



USAID
FROM THE AMERICAN PEOPLE

ANALYSIS OF THE LINKAGE BETWEEN DOMESTIC REVENUE MOBILIZATION AND SOCIAL SECTOR SPENDING

NATHAN ASSOCIATES INC.

MOTIVATION

- “Strengthening domestic resource mobilization, including through international support to developing countries, to improve capacity for tax and other revenue collection,” is a specific SDG.
- Health and education build human capacity that leads to inclusive and sustainable economic growth and thereby poverty alleviation.
- Health and education ministries focus on increasing spending efficiency, sector-specific financing, external funding, and budget reprioritization as ways to fund their spending.
- Health and education ministries do not consider supporting domestic resource mobilization as an alternative way to fund spending.
- This is due to the lack of empirical support for the linkage between domestic resource mobilization and allocation to health and education spending.

INTRODUCTION

- The study aims to answer the question: Do public expenditures in the health sector increase when domestic revenues increase in developing countries?



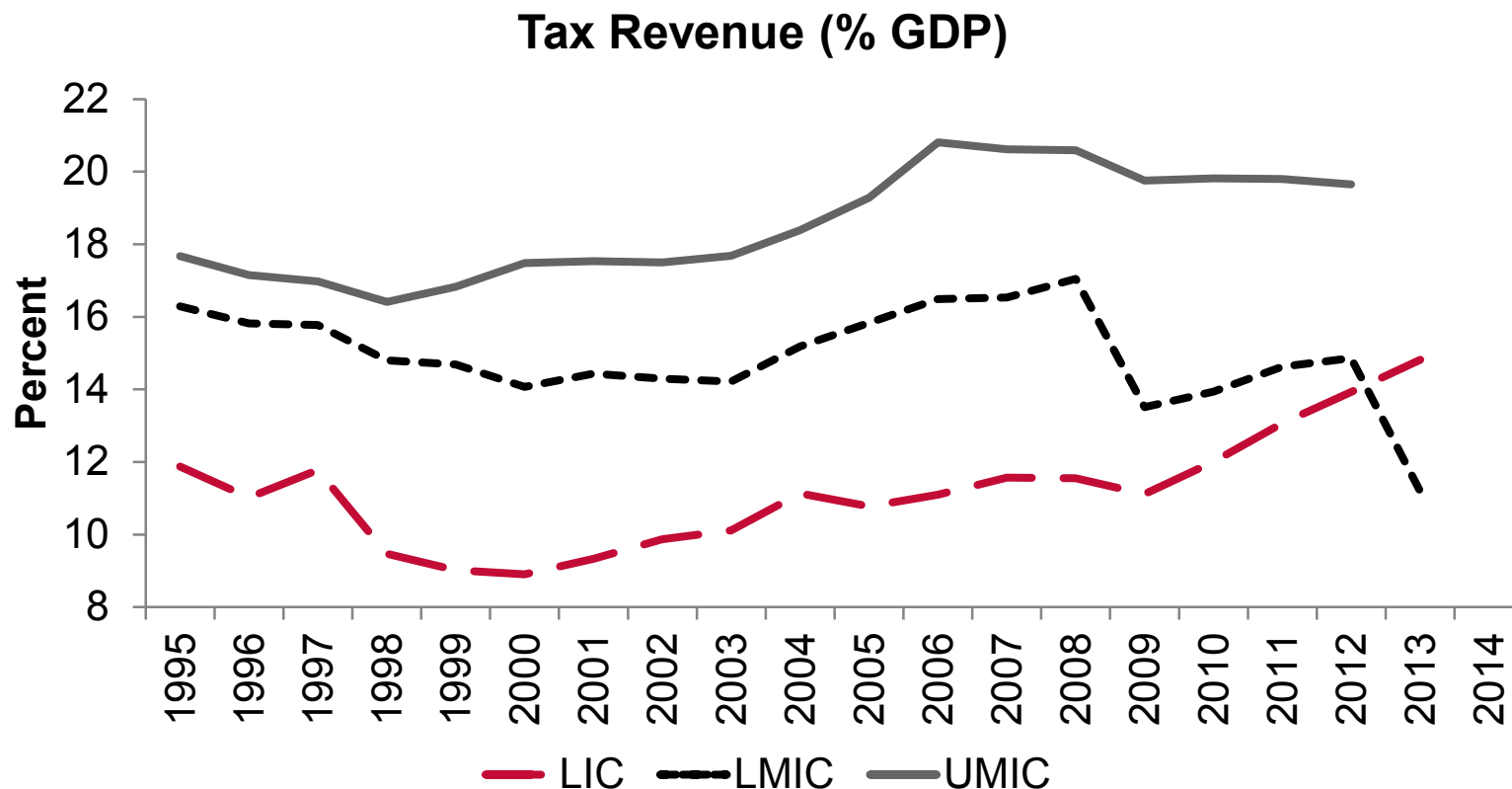
METHODOLOGY

- Thorough review of literature
- Develop econometric models, for different country groups, to identify the factors influencing public expenditure on health and education
- Estimate the models to quantify the relationship between tax revenue and public expenditure on health for:
 - Low income countries (LIC)
 - Lower middle income countries (LMIC)
 - Upper middle income countries (UMIC)

