

## Globalisation and the prevention and control of non-communicable disease: the neglected chronic diseases of adults

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**The growing global burden of non-communicable diseases in poor countries and poor populations has been neglected by policy makers, major multilateral and bilateral aid donors, and academics. Despite strong evidence for the magnitude of this burden, the preventability of its causes, and the threat it poses to already strained health care systems, national and global actions have been inadequate. Globalisation is an important determinant of non-communicable disease epidemics since it has direct effects on risks to populations and indirect effects on national economies and health systems. The globalisation of the production and marketing campaigns of the tobacco and alcohol industries exemplify the challenges to policy makers and public health practitioners. A full range of policy responses is required from government and non-governmental agencies; unfortunately the capacity and resources for this response are insufficient, and governments need to respond appropriately. The progress made in controlling the tobacco industry is a modest cause for optimism.**

Globalisation—the increasing interconnectedness of countries and the openness of borders to ideas, people, commerce, and financial capital—has beneficial and harmful effects on the health of populations.<sup>1,2</sup> The effect of the current phase of globalisation, or more properly reglobalisation,<sup>3</sup> on health has been debated worldwide.<sup>1,2,4</sup> Most attention has been directed towards control of infectious diseases and national security threats, provision of affordable medicines, and changes required in international trade and finance agreements to improve access to treatment. Broader policy concerns include the relation between globalisation and equity and the changing role of the state and governance for health.<sup>5</sup>

By contrast, the growing burden of non-communicable diseases—mainly heart disease, stroke, cancer, diabetes, and obesity—has been neglected. In this article, we assess the relation between globalisation and non-communicable disease epidemics, summarise the evidence in support of preventing such disease, and outline the required global and national responses.

### The global burden of non-communicable disease

This year there will be an estimated 56 million deaths globally, of which 60% will be due to non-communicable diseases:<sup>6</sup> 16 million deaths will result from cardiovascular disease (CVD), especially coronary heart disease (CHD) and stroke; 7 million from cancer; 3.5 million from chronic respiratory disease; and almost 1 million from diabetes. Mental health problems are leading contributors to the burden of disease in many countries and contribute substantially to the incidence and severity of many non-communicable diseases including CVD and cancer.<sup>7</sup>

Table 1 shows that non-communicable diseases are leading causes of death in developing and developed countries. Only in Africa do communicable diseases cause more deaths than non-communicable diseases; this year

2.8 million CVD deaths will occur in China and 2.6 million in India. Non-communicable diseases contribute substantially to adult mortality with the highest rates being in central and eastern European countries (figure).<sup>7</sup> They add to health inequalities within and between countries, mainly affecting poor populations largely because of inequalities in the distribution of major risk factors.<sup>8–10</sup> The global pattern of death will increasingly be dominated by non-communicable diseases; by 2020, CHD and stroke are expected to be the leading causes of death and loss of disability-adjusted life years.<sup>6</sup>

### Causes of non-communicable disease

The burden of non-communicable disease results from past and cumulative risks; the future burden will be determined by current population exposures to risk factors. Although the major risk factors for non-communicable disease epidemics are more complex than those for infectious disease, they are well known and account for almost all such events;<sup>11,12</sup> many are common to the main categories of non-communicable diseases and most are modifiable and operate in the same manner in all regions of the world, with some quantitative differences.<sup>13</sup>

The ageing of populations, mainly due to falling fertility rates and increasing child survival, are an underlying determinant of non-communicable disease epidemics. Additionally, global trade and marketing developments are driving the nutrition transition towards diets with a high proportion of saturated fat and sugars. This diet, in combination with tobacco use and little physical activity, leads to population-wide atherosclerosis and the widespread distribution of non-communicable disease.

Table 2 shows the contribution of the major non-communicable disease risk factors to the burden of disease. In developed countries, seven of the ten leading risk factors contributing to the burden of disease are for non-communicable disease, compared with six and three of ten in developing countries with low and high rates of mortality, respectively. In most developing countries, non-communicable disease risk factor levels have increased during the past decade, portending an increase in the rate of non-communicable diseases in the next two decades.

