Healthy Trade

How free trade improves health

JASSON URBACH, PHILIP STEVENS
AND GABRIELLE WILLS

FREE MARKET FOUNDATION

Minimal
Government
Thinkers, Inc.
www.minimalgovernment.net

Healthy Trade

First published in February 2012 by
The Free Market Foundation of Southern Africa
Johannesburg: PO Box 785121, Sandton 2146,
South Africa

Tel: (011) 884 0270
Fax: (011) 884 5672
Email: fmf@mweb.co.za

Cape Town: PO Box 805, Cape Town 8000, South Africa

Tel: (021) 465 1856
Fax: (021) 465 1860
Email: fmf.ct@mweb.co.za

www.freemarketfoundation.com

Designed and typeset in Avenir by MacGuru Ltd
info@macguru.org.uk

About the authors

Jasson Urbach works as an economic researcher at the Free Market Foundation and for Africa Fighting Malaria. He has written a range of academic papers and articles for the popular media on a range of health and economics issues. Jasson is a South African and has a masters degree in economics and a bachelors of commerce with majors in finance and economics from the University of Natal in Durban, South Africa. His masters thesis was on "The Determinants of Labour Force Participation of the Elderly."

Gabrielle Wills is an independent researcher based in Durban, South Africa. Her experience lies in collecting and analyzing survey data to identify and understand sub-populations within South Africa. In 2010 and 2011 she was involved as a project manager with Reform Development Consulting in implementing a quantitative study on the impacts of the Child Support Grant commissioned by the Department of Social Development, UNICEF and SASSA. Gabrielle holds a Master's Degree in Economics (UKZN), completed summa cum laude and won the 2009 Founder's Medal from the Economic Society of South Africa (ESSA). She also runs a non-profit organisation called Micah6 which facilitates educational improvement for school learners.

Philip Stevens is founder of the Covent Garden Writers Group, a UK-based policy and research consultancy. From 2004 to 2010 he was health programme director at International Policy Network, a development think tank. In 2008 he authored "Fighting the Diseases of Poverty", published by Transaction press.

FREE MARKET FOUNDATION

Minimal Government Thinkers, Inc.
www.minimalgovernment.net

Contents

Healthy Trade

Abstract

A recurrent theme of the academic literature and wider public discourse is that free trade harms the poor by promoting economic inequality and insecurity, polluting the environment and making processed foods more widely available. All of these factors are deemed to be deleterious to health.

However, there has been little empirical evidence to support these assertions, in particular the relationship between free trade and health. This is an important relationship, as it tells us more about the effect of economic policies on human welfare than bald statistics related to GDP.

This study aims to build on a nascent literature by examining the relationship between free trade and health, using a range of data relating to trade openness and human development. Contrary to much of the literature, our analysis finds that free trade does in fact promote better health outcomes, with the relationship particularly pronounced for lower-income countries.

There are two mechanisms that might be responsible for this relationship. On the one hand, trade promotes economic growth, which in turn provides greater sums for individuals to improve their living conditions and for authorities to spend on public health measures such as sanitation and universal vaccination. Another mechanism is 'knowledge spillover', wherein international trade increases the global diffusion of both knowledge and products that improve health -- ranging from the basics of germ theory to modern pharmaceuticals and medical devices.

Introduction

While most discussion of the benefits of trade liberalisation normally focuses on potential increases in income, innovation and productivity, less attention is directed at the human impact. In particular, little empirical research has been conducted into elucidating the relationship between trade liberalisation and health. Yet without better knowledge of the impact of trade liberalisation on human welfare, it will be difficult to maintain support for the global trading regime, which currently faces a series of challenges at the highest levels, including the stalled negotiations of the WTO's Doha Round. Health is a critical component of human welfare.

Most economists agree that trade liberalisation improves well-being by increasing economic growth and average incomes (for example, Dollar, 1995; Dollar & Kraay, 2001; Frankel & Romer, 1999; Sachs & Warner, 1995). However, those in the public health community are more sceptical, particularly when it comes to developing countries. Amongst this group, free trade stands accused of negatively impacting the so-called 'determinants of health' – the social, economic and environmental conditions that influence the health of individuals and populations (Rafael, 2004). Free trade, such arguments go, directly harms people's health by increasing income inequality and economic insecurity

(Cornia et al, 2007); by increasing the availability of unhealthy processed foods (Popkin, 2006); and by polluting the environment. Multilateral and bilateral free trade agreements, which have driven the last fifty years of trade liberalisation, are typically condemned by public health academics as promoting a 'neoliberal' agenda which imposes mandatory privatisations of public health services and overly strict standards of intellectual property protection on the poor and defenceless (e.g. San Sebastian et al, 2006). Such arguments are typical of a rich theoretical literature on the supposedly harmful health effects of increased economic globalisation, of which trade liberalisation is an important component. International institutions such as the World Health Organization also promulgate this apparent consensus, for instance in the final report of its Commission on the Social Determinants of Health (CSDH, 2008).

Despite this consensus, there is very little literature that examines empirically the direct relationship of open trade on health. This is an important area of research, not least because health outcomes provide a very tangible indicator of the effect of economic policies on human welfare, which tells us more than bald statistics related to GDP about the effects of various policies on individuals. Further, as the direct relationship between open trade and economic growth does not represent the entire consensus of the economics profession (dissenting voices include, for example, Rodriguez and Rodrik, 2001) looking at human welfare measures such as life expectancy and infant mortality provides an alternative framework from which to judge the desirability of opening borders to trade.

