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Public expenditure and health status in the context of millennium development goals in Malawi

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Abstract

Conventional wisdom justifies large public expenditure to finance human capital formation. Despite significant achievements in human development, Malawi is slowly making progress to achieve the Millennium Development Goals (MDGs) by 2015. Since the year 2000, Malawi has experienced a decline in infant mortality rates (IMRs) and this study examines the determinants of reductions in IMRs with a focus on the impact of public expenditure. Data come from censuses and various surveys conducted between 1978 and 2011 and regression results generally show that public expenditure per se does not influence reductions in IMR. A number of other factors mediate the impact of public expenditure on IMRs thereby making the effect of government interventions on health more indirect than direct. While public expenditure on health is inevitable, these results call for the Malawi Government to pursue policies that balance increased expenditure on health with efficient use of resources. Adopting this strategy is very likely to accelerate progress in achieving the MDGs for health.

Keywords: Public expenditure; Infant mortality; Malawi; Least developed countries; Millennium Development Goals

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1. Introduction

A number of studies (e.g. Romer, 1990; Mundle, 1998) have long recognized the critical role of public expenditure on human development. Public expenditure is a backbone of emerging sub Saharan Africa economies and provides social services such as education and health at the primary, secondary, and tertiary levels. The advantage of public expenditure is its ability to improve the welfare and productivity of the poor and the rich and ultimately advancing human capital development. Labor, by virtue of it being a factor of production, entails that its quality and quantity determine production, (Todaro and Smith, 2009). (Roux, 1994, p.1) states that:

> *"... improving the quality of the labor force yields implicit non-economic outputs related to the generation of ideas and decisions which have a significant positive impact on innovation investment and other growth opportunities",*

Despite the myriad of factors that influence economic growth, there is sufficient evidence to suggest that formal education and health contributes immensely to economic growth. Public expenditure on education and health has the potential to enhance economic growth while at the same time promoting equity and reducing poverty (Gupta et al., 1998). Worldwide, it is recognized that good health is one of the basic rights for an individual. This perception has led to the emergence of extensively supported social systems which aim at providing unlimited access at zero or minimal cost.

The MDGs, the strongest commitment by the international community to end global poverty, came into effect in September 2000. The international community acknowledges that development is multidimensional and that ending poverty is beyond strategies that only increase incomes (UNDP, 2003). The eight MDGs focus on income and food, education, gender equality, child mortality, maternal health, HIV/ AIDS and other major diseases, environmental sustainability, and global partnerships (United Nations, 2007). The MDGs embody 18 targets with 48 social and human development indicators to monitor progress toward the achievement of the MDGs.

As part of its commitment to the MDGs, the Malawi Government started implementing the Malawi Poverty Reduction Strategy (MPRS) between 2002 and 2005. In 2006, the MPRS transitioned into the Malawi Growth and Development Strategy (MGDS) which is a policy framework to monitor progress to achieve the MDGs from 2006 to 2011. With support from its development partners, the Malawi Government is reorienting its work around the MDGs. As is the case with most middle-income countries, the implementation of the MDGs is integrated with regular budget processes and long-term development strategies. The MDGS largely focuses on reducing poverty through wealth creation.

The 2008 population census enumerated Malawi's population at 13.1 million (and an estimated population of 15.3 million people in 2012). Malawi had a relatively low adult literacy rate (64.1%) and a life expectancy of 46.3 years in 2008 compared with other African countries. The country ranked 164 out of 177 countries in the 2008 Human Development Report. The population is predominantly rural (83%) with an annual growth rate of 2.8%. The economy is highly dependent on rain-fed agriculture and the agricultural

sector contributes more than 35% of the Gross Domestic Product (GDP). Agriculture is a major source of livelihoods for more than 85% of the population (Chirwa, 2006). Malawi has a low GDP per capita of less than US$800 and an average GDP growth rate of 7% in real terms. At the time of this study, Malawi was facing several challenges including poverty which continued to be above 50% with a quarter of the population still ultra-poor. With a youthful population and an adult HIV/AIDS prevalence rate of 10.9%, Malawi's economy remains fragile with an inflation rate of up to 25% in August 2012 (World Bank, 2012).

