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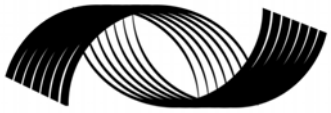

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Still Taxed to Death: An Analysis of Taxes and Tariffs on Medicines, Vaccines and Medical Devices

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Executive Summary

This paper examines the role that tariffs, domestic taxes, and regulatory requirements pose on access to essential drugs, vaccines and devices for the diseases that afflict the developing world. While aid has increased in recent years and the price of many drugs has fallen, access to medicines, vaccines and devices has not increased greatly. There are numerous reasons for this, notably the paucity of medical professionals in the poorest countries. The major one discussed in this paper is the barrier imposed by recipient countries themselves. For example the combined domestic tax and import tariff barrier in India until recently was over 60% and in Morocco it currently stands at 38%. Only just over a third of Indians have access to essential drugs and it is likely that a reduction of these financial impediments would increase access. Removal of these barriers would therefore likely save thousands of lives across the developing world. Southern African countries generally have fewer tariff barriers. But if South Africa removed its 14% sales tax, HIV patients could afford more food, and many are currently malnourished. Furthermore, many Southern African countries, such as Namibia, impose regulatory constraints (expensive and time consuming registration of products already approved in US/EU), which reduce access to essential medicines.

Still Taxed to Death:
An Analysis of Taxes and Tariffs on Medicines, Vaccines and Medical Devices

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1. Introduction

According to the World Health Organisation, (WHO), approximately one third of the world's population lacks access to essential medicines and proper medical treatment.[1] Although this figure represents between 1.3 and 2.1 billion people, and is a serious cause for concern, access to medicines has actually increased in recent years. In 1975 less than half of the world's population had access to medicines and although the overall number of people without access to medicines has remained constant, the proportion of the world's population without access has fallen. The primary reason for this increase in access to medicines is most likely to be a result of rising incomes and increased prosperity in many developing countries, particularly in South East Asia.[2] Indeed, the World Bank estimates that the Southern Asian economies grew at 7.8% and 6.7% in 2003 and 2004 respectively.[3] Furthermore, the Bank estimates that low-income countries grew at rates of 7.2% and 6.3% in 2003 and 2004 respectively.[4]

Access to medicines is lowest in poor countries, which also have the lowest life expectancy and high disease burdens.[5] The reasons for inadequate access to medicines and to medical care are numerous and varied. This paper looks at the extent to which import tariffs, taxes, duties and bureaucratic rules and regulations deny people medicines. This paper is an updated version of an earlier research working paper, *Taxed to Death*, published in May 2005 with the AEI-Brookings Joint Centre on Regulatory Affairs.

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[1] World Health Organization (2004), "The World Medicines Situation," WHO, Geneva, p 63.

[2] For instance, between 1960 and 2000 in Malaysia and Thailand, per capita GDP rose from US$ 974 to US$ 4,796 and US$ 464 to US$ 2,804 respectively (Constant 1995 US$). Source: US-ASEAN Business Council, "ASEAN Finance and Marcroeconomic Surveillance Unit (FMSU) Database," available at: http://www.us-asean.org/aftatariffs.asp (accessed December 18, 2005).

[3]The World Bank Group (2005), South Asia Data Profile. *World Development Indicators database.* August 2005. Available at: http://devdata.worldbank.org/external/CPProfile.asp?SelectedCountry=SAS&CCODE=SAS&CNAME=South+Asia&PTYPE=CP, (accessed February 20, 2006).

[4]The World Bank Group (2005), Low Income Data Profile. *World Development Indicators database*. August 2005. Available at: http://devdata.worldbank.org/external/CPProfile.asp?SelectedCountry=LIC&CCODE=LIC&CNAME=Low+income&PTYPE=CP, (accessed January 20, 2006).

[5] In 2003 low-income countries had an average life expectancy of 58.3 years compared to high-income

Our initial analysis showed that countries routinely increased the price of medicines to consumers through import tariffs, other duties and sales taxes by over 20% and sometimes by as much as 40%. We have updated our data from the latest COTECNA database[6] and have gathered the most recent data available on value added taxes and other charges on medicines. Since the publication of *Taxed to Death*, the World Health Organisation (WHO) published a study by Richard Laing and Muge Olcay (2005). The study examines the degree to which 151 countries impose import tariffs on completed pharmaceuticals and active pharmaceutical ingredients (API).We use their larger database to analyse the relationship between import tariffs and access to medicines and tariffs in vaccines and vaccination rates.

The broad conclusions of the WHO paper concurred with our initial conclusions; that import tariffs and taxes should be removed as they are highly regressive. Laing and Olcay(2005) conclude, "It is vital that policy makers, both at a national and international level, address the issue of tariffs on medicines and recognize the regressive nature of these duties, which ultimately tax the sick without regard for their economic status or ability to afford these medicines. Pharmaceutical tariffs could be eliminated without adverse revenue or industrial policy impacts."[7]

2. Methodology

Taxed to Death, examined data on import tariffs for organic chemicals that are used in the manufacture of pharmaceuticals as well as active pharmaceutical ingredients (API) and completed pharmaceuticals. In order to do this we used the Essential Drugs List (EDL) published by the World Health Organisation. We identified the customs classification of these drugs using an international benchmark namely the Harmonised System (HS) produced by the Customs Cooperation Council. The HS forms the basis by which goods are encoded, trade statistics are developed

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countries that had an average life expectancy of 78.3 years (World Bank development data, 2005).

[6] COTECNA database offers trade supervision services – one of which is the valuation and tariff code classification of tradable goods. This database contains fewer countries than comparable sources but it has more up-to-date data and therefore was used to provide the most up-to-date data possible for the reader, however, for consistency and comparability with Laing and Olcay's study we used their data set for all econometric analysis.

[7] Laing, Richard and Muge Olcay (2005), "Pharmaceutical Tariffs: What Is Their Effect on Prices, Protection of Local Industry and Revenue Generation?" (study, Commission on Intellectual Property Rights, Innovation and Public Health, World Health Organization, Geneva, May 2005), available at: http://www.who.int/intellectualproperty/studies/tariffs/en/ (accessed December 18, 2005).

and from which the customs and excise authorities in various countries compile their tariffs.[8]

The study analysed items classified at the 6-digit level of the Harmonised System. This is done so that a sufficiently broad level of disaggregation is obtained. Any higher level of disaggregation would have jeopardised the comparability between countries and any lower disaggregation would not have correctly identified items listed on the EDL.

Pharmaceutical goods are classified in either Chapter 29 or Chapter 30 of the Harmonised System (HS). Goods classified in Chapter 29 are the basic organic compounds used in the manufacture of pharmaceutical products.[9] Goods classified in Chapter 30 are the manufactured pharmaceutical products. The Chapter 29 tariffs are likely to benefit producers in countries that have domestic medicine manufacturing capacity. Many developing countries do not have this; however others, such as India, Brazil and Thailand, are among the world's largest and most successful drug manufacturers and producers of active pharmaceutical ingredients.

There are approximately 27 HS 6-digit headings corresponding to products used in the treatment of the major communicable diseases. In addition the study includes 3 additional headings, which cover items such as bandages and gauze strips as well as medicine boxes (see Annex 2).

The tariff data was obtained from the International Customs Tariff Bureau (ICTB), which has the advantage of listing sales tax and value added tax rates for goods examined. A disadvantage of the ICTB database is that it does not contain data on the value of each good imported to each country, which would provide a system of weighting the import tariffs. Our analysis based on the ICTB data was therefore a simple average of the tariffs levied on the items in question. Where possible, we have updated our original data by drawing on the COTECNA database, which contains more up to date information, however, for consistency and comparability with Laing and Olcay's study we used their data set for all econometric analysis.

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[8] There are 23 major sections of the HS, containing a total of 98 chapters which have 1241 main 4-figure headings. Theses headings are further divided into approximately 5000 subheadings or codes. The headings and subheadings in the HS are mandatory and cannot be changed. However, each national authority can extend the codes and add any subdivisions, which it may find necessary.

[9] Certain chemicals are included in the Chapter 29 classifications that have no pharmaceutical

In their paper, Laing and Olcay (2005) make use of the UN's World Integrated Trade Solutions (WITS) database, which has the advantage of listing the value of goods traded for each HS code. This allows Laing and Olcay to weight their tariff data according to the value of goods imported by a country. A danger of this approach however, is that it may underestimate the impact of a certain tariff on medicine importation and therefore on access.

For instance, if Drug A carries a tariff of 50% and, due to this high tariff is rarely imported and Drug B carries a tariff of 10% and is imported in large quantities, the 10% tariff will receive a greater weighting than the 50% tariff. While this may provide an accurate picture of the average tariff rates applied in that country, it may underestimate the damage done, in denying people access to medicines, by those tariffs.

However a comparison of the weighted and simple average tariffs shows that there is in fact little difference between the two. With regards to active ingredients the difference between the weighted and simple averages is 0.02%. With regards to finished products the difference between the weighted average and simple averages is 0.36%. It is therefore not clear that weighting tariffs according to the value of imports adds greatly to the analysis.

In order to present as comprehensive a picture as possible of the import tariffs, taxes and other duties on medicines and other medical equipment, we have presented our original data along with unweighted and weighted WITS tariff data.

In some cases, countries have made changes to their tariff regimes, which while reported in the media, are not reflected in either the WITS database or the ICTB database. Wherever possible, we have tried to update our data to reflect the most recent changes to the tariff regimes, but where we have not been able to verify media reports, we have utilised the WITS database tariff rates.

3. State-Imposed Barriers to Drug Access

Many factors determine the price of a medicine in different countries. First, domestic healthcare and pricing policies, as well as market size, the degree of competition and the extent to which the government protects the intellectual property

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application.

of patented drugs often determine the price at which the manufacturer sells his product. Along with these factors, the mark-up that distributors and retailers make can greatly influence the price of a medicine to the patient.

However, as we discuss below, the various campaigns to lower the price of medicines and improve access to medicines have placed little emphasis on the state-imposed barriers to access. The import tariffs, duties and taxes that various governments impose can increase the price of medicines significantly. In addition to these taxes, there are several non-tariff barriers, such as lengthy registration periods for medicines and onerous requirements to clear customs.

Table 1 details the average import tariffs for 53 countries based on our original working paper *Taxed to Death* as well as tariff rates according to the WITS database used by Laing and Olcay (2005). Table 2 in this paper details the additional taxes and duties often imposed by national governments.

Import tariffs

As Table 1 shows, there are wide variations in the levels of import tariffs imposed by the 53 countries in our study. Our original analysis in *Taxed to Death* found a wide range of import tariffs for the 53 countries that we examined. Our updated data show that for Chapter 29 (organic chemicals) and Chapter 30 (pharmaceuticals including API, completed medicines, bandages, gauze etc) only four countries, Brunei, Malaysia, Madagascar and Costa Rica had zero tariffs. Slightly over 50% of countries maintained tariffs of between 0% and 5% and just over 20% maintained tariffs of between 5% and 10%. Our analysis found that 7 out of the 53 countries examined (or 13%) maintained tariffs of between 10 and 15% and only 2 countries, India and Morocco imposed tariffs higher than 15%.