The aim of this paper, therefore, is to shed greater light on the relationship between trade openness and health outcomes. We build on two previous studies that examine this question, namely Wei and Wu (2002), and Owen and Wu (2007). Both of these studies found an association with increased trade openness and improved health outcomes measured in terms of life expectancy and infant mortality, with Owen and Wu finding this relationship particularly marked in countries lower down the income scale. As these studies use data up to 1997 and 1995 respectively, our analysis (using data up until 2005) aims to determine if this relationship has continued to hold up in the subsequent decade. In addition, we examine the impact of the recent moves towards bilateral and regional free trade agreements on health outcomes.

The first section describes our econometric analysis of panel data relating to trade and health, while the following section discusses some of the possible drivers of the results. The third section broadens the analysis into a wider discussion of the relationship between trade and health.

Methodology

In order to shed greater light on the relationship between trade and health outcomes we have created an econometric model. Econometric analysis allows us to isolate the relationship between trade and health in a world where health is affected by a host of other factors in addition to the variables we are examining (for instance, educational levels, the political environment, economic stability, etc). Econometric analysis allows us to hold constant these other factors in order to isolate and identify the relationship between trade and health outcomes.

Data

In their study on trade openness and health, Owen and Wu (2007) used panel data of 219 countries across time. We have chosen to replicate that approach using panel data of 170 countries (where consistent data was available) to determine if a relationship exists between the health outcomes of a country and the level of trade openness in that country. Panel data contains data points for a host of countries (or individuals/firms, etc.) but over multiple time periods rather than only one time period. Panel data is useful for obtaining reliable estimates of the relationship between trade and health outcomes, because it allows us to control for unobserved variables that are constant across countries over time; for example, cultural differences, national policies or government regimes.

Traditional linear regression modelling that omits these unobserved variables, which are typically unavailable, would result in biased coefficients (i.e. untruthful

Table 1 **The four health outcomes used as dependent variables from the World Development Indicators**

	Health outcome	*Explanation*
1	Under-five mortality rate	This uses age-specific mortality rates to determine the probability per 1,000 births that a newborn infant will die before turning five years old (The World Bank Group, 2011).
2	Under-one infant mortality rate	This considers the number of infant deaths before reaching one year of age in a given year and is measured per 1,000 live births (The World Bank Group, 2011).
3	Life expectancy of females at birth	This uses current mortality rates to determine the number of years a female newborn infant would likely live (The World Bank Group, 2011)
4	Life expectancy of males at birth	This uses current mortality rates to determine the number of years a male newborn infant would likely live (The World Bank Group, 2011).

estimates of how trade affects health outcomes in a country). The combination of data points across time and country can control for these unobserved country characteristics and produce more reliable estimates of the relationship under consideration.

Our panel dataset is derived from two sources:

- World Development Indicators – this data contains historical records from as early as the 1960s and is a collection of global development data collated by the World Bank.
- Penn World Tables version 7.0 (Alan Heston, 2011) – This data released in May 2011 provides comparative purchasing power parity and national income accounts for a host of countries for the period 1950 to 2009 using 2005 as a reference year.

Table 2 **Explanatory variables used in the model**

Explanatory variable	*Data source*	*Explanation/reason for inclusion in the model*
Trade openness	Penn World Tables version 7.0	This is the key variable of interest. A volume-based measure, calculated as the sum of exports and imports divided by the Gross Domestic Product (GDP) of a country.
A free trade agreement with the United States (US)	Office of the US Trade Representative	A policy-based measure of openness, which may be closely related to improved health outcomes, is an indicator that takes on a value of one from the year a country has signed a free trade agreement with the United States (US).[1] Currently the US owns over fifty per cent of the global pharmaceutical industry when measured in terms of total sales (IMS, 2011). It is expected that countries that have signed a free trade agreement with the US would have increased access to affordable medicine. This in turn could have a positive influence on health outcomes of a country.
The real GDP per capita of a country in $US (base year = 2005)	Penn World Tables version 7.0	More wealthy economies with increased access to infrastructure, medical care and medicines are in general likely to have better health outcomes than poorer countries.
An interaction term of trade openness and real GDP per capita.	N/A	Literature suggests that the effects of increased openness on health are more likely to be evident in poorer or less developed countries compared to more developed countries. To capture these differences the interaction term is included.
Population growth	World Development Indicators	
Secondary schooling enrolment	World Development Indicators	Increased access to education is likely to have positive effects on improving health in a country if education is linked to increased awareness about hygiene and health practices.

Table 3 **Explanatory variables included in each of the specifications**

	Specification 1	*Specification 2*	*Specification 3*
Log of openness i.e. (Exports + Imports/ GDP)*100	•	•	•
USA free trade agreement		•	•
Interaction of openness and real GDP per capita	•	•	•
Log of Real GDP per capita in $US (2005 = base year)	•	•	•
Log of Gross secondary schooling enrolment			•
Log of Population growth per annum			•
Year specific effects	•	•	•

In estimating the relationship between health outcomes and trade openness we employ a technique called "fixed effects" regression using panel data. The technical model is represented in the following way:

$$Y_{it} = \beta_0 + \beta_1 \ln(\text{openness}_{i,t-1}) + \beta_2 \ln(\text{real GDP per capita}_{i,t-1}) + \beta_3 \ln(\text{real GDP per capita}_{i,t-1}) * \ln(\text{openness}_{i,t-1}) \beta_4 X_{it} + u_i + \lambda_t + e_{it}$$

The left hand side of the equation

The dependent variable of the equation, $Y_{it,}$ reflects the four health outcome variables for a specific country (represented by *i*) at a specific time period (represented by *t*). We use four indicators of health outcomes from the World Development Indicators reflected in Table 1.

The right-hand side of the equation

The right-hand side of the equation identifies the variables used to explain health outcomes in a country. The betas are the parameters we are trying to estimate and they indicate the size of the relationship between the health outcomes and a particular explanatory variable. For example, β1 identifies the size and direction of the effect of openness on health outcomes.