Government expenditure policy has a key role in determining whether a country meets the agreed MDGs. In Malawi, the total amount of resources required from 2003 to 2015 for achieving the MDGs was estimated at US$7 billion (Malawi Government, 2002-2009). Despite renewed commitment to achieving the MDGs by 2015, in the form of increased public expenditure and improvement in the GDP growth rate (7% on average) (Malawi Government, 1990-2008) the progress towards achieving the set targets is inadequate. The economic progress has not translated into improved wellbeing. This challenges the policies and strategies that have been adopted to achieve the MDGs and consequently improvements in living standards.

Against this background, this study investigates the impact of public expenditure on health in Malawi. We analyze the relationship between the input, output, and outcomes with a focus on MDG 4 which targets reduction in childhood mortality. Specifically, the objective of the study is to provide a quantitative evaluation of the relationship between public expenditure and health outcomes with a focus on IMR. We hypothesize that public health expenditure does not have an influence on IMR reduction.

Adopting this research strategy is imperative since earlier studies (e.g., [Barro, 1990; Barro and Sala-l-Martin, 1992; Minea 2008]) have dealt specifically with the general role of public expenditure on economic growth. Numerous studies have also been conducted exclusively on public health expenditure on economic growth. However, there is a dearth of studies on whether public expenditure on the health sector results in more and well healthier people. In addition, Malawi produces annual reports on the MDGs and the MGDS. Nevertheless, these reports only focus on the performance of the indicators (and budget performance with respect to the MGDS) without evaluating the input-output relationship. The uniqueness of this study is its ability to assess the impact of public spending towards achieving MDG 4. In the next sections, we present the methodology of the study, results of our analyses, and conclude with policy implications.

2. Malawi's economic performance and public expenditure on health

2.1. Economic performance in brief

The Malawi Growth and Development Strategy (MGDS) is the second poverty reduction strategy for Malawi and 2008 was its fourth year of implementation. Between 2005/06 and 2008/09, expenditure towards social development has been increasing. For example, the budget for sustainable growth increased from about 30 million Malawi Kwacha (MK) in 2005/06 (on average US$1=MK123) to slightly over MK60 million in 2008/09 (on average US$1=MK146). Social protection and disaster risk management expenditure was virtually non-existent. Social development expenditure was the highest at MK40 million in 2005/06 and

steadily increased to over MK80 million in 2008/09. Expenditure on infrastructure was relatively stable at around MK13 million in 2005/06 to around MK22 million in 2008/09 (Malawi Government, 2004–2009).

In Malawi, poverty declined from 52.4% in 2004/5 to 40% in 2008 largely due to relatively strong economic growth. Nevertheless, domestic borrowing picked up during 2008/9 against an MGDS target of 30-35% by 2011. Despite the global downturn, the economy grew by 9.7% in real terms in 2008, compared with 8.6% and 6.7% in 2007 and 2006, respectively. Inflation and domestic debt had been on constant downward trend between 2004 and 2008 although domestic borrowing picked up during 2008/9. The deterioration of Malawi's economic performance was largely due to the falling prices for Malawi's main cash crops (tobacco, cotton, sugar, and tea) (Malawi Government, 1990-2008).

2.2. Public expenditure

Malawi experienced a strong growth in total budgeted expenditure between 2004/05 and 2009/10, with an average nominal annual growth rate of 23%, and real GDP growth rates equivalent of 10.6%. Although accounting for inflation attenuates the growth rate, the sharp drop in inflation in this period to single digit figures since 2007/08 meant that considerable real growth rates were still achieved.

Budget expenditure in health has been rising in real terms and as a share of total budget expenditures. However, the government commitment to the sector is insufficient to accommodate the demands of significant expansion and improvement in the system. A major pitfall of Malawi's financing mechanisms in the health sector is the over-dependence on scarce government resources. Per capita budget expenditure on health is still low compared with international standards (Malawi Government & World Bank, 2006).

Household spending on health is very large, amounting to a quarter of total expenditure and influenced by the increasing privatization of care, and drug and supply shortages in public facilities. Most household spending is on outpatient care (Malawi Government & World Bank, 2006).

