach, drawing links between health status and economic progress over time at the country or regional level. The third phase which emerged in the 1990s involved the human capital approach, whereby health was being treated as a productive asset contributing to economic growth, just the same way as education. In the early 2000s, precisely in 2001, the focus shifted to the relationship between macroeconomics and health. This position was influenced by the commission chaired by Jeffrey Sachs, which reported to the World Health Organization in 2001 with identified channels of causation between health and growth and policy prescriptions for improving health and thus economic growth.

Lewis (1955) was the first study that examined the relationship between illness and economic growth at the micro level. The study focused on hookworm as a cause of anemia, and thus as a drain on productivity in the United States. A similar study was undertaken by Conly (1975) with respect to malaria in Paraguay. The study proved that productivity would rise if malaria were eradicated. Ram and Schultz (1979) established that improvement in health induced a rise in output growth. Focusing on malaria, the study showed that agricultural productivity was higher in those areas of India where malaria was low.

Fogel (1986) and Arora (2001) can be categorized as some of the studies in the historical retrospective approach phase. The aim of these studies was to establish how much of a country's or region's economic growth would depend on the extent to which there was proper nutrition and improved health. For example, Arora (2001) looked back at the trends in health outcome over almost 100 years with a view to establishing whether health had improved and whether such health improvements have induced economic growth in these countries. The study concluded in the affirmative.

Late 1950s and early 1960s was marked by debate on whether improvement in human capital, as contributed by investment in health, was important for economic growth. In the midst of this debate, Mushkin (1962) published a seminal work which marked the beginning of the views of health as a human capital. This study provoked research into this phenomenon, such that by 1990s it had been equivocally established that health truly affects wealth (Grossman, 1972a,b; Schultz, 1980; and Fogel, 1994). For example, in analyzing human development, UNDP (1990) included health as an indicator of human development. The study marked the beginning of the role of multilateral institutions in ascribing vital function to health as a human capital. In 1993, the World Bank's World Development Report focused on investment in health as means of improving development in less-developed countries (World Bank, 1993), with similar report recommending prioritization of disease control as an instrument of economic growth in Jamison, Sandbu and Wang (2004). Smith (1999) revealed that individual households with better health tended to be richer 5 and 10 years down the road, and households with excellent health had a remarkable increase in median wealth. And then, a bigger discovery was made as Behrman (1996) established that the returns to investment in health were even greater than in education.

Analyses on the effects of health on economic growth were given a major recognition by the Commission on Macroeconomics on Health (2001). This study identified three channels through which health inputs contribute to economic growth at the macro level. These are: returns to individual health, through labour market outcomes, a demographic dividend, and increased savings; the net value of increased income from household investment in human capital; and societal returns to health, through economic activity such as the tourism industry or agriculture. Three important findings of this study are noteworthy. One, it was found that regardless of a country's initial income level, income growth is faster where infant mortality rates are low. Two, taller adults have higher earnings than shorter adults. Three, based on data from Guatemala, children who received supplements of up to 32,000 calories in their first three years of life would earn more than those who received fewer supplemental calories (Fuentes, Hernandez and Pascual, 2001).

In the literature, the effects of health on economic performance have been decomposed to both the micro and macro levels. Evidence of this link at the micro level is increasing and appears to be robust (Schultz and Tansel, 1993; Strauss and Thomas, 1998; Schultz, 1999a, 1999b, 2002). Good health is a precondition for school attendance, since a child has to be healthy first to withstand the rigours of schooling. Also, healthier students have lower absenteeism and higher cognitive functioning, and thus receive a better education for a given level of schooling, which in turn guarantees higher income over a longer period of time. Good health enhances workers' productivity through improvements in their physical and mental capabilities. Such healthy workers work harder and longer, and think more clearly. Good health also reduces poverty through higher labour participation and reduction in cost of medical services, thus freeing income for other welfare-improving consumption. This is the case irrespective of whether the worker is skilled or unskilled. In addition, the fact that people generally live longer as a result of improved health may encourage them to save for retirement, thus raising the levels of saving, investment and physical capital per worker.

There are three main channels through which health impedes economic well-being, growth and development (Commission on Macroeconomics and Health, 2001). First, avoidable diseases reduce the number of years of healthy life expectancy. A classical example here is the HIV/AIDS pandemic, where truncated lives due to the combination of early deaths and chronic disability are costing developing countries billions of dollars - a substantial percentage of income in these countries. In Africa, for example, as individuals in the prime of their working lives are struck down by the HIV/AIDS scourge, average annual economic growth is expected to slow by several percentage points. Second, diseases reduce parental investments in their children because of their knowledge of high probability of dying. For example, societies experiencing high infant and child mortality rates tend to have high fertility rates as a way of compensating for the frequent deaths of children based on expectation that some of the existing ones will die. In many cases, this leads to a large number of children where some children that were expected to die ultimately survive. The poor status of these families reduces the parental ability to invest sufficiently in the surviving children in terms of both education and healthcare. Lastly is the depressing effects of disease on the returns to business and infrastructure investment, beyond the effects on individual worker productivity. In fact, all activities within the economy are undermined by the prevalence of disease, with the possibility of causing both political and macroeconomic instability if the disease is endemic or becomes an epidemic.

Micro

At the micro level, quantitative analyses on the effects of health on economic growth often straddle between the reduction in market income, reduction in longevity, and reduction in psychological well-being caused by disease, often labeled "pain and suffering," even when there is no reduction in market income or longevity. The analyses of the reduction in market income are often cast in the context of the costs of medical treatment, the loss of labour market income resulting from an episode of illness, the loss of adult earning power from episodes of disease in childhood, and the loss of future earnings from premature mortality.

For poor households, the consequences of poor health can be very enormous. In many cases, poor health forces poor households to spend a greater part of their earnings and resources on medical care, so much that available assets are not just depleted but debts are also incurred. This may further sink the household deeper into poverty trap in which recovery becomes almost impossible. Given the nature of family structure in developing countries such as SSA, the negative effects will go beyond the immediate family to other relatives.

Several studies have examined the relationship between nutrition and child brain development. Balasz et al (1986) and Pollitt (1997; 2001) have established the link between these variables. Deficiency in key nutrients such as iron and Vitamin A are connected to deficiency in cognitive ability. Bhargava (1997) conducted a similar study for Tanzania schoolchildren and found that health and nutritional status were important predictors of cognitive and educational achievements. Based on this finding, the study concluded that removal of intestinal parasites such as hookworm was a major factor for child development. This submission was corroborated by Miguel and Kremer (2004) in

the case of de-worming. In a randomized experimental study, it was found that children in the treated schools recorded significantly higher attendance rates compared to those in schools without such treatment.

The World Health Organization (1998) demonstrated that the effects of health on economic performance are more pronounced in developing countries. Illustrating with the case of Indonesia, anemic men were found to be 20% less productive than men who were not. When the anemic men were treated, their observed productivity increased significantly and almost reached the levels of the non-anemic. This has serious implications for economic growth. Healthy workers are more productive, are less absent from work as a result of illnesses, and contribute to higher profits of the company that employed them. All of these positive developments ultimately have a positive influence on economic growth.

Informative as these studies appear, their most important limitation is that they cannot, by definition, investigate general equilibrium effects of changes in health, or health policy (Eastwood, 2009). For example, analyses on the effects of HIV/AIDS on economic growth in SSA are often done at micro level for given wage levels. However, this relationship is not as simple as that. There are several other variables involved in this relationship. Eastwood (2009) identified this as the assumed rise in public health expenditure due to AIDS-related expenditure, whether this is domestically or internationally financed, as well as assumption about international capital mobility. Additional long-term general equilibrium effects on wages resulting from the aggregate effects on labour supply, and including human capital of changes in health, cannot be captured by micro studies. Macroeconomic studies are, therefore, needed to correct for these weaknesses.

Macro

At the macroeconomic level, there is a strong positive correlation between income per capita and life expectancy and other measures of health, indicating a prima facie case that improvements in health indicators will make a country richer (Acemoglu and Johnson 2007; Weil, 2007; and Ashraf, Lester and Weil, 2008). This demonstrates that the impact of health on economic growth at the macro level cannot be over-emphasized. The Commission on Macroeconomics and Health (2001) reiterated the fact that health status appears to explain an important part of the difference in economic growth rates, even after controlling for standard macroeconomic variables. This fact has been established earlier by several studies that a strong relationship between better health and higher economic growth exists even when additional economic variables are introduced to try to account for the cross-country patterns of growth (see Barro and Sala-i-Martin, 1995; Bloom and Sachs, 1998; Bhargava et al., 2001).

Several cross-country studies have shown a strong link between measures of aggregate health, such as life expectancy or child mortality, and growth per capita (Preston, 1975; McKeown, 1976; Barro, 1991, 1996; World Bank, 1993; Barro and Lee, 1994; Barro and Sala-i-Martin, 1995; Sachs and Warner, 1995; Pritchett and Summers, 1996; Easterly and Levine, 1997; Gallup and Sachs, 2000; Arora, 2001; Bhargava et al., 2001;Fogel, 2002; and Aisa and Pueyo, 2004). The channel of causation is certainly through improved quantity and quality of individual labour force that ultimately

contribute to increased national income.

Studies from both developed and developing SSA countries reveal that the stock of health human capital has a quadratic effect on the growth rate of per capita income, and that investment in health human capital significantly enhances GDP growth (Gyimah-Brempong and Wilson, 2004). Similarly, Sachs and Warner (1997) found that growth tends to be higher in countries with a medium level of health human capital compared with those with very low levels.

To a large degree, the poor growth rates and generally poor economic performance in SSA countries is attributed to poor health in these countries. For example, Bloom and Sachs (1998) found that over 50% of the shortfall in Africa's economic growth relative to high-growth economies of East Asia could be explained by health factors such as burden of disease, demography, and geography, as opposed to the traditional macroeconomic policy variables of political governance. Similarly, Ettling (1981) described the elimination of hookworm and its attendant anemic conditions that was responsible for low productivity in the Southern America as conquest of "germ of laziness". This very important finding has provoked more research seeking to better understand this relationship. More findings in this respect have informed the policy shift towards focusing more on improving health for better economic performance.

Health has also been shown to influence both economic and political instability with potential for state failure. The State Failure Task Force Project commissioned by the Central Intelligence Agency in 1994, which considered 113 cases of state failure between 1957 and 1994 in countries with populations of at least 500,000 persons, made a startling discovery on the impact of health on state failure. The study found that infant mortality rate was one of the three most significant determinants of state failure in these countries. Other determinants were openness and democracy. This demonstrates that health is as important as other factors considered as traditional determinants of economic growth.

In Africa alone, the Abuja Declaration of 2005, signed by 53 African heads of state acknowledged that malaria has reduced economic growth by 1.3% annually, making GDP of African countries to be 37% lower than it would have been in the absence of malaria. Finally, increased longevity, in addition to its direct impact on growth through earning power, consumption, and leisure, also has indirect impact on economic growth. Longer-lived households tend to invest a higher fraction of their income in education and financial saving, because they are convinced that their longer time horizon would allow them more years to reap the benefits of such investments.

Micro–Macro

In recent times, there has been an emergence of a group of studies that seek to avoid the shortcomings of both macroeconomic- and microeconomic-specific studies by combining both approaches. Shastry and Weil (2003) and Weil (2007) are the leading studies in this category. Using different methodologies to estimate the share of cross-country variation in income that can be associated with differences in health status, these studies combined microeconomic estimates of the impact of health on productivity with a macroeconomic accounting model. Aggregate country output was decomposed into a (residual) productivity term plus the return to factors, including physical capital,

educational human capital, and health human capital. Weil (2007) accounted for the impact of health on economic performance by estimating the returns to a number of health indicators. The study found that a 10% increase in the adult survival rate would lead to an increase in labour input per worker of 6.7% and in GDP per worker of about 4.4%.