Table 2 provides a summary of the explanatory variables used. Typically we transform these variables mathematically into their log form due to the non-linear nature of these variables; and transforming the variables into their log form produces a better model fit. We also use the five-year lags of the openness and real GDP per capita. Changes in the trade openness and wealth of a country are likely to affect health outcomes over a delayed period rather than instantaneously. This is consistent with the methodology of Owen and Wu (2007). The panel data fixed effects approach allows us to control for unobserved variables that are constant across countries over time. These country specific characteristics that remain constant with time are reflected by u_i.

The last two terms in the model λ_t and e_{it} identify year specific effects and the error term. There may be unobserved characteristics that are specific to a time period that affect health outcomes, therefore we include indicators for specific years. Without including these year specific effects, the results on other variables may be biased. A test to determine whether the year specific effects together have an effect on health outcomes is identified as statistically significant in every specification of the model. The error term is the unexplained variation that is not captured by the model.

Model specification

In identifying the effects of openness on health outcomes, we estimate three specifications of the econometric model. The specifications differ by the number of explanatory variables included on the right-hand side of the equation. The three specifications are identified in Table 3.

A description of the data

The dataset contains information for 170 countries. Consistent with Owen and Wu (2007), data used are in five-year intervals. The choice of interval is largely

Table 4 **Summary statistics**

	Mean/ average	*Standard deviation*	*Range* Min.	Max.	*Sample size*
Key Health Outcomes:					
Infant mortality rate under one (per 1000 births)	54.01	44.56	2.10	201.00	798
Infant mortality rate under five (per 1000 births)	80.24	74.83	3.00	346.40	798
Life expectancy of females	61.88	10.37	37.38	79.20	793
Life expectancy of males	66.26	11.61	37.09	85.49	793
Measures of trade openness:					
Trade openness i.e. (Exports + Imports/GDP)*100	71.30%	42.81%	7.19%	286.06%	798
USA free trade agreement (proportion)	0.03	0.18	0.00	1.00	798
Other explanatory variables:					
Real GDP per capita in $US (2005 = base year)	$9,467.64	$12,101.03	$212.35	$9,9462.73	798
Gross secondary schooling enrolment	56.084%	34.08%	0.596%	161.78%	798
Population growth per annum	1.95%	1.17%	0.00%	10.52%	798

Notes: Data are from the World Penn Tables version 7.0 and World Bank Development Indicators. Data are in five year intervals from 1970 to 2005. Standard deviation is a measure of variation about the mean. Range represents the smallest and largest values for each of the variables in the dataset.

determined by the availability of infant mortality rate data, which is typically generated in five-year intervals. The maximum number of time periods observed per country in our sample is eight years including 1970, 1975, 1980, 1985, 1990, 1995, 2000 and 2005. Data used by Owen and Wu covered the years to 1995. Our study sheds light on a further, more recent decade. Summary statistics of the data used in the econometric model are provided in Table 4.

Some summary statistics

Over the 35 year period under examination, we found an average of 54 deaths per 1000 live births among infants under the age of one across all 170 countries. The probability of an infant dying before reaching age five averaged 80 deaths per 1,000 infants born alive. However, there is large variation in infant mortality rates across countries. For example, in 1995, the probability in Iceland that an infant would die before reaching 5 years of age was 3 deaths per 1000 newborn infants, whereas in Sierra Leone it was 216 deaths per 1000 newborn infants.

The average life expectancy overall of males is about 66 years and for females 62 years, however, life expectancies also vary substantially from country to country. In war torn countries such as Sierra Leone and Afghanistan it is as low as 37 years but is at its highest

Figure 1 **Trends in average life expectancy and trade openness over time**

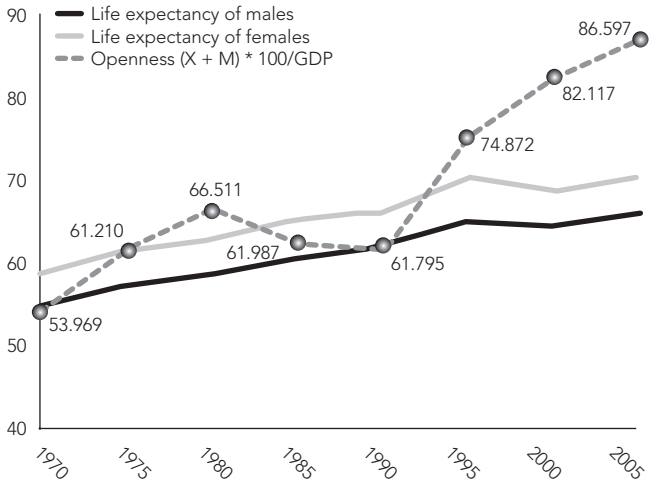

Figure 2 **Trends in infant mortality and trade openness over time**

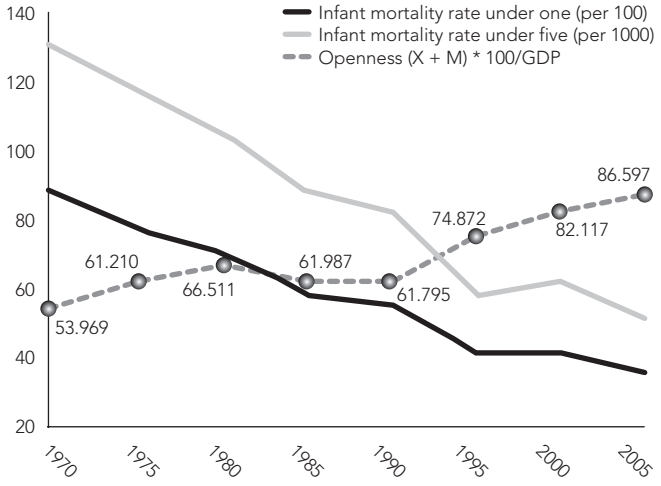

Figure 3 **Proportion of countries with a free trade agreement in force with the US over time**

in Japan, Switzerland and Iceland with women at over 78 years and men over 83 years.