2.3. Overview of the health sector

Health services in Malawi are organized into four levels. At the most rudimentary level, the household itself produces health services through "self-care" and use of appropriate health information and goods available within the immediate community through a range of suppliers including health surveillance assistants; social marketing programs; village drug revolving funds; and drug shops.

The first level of the household's contact with the facility-based network is the primary care health posts, dispensaries, clinics, and centres. The second level is represented by district hospitals, which act as referral units for primary–level facilities. In general, there is a district secondary–level hospital for each district. Places with no government district hospitals are served by the Christian Health Association of Malawi (CHAM) hospital network. The tertiary level consists of the four central hospitals (Queen Elizabeth Central Hospital (QECH) in Blantyre; Zomba General Hospital; Lilongwe Central Hospital (LCH); and Mzuzu Central Hospital). Blantyre and Lilongwe have no district hospitals and the QECH and LCH also act as district

hospitals. Although most health facilities in the country are under the Ministry of Health, the non-government sector is growing rapidly.

The health status of Malawians continues to be poor and progress on basic indicators is mixed. Life expectancy declined from 48 to 46 years between 1990 and 2005, mainly as a result of HIV/AIDS. The under-five mortality rate (deaths per 1,000 live births) declined from 258 in the 1980s to 122 in 2008, and the IMR declined from 138 deaths per 1,000 live births in the late 1980s to 66 in 2008. Malawi's maternal mortality ratio (deaths per 100,000 live births) has declined from 1,120 in 2000 to 807 in 2008 but remains alarmingly high.

The Malawi Health Management Information system shows that malaria incidence declined from the extremely high rate of 812 cases per 1,000 in 1992 to around 282 per 1,000 in 2005, but continues to be a major problem especially among women and children. Despite of this progress, the health sector is wrought with inefficiencies and inequities to poor management and inappropriate pricing of services. The method of financing referrals and medical evacuation abroad through direct budget support is inefficient, unsustainable, and lacks transparency (Malawi Government and World Bank, 2006).

3. Data and methodology

3.1. Data

Data come from the 1992, 2000, and 2004 Malawi Demographic and Health Surveys (DHS); Malawi population censuses (1998 and 2008); Integrated Household Survey (IHS) 1998 and 2005; Malawi Multiple Indicator Cluster Survey (MICS) 2006; Malawi MDGs Reports (2002, 2003, 2007, 2008, and 2009); Malawi Government Economic Reports (1990-2008); and the various Health Statistics Bulletins. Other sources of data include International Monetary Fund financial statistics, World Development Reports, and Human Development Reports. The period of interest for presentation purposes is from 1978 to 2008, taking into account the pre-MDG period as well. Based on previous studies, the study uses the ordinary least squares (OLS) regression model:

$$[\,IMR = b_0 + b_1 ECG + b_2 TPHE + b_3 PI + b_4 PGDP + b_5 IRC + b_6 BA + b_7 POPGR + e_i\,] \quad (1)$$

where;

- IMR is infant mortality rate, one of the MDG 4 indicators;
- ECG is the economic growth and calculated as percentage change in GDP;
- TPHE: is per capita health expenditure;
- PI is the poverty incidence;
- PGDP is per capita income / per capita GDP, a proxy indicator of household poverty;
- IRC is immunization rate for children (<12 months). Child immunization measures the percentage of vaccinations coverage of children less than one year of age. The World Health Organization considers a

child as adequately immunized against diphtheria, pertusis (or whooping cough), and tetanus (DPT) after receiving three doses of vaccine;

- BA is proportion of birth attended by skilled personnel (midwife, doctor or nurse);
- POPGR is the population growth rate;
- bo, b1, …, b7 are the regression coefficients; and
- Ɛi represents random effects, capturing all the factors that affect the outcomes in the health sector but will not be explicitly taken into account in the models.

The data were analyzed using Econometric Views version 7.1. The OLS regression method is used where there is no violation of classical linear regression model assumptions. In addition, the OLS estimates are said to be best, linear, and unbiased. We also performed a number of diagnostics tests such as unit root tests for the economic variables to determine their time series characteristics. Unit root tests ascertain the number of times a variable has to be differenced to become stationary.