In several respects, our data is consistent with that used by Laing and Olcay (2005) from the UN WITS database. Laing and Olcay's analysis finds that for active pharmaceutical ingredient (HS Code 3003), 41% of countries (61 out of 151) had zero import tariffs, while 26% had tariffs between 0 and 5%, 22% had tariffs between 5.1 and 10%, 9% had tariffs between 10.1 and 20% and 2% (or only 3 countries) had tariffs greater than 20%.[10]

[10] The inclusion of Chapter 29 products as well as bandages, gauze and other medical products probably accounts for the lower proportion of zero tariff countries in our analysis as compared to Laing

Laing and Olcay (2005) examine completed pharmaceuticals (HS Code 3004) separately and find that slightly fewer (60 countries out of 151) maintained zero tariffs for these goods. According to the WITS database, 25% of countries maintain tariffs between 0 and 5% for these goods, 21% maintain tariffs between 5.1 and 10%, 13% maintain tariffs between 10.1 and 20% and only 2 countries, India and Iran, had tariffs greater than 20%.

The WTO Pharmaceutical Agreement, an outcome of the Uruguay Round, led to reciprocal elimination of import tariffs on around seven thousand pharmaceutical products. However, only 22 countries are part of this agreement, and many developing countries continue to impose import tariffs on pharmaceutical products.[11]

Table 1
Import Tariffs – Simple Average and Weighted Averages

Country	Bate et al. Simple Average of Ch 29 & 30 tariffs	Laing and Olcay Weighted Ave. Active Ingredient	Laing and Olcay Unweighted Ave. Active Ingredient	Laing and Olcay Weighted Ave. Finished Product	Laing and Olcay Unweighted Ave. Finished Product	Laing and Olcay Vaccines
Brunei	0	0	0	0	0	0
Malaysia (ASEAN)	0	0	0	0	0	0
Madagascar	0	0	0	0	0	0
Costa Rica	0	2.5	2.5	2.5	2.5	0
Botswana (SACU)	0.71	0	0	0	0	0
Lesotho (SACU)	0.71	0	n.d.	0	0	0
Namibia (SACU)	0.71	0	0	0	0	0
South Africa (SACU)	0.71	0	0	0	0	0
Swaziland (SACU)	0.71	0	0	0	0	0
Honduras	0.83	0	0	0	0	0
Mozambique	0.88	0	0	0	0	0
El Salvador (AC)	1	0	0	5	5	0
Myanmar (ASEAN)	1.18	1.5	1.5	1.5	1.5	0
Benin (WAEMU)	1.62	0	0	0	0	0
Cote d'Ivoire (WAEMU)	1.62	0	0	0	0	0
Guinea Bissau (WAEMU)	1.62	1.6	n.d.	0	0	0
Mali (WAEMU)	1.62	0	0	0	0	0

and Olcay (2005) and for the differences in average tariffs.

[11] The signatories of the WTO Pharmaceutical Agreement are 15 member states of the European Union, the US, Switzerland, Japan, Canada, Norway, Czech Republic, Slovak Republic and Macau-China.

Niger (WAEMU)	2.38	0	0	0	0	0
Dominican Rep.	2.42	3	3	3	3	0
Burkina Faso (WAEMU)	2.5	0	0	0	0	0
Philippines (ASEAN)	2.54	3	3	3.84	3.95	3
Senegal (WAEMU)	2.5	0	0	0	0	0
Togo (WAEMU)	2.5	0	0	0	0	0
Vietnam (ASEAN)	2.78	0.08	0.83	5.71	3.99	0
Lebanon	2.79	5	5	5	5	5
Cambodia (ASEAN)	3.5	0	0	0	0	0
Indonesia (ASEAN)	4.13	5	5	5	5	2.5
Cameroon	5	5	5	5	5	5
Central African Rep.	5	5	5	5	5	5
Chad	5	5	5	5	5	5
Congo, Rep.	5	5	5	5	5	5
Tanzania (EACU)	5.45	10	10	10	10	10
Bangladesh	5.63	7.45	5.73	9.63	6.43	0
Ecuador (AC)	6.16	5	5	5.64	4.43	5
China	6.75	5.6	5.67	4.41	5.24	3
Laos (ASEAN)	6.59	10	10	10	10	5
Zimbabwe	7.49	2.76	6	17.6	5.83	0
Congo Dem Rep.	8.10	10	10	15.45	11.90	10
Peru (AC)	8.26	12	12	12	12	12
Nigeria	8.41	20	20	20	20	20
Algeria	9.48	5	5	5.24	6.79	0
Brazil	9.6	9.51	10.35	10.31	7.28	2.65
Ghana	9.77	10	10	4.73	9.29	10
Bolivia (AC)	10	10	8.33	10	8.57	10
Colombia (AC)	10	5	5	8.04	7.61	5
Kenya (EACU)	10	6.86	2.08	5.29	1.79	0
Uganda (EACU)	10	0	0	0	0	0
Venezuela (AC)	10	9.93	9	9.2	8.33	5
Pakistan	11.12	10	10	13.63	10.82	10
Thailand (ASEAN)	11.1	10	10	18.01	11.43	0
Mexico	11.8	14.67	16.07	6.91	10.52	8.5
India	16	35	33	30	35	30
Morocco	18.30	23.74	29.38	12.4	17.81	2.5

AC – Andean Community
ASEAN – Association of Southeast Asian Nations
EACU – East African Community Customs Union
SACU – Southern African Customs Union
WAEMU – West African Economic and Monetary Union

Some regional trade groups, such as the Southern African Customs Union, have made significant progress in reducing or removing import tariffs. Many other African countries maintain very low or negligible import tariffs on completed pharmaceuticals

and on the Chapter 29 intermediate pharmaceutical products.

Some countries however are moving in the opposite direction. On January 1, 2005, both Kenya and Uganda imposed 10% import tariffs on all imported medicines in line with East African Customs Union protocols. The harm that these newly imposed tariffs will cause is likely to be considerable. The Kenyan government failed to meet its target of treating 45,000 patients on antiretroviral therapy at the end of 2004, treating only 24,000. The increased cost of treatment adds another hurdle to the government's already ambitious aim of treating 95,000 by the end of 2005. According to Dr Patrick Orege, director of the National AIDS Control Council, the tariff issue is "…problematic – this increase should be addressed urgently, so that we can meet our goals."[12] Kenya subsequently unilaterally reversed the 10% import tariff decision. Currently it is unclear as to whether the other East African Customs Union countries have also reduced their medicine import tariffs. Table 1 retains Kenya's import tariff at 10% as we have not been able to confirm the precise level to which import tariffs have been reduced.

The DRC's import tariffs on completed pharmaceuticals varies from 10% on most products, to 15% on any medicines containing penicillin, to a high of 18.3% on a range of products, such as antidepressants, anaesthetics, cough and cold preparations and diuretics. The Chapter 29 tariffs are fixed at 5% for all goods, resulting in an average import tariff of 8.1%.

India recently reduced its import tariffs of 30% on completed pharmaceuticals, vaccines and 35% on API to 16%. This change is not reflected in Laing and Olcay's study but the newer rate is given in this study.

Zimbabwe, which is currently facing a healthcare crisis and an average life-expectancy of only 33 years, imposes a 5% tariff on most medicines, although it does have a zero tariff for vaccines.[13] Zimbabwe's tariffs for adhesive dressings and bandages, however is set at 20%, perhaps in an effort to protect a local industry from international competition. Laing and Olcay (2005) weighted average of import tariffs imposed by Zimbabwe on completed pharmaceuticals are approximately 10% higher than the average tariff calculated in our original working paper, *Taxed to Death.*

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[12] "Kenya; New Tax Jeopardises HIV Treatment Access" *Africa News*, February 10, 2005.

[13] See Bate and Tren (2005), "Despotism and Disease: A Report into the Health Situation of Zimbabwe and its Probable Impact on the Region's Health," *Africa Fighting Malaria*, available at: http://www.fightingmalaria.org/pdfs/Zimbabwe_health_hires.pdf (accessed February 10, 2006).

Sales Taxes and Other Duties

Another source of government revenue and yet another price inflator of pharmaceuticals and other medical devices are sales taxes, value added taxes and other duties and port charges. Some governments have a zero value added tax rating for medicines. However, many do charge VAT, and the rates range from 0% in Brunei to 19% in Peru. India maintains a complex set of sales taxes that vary from state to state and recently introduced VAT. Officially the VAT rate on medicines should be 4% (as depicted in Table 2 below) however many states continue to impose the old sales taxes that VAT was supposed to replace. This means that in some cases medicines could be taxed twice, increasing the cost of medicines by well over 10%.

In recent years, the South African government passed draconian drug pricing regulations in an effort to reduce the price of medicines to private consumers, yet the government maintains a 14% VAT on all medicines.[14] Many countries also impose other charges and duties. For instance, several countries such as Benin and Guinea-Bissau impose a community solidarity levy of 1%. Kenya imposes a pre-shipment inspection fee on all imports valued at over US$5,000. According to the US Trade Representative, "Kenya's customs procedures are detailed and rigidly implemented, often leading to delays in clearance of both imports and exports."[15]

In addition to the taxes listed above, certain countries impose additional taxes and duties for which we have not accounted. For instance, Lesotho, with a life expectancy of just 36.3 years in 2002, imposes a 10% withholding tax on all medicines. In implementing this tax, the state withholds 10% of the value to be paid to the supplier. In anticipating this, the supplier normally increases the total amount invoiced by 10%.[16]

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[14] The South African government has been challenged at the highest court in the land, the Constitutional Court, over its attempts to control drug prices and regulate the mark-up that pharmacists may make.

[15] United States Trade Representative (USTR), "Kenya: Foreign Trade Barriers," Available at: http://www.ustr.gov/assets/Document_Library/Reports_Publications/2005/2005_NTE_Report/asset_upload_file747_7480.pdf (accessed February 17, 2006).

[16] Pers comm. Matebele Sefali, National Drug Service Organisation, Lesotho. March 16, 2005.

Table 2
Taxes and Duties Applied to Chapter 29 and Chapter 30 Products, Selected Countries

Country	VAT	Other Taxes	Duty	Combined
Brunei	0.0			0.0
Morocco	0.0			0.0
India	4.0			4.0
Myanmar	5.0			5.0
Lebanon	5.0			5.0
Mozambique	5.0	US $ 50		6.0
Thailand	7.0			7.0
Senegal	5.8	2.0		7.8
Nigeria	5.0	2.9		7.9
Namibia	8.0			8.0
Botswana	10.0			10.0
Cambodia	10.0			10.0
Colombia	10.0			10.0
Indonesia	10.0			10.0
Laos	10.0			10.0
Lesotho	10.0			10.0
Philippines	10.0			10.0
Viet Nam	10.0			10.0
Mali	9.0	2.5		11.5
Algeria	11.5			11.5
Burkina Faso	9.0	3.5		12.5
Ghana	12.5			12.5
Honduras	12.0	0.5		12.5
Congo, Republic of	18.7			18.7
El Salvador	13.0			13.0
Madagascar	8.2	5.0		13.2
Mexico	12.5	0.8		13.3
Ecuador	14.0			14.0
South Africa	14.0			14.0
Swaziland	14.0			14.0
Bolivia	13.0		1.9	14.9
Bangladesh	15.0			15.0
Malaysia	5.0			5.0
Pakistan	15.0			15.0
Venezuela	15.0			15.0
Zimbabwe	15.0			15.0
Togo	9.8	5.25		16.1
China	17.0			17.0
Côte d'Ivoire	15	2.0		17.0
Dominican Republic	15.0	2.0		17.0
Guinea-Bissau	15.0	2.0		17.0

Benin	15	2.0		17.5
Cameroon	18.7			18.7
Central African Republic	18.7			18.7
Chad	18.7			18.7
Brazil	18.0	1.0		19.0
Peru	17.0	3.14		20.1
Uganda	17.0	4.0		21.0
Niger	6.15	18.95		25.2
Tanzania, U. Rep. of	20.0		6.2	26.2
Kenya	16.0		11.8	27.8
Congo, Dem. Rep. of the	18.7	12.7		31.4
Costa Rica	10.7			

- For Cameroon, Central African Republic, Chad and the Republic of Congo: There is a 5 percent duty on basic necessities, 10 percent on raw materials and capital goods, 20 percent on intermediate and miscellaneous goods, and 30 percent on consumer goods. Furthermore, there is an 18.7 value added tax on CIF + duty. It is not clear how these countries classify Chapter 29 and 30 products.

