

Impact of Trade, and Trade and Investment Agreements, on Air Pollution and Public Health

Position Paper

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1. Introduction: Trade and the Environment

Trade can have positive or negative effects on the environment and subsequently public health, depending on whether production reallocation is resulting in lower or higher pollutant emissions compared to the baseline [1]. In addition, trade liberalisation may lead to specialisation in pollution intensive activities in certain countries, if the stringency of environmental regulations differs across countries (the *pollution haven* hypothesis). On the other hand, increased trade can contribute to improved environmental quality and public health by supporting economic growth, knowledge exchange, and social welfare. Importantly, open markets can improve access to clean technologies that make local production processes more efficient and reduce harmful emissions to the environment. Trade and investment liberalisation can also generate incentives for industry to adopt more stringent environmental standards. It has been argued that as a country becomes more integrated within the world economy, its export sector becomes more exposed to the environmental requirements of international importers. Changes needed to meet these requirements flow upstream along the supply chain, incentivising the use of cleaner production processes and technologies [2].

The interactions between trade and investment and environmental quality are well recognised. The debate on trade and pollution, including both the impact of environmental policies on trade, as well as the impact of trade on the environment, started in the 1970s [3]. At that time there was growing concern regarding the impact of economic growth on the environment, which led to the *1972 Stockholm Conference on the Human Environment*. In 1987, the World Commission on Environment and Development produced the report *Our Common Future*, in which the term *sustainable development* was first used. This report identified poverty as one of the most important causes of environmental degradation, and argued that greater economic growth, stimulated by increased international trade, could generate the resources needed to tackle pollution. Trade and the environment was also identified as a key area in the *1992 Rio Earth Summit* and referred to in the *United Nations Rio+20 Agreement*, which called for more action to ensure that countries could pursue a sustainable path to economic growth and social progress with the necessary environmental protection [4].

2. Air Pollution and Public Health

The production of goods and services generates air pollution and greenhouse gases both directly and through the activities of their supply chains. The latter, called *embodied emissions*, are caused by internationally or domestically traded materials and services [5]. As international trade expands at a rate that is faster than economic growth, partly driven by the development of transport technologies, it can lead to air quality degradation due to the increasing distance between consumption from production locations [5].

Air pollution has a very significant impact on the public's health, globally accounting for about 4.2 million deaths and ranking 5th worldwide among all health risks, including high blood pressure, smoking, and diet [6]. Exposure to air pollution over several years has been found to reduce life-expectancy, mainly due to an increased risk of cardiovascular and respiratory illness and lung cancer,

while short-term exposure can aggravate respiratory and cardiovascular conditions, and trigger asthma attacks and premature deaths [7, 8]. The World Health Organization's International Agency for Research on Cancer (IARC) has classified outdoor air pollution as carcinogenic to humans [9]. There is also emerging evidence of possible links of air pollution with a wide range of other non-communicable diseases (NCDs), including diabetes, obesity, cognitive decline, dementia, and various adverse birth outcomes [8].

Many people are also affected by rising health costs and a decline in quality of life in polluted environments. Air pollution comes from many sources (e.g. industry, transport, energy generation, agriculture) and does not recognise geographical boundaries. Although significant progress has been made in controlling emissions from industry, energy generation and domestic sources, particularly in high-income countries, air pollution remains one of the leading causes of NCDs in many low and middle-income countries and the world as a whole [10]. A significant share of the pollution burden in low and middle-income countries can be attributed to production of goods for export to consumers in high-income nations [11].

3. Trade and Air Pollution

Zhang et al. [12] investigated the effects of international trade on atmospheric emissions, air quality and resulting health impacts by estimating premature mortality attributable to fine particulate matter (PM_{2.5}) pollution as a result of the production and consumption of goods and services in different world regions. They found that 750,000 air pollution-related deaths were associated with goods and services produced in one region for consumption in another. This means that international trade shifts the health impacts of production from countries that import goods to those that produce them. For example, consumption in western Europe and the United States was linked to more than 108,600 premature deaths in China. Similar results were presented by Liang et al. [13] who showed that in 2010, 26% of global PM_{2.5} related health impacts were caused by production induced by other countries. According to their study, high-income countries (e.g. USA, Japan, and Germany) outsource not only economic production but also PM_{2.5} related health impacts (14%) to Asia (e.g. China and India).

