

Economic impact of epidemics and pandemics

SUMMARY

Despite significant medical progress over the last centuries, infectious diseases such as influenza or malaria still represent a considerable threat to society. While some are endemic to specific geographical regions, others can spread, becoming epidemics or pandemics. While the first and most crucial aspect of an epidemic is, and will always remain, the loss of human life, the spread of a virus can also have important repercussions for national or regional economies.

The evidence reported in various studies indicates that epidemic disease impacts on a country's economy through several channels, including the health, transportation, agricultural and tourism sectors. At the same time, trade with other countries may also be impacted, while the interconnectedness of modern economies means that an epidemic can also implicate international supply chains.

These considerations, as well as the fact that rapid urbanisation, increasing international travel and climate change all render epidemic outbreaks a global and not simply a local phenomenon, imply that it is important for all countries to take necessary measures to counter this threat. In this context, several initiatives have been proposed, ranging from a single measure (e.g. investing in new antibiotics), to broader solutions to be adopted by developing and developed countries alike.

In the European Union (EU), healthcare organisation and provision are Member State prerogatives and responsibilities. The EU's actions in this area therefore aim at complementing national policies to help Member States face common challenges, such as epidemics. This support takes place via coordination and exchange of best practices between EU countries and health experts, financial support under Instruments for co-financing, (e.g. the Horizon 2020 research programme and European Fund for Strategic Investments), and the adoption of relevant legislation.

The European Parliament has taken the opportunity, through own-initiative resolutions, to highlight the need for further actions.



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Introduction

Despite significant medical progress over the last centuries, [infectious diseases](#) such as influenza and malaria still represent significant threats to modern societies. While some have been fought successfully and are only found within a few geographical areas (endemics), others have the ability to spread quickly from an initially limited outbreak, becoming epidemics or pandemics.¹

The first and most crucial aspect of an epidemic or pandemic is, and will always remain, human suffering and the loss of lives.² Nevertheless, the spread of a virus can also have important economic implications. A number of studies focusing on this aspect of the impact of epidemics and pandemics have found that the effects across the economy can be significant.

A recent [article](#) estimates that the total value of losses (including lost income³ – through reductions in the size of the labour force and productivity, increases in absenteeism and, importantly, as the result of individual and social measures that interrupt transmission, but disrupt economic activity – and the intrinsic cost of elevated mortality) incurred by a severe **global** influenza pandemic (such as the [1918](#) pandemic), could reach about US\$500 billion per year, i.e. about 0.6 % of global income. The authors further calculate that the estimated proportion of annual national income represented by these losses varies according to income groupings, with lower-middle-income countries being more severely impacted (1.6 %) than high-income countries (0.3 %). A 2019 [joint report](#) from the World Health Organization (WHO) and the World Bank estimates the impact of such a pandemic upwards, bringing the total cost to 2.2 %-4.8 % of global GDP (US\$3 trillion). The report further notes that, in such an event, South Asia's GDP could potentially fall by 2 % (US\$53 billion), and sub-Saharan Africa's GDP by 1.7 % (US\$28 billion). Yet another article, from the International Monetary Fund, finds that [vulnerable populations](#), particularly the poor, are likely to suffer disproportionately from an outbreak, as they may have less access to health care and lower savings to protect against financial catastrophe.

At **regional** level, a World Bank [report](#) estimates that the recent [ebola epidemic](#) in Guinea, Liberia, and Sierra Leone, cancelled-out many of the previous years' economic gains for these countries which, until then, were among the fastest-growing economies in the world.⁴ Another WHO [report](#) explains further that the outbreak caused a substantial loss of growth in the private sector, posed threats to food security due to a decline in agricultural production, and burdened cross-border trade with restrictions on movement, goods, and services.

More specifically, while a national or regional economy is always impacted by an epidemic or a pandemic, some sectors of the economy are hit harder than others.

Potentially impacted economic sectors

Health sector and virus containment impacts

One of the first sectors impacted by an outbreak is the public and private health system. A surge in hospital admissions results in sudden peaks in administrative and operational expenditure. For example