* In April 2005 India introduced a VAT of 4% on medicines. Many states in India however continue to charge VAT as well as the erstwhile sales taxes which could increase the cost of medicines by as much as 30%.

Tariffs and Government Revenue

Laing and Olcay (2005) compare the revenue raised from pharmaceutical import tariffs and overall GDP and find that it "can be considered to be an insignificant amount in national economies." It would perhaps be more logical to measure the revenue raised from these tariffs against total government expenditure. It is perhaps also instructive to compare the revenue raised from tariffs with total public healthcare expenditure, in case such revenue was hypothecated to such expenditure.

Annex 1 contains tables detailing import tariffs as a percentage of government revenue and healthcare budget. For most countries where reliable data could be obtained, the revenue raised from pharmaceutical tariffs as measured by Laing and Olcay(2005) represent either zero % or less than 1% of total government revenue. In only one country, Democratic Republic of Congo, do revenues from pharmaceutical tariffs form more than 1% of government revenue. In four countries, Ecuador (1.29%), Lebanon (2.48%), Nigeria (2.49%) and Democratic Republic of Congo (8.24%) do pharmaceutical import tariffs generate an amount equivalent to more than 1% of the total healthcare budget.

Any revenue statistics or information on government programs emanating from the Democratic Republic of Congo should be viewed with scepticism as to all intents and purposes it is a failed and chaotic state. However, it is clear that at least for some countries, the revenues raised from import tariffs on pharmaceuticals are likely to constitute a non-trivial portion of the overall budget. In some countries therefore, opposition to reducing or removing these tariffs is likely to arise out of concern for lost revenues.

It should be borne in mind that the revenues generated from all import tariffs provide poor country governments with much needed foreign exchange, which in turn is used to purchase other imported goods and services. Any attempt to limit the number of sources from which foreign exchange can be earned is likely to be resisted by Ministries of Finance.

To help these countries move to more efficient and more equitable means of raising revenue, bilateral and multilateral agencies such as from US Government (State Dept., USAID) or World Bank and OECD could provide technical assistance in this regard.

Tariffs, taxes and access to medicines

As Table 3 shows, there are enormous differences between the health status of citizens of the countries examined and their access to medicines. As we have already explained, there are several factors that influence the price at which a medicine sells in any particular country, as well as a variety of reasons for access to medicine to differ from country to country.

India, which until recently maintained the world's highest import tariffs for medicines has over 5 million people living with HIV/AIDS.[17] Access to antiretroviral therapy is extremely low, with only 20,000 to 36,000 receiving treatment.[18] Even the most basic treatment for preventable and curable diseases is out of reach of most Indians. According to the United Nations, only 35% of the Indian population has access to essential medicines, yet this might be increased had the country removed import tariffs on Chapter 29 and 30 goods many years ago.

Table 3
Overall Taxation Rates, Health Indicators and Access to Essential Medicines (2002)

Country	Adult (15-49) HIV/AIDS Prevalence (%)	Est. Coverage of Antiretroviral Therapy (%)	% of Pop. Living in Areas with DOTS Coverage	Malaria Cases per 100 000 People	Access to Essential Drugs (%, 1999)	Life Expectancy at Birth	Average Overall Taxes and Tariffs±
Algeria	0.1 (03)	Nd	100	2*	95-100	69.5	21
Bangladesh	Nd	Nd	95	40**	50-79	61.1	21.5
Benin (WAEMU)	1.9	5.1	100 (02)	10 697*	50-79	50.7	18.6
Bolivia (AC)	Nd	Nd	86	378 (00)	50-79	63.7	24.9
Botswana (SACU)	37.3	23.9	100	48 704	80-94	41.4	10.85
Brazil	0.7	100	25	344 (00)	0-49	68.0	28.6
Brunei	<0.1	Nd	100	Nd	95-100	76.2	0

[17] Joint United Nations Programme on HIV/AIDS, UNAIDS (2004), "UNAIDS 2004 Report on the Global AIDS Epidemic," available at: http://www.unaids.org/bangkok2004/report.html (accessed January 10. 2006).

[18] World Health Organization (2004), "The 3x5 Progress Report", available at: http://www.who.int/3by5/progressreport05/en/ accessed November 18, 2005).

(ASEAN)							
Burkina Faso (WAEMU)	4.2	2.5	100	619	50-79	45.8	15
Cambodia (ASEAN)	2.6	5.0	100	476	0-49	57.4	13.5
Cameroon	6.9	8.9	90	2 900*	50-79	46.8	23.7
Central African Republic	13.5	Nd	75	2 207*	50-49	39.8	23.7
Chad	4.8	Nd	98	197*	0-49	44.7	23.7
China	0.1	8.4	78	1	80-94	70.9	23.5
Colombia (AC)	0.7	Nd	14	250 (00)	80-94	72.1	20
Congo, Dem Rep	4.2	0.8	70	2 960*	Nd	41.4	39.5
Congo, Rep	4.9	2.4	20	5 880 (00)	50-79	48.3	23.7
Costa Rica	0.6	Nd	84	42 (00)	95-100	78.0	10.7
Cote d'Ivoire (WAEMU)	7.0	4.5	74	12 152 (00)	80-94	41.2	18.6
Dominican Republic	1.7	2.6	40	6 (00)	50-79	66.7	19.4
Ecuador (AC)	0.3	Nd	37	728	0-49	70.7	20.1
El Salvador	0.7	30.3	100	11	80-94	70.6	14
Ghana	3.1	0.2	100	15 344	0-49	57.8	22.3
Guinea Bissau (WAEMU)	Nd	Nd	20	2 421*	0-49	45.2	18.6
Honduras	1.8	17.8	100	541	0-49	68.8	13.5
India	0.9	4.2	52	7	0-49	63.7	20
Indonesia (ASEAN)	0.1	22.5	98	920	80-94	66.6	14.1
Kenya (EACU)	6.7	3.1	100	545	0-49	45.2	37.8
Laos (ASEAN)	0.1	Nd	77	759	50-79	54.3	16.6
Lebanon	0.1	Nd	100	Nd	80-94	73.5	7.8
Lesotho (SACU)	28.9	Nd	100	0*	80-94	36.3	10.8
Madagascar	1.7	0.0	100	Nd	50-79	53.4	13.2
Malaysia (ASEAN)	0.4	67.5	100	57	50-79	73.0	5
Mali (WAEMU)	1.9	3.4	68	4 008*	50-79	48.5	13.1
Mexico	0.3	100	70	8	80-94	73.3	25.1
Morocco	0.03	Nd			50-79	68.5	18.3
Mozambique	12.2	1.1	100	18 115 (00)	50-79	38.5	7 +$50
Myanmar (ASEAN)	1.2	Nd	88	224	50-79	57.2	6.1
Namibia (SACU)	21.3	1.3	60	1 502	80-94	45.3	8.7

Niger (WAEMU)	1.2	Nd	81	1 693 (98)	50-79	46.0	27.5
Nigeria	5.4	2.3	55	30	0-49	51.6	16.3
Pakistan	0.1	Nd	45	58	50-79	60.8	26.1
Peru (AC)	0.5	23.8	100	258	50-79	69.7	28.4
Philippines (ASEAN)	<0.1	7.1	98	15	50-79	69.8	12.5
Senegal (WAEMU)	0.8	22.9	100	11 925	50-79	52.7	10.3
South Africa (SACU)	21.5	2.7	98	143	80-94	48.8	14.7
Swaziland (SACU)	38.8	9.6	100***	2 835	95-100	35.7	14.7
Tanzania	8.8	0.5	100****	1 207*	50-79	43.5	31.6
Thailand (ASEAN)	1.5	12.2	100	130	95-100	69.1	18.1
Togo (WAEMU)	4.1	0.4	81	7 701 (98)	50-79	49.9	17.6
Uganda (EACU)	4.1	12.9	100	46	50-79	45.7	31
Venezuela (AC)	0.7	Nd	88	94	80-94	73.6	25
Viet Nam (ASEAN)	0.4	35.0	100	95	80-94	69	12.7
Zimbabwe	24.6	1.0	100	5 410	50-79	33.9	22.5

nd=No Data
*=1999
**=2000
***Four of 15 operational units are not reporting to the National Tuberculosis Control Program on a regular basis
****Country offers additional information on "access" to DOTS services, which it measures in terms of distance from health facility: 70% population live within 5 km and 90% within 10 km from a health unit.
± Based on Taxed to Death average tariffs, taxes and other duties.
Source: UNDP Human Development Report 2002, 2004
World Health Organisation, The World Medicines Situation, 2004, Geneva.

Laing and Olcay (2005) critique our use of UN "Access to Medicine" data in *Taxed to Death*. Though we utilized point estimates of access to medicine in estimating the impact of taxes and tariffs, these points are nothing more than arbitrary representations of the interval estimates to which the numbers belong. Thus, directly following the methodology of the UN Human Development report, we instead use the access data to place countries into ordinal categories: Very low access (0-49 percent, low access (50-79 percent), medium (80-94 percent), and good (95-100 percent).

In an attempt to estimate a quantitative relationship between tariff levels and

access to medicine, we utilize tariff data provided by Laing and Olcay (2005). Our sample consists of 96 countries with populations greater than 500,000 and a classification of low or medium in the 2002 UNHD report.[19] Some countries that meet these criteria have been excluded due to dearth of reliable data. We have also excluded the influential outlier Iran from this analysis due to their extraordinary large tariff levels.[20] Unsurprisingly, the countries in the sample populate the bottom three access to medicine categories, most frequently 'low' (see Table 4).

Table 4

Distribution of Access to Medicine Among Low and Medium Developed Countries

Category	Frequency
Very Low	23
Low	40
Medium	23
High	10

We include several explanatory variables in our model to control for factors other than tariffs that influence the probability of being in a particular "Access" category (Table 5).We expect all the tariff variables and RURAL to have negative coefficients, and GNI02 to have a positive coefficient. In addition, we expect HEXPR to also have a negative coefficient, as higher private expenditures, holding other factors constant, may indicate inequities in access to health care that disfavor the majority of inhabitants. However, we are uncertain as to the effects of Hexpub.