Extending and modifying this analysis by incorporating equilibrium effects associated with fertility and population changes, Acemoglu and Robinson (2006) established that the effect of health on per capita income was much smaller than established by Weil (2007). Again, this study suffers a major defect, namely, inability to account for certain behavioural responses to improved health. As a result, it does not take cognizance of factors that could possibly increase incomes in the long term. In a bid to correct this obvious weakness, Ashraf, Lester and Weil (2008) incorporated these additional channels by which health changes might affect growth. However, the findings were not significantly different as only modest impact could be established.

Economic growth to health

Earlier works tend to see the causality between health and economic growth as running from health to economic growth. Today, however, there exists evidence both in the developed and developing countries of a possible two-way causality between them; economic growth improves health and at the same time improved health also significantly enhances economic productivity and growth. Pritchett and Summers (1996) provide the first evidence on this relationship when they concluded that "wealthier was healthier", implying that the causality ran from income to health.

The belief that economic growth or wealth improves health is borne out of the observation that countries with the highest per capita income and highest life expectancies in the world have the highest life expectancies and lowest infant mortality rates, while the poorest countries with the poorest people have the poorest health status. Creese (1992) established that as income improves, more resources become available for use on medicines, medical care, safe streets and roads, safe water, and controlled pollution, leading to improvement in life expectancy and child survival rates. Also, higher income brings with it an improved physical environment and hygiene. One important conclusion of this study is that there is a threshold to which higher income can improve health, positing that once the good basic preventive and curative health services are achieved, the extra cost of saving or prolonging life through certain interventions increases at a disproportionately faster rate compared to health improvements. Moreover, higher economic growth beyond a certain level in some cases poses potential health hazards, including increased rate of occupational accidents, environmental damage, and rapid and unplanned urban growth.

Filmer and Pritchet (1997) show that inter-country variation in infant and child mortalities is primarily explained by GNP per capita. It was believed that the channel through which this occurred was higher degree of female participation in the labour force, which in turn reduced the demand for children as a result of the higher opportunity cost of rearing children (Hojman, 1996).

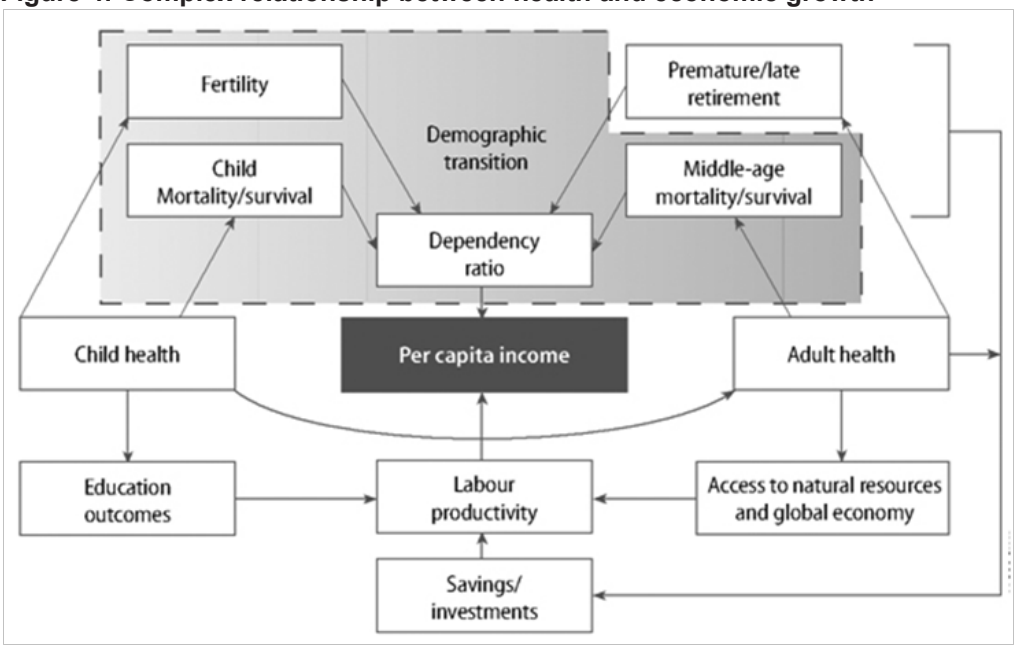
In an analysis based on 48 African countries, Noumba (2004) found that wealthier African nations are not always healthier nations. This is because some of the wealthy

nations in this region exhibit weak health outcomes. The author concluded that despite this finding, income remain an important determinant of health.

Real-life complex relationship between health and economic growth

Figure 4 demonstrates the real life complex relationship between health and economic growth. Improvements in child health, for example, which implies reduction in child mortality rates, translate to improvements in adult health in subsequent years. From this point, several scenarios could emerge, with all having a positive effect on per capita economic growth or income. Improved adult health implies a reduction in middle-age mortality and reduction in premature retirement. This improves the demographic transition by reducing dependency ratio in the economy with ultimate improvements in per capita income. Another possible scenario is that improved adult health means longer period of working life. This means higher savings with improvements in the savings-investment ratio. The improved labour productivity emanating from this contributes positively to per capita income.

Figure 4: Complex relationship between health and economic growth



Source: WHO (1999), p. 11

This demonstrates the complex relationship between health and economic growth. The paths through which health improvements can influence the economy, as identified in the literature, include its effects on child health, labour market participation, worker productivity, savings, investments in human capital, education outcomes, fertility, dependency ratio, and population age structure (Easterlin, 1999; Hamoudi and Sachs 1999; Bloom and Canning, 2000; and WHO, 1999).

This extensive and focused literature review has helped us understand the nature

of health and its determinants. It has also shed light on the direct, indirect and complex relationships between health and economic growth. Several gaps exist in the literature that necessitate this study. First, there are very limited regional-specific studies that have investigated the relationship between health and economic growth in SSA. Second, the existing few studies concentrated on examining the effects of health on economic growth without considering the possible existence of a feedback relationship between them. Third, there is no study on SSA that has attempted to investigate the health-growth nexus through the use of the Arellano-Bond GMM technique with a view to controlling for the possible endogeneity in the health-growth relationship. This study is an attempt to bridge these obvious gaps in the literature.

4. Theoretical framework

This theoretical framework is introduced as the motivation for testing the relationships stated in the empirical model which follows. The standard neoclassical growth theory pioneered by Solow (1956) assumes an economy-wide production function of the form:

$$Y(t) = A(t)L^{\alpha}(t)K^{\beta}(t)$$
$$\alpha > 0, \beta > 0, \alpha + \beta = 1 \quad (1)$$

where Y is aggregate output, A is the efficiency parameter, K is total physical capital stock, and L represents the labour force. The production function is assumed to be the Cobb-Douglas type and is, therefore, characterized by constant returns to scale.

However, one of the basic weaknesses of this model is its treatment of the variable it assumes to be the driver of differences in economic growth across countries. While it recognizes effectiveness of labour as the driver of economic growth, the model treats this variable as a 'black-box', a mystery. Moreover, its exact meaning and nature is neither specified nor is its dynamics explicitly modelled. In addition, it has been shown that other exogenous factors such as health, education and human capital, also influence growth (Romer, 1990; Barro, 1991; Mankiw, Romer and Weil, 1992; Gemmell, 1996; and Grammy and Assane, 1996). Thus, Mankiw, Romer and Weil (1992) modified the production function by augmenting it with human capital thus:

$$Y(t) = K(t)^{\alpha} H(t)^{\beta} [A(t)L(t)]^{1-\alpha-\beta}$$
$$\alpha > 0, \beta > 0, \alpha + \beta < 1 \quad (2)$$

where H is the human capital stock, defined as health outcomes for the purpose of this study, A is knowledge, and other variables remain as earlier defined. The model assumes constant returns to K, H and L.

The dynamics of labour, capital, knowledge and health are assumed to follow the following paths:

$$\dot{K}(t) = s_k Y(t) \quad (3)$$

$$\dot{L}(t) = nL(t) \quad (4)$$

$$\dot{A}(t) = gA(t) \tag{5}$$

$$\dot{H}(t) = s_H Y(t) \tag{6}$$

where s_k and s_H are the fraction of capital devoted to physical capital accumulation and health expenditures, respectively, n is the population growth rate while g represents the growth rate of knowledge. The dot (.) on the variables implies growth. Expressing Equation 2 per unit of effective labour yields:

$$y(t) = k(t)^{\alpha} h(t)^{\beta} \tag{7}$$

Given the focus of this study, we assume the process of physical capital accumulation is exogenous. Therefore, we concentrate on the dynamics of health outcomes. To obtain this, Equation 6 is differentiated by applying both the quotient and product rules, thus:

$$\dot{h}(t) = \frac{\dot{H}(t)}{A(t)L(t)} - \frac{H(t)A(t)\dot{L}(t)}{[A(t)L(t)]^2} - \frac{H(t)L(t)\dot{A}(t)}{[A(t)L(t)A(t)]^2} \tag{8}$$

$$\dot{h}(t) = \frac{s_H Y(t)}{A(t)L(t)} - \frac{H(t)}{A(t)L(t)}\frac{\dot{L}(t)}{L(t)} - \frac{H(t)}{A(t)L(t)}\frac{\dot{A}(t)}{A(t)} \tag{9}$$

$$\dot{h}(t) = s_H y(t) - nh(t) - gh(t) = 0$$

$$\dot{h}(t) = s_H k(t)^{\alpha} h(t)^{\beta} \tag{10}$$

Taking natural logarithm of equations 7 and 10, respectively, yields:

$$\ln \dot{y}(t) = \alpha \ln \dot{k}(t) + \beta \ln \dot{h}(t) \tag{11}$$

$$\dot{h}(t) = s_H k(t)^{\alpha} h(t)^{\beta} \tag{12}$$

Equations 11 and 12 show the dynamics of health outcomes and economic growth, respectively.

5. Empirical methodology

In this section, we present empirical models for both the health production function and the growth model that will help us obtain econometric estimates of the parameters of the models.

Model specification and estimation techniques

Since cross-country growth and health production regressions are proposed for this study, the model specification relies on the theoretical relationships underlying this technique and borrows from Grossman (1972a). We adopt the growth model stipulating the growth rate of income and the gap between the current level of income in a country and the steady state level. The latter is usually referred to as the speed of convergence.

It is assumed that there is a log-linear relationship between the steady state income per capita in a country and several real and potential exogenous factors. These include physical investment, labour force, political institutions, geographic characteristics, initial conditions, etc. Since our interest in this study is the effect of health, a simple specification is considered where health indicators enter the growth model explicitly, while a number of other covariates are controlled for. This is expressed as:

$$\ln(y_{i,t}) = \alpha_0 + \alpha_1 H_{i,t} + \sum_j \alpha_j X_{i,t} + D_t + \delta_i + \varepsilon_{i,t} \tag{13}$$

Health (H) is our variable of interest, X is the vector of additional control variables such as initial conditions, institution variables, and education variables, D are time dummies, δ is the time-invariant country fixed effect, while ε is the true equation error term. The components of the true error term include measurement error on income and on health.