The world average secondary school enrolment rates was 56 per cent over the thirty five year period. As expected gross secondary schooling enrolment displays considerable variation ranging from 1 per cent to 161 per cent.[2]

Real GDP per capita also varies very widely across countries. This is most starkly seen in 1980 where real GDP per capita, measured in 2005 dollars, was $231 in Zimbabwe compared to almost $100,000 in Brunei Darussalam.

The openness measure (total trade divided by GDP) also varies widely, ranging from approximately 7 per cent in the Lao People's Democratic Republic in 1985 to almost three times this size in Luxembourg in 2005.

Changes in trade openness and health outcomes over time

Not shown in Table 4 is the fact that trade openness has increased a great deal across the country sample since 1970. On average the ratio of countries' total trade to their GDP was 54 per cent in 1970. This increased to 62 per cent in 1990 and 87 per cent in 2005 (see Figure 1 or Figure 2). Openness as reflected by the number of free trade agreements with the United States has also been increasing since the 1970s. Pre-1990, few, if any, countries had a free trade agreement in force with the USA. By 2005, 9 per cent of the sample had a US free trade agreement in force (see Figure 3).

Over the same period, all four health variables improved, average infant mortality rates declined and life expectancies for both males and females increased. This is graphically illustrated in Figure 1 and Figure 2.

Figure 1 suggests a positive relationship between trade openness and life expectancy as both variables trend upwards with time. The negative relationship between infant mortality and trade openness in Figure 2 suggests that as trade openness trends upwards, there is a corresponding decline in infant mortality. These trends reflect improved health outcomes across the sample of countries with time, and in the next section, we use econometric modelling to confirm the significance and direction of these suggested relationships.

Results

Table 5 shows summarised results of the panel fixed effects model for the three specifications. For the sake

of brevity, coefficient magnitudes are not provided and results for the year fixed effects are excluded. Signs and shading are provided to indicate the direction of the relationship between health outcomes and respective explanatory variables. Green cells indicate a positive relationship while red cells indicate a negative relationship. Stars are also used to indicate the statistical significance of a relationship. By significance we mean the extent to which we can be confident that a relationship actually exists rather than being a chance or coincidental occurrence. Two to three stars indicates very strong evidence of a statistical relationship while one star indicates a weaker or marginal statistical relationship. The absence of stars indicates the likely absence of a statistical relationship.

Results of the first specification

Regardless of the health indicator used, resulting coefficients on the log of real GDP per capita, the log of openness and their interaction term suggest significant effects of trade openness on each of the four health outcomes:

- Trade openness has a significant *negative* effect on infant mortality rates (i.e. reduces infant mortality) while it has a significant *positive* effect in increasing life expectancies in a country.
- The coefficient on the interaction term, however, indicates that there are differences in the effect of trade openness in improving all four health outcomes depending on the level of a country's GDP per capita. As the real GDP per capita of countries increase, the advantages of increased openness on improved health outcomes gets smaller and smaller.
- There is also clear evidence that real GDP per capita has a significant effect in improving each of the four health outcomes i.e. it reduces both the under-one and under-five infant mortality rates over a five year interval while increasing both life expectancy for males and females.

Results of the second specification

The second specification is augmented by the inclusion of a dummy variable indicating when a country has a free trade agreement in force with the United States. The results provide some evidence that such countries have better health outcomes than those that have not signed a US free trade agreement. Using life expectancy as the health outcome, a positive and significant effect is identified on the US free trade agreement variable. However, there is little evidence of this relationship when the health indicator is infant mortality.

Table 5 **The direction and effect of an explanatory variable on health outcomes in specification one**

	Under one infant mortality rate (per 1000 births)			*Under five infant mortality rate (per 1000 births)*			*Life expectancy of males*			*Life expectancy of females*		
	1	*2*	*3*	*1*	*2*	*3*	*1*	*2*	*3*	*1*	*2*	*3*
Log of Real GDP per capita in $US	– ***	– ***	– ***	– ***	– ***	– ***	+ *	+ *	+ *	+ *	+ *	+ *
Log of openness i.e. (Exports + Imports/ GDP)*100	– ***	– ***	– ***	– ***	– ***	– ***	– *	– *	– *	– **	– **	– *
Interaction of openness and real GDP per capita	+ ***	+ ***	+ ***	+ ***	+ ***	+ ***	– *	– *	– *	– *	– **	– *
Free trade agreement with the US		–	–		–	–		+ ***	+ ***		+ **	+ **
Log of secondary schooling enrollment			– ***			– ***			+			+
Log of population growth			+			–			+			+
N		798			798			793			793	

Results of the third specification

Even with the inclusion of the log of schooling enrolment and the log of population growth, the effect of increased openness in improving health outcomes remains significant and the coefficient on the dummy variable 'US free trade agreement' remains significant when the outcome variable considered is the life expectancy of either males or females. Although the log of population growth has insignificant effect on health outcomes, an increase in the log of schooling enrolment has some effect in reducing infant mortality rates.

Discussion

Our analysis shows a clear relationship between trade openness and improved life expectancy and infant mortality rates, a relationship that is particularly marked for low-income countries. The implications are clear: policymakers – particularly those from low-income countries – should continue to pursue trade liberalisation in order to improve the welfare of their citizens. This should also continue to be a goal for middle-income countries.