Table 5

Variable Names (Access to Medicine)

Variable Name	Variable Description
Wavgactive	Weighted average tariff across subcategories of the four digit category (3003) for active ingredients in pharmaceutical products
Wavgfnsh	Weighted average tariff across subcategories of the four digit category (3004) for finished

[19] For a list of countries as 'low' or 'medium' in the UNHD report but excluded from the analysis due to data issues, see Annex 3.

[20] We discuss the implications of removing this outlier in the results section.

	pharmaceutical products
Totwavg	Average of wavgfnsh and wavgactive
Hexpr	Private Health Expenditure as a percentage of GDP (2002)
Hexpub	Public Health Expenditure as a percentage of GDP (2002)
Rural	Percentage of Population living in rural areas (2002)
GNI02	GNI per capita in 2002
Corrupt	Score on Corruption Perceptions Index (high scores inversely related to corruption) (2004)[i]

Note: i=data drawn from 2004 due to availability

We limit ourselves to these explanatory variables because the role of other factors, such as drug price regulations, is likely to be minor when compared to GNI. Additionally we do not have access to comprehensive data on regulations, competition within the pharmaceutical industry and market size.

In Table 5, no year is designated for the tariff variables. One of the weak points of the data taken from Laing and Olcay (2005) is that the year of the tariff level measurement is not uniform for all countries. Therefore, in order to carry out a meaningful estimation, we must assume that variation in tariff levels across time periods for each observation is extremely small. Considering that our sample consists of tariff data from a small window of time (2000-2004) and tariff rates are generally stable,[21] with major changes occurring rarely, we consider this a fairly reasonable assumption. To be thorough, however, we must caution the reader that violation of this assumption damages the validity of our estimation results.

Estimation

We use an Ordered Probit model to estimate the relationship between the explanatory variables and our ordered dependent variable, Access to Medicine. Ordered Probit models are of a general class of estimators designed to handle indexed descriptions of a latent continuous variable (Access to Medicine, in this case).[22]

[21] According to former Australian Trade Ambassador, Alan Oxley, tariffs "are generally not volatile. Most Western economies bind their tariffs under the WTO (formally committing not to raise them). Many developing countries bind their tariffs at a higher level – typically 30 percent – than the rate at which they are actually 'applied' – average of applied tariffs in developing countries is 12- 15 percent. (For reference average applied tariff in industrialized economies is 4 percent). So most developing countries have legal scope to raise tariffs. They usually only do so when there is an economic crisis. Thailand did after the Asian currency crisis. You can safely assume the rates you have are probably current." Pers comm. 2-21-06.

[22] These models are widely used for estimating ordinal dependent variables, and their properties are

Interpretation of the coefficients on the explanatory variables is not as straight forward as in the linear regression model. Conceptually, the coefficients can be viewed as propensities of being in higher categories. For positive coefficients, an increase in the explanatory variable is associated with an increase in the latent Access to Medicine variable. Thus, positive coefficients indicate that all other variables held constant, the probability of being in a higher category of the dependent variable increases with higher values of the explanatory variable. The reverse is true for negative coefficients.[23]

We estimate two models. In one, we include wavgfnsh and wavgactive (but not totwavg) as separate terms in the regression, and in the other, we leave both of these variables out and include totwavg.

Results

Our results in Tables 6 and 7 indicate that tariff weighted averages have a statistically significant and negative effect on Access to Medicine when inserted in the model as an average of active ingredient and finished product tariffs (i.e. totwavg). Computing marginal effects, we find that a one percent increase in totwavg is associated with a .013 percent increase in the probability of being in the 'very low' category, and a .12 decrease in being in the 'medium' category. In other words these relationships demonstrate strong but relatively small likelihoods of higher tariffs being associated with a very significant change – being in the 'very low' category of access to medicines. And hence a reduction in tariffs is associated with a reversal of the above, less likelihood of a country having woefully low access to essential medical interventions.

When inserted into the model separately, the coefficient on wavgactive remains negative and significant, but wavgfnsh becomes positive and insignificant. The only other statistically significant variables in the model are GNI02 and HEXPR, which are respectively positive and negative, as expected.

The seemingly differing results regarding the tariff variables in both models

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thoroughly discussed in the standard literature. We refer the reader to Greene (2003) for a review of the estimator's basic motivation and properties, and Long and Freese (2006) for a thorough treatment of estimating ordinal (and related) models in STATA.

[23] We again refer the reader to Greene (2003) and Long and Freese (2006) for a more formal and rigorous explanation than given here.

may have a less than straightforward interpretation. Given the statistical significance of totwavg in the previous model, the insignificance and unexpected sign of wavgfnsh, as well as the unexpectedly large coefficient on wavgfnsh and wavgactive, is probably due to problems arising from multicollinearity among wavgfnsh and wavgactive.[24] The high degree of correlation (simple r=.872) between the two is unsurprising, given that governments tend to set similar tariff levels for closely related goods. Unfortunately, teasing out the independent effect of each is difficult when both are included like this in the model. Thus we cannot conclude from these results that it is only tariffs on active ingredients that negatively impact access to medicine.

There are two important notes regarding the sensitivity of these results. For one, while we do not have data on simple averages for finished goods, replacing wavgactive with its simple average corollary in the second model has almost no effect on the results. However, the exclusion of Iran does. When Iran is included, totwavg becomes insignificant different from zero, hexpub becomes statistically significant.[25] Iran, whose 54 percent weighted average tariff for finished products and 100 percent weighted average for active ingredients, is markedly above the next highest taxer, India (30% and 35% respectively) and the median tariff rate for the sample (3.42 percent). Combined with Iran's relatively high score for Access to Medicine (Medium), this observation has enough influence to dramatically increase the standard error calculation for totwavg (as well as wavgfnsh and wavgactive).

To keep Iran in the estimation, and properly account for possible nonlinearity at extremely large values for totwavg, we estimate a third model that includes a quadratic totwavg term and the Iran observation (Table 8). Totwavg and towavgsq are both significant, but estimating the same quadratic model excluding Iran drops both terms from statistical significance. This exercise serves primarily to demonstrate the influence of Iran's high observation on the estimation results, though it might suggest the possibility of decreasing marginal effect of tariffs at extremely high levels. However, it would be highly presumptuous to fashion ideas about the effect of tariffs from the uniqueness of Iran's high tariff levels alone.[26]

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[24] Judge et al. (1988), among others, discuss more thoroughly the problems with interpreting coefficient estimates in the presence of multicollinearity.

[25] Aside from a decrease in the magnitude of totwavg, coefficient estimates remain stable.

[26] Lest we be accused of 'rigging' our results, we stress that the estimates given in Table 8 demonstrate the sensitivity of the model to the inclusion of outliers, not as an assertion of the true specification of

Table 6

Access to Medicine with a Combined Tariff Variable

	Coef.	Std. Err.
gni02	.0004451	.0001245***
totwavg	-.0487805	.0249629**
hexpub	.1305626	.0997555
hexpr	-.173003	.0823335**
rural	.0058439	.0078305
corrupt	.0663597	.1346674
N=94		
Significance Levels: ***=.01, **=.05, *=.10		

Table 7

Access to Medicine with Separate Tariff Variables

	Coef.	Std. Err.
gni02	.0004857	.0001284***
wavgfnsh	.0741729	.0520966
wavgactive	-.1177935	.0496327**
hexpub	.1012494	.1011554
hexpr	-.1700761	.0827509**
rural	.0070208	.0079177
corrupt	.062901	.1357761
N=94		
Significance Levels: ***=.01, **=.05, *=.10		

the relationship between tariffs and access to medicine.

Table 8

Access to Medicine with Quadratic Combined Tariff Variable, Including Iran

	Coef.	Std. Err.
gni02	.0004531	.0001252***
totwavg	-.0620272	.0305299**
totwavgsq	.0009294	.0004343**
hexpub	.1342746	.0997864
hexpr	-.1770456	.0823616**
rural	.0056399	.0078332
corrupt	.0603393	.1350752
N=95		

Significance Levels: ***=.01, **=.05, *=.10

Table 9

Marginal Effects of Independent Variables on Access to Medicine

	Prob(=Very Low)	Prob(=Low)	Prob(=Medium)	Prob(=High)
gni02	-.0001***	-.0001	.0001***	.0001***
totwavg	.0130*	.0042	-.0120*	-.0052*
hexpr	.0460**	.0149	-.0427**	-.0183*
hexpub	-.0347	-.0113	.0322	.0138
rural	-.0015	-.0005	.0014	.0006
corrupt	-.0178	-.0057	.0163	.0070

Vaccine tariffs

In addition to examining tariffs on various medicines, we take special note of import tariffs on vaccines. We do this not only because immunization is a crucial public health issue, but also because we can quantify the relationship between vaccine tariffs and vaccine consumption with much greater ease and reliability. Indeed,

'access to medicine' is inherently difficult to measure with precision. Immunization coverage, however, is actively measured by national governments and the World Health Organization.

Our vaccine tariff data reveals that 57% of the countries in our sample, which consists of 96 countries with a population greater than 500,000, classified as low or medium in the 2002 UNHD report and for which complete data is available, have zero tariff levels (see Table 10).[27] Though the mean tariff in the sample was only 2.9%, fifteen countries have a tariff of five percent and nine countries have a ten percent tariff. All told, thirty countries or 31 percent have a tariff level of five percent or more.[28]

Table 10

Distribution of Vaccine Tariff Levels

Tariff Level (percent)	Frequency
0	55
0-5	26
5.1-10	11
10.1-15	2
15.1-30	2

As before, we assume that the tariff rates remain constant throughout the period of our analysis (2000 – 2004).

Model

Utilizing vaccine tariff and immunization coverage data enables us to detect the impact of tariffs in a more precise manner than our access to medicine data allow. We expect vaccine tariffs to affect coverage rates in a manner similar to tariffs on medicine. However, in the case of immunizations, individuals typically do not consume vaccines from their own budget. For the countries in our sample, immunization campaigns are usually headed by national governments, in coordination with international development agencies.[29]

[27] We take our tariff data from Laing and Olcay (2005), who report no differences in simple and weighted averages despite positive import levels.

[28] India, which has a stated tariff of 30 percent, is included in this sample. Laing and Olcay (2005) claim that this tariff is not collected, but we were unable to confirm that this was the case in 2002.

[29] World Health Organisation (2002), "State of the World's Vaccines and Immunization" WHO, Geneva. Available from http://www.unicef.org/publications/files/pub_sowvi_en.pdf (accessed January

In general, higher costs for vaccines raise the total cost of immunization campaigns. We suspect that in some cases, this cost may be substantial enough to affect the number of people that these campaigns reach. Clearly, given the somewhat centralized nature of immunization campaigns in developing countries, the effect of these tariffs are conditional on other factors. For this reason, we include the variable CORRUPT, which contains data from the Corruption Perceptions Index (CPI) compiled by Transparency International, in our model.[30] We expect CORRUPT to be positively correlated to tariff rates, as higher values indicate 'cleaner' government, which are expected to both be more responsive to the needs of its citizens and more likely to receive (and use) donor support. DOCTORS and POPDEN (population density) reflect the difficulty of administering immunization campaigns, and we expect both variables to have a positive coefficient as well.

We construct two linear models identical in all but the choice of dependent variable. In one, we use the (DPT3) vaccine, and in the other the Measles containing vaccine (MCV).