Borrowing from Mankiw, Romer and Weil (1992), which linearizes the Solow model around the steady state, the growth model is expressed as:

$$\frac{\dot{y}}{y} = \lambda(\ln(y_{i,t}) - \ln(y_{i,t-1})) \tag{14}$$

Equation 14 is the convergence speed and the parameter λ is a function of the shares of physical and human capital in the production function. Substituting 13 into 14, we obtain:

$$\frac{\dot{y}}{y} = \lambda(\alpha_0 + \alpha_1 H_{i,t} + \sum_i \alpha_i X_{i,t} + D_t + \delta_i + \varepsilon_{i,t} - \ln(y_{i,t-1})) \quad (15)$$

It is noteworthy that the time-invariant country factors (δ_i) can be a source of bias in the estimation. To eliminate this bias, Equation 15 is differenced once to obtain:

$$\Delta \ln y_{i,t} = \lambda(\alpha_0 + \alpha_1 \Delta H_{i,t} + \sum_i \alpha_i \Delta X_{i,t} + \Delta D_t + \Delta \varepsilon_{i,t} - \ln(\Delta y_{i,t-1})) \quad (16)$$

While equation (16) is our growth model, the equation still contains some bias due to the correlation between $\Delta \ln y_{i,t-1}$ and $\Delta H_{i,t}$ on the one hand, and $\Delta \varepsilon_{i,t}$ on the other. To correct for this bias, Anderson and Hsiao (1981) were the first to come up with the idea to instrument ($y_{i,t-1} - y_{i,t-2}$), for instance with $y_{i,t-2}$ or ($y_{i,t-2} - y_{i,t-3}$). Arellano and Bond (1991) subsequently recognized that using this latter instrument implies, essentially, imposing moment conditions, in which the list of instruments can be expanded with additional moment conditions depending on the number of time observations, t. Therefore, the Arellano and Bond (1991) Generalized Method of Moments (GMM) technique will be used, taking into consideration the number of time observations.

The Arellano-Bond Generalized Method of Moments (GMM) is an instrumental variables estimator that takes into account all the available restrictions on moments, namely, restrictions on the covariances between regressors and the error term. Arellano and Bond (1991) argues that a more efficient estimator results from the use of additional instruments whose validity is based on orthogonality between lagged values of the dependent variable and the error terms. They proposed moment conditions that are of these form:

$$E\{y_{i,t-s}(\Delta \varepsilon_{i,t})\} = 0 \text{ , for } s \geq 1; t = 2,3,...,T$$
$$E\{x_{i,t-s}(\Delta \varepsilon_{i,t})\} = 0 \text{ , for } s \geq 1; t = 2,3,...,T \quad (17)$$

The method assumes that the error terms, ε , are not serially correlated and the explanatory variables, x, are weakly exogenous; that is, they are assumed to be uncorrelated with future values of the error term. Under these moment conditions, Arellano and Bond (1991) proposed a two-step GMM estimator. In the first step, the error terms are assumed to be independent and homoscedastic across countries over time. In the second step, the residuals obtained in the first step are used to construct a consistent estimate of the variance-covariance matrix, thus relaxing the assumption of independence and homoscedasticity. Thus, the two-step estimator is asymptotically more efficient relative to the first-step estimator. For the model estimation, they

proposed the following instruments: the levels of dependent variables lagged two or more periods; levels of the endogenous variables lagged two or more periods; and the first differences of the strictly exogenous covariates, which are used as their own instruments.

In this framework, the explanatory variables assumed endogenous or predetermined can be instrumented, and the validity of such instruments can be tested. To correct for the endogeneity problem, the Arellano-Bond GMM procedure uses lagged values of the corresponding endogenous variables as internal instruments. More specifically, endogenous variables are instrumented by lags from at least two periods and deeper, and a predetermined variable is instrumented by lags from at least one period and deeper. This demands some assumptions on the endogeneity or exogeneity of the explanatory variables included in the growth model. The explanatory variables can be strictly exogenous to growth or predetermined or endogenous.

The consistency of the Arellano-Bond estimator depends on the validity of the assumption that the error terms do not exhibit serial correlation and on the validity of the instruments used. To address these issues, two specification tests recommended by Arellano and Bond (1991) and Blundell and Bond (1998) will be explored. First is the Sargan test of over-identifying restrictions, which tests the overall validity of the instruments. Second is testing the hypothesis that the error term is not serially correlated. We will test whether the first differenced error term is second-order serially correlated.

In sum, two models are proposed for estimation, namely the health production function and the growth model. From Equation16, the proposed health production function for estimation can be expressed thus:

$$\Delta Lnh_{i,t} = \ln\Theta + \alpha_i \Delta \ln y_{i,t} + \beta_i \Delta \ln FA_{i,t} + \chi HF_{i,t} + \delta ED_{i,t} + \phi LS_{i,t} + \varphi UR_{i,t} + \gamma EM_{i,t} + \varepsilon_{i,t} \quad (18)$$

where h is as earlier defined, FA is food availability, HF signifies availability of health facilities, ED indicates education variable, LS symbolizes lifestyle of individuals, UR represents urbanization, and EM denotes carbon dioxide emission rate. The selection of these variables is based on evidence on the theoretical and empirical determinants of health in the literature. GDP per capita growth is symbolized by y and is singled out for further explanation. As revealed in the literature review, several authors have pointed to the glaring endogeneity between health and economic growth, and have shown that growth also promotes health. Thus, this variable is added to the model estimation to control for the obvious endogeneity (Creese, 1992; Pritchett and Summers, 1996; Filmer and Pritchet, 1997).

The reinforcing relationship between health and growth is a revelation of the inherently dynamic nature of economic development process. In this case, improvements in health promote economic growth and, in turn, economic growth improves health. As economies grow and become more affluent, such economies make improvements in their ability to transform the life of their indigent citizens through better health services that would have been hitherto unaffordable. This has been proved in the case of East Asia, Ireland and several other countries that are wealthy today (Steckel and Floud, 1997). Another channel through which this mutually reinforcing relationship

could be established is through decline in fertility, given its negative relationship with income. Rising income means a reduction in fertility, providing ample time for mothers to breastfeed their babies. With mothers' improved health comes less stress on their reproductive systems. Moreover, this gives them more opportunities to work, increase their incomes and better provide for individual physical and health needs of their children. Finally, reduction in fertility implies that more resources that would have been expended on providing for caring for such additional people would otherwise be made available for additional health- and growth-improving resources such as infrastructure, education, and physical capital.

Similarly, from Equation 16, the proposed growth model for estimation can be expressed thus:

$$\Delta \ln y_{i,t} = \eta_0 + \mu_i \Delta \ln K_{i,t} + \lambda_i \Delta \ln L_{i,t} + \kappa_i \Delta \ln h_{i,t-20} + \pi_i \Delta \ln IN_{i,t} + \varpi \Delta \ln GV_{i,t} + \theta_i \Delta \ln CV_{i,t} + \sigma_i \Delta \ln y_{i,t-1} + \rho_i D_{i,t} + \xi_t \quad (19)$$

where y, h and D are as earlier defined, K denotes physical capital stock, L stands for labour supply, i.e. economically active population, IN represents institution variables, GV denotes governance variables, CV signifies a set of possible additional control variables, and y_{t-1} is per capita income lagged by one period. It is noteworthy that the lag notation for health in this growth model follows the fact that it takes a period of about 20 years for our measures of health, namely, infant mortality and life expectancy at birth, to influence growth. Appropriate lags of growth and health variables as dictated by Arellano and Bond (1991) will be used as instruments.

In summary, the two equations that will form the empirical models to be estimated in this study with a view to establishing the nature of relationship between health and economic growth are restated below:

$$\Delta Lnh_{i,t} = \ln \Theta + \alpha_i \Delta \ln y_{i,t} + \beta_i \Delta \ln FA_{i,t} + \chi HF_{i,t} + \delta ED_{i,t} + \phi LS_{i,t} + \varphi UR_{i,t} + \gamma EM_{i,t} + \varepsilon_{i,t} \quad (20)$$

$$\Delta \ln y_{i,t} = \eta_0 + \mu_i \Delta \ln K_{i,t} + \lambda_i \Delta \ln L_{i,t} + \kappa_i \Delta \ln h_{i,t-20} + \pi_i \Delta \ln IN_{i,t} + \varpi \Delta \ln GV_{i,t} + \theta_i \Delta \ln CV_{i,t} + \sigma_i \Delta \ln y_{i,t-1} + \rho_i D_{i,t} + \xi_t \quad (21)$$

Data and sources

Estimation of determinants of health as expressed in Equation 18 requires data on health outcomes as well as socio-economic and environmental variables affecting health. Given the constraints on availability of health data on annual basis, we construct a panel of data observed every five years over 1980 to 2005. For the purpose of this study, both child mortality and life expectancy are estimated as proxy for health outcomes. Life expectancy is an appropriate measure of health because it is generally associated with better health status and lower morbidity (Murray and Chen, 1992; Murray and Lopez, 1997). It is an acknowledged fact that both child mortality and life expectancy influence growth with a lag; the former because it takes a period of time for an infant to

grow old enough to join the working population and begin contributing to the national income, and the latter because it is largely reflective of infant and child mortality in SSA.

The socio-economic and environmental variables used are alcohol consumption, urbanization, carbon emission, food availability and education. It is worth emphasizing that the assumption here is that the effect of these health inputs on output depends only on the average level in the economy and not on its distribution. Food availability is considered because in developing countries such as SSA, the problem of nutrition is more of scarcity than over-consumption. Total adult literacy rate is used as a proxy for education. This is measured as the percentage of persons above age 15 years that can read and write. It has been argued that education is a major factor that determines important health-enhancing decisions such as a healthy diet, efficient use of medical care and avoidance of unhealthy habits (Grossman, 1972b; Rosen and Taubman, 1982; and Berger and Leigh, 1989). Therefore, the more literate the population, the healthier the people are expected to be, suggesting expected negative coefficient of this variable in the estimation. Another social factor examined here is lifestyle, represented by alcohol consumed per adult of 15 years and older per annum, measured in litres. This is a very appropriate measure as Chick et al (1986) and Choquet and Ledoux (1989) have indicated; alcohol consumption is a major risk factor for a good number of chronic diseases as well as accidents and violent deaths.

Two environmental factors are considered as determinants of health. First is urbanization rate, measured as the percentage of the population in area defined as urban in a country. Urbanization has the potential for exerting either positive or negative influence on health production. On a positive note, urbanization makes possible better access to health information and quality health care and facilities. On the negative side is pollution and congestion with its associated undesired impact on health (Thornton, 2002). This is especially true in SSA. Therefore, the sign of this coefficient cannot be determined a priori. Second is carbon dioxide emission per capita, which causes pollution that ultimately has a negative impact on health production. This variable is expected to have a negative sign.

The growth equation follows the standard growth model, with emphasis on the effects of health outcomes on economic growth, using the standard covariates identified in the growth literature. These covariates can be broadly grouped into economic, social and institutional variables. For the purpose of this paper, we follow Bloom, Canning and Sevilla (2004) in specifying these models. Economic growth is measured as real per capita GDP growth. Each country's labour supply is measured as the economically active population. Fixed capital formation is used as a proxy for physical capital. Institutional and governance institutions are also considered. For the purpose of this study, data such as quality of government bureaucracy, corruption in government, efficacy of rule of law, risks of expropriation of private investment, risk of repudiation of contracts by the government, etc are examined.