While our analysis stops short of providing answers to why this might be the case, the existing literature provides some clear clues. There appear to be two main mechanisms through which trade liberalisation improves health: first, and most obviously, via the increases in incomes that arise from increased openness to trade; and secondly, via the global diffusion of knowledge that has accompanied greater economic globalisation and trade liberalisation. This second contention is the main conclusion of the earlier study by Owen and Wu (2007).

Trade, wealth and health

In the first instance, it is intuitive that there is a strong relationship between income and health, not least because greater wealth buys greater access to the basic determinants of health: nutrition, better accommodation and sanitation. This relationship was confirmed by a seminal 1996 study by economists Lant Pritchett and Lawrence Summers, who showed the dramatic effect that increases in incomes can have on health. They found a strong causative effect of income on infant mortality and demonstrated that, if the developing world's growth rate had been 1.5 percentage points higher in the 1980s, half a million infant deaths would have been averted.

In fact, the health of the world's population has been improving since modern economic growth began with the Industrial Revolution. Infant mortality and life expectancy rates have improved dramatically around the world, as increasing numbers of people abandon the precarious subsistence agrarian lives of their forebears, and gain access to increasingly cheap food, better accommodation and improved public health and sanitary infrastructure, often in towns and cities. Basic health indicators improved noticeably in rich countries from the mid to late nineteenth century as nations cleaned up their water supplies and instituted basic public health measures, such as sanitation, pasteurisation, and vaccination. Then, in the first half of the twentieth century, antibiotics, pesticides such as DDT, and an array of vaccines were added to the arsenal of weapons against disease. Once the traditional infectious and parasitic diseases were essentially conquered, richer countries turned their ingenuity and wealth to dealing with the increasing burden of non-communicable diseases such as heart disease, cancer and pulmonary conditions. While these have not yet been entirely defeated, a vast array of new treatments, drugs and technologies now exist to mitigate their effects and in some cases, cure.

It is clear that humanity owes its current, unprecedented good health to growing prosperity and the diffusion of advances in knowledge. This knowledge would be of limited value without the economic resources required to implement it; sewage systems are expensive, for example, as are mass vaccination programmes or the construction of hygienic dwellings.

Much of this economic growth and diffusion of health knowledge could never have been achieved without the dramatic increases in international trade that characterised the late nineteenth century and the second half of the twentieth century. Before the late nineteenth century, cross-border trade was confined to a handful of nations. Today, all countries trade

internationally and, with the occasional exception such as North Korea, they trade significant – and increasing – proportions of their national incomes. While higher income countries still accounted for three quarters of global trade in 2000, lower income countries recently have seen their share climb by one third as they have cut tariffs and dismantled other barriers to free trade. The average tariff in lower-income countries has fallen from 25 per cent in the late 1980s to 11 per cent today (World Bank and IMF 2005). According to the WTO, lower-income countries now command 31 per cent of global merchandise trade, their highest level since the 1950s (WTO, 2005).

This relatively recent entry by developing countries into global markets has had an astonishing impact on human welfare. During the second half of the twentieth century, lower-income countries saw their life-expectancies rise rapidly as incomes rose and new technology arrived from overseas, described by Gwatkin (1980) as the third of three great waves of mortality decline. This period saw increased access to safe water and sanitation services in lower-income countries, increases in per capita food supplies, the arrival of basic public health services, greater knowledge of basic hygiene, and new medical technologies (such as antibiotics and tests for early diagnosis) that were instrumental in reducing mortality rates. As a result of these advances, life expectancies lengthened worldwide, not just in the richest nations. Average global life expectancy increased from 46.6 years between1950–1955 to 69.2 in 2009, as increased wealth and knowledge spread around the world.

Trade, knowledge spillovers and health

Increased openness to trade, then, is clearly one determinant of the income of a country, and income obviously has a bearing on health status. However, a less obvious relationship between trade and health is not so much economic, but rather related to 'knowledge spillovers' that occur as people, goods and technologies move more freely around the world. The notion that these exchanges of ideas have been instrumental to improving health in developing countries is shared both by Owen and Wu's analysis, and Jamison, Sandbu and Wang in their 2001 analysis prepared for the WHO's Commission on Macroeconomics and Health.

Knowledge spillovers are an intrinsic outcome of increased international trade. When the costs of trade are lowered, it becomes easier to disseminate to other countries knowledge, techniques and medical products from the countries that developed them. This knowledge can have a profound impact on health outcomes. For example, the discovery by John Snow in London in 1854 that cholera is spread by contaminated water had significant implications for the prevention of infectious diseases throughout the world. This knowledge gradually filtered from London throughout Europe, where other scientists built upon it and developed more refined and applicable knowledge regarding the role of microbes in the spread of disease. This diffusion of knowledge led city authorities to upgrade their water and sewage systems in order to prevent human waste contaminating water supplies (Williamson, 1990). Today, germ theory is widely understood and recognised by public health authorities all over the world as an important tool for fighting disease, with even the poorest countries recognising that sanitation infrastructure is vital for population health (even if the resources do not always exist to construct and maintain effective water management systems). Germ theory was only the beginning; today the health consequences of over-eating, smoking, excessive drinking and inactivity are well known amongst medical professionals the world over. This knowledge is at the centre of today's attempts to tackle the rising incidence of chronic diseases in less-developed countries (WHO, 2011), even though the research which originally gave rise to this knowledge was originally largely conducted in wealthy countries.

Similarly, lowering the costs of trade can speed up the rate at which proven medical technologies can be adopted by other countries. Some of the most effective medicines such as antibiotics and vaccines were first developed in richer countries, but the international manufacture and trade of such technologies has allowed them to become readily available in most parts of the world.