Figure 1

Dependent Variables

$DPT3_i$ = Percentage of Target Population Immunized With Third Dose of Diphtheria, Pertussis, and Tetanus Vaccine, 2004

MCV_i = Percentage of Target Population Immunized With Measles Containing Vaccine, 2004

15, 2006).

[30] Corruption Perceptions Index (CPI) compiled by Transparency International. Available at: http://www.icgg.org/corruption.cpi_2003_sources.html (accessed 02/01/2006)

Figure 2

Explanatory Variables

GNI_i=Gross National Income per Capita, 2004
$TARIFF$=6 Digit Vaccine Tariff Rate (varies)
$CORRUPT_i$=Score on Corruption Perceptions Index (high scores inversely related to corruption) (2004)
$DOCTORS_i$ = Physicians Per 1000 People (2004)
$POPDEN_i$ = Population Per km^2 (2004)

Note: Tariff Data from Laing and Oclay (2005) do not indicate any difference between simple and weighted tariff avergages for the countries in our sample.

Estimation

We employ quantile regression to estimate these models. This estimation technique is more efficient than OLS when the error terms are non-normally distributed, as they are here. Both visual inspection and a Shapiro-Wilk test for normality confirm that the residuals in this regression are not normal, which we attribute to negative skewness in the dependent variables.[31] [32] This skewness is seen readily in Table 10, which shows a high concentration of the data at or around zero.

Quantile regression is actually very similar to least squares regression in conception, though the former's focus on the conditional median (in lieu of the mean) makes it a more attractive estimator in the presence of non-normality. While OLS estimates the marginal effect of an explanatory variable at the mean of the dependent variable, quantile regression estimates this marginal effect at various points along the distribution of the dependent variable. Methodologically, in the simple case of median regression, the estimator is simply minimizing the sum of the absolute value of the error terms (referred to varyingly as a "least absolute error", "least absolute residual" or "minimum absolute deviation" estimator). At other quantiles, the errors are weighted accordingly before fitting a sum-of-errors minimizing line.[33]

There is considerable debate regarding the proper method of estimating

[31] Shapiro-Wilk p-value: .00008
[32] Attempts to alleviate the skewness by reflecting the data and taking a logarithmic transformation were ineffective.
[33] Please refer to Koenker and Basset (1978), Judge et al. (1988), Buchinsky (1998) and Koenker and Hallock (2001) for a more rigorous explanation of the methodology behind quantiles.

standard errors for quantile regression parameters. Estimating standard errors using the method proposed by Koenker and Bassett (1982) and Rogers (1993), which is the default method in STATA, is often unreliable in the presence of heteroskedastic error terms, so we also present bootstrapped results.[34]

Results

Table 11 presents estimation results with MCV immunization coverage as the dependent variable, and Table 12 presents results with DPT3 immunization cover as the dependent variable.

All of the variables in our model have expected coefficients, with DOCTORS positively correlated and statistically significant at the 1% level for virtually all quantiles and standard error estimations.[35] Further, the negative correlation of TARIFF with immunization coverage is robust to all quantiles and both types of vaccines. At the middle quantiles of both the MCV and DPT3 regression, the relationship is significantly different from zero under both methods of calculating the standard error. TARIFF appears significant at other places in the regression, but the differences between the MCV and DPT3 in the regressions and variations in standard error calculations limit our ability to make further generalizations.[36]

As expected the magnitude of TARIFF is not large (between -.6 and -.8 were significantly different from zero) in comparison to variables such as DOCTORS and CORRUPT.[37] Unexpectedly, however, GNI04 did not appear significant in the equation. The role of international donors in immunization campaigns may mute the effect of variations in GNI per capita among less developed countries on coverage levels.

Though some of the shortcomings in our data and the difficulty in estimating precise standard errors limit our ability to interpret the statistical significance levels of the variables presented here, the difference between the DPT3 and measles estimations in this regard nevertheless may appear surprising. According to Younger

[34] See Koenker and Hallock (2001) for a comparison of methods to estimate standard errors.
[35] The estimated signs of the coefficients are robust to variation in specification, including alternative means to compensate for the skewness in the dependent variable.
[36] Interquantile regression coefficients do not reveal statistically significant different impacts of the explanatory variables across the quantiles.
[37] Interpretation of the coefficients is the same in quantile regression as in OLS. Thus, at the median conditional quantile of DTP3 vaccine coverage, for example, a one percent increase in the vaccine tariff rate decreases coverage by .735 percentage points, while an additional physician (per 1000

(2001), however, these two variables also produce different results when used in economic growth equations as proxies for more general health status variables. Perhaps some of this difference may be attributed to the contrasting administrations of the two vaccines: while measles is given once, DPT3 represents the third in a series of doses.

Table 11 and 12

Estimation Results

MCV				DPT3		
Variable	**Coefficient**	**Bootstrap Standard Error (1000 Repititions)**	**Assymptotic Standard Error**	**Coefficient**	**Bootstrap Standard Error (1000 Repititions)**	**Assymptotic Standard Error**
Quantile (.1)	.10 Pseudo R2 = 0.2877			.10 Pseudo R2 = 0.3173		
tariff	-1.020	0.7959966	0.6543906	-1.525	.7724317**	.7980456*
gni04a	0.003	0.0019619	0.0033938	0.003	0.0031551	0.0031853
popden	0.025	0.0179643	0.036049	0.025	0.0233489	0.0280448
corrupt	3.465	4.436569	4.818335	4.969	2.276146**	5.500967
doctors	8.575	2.268028***	4.34237**	6.205	2.283767***	4.378142
_cons	42.954	15.14136***	18.33114**	41.069	9.333565***	21.6654*
Quantile (.25)	.25 Pseudo R2 = 0.3201			.25 Pseudo R2 = 0.2804		
tariff	-0.678	0.4329454	-0.6778915	-0.665	0.5123128	.3887701*
gni04a	0.001	0.001341	0.0008062	0.002	.0008814*	0.0010862
popden	0.013	0.01055	0.0125681	0.020	.0094812**	.0112273*
corrupt	3.448	2.347493	3.447993	5.640	1.792609***	2.561764**
doctors	7.911	1.552696***	7.911202***	4.488	1.765193***	1.908258**
_cons	56.517	7.083161***	56.51729***	53.710	6.732673***	8.133589***
Quantile (.4)	.40 Pseudo R2 = 0.3132			.40 Pseudo R2 = 0.2591		
tariff	-0.875	0.4031576**	.3459299***	-0.643	.3961236*	.356912*
gni04a	0.001	0.0010591	0.000963	0.001	0.0008844	0.0011296
popden	0.008	0.010517	0.0090501	0.015	.0052238***	0.0109195
corrupt	3.996	1.622692**	2.015838**	5.146	1.16633***	2.397763**
doctors	6.886	1.413854***	1.614392***	5.666	1.553399***	1.940247***
_cons	60.542	5.193902***	6.589769***	60.186	3.784221***	7.761941***
Quantile (.5)	.50 Pseudo R2 = 0.3125			.50 Pseudo R2 = 0.2695		
tariff	-0.827	0.4682227*	.294963***	-0.735	.2250161***	.1691178***

people) increases coverage by 5.16 percentage points.

gni04a	0.001	0.0009407	0.0009564	0.001	0.0006149	0.0005167
popden	0.005	0.0114701	0.0086642	0.010	.0048652**	.0051347**
corrupt	3.817	1.395012***	1.991667*	4.974	1.040846***	1.040186***
doctors	7.123	1.317103***	1.558888***	5.158	1.090614***	.9177932***
_cons	64.191	4.881548***	6.499429***	65.538	3.844374***	3.537321***
Quantile (.6)	.60 Pseudo R2 = 0.3023			.60 Pseudo R2 = 0.2722		
tariff	-0.234	0.4590907	0.2642471	-0.815	.1965511***	.2574008***
gni04a	0.001	0.0008152	0.0007689	0.000	0.000545	.0007517***
popden	0.013	0.0123093	0.0080778	0.011	0.0079037	0.0086459
corrupt	4.069	1.356541***	1.327228***	4.411	1.125132***	1.454207***
doctors	7.166	1.135346***	1.150167***	4.748	.9009561***	1.084565***
_cons	64.927	4.773336***	4.498341***	69.829	4.898721***	4.779701***
Quantile (.75)	.75 Pseudo R2 = 0.2263			.75 Pseudo R2 = 0.2411		
tariff	-0.561	0.3661937	0.3202669*	-0.733	.2841977***	.1977535***
gni04a	0.001	0.0008435	0.0009127	0.001	.0005282**	0.0006976
popden	0.009	0.0137859	0.0089993	0.005	0.0134377	0.0055851
corrupt	3.333	1.374244**	1.486914**	3.347	1.040877***	.9085314***
doctors	5.722	1.213297***	1.32848***	4.930	.9128649***	.873459***
_cons	72.872	5.23648***	5.338117***	75.580	3.115575***	3.246074***
Quantile (.9)	.90 Pseudo R2 = 0.1116			.90 Pseudo R2 = 0.1017		
tariff	-0.237	0.4483761	0.2403709	-0.368	0.4449361	-0.3684446
gni04a	0.001	0.0009777	0.000591*	0.001	0.0009309	0.0009981
popden	0.008	0.0156465	0.0072305	0.018	0.0139216	.0176458*
corrupt	1.294	1.392382	0.9611167	2.210	2.006037	2.210044*
doctors	3.314	1.709302*	0.7636374***	4.537	1.424357***	4.536767**
_cons	86.637	5.9777***	3.242298***	81.126	6.205883***	81.12643***
n=96						

4. The Impact of Value Added Taxes on Medicines

As Table 2 shows, in addition to import tariffs, many countries impose value added taxes and other charges on the sale of medicines. We have not conducted a regression analysis of the effect of these taxes on access to medicines, however we have examined the impact of such taxes on a typical patient purchasing anti-retroviral medicines in South Africa. Although South Africa does not have import tariffs, the government does impose VAT on all medicines. The country has one of the highest rates of HIV infection in the world at approximately 21.5 percent of the population. The government's program to provide antiretroviral therapy through the state healthcare system has been delayed and is largely inadequate; as a result many people living with HIV/AIDS seek treatment through the private sector.

A month's supply of antiretroviral triple therapy consisting of Combivir and

Nevirapine, is likely to cost R 586 ($101) for the drugs alone. Of this amount, R72 ($14) is paid directly to the South African government in the form of VAT. If the government were to waive VAT, however, patients would be able to afford more of the fresh fruit, vegetables and meat that they should consume in order to remain healthy and be able to maintain their antiretroviral therapy. Among the billions of Rand raised by the South African government, the R72 raised via VAT on each person's monthly antiretroviral therapy makes little difference to the life of the government, but that money can make an enormous difference to the lives of ordinary South Africans living with HIV/AIDS.[38]

Table 13
Essential Foodstuffs Denied Due to South Africa's VAT Payment on Antiretroviral Triple Therapy[39]

Item	Unit Cost	Quantity	Total (South African Rand)
Brown bread	3.59/loaf	2	R 7.18
Eggs	1.05/egg	6	R 6.3
Low fat milk	5.69/litre	1	R 5.69
Maize meal	2.59/kg	1	R 2.59
Bananas	4.99/kg	1	R 4.99
Beetroot	5.32/kg	0.5	R 2.66
Tomatoes	9.99/kg	0.5	R 4.99
Broccoli	5.99/kg	0.5	R 2.99
Lean minced beef	27.95/kg	0.5	R 13.98
Whole chicken	18.99/kg	1.1	R 20.89
TOTAL			**R 72.26**

Bureaucracy and delays in delivery

The taxes and tariffs that governments impose directly increase the cost of medicines and medical equipment to patients. However, there are other non-tariff barrier costs that, while difficult to quantify, increase the cost of medicine. Onerous and difficult customs procedures that delay the transit of goods not only delay getting medicines to patients, they also add to the costs of manufacturers, agents and distributors.