Data on variables of interest are collected from appropriate sources. Data on child mortality, life expectancy and alcohol consumption are sourced from the World Health Organization Database. Real per capita GDP, urbanization, carbon emission, infrastructure availability, labour force participation and openness of the economies

are collected from the World Bank's Africa Development Indicators 2008/09 CD-ROM. Literacy rate data is extracted from the African Development Bank's Selected Statistics on African Countries 2006 and 2008, while food availability data is extracted from the Food and Agriculture Organization (FAO) database. It should be noted that food availability refers to the total amount of all commodities available as human food during the reference period, and is measured in grams per capita. Data on quality of governance and institutions are obtained from Polity IV Project database. The analysis covers 40 countries for 1980-2005.

6. Empirical results

Descriptive statistics

We begin the discussion of our empirical findings by first examining the basic statistical characteristics of the data, concentrating only on the variables of utmost interest, namely, growth and health indicators (Table 3). The mean per capita GDP growth in the SSA countries over the period was less than 1%. Given a standard deviation of more than 7, growth in these countries can be said to be volatile over the entire period. Liberia recorded the lowest per capita GDP growth of -50% in 1990 at the height of the first civil war. The same country recorded the highest GDP per capita growth of 90% in 1997 as the economy experienced a rebound at the end of the first civil war. This experience is seconded by Rwanda, which had GDP growth of -47% in 1994 at the height of the genocide and 38% in 1995 at the end of the genocide. These experiences demonstrate that conflict is a major cause of poor economic performance and growth instability in SSA countries.

Table 3: Summary of descriptive statistics of selected variables

Variable	Mean	Standard Deviation	Minimum	Maximum
GDP Growth per Capita	0.86	7.50	-50.49	90.07
Infant Mortality	100.00	33.90	14.00	189.00
Life Expectancy	51.00	7.1.00	24.00	73.00

Source: Author's calculations

The mean child mortality rate per 1,000 live births was 100 for the selected countries. Mauritius recorded the best result in 2007, with only 14 deaths per 1,000 live births, while Niger had the worst record of 189 in 1980. The performance of SSA countries on life expectancy is also relatively poor. Generally, the Southern African countries are leaders on this health indicator, though the toll of the HIV/AIDS in the region has drastically reversed the earlier strong performance. Mauritius recorded the best performance in total life expectancy amounting to 73 years in 2007. This country is a very strong performer on this health indicator, having attained more than 60 years of total life expectancy as far back as 1980 and consistently sustaining this lead. Rwanda recorded the worst performance of 24 years in 1992, a period of crisis that ultimately culminated in the 1994 genocide. However, the country has gradually overcome this setback, reaching a total life expectancy of 46 years in 2007.

Determinants of health

The estimated results of the determinants of health – child mortality and life expectancy – for the 40 SSA countries are based on the Arellano-Bond first differenced GMM estimates of equation 18 as reported in Table 4.[7] Similarly, the empirical results for the relationship between health indicators and economic growth as indicated in equation 19 are reported in Table 5. For all the estimated models, Sargan test is conducted and the results are reported with a view to assessing the validity of the over-identifying restrictions. While the growth models passed this test as we cannot reject the null hypothesis that the over-identifying restrictions are valid in these cases, the models on the determinants of health could not be successfully scaled through the test, thus necessitating further analysis. We also take cognizance of the fact that the reliability of the GMM estimation is based on the condition that there is no second-order correlation, even though first-order auto-correlation is expected. Thus, we computed and report the Arellano-Bond test that average autocovariance in residuals of order 1 and 2 is zero. The results for the models on the determinants of health confirm the absence of second-order autocorrelation. Consequently, the estimated coefficients reflect the true (efficient and unbiased) relationship between health (our variables of interest) and the traditional predetermined and endogenous determinants of growth, on the one hand, and per capita GDP growth, on the other. For the determinants of health models, more data cleaning and model specification are undertaken for better results that are efficient and unbiased.

The estimated results for the determinants of child mortality show that five explanatory variables are statistically significant in explaining health. These are health infrastructure, education, lifestyle, urbanization and carbon emission, with all the variables turning up with the right signs, except carbon emission. The findings that alcohol consumption per capita and urbanization are important determinants of child mortality in SSA agree with Grossman (1972b), Amouzou and Hill (2004) and Fayissa and Gutema (2008). The finding that income is not an important determinant of health in SSA also agrees with Noumba (2004) that found that wealthier African nations are not always healthier nations. However, the fact that income has the expected signs in both models shows that its statistical insignificance does not mean that income is not an important determinant of health in SSA.

Table 4: Panel data estimation results of the determinants of health in SSA countries for 1980-2005 using the Arellano-Bond GMM estimator

Explanatory Variables	Dependent Variable: Child Mortality	Dependent Variable: Total Life Expectancy at Birth
$H_{i,t-1}$	0.0164 (0.0131)	0.2583*** (0.1012)
$Y_{i,t}$	-0.0175 (0.0082)	0.0011 (0.0031)
$FA_{i,t}$	0.0076 (0.0077)	-0.0237)*** (0.0028

Continued next page

Table 4 continued

$HF_{i,t}$	-0.0734*** (0.0176)	0.0253*** (0.0101)
$ED_{i,t}$	0.0240* (0.0131)	0.0002 (0.0049)
$LS_{i,t}$	0.0723** (0.0269)	-0.1172*** (0.0355)
$UR_{i,t}$	-0.2382*** (0.0544)	0.1276*** (0.0181)
$EM_{i,t}$	-0.2640*** (0.1145)	0.0117*** (0.0023)
Sargan test, p-level	0.2478	0.2838
AR(1) test, p-level	0.0000	0.0000
AR(2) test, p-level	0.7278	0.7287

Note: Standard errors are in parentheses. ***, ** and * represent respectively statistical significance at the 1%, 5% and 10% levels.

Alcohol consumption, either by men or pregnant women, could have a significant deleterious effect on child mortality through several risk-inducing channels. One, high dosage of alcohol consumption by pregnant women could result in foetal alcohol spectrum disorders and foetal alcohol syndrome, leading to serious health and life-threatening risks at birth (Burd and Wilson, 2004). Two, children conceived by such women are prone to have acute respiratory tract infection (Bang and Bang, 1991). Three, there is a high tendency that a heavy alcohol-consuming father would abuse his pregnant wife and any unborn foetus, thus threatening their health.

Granted the many social and economic problems plaguing many households in SSA countries, many male and female have resorted to alcohol consumption as an escape route out of daily life problems and worries. Some young adults who are frustrated with life, either as a result of unemployment and/or family strain, find solace in heavy alcohol consumption. This kind of problem is also very rampant in rural areas where men assume superiority over women and abuse them constantly when they are drunk. Even in the cities, most drinking spots are crowded most evenings, especially weekends, explaining why breweries are among the best performing industries on the continent. Similar anecdotal evidence could be observed for tobacco companies with the current trend of relocating to SSA countries given the unfavourable operating conditions in developed countries.

Our findings contrast with most studies that have established a negative relationship between urbanization and child mortality, especially in Latin America and Asia. But our findings agree with Gracey (2000) that established that although the effects of urbanization on child health through urbanization has several beneficial effects for the general urban population, for children living in the city is the antithesis of growing up in a traditional family and community setting. The study thus identified accidents as the

main channel through which urbanization affects child health, in addition to pressure on health infrastructure due to overcrowding; westernized diets; shortage supply of adequate, safe drinking water; removal of sewage, solid and liquid wastes from the environment; and deployment of adequately trained health inspection personnel.

The negative relationship between urbanization and child mortality is understandable in the context of SSA countries. In most SSA countries, many rural areas are associated with deprivation in several life-enhancing amenities: infrastructure, health facilities, health personnel, and outreach. In Ghana, for example, there is a very wide margin between health indicators, health infrastructure, coverage and access to health facilities in the more urban South compared to the more rural North. Incidence of diarrhoea, child mortality, and malnourishment are higher in the rural areas compared to the urban areas. The reasons for this disparity are limited access to safe water, nutrition, sanitation, and transportation constraint (Arhin-Tinkorang, 2002 and Heyen-Perschon, 2005). Yet, a greater percentage of African population continues to live in rural areas while an appreciable percentage in the cities live in slums and other areas where there is huge pressure on health-enhancing facilities.

Another angle to it is the fact that constraints to health care facilities and personnel that remain major sources of deprivation in rural areas are less binding in most urban areas. In most urban areas in SSA countries, health infrastructure is relatively available and reachable, given the absence of transportation constraint. Therefore, medical help is readily available compared to the rural areas and at a lower cost to the consumer. For example, while immunization is almost 100% in most urban areas in Africa, coverage in several rural areas is less than 30%. In addition, living in urban areas provides a child with more comfort of life. The idea here is not to discount the potential negative effect of urbanization on child health as described earlier, but to demonstrate that there are several potential benefits that explain the favourable relationship found in our empirical model.

This leads to the observed positive and significant effects of health infrastructure on health production. It is noteworthy that the recent giant strides of some African countries in this respect are noteworthy, especially in making available health infrastructure for dealing with emerging health hazards. For example, countries in Southern and Eastern Africa have invested heavily on awareness campaigns, counselling centres, anti-retroviral drugs and health personnel. These have dramatically curtailed the initial widespread of life-threatening diseases, especially HIV/AIDS. In addition, some countries have invested in improving their health systems through health reforms and new policies. For example, Ghana and Rwanda have established functional and widespread health insurance schemes that have influenced health access, coverage and utilization both in rural and urban areas. Several other countries are replicating these examples, adapting them to suit local peculiarities.

The negative but statistically significant sign of the carbon emission appears perverse but demonstrates the complex relationship between the variable and health indicators. However, this can be explained within the context of the nature of SSA countries. The emergence of the middle class in most African countries, which began in the 1980s, has gained momentum in recent times. Africans in this group have a penchant for imported used automobiles from Europe and USA for convenience, given

the poor public transport systems prevailing in most of these countries, coupled with very expensive new vehicles. While these automobiles emit carbon to the atmosphere, members of this class are well off materially and can better take care of both their own health and those of their children. In addition, the benefits in terms of comfort derived from the use of these automobiles perhaps outweigh the cost, such that this improves life expectancy on aggregate. Second, given the long distance involved in travel in most SSA communities, there is significant use of aged automobiles that emit a high level of carbon and have the potential for affecting significantly the health of people living in the communities. Moreover, the poor electricity supply that has pushed millions of Africans to generators is also having untold effects on people's health through the fumes. There have been several death cases of entire families caused by inhalation of deadly fumes, in addition to several other life-threatening respiratory diseases.

In addition to the variables discussed above, food availability is found to have a statistically significant negative sign in the total life expectancy model. This may not be unconnected with the mode of agriculture and food production in SSA countries. Agricultural and food production in the region are far from being mechanized. Up till now, a big proportion of farmers still use the traditional and crude means of production. This system of food production is really energy-sapping and highly subsistent. Thus, in many instances, these farmers do not have sufficient food to feed their households, let alone basic health care. Yet, the mode of production is such that these farmers are constantly exposed to accidents and diseases that tend to reduce their life span.

There are also other interesting features of the results. One, effects of food availability on health, in terms of statistical significance, is different between child mortality and the life expectancy models. The possible reason is that the measures of food used in our database are those consumed by adults and not children. In most cases, children foods are usually processed and imported from foreign countries. Two, education also has different significant effects across the two models. This makes sense as children are more prone to death due to the dangerous actions or inactions of their parents, which are influenced by either good education or ignorance. Therefore, literacy will be more beneficial to children survival rate compared to the length of life of adults.