KEY VARIABLES

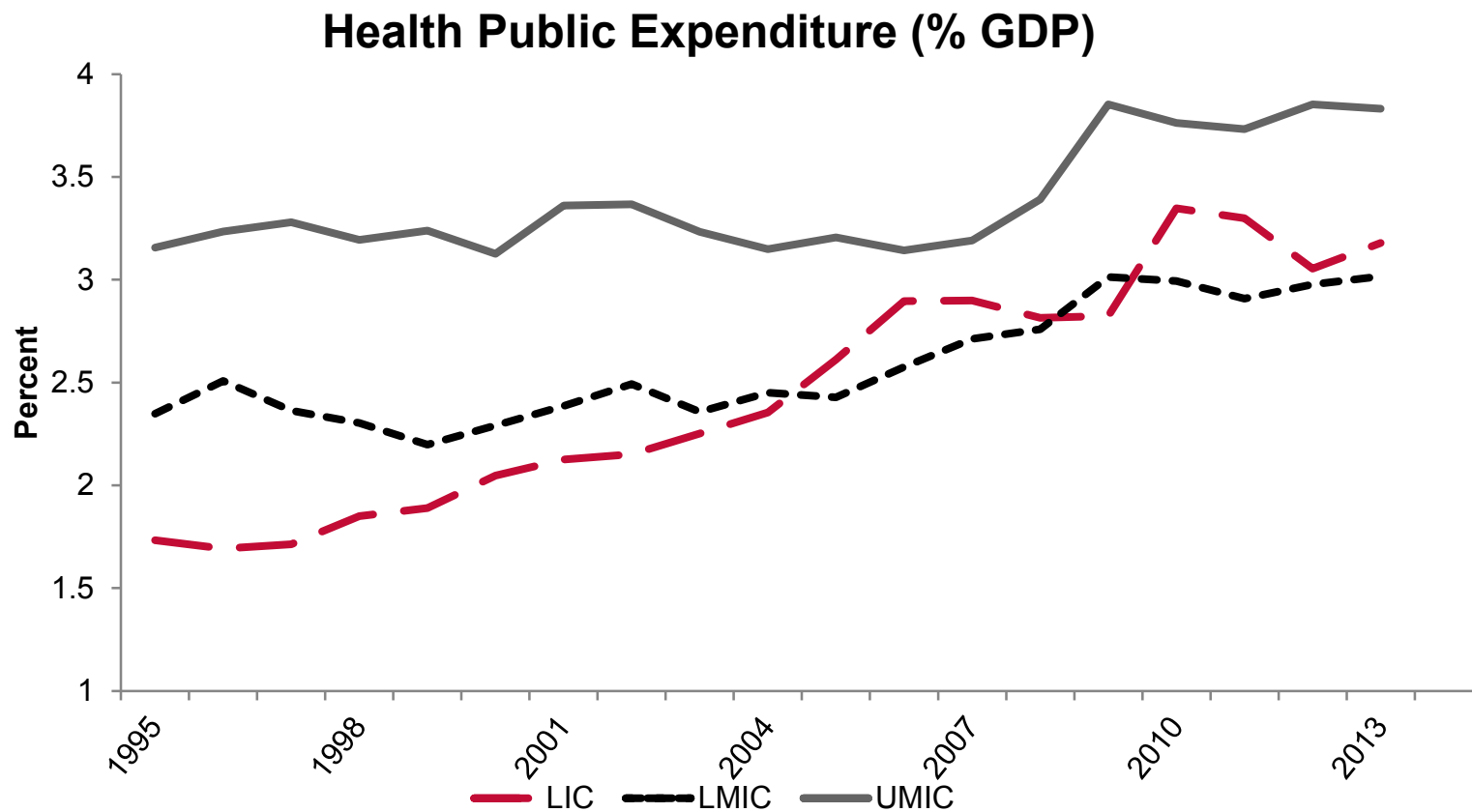
- Tax revenue
- Public spending on health
- Total public expenses
- GDP per capita, PPP (constant 2011 USD)
- Private health expenditure
- Health Assistance to countries
- Closeness to equator
- Access to improved sanitation
- Population between 0 to 14 years
- Population above 64 years