For instance, the US government warns that Nigeria's "ports continue to

[38] Table 13 details the basket of goods that a patient could afford if the South African government did not impose VAT on medicines.

present major obstacles to trade. Importers face inordinately long clearance procedures, high berthing and unloading costs, erratic application of customs regulations and corruption."[40] It isn't only commercial organisations that face barriers to importing goods to Nigeria. Confidential enquiries made by the authors found that the process of securing exemptions for donated medicines was extremely arduous, with reports that the President of Nigeria himself must authorise customs exemptions for donated medicines. This inevitably leads to immense delays in clearing the goods; consequently those in need of treatment are left without it.

While Nigeria's port system may well be one of the slowest and most corrupt in Africa, anecdotal evidence suggests that many other African countries have a great deal of scope to improve their port and customs procedures as well.

Apart from the slow process of clearing goods through customs, most African countries require that pharmaceutical products are registered with their own medicine control agencies, even when the medicines are registered for use in the US, the EU and Japan. In these cases, domestic drug regulators simply delay the approval of medicines that have already been approved by and are being used in other markets.[41]

The South African drug regulator, the Medicines Control Council (MCC) is notoriously inefficient and tardy with its approval process. On average, drugs that have already been registered for use in the US, EU and Japan can wait for 39 months for approval in the South African system.[42]

In 2002, the Namibian Medicines Control Council announced that it required all drug manufacturers to re-register all medicines that were registered in the country prior to 1990, the year Namibia gained independence. There is no reasonable healthcare argument in favour of this requirement. The move amounts to shameless bureaucratic empire building by the Namibian department of health.

The inefficiency and obstructionism of drug regulators imposes enormous, though largely unquantifiable, costs on manufacturers and patients. Along with the

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[39] Source: Dischem Pharmacy and Pick 'n Pay Supermarket

[40] US Trade Representative, "Foreign Trade Barriers – Nigeria," USTR, US Government, available at: http://www.ustr.gov/Document_Library/Reports_Publications/2004/2004_National_Trade_Estimate/2004_NTE_Report/Section_Index.html?ht= (accessed February 21, 2006)

[41] Where a therapy is designed to treat an infectious disease in a developing country, domestic drug regulators play an important role because drug manufacturers do not register these medicines in developed countries. A private agency however might do a more efficient and effective job of ensuring that drugs are safe and effective.

[42] Health Systems Trust, "Drugs for the poor collect dust as council drags its feet," available at:

direct costs of compliance, drug manufacturers face the considerable opportunity costs of not being able to sell their product. These costs however pale in comparison to the costs faced by patients forced to go without a particular therapy for several years while the domestic medicine control agencies satisfy themselves that the drug is safe.

Reforming the regulatory regime and customs procedures is an essential step for developing countries to take in order to reduce the cost of medicines to the world's poorest people. Many developing countries face considerable difficulties with fake or counterfeit drugs being imported and sold to unsuspecting patients. Governments should reform the regulatory and customs procedures in a way that does not compromise the quality of medicines, but improves the trading environment for legitimate producers and distributors.

5. Discussion

As we have already mentioned, there are numerous and varied reasons for the fact that many people around the world, mostly in poor countries, lack access to medicines and decent medical care. The World Health Organisation considers that along with the general inadequacies of health systems in poor countries, access to medicines is determined by four distinct key factors; rational use, affordable prices, sustainable financing and reliable health and supply systems.[43]

In order to improve access to medicines, the WHO proposes that countries implement changes to these four areas of healthcare policy. In particular setting rational medicine use guidelines involves the state setting guidelines over medicine use and choosing medicines that are appropriate to a country's disease burden, the cost effectiveness of treatment and the country's economic situation. Low-income countries have updated their own essential drugs lists as defined by the WHO. In 1985, only 5% of low income countries had updated their essential drugs lists in the previous 5 years, however by 1999, that figure had risen to 60%.

According to the WHO, assuring affordable prices can be achieved either through "obtaining the best possible prices through the selection and purchasing process" or through "ensuring price regulation throughout the supply chain from

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http://www.hst.org.za/news/20040355 (accessed April 23, 2004).

[43] World Health Organisation (2004), "The World Medicines Situation," WHO, Geneva, 2004. p 64

manufacturer or importer to patient." Indeed, many countries implement a combination of these two strategies in order to keep the price of medicines low and theoretically affordable.

What the WHO does not point out however, is that the best mechanism to increase access to medicines is not greater regulation and more state interference in price setting, but is found in increased economic growth and greater wealth creation. Indeed, Barro (1997) reports, "a statistically significant positive correlation between per capita GDP growth and life expectancy."[44]

The fact that the WHO does not actively involve itself with general economic policy is perhaps understandable. However, one would think that the primary reason for increased access to healthcare, longer life expectancies and improved standards of living – increased wealth and economic growth - should at least be mentioned by the WHO.

There is little informed debate on how countries can grow their economies and increase wealth for all. Greater economic freedom, defined by secure property rights, the rule of law, low taxes, limited government and more open trade drive economic growth which in turn increases incomes. With increased incomes comes more funding that can be spent on health - and as was demonstrated in the vaccines model above one form of allocation is to increase the number of health professionals which improves vaccine access rates.

Changing economic policies for poor countries can be a slow and politically fraught process, however, and it is little comfort for those who are dying now for an inability to afford medicines that their children or grandchildren may one day be able to afford medicines. Governments do however have direct and immediate control over the import tariffs, taxes and duties imposed on medical interventions as well as the bureaucratic mechanisms that allow medicines to be sold in their countries. Removing these state imposed barriers should be the first and most logical place for any government interested in improving access to medicines to start. Removing barriers where most products are donated (especially vaccines) would seem to be the most urgent priority.

A 2004 project by the WHO and Health Action International (HAI) on

[44] Barro, R.J. (1997), "Determinants of Economic Growth," MIT Press, Cambridge, Massachusetts.

medicine pricing in 9 African countries suggested that the removal of import taxes and levies on essential medicines would lower prices and improve access. Laing and Olcay's study for the WHO also recommends that countries should remove import tariffs and taxes. Yet these state-imposed barriers to access are rarely criticised by intergovernmental agencies, health charities and NGOs. For instance, a 2002 report by Claire Short, then Secretary of State for International Development to British Prime Minister Tony Blair on access to essential medicines does not mention any of the state-imposed barriers to access.

However one of the world's leading agencies involved in improving healthcare and access to medicines, The Global Fund to Fight AIDS, TB and Malaria, considers that taxes and tariffs inhibit access to medicines. Global Fund grant agreements specifically state, "the assistance financed hereunder shall be free from any customs duties, tariffs, import taxes, or other similar levies and taxes (including value-added tax) imposed under laws in effect in the Host Country." However, even when an import tariff or tax is waived, the process of securing that exemption is likely to be slow and arduous. If the principle of waiving taxes and tariffs on Global Fund drugs makes sense, then countries should extend that logic to all other medicines, devices and medical services.

The problem however is that in some cases, as explained above, import tariffs and taxes may be in place because they raise much needed revenue and, in the case of tariffs, foreign exchange for ministries of finance. These tariffs could also protect the local pharmaceutical industry from international competition. Laing and Olcay (2005) argue that because import tariffs are imposed on active pharmaceutical ingredients (API) as well as on completed pharmaceuticals, there is little logic to the trade protection argument.

However, a country such as India produces both API as well as completed pharmaceuticals. The import duties on API will protect the local producers of API from competition abroad and is likely to raise prices of locally produced drugs that use local API.

In any event, Laing and Olcay's analysis presupposes that there has to be some sort of logic behind trade policy and protectionism. In reality governments are often lobbied and captured by special interests to secure special treatment for their particular niche. There need be little benefit to the economy or consumers as a whole,

and in some cases, little benefit to the entire industry.

An example of this and an illustration of the importance of trade protection to local pharmaceutical manufacturers can be found in the recent lobbying in favour of import tariffs by East African pharmaceutical producers. Since the imposition of a 10% import tariff by Kenya, Uganda and Tanzania in February 2005 and then the subsequent removal of those tariffs by Kenya in April 2005, local medicine manufacturers have lobbied to retain the tariffs.

Harpreet Duggal, secretary general of the Tanzanian Pharmaceutical Manufacturers Association told journalists that Kenya's move would kill pharmaceutical industries in the region. Mr Duggal's argument relies on the old, and largely discredited, infant industry argument, which proposes that new industries need government protection rather than competition. Mr Duggal maintains that Kenya's action to lower its import tariffs only benefits the multinational pharmaceutical industry: "We find that action goes against the very spirit of the East African member states," he said. Other Tanzanian business leaders backed Mr Duggal claiming that the funds raised by the Government could be used to buy antiretroviral drugs for thousands of patients.[45]

There is little in the way of economic evidence to suggest that Mr Duggal's argument would improve access to medicines or indeed promote anything other than the narrow interests of a few drug producers. Yet this forceful lobbying undermines Laing and Olcay's assertion that import tariffs on medicines do not benefit any particular group. Furthermore, their conclusion that import tariffs represent a tiny fraction of a country's GDP ignores the fact that they represent a very sizable amount of money for particular producers.

Improving access to medicines has been the focus of countless United Nations initiatives and has been a major preoccupation of the World Trade Organisation's Doha Development Round. Much of the focus on improving access to medicines has been on the price of those medicines, and specifically the price at which drug manufacturers sell their product. In recent years a great deal of progress has been made in reducing the cost of essential medicines and on giving poor countries greater flexibility in importing cheap medicines. And yet access to medicines remains low – largely because of grinding poverty and a lack of decent medical infrastructure so that

countries can actually take advantage of lower drug prices.

Our regression analysis confirms an inverse relationship between import tariffs on medicines and access to medicines. In general, our analysis of the relationship between import tariffs on vaccines and vaccination rates supports the hypothesis that vaccine tariffs have a negative impact on vaccine coverage. Though the data shortcomings prevent us from making definitive statements regarding the certainty and magnitude of this relationship, these results indicate that research into the issue is worthwhile, as is more rigorous data collection. Indeed, it makes little sense for international agencies to so heavily subsidize these campaigns while vaccine costs are essentially marked up by national governments. Recent studies suggest how effective mass immunization campaigns can be,[46] so it would behove national governments to eliminate as many barriers to success as possible.

Poor countries should, despite the ongoing lobbying from special interest groups, press ahead with reducing tariffs, taxes and duties in medicines and reform the burdensome regulations that restrict drug access. Unless these countries wish only the wealthy elites to have access to medicines, they must make widespread changes to their domestic taxes, tariff and regulatory structures.