*Lancet* 2003; **362**: 903–08

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World			Developed countries			Developing countries		
Rank	Cause	% of total deaths	Rank	Cause	% of total deaths	Rank	Cause	% of total deaths
1	Ischaemic heart disease	12.4%	1	Ischaemic heart disease	22.6%	1	Ischaemic heart disease	9.1%
2	Cerebrovascular disease	9.2%	2	Cerebrovascular disease	13.7%	2	Cerebrovascular disease	8.0%
3	Lower respiratory infections	6.9%	3	Trachea, bronchus, lung cancers	4.5%	3	Lower respiratory infections	7.7%
4	HIV/AIDS	5.3%	4	Lower respiratory infections	3.7%	4	HIV/AIDS	6.9%
5	COPD	4.5%	5	COPD	3.1%	5	Perinatal conditions	5.6%
6	Perinatal conditions	4.4%	6	Colon and rectum cancers	2.6%	6	COPD	5.0%
7	Diarrhoeal diseases	3.8%	7	Stomach cancer	1.9%	7	Diarrhoeal diseases	4.9%
8	Tuberculosis	3.0%	8	Self-inflicted injuries	1.9%	8	Tuberculosis	3.7%
9	Road traffic accidents	2.3%	9	Diabetes	1.7%	9	Malaria	2.6%
10	Trachea, bronchus, lung cancers	2.2%	10	Breast cancer	1.6%	10	Road traffic accidents	2.5%

COPD=chronic obstructive pulmonary disease. Developed countries include European countries, former Soviet countries, Canada, USA, Japan, Australia, and New Zealand.

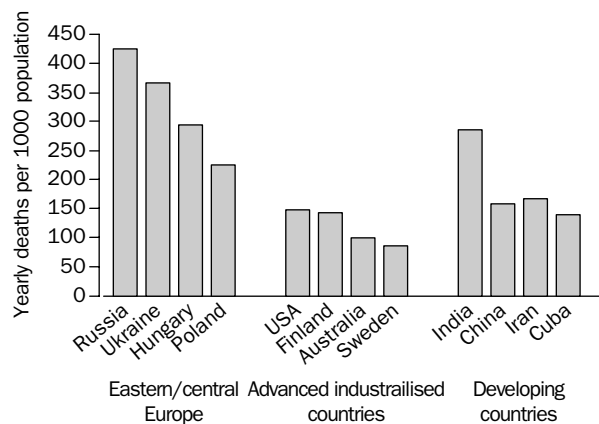
Table 1: Estimates of the ten leading causes of death in 2000<sup>6</sup>

### Effects of globalisation

Financial and economic globalisation and the World Trade Organization (WTO) rules that regulate trade, can improve population health status by increasing national incomes. However, the poorest and most excluded countries have not experienced this benefit.<sup>14</sup> Global rules and power imbalances constrain the ability of countries and national health services to respond adequately to health problems. Although national governments can shape international trade rules their influence has been limited by insufficient resources, expertise, and technical support; although advances were made in promoting access to pharmaceuticals at the WTO Ministerial Meeting in Doha in 2001.<sup>15</sup>

Globalisation directly and indirectly affects the development of non-communicable disease epidemics.<sup>1</sup> The indirect effects of globalisation are mediated by national economic performance and act through changes in household income, government expenditure, the exchange rate, and prices. National income is especially important because of its effects on public sector resources available for health and on household health-related behaviours—in particular in low-income households. The direct negative health effects of the modern phase of globalisation are illustrated by the increasingly globalised production and marketing of tobacco, alcohol, and other products with adverse effects on health.<sup>2,16</sup>

Protection of domestic producers by many developed countries and their regional organisations, impacts on non-communicable disease epidemics. For example, US and European Union (EU) agricultural subsidies limit competition from primary producers of fresh produce in developing countries and seriously reduce these countries' national incomes. Subsidisation of tobacco production by



Number of deaths from non-communicable diseases per year in men aged 15–59 years

the EU shows the continuing power of tobacco interests and is a major policy anomaly hindering progress on tobacco control; the EU spends about €1 billion on tobacco production subsidies and only €10–20 million on agricultural diversification and tobacco control programmes.<sup>17</sup> The importance and urgency of removing such agricultural subsidies was endorsed in Doha and again during the Johannesburg World Summit on Sustainable Development. Recent pronouncements by the EU suggest that subsidies tied to production might soon be lifted.