KEY STATS



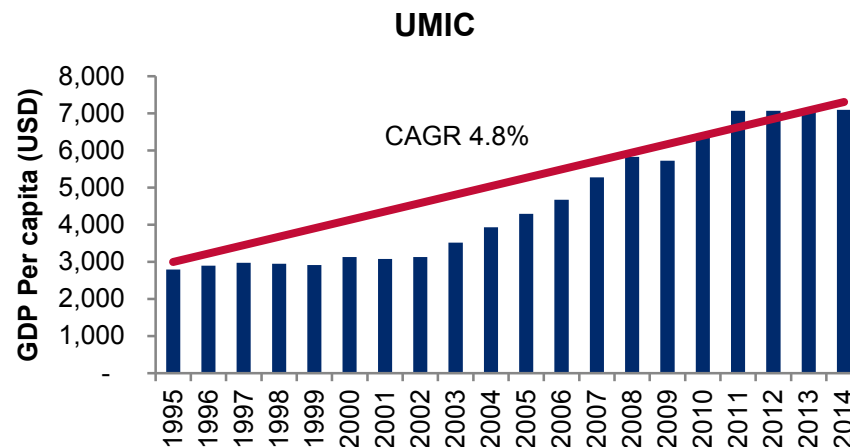
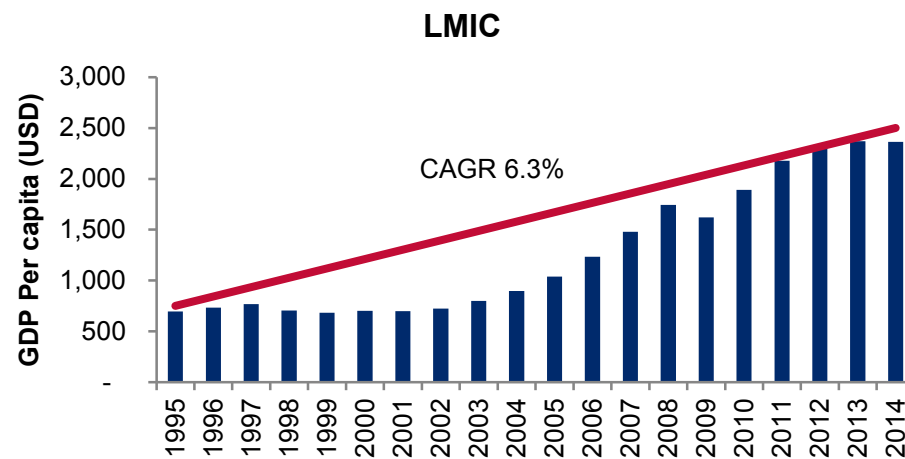
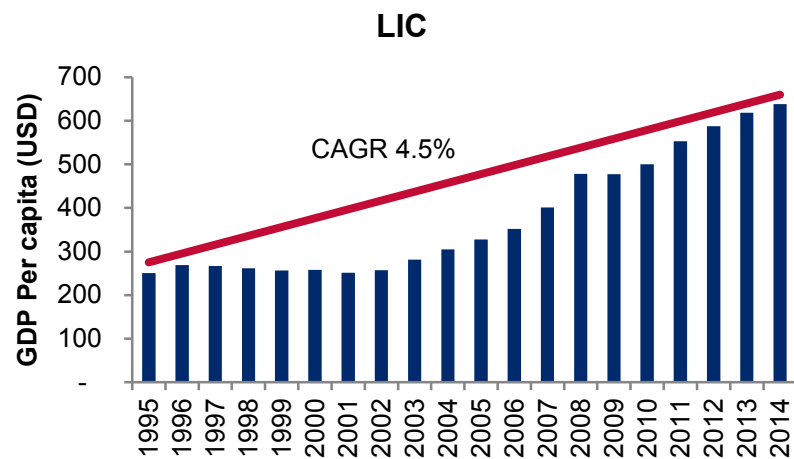
* Average of all countries covered in the study in the respective income group.

KEY STATS



* Average of all countries covered in the study in the respective income group.

KEY STATS



* Average of all countries covered in the study in the respective income group.

STRUCTURAL RELATIONSHIPS

Relationship between Total Expenses, Tax Revenues and Public Spending on Health.

Factors influencing TOTAL EXPENSES

(1) Total Expenses = fn (Tax Revenue, Total Other Revenues, GDP per capita (PPP), Total Population, Official Aid)

Factors influencing TAX REVENUE

(2) Tax Revenue = fn (Total Expenses, GDP per capita (PPP), Non-Agricultural Sector, Trade)

Factors influencing PUBLIC HEALTH EXPENDITURE

(3) Public Health Expenditure = fn (Tax Revenue, Total Other Revenues, GDP per capita (PPP), Lag Private Health Expenditure, Lag External Health Assistance, Equator Indicator, Needy population, Lag Improved Sanitation)

Substituting the variables of (1) in (2),

Tax Revenue (Equation 1)

Tax Revenue = fn (GDP per capita (PPP), Non-Agricultural Sector, Trade, Total Population, Official Aid, Total other revenues)

ESTIMATED RELATIONSHIPS

Tax Revenue (Equation 1)

Tax Revenue = fn (GDP per capita (PPP), Non-Agricultural Sector, Trade, Total Population, Official Aid, Total other revenues)

Health Expenditure (Equation 2)

Public Health Expenditure = fn (**Tax Revenue**, Total other revenues, GDP per capita (PPP), Lag Private Health Expenditure, Lag External Health Assistance, Equator Indicator, Needy population, Lag Improved Sanitation)

*Variables highlighted in GREEN are endogenous.

ESTIMATION APPROACH

- Tax revenue and public spending on health are endogenous, as confirmed by the Hausman test
- Given this endogeneity, we use the 2SLS estimation technique.
- Two structural equations estimated are:
 - a. Factors influencing tax revenue
 - b. Factors influencing public expenditure on health