The international community can certainly help the poorest countries to lower their tariffs (in general but specifically on donated medicines) by providing technical assistance (macro and micro economists in particular) to these countries to assess how to maintain revenue from other sources.

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[45] "Ministers to Meet Over Suspended Tax on Drugs", *The East African,* June 15, 2005.
[46] See, for example, see Otten et. al. (2005).

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ANNEX 1

Table 1
Pharmaceutical import tariff revenue as a percentage of overall government revenue (Selected countries)[47]

Country	% Tariff Revenue of Overall Government Revenue
Cote d'Ivoire	0.000%
Lesotho	0.000%
Madagascar	0.000%
Malaysia	0.000%
Namibia	0.000%
Senegal	0.000%
South Africa	0.000%
Swaziland	0.000%
Uganda	0.000%
China	0.004%
Indonesia	0.006%
Bangladesh	0.009%
India	0.012%
Congo, Rep	0.017%
Philippines	0.018%
Dominican Rep	0.019%
Vietnam	0.037%
Pakistan	0.041%
Colombia	0.049%
Algeria	0.049%
Kenya	0.058%
Costa Rica	0.062%
Bolivia	0.067%
Thailand	0.067%
Mexico	0.069%
Peru	0.080%
Venezuela	0.105%
El Salvador	0.153%
Lebanon	0.431%
Congo, Dem Rep	1.460%

[47]Sources: Laing & Olcay (2005), International Monetary Fund, Central Government Finances (1996), CIA World Factbook (2005), United Nations Development Program, "Commitment to Health; Resources, Access and Services," Human Development Report 2004: Cultural Liberty in Today's Diverse World, available from: http://hdr.undp.org/reports/global/2004/pdf/hdr04_HDI.pdf, (accessed February 22, 2006); World Bank, World Development Indicators,2004.

Table 2
Percentage pharmaceutical revenue of overall public healthcare budget[48]

Country	% Tariff of Public Healthcare Budget
Benin	0.000%
Botswana	0.000%
Brunei	0.000%
Burkina Faso	0.000%
Cambodia	0.000%
Cote d'Ivoire	0.000%
Guinea Bissau	0.000%
Honduras	0.000%
Lesotho	0.000%
Madagascar	0.000%
Malaysia	0.000%
Mali	0.000%
Mozambique	0.000%
Namibia	0.000%
Niger	0.000%
Senegal	0.000%
South Africa	0.000%
Swaziland	0.000%
Togo	0.000%
Uganda	0.000%
China	0.037%
Bangladesh	0.054%
Dominican Rep	0.146%
India	0.150%
Philippines	0.177%
Chad	0.184%
Indonesia	0.201%
Laos	0.221%
Brazil	0.225%
Ghana	0.247%
Colombia	0.258%
Cent African Rep	0.271%
Costa Rica	0.287%
Congo, Rep	0.368%
Bolivia	0.368%
Mexico	0.377%
Vietnam	0.466%
Peru	0.496%
Algeria	0.574%
Pakistan	0.597%
Thailand	0.626%
El Salvador	0.638%
Venezuela	0.652%
Tanzania	0.704%
Morocco	0.777%
Kenya	0.837%
Cameroon	0.942%

[48] Ibid

Ecuador	1.285%
Lebanon	2.484%
Nigeria	2.497%
Congo, Dem Rep	8.240%
Myanmar	N/A
Zimbabwe	N/A

ANNEX 2

Medical Devices – HTS Codes that are covered in this paper

HS Heading	HS Description
3005	Wadding, gauze, bandages and similar articles for medical, surgical, dental or veterinary purposes
3006.10	Sterile surgical catgut, similar sterile suture materials and sterile tissue adhesives for surgical wound closure and similar sterile material
3006.20	Blood-grouping reagents
3006.30	Opacifying preparations for X-ray examinations; diagnostic reagents designed to be administered to the patient
3006.40	Dental cements and other dental fillings; bone reconstruction cements
3006.50	First-aid boxes and kits

Tariffs on medical devices covered in this paper's discussions include adhesive dressings and sterile surgical catgut, (over 12% tariffs in Thailand and Argentina). Many medical devised are not covered in this paper's analysis, such as surgical towels (HS 6307) and sterilizers (HS 8419). The value of the market for all devices was $220 billion in 2004 (Advamed 2002, Demoor pers comm. 2006). Although the value of the market is much smaller in poor countries, this is where most tariffs are paid, and much as in the above analysis, these tariffs probably harm access. Indeed, industry lobby group, Advamed, says that their 'members pay most of their tariffs to developing countries' ibid p.4)

ANNEX 3
REGRESSION ANALYSIS DATA

1. Key

Variable Name	Variable Description
Wavgactive	Weighted average tariff across subcategories of the four digit category (3003) for active ingredients in pharmaceutical products (varies)
Wavgfnsh	Weighted average tariff across subcategories of the four digit category (3004) for finished pharmaceutical products (varies)
Totwavg	Average of Wavgfnsh and Wavgactive
Hexpr	Private Health Expenditure as a percentage of GDP (2002)
Hexpub	Public Health Expenditure as a percentage of GDP (2002)
Rural	Percentage of Population living in rural areas (2002)
GNI02	GNI per capita in 2002
Corrupt	Score on Corruption Perceptions Index (high scores inversely related to corruption) (2004)[i]
Tariff	6 Digit Vaccine tariff rate (varies)
Doctors	Physicians per 1000 people (2004)
Popden	Population per km^2
DPT3	Percentage of target population immunized with third dose of Diphtheria, Pertussis, and Tetanus and Vaccine (2004)
MCV	Percentage of target population immunized with Measles Containing Vaccine

2. List of Countries Not Included in the Regression due to Data Limitations or Population Size of Less than 500,000.

Antigua and Barbuda
Belize
Brunei Darussalam
Cape Verde
Congo, Dem. Rep. of the
Dominica
Equatorial Guinea
Fiji
Gambia
Georgia
Grenada
Haiti
Maldives
Mongolia
Occupied Palestinian Territories
Saint Lucia
Saint Vincent and the Grenadines
Samoa (Western)
São Tomé and Principe
Sierra Leone
Solomon Islands
Suriname
Timor-Leste
Vanuatu

3. Data Output Spreadsheet

Country	wavgfnsh	yearfnsh	wavgactive	Savgactive	totwavg	gni2002	hexpr	accessord	rural
Albania	0	2002	0	0	0	1390	1.044	low	56.23
Algeria	5.24	2003	5	5	5.12	1720	1.118	high	41.17
Angola	2	2002	2	2	2	680	2.905	Very low	64.31
Armenia	0	2001	0	0	0	800	4.175	Very low	35.54
Azerbaijan	0	2002	0.26	0.69	0.13	720	2.8823	low	49.86
Bangladesh	9.63	2004	7.45	5.73	8.54	370	2.3188	low	75.73
Belarus	8.26	2002	5	5	6.63	1310	1.6704	low	29.11
Belize	10.84	2003	9.62	2.67	10.23	3090	2.7404	medium	51.62
Benin	0	2004	0	0	0	380	2.6132	low	55.43
Bhutan	0	2004	0	0	0	590	0.351	medium	91.46
Bolivia	10	2004	10	10	10	930	2.814	low	36.62
Bosnia and Herzegovina	3.93	2001	0	0	1.965	1410	4.6184	medium	55.62
Botswana	0	2001	0	0	0	2780	2.286	medium	48.42
Brazil	10.31	2004	9.51	10.04	9.91	2860	4.2739	Very low	16.99
Brunei	0	2003	0	0	0		0.763	very high	23.88
Bulgaria	0	2004	0	0	0	1790	2.854	medium	30.19
Burkina Faso	0	2004	0	0	0	250	2.3263	low	82.17
Burundi	15	2002	15	15	15	90	2.355	Very low	90.05
Cambodia	0	2003	0	0	0	290	9.948	Very low	81.39
Cameroon	5	2002	5	5	5	560	3.3948	low	48.64
Central African Republic	5	2002	5	5	5	250	2.2776	low	57.26
Chad	5	2002	5	5	5	210	3.7765	Very low	75.03
China	4.41	2004	5.6	5.67	5.005	970	3.8454	medium	61.37
Colombia	8.04	2004	5	5	6.52	1830	1.3851	medium	23.6
Congo, Rep.	5	2002	5	5	5	620	0.6534	low	46.48
Cote d'Ivoire	0	2004	0	0	0	610	4.8112	medium	55.08
Djibouti	10	2002	10	10	10	850	2.9673	medium	16.36
Dominica	8.76	2003	6.78	3.93	7.77	3190	1.8368	medium	27.96
Dominican Republic	3	2004	3	3	3	2370	3.8796	low	40.65

Ecuador	5.64	2004	5	5	5.32	1510	3.072	very low	38.21
Egypt, Arab Rep.	6.83	2002	7.05	7.75	6.94	1470	3.1066	medium	57.79
El Salvador	5	2004	0	0	2.5	2110	4.424	medium	40.56
Equatorial Guinea	5	2002	5	5	5	9110	0.5004	very low	51.95
Eritrea	2	2002	2	2	2	150	1.8513	low	80.01
Ethiopia(excludes Eritrea)	8.56	2002	5	5	6.78	100	3.1407	low	84.35
Gabon	5	2002	5	5	5	3000	2.5241	very low	16.33
Georgia	1	2004	5	5	3	710	2.7702	very low	48.05
Ghana	4.73	2004	10	10	7.365	270	3.304	very low	54.64
Grenada	12.58	2003	11.37	7.78	11.975	3290	1.653	high	59.28
Guatemala	5	2004	4.93	4.17	4.965	1750	2.52	low	53.65
Guinea-Bissau	0	2004	0	0	0	130	3.2634	very low	66.03
Guyana	12.04	2003	12.49	7.03	12.265	860	1.3272	very low	62.39
Honduras	0	2004	0	0	0	910	3.0256	very low	54.4
India	30	2004	35	35	32.5	470	4.8007	very low	71.69
Indonesia	5	2003	5	5	5	830	2.048	medium	54.47
Iran, Islamic Rep.	54.26	2004	100	100	77.13	1740	3.132	medium	33.4
Jamaica	7.7	2003	7.62	4.48	7.66	2690	2.556	very high	47.85
Jordan	4.18	2003	0	0	2.09	1810	5.0127	high	20.92
Kazakhstan	0	2000				1520	1.638	low	44.1
Kenya	5.29	2004	6.86	2.5	6.075	360	2.744	very low	60.66
Kyrgyz Republic	0	2003	0	0	0	290	2.0984	low	66
Lao PDR	10	2001	10	10	10	320	1.4239	low	79.31
Lebanon	5	2002	5	5	5	4070	8.0385	medium	12.54
Lesotho	0	2001				540	0.9362	medium	82.04
Libya	0	2002	0	0	0	4820	1.7424	high	13.77
Macedonia, FYR	3.67	2004	2	2	2.835	1710	1.0404	low	40.44
Madagascar	0	2001	0	0	0	230	0.945	low	73.39
Malawi	0	2001	0	0	0	160	5.7722	very low	83.67
Malaysia	0	2003	0	0	0	3550	1.7556	low	36.24
Maldives	5	2003	5	5	5	2150	0.719	low	71.18
Mali	0	2004	0	0	0	240	2.214	low	67.73