Modern information and communication technologies have positive and negative effects on health. Global marketing of tobacco and alcohol, and salty, sugary, and fatty foods now reaches most parts of most countries. A significant proportion of global marketing is targeted at children younger than 14 years. Worldwide, 600 million urban-based 5–14-year-olds spend more than US\$200 billion per year on themselves and influence parental spending of more than ten times that amount.<sup>18</sup> A large proportion of this money is spent on fast food, soft drinks, cigarettes, and alcohol. Advertisers increasingly use sophisticated means to ensure that their messages “slip below the radar of critical thinking”;<sup>19</sup> take advantage of weak regulatory environments; and have used false, misleading, or deceptive advertising to reach their targets.

### Globalisation and the tobacco pandemic

Tobacco is the only consumer product that, when used as recommended by its manufacturers, eventually kills half its regular users. Transnational tobacco companies are aggressively exploiting the potential for growth in tobacco sales in developing countries. The main targets of the industry and associated marketing campaigns are women and young people;<sup>20</sup> in many developing countries, marketing strategies are used that have long been banned in many developed countries. Tobacco companies have consistently denied the adverse effects of tobacco, especially via passive smoking.<sup>21,22</sup> More than 30 years ago, Philip Morris scientists were concerned that “the public have not yet arrived at the consensus that smoking causes heart disease, so cardiovascular developments must be watched extremely carefully”.<sup>23</sup> The response was to publicly deny evidence of adverse effects and encourage scientists to carry out spurious research aimed at confusing the public and delaying action. For many years, tobacco companies have deliberately subverted the tobacco control efforts of WHO.<sup>24</sup>

There is a strong link between increased tobacco consumption and free trade and tobacco-related foreign direct investment.<sup>25</sup> In the 1980s, bilateral agreements negotiated between the USA and several Asian countries under threat of sanctions resulted in an overall increase in

Developed countries (n=1.4 billion)		Developing countries			
Cause	% of total DALYs	High mortality (n=2.3 billion)		Low mortality (n=2.4 billion)	
		Cause	% of total DALYs	Cause	% of total DALYs
Tobacco	12.4%	Underweight	14.0%	Alcohol	6.3%
Blood pressure	11.0%	Unsafe sex	11.7%	Underweight	5.8%
Alcohol	9.3%	Unsafe water, sanitation, and hygiene	5.6%	Blood pressure	5.0%
Cholesterol	7.6%	Indoor smoke from solid fuels	3.8%	Tobacco	4.2%
Body-mass index	7.5%	Zinc deficiency	3.3%	Body-mass index	2.7%
Low fruit and vegetable intake	3.9%	Iron deficiency	3.2%	Cholesterol	2.1%
Physical inactivity	3.3%	Vitamin A deficiency	2.9%	Iron deficiency	2.0%
Illicit drugs	1.9%	Blood pressure	2.5%	Low fruit and vegetable intake	1.9%
Underweight	1.3%	Tobacco	1.9%	Indoor smoke from solid fuels	1.9%
Iron deficiency	0.8%	Cholesterol	1.9%	Unsafe water, sanitation, and hygiene	1.8%

DALYs=disability-adjusted life years. See *World Health Report 2002* for full list. Developed countries include USA, Japan, and Australia; low-mortality developing countries include China, Brazil, and Thailand; and high-mortality developing countries include India, Mali, and Nigeria.