DATA SOURCES

Panel data covering 74 countries over a period from 1990 to 2015

Factor	Variable Used	Source	Original Source
Formal Sector	(1 - Agriculture, value added (% of GDP))	World Development Indicators (WDI), World Bank	World Bank national accounts data, and OECD National Accounts data files.
Total Government Expense	Expense (% of GDP)	WDI, World Bank	International Monetary Fund, Government Finance Statistics Yearbook and data files, and World Bank and OECD GDP estimates.
Equator Indicator	Equator Dummy		The countries lying on the equator were identified from the world atlas.
GDP per capita	GDP per capita, PPP (constant 2011 international \$)	WDI, World Bank	World Bank, International Comparison Program database.
Other Total Revenue	(Revenue, excluding grants (% of GDP) - Tax revenue (% of GDP))	WDI, World Bank	International Monetary Fund, Government Finance Statistics Yearbook and data files, and World Bank and OECD GDP estimates.
Private Health Expenditure	Health expenditure, private (% of GDP) (Lag)	WDI, World Bank	World Health Organization Global Health Expenditure database
Public Health Expenditure	Health expenditure, public (% of GDP)	WDI, World Bank	World Health Organization Global Health Expenditure database
Improved Sanitation	Improved sanitation facilities (% of population with access) (Lag)	WDI, World Bank	WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation (http://www.wssinfo.org/).
Total Population	Population, total	WDI, World Bank	(1) United Nations Population Division. World Population Prospects, (2) United Nations Statistical Division. Population and Vital Statistics Report (various years), (3) Census reports and other statistical publications from national statistical offices, (4) Eurostat: Demographic Statistics, (5) Secretariat of the Pacific Community: Statistics and Demography Programme, and (6) U.S. Census Bureau: International Database.
Needy population	Population ages 65 and above (% of total)	WDI, World Bank	The United Nations Population Division's World Population Prospects.
	Population, ages 0-14 (% of total)		
Tax Revenue	Tax revenue (% of GDP)	WDI, World Bank	International Monetary Fund, Government Finance Statistics Yearbook and data files, and World Bank and OECD GDP estimates.
Trade	Trade (% of GDP)	WDI, World Bank	World Bank national accounts data, and OECD National Accounts data files.
Health Assistance	$((\text{Million USD} \times 1000000) / (\text{GDP LCU} / \text{Exchange Rate}))$ (% of GDP)	WHO, Global Health Expenditure Database	OCED Data and respective Government departments

COUNTRIES COVERED

LOW INCOME		LOWER MIDDLE INCOME		UPPER MIDDLE INCOME	
BENIN	12	BHUTAN	13	BELIZE	15
BURKINA FASO	11	EGYPT, ARAB REP.	13	BOTSWANA	8
BURUNDI	4	GEORGIA	15	BRAZIL	16
CENTRAL AFRICAN REPUBLIC	5	GHANA	11	BULGARIA	8
CONGO, DEM. REP.	15	GUATEMALA	12	GRENADA	7
ETHIOPIA	1	INDIA	17	IRAN, ISLAMIC REP.	14
MADAGASCAR	12	INDONESIA	13	JORDAN	17
MALI	14	KENYA	17	LEBANON	13
MOZAMBIQUE	3	KYRGYZ REPUBLIC	13	MALAYSIA	10
NEPAL	18	LESOTHO	13	MONGOLIA	15
NIGER	3	MOLDOVA	14	NAMIBIA	16
RWANDA	6	NICARAGUA	17	PERU	16
SIERRA LEONE	15	PAKISTAN	18	SOUTH AFRICA	13
TANZANIA	4	PAPUA NEW GUINEA	7	ST. LUCIA	3
TOGO	9	PHILIPPINES	16	ST. VINCENT AND THE GRENADINES	1
UGANDA	15	SRI LANKA	14	TUNISIA	17
		UKRAINE	14		
		ZAMBIA	15		
Total Obs	147		252		189

KEY FINDINGS

Health		leads to increase / decrease in public health expenditure		
		LIC	LMIC	UMIC
10% Increase in	Tax revenue	8%-10%	4%-7%	2%-3%
	External Health Assistance	3%-4%	2%	1%
	Private Health Expenditure	1%-2%	1%-2%	2%
	GDP per capita, PPP (constant 2011 USD)		1%-2%	2%

* Blank cell refers to statistical insignificant between the variables, i.e., no impact on the dependent variable.

2SLS ESTIMATION RESULTS

Equation 2: Log (Public Health Exp (% of GDP)) = fn (Log (Tax Revenue (% of GDP)), Log (GDP per capita (PPP constant 2011 USD)), Log (Lag Private Health Exp (% of GDP)), Log (Lag External Health Assistance (% of GDP)), Equator Dummy, Log (Needy Population), Log(Lag Improved Sanitation), Log (Other Total Revenue (% of GDP))			
	LIC	LMIC	UMIC
Intercept	5.76 *	(0.16)	3.79 ***
Log Tax Revenue (% of GDP)	1.03 ***	0.74 ***	0.35 ***
Log GDP per capita, (PPP constant 2011 USD)	(0.07)	0.17 **	(0.22) ***
Log Needy Population (% of total population)	(1.35) **	(0.36)	(0.44) **
Lag of log Private Health Exp (% of GDP)	0.22 ***	(0.16) ***	0.16 ***
Equator Dummy	(0.27) **	(0.50) ***	0.12 ***
Lag of Log Improved sanitation (% of pop access)	(0.14) *	0.12 **	0.04
Lag of log External Health Assistance (% of GDP)	0.35 ***	0.24 ***	0.06 ***
Log Other Total Revenue (% of GDP)	(0.02)	0.12 ***	0.05 **
R Square	80%	53%	45%
Adjusted R Square	79%	52%	43%
No of Observations	147	252	189
Wu-Hausman F (p-value) [1]	0.19	-	0.02
Minimum eigenvalue statistic (Weak Instruments)[2]	25.25	71.94	24.34

Note: Levels of significance at 1% (***), 5% (**) and 10% (*) percent. [1] Tests of endogeneity (Ho: variables are exogenous)

[2] In all income groups, the value is greater than critical value of 2SLS relative bias.