Between the 1920s and 1940s huge advances in medical discovery were made, including penicillin, sulfa

drugs, bacitracin, streptomycin and chloroquine. In the post war years, with the arrival in Asia of these and other drugs, effective treatments became available at low cost and are largely responsible for the remarkable declines in their crude death rates. In the 1940s, Asia ended several decades of relative economic and cultural isolation, and started to integrate into the global economy. This brought with it a massive transfer and diffusion of public health programmes, technologies and techniques that originated in richer countries. Furthermore, the invention of DDT in 1943 gave authorities a hugely powerful weapon in the fight against malaria which allowed the disease to be eradicated from the US and Europe, and to lower caseloads by over 99 per cent in parts of Sri Lanka and India (Gramiccia and Beales, 1988).

As a result of the widening availability and decreasing cost of such interventions – made possible by freer trade – crude death rates dropped steeply, particularly in eastern Asia in the late 1940s. By the 1950s and 1960s, fewer and fewer children and young people were succumbing to the easily preventable diseases which had historically depressed the region's health indicators, and life expectancy was on the rise throughout the region (Bloom and Williamson, 1998).

This process continues today. New drugs and medicines invented in one place are made available elsewhere, throughout the world, via international markets. Nearly all drugs start off protected by patents, but these eventually expire, opening the market for generic competition. As a result, many off-patent medicines are available throughout the world at extremely low prices – allowing people in poorer countries to benefit from the knowledge and innovation of more affluent countries. Recent examples of this include antiretroviral drugs, statins and insulin, as well as neonatal intensive care units, kidney dialysis equipment, screening equipment and myriad other modern medical devices. The year 2011 saw the expiry of the patent of atorvastatin. This means that in the near future, this highly effective statin will become available and affordable and thereby help reduce the risk of cardiovascular disease for millions more people around the world. Of course, many on-patent drugs are subject to competition from other medicines in the same class which place downward pressure on price. Moreover, with price differentiation, on-patent drugs may be made available to poorer people at prices close to the cost of production, an increasingly prevalent marketing strategy amongst drug manufacturers (Yadav, 2010).

Table 6 **A selection of import tariff rates on finished pharmaceutical products**

Burundi	15%
Nigeria	14.8%
Tunisia	13%
Nepal	12.7%
Pakistan	10.6%
Jamaica	10.5%
Djibouti	10%

Source: Stevens and Linfield, 2010

Tariffs and taxes on medicines

If free trade helps improve welfare by making health technologies more widely available, it would be perverse to enact policies that actively conspire against the diffusion of such technologies. Nevertheless, in many lower and middle-income countries, this is precisely the case. Governments impose tariffs and other taxes on both imported medicines and the active ingredients required to manufacture them locally. Such tariffs do not discriminate between generic and patented medicines and so this regressive form of taxation unnecessarily drives up the cost of medicines, making all classes of drugs less affordable for patients (many of whom pay for their entire healthcare out of pocket) and third party payers. Even though vaccines are widely recognised as one of the most cost-effective public health interventions for lower-income countries, high-disease burden countries continue to levy punitive tariff rates: for instance, Burundi at 15 per cent, and Ghana and India at 10 per cent (Stevens and Linfield, 2010).

Although the majority of high-income countries have abolished tariffs on medicines and average rates are on the decline in the rest of the world they remain high in many low-income countries. Table 6 shows a sample of countries that impose the highest tariff rates.

In addition to tariffs on imported pharmaceutical products, many governments also levy a range of other taxes and mark-ups on medicines. Value-added tax is extremely common, as are sales taxes. Other duties include solidarity taxes, port charges and income taxes on local manufacturers. Value-added taxes range from 0 per cent in Nigeria to 20 per cent in Armenia. In China, these mark-ups add substantially to the final retail price of medicines. In addition to the tariff of 4 per cent, the government levies a value-added tax of 17 per cent and a sales tax of 5 per cent. Local manufacturers of medicines must also pay a 15 per cent income tax.[3] Importers face further complications in that they have to send their products to one of 18 designated ports. For products that are being imported for the first time to China, there are only three designated ports.[4]

If lower-income countries are to benefit more widely from the 'knowledge spillover' effects of free trade, then abolishing these regressive taxes should be a policy priority.

Free Trade Agreements

A recurring theme of the related literature is that bilateral Free Trade Agreements are harmful for health because of the inclusion of mandatory intellectual property provisions by the economically stronger negotiating partner (typically the US or European Union). The imposition of strict intellectual property regimes on lower- and middle-income countries, so the argument goes, is deleterious to health because it reduces generic competition and drives up the price of medicines and other patented health technologies (Shaffer and Brennan, 2009; Aziz ur Rehmana, 2010). This form of criticism is not new, having been around since intellectual property provisions were first included in the Uruguay Round negotiations of the GATT and, later, the World Trade Organisation in the form of the 1994 TRIPs agreement. Specific research claims to have found that Free Trade Agreements have reduced access to certain medicines in Guatemala (via CAFTA) (Shaffer and Brennan, 2009) and in Jordan (Oxfam, 2007). This debate has recently been reignited by the European Union's negotiation of a bilateral agreement with India, as well as the on-going multilateral negotiations of the Trans Pacific Partnership, involving the US and a range of countries from the Asia Pacific region (see for example, MSF, 2011).

While theoretically plausible, our analysis shows no indication that the arrival of an international intellectual property regime in the mid-1990s through the WTO resulted in an average decrease in health outcomes, as would be expected if such criticisms were valid. On the contrary, our data shows life expectancies continued to rise until 1995 in all countries following the creation of the TRIPs agreement in 1994, although certain global events (for instance the HIV pandemic and the dissolution of the Soviet Union) exerted downward regional pressure on health indicators in the same period. Even so, over this period, average life expectancy rose worldwide, and even more rapidly in lower income countries.