Table 2: **Contribution of top ten risk factors to global burden of disease<sup>6</sup>**

demand for tobacco, with the highest increase in poor countries.<sup>26</sup> New cross-border challenges such as internet commerce and the illicit trade in tobacco products—often sanctioned by the major tobacco company executives—pose additional challenges. Online marketing by major tobacco manufacturers has increased substantially over the past 3 years, and one company, R J Reynolds, began marketing its new brand, Eclipse, only through the internet. Some websites offer toll-free numbers for offline orders of tobacco products.<sup>22</sup> WTO member governments are allowed to implement the laws and regulations necessary for comprehensive tobacco control policies, provided these are applied equally to all tobacco products irrespective of country of origin; countries vary greatly in their political willingness and capacity to implement these policy measures.<sup>22</sup>

### Globalisation, nutrition transitions, and alcohol

Replacement of a traditional diet rich in fruit and vegetables by a diet rich in calories provided by animal fats and low in complex carbohydrates, is happening in all but the poorest countries.<sup>27</sup> Such changes will in general lead to increased rates of many non-communicable diseases, although not necessarily stroke rates, in countries previously protected by balanced and healthy diets. Asia is experiencing a particularly striking shift in consumption patterns, although rates of coronary disease are still low, and stroke rates have fallen substantially in Japan. The rapidity of the transition and the reductions in the energy expended on physical activity in all but the poorest countries, especially in urban areas,<sup>28</sup> are reflected in the rapid rise of urban obesity;<sup>29</sup> in China the prevalence of obesity in urban children aged 2–6 years increased from 1.5% in 1989 to 12.6% in 1997.<sup>30</sup>

During the past 50 years there has been a remarkable and fundamental transformation in farming,<sup>31</sup> food processing, distribution,<sup>32</sup> transportation,<sup>33</sup> shopping practices,<sup>34,35</sup> and the consumption of food outside of the home.<sup>36</sup> Cooking has changed with the development of microwave ovens and other techniques.<sup>37</sup> Changing patterns of production and consumption underlie the emergence of non-communicable disease epidemics and threaten attainment of sustainable development goals.<sup>38</sup>

The alcohol industry is almost as globalised as the tobacco industry.<sup>39</sup> The role of alcohol consumption in non-communicable disease epidemics is complex. There is a direct relation between alcohol consumption and liver cirrhosis, some cancers, and most causes of injuries and violence. Alcohol reduces the risk of CVD, but only very low amounts are needed to achieve this benefit. Binge drinking is an important cause of CVD and is implicated

in the substantial decline in middle-aged life expectancy in Russian men since the collapse of the Soviet Union.<sup>40</sup>

### Global policies for non-communicable disease prevention and control

Rates of non-communicable disease, notably of lung cancer in men and CVD, have fallen substantially in many wealthy countries. For lung cancer, the reduction in mortality is due to the substantial fall in tobacco consumption by men as a result of active dissemination of scientific research results by politically engaged doctors.<sup>41</sup> However, in many European countries and in Korea, China, and Jordan, lung cancer epidemics are increasing, especially in women. This increase is a result of an increase in smoking by women and the inability of traditional health promotion programmes to counter tobacco marketing campaigns directed towards young women. The reasons for declines in CVD mortality are complex and include improved management of high risk people, in particular in the USA, and in some countries, such as Finland, prevention programmes for reducing population risk levels in combination with other environmental changes.<sup>42</sup>