OLS ESTIMATION RESULTS

Equation 2: $\text{Log (Public Health Exp (\% \text{ of GDP}))} = \text{fn (Log (Tax Revenue (\% \text{ of GDP})), \text{Log (GDP per capita (PPP constant 2011 USD)), \text{Log (Lag Private Health Exp (\% \text{ of GDP})), \text{Log (Lag Health Assistance (\% \text{ of GDP})), \text{Equator Dummy, \text{Log (Needy Population), \text{Log(Lag Improved Sanitation), \text{Log (Other Total Revenue (\% \text{ of GDP}))}$

	LIC	LMIC	UMIC
Intercept	1.96	1.16	4.40 ***
Log Tax Revenue (% of GDP)	0.81 ***	0.41 ***	0.18 ***
Log GDP per capita, (PPP constant 2011 USD)	0.01	0.11	(0.20) ***
Log Needy Population (% of total population)	(0.33)	(0.33)	(0.45) **
Lag of log Private Health Exp (% of GDP)	0.13 *	(0.13) **	0.17 ***
Equator Dummy	(0.39) ***	(0.49) ***	0.11 ***
Lag of Log Improved Sanitation (% of pop access)	(0.10)	0.10 *	0.02
Lag of log External Health Assistance (% of GDP)	0.37 ***	0.24 ***	0.08 ***
Log Other Total Revenue (% of GDP)	0.01	0.12 ***	0.04 *
R Square	77%	55%	47%
Adjusted R Square	76%	54%	45%
No of Observations	163	259	190

Note: Levels of significance at 1% (***), 5% (**) and 10% (*) percent.



USAID
FROM THE AMERICAN PEOPLE

ROBUSTNESS CHECKS

2SLS WITH FIXED EFFECTS, GOVERNANCE INDEX, NUMBER OF TB CASES

Equation 2: $\text{Log (Public Health Exp (\% \text{ of GDP}))} = \text{fn (Log (Tax Revenue (\% \text{ of GDP})), \text{Log (GDP per capita (PPP constant 2011 USD))}, \text{Log (Lag Private Health Exp (\% \text{ of GDP})), \text{Log (Lag External Health Assistance (\% \text{ of GDP})), \text{Log (Needy Population)}, \text{Log(Lag Improved Sanitation)}, \text{Log (Other Total Revenue (\% \text{ of GDP})), \text{Log(Lag No. of prevalence TB cases)}, \text{Governance Index (Polity)}, \text{Country Dummy}, \text{Year Dummy})}$

	LIC	LMIC	UMIC	Overall
Intercept	(3.49)	2.59	7.18 **	5.83 **
Log Tax Revenue (% of GDP)	1.70 ***	0.40 **	0.27 **	1.00 ***
Log GDP per capita, (PPP constant 2011 USD)	(1.74) ***	(0.28) *	(0.37) **	(0.84) ***
Log Needy Population (% of total population)	4.90 *	(0.16)	(0.43)	(0.01)
Lag of log Private Health Exp (% of GDP)	0.10	0.16 ***	(0.18) ***	(0.11) *
Lag of Log Improved sanitation (% of pop access)	0.08	(0.06)	(0.08)	(0.04)
Lag of log External Health Assistance (% of GDP)	0.06	0.03 *	0.01	0.03 **
Log Other Total Revenue (% of GDP)	0.01	0.12 ***	0.21 ***	0.18 ***
Lag of log Number of TB cases	(0.57)	0.04	(0.19) ***	0.04
Governance Index (Polity)	0.02	0.01 *	0.00	0.01 *
R Square	89%	95%	93%	90%
Adjusted R Square	84%	94%	90%	88%
No of Observations	147	252	158	557

Note: Levels of significance at 1% (***), 5% (**) and 10% (*) percent.

OLS WITH FIXED EFFECTS, GOVERNANCE INDEX, NUMBER OF TB CASES

Equation 2: $\text{Log (Public Health Exp (\% \text{ of GDP}))} = \text{fn}(\text{Log (Tax Revenue (\% \text{ of GDP}))}, \text{Log (GDP per capita (PPP constant 2011 USD))}, \text{Log (Lag Private Health Exp (\% \text{ of GDP}))}, \text{Log (Lag External Health Assistance (\% \text{ of GDP}))}, \text{Log (Needy Population)}, \text{Log(Lag Improved Sanitation)}, \text{Log (Other Total Revenue (\% \text{ of GDP}))}, \text{Log(Lag No. of prevalence TB cases)}, \text{Governance Index (Polity)}, \text{Country Dummy}, \text{Year Dummy})$

	LIC	LMIC	UMIC	Overall
Intercept	(4.23)	4.80 **	7.67 **	4.15 **
Log Tax Revenue (% of GDP)	0.97 ***	0.25 ***	0.15 **	0.54 ***
Log GDP per capita, (PPP constant 2011 USD)	(1.39)***	(0.21)	(0.38)**	(0.65)***
Log Needy Population (% of total population)	4.51 *	(0.56)*	(0.40)	0.12
Lag of log Private Health Exp (% of GDP)	(0.10)	0.13 **	(0.15)**	(0.08)
Lag of Log Improved sanitation (% of pop access)	0.73 ***	(0.21)	(0.09)	0.35 ***
Lag of log External Health Assistance (% of GDP)	0.15 **	0.03 **	0.01	0.05 ***
Log Other Total Revenue (% of GDP)	0.13 **	0.09 ***	0.17 ***	0.18 ***
Lag of log Number of TB cases	(0.54)	(0.01)	(0.21)***	(0.06)
Governance Index (Polity)	0.02 **	0.01 **	0.00	0.01 **
R Square	89%	95%	93%	90%
Adjusted R Square	85%	94%	91%	89%
No of Observations	163	259	159	581

Note: Levels of significance at 1% (***), 5% (**) and 10% (*) percent.