Most bilateral Free Trade Agreements were negotiated and came into force during the second half of the 2000s. Our analysis shows some evidence that a Free Trade Agreement with the USA resulted in higher life expectancies overall during this period. This may be because such agreements have resulted in higher levels of economic growth, as well as making medical technologies and knowledge more widely available (in addition to the knowledge spillovers described earlier in the paper).

What, then, of the oft-heard criticisms that Free Trade Agreements undermine health by reducing access to medicines in developing countries by imposing unnecessarily strict intellectual property regimes? The reality is that intellectual property is somewhat of a peripheral concern when it comes to healthcare in the poorest countries. A 2004 study by Amir Attaran found that 98 per cent of drugs on the World Health Organization's Essential Medicines List are off-patent. Many of the biggest killers of children in low-income countries – diarrhoea and respiratory infections – are easily preventable or treatable with cheap, off-patent medicines. Yet, according to the WHO, an estimated 30 per cent of the world population lacks regular access to existing drugs, with this figure rising to over 50 per cent in the poorest parts of Africa and Asia (WHO, 2004). The majority of non-communicable diseases can be treated or managed with off-patent therapies, but access to these medicines in lower-income countries

remains low (WHO, 2011). Many modern patented cancer and biotech therapies require complex delivery and monitoring systems that are simply not available in lower- and middle-income countries. The evidence therefore suggests a poor *prima facie* case that patents *per se* block access to thousands of useful therapies, with other factors relating to the supply chain and infrastructure more likely culpable. As such, the inclusion of intellectual property provisions in Free Trade Agreements is by itself unlikely to have either a positive or negative impact on overall population health.

Some activist groups assert that certain intellectual property provisions in Free Trade Agreements (the TPP being most current) will prevent countries from making use of safeguards provided in the Doha Declaration on the TRIPS Agreement and Public Health. Signed by all WTO member countries, the declaration restated flexibilities in TRIPS that allow countries to take necessary measures, including the compulsory licensing of medicines, to protect public health. A further clarification in August 2003 ensured that third-world countries could also compulsory-license drugs for export to poor countries lacking manufacturing capability.

All the Free Trade Agreements have language that expressly states that the Free Trade Agreement will not restrict any flexibility permitted under TRIPS, or the Doha Declaration, to protect public health. Where this language does not appear in the main agreement, the US and its partner country (or countries) have signed binding "side letters" to the same effect. In the TPP negotiations, the US has made clear its commitment to safeguarding the public health flexibilities included in the Doha Declaration (although in the TPP negotiations there is uncertainty as to whether these will extend to patented medicines for non-communicable diseases).

When campaigning against Free Trade Agreements, activist groups also raise the spectre of patent terms that go beyond the TRIPS' minimum of 20 years, thus suggesting a situation where poor people would have to wait 20 years or more before they can get access to generic drugs.[5] But, as we have seen, 98 per cent of drugs on the World Health Organization's essential-drugs list are off-patent and will remain so (Attaran, 2004). Similarly, drugs patented in the US, but not in other countries, including many anti-retrovirals, cannot gain patent protection now. In any case, no drugs have a *de facto* 20-year patent term. It typically takes between 10 and 12 years to take a molecule through testing and regulatory approval – all of which occur after a patent has been granted, since no company would invest in an unpatented molecule. Meanwhile, it can take between one and three years to obtain a patent after filing. Therefore, most drugs have an effective patent term of six to ten years, often less.

According to the US Food and Drug Administration (FDA), the average patent life remaining after marketing approval in 2001 was 7.8 years out of the original 20 years of patent protection (FDA, 2002). By contrast, other industrial sectors enjoy an average patent life of more than 18.5 years. Some Free Trade Agreements do provide for patent term restoration, but only in the case of unnecessary delays in marketing approvals. In the US, where such legislation exists, this extra term typically does not exceed two years. Marketing approval in lower-income countries can take many years, due to delays and bottlenecks in poorly resourced local drug regulatory authorities. In South Africa, for example, these delays can delay the marketing approval of new medicines by up to five years.[6] In other words, most drugs would still have far less than 20 years of exclusivity.

Concerns have also been raised about the inclusion of new Data Exclusivity requirements in Free Trade Agreements. When submitting a new product to regulators for marketing approval, manufacturers are required to also submit the data generated during clinical trials. Data Exclusivity is a form of Intellectual Property that allows manufacturers to retain the right to this valuable data, preventing competitors from using it until that period elapses. While the standard has been five years for most Free Trade Agreements, the TPP is likely to introduce 12 years of Data Exclusivity for "biosimilar" drugs (generic copies of biotech drugs), thereby bringing negotiating partners into line with US law. Arguments for this extra period of exclusivity have centred on the recent narrowing of patents for biotech products, making it easier for competitors to invent around an on-patent innovator product.

For developing countries, such arguments are again somewhat peripheral to the question of technology transfer. Given that many modern biologic drugs require complex delivery mechanisms and close medical supervision (for example Humira for Crohns disease, or Herceptin for breast cancer), lower-income countries with anything less than extremely modern health facilities cannot take advantage of these medicines, even if they were given away for free. As such, it is difficult to see how Data Exclusivity requirements in Free Trade Agreements can have any meaningful impact on health outcomes in developing countries.

To be sure, Free Trade Agreements are a second-best solution to multilateral free trade. Nevertheless, they are an improvement on the then prevailing situation, freeing up trade and improving economic wellbeing. This will allow countries to spend more on healthcare, as well as enabling individuals to improve their living conditions and thus improve health.