Relationship between health and economic growth

It is interesting to note that our health variables have the right sign in both growth models. However, none of these exerts a significant positive effect on growth. This finding runs counter to Bloom, Canning and Sevilla (2004) that find a positive, sizable, and statistically significant effect, and Acemoglu and Johnson (2007) that concluded that, when the problems of health's endogeneity and omitted variables are corrected, health improvements in the post-World War II would actually have a negative effect on income per capita. Possible sources of divergence are the method of analysis, period of coverage, countries of focus and most importantly the innovative approach of lagging the health variables by 20 years, given the delayed effect of life expectancy and child mortality on economic performance.

Table 5: Panel data estimation results of the relationship between health and economic growth in SSA countries for 1980-2005

Explanatory Variables	Dependent Variable: $Y_{i,t}$	Dependent Variable: $Y_{i,t}$
	Child Mortality	**Life Expectancy**
$Y_{i,t-1}$	-0.2878** (0.1244)	-0.1187*** (0.0312)
$K_{i,t}$	0.0252 (0.1954)	0.2385 (0.1938)
$L_{i,t}$	0.4893*** (0.2270)	0.3790*** (0.1086)
$H_{i,t-20}$	-0.0765 (0.1345)	0.2168 (0.3033)
$IN_{i,t}$	-0.1083*** (0.0243)	0.2337* (0.1201)
$GV_{i,t}$	-0.4812*** (0.1734)	-0.0290** (0.0120)
$IF_{i,t}$	0.0041 (0.1039)	0.0876 (0.0781)
$OP_{i,t}$	0.0382 (0.1021)	0.1347* (0.0701)
$HK_{i,t}$	0.0107 (0.0969)	0.0023 (0.0049)
$UR_{i,t}$	0.3359 (0.3723)	0.1731 (0.2784)
Sargan test, p-level	0.8629	0.7509
AR(1) test, p-level	0.0023	0.078
AR(2) test, p-level	0.1327	0.2673

Note: Standard errors are in parentheses. ***, ** and * represent, respectively, statistical significance at the 1%, 5% and 10% levels.

Our finding is far-reaching as it demonstrates that health indicators are so poor in SSA countries that they are unable to significantly influence growth. The reason for this has been amply demonstrated in the background section, where it is evident that health indicators in Africa are the worst in all developing regions of the world.

Another possible explanation for the observed insignificant relationship could be emanating from the complex relationship between child mortality and life expectancy, on the one hand, and per capita economic growth, on the other. For example, the little increase in life expectancy recorded by most SSA countries has further increased population growth and consequently total population. This rise in population appears to have reduced the available resources per capita, thus weakening the potential economic

benefits of improved health. Further, most economies in Africa are still unable to match health production with health demands, thus leaving a huge health gap that needs to be filled. While donors have made significant contributions to improving health in Africa, their focus has been more on interventions during health crisis or epidemic – as demonstrated by the HIV/AIDS interventions – other than sustained assistance in systematic improvement in health. Finally, the results could be an amplification of the peculiarity of African countries and the extent to which they differ from developed economies that tend to establish different findings.

7. Conclusion and recommendations

This study modelled the relationship between health and economic growth in SSA countries at five yearly intervals using panel data for 40 SSA countries. The study estimates reduced form equations for both health and growth with a view to establishing the relationship between them. Child mortality and life expectancy are the chosen proxies for health, while per capita GDP growth represents economic growth. Given the inherent problem of endogeneity observed from the literature, the study adopts the Arellano-Bond Dynamic GMM estimation technique. For the health model, it is established that alcohol consumption, urbanization and carbon emission are the statistically significant determinants of both child mortality and life expectancy in SSA. On the other hand, none of our health indicators are statistically significant determinants of economic growth in the region, even though most of them have the right sign. These findings should provoke policy actions that will help improve health indicators and better stimulate health-led economic growth in SSA.

Policy lessons and recommendations

There is a need for more specific policy focus on improving the lifestyle of Africans for meaningful progress towards improved health on the continent. Given our measure of lifestyle – alcohol consumption – there is real need to direct efforts toward controlling alcohol consumption. First, SSA countries are encouraged to establish a National Committee for Alcohol Consumption Control (NCACC). In addition, they should also form a continental umbrella body for the national institutions, namely, African Committee for Alcohol Consumption Control (ACACC). The activities of the NCACC should be coordinated by the ACACC. The responsibilities of these institutions should be to develop, design, coordinate and implement both national and regional policy on alcohol consumption. This should be done in close collaboration with local government and non-governmental organizations and institutions, and specialized international organizations such as the World Health Organization (WHO). Implementation should encompass a mechanism for surveillance and legal enforcement of the policy. To provide a useful input for this process, SSA countries should establish a regional Research Centre on Alcohol Consumption (RCAC) charged with the duties of conducting policy-relevant research into understanding the determinants of alcohol consumption in SSA and its effects on the health of Africans, develop a database for monitoring consumption, disseminate findings through publications and campaigns, and provide relevant policy advice to the NCACC, ACACC and other specialized organizations working in this area, both within and outside Africa.

Direct alcohol control through availability is also important. In an environment where alcohol is freely available for all, there are bound to be over-consumption and abuse, especially by youths. There is a need for proper regulation on availability, sale and marketing. This should be directly mentioned in all advertisements involving alcohol. Some SSA countries are already taking steps in this direction, prohibiting sale of alcohol in certain public areas and stipulating minimum legal alcohol purchasing and drinking age. Countries that are already implementing this policy should firm up the monitoring process to ensure compliance, while those that are yet to do so are urged to seriously consider this.

There is also a need for better urban management policies to improve the health of Africans. Based on our findings, such policies should be geared towards improving health facilities and mitigating possible risks of negative effects of urbanization on health. Proper sanitation, effective sewage disposal system, efficient infrastructure development, especially potable water are important preconditions for improving human health in SSA countries. Improvements are also needed in strengthening direct health infrastructure such as hospitals and clinics. Given the large population in urban areas and the pressure this exerts on available facilities, there is a need for conscious effort to increase availability of necessary health infrastructure per capita. Focus is also required on providing a good road and transportation system that will further improve access to these facilities.

The most important policy implications of our findings on the effects of health on economic growth is that more is required from both the public and private sectors in SSA countries to jump-start a positive impact of health on growth. Several policy actions are recommended for adoption and implementation. First, there is a need for SSA countries to improve their national health systems through improved health policy, institutional and administrative reforms. This is premised on the general weakness of major institutions, including health institutions in the region. Second, the individual countries should create social and community health insurance schemes that will improve access to healthcare, especially for the poor and vulnerable by reducing out-of-pocket health expenditures and ensure effective coverage. Ghana and Rwanda provide good examples for other SSA countries to emulate in designing and implementing health insurance schemes. Countries may have to undertake a learning mission to these countries to better understand the modus operandi of an effective health insurance scheme. Third, there is a need for improvement in both private and public investment in health. Currently, most SSA countries' governments view health investment as a cost. Such orientation should be eschewed while conscious efforts are being made for improved investment in all aspects of health in SSA countries. Finally, African countries should endeavour to harmonize health interventions being undertaken by development partners with national health policy and aspirations. There is also a need to nudge these partners away from the current fire brigade-style of health interventions to more calculated, systematic and sustainable assistance programmes.

Directions for further studies

A relevant research direction emanating from this study is identifying the channels through which alcohol consumption hurts human health in Africa. The literature is

inconclusive on whether these effects are direct, indirect or both (see, for instance, Block and Webb, 2009). While anecdotal evidence suggests that both effects are plausible, further studies are required to establish this for SSA countries with a view to informing policy direction. Second, the complex relationship between health production, health outcomes and economic performance at the macro level might require a more complex model, perhaps CGE modelling. A possible research direction along this line is for a study to examine this complex relationship from the perspective of CGE models. Such approach might be as educative as it might be policy relevant.

8. Notes

1. Angola, Botswana, Burkina Faso, Cape Verde, Chad, Equatorial Guinea, Ethiopia, Ghana, Mali, Mozambique, Nigeria, Rwanda, Sierra Leone, Sudan, Tanzania and Uganda.

2. Benin, Cameroon, Democratic Republic of Congo, Republic of Congo, Djibouti, The Gambia, Kenya, Lesotho, Liberia, Madagascar, Mauritania, Mauritius, Namibia, Niger, Senegal, South Africa, and Zambia.

3. Burundi, Comoros, Gabon, Guinea, Guinea-Bissau, Malawi, Swaziland, and Togo.

4. Central African Republic, Cote d'Ivoire, Eritrea, Seychelles, and Zimbabwe.

5. Cote d'Ivoire, Ghana, Kenya, South Africa, and Tanzania.

6. Some of these countries include Botswana, Cameroon, Ghana, Kenya, Lesotho, Madagascar, Senegal, South Africa, Sudan, Swaziland, Tanzania, Togo, Uganda and Zimbabwe.

7. Estimations of the Arellano-Bond dynamic GMM models are based on the Xtabondtechnique provided in STATA software.

References

Acemoglu, D. and S. Johnson. 2007. "Disease and development: The effect of life expectancy on economic growth". *Journal of Political Economy*, 115: 925-984.

Acemoglu, D. and J.A. Robinson. 2006. *Economic origins of dictatorship and democracy*, New York: Cambridge University Press.

Adedeji, A. 2002. "From the Lagos Plan of Action to NEPAD and from the Final Act of Lagos to the Constitutive Act: Whither Africa". Keynote address presented at the African Forum for Envisioning Africa, 26-29 April. Nairobi, Kenya.

AfDB. 2008. *Selected statistics on African countries 2008 volume XXVII*. Tunis: African DevelopmentBank.

Aguayo-Rico, A., I. A. Guerra-Turrubiatesand R. M. de Oca-Hernández. 2005. "Empirical evidence of the impact of health on economic growth". *Issues in Political Economy*, 14.

Aísa, R. and F. Pueyo. 2004. "Endogenous longevity, health and economic growth: A slow growth for a longer life?"*Economics Bulletin,* 9(3): 1-10.

Alleyne, G. 2009. "Health and economic growth: Policy reports and the making of policy". In: Spence, Michael and Maureen Lewis (eds),*Health and growth.*Washington DC: International Bank for Reconstruction and Development/The World Bank.

Amouzou, A. and K. Hill. 2004. "Child mortality and socioeconomic status in Sub-Saharan Africa". *African Population Studies*, 19(1): 1-12.

Anand, S.and T. Barnighausen. 2004. "Human resources and health outcomes: Cross- country econometric study." *Lancet*, 364:1603-09.

Anderson, T.W. and C. Hsiao. 1981. "Estimation of dynamic models with error components," *Journal of the American Statistical Association*, 76: 589-606

Anyanwu, J. C. 1996. "Empirical evidence on the relationship between human capital and the income of Nigerian women". *Journal of Economic Management*, 3(1): 45-67.

Anyanwu, J. C. 1998. "Human capital and Nigerian men's income".*Pakistan Economic & Social Review*, XXXVI (1):73-94.

Arellano, M. and S. Bond.1991. "Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations". *The Review of Economic Studies*, 58(2): 277-297.

Arhin-Tinkorang, D. 2002."Revisit of Ghana's poverty profile as inputs into GMH Initiative".

Arora, S. 2001."Health human productivity and long-term economic growth".*Journal of Economic History,* 61(3).

Ashraf, Q. H., A. Lester, and D. N. Weil. 2008."When does improving health raise GDP?" National Bureau of Economic Research Working Paper Series No.14449.

Balasz R., P. J. P. Lewis and A. Patel. 1986."Under-nutrition and brain development." In: Faulkner, F, J. M. Tanner (eds), *Human growth: A comprehensive treatise*. New York: Plenum Press.