The application of existing knowledge could make a major, rapid, and cost-effective contribution to the prevention and control non-communicable disease epidemics.<sup>43</sup> However, there are important constraints on the implementation of effective policies. The agenda of most international donors is dominated by the notion that communicable diseases should be prevented and treated before non-communicable diseases receive attention. The report of The Commission on Macroeconomics and Health paid scant attention to the growing burden of non-communicable diseases,<sup>4</sup> with the exception of the cost-effectiveness of tobacco cessation, perhaps because of the misconception that non-communicable diseases are still the preserve of wealthy countries and populations. Although the epidemiological transition is well advanced in all but the poorest countries, the institutional response to disease prevention and control is still based on the infectious disease paradigm. Consequently, the global and national capacity to respond to non-communicable disease epidemics is woefully inadequate and few countries have implemented comprehensive prevention and control policies. Furthermore, some commercial entities involved in producing and promoting unhealthy products exert an adverse influence on health policy. The influence of the tobacco industry has been well documented,<sup>21</sup> and recently the effect of some major food companies on US dietary guidelines and food policy has been described.<sup>44</sup> Appropriate policies are available to

Advocacy	World No Tobacco Day: frequent high-level media coverage
Norms and international legal instruments	Framework Convention on Tobacco Control
Surveillance and surveys	Global Youth Tobacco Survey (now in 110 countries)
Intersectoral action	UN Task Force on Tobacco Control
Research and training	Canadian and USA support for global research and training
Partnerships	Tobacco-Free Sports: Smoking Cessation

Table 3: **Progress in developing formal global responses to tobacco**

promote physical activity in urban environments. However, their implementation is still at an early stage, their effects are not well documented, and they face powerful opposition.<sup>45</sup>

### Tobacco control

Table 3 shows progress in developing a global response to the tobacco threat and provides a model for response to non-communicable disease epidemics. An international treaty directed towards the control of tobacco use has been adopted after 3 years of negotiation. The Framework Convention on Tobacco Control (FCTC) is linking the science of tobacco control with the political process of negotiating an international treaty and possible associated protocols on tobacco control priorities, such as advertising restrictions, illicit trade in tobacco products, packaging and labelling, and product regulation.<sup>46</sup> The process of developing the FCTC has led to a coherent UN system-wide approach to tobacco control with demand reduction as the primary goal. This global coherence is being translated into equally important and complementary actions within countries.<sup>47</sup>

### Global advocacy

Advocacy is scarce at the global level for non-communicable disease prevention and control, and what there is tends to be fragmented and risk-factor or disease specific. The lack of connection between evidence and action in the USA<sup>48</sup> applies globally. Many potential advocacy groups have their origins in specialist organisations of health professionals, and have not coalesced to become powerful promoters of broad prevention and control policies.<sup>43</sup> This lack of advocacy for health promotion contrasts with the growing dominance of commercial and consumer groups who have placed treatment at the centre of health policy debates and funding priorities. Stronger and broader alliances of major health professional bodies, consumer groups, enlightened industries, and academics are needed to effectively prioritise prevention of major risk factors for non-communicable diseases.

### Partnerships and interactions

WHO and governments alone cannot address the challenges of non-communicable disease prevention and control. Unlike tobacco control, partnerships and new forms of interaction are critical. Interaction with international consumer groups and commercial food multinationals is essential if progress is to be made in improving the quality of and access to healthy food and increased physical activity. WHO has started to develop a strategy to address diet and physical activity in relation to chronic diseases. The process has already led to the development of dietary guidelines, and extensive consultations are underway between WHO, governments, consumer groups, multinationals, and UN partners to define complementary roles in tackling

obesity, CVD, and diabetes. Several food multinationals have announced changes in product competition and marketing practices; if widely implemented, these changes could harness the benefits of globalisation and promote public health.<sup>49</sup> WHO is also working with the alcohol industry to assess whether its self-regulatory approaches will reduce marketing to young people and promote safe drinking.

### Capacity and resources

National capacity for non-communicable disease prevention and control is weak<sup>50</sup> and the institutional response to capacity development has not kept pace with epidemiological transition. Substantial investment is needed in the capacity of countries to plan and manage health projects for infectious disease<sup>51,52</sup> and even more so for non-communicable disease. Donors and governments have been reluctant to invest in national institutions and infrastructures. Global commitment is needed to assure sustainable progress in policy development and implementation for non-communicable diseases, among other aspects of public health. During the past two decades, WHO's tropical disease research programme, funded by a consortium of donors, has developed an impressive network of communicable disease researchers<sup>53</sup> and provides a useful model for efforts in non-communicable disease. The USA National Institutes for Health, through their Fogarty International Center, and Canada's International Development Research Center have begun to invest modestly in tobacco control research in developing countries; this needs to be expanded to other aspects of non-communicable diseases.