4. Results

4.1. Unit root tests

The unit root tests results on the variables being considered in this study (results not reported here) revealed that the variables are not integrated of the same order. On the one hand, THPE, PI, ECG, and PGDP are stationary in levels. On the other hand, BA, IMR, and IRC are integrated of order one. For purposes of this study it is assumed that variables in this study are integrated of order one (Gujarat, 1993). This leads to estimation of a long run static equation and an error correction short run dynamic equation.

4.2. Correlation matrix of variables

Table 1. Correlation matrix for variables

	IMR	**TPHE**	**IRC**	**BA**	**PI**	**POPGR**	**ECG**	**PGDP**
IMR	1.00	-0.82	-0.58	-0.80	0.37	0.43	-0.12	0.34
TPHE	-0.82	1.00	0.46	0.79	-0.28	-0.34	0.26	-0.19
IRC	-0.58	0.46	1.00	0.81	-0.19	-0.85	-0.05	-0.56
BA	-0.80	0.79	0.81	1.00	-0.35	-0.71	0.06	-0.53
PI	0.37	-0.28	-0.19	-0.35	1.00	0.18	-0.02	0.24
POPGR	0.43	-0.34	-0.85	-0.71	0.18	1.00	-0.05	0.67
ECG	-0.12	0.26	-0.05	0.06	-0.02	-0.05	1.00	0.39
PGDP	0.34	-0.19	-0.56	-0.53	0.24	0.67	0.39	1.00

Table 1 presents the correlation matrix for variables and results show that multicollinearity is less of a problem based on the rule of thumb that multicollinearity should be less than 85% to pose a significant problem.

4.3. Estimation and diagnostics

The long run model specification test results were favourable. A Ramsey RESET p-value obtained is 0.349. Thus, at 5% level of significance there is no adequate evidence to reject the model hypothesis. The ARCH LM tests for autoregressive conditional heteroscedasticity in the residuals. The null hypothesis is that there is ARCH up to the order q in the residuals. The results indicate the absence of ARCH at 1%, 5%, and 10% significance levels. ARCH test results yield a p-value of 0.92, high enough to wrongly reject the homoscedasticity hypothesis. Therefore, it is evident that the new equation has homoscedastic variance which is ideal for the estimates to possess efficiency properties.

Serial correlation tests are implemented using the Breusch-Godfrey test for higher order serial correlation. The Durbin-Watson (DW) test has limited utility in detecting first order serial correlation and is not used as a diagnostic test. Moreover, the DW test assumes that no lagged dependent variable is included in the model. The p-value obtained, 0.87 is fairly high to wrongly reject the absence of serial correction in the model at 5% level of significance. It follows that the model does not have serial correlation problems.

The Histogram-Normality Test was employed to establish the normality of the error term. If the error term is not normally distributed so will be the estimators thereby limiting efforts to derive the values of estimators. The results are consistent with the null hypothesis that the error term is not normally distributed.

4.4. Short-run dynamic model

The regression equation is estimated in first differences in order to test short-run adjustment mechanism towards the long-run equilibrium estimated in the long-run equation. The residuals obtained from the long-run equation were entered into the short-run equation as an error correction term, ECM. Table 2 presents the results of the short-run dynamic model diagnostics.

Table 2. Short-run dynamic model diagnostics

Type of Test	Probability
Ramsey RESET Test	0.719
Histogram-Normality Test	0.372
Breusch-Godfrey Serial Correlation LM Test	0.729
Arch's Heteroscedasticity Test	0.900

In Table 2, results show that the model passes the test (p=0.372) at 5% level of significance. The probability of wrongly rejecting the normality is high at this level of significance hence the normality of error terms cannot be rejected. Similarly, the Arch's Heteroscedasticity p-value of 0.90 implies that the error term has homoscedastic variance at all conventional levels of significance. Thus, efficiency of the estimators is still relied upon. The model succeeds the specification test through the Ramsey RESET test with p=0.719. This value is still high to wrongly reject the hypothesis that the model is correctly specified. The model also yields favorable Breuch-Godfrey serial correlation test results. An associated p-value of 0.729 is good enough to conclude that there is no adequate evidence for serial correlation.

4.5. Analysis of partial regression coefficients

Based on the econometric diagnostic tests and selected transformations to overcome problems associated with heteroscedasticity, Table 3 presents the long-run static equation for IMR and results show that TPHE, BA, ECG, POPGR, PI, PGDP, and IRC have a significant impact in explaining the variations in IMR in Malawi over the study period. In the long run, TPHE and BA are statistically different from zero at 5%. In the long run, PI, ECG, PGDP, and IRC are not statistically different from zero.

Table 3. Long-run static regression results of infant mortality rate (IMR) on selected socio-economic factors, Malawi 1980-2008, (n=31)

Variable	Coefficient	Std. error	T-statistic	P-value
Constant	265.4	62.4	4.25	0.000
Per capita public health expenditure	-309.8	142.5	-2.17	0.040
Immunisation rates for children	-0.012	0.5	0.03	0.973
Births attended by skilled staff	-2.2	0.8	-2.79	0.010
Poverty incidence	0.2	0.4	0.56	0.581
Population growth rate	-9.5	8.3	-1.16	0.260
Economic growth	-0.1	0.6	-0.11	0.914
Per Capita Income/Per Capita GDP	0.1	0.4	0.29	0.773
R-squared	0.866	Mean of IMR		129.35
Standard error of regression	13.04	Akaike info criterion		8.19
Durbin-Watson Statistic	1.90	Prob (F-statistic)		0.00

The short run dynamic process allowed us to make some meaningful interpretation of the dynamic process unlike the case with the over-parameterized model. The results presented in Table 4 shows that all the variables are statistically significant.

Table 4. Short-run regression results of infant mortality rate (IMR) on selected socio-economic factors, Malawi 1980-2008 (n=29)

Variable	Coefficient	Std. error	T-statistic	P-value
Constant	-1.92	2.63	-0.73	0.473
D(BA (-1))	-1.09	1.20	-0.91	0.374
D(ECG (-1))	0.09	0.44	0.20	0.845
D(IRC (-1))	-0.13	0.41	-0.32	0.754
D(PGDP(-1))	0.47	0.48	0.99	0.334
D(PI(-1))	-0.06	0.37	-0.16	0.873
D(POPGR(-1))	-8.30	6.96	-1.19	0.247
D(TPHE(-1))	-222.79	94.93	-2.35	0.029
ECM(-1)	0.94	0.21	4.43	0.000
R-squared	0.700	Mean of IMR		-3.379
Standard error of regression	12.145	Akaike info criterion		8.081
Durbin-Watson Statistic	2.225	Prob (F-statistic)		0.008

The results presented in Tables 3 and 4 show that in the long run, TPHE is significantly related to IMR. Bidani and Ravallion (1997) found that public expenditure has significant benefits for the health status of the poor, though not of the non-poor. This contradicts with other studies that often document that the impact of public expenditure is insignificant or inconclusive. The weak impact of public expenditure on health in the econometric analysis of the determinants of health outcomes (in both the rich and the poor countries) has long been recognized. For example, WHO (2001) documented that health system expenditure often seems to make little difference, even in poor countries with high infant and child mortality, which it should be a priority to reduce.

Immunization of children before one year is one of the basic prevention measures to health problems. As more children get immunized, their mortality rates are expected to decline. The coefficient for immunization is negatively related to mortality rates. This implies that as 1% increase in the number of immunized children leads to a considerable reduction in infant deaths. However, the coefficient is insignificant. This is contrary to Wang (2002) who found and concluded that at national levels and for rural households, first year vaccination coverage and thus low cost health interventions can also make a significant contribution to health outcomes.

The coefficient of economic growth is highly insignificant in the long and short run periods. In the short run, there is a positive relation whereas in the long run it's the opposite. This might be attributed to the fact that economic growth in Malawi, just as in sub Saharan Africa has been associated with worsening human

development. However, there is no evidence that in the short run, economic growth will contribute to increases in infant mortality.

Per capita GDP is positively related to infant mortality, contrary to the expectations of the study. However, the coefficient is insignificant implying that it doesn't contribute to the current trends in IMRs. This is dissimilar to other studies such as Roberts (2003) who found that per capita GDP alone explains 75-80% of the inter-county variation in health outcomes. A common estimate of the elasticity of mortality with respect to income is -0.6. The inclusion of socio-cultural variables (e.g., level of female education, income distribution, and ethno linguistic diversity) raises the level of explanation of inter-country variation in health outcomes to over 90%.

The results for this study affirm that poverty incidences contribute to infant mortality. The coefficient was positively related to infant mortality both in the long and short run. The differences between the health status of the poor and the non-poor within Malawi are bleak. Household survey results reveal that childhood mortality rates for households in the lowest income quintile are more than double the rates for households in the highest income quintile. However, the contribution is insignificant for the period of study.

With respect to population growth rate, Todaro and Smith (2009) argue that high fertility is detrimental to the health of mothers and children. It increases the health risks of pregnancy and closely spaced births which have shown to reduce birth weights and increase child and infant mortality. In the current study, population growth rates are negatively related to IMR. The coefficient of population growth rate was statistically insignificant both in the long run as well as in the short run. This entails that population growth is not important in affecting the IMRs in Malawi.

With respect to BA, the coefficient was not statistically different from zero, both in the long and short run. The coefficient of the equilibrium error term, ECM, was positive and significant at 5% level. This means that the adjustment process of infant mortality towards the equilibrium occurs at a dynamic rate. The positive coefficient implies that the equilibrium value is lower and the discrepancy between the actual and the equilibrium values is increased by 0.937 in each period.

5. Discussion

This study aimed at providing more insights on the factors associated with reductions in infant mortality in Malawi. In general, the study found that there are other factors that influence reductions in IMR apart from public expenditure. Administrative services consume a greater portion of government expenditure and the health sector has suffered neglect and is characterized by low or insignificant proportion of the government expenditure (Malawi Government, 2008). Generally, government spending on health has been increasing gradually despite the health sector enjoying a relatively marginal increase on the aggregate. These results suggest the need for policy strategies that focus, among other things, increasing per capita expenditure.

The reduction in IMRs is highly influenced by the amount of money injected into the health sector. As a result, there is a need for the government to seek and invest resources in preventive projects. Investing in

health education, water, sanitation, increasing immunization and fighting malnutrition will eventually lead to a reduction in child deaths annually.

The results of the study point to the need for the government to step up its efforts in nurturing human capital, through increased efficient expenditures in the social sector. Even though empirical studies have indicated that public expenditure is retrogressive to economic growth, human capital is one of the key elements to growth and development. It is only government that can foster human development since it has the elements of a public good.

Decentralization policy in the sectors should be accelerated but with enough resources to support its implementation and thus increase community participation. While poor communities will be given an opportunity to be involved in decision making, about the health of their communities, they should not be left alone to find resources to support policy implementation. Local level planning and monitoring ensures that pertinent and specific community problems and solutions are well recognized and acted upon. At the community level, it will be practical to monitor progress and advances towards the MDGs rather than at the national level where aggregates and averages are used and hence conceal the true situation on the ground.

To conclude, efforts should be made to improve awareness and facilitate greater utilization of health services particularly among the rural poor. This will require intensified and appropriate information, education, and communication campaigns. Re-socialization processes need to be emphasized through sensitization and mass campaigns. In some instances, due to negative cultural beliefs, values, and sometimes misinformation, communities fail or refuse to access health services even if these are freely available.

5.1. Study limitations

Although earlier studies have highlighted the role of government in the provision of health services as a public good, very few studies have looked at the relationship between public expenditure and health outcomes in the health sector in Malawi over the reference period. Most of the studies conducted elsewhere were largely cross sectional with fewer inclusions of sub-Saharan African countries. This entailed lack of direct empirical reference regarding the relationship of these variables.

Data used in this study were limited with particular reference to reliance on projections on poverty incidence. Data in Malawi are not regularly available and most of the nationally representative surveys such as DHS are conducted once every four or five years or through decennial censuses. As a result, detailed and time series data on selected indicators are lacking. Nevertheless, we hope that this study has provided some information critical for planning socioeconomic development focused on health outcomes.

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