Banerjee, A, A. Deaton and E. Duflo. 2004. "Wealth, health, and health services in rural Rajasthan," *American Economic Review*, *Papers and Proceedings*, 94(2):326-330.

Bang, A.T. and R. A. Bang. 1991."Community participation in research and action against alcoholism". *World Health Forum,* 12:104-9.

Barro, R, J. 1991."Economic growth in a cross section of countries".*Quarterly Journal of Economics,* 106(2): 407-43.

Barro, R. J. and J. Lee. 1994."Losers and winners in economic growth". In: Bruno, Michael and Boris Pleskovic (eds), Proceedings of the World Bank Annual Conference on Development Economics, 1993: Supplement to the World Bank Economic Review and World Bank Research Observer, Washington DC: World Bank.

Barro, R. and X. Sala-I-Martin. 1995. *Economic growth.* New York: McGraw-Hill.

Barro, R. J. 1996."Determinants of economic growth: A cross-country empirical study. National Bureau of Economic ResearchWorking Paper No.5698.

Behrman, J. R. 1996. *Human resources in Latin America and the Caribbean.*Washington DC: Inter-American Development Bank.

Benhabib, J. and Spiegel, M. 1994. "The role of human capital in economic development: Evidence from aggregate cross-country data*". Journal of Monetary Economics*, 34: 143-74.

Berger, M. and J. Leigh.1989."Schooling, self-selection and health".*Journal of Human Resources,* 24: 433-455.

Bhargava A.1997."Nutritional status and the allocation of time in Rwandese households". *Journal of Econometrics*, 77: 277-295.

Bhargava, A., D. T. Jamison, L. J. Lau, and C. J. L. Murray. 2001. "Modeling the effects of health on economic growth." *Journal of Health Economics,*20: 423-40.

Block, S. and P. Webb. 2009. Up in smoke: Tobacco use, expenditure on food, and child malnutrition in developing countries. *Economic Development and Cultural Change*, 58(1): 1-23.

Bloom, D. E., and J. D. Sachs. 1998."Geography, demography, and economic growth in Africa". *Brookings Papers on Economic Activity*, 2:207-295.

Bloom, D. E. and David Canning.2000."The health and wealth of nations".*Science*, Vol. 287, No. 18: 1207-1209.

Bloom, D. E. and Canning, D. 2003."The health and poverty of nations: From theory toPractice". *Journal of Human Development*, Vol. 4, No. 1: 47-71.

Bloom, D. E., D. Canning and J. Sevilla. 2004. "The effect of health on economic growth: A production function approach". *World Development*, 32(1): 1-13.

Blundell, R. and S. Bond. 1998."Initial conditions and momentrestrictions in dynamic panel data models". *Journal of Econometrics*, 87: 115-143.

Burd, L. and H. Wilson. 2004.Fetal, infant, and child mortality in a context of alcohol use. *American Journal of Medical Genetics Part C: Seminars in Medical Genetics,* 127: 51-58.

Caballé, J. and M. S. Santos. 1993."On endogenous growth with physical and human capital". *Journal of Political Economy*, 101.6: 1042-1067.

Caldwell, J. C. 1979."Education as a factor in mortality decline: An examination of Nigeria data". *Population Studies*, Vol. 33: 395-413.

Caldwell, J. C. 1991. "The soft underbelly of development: Demographic transition in conditions of limited economic change, comments". *Proceedings of the World Bank Annual Conference on Development Economics*, 207-253.

Chick, J., J. C. Duffy, G. G. Lloyd and B. Ritson.1986. "Medical admission in men: The risk among drinkers". *Lancet*, 2: 1380-83.

Choquet, M. and S. Ledoux. 1989. "Alcohol related problems in France". *WHO EURO Reports and Studies*, 109: 45-63.

Commission of Macroeconomics and Health. 2001. *Macroeconomics and health: Investing in health for economic development*. Switzerland: World Health Organization.

Conly, G. N.1975. "The impact of malaria on economic development: A case study." Pan American Health Organization Scientific Publication 297.

Currie, J. and E. Moretti. 2003. "Mother's education andthe intergenerational transmission of human capital: Evidence from college openings", *Quarterly Journal of Economics*, 118(4): 1495-1532.

Cutler, D. M. and G. Miller. 2005. "The role of public health improvements in health advances: The twentieth-century United States."*Demography* 42(1):1-22.

Cutler, D. M., A. S. Deaton and A. Lleras-Muney. 2006."The determinants of health". *NBER Working Paper* No. 11963.

Creese, A. L. 1992."Health is wealthbut also wealth is health". *World Health*, November-December 4-5.

Das, J. and J. Hammer. 2004. "Strained mercy: The quality of medical care in Delhi". Washington DC: *World Bank Policy Research Working Paper* No. 3228.

Dollar, D. 2001."Is globalization good for your health?" *Bulletin of the World Health Organization*, 79(9): 827-833.

Drèze, J. and M. Murthi. 2001."Fertility, education, and development". *Population and Development Review*, 27: 33-63.

Easterlin, R. 1999. "How beneficent is the market? A look at the modern history of mortality". *European Review of Economic History,* 3(3): 257-94.

Easterly, W. and Levine, R. 1997. "Africa's growth tragedy: Policies and ethnic divisions". *Quarterly Journal of Economics*, 112(4): 1203-50.

Eastwood, R. 2009. "Macroeconomic approaches to identifying the effects of health on output, growth and poverty". Framework Paper for AERC Project: Health, Economic Growth, and Poverty Reduction in Africa.

Ettling, J.1981."The germ of laziness: Rockefeller philanthropy and public health in the New South". Cambridge, Massachusetts: Harvard University Press.

Fayissa, B. and P. Gutema. 2008."A health production function for Sub-Saharan Africa". Department of Economics and Finance Working Paper Series. August.

Filmer, D and L. Pritchet. 1997. "Child mortality and public spending on health: How much does money matter?" Policy Research Working Paper 1864, Washington DC.

Fogel, R. W. 1994."Economic growth, population theory, and physiology: The bearing of long-term processes on the making of economic policy". *American Economic Review*, 84(3): 369-95.

Fogel, R. W. 1986."Nutrition and the decline in mortality since 1700: Some additional preliminary findings". NBER Working Paper 1802, National Bureau of Economic Research, Boston, MA.

Fogel, R. W. 2002."Nutrition, physiological capital, and economic Growth". *Pan American Health Organization and Inter-American Development Bank*.

Fuchs, V. R. 1974. *Who shall live? Health, Economics and Social Choice*. New York: Basic Books.

Fuentes J., J. Hernandez, M. Pascual. 2001."The effects of early nutritional intervention on human capital formation". Report prepared by the Institute of Nutrition of Central America and Panama (INCAP) for Working Group 1 of the Commission on Macroeconomics and Health (CMH), Guatemala.

Gallup, J. and J. Sachs. 2000."The economic burden of malaria". *Working Paper* No. 52, Center for International Development, Harvard University.

Gemmell, N. 1996."Evaluating the impacts of human capital stocks and accumulation on economic growth: Some evidence", *Oxford Bulletin of Economics and Statistics*, 58(1): 9-29.

Gracey, M. 2000."Urbanization and child health". *Papua New Guinea Medical Journal*, 43(1-2): 30-33.

Grammy, A. P. and D. Assane. 1996. "New evidence on the effect of human capital on economic growth", *Applied Economic Letters*, 4: 121-4.

Grossman, M. 1972a. *The demand for health: A theoretical and empirical investigation*. Occasional Paper 119. New York: National Bureau of Economic Research.

Grossman, Michael.1972b. "On the concept of health capital and the demand for health". *Journal of Political Economy*, 80(2): 223-255.

Gyimah-Brempong, K. and M. Wilson. 2004. "Health human capital and economic growth in Sub-Saharan African and OECD countries". *The Quarterly Review of Economics and Finance*, 44(2): 296-320.

Hamoudi, A.and J. Sachs.1999. "Economic consequences of health status: A review of the evidence". *CID Working Paper* No. 30. Harvard Center for International Development, Cambridge, MA.

Hanmer, L., R. Lensink, and H. White. 2003."Infant and child mortality in developing countries: Analyzing the data for robust determinants". *Journal of Development Studies*, 40(1):101-118.

Hanmer, L and Naschold, F. 2001."Attaining the international development targets: Will growth be enough?"*WIDER Development Conference on Growth and Poverty*.

Hanmer, L and H. White.1999. "The impact of HIV/AIDS on under five mortality in Zambia and Zimbabwe". In *Human development in Sub-Saharan Africa: The determinants of under five mortalities*, ISSAS: The Hague, Journal.

Heyen-Perschon, J. 2005. Report on current situation in the health sector of Ghana and possible roles for appropriate transport technology and transport related communication interventions. Institute for Transportation and Development Policy.

Hojman, D. E. 1996. "Economic and other determinants ofinfant and child mortality in small developing countries: The case of Central America and the Caribbean", Department of Economics and Institute of Latin America Studies, University of Liverpool, Chapman and Hall, UK.

Imam, B. M. and S. F. Koch.2004."The Determinants of infant, child and maternal mortality in Sub-Saharan Africa". *Journal for Studies in Economics and Econometrics*, 28(2): 23-40.

Jack, W. and M. Lewis. 2009."Health investments and economic growth: Macroeconomic evidence and microeconomic foundations," *Policy Research Working Paper Series* 4877, World Bank.

Jamison, D. T., Sandbu, M.E., and J. Wang. 2004. "Why has infant mortality decreased at such different rates in different countries?" Working Paper 21, Disease Control Priorities Project, Bethesda, MD.

Kovsted, J., C.C. Pörtner and F. Tarp. 2002."Child health and mortality: Does health knowledge really matter?". *Journal of African Economies,* 11(4): 542-560.

Lewis, W. A. 1955. *The theory of economic growth.* Homewood, IL: R. D. Irwin.

Lleras-Muney, A. 2005."The relationship between education and adult mortality in the United States". *Review of Economic Studies*, 72(1): 189-221.

Mankiw, G., D. Romer and D. Weil.1992."A contribution to the empirics of economic growth". *Quarterly Journal of Economics*, Vol. 107: 407-37.

McKeown, T. 1976. *The modern rise of population.* New York: Academic Press.

McKeown T., Brown R. G.1955. "Medical evidence related to English population changes in the eighteenth century". P*opulation Studies,* 9: 119–141.

McKeown T., Record R. G.1962."Reasons for the decline of mortality in England and Walesduring the nineteenth century". *Population Studies, Vol.* 16: 94-122.

McKeown, T., R. G. Record and R. D. Turner. 1962."Reasons for the decline of mortality in England and Wales during the nineteenth century."*Population Studies* 16.2: 94-122.

McKeown, T., R. G. Record and R. D. Turner.1975."An interpretation of the decline of mortality in England and Wales during the twentieth century."*Population Studies* 29.3: 391-421.

Meara, E. 2001."Why is health related to socioeconomic status? The case of pregnancy and low birth rate".*NBER Working Paper* No. W8231.

Miguel, E. and M. Kremer. 2004. Worms: Identifying impacts on education and health in the presence of treatment externalities. *Econometrica*, 72(1): 159: 217.

Murray, C.J. L. and L.C. Chen.1992. "Understanding morbidity change." *Population and Development Review,* 18: 481-503.

Murray, C. J. L. and A. D. Lopez. 1997. "Regional patterns of disability-free life expectancy and disability adjusted life expectancy: Global burden of disease study." *Lancet,* 349: 1347-1352.