Conclusion

From the foregoing, it is clear that trade liberalisation should remain an important goal, not just for economic purposes, but also for improving human welfare and health. This is particularly important for lower and middle income countries, many of which still labour under a plethora of tariff and non-tariff barriers. While certain economists may dispute the economic benefits of free trade, this paper adds to the increasing body of evidence that demonstrates a strong link between trade openness and better health. Despite emotive campaigning, there does not appear to be a correlation between trade agreements and reduced health outcomes, in fact, quite the opposite.

However, the knowledge spillovers discussed in this paper would be more potent if there were greater international trade in healthcare. New developments such as telemedicine and medical tourism would particularly benefit developing countries, as would the freer international movement of medical professionals for overseas training and practice. Telemedicine has particular potential, given its ability to reduce costs and deliver expertise rapidly to rural areas that are typically under-served by medical services. Hospital and clinical management could also benefit from the increased innovation and productivity gains that could emerge from exposure to international competition. However, there is little international trade in healthcare services, even though mechanisms exist via the World Trade Organization's General Agreement on Trade in Services (Erixon and Davis, 2008).

To improve the health of the world's people, more free trade is needed – not less.

Notes

1. Currently US free trade agreements are in force with 17 countries including: Australia, Bahrain, Canada, Chile, Costa Rica, Dominican Republic, El Salvador, Guatemala , Honduras , Israel, Jordan, Mexico, Morocco, Nicaragua, Oman, Peru and Singapore (Office of the Unites States Trade Representative, 2011). However four of these countries signed free trade agreements post 2005 and therefore these agreements are not reflected in the data which only goes up to 2005.
2. It is possible for this gross enrolment ratio to exceed100% because it measures the ratio of total enrolment, *regardless of age*, to the population of the age group that corresponds to a specific level of education. By contrast *net* enrolment ratios cannot exceed 100% because the measure restricts total enrolment to the official school going age as reflected in the International Standard Classification of Education 1997 (The World Bank Group, 2011).
3. Information from http://www.sda.gov.cn/WS01/CL0001/
4. Pharmaceutical Administration Law of the People's Republic of China
5. See, for example: Medicins Sans Frontieres, Sept 2011, "How the Trans Pacific Partnership Threatens Access to Medicines", TPP Issue Brief
6. "Medicines Control Council to address drug registration delays", *Pharma and Healthcare Insight,* September 2009, available at http://www.pharmaceuticalsinsight.com/file/99346/medicines-control-council-to-address-drug-registration-delays.html

Bibliography

Aziz ur Rehmana, H, (2010), "India, TRIPS-plus free trade agreements and the future of access to essential medicines. *Information & Communications Technology Law* 19(3): 267–300

Bloom, D., & Williamson, J., (1997), "Demographic change and human resource development", In Asian Development Bank, *Emerging Asia,* Manila

Cornia, G, Rosignoli, S, Tiberti L. (2007) "Globalisation and health: impact pathways and recent evidence" Center for Global, International and Regional Studies. Mapping global inequalities: conference papers (paper mgi-7). http://repositories.cdlib.org/cgirs/mgi/mgi-7.

Dollar, D., & Kraay, A., (2001), *Trade, growth, and poverty,* Policy Research Working Paper No 2199, Washington DC: World Bank

Dollar, D., (1995), "Outward-oriented developing countries really do grow more rapidly: evidence from 95 LDCs, 1976–85", *Economic Development and Cultural Change* 523–44.

Frankel, J., & Romer, D., (1999), "Does trade cause growth?" *American Economic Review* June:379 99

Gramiccia, G., & Beales, P., (1988), "The recent history of malaria control and eradication," in

Wersdorfer, W., & McGregor, I., eds. *Malaria: principles and practice of malariology.* New York: Churchill Livingstone

Gwatkin, F., (1980), "Indications of change in developing country mortality trends: the end of an era?" *Population and development review,* 6(4), 615–44

Jamison, D; Sandbu, M; W, Jia, (2001), "Cross-Country Variation in Mortality Decline, 1962–1987: The Role of Country-Specific Technical Progress," *Commission on Macroeconomics and Health Working Paper Series*, World Health Organization #WG1:4

Owen and Wu (2007), "Is trade good for your health?" *Review of International Economics,* 15:4

Oxfam, 2007

Popkin, B, Du S. Dynamics of the nutrition transition toward the animal foods sector in China and its implications: a worried perspective. *J Nutr* 2003; 133 (11 suppl 2): 3898S-3906S. PubMed

Raphael, 2004 'Social Determinants of Health: Canadian perspectives', Toronto, CSPI.

Rodriguez and Rodrik, 1999, Trade Policy and Economic Growth: A Skeptic's Guide to Cross-National Evidence, NBER Working Paper No. 7081

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

San Sebastián, M. *et al*. 2006. Is trade liberalization of services the best strategy to achieve health-related Millennium Development Goals in Latin America? A call for caution. *Pan American Journal of Public Health* 20(5): 341–346.

Shaffer, E, & Brenner, J, (2004), "International Trade Agreements: Hazard to Health?" *International Journal of Health Services* 34(3): 467–481.

Stevens & Linfield, (2010), "Death and taxes: government mark-ups on the price of drugs", International Policy Network, London

Wei., S-J., & Wu, Y., (2002), The Life and Death implications of globalization, *IMF Working Paper* (Washington: International Monetary Fund)

WHO, (2004), "World Medicines Situation"

WHO, (2008), Final Report of the Commission on the Social Determinants of Health,

World Health Organization (2011), "From burden to 'best-buys': Reducing the economic impact of non-communicable diseases in low and middle income countries"

World Health Organization (2011), Essential Medicines for Non-Communicable Diseases, Background paper, Geneva

Yadav, P, 2010. "Differential Pricing for Pharmaceuticals", DFID: London