### Global norms and standards

There is an increasing need to establish global norms, both legally binding and non-binding, across many spheres to balance otherwise unrestrained influences of powerful actors. Relevant public health professionals need to master technical issues in international trade regulation. They could then influence bodies such as WTO, where health issues are increasingly considered,<sup>5</sup> and develop stronger WHO-led norms that could be used to resolve trade disputes about products with health effects. The proposed FCTC is one example of a legally-binding global norm; non-binding instruments important for non-communicable disease control include the Codex Alimentarius Commission (with its probable increased focus on food labelling and health claims), but more will be needed. Treaties are not the solution to the complex issues related to nutrition transition or physical inactivity. Multistakeholder and intergovernmental mechanisms and other non-binding measures are better options, especially in relation to children and to marketing of alcohol and foods. Such approaches are already being used in improving labour conditions, environmental quality, and human rights.<sup>54</sup>

### Reorientation of health services

Untold lives are lost prematurely because of inadequate acute and long-term management of non-communicable disease, many of which have simple and cheap treatments. For example, excellent evidence shows the effectiveness of fairly cheap interventions for CVD.<sup>55</sup> Even in wealthy countries, the potential of these interventions for secondary prevention is far from fully utilised<sup>56</sup> and the situation in poorer countries is even less satisfactory. Effective means of preventing, treating, and providing palliative care for cancer exist<sup>57</sup> but are not implemented in most countries. There are many opportunities for



coordinated non-communicable disease risk reduction, care, and long-term management; for example, smoking cessation is a priority for all patients.<sup>58</sup>

## Conclusion

The pace of globalisation of the major risks for non-communicable diseases is increasing. However, the prospects for non-communicable disease prevention and control are only slowly improving. Sustained progress will occur when governments, relevant international agencies, non-governmental agencies, and civil society acknowledge that public health must include non-communicable diseases and their risk factors. The challenges are enormous and the ongoing tobacco wars indicate that progress will remain slow until the response to non-communicable disease epidemics is scaled up in a manner commensurate with their burden.

### Conflict of interest statement

Both authors are full-time employees of WHO.

### Acknowledgments

We thank Douglas Bettcher for useful comments on an earlier version. There was no funding source for this article.

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## Uses of error

### Surgical planning error: what's in a name?

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A woman was referred with a 1-year history of intractable left leg sciatica refractory to conservative therapy. Neurological examination revealed signs of nerve root irritation but no hard neurological deficit. MRI from another hospital showed a large disc herniation to the left side between the fourth and fifth lumbar vertebrae.

She was offered lumbar microsurgical discectomy. On the morning of surgery she was given a general anaesthetic, and placed in the knee-chest position. After the localising radiograph was done to establish the correct level, but before the skin was cut, the junior resident noticed that the name on the actual MRI sheet was not the patient's even though the radiograph folder had the patient's correct name on it.

An urgent MRI was done while she remained under general anaesthesia; this revealed a disc herniation to the

left side at the level below (ie, between the fifth lumbar vertebra and the sacrum). Surgery was then done at the correct level with an excellent outcome and the patient remains pain-free 3 years later.

Many purists would argue that the patient should have been awakened after the error was discovered, but I felt we should avoid a wasted anaesthetic for her if possible. However that issue is peripheral to the main message here. The message is simply that busy clinicians must carefully examine the names on all imaging studies despite the fact that the imaging study the patient brings matches his/her clinical picture well. In this case the patient and her family were openly informed that two errors had been committed: (1) a mix-up by the hospital where the MRI was reported; and (2) failure of the neurosurgeon to confirm that the MRI in hand was indeed that of the patient.

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