Murthi, M, A. Guio and J. Drèze. 1995."Mortality, fertility, and gender bias in India: Adistrict level analysis". *Population and Development Review*, 21(4): 745-782.

Mushkin, S. J. 1962."Health as an investment".*Journal of Political Economy*, 70: 129-57.

Noumba, I. 2004."Are wealthier nations healthier nations? A panel data approach to the determination of human development in Africa". Paper presented at the African Development and Poverty Reduction: The Macro-Micro Linkage, Forum Paper 2004, Somerset West, South Africa, 13-15 October.

Ntozi, J. P. M. and I. M. Nakanaabi.1997."The AIDS epidemic and infant and child mortality in six districts of Uganda".*Health Transition Review*, 7.

Pollitt, E. 1997."Iron deficiency and educational deficiency". *Nutritional Reviews*, 55: 133-140.

Pollitt, E. 2001."The developmental and probabilistic nature of the functional consequences of iron deficiency in children." *The Journal of Nutrition*, 131: 669S–675S.

Preston, S. H. 1975. "The changing relation between mortality and level of economic development". *Population Studies,* 29: 231-248.

Preston, S. H. 1980. "Causes and consequences of mortality declines in less developed countries during the 20th century". In Easterlin, R. A. (ed), *Population and Economic Change in Developing Countries*. Chicago: University of Chicago Press for National Bureau of Economic Research.

Pritchett, L. and L.H. Summers. 1996. "Wealthier is healthier". *Journal of Human Resources*, 31(4): 842-868.

Ram, R. Schultz, W. Theodore. 1979."Life span, health, savings, and productivity". *Economic Development and Cultural* Change, 27: 399-421.

Romer, P. 1990."Endogenous technical change".*Journal of Political Economy*, 98(5): 5129-150.

Rosen, S. and P. Taubman.1982."Some socioeconomic determinants of mortality". In Van der Gagg, J., W. B. Neeman and T. Tsukahara(eds),*Economics of Health Care*. New York: Praeger Publishers.

Sachs, J. and A. Warner. 1995. "Economic reform and the process of global integration". *Brookings Papers on Economic Activity*, 1: 1-118.

Sachs, J. and A. Warner. 1997."Sources of slow growth in African economies". *Journal of African Economies,* 6(3): 335-76.

Schultz, T. P. 1980. "Nobel lecture: The economics of being poor". *Journal of PoliticalEconomy*, 88(4): 639-51.

Schultz, T. P. 1992. "The role of education and human capital in economic development: An empirical assessment". Yale Economic Growth Center Discussion Papers No.670.

Schultz, T. P. 1999a. "Health and schooling investments in Africa".*Journal of Economic Perspectives*, Vol.13, No. 3: 67-88.

Schultz, T. P. 1999b. "Productive benefits of improving health: Evidence from low-income countries". *Mimeo.*

Schultz, T. P. 2002. "Wage gains associated with height as a form of human capital", *American Economic Review, Papers and Proceedings*.

Schultz, T. P. and A. Tansel. 1993."Measurement of returns to adult health". *LSMS 95.* Washington DC: World Bank.

Shastry, G. K. and D. Weil. 2003. How much of cross-country income variation is explained by health? *Journal of European Economic Association* 1: 387-396.

Smith, J. P. 1999. "Healthy bodies and thick wallets: The dual relation between health and socioeconomic status". *Journal of Economic Perspectives*, 13: 145-66.

Solow, R. M. 1956."A contribution to the theory of economic growth".*Quarterly Journal of Economics*, 70(1): 65-94.

Esty, D.C., J. A. Goldstone, T.R. Gurr, B. Harff, M. Levy, G.D. Dabelko, P.T. Surko, and A.N. Unger. 1999. State failure task force report: Phase II findings. *Environmental Change and Security Project Report*, Issue 5: 49 – 72.

Steckel, R. H. and R. Floud (eds), 1997. *Health and welfare during industrialization*. Chicago: University of Chicago Press.

Strauss, J. and D. Thomas. 1998. "Health, nutrition, and economic development". *Journal of Economic Literature*, 36(2): 766-817.

Thornton, J. 2002. "Estimating a health production function for the US: Some new evidence". *Applied Economics*, 34: 59-62.

UNAIDS. 2008. *Epidemiological fact sheet on HIV and AIDS: Core data on epidemiology and response, South Africa*. Joint publication of UNAIDS, WHO and UNICEF.

UNDP.1990. Human Development Index.United Nations Development Programme.

Weil, D. N. 2007. "Accounting for the effect of health on economic growth," *The Quarterly Journal of Economics*, 122.3: 1265-1306.

World Bank. 1981. *Accelerated development in Sub-Saharan Africa: An agenda for action,* Washington DC: World Bank.

World Bank. 1993. *World Development Report, 1993: Investing in health*. New York: Oxford University Press.

WHO. 1998. *Health, Health Policy and Economic Outcomes*. Prepared by the Health and Development Satellite, WHO Transition Team.

WHO. 1999. *World Health Report 1999: Making a Difference*. World Health Organization, Geneva.

WHO. 2003. *World Health Report 2003: Shaping the Future*. World Health Organization, Geneva.

Other recent publications in the AERC Research Papers Series:

Poverty, Inequality and Welfare Effects of Trade Liberalization in Côte d'Ivoire: A Computable General Equilibrium Model Analysis, by Bédia F. Aka, Research Paper 160.

The Distribution of Expenditure Tax Burden before and after Tax Reform: The Case of Cameroon, by Tabi Atemnkeng Johennes, Atabongawung Joseph Nju and Afeani Azia Theresia, Research Paper 161.

Macroeconomic and Distributional Consequences of Energy Supply Shocks in Nigeria, by Adeola F. Adenikinju and Niyi Falobi, Research Paper 162.

Analysis of Factors Affecting the Technical Efficiency of Arabica Coffee Producers in Cameroon, by Amadou Nchare, Research Paper 163.

Fiscal Policy and Poverty Alleviation: Some Policy Options for Nigeria, by Benneth O. Obi, Research Paper 164.

FDI and Economic Growth: Evidence from Nigeria, by Adeolu B. Ayanwale, Research Paper 165.

An Econometric Analysis of Capital Flight from Nigeria: A Portfolio Approach, by Akanni Lawanson, Research Paper 166.

Extent and Determinnants of Child Labour in Uganda, by Tom Mwebaze, Research Paper 167.

Oil Wealth and Economic Growth in Oil Exporting African Countries, by Olomola Philip Akanni, Research Paper 168.

Implications of Rainfall Shocks for Household Income and Consumption in Uganda, by John Bosco Asiimwe, Research Paper 169.

Relative Price Variability and Inflation: Evidence from the Agricultural Sector in Nigeria, by Obasi O. Ukoha, Research Paper 170.

A Modelling of Ghana's Inflation: 1960–2001, by Mathew Kofi Ocran, Research Paper 171.

The Determinants of School and Attainment in Ghana: A Gender Perspective, by Harry A. Sackey, Research Paper 172.

Private Returns to Education in Ghana: Implications for Investments in Schooling and Migration, by Harry A. Sackey, Research Paper 173.

Oil Wealth and Economic Growth in Oil Exporting African Countries, by Olomola Philip Akanni, Research Paper 174.

Private Investment Behaviour and Trade Policy Practice in Nigeria, by Dipo T. Busari and Phillip C. Omoke, Research Paper 175.

Determinants of the Capital Structure of Ghanaian Firms, by Jochua Abor, Research Paper 176.

Privatization and Enterprise Performance in Nigeria: Case Study of some Privatized Enterprises, by Afeikhena Jerome, Research Paper 177.

Sources of Technical Efficiency among Smallholder Maize Farmers in Southern Malawi, by Ephraim W. Chirwa, Research Paper 178.

Technical Efficiency of Farmers Growing Rice in Northern Ghana, by Seidu Al-hassan, Research Paper 179.

Empirical Analysis of Tariff Line-Level Trade, Tariff Revenue and Welfare Effects of Reciprocity under an Economic Partnership Agreement with the EU: Evidence from Malawi and Tanzania, by Evious K. Zgovu and Josaphat P. Kweka, Research Paper 180.

Effect of Import Liberalization on Tariff Revenue in Ghana, by William Gabriel Brafu-Insaidoo and Camara Kwasi Obeng, Research Paper 181.

Distribution Impact of Public Spending in Cameroon: The Case of Health Care, by Bernadette Dia Kamgnia, Research Paper 182.

Social Welfare and Demand for Health Care in the Urban Areas of Côte d'Ivoire, by Arsène Kouadio, Vincent Monsan and Mamadou Gbongue, Research Paper 183.

Modelling the Inflation Process in Nigeria, by Olusanya E. Olubusoye and Rasheed Oyaromade, Research Paper 184.

Determinants of Expected Poverty Among Rural Households in Nigeria, by O.A. Oni and S.A. Yusuf, Research Paper 185.

Exchange Rate Volatility and Non-Traditional Exports Performance: Zambia, 1965–1999, by Anthony Musonda, Research Paper 186.

Macroeconomic Fluctuations in the West African Monetary Union: A Dynamic Structural Factor Model Approach, by Romain Houssa, Research Paper 187.

Price Reactions to Dividend Announcements on the Nigerian Stock Market, by Olatundun Janet Adelegan, Research Paper 188.

Does Corporate Leadership Matter? Evidence from Nigeria, by Olatundun Janet Adelegan, Research Paper 189.

Determinants of Child Labour and Schooling in the Native Cocoa Households of Côte d'Ivoire, by Guy Blaise Nkamleu, Research Paper 190.

Poverty and the Anthropometric Status of Children: A Comparative Analysis of Rural and Urban Household in Togo, by Kodjo Abalo, Research Paper 191.

African Economic and Monetary Union (WAEMU), by Sandrine Kablan, Research Paper 192.

Economic Liberalization, Monetary and Money Demand in Rwanda: 1980–2005, by Musoni J. Rutayisire, Research Paper 193.

Determinants of Employment in the Formal and Informal Sectors of the Urban Areas of Kenya, by Wambui R. Wamuthenya, Research Paper 194.

An Empirical Analysis of the Determinants of Food Imports in Congo, by Léonard Nkouka Safoulanitou and Mathias Marie Adrien Ndinga, Research Paper 195.

Determinants of a Firm's Level of Exports: Evidence from Manufacturing Firms in Uganda, by Aggrey Niringiye and Richard Tuyiragize, Research Paper 196.

Supply Response, Risk and Institutional Change in Nigerian Agriculture, by Joshua Olusegun Ajetomobi, Research Paper 197.

Multidimensional Spatial Poverty Comparisons in Cameroon, by Aloysius Mom Njong, Research Paper 198.

Earnings and Employment Sector Choice in Kenya, by Robert Kivuti Nyaga, Research Paper 199.

Convergence and Economic Integration in Africa: the Case of the Franc Zone Countries, by Latif A.G. Dramani, Research Paper 200.

Analysis of Health Care Utilization in Côte d'Ivoire, by Alimatou Cissé, Research Paper 201.

Financial Sector Liberalization and Productivity Change in Uganda's Commercial Banking Sector, by Kenneth Alpha Egesa, Research Paper 202.

Competition and Performance in Uganda's Banking System, by Adam Mugume, Research Paper 203

Parallel Market Exchange Premiums and Customs Revenue in Nigeria, by Olumide S. Ayodele and Francis N. Obafemi, Research Paper 204

Fiscal Reforms and Income Inequality in Senegal and Burkina Faso: A Comparative Study, by Mbaye Diene, Research Paper 205.