Moving goods from their place of production to their place of consumption contributes to air pollution as well as carbon emissions into the atmosphere. Maritime shipping generates around 50% of all carbon emissions from international freight transport, compared with 40% for road transport, 6% for air and 2% for rail transport of goods. Per tonne-kilometre, carbon emissions from shipping are significantly lower than for road or air transport [14]. It is estimated that carbon emissions from international freight transport (all modes) could increase by up to 160% by 2050 in a business-as-usual scenario, with road freight replacing maritime shipping as the largest emitter [14]. At this rate, the share of international freight transport in total global carbon emissions from fuel combustion would increase well above its current level of 5% [15].

A combination of cleaner fuels and renewable energy, innovative technologies and operational control measures are needed to reduce the impact of freight transport on air quality and health [7]. Future freight-related emissions also depend on the current planning and design of major transport infrastructure projects. To tackle road emissions originating from diesel lorries, which are largely responsible for emissions of black carbon and PM_{2.5}, many countries are launching green freight initiatives or switching cargo transport from road to rail. For example, the Northern Corridor Green Freight Programme launched in 2017 seeks to reduce emissions and improve fuel efficiency of heavy diesel vehicles travelling along the trade route that links Kenya to Burundi, the Democratic Republic of the Congo, Rwanda, South Sudan and Uganda [16].

Transport is just one way that trade affects the environment and air quality in particular. Production, use and disposal of traded goods are other key stages in the life cycle of a product that affect air quality. More stringent environmental regulations focused on the agricultural sector, such as the introduction of good practices in the use of fertilizers and the promotion of cleaner production technologies, could reduce the health burden of ground-level ozone associated with international trade [17].

The environmental effects of production differ widely across countries due to differences in climate, technology used, energy source and intensity, and laws and institutions, among other factors [15]. Generally, it is preferable to produce goods where it is most economically and environmentally efficient to do this, and to allow trade to match global supply and demand.

4. Trade Agreements and Environmental Provisions

Effective environmental policies and institutional frameworks are needed at the local, regional, national, and international levels to combat air pollution and protect public health. The impact of trade and investment on NCDs largely depends on whether appropriate environmental policies are in place. According to the Organisation for Economic Co-operation and Development (OECD), stringent environmental policies are compatible with an open trade regime, as they create markets for environmental goods and services that can subsequently be exported to countries that adopt high environmental standards (the so-called *first-mover advantage*) [2]. This is particularly the case for complex technologies, such as renewable energy technologies.

An increasing number of regional trade agreements have introduced environmental provisions in the main text or in companion side agreements. For example, European countries have harmonized national environmental policies to facilitate international trade [18]. These provisions generally aim to protect the environment and establish collaboration in addressing environmental issues. The OECD has undertaken regular reviews of how environmental issues are treated in trade agreements and provided an inventory of regional trade agreements with environmental provisions [19].

Martinez-Zarzoso and Oueslati [4] examined the impact of environmental provisions in regional trade agreements, particularly focusing on air pollution. Although it was difficult to differentiate the impact of regional trade agreements on environmental outcomes from other factors, they concluded that regional trade agreements with environmental provisions reduced air pollution measured as PM_{2.5}. Their results showed a direct positive effect of regional trade agreements that specifically include environmental provisions (in the main text or are accompanied by side environmental agreements) in reducing air pollution. For example, air pollution in Mexico was reduced after the adoption of the North American Free Trade Agreement (NAFTA), thanks to investment in clean technologies to improve the energy efficiency of the production technology [20]. This effect could be explained by the fact that these environmental provisions encourage members to implement more stringent environmental regulations, which help improve air quality [4].

5. Environmental Effects of Trade Liberation

Trade liberalisation can generate a mixture of positive and negative effects on air quality and subsequently public health. Focusing on the environmental effects of NAFTA, Grossman and Krueger [21] decomposed the environmental impact of trade liberalization into (a) scale, (b) technique, and (c) composition effects:

(a) The *scale effect* indicates that an increase in economic activity due to increased trade raises the total amount of pollution and consequently damages the environment. Thus, the scale effect is

expected to have a negative impact on air quality and public health. However, economic growth can also affect environmental quality positively, since increasing income is typically associated with greater demand for environmental quality and consequently with beneficial changes in environmental policy and legislation.

(b) The *technique effect* is expected to have a positive impact on the environment. This is because trade stimulates technology transfer, which can benefit the environment if pollution per output of production is reduced. A reduction in the emission intensity in the production of traded goods therefore results in air quality and related public health improvements.

(c) The *composition effect* on the environment, i.e. the effect of a change in the basket of products exported after trade liberalization, is more controversial. Countries specialise in the production of traded goods that are relatively efficient at producing, which may reduce global emissions. However, if competitive advantage results from differences in environmental regulations between countries, they could benefit economically from having less stringent environmental regulations, which would lead to increases in pollution and related health impacts.

In general, the more open an economy, the greater the impact of foreign trade on a country's environment according to Machado et al. [22]. However, Managi et al. [23] argues that whether or not trade has a beneficial effect on the environment depends on the pollutant and the country. They found trade to benefit the environment in terms of SO₂ and CO₂ emissions in OECD countries, but to have a detrimental effect in non-OECD countries. These findings are in agreement with the analysis by Kukla-Gryz [24], which showed that in low and middle-income countries, the *composition effect* of trade liberalization leads to increased emissions. Moran and Kanemoto [11] used a modelling approach to link SO₂, NO_x, and PM₁₀ high emissions hotspots to final consumers via global supply chains. Their maps showed that high income countries reduce their air pollutant emissions domestically by creating new pollution hotspots in low and middle-income countries. However, the *technique effect* of international trade (i.e. the transfer of cleaner technologies from the high-income to low-income countries) is expected to eventually compensate to some extent this increase in air pollution in low-income countries.

6. Conclusions

In summary, the scientific literature identifies both positive and negative effects of the trade and investment on the environment. The positive effects include increased economic growth and technology transfers accompanied by the distribution of environmentally friendly goods and services, and clean technologies. The negative effects mainly result from the migration of pollution generating economic activities to countries with less stringent environmental policies [4].

Zhang et al. [12] argued that if the cost of imported goods is lower because of less stringent air pollution controls in the regions where they are produced, then the consumer savings may come at the expense of lives lost elsewhere. They concluded that improving pollution control technologies in China, India and elsewhere in Asia would have disproportionately large health benefits in those regions and worldwide, and that international cooperation to support such pollution abatement efforts and to reduce migration of emissions via international trade is in the global interest.

Tackling the world's environmental challenges requires the development and widespread dissemination of technological solutions, for example to produce clean energy and electric vehicles, around the world. Trade can serve as a powerful mechanism to help achieve this goal, as it facilitates countries' access to the best environmental goods and services available in the global market at lower cost. However, this needs to be combined with environmental provisions included in trade

agreements or investment decisions that safeguard environmental quality from a *race-to-the-bottom* through migration of polluting industries to countries with less stringent environmental regulations.

Finally, the COVID-19 pandemic and related travel restrictions are having a significant impact on trade (particularly in services), as well as a transient positive effect on air quality around the world. It is important that the response to this crisis does not result in a rebound effect on emissions through relaxation of environmental regulations aiming to boost economic growth. This situation calls for increased international cooperation to ensure that trade, environmental and public health policies are fully aligned with the broader aim of achieving sustainable development. Future research on international trade policies and agreements that can enhance environmental protection and climate change mitigation in a post-COVID world is urgently needed.

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