OVERALL REGRESSION RESULTS (WITHOUT INCOME CATEGORIES)

Equation 1: Log (Tax Revenue (% of GDP)) = fn (Log (GDP per capita (PPP constant 2011 USD)), Log (Non-Agricultural Sector (% of GDP)), Log (Trade (% of GDP)), Log (Other Total Revenue (% of GDP)), Log (Total Population), Log (Official Aid (% of GDP)))	
Intercept	(1.62)***
Log GDP per capita, (PPP constant 2011 USD)	0.04
Log Non-Agricultural Sector (% of GDP)	0.74***
Log Trade (% to GDP)	0.28***
Log Other Total Revenue (% of GDP)	(0.00)
Log Total Population	(0.03)**
Log Official Aid (% of GDP)	0.03*
R Square	39%
Equation 2: Log (Public Health Exp (% of GDP)) = fn (Log (Tax Revenue (% of GDP)), Log (GDP per capita (PPP constant 2011 USD)), Log (Lag Private Health Exp (% of GDP)), Log (Lag External Health Assistance (% of GDP)), Equator Dummy, Log (Needy Population), Log(Lag Improved Sanitation), Log (Other Total Revenue (% of GDP)))	
Intercept	(0.68)
Log Tax Revenue (% of GDP)	0.50***
Log GDP per capita, (PPP constant 2011 USD)	0.29***
Log Needy Population (% of total population)	(0.21)
Lag of log Private Health Exp (% of GDP)	0.15***
Equator Dummy	(0.28)***
Lag of Log Improved sanitation (% of pop access)	(0.13)***
Lag of log External Health Assistance (% of GDP)	0.18***
Log Other Total Revenue (% of GDP)	0.12***
R Square	53%
No of Observations	588

Note: Levels of significance at 1% (***), 5% (**) and 10% (*) percent.

OVERALL REGRESSION RESULTS (WITH INCOME CATEGORIES)

Equation 1: Log (Tax Revenue (% of GDP)) = fn (Log (GDP per capita (PPP constant 2011 USD)), Log (Non-Agricultural Sector (% of GDP)), Log (Trade (% of GDP)), Log (Other Total Revenue (% of GDP)), Log (Total Population), Log (Official Aid (% of GDP)))	
Intercept	(1.07) *
Log GDP per capita, (PPP constant 2011 USD)	(0.05)
Log Non-Agricultural Sector (% of GDP)	0.66 ***
Log Trade (% to GDP)	0.30 ***
Log Other Total Revenue (% of GDP)	(0.01)
Log Total Population	(0.01)
Log Official Aid (% of GDP)	0.03 **
Lower Middle Income Dummy	0.13 **
Upper Middle Income Dummy	0.31 ***
R Square	40%
Equation 2: Log (Public Health Exp (% of GDP)) = fn (Log (Tax Revenue (% of GDP)), Log (GDP per capita (PPP constant 2011 USD)), Log (Lag Private Health Exp (% of GDP)), Log (Lag External Health Assistance (% of GDP)), Equator Dummy, Log (Needy Population), Log(Lag Improved Sanitation), Log (Other Total Revenue (% of GDP)))	
Intercept	0.48
Log Tax Revenue (% of GDP)	0.50 ***
Log GDP per capita, (PPP constant 2011 USD)	0.24 ***
Log Needy Population (% of total population)	(0.42) **
Lag of log Private Health Exp (% of GDP)	0.10 ***
Equator Dummy	(0.28) ***
Lag of Log Improved sanitation (% of pop access)	(0.06)
Lag of log External Health Assistance (% of GDP)	0.18 ***
Log Other Total Revenue (% of GDP)	0.11 ***
Lower Middle Income Dummy	(0.25) ***
Upper Middle Income Dummy	(0.05)
R Square	56%
No of Observations	588

Note: Levels of significance at 1% (***), 5% (**) and 10% (*) percent.

FIRST DIFFERENCE MODEL WITH FIXED EFFECTS, GOVERNANCE INDEX, NUMBER OF TB CASES

Equation 2: $\text{Log (Public Health Exp (\% \text{ of GDP}))} = \text{fn (Log (Tax Revenue (\% \text{ of GDP})), \text{Log (GDP per capita (PPP constant 2011 USD)}), \text{Log (Lag Private Health Exp (\% \text{ of GDP})), \text{Log (Lag External Health Assistance (\% \text{ of GDP})), \text{Log (Needy Population)}, \text{Log(Lag Improved Sanitation)}, \text{Log (Other Total Revenue (\% \text{ of GDP})), \text{Log(Lag No. of prevalence TB cases)}, \text{Governance Index (Polity)}, \text{Country Dummy}, \text{Year Dummy})}$

	2SLS	OLS
Intercept	0.09	0.00
FD Log Tax Revenue (% of GDP)	0.92 **	0.41 **
FD Log GDP per capita, (PPP constant 2011 USD)	(0.52)*	(0.35)
FD Log Needy Population (% of total population)	1.13	0.61
FD Lag of log Private Health Exp (% of GDP)	0.11	0.02
FD Lag of Log Improved sanitation (% of pop access)	1.91	0.18
FD Lag of log External Health Assistance (% of GDP)	(0.01)	(0.01)
FD Log Other Total Revenue (% of GDP)	0.07 **	0.09 ***
FD Log Number of TB cases	0.09	0.04
FD Log of Governance Index (Polity)	0.00	0.00
R Square	13%	26%
Adjusted R Square	-1%	14%
No of Observations	503	531

Note: Levels of significance at 1% (***), 5% (**) and 10% (*) percent.