Factors Influencing Technical Efficiencies among Selected Wheat Farmers in Uasin Gishu District, Kenya, by James Njeru, Research Paper 206.

Exact Configuration of Poverty, Inequality and Polarization Trends in the Distribution of well-being in Cameroon, by Francis Menjo Baye, Research Paper 207.

Child Labour and Poverty Linkages: A Micro Analysis from Rural Malawian Data, by Leviston S. Chiwaula, Research Paper 208.

The Determinants of Private Investment in Benin: A Panel Data Analysis, by Sosthène Ulrich Gnansounou, Research Paper 209.

Contingent Valuation in Community-Based Project Planning: The Case of Lake Bamendjim Fishery Re-Stocking in Cameroon, by William M. Fonta, Hyacinth E. Ichoku and Emmanuel Nwosu, Research Paper 210.

Multidimensional Poverty in Cameroon: Determinants and Spatial Distribution, by Paul Ningaye, Laurent Ndjanyou and Guy Marcel Saakou, Research Paper 211.

What Drives Private Saving in Nigeria, by Tochukwu E. Nwachukwu and Peter Odigie, Research Paper 212.

Board Independence and Firm Financial Performance: Evidence from Nigeria, by Ahmadu U. Sanda, Tukur Garba and Aminu S. Mikailu, Research Paper 213.

Quality and Demand for Health Care in Rural Uganda: Evidence from 2002/03 Household Survey, by Darlison Kaija and Paul Okiira Okwi, Research Paper 214.

Capital Flight and its Determinants in the Franc Zone, by Ameth Saloum Ndiaye, Research Paper 215.

The Efficacy of Foreign Exchange Market Intervention in Malawi, by Kisukyabo Simwaka and Leslie Mkandawire, Research Paper 216.

The Determinants of Child Schooling in Nigeria, by Olanrewaju Olaniyan, Research Paper 217.

Influence of the Fiscal System on Income Distribution in Regions and Small Areas: Microsimulated CGE Model for Côte d'Ivoire, by Bédia F. Aka and Souleymane S. Diallo, Research Paper 218.

Asset price Developments in an Emerging stock market: The case study of Mauritius by Sunil K. Bundoo, Research Paper 219.

Intrahousehold Resources Allocation in Kenya by Miriam Omolo, Research Paper 220.

Volatility of Resources Inflows and Domestic Investment in Cameroon by Sunday A. Khan, Research Paper 221.

Efficiency Wage, Rent-Sharing Theories and Wage Determination in Manufacturing Sector in Nigeria by Ben E. Aigbokhan, Research Paper 222.

Government Wage Review Policy and Public-Private Sector Wage Differential in Nigeria by Alarudeen Aminu, Research Paper 223.

Rural Non-Farm Incomes and Poverty Reduction in Nigeria by Awoyemi Taiwo Timothy, Research Paper 224.

After Fifteen Year Use of the Human Development Index (HDI) of the United Nations Development Program (UNDP): What Shall We Know? by Jean Claude Saha, Research Paper 225.

Uncertainty and Investment Behavior in the Democratic Republic of Congo by Xavier Bitemo Ndiwulu and Jean-Papy Manika Manzongani, Research Paper 226.

An Analysis of Stock Market Anomalies and Momentum Strategies on the Stock Exchange of Mauritius by Sunil K. Bundoo, Research Paper 227.

The Effect of Price Stability on Real Sector Performance in Ghana by Peter Quartey, Research Paper 228.

The Impact of Property Land Rights on the Production of Paddy Rice in the Tillabéry, Niamey and Dosso Regions in Niger by Maman Nafiou Malam Maman and Boubacar Soumana, Research Paper 229.

An Econometric Analysis of the Monetary Policy Reaction Function in Nigeria by Chukwuma Agu, Research Paper 230.

Investment in Technology and Export Potential of Firms in Southwest Nigeria by John Olatunji Adeoti, Research Paper 231.

Analysis of Technical Efficiency Differentials among Maize Farmers in Nigeria by Luke Oyesola Olarinde, Research Paper 232.

Import Demand in Ghana: Structure, Behaviour and Stability, by Simon Kwadzogah Harvey and Kordzo Sedegah, Research Paper 233.

Trade Liberalization Financing and Its Impact on Poverty and Income Distribution in Ghana, by Vijay K. Bhasin, Research Paper 234.

An Empirical Evaluation of Trade Potential in Southern African Development Community, by Kisukyabo Simwaka, Research Paper 235.

Government Capital Spending and Financing and Its Impact on Private Investment in Kenya: 1964-2006, by Samuel O. Oyieke, Research Paper 236.

Determinants of Venture Capital in Africa: Cross Section Evidence, by Jonathan Adongo, Research Paper 237.

Social Capital and Household Welfare in Cameroon: A Multidimensional Analysis, by Tabi Atemnkeng Johannes, Research Paper 238.

Analysis of the Determinants of Foreign Direct Investment Flows to the West African and Economic Union Countries, by Yélé Maweki Batana, Research Paper 239.

Urban Youth Labour Supply and the Employment Policy in Côte d'Ivoire, by Clément Kouadio Kouakou, Research Paper 240.

Managerial Characteristics, Corporate Governance and Corporate Performance: The Case of Nigerian Quoted Companies by Adenikinju Olayinka, Research Paper 241.

Effects of Deforestation on Household Time Allocation among Rural Agricultural Activities: Evidence from Western Uganda by Paul Okiira Okwi and Tony Muhumuza, Research Paper 242.

The Determinants of Inflation in Sudan by Kabbashi M. Suliman, Research Paper 243.

Monetary Policy Rules: Lessons Learned From ECOWAS Countries by Alain Siri, Research Paper 244.

Zimbabwe's Experience with Trade Liberalization by Makochekanwa Albert, Hurungo T. James and Kambarami Prosper, Research Paper 245.

Determinants in the Composition of Investment in Equipment and Structures in Uganda by Charles Augustine Abuka, Research Paper 246.

Corruption at household level in Cameroon: Assessing Major Determinants by Joseph-Pierre Timnou and Dorine K. Feunou, Research Paper 247.

Growth, Income Distribution and Poverty: The Experience of Côte d'Ivoire from 1985 to 2002, by Kouadio Koffi Eric, Mamadou Gbongue and Ouattara Yaya, Research Paper 248.

Does Bank Lending Channel Exist In Kenya? Bank Level Panel Data Analysis by Moses Muse Sichei and Githinji Njenga, Research Paper 249.

Governance and Economic Growth in Cameroon by Fondo Sikod and John Nde Teke, Research Paper 250.

Analyzing Multidimensional Poverty in Guinea: A Fuzzy Set Approach, by Fatoumata Lamarana Diallo, Research Paper 251.

The Effects of Monetary Policy on Prices in Malawi, by Ronald Mangani, Research Paper 252.

Total Factor Productivity of Agricultural Commodities in the Economic Community of West African States: 1961-2005 by Joshua Olusegun Ajetomobi, Research Paper 253.

Public Spending and Poverty Reduction in Nigeria: A Benefit Incidence Analysis in Education and Health, by Uzochukwu Amakom, Research Paper 254.

Supply Response of Rice Producers in Cameroon: Some Implications of Agricultural Trade on Rice Sub-sector Dynamics by Ernest L. Molua and Regina L. Ekonde, Research Paper 255.

Effects of Trade Liberalization and Exchange Rate Changes on Prices of Carbohydrate Staples in Nigeria, by A. I. Achike, M. Mkpado and C. J. Arene, Research Paper 256.

Underpricing of Initial Public Offerings on African Stock Markets: Ghana and Nigeria by Kofi A. Osei, Charles K.D. Adjasi and Eme U. Fiawoyife, Research Paper 257.

Trade Policies and Poverty in Uganda: A Computable General Equilibrium Micro Simulation Analysis by Milton Ayoki, Research Paper 258.

Interest Rate Pass-through and Monetary Policy Regimes in South Africa by Meshach Jesse Aziakpono and Magdalene Kasyoka Wilson, Research Paper 259.

Vertical Integration and Farm gate prices in the Coffee Industry in Côte d'Ivoire by Malan B. Benoit, Research Paper 260.

Patterns and Trends of Spatial Income Inequality and Income Polarization in Cameroon by Aloysius Mom Njong and Rosy Pascale Meyet Tchouapi, Research Paper 261.

Private Sector Participation in the Provision of Quality Drinking Water in Urban Areas in Ghana: are the People Willing to Pay? By Francis Mensah Asenso-Boadi and Godwin K. Vondolia, Research Paper 262.

Private Sector Incentives and Bank Risk Taking: A Test of Market Discipline Hypothesis in Deposit Money Banks in Nigeria by Ezema Charles Chibundu, Research Paper 263.

A Comparative Analysis of the Determinants of Seeking Prenatal Health Care in Urban and Rural Areas of Togo by Ablamba Johnson, Alima Issifou and Etsri Homevoh, Research Paper 264.

Predicting the Risk of Bank Deterioration: A Case Study of the Economic and Monetary Community of Central Africa by Barthélemy Kouezo, Mesmin Koulet-Vickot and Benjamin Yamb, Research Paper 265.

Analysis of Labour Market Participation in Senegal by Abou Kane, Research Paper 266.

What Influences Banks' Lending in Sub-Saharan Africa? by Mohammed Amidu, Research Paper 267.
Central Bank Intervention and Exchange Rate Volatility in Zambia by Jonathan Mpundu Chipili, Research Paper 268.
Capital Flight from the Franc Zone: Exploring the Impact on Economic Growth by Ameth Saloum Ndiaye, Research Paper 269.
Dropping Out of School in the Course of the Year in Benin: A Micro-econometric Analysis by Barthelemy M. Senou, Research Paper 270.
Determinants of Private Investment Behaviour in Ugandan Manufacturing Firms by Niringyiye Aggrey, Research Paper 271.
Determinants of Access to Education in Cameroon by Luc Nembot Ndeffo, Tagne Kuelah Jean Réné & Makoudem Téné Marienne Research Paper 272.
Current Account Sustainability in the West African Economic and Monetary Union Countries by Zakarya Keita, Research Paper 273.
An Empirical Assessment of Old Age Support in sub-Saharan Africa: Evidence from Ghana by Wumi Olayiwola, Olusanjo Oyinyole & S.L. Akinrola, Research Paper 274.
Characteristics and Determinants of Child Labour in Cameroon by Laurent Ndjanyou and Sébastien Djiénouassi, Research Paper 275.
Private Sector Investment in Sierra Leone: An Analysis of the Macroeconomic Determinants by Mohamed Jalloh, Research Paper 276.
Technical Efficiency and Productivity of Primary Schools in Uganda by Bruno L. Yawe, Research Paper 277.
Comparisons of Urban and Rural Poverty Determinants in Cameroon by Samuel Fambon, Research Paper 278.
Impact of External Debt Accumulation and Capital Flight on Economic Growth of West African Countries, by Akanni O. Lawanson, Research Paper 279.
Female Education and Maternal Health Care Utilization in Uganda by Asumani Guloba & Edward Bbaale, Research Paper 280.
HIV/AIDS Sero-prevalence and Socio-economic Status: Evidence from Uganda by Ibrahim Kasirye, Research Paper 281.
Female Education, Labour Force Participation and Fertility: Evidence from Uganda by Edward Bbaale, Research Paper 282.
Estimating the Informal Cross-border Trade in Central Africa, by Robert Nkendah, Chantal Beatrice Nzouessin and Njoupouognigni Moussa, Research Paper 283.