Mauritania	0	2001	0	0	0	400	1.0062	low	38.32
Mauritius	5	2002	5	5	5	3850	0.6699	high	56.67
Mexico	6.91	2004	14.67	16.07	10.79	5960	3.3611	medium	24.51
Moldova	0	2001	0	0	0	470	2.926	low	53.9
Morocco	12.4	2003	23.74	29.38	18.07	1170	3.0912	low	42.56
Mozambique	0	2003	0	0	0	200	1.682	low	64.39
Myanmar	1.5	2003	1.5	1.5	1.5		1.793	low	70.48
Namibia	0	2001	0	0	0	1650	2.0033	medium	67.56
Nepal	9.29	2004	15	15	12.145	230	3.7856	very low	85.02
Nicaragua	0	2004	0	0	0	730	4.0211	very low	42.68
Niger	0	2004	0	0	0	180	1.968	low	77.8
Nigeria	20	2002	20	20	20	300	3.4968	very low	53.38
Oman	5	2002	5	5	5	7740	0.6256	medium	22.43
Pakistan	13.63	2004	10	10	11.815	490	2.0832	low	65.88
Panama	2.77	2001	4.93	2.4	3.85	4040	2.5187	medium	42.85
Papua New Guinea	0	2004	0	0	0	510	0.4902	medium	86.78
Paraguay	10.82	2004	8.27	8.44	9.545	1170	5.1996	very low	42.78
Peru	12	2004	12	12	12	2020	2.2044	low	26.13
Philippines	3.84	2003	3	3	3.42	1020	1.769	low	39.03
Romania	6.25	2001	9.29	9	7.77	1910	2.1483	medium	45.35
Russian Federation	9.81	2002	6.5	6.67	8.155	2120	2.7404	low	26.71
Rwanda	2.5	2003	0	0	1.25	230	2.354	very low	81.5
Saudi Arabia	2.15	2004	0	0	1.075	8440	0.9847	high	12.44
Senegal	0	2004	0	0	0	460	2.7948	low	50.4
Solomon Islands	5	1995	5	5	5	560	0.3264	medium	83.48
South Africa	0	2001	0	0	0	2630	5.1678	medium	43.08
Sri Lanka	0	2004	0	0	0	850	1.8981	high	78.93
St. Lucia	8.43	2003	8.79	4.22	8.61	3830	1.58	low	69.49
St. Vincent and the Grenadines	8.6	2003	8.08	5.89	8.34	3010	2.0355	medium	41.81
Sudan	10	2002	10	10	10	400	3.8857	very low	61.09
Suriname	11.93	2000	11.73	8.83	11.83	1930	3.324	high	24.02
Swaziland	0	2001	0	0	0	1190	2.43	high	76.4

Syrian Arab Republic	1	2002	1	1	1	1080	2.7642	medium	49.81
Tajikistan	5	2002	5	5	5	180	2.3859	Very low	75.18
Tanzania	10	2003	10	10	10	300	2.2148	low	64.6
Thailand	18.01	2003	10	10	14.005	2000	1.3332	high	68.05
Togo	0	2004	0	0	0	280	1.829	low	64.84
Tunisia	13.79	2004	10.4	12	12.095	1990	2.9058	low	36.27
Turkey	0	2003	0	0	0	2510	2.223	very medium	33.74
Turkmenistan	0	2002	0	0	0	850	1.2599	low	54.62
Uganda	0	2004	0	0	0	240	5.3354	low	87.73
Ukraine	7.02	2002	1.92	1.5	4.47	780	1.3583	low	32.74
Uzbekistan	0	2001	0	0	0	450	2.9975	low	63.29
Vanuatu	0	2002	0	0	0	1070	1.0032	very low	77.12
Venezuela	9.2	2004	9.93	9	9.565	3970	2.6019	medium	12.36
Vietnam	5.71	2004	0.08	1	2.895	430	3.6816	medium	74.24
Yemen	5	2000	5	5	5	490	2.6936	low	74.31
Zambia	0	2003	1.1	0.83	0.55	340	2.7318	low	64.05
Zimbabwe	17.6	2002	2.76	5	10.18	2180	4.114	low	65.03

anom	tariff	wavgvacc	doctors	immdpt04	immsl04	popden04	gni04
Albania	0	0	1.389292	97	96	116.3495	2080
Algeria	0	0	0.846	86	81	13.6035	2280
Angola	2	2	0.077	59	64	11.22965	1030
Armenia	0	0	3.525857	91	92	108.1439	1120
Azerbaijan	0	0	3.53562	96	98	100.2366	950
Bangladesh	0	0	0.230678	85	77	1075.517	440
Belarus	10	10	4.49651	99	99	47.38943	2120
Belize	0	0	1.045019	95	95	12.39474	3940
Benin	0	0	0.057591	83	85	62.28724	530
Bhutan			0.051405	89	87	19.06405	760
Bolivia	10	10	0.733371	81	64	8.287128	960
Bosnia and Herzegovina	0	0	1.338396	84	88	74.92188	2040
Botswana	0	0	0.287644	97	90	3.047269	4340
Brazil	2.64	2.64	2.056482	96	99	21.15984	3090
Brunei	0	0	1.005892	92	99	68.58	
Bulgaria	0	0	3.384453	95	95	70.32451	2740
Burkina Faso	0	0	0.039972	88	78	45.32164	360
Burundi	15	15	0.051544	74	75	285.9415	90
Cambodia	0	0	0.155701	85	80	77.0451	320
Cameroon	5	5	0.074	73	64	35.23851	800
Central African Republic	5	5	0.035	40	35	6.336314	310
Chad	5	5	0.025301	50	56	7.006777	260
China	3	3	1.642473	91	84	139.374	1290
Colombia	5	5	1.350007	89	92	43.61221	2000
Congo, Rep.	5	5	0.251	67	65	11.287	770
Cote d'Ivoire	0	0	0.09	50	49	53.77359	770
Djibouti	10	10	0.132866	64	60	30.86799	1030
Dominica	0	0	0.493	99	99	95.27955	3650
Dominican Republic	0	0	1.88	71	79	183.1627	2080
Ecuador	5	5	1.476256	90	99	47.68097	2180

Egypt, Arab Rep.	1	1	2.117838	97	97	69.01402	1310
El Salvador	0	0	1.273731	90	93	321.3169	2350
Equatorial Guinea	5	5	0.246	33	51	18.04207	
Eritrea	2	2	0.03	83	84	44.32673	180
Ethiopia(excludes Eritrea)	5	5	0.028581	80	71	70	110
Gabon	5	5	0.289375	38	55	5.330974	3940
Georgia	0	0	3.906598	78	86	65.05972	380
Ghana	10	10	0.09	80	83	92.73095	3760
Grenada	0	0	0.495	83	74	310.8824	2130
Guatemala	0	0	0.896	84	75	116.204	460
Guinea-Bissau	0	0	0.166	80	80	54.52429	160
Guyana	0	0	0.482	91	88	3.922052	990
Honduras	0	0	0.832	89	92	63.82576	1030
India	30	30	0.512557	64	56	363.2462	620
Indonesia	2.5	2.5	0.162352	70	72	120.3376	1140
Iran, Islamic Rep.	4	4	1.049192	99	96	40.88742	2300
Jamaica	0	0	0.85	77	80	246.0541	2900
Jordan	0	0	2.049699	95	99	61.17117	2140
Kazakhstan	0	0	3.301971	82	99	5.556173	2260
Kenya	0	0	0.132	73	73	56.928	460
Kyrgyz Republic	0	0	2.678533	99	99	26.58707	400
Lao PDR	5	5	0.59	45	36	25.09727	390
Lebanon	5	5	3.252433	92	96	445.1543	4980
Lesotho	0	0	0.054	78	70	59.59961	740
Libya	0	0	1.29	97	99	3.224801	4450
Macedonia, FYR	0	0	2.191234	94	59	81.08533	2350
Madagascar	0	0	0.086868	61	59	29.7486	300
Malawi	0	0	0.011317	89	80	119.0476	170
Malaysia	0	0	0.701958	99	95	76.70065	4650
Maldives	5	5	0.776747	96	97	998.4	2510
Mali	0	0	0.044438	76	75	9.75258	360
Mauritania	0	0	0.138	70	64	2.834605	420

Mauritius	5	5	0.85	98	98	607.996	4640
Mexico	8.5	8.5	1.714835	98	96	54.48763	6770
Moldova	0	0	2.694388	98	96	128.2755	710
Morocco	2.5	2.5	0.483126	97	95	68.56374	1520
Mozambique	0	0	0.024354	72	77	24.35945	250
Myanmar	0	0	0.301949	82	78	75.88776	500
Namibia	0	0	0.295	81	70	2.469887	2370
Nepal	0	0	0.052328	80	73	176.2238	260
Nicaragua	0	0	1.644013	79	84	46.16145	790
Niger	0	0	0.033437	62	74	9.552381	230
Nigeria	20	20	0.26916	25	35	153.7161	390
Oman	5	5	1.256528	99	98	8.591322	390
Pakistan	10	10	0.66244	65	67	197.1772	600
Panama	0	0	1.68	99	99	40.68	4450
Papua New Guinea	0	0	0.051559	46	44	12.42153	580
Paraguay	3.72	3.72	1.17	76	89	14.55215	1170
Peru	12	12	1.167	87	89	21.48438	2360
Philippines	3	3	1.163244	79	80	278.3647	1170
Romania	10	10	1.887043	97	97	95.27124	2920
Russian Federation	6.67	6.67	4.17157	97	98	8.461538	3410
Rwanda	0	0	0.018737	89	84	340.9803	220
Saudi Arabia	0	0	1.397156	96	97	10.79225	10430
Senegal	0	0	0.075	87	57	54.53696	670
Solomon Islands			0.13	80	72	16.82247	550
South Africa	0	0	0.692095	93	81	37.54724	3630
Sri Lanka	0	0	0.428241	97	96	300.1702	1010
St. Lucia	0	0	5.18	91	95	268.28	4310
St. Vincent and the Grenadines	0	0	0.877	99	99	277.6769	3650
Sudan	10	10	0.15819	55	59	16.4765	530
Suriname	0	0	0.45	85	86	2.839539	2250
Swaziland	0	0	0.176198	83	70	65.10703	1660
Syrian Arab Republic	1	1	1.399254	99	98	96.85493	1190

Tajikistan	5	5	2.179868	82	89	45.73257	280
Tanzania	10	10	0.022659	95	94	41.42192	330
Thailand	0	0	0.3008	98	96	122.1398	2540
Togo	0	0	0.05655	71	70	91.29676	380
Tunisia	0	0	0.7	97	95	64.36663	2630
Turkey	0	0	1.240929	85	81	93.16165	3750
Turkmenistan	0	0	3.171174	97	97	10.49284	1340
Uganda	0	0	0.047	87	91	131.4054	270
Ukraine	10	10	2.973874	99	99	82.85147	1260
Uzbekistan	0	0	2.885484	99	98	62.52414	460
Vanuatu	0	0	0.11	49	48	17.63489	1340
Venezuela	5	5	1.939226	86	80	29.59016	4020
Vietnam	0	0	0.534455	96	97	252.5423	550
Yemen	5	5	0.21866	78	76	37.50213	570
Zambia	0	0	0.069	80	84	14.12448	450
Zimbabwe	0	0	0.057343	85	80	34.12175	600
							600