FIRST DIFFERENCE WITH NUMBER OF TB CASES, GOVERNANCE INDEX, FIXED EFFECTS

Equation 2: $\text{Log (Public Health Exp (\% \text{ of GDP}))} = \text{fn (Log (Tax Revenue (\% \text{ of GDP})), \text{Log (GDP per capita (PPP constant 2011 USD)), \text{Log (Lag Private Health Exp (\% \text{ of GDP})), \text{Log (Lag External Health Assistance (\% \text{ of GDP})), \text{Log (Needy Population)}, \text{Log(Lag Improved Sanitation)}, \text{Log (Other Total Revenue (\% \text{ of GDP})), \text{Log(Lag No. of prevalence TB cases)}, \text{Governance Index (Polity)}, \text{Country Dummy}, \text{Year Dummy})}$

	LIC (2SLS)	LMIC (OLS)	UMIC (OLS)
Intercept	0.15	(0.01)	0.08
FD Log Tax Revenue (% of GDP)	1.03 *	0.20 **	0.09
FD Log GDP per capita, (PPP constant 2011 USD)	(1.80)	(0.12)	(0.33)
FD Log Needy Population (% of total population)	(8.16)	(1.88)	0.40
FD Lag of log Private Health Exp (% of GDP)	0.08	0.14 ***	0.05
FD Lag of Log Improved sanitation (% of pop access)	5.10	(2.82)	1.16
FD Lag of log External Health Assistance (% of GDP)	(0.10)	(0.01)	(0.00)
FD Log Other Total Revenue (% of GDP)	0.08	0.00	0.05
FD Lag of Log No. of prevalence TB cases	1.31	(0.29)	0.02
FD Governance Index (Polity)	0.01	0.01	0.01 *
R Square	39%	16%	32%
Adjusted R Square	13%	-2%	11%
No of Observations	131	238	147

Note: Levels of significance at 1% (***), 5% (**) and 10% (*) percent.

2SLS WHEN ALL VARIABLES ARE STATIONARY (WITH FIXED EFFECTS, GOVERNANCE INDEX, NUMBER OF TB CASES)

Equation 2: Log (Public Health Exp (% of GDP)) = fn (Log (Tax Revenue (% of GDP)), Log (GDP per capita (PPP constant 2011 USD)), Log (Lag Private Health Exp (% of GDP)), Log (Lag External Health Assistance (% of GDP)), Log (Needy Population), Log(Lag Improved Sanitation), Log (Other Total Revenue (% of GDP)), Log(Lag No. of prevalence TB cases), Governance Index (Polity), Country Dummy, Year Dummy)

	LIC	LMIC	UMIC
Intercept	15.02 **	(4.89)	(2.21)
Log Tax Revenue (% of GDP)	1.06 **	0.81 ***	0.01
Log GDP per capita, (PPP constant 2011 USD)	(1.57) ***	0.20	(0.43) *
Log Needy Population (% of total population)	(7.83)	0.03	0.31
Lag of log Private Health Exp (% of GDP)	0.02	0.17 *	0.09
Lag of Log Improved sanitation (% of pop access)	(0.00)	0.22	0.24
Lag of log External Health Assistance (% of GDP)	0.16	0.02	0.01
Log Other Total Revenue (% of GDP)	0.14	0.18 ***	0.00
Lag of log Number of TB cases	(0.40)	0.26 **	0.02
Log of Governance Index (Polity)	0.02 *	0.01	(0.00)
R Square	90%	93%	34%
Adjusted R Square	86%	92%	14%
No of Observations	146	240	149

Note: Levels of significance at 1% (***) , 5% (**) and 10% (*) percent.

The first difference of the following variables are considered:

LIC: Needy Population (% of total population), Trade (% to GDP), Official Aid (% of GDP)

LMIC: GDP per capita (PPP constant 2011 USD), Private Health Exp (% of GDP), Non-Agricultural Sector (% of GDP), Trade (% to GDP)

UMIC: GDP per capita (PPP constant 2011 USD), Private Health Exp (% of GDP), Official Aid (% of GDP), Public Health Exp (% of GDP)

OLS WHEN ALL VARIABLES ARE STATIONARY (WITH FIXED EFFECT, GOVERNANCE INDEX, NO. OF TB CASES)

Equation 2: $\text{Log (Public Health Exp (\% \text{ of GDP}))} = \text{fn (Log (Tax Revenue (\% \text{ of GDP})), \text{Log (GDP per capita (PPP constant 2011 USD)), \text{Log (Lag Private Health Exp (\% \text{ of GDP})), \text{Log (Lag External Health Assistance (\% \text{ of GDP})), \text{Log (Needy Population)}, \text{Log (Lag Improved Sanitation)}, \text{Log (Other Total Revenue (\% \text{ of GDP})), \text{Log (Lag No. of prevalence TB cases)}, \text{Governance Index (Polity)}, \text{Country Dummy}, \text{Year Dummy})}$

	LIC	LMIC	UMIC
Intercept	14.46 **	4.33 **	(2.21)
Log Tax Revenue (% of GDP)	0.91 ***	0.25 ***	0.05
Log GDP per capita, (PPP constant 2011 USD)	(1.55) ***	(0.17)	(0.41) **
Log Needy Population (% of total population)	(9.59)	(0.91) ***	0.32
Lag of log Private Health Exp (% of GDP)	(0.01)	0.11	0.09
Lag of Log Improved sanitation (% of pop access)	0.61 ***	(0.32) *	0.16
Lag of log External Health Assistance (% of GDP)	0.22 ***	0.03 **	0.01
Log Other Total Revenue (% of GDP)	0.14 ***	0.12 ***	0.02
Lag of log Number of TB cases	(0.47)	0.06	0.04
Log of Governance Index (Polity)	0.02	0.01 *	(0.01)
R Square	89%	95%	35%
Adjusted R Square	85%	94%	15%
No of Observations	163	248	154

Note: Levels of significance at 1% (***) , 5% (**) and 10% (*) percent.

The first difference of the following variables are considered:

LIC: Needy Population (% of total population), Trade (% to GDP), Official Aid (% of GDP)

LMIC: GDP per capita (PPP constant 2011 USD), Private Health Exp (% of GDP), Non-Agricultural Sector (% of GDP), Trade (% to GDP)

UMIC: GDP per capita (PPP constant 2011 USD), Private Health Exp (% of GDP), Official Aid (% of GDP), Public Health Exp (% of GDP)

2SLS WITH FIXED EFFECTS, GOVERNANCE INDEX, NO. OF TB CASES, TOTAL POPULATION

Equation 2: $\text{Log (Public Health Exp (\% \text{ of GDP}))} = \text{fn (Log (Tax Revenue (\% \text{ of GDP})), \text{Log (GDP per capita (PPP constant 2011 USD)}), \text{Log (Lag Private Health Exp (\% \text{ of GDP})), \text{Log (Lag External Health Assistance (\% \text{ of GDP})), \text{Log (Needy Population)}, \text{Log (Lag Improved Sanitation)}, \text{Log (Other Total Revenue (\% \text{ of GDP})), \text{Log (Lag No. of prevalence TB cases)}, \text{Governance Index (Polity)}, \text{Log Total Population}, \text{Country Dummy}, \text{Year Dummy})}$

	LIC	LMIC	UMIC
Intercept	30.20	23.23 ***	23.25 ***
Log Tax Revenue (% of GDP)	1.58 ***	0.07	0.11
Log GDP per capita, (PPP constant 2011 USD)	(1.66) ***	(0.34) **	(0.40) **
Log Needy Population (% of total population)	7.88 **	(0.36)	(0.30)
Lag of log Private Health Exp (% of GDP)	0.06	0.09	(0.15) ***
Lag of Log Improved sanitation (% of pop access)	(0.36)	(0.12)	(0.15)
Lag of log External Health Assistance (% of GDP)	0.08	0.02 *	0.00
Log Other Total Revenue (% of GDP)	0.03	0.09 **	0.14 **
Lag of log Number of TB cases	(0.62)	(0.04)	(0.19) ***
Log of Governance Index (Polity)	0.02	0.01 ***	0.00
Log Total Population	(2.51)	(1.05) ***	(0.95) **
R Square	89%	95%	93%
Adjusted R Square	85%	94%	91%
No of Observations	147	252	158

Note: Levels of significance at 1% (***), 5% (**) and 10% (*) percent.

FIXED EFFECTS, NUMBER OF TB CASES, GOVERNANCE INDEX, OTHER GOVT EXPENSES

Equation 2: $\text{Log (Public Health Exp (\% \text{ of GDP}))} = \text{fn} (\text{Log (Tax Revenue (\% \text{ of GDP}))}, \text{Log (GDP per capita (PPP constant 2011 USD))}, \text{Log (Lag Private Health Exp (\% \text{ of GDP}))}, \text{Log (Lag External Health Assistance (\% \text{ of GDP}))}, \text{Log (Needy Population)}, \text{Log(Lag Improved Sanitation)}, \text{Log (Other Total Revenue (\% \text{ of GDP})}, \text{Log(Lag No. of prevalence TB cases)}, \text{Governance Index (Polity)}, \text{Log Other Expenses (excl Public Health Exp) (\% \text{ of GP})}, \text{Country Dummy}, \text{Year Dummy})$

	LIC (2SLS)	LMIC (OLS)	UMIC (OLS)
Intercept	7.87	5.95 ***	2.72
Log Tax Revenue (% of GDP)	1.47 *	0.32 ***	0.07
Log GDP per capita, (PPP constant 2011 USD)	(0.80)	(0.24) *	(0.32) **
Log Needy Population (% of total population)	0.82	(0.63) **	(0.10)
Lag of log Private Health Exp (% of GDP)	0.03	0.18 ***	(0.11) **
Lag of Log Improved sanitation (% of pop access)	(0.63)	(0.15)	0.27
Lag of log External Health Assistance (% of GDP)	0.19	0.02 *	0.00
Log Other Total Revenue (% of GDP)	0.05	0.10 ***	0.14 ***
Lag of Log No. of prevalence TB cases	(0.50)	(0.04)	(0.04)
Governance Index (Polity)	0.01	0.01 **	(0.00)
Log Other Expenses (excl Public Health Exp) (% of GP)	0.12	(0.14)	0.19 **
R Square	91%	95%	94%
Adjusted R Square	86%	94%	92%
No of Observations	130	244	159

Note: Levels of significance at 1% (***), 5% (**) and 10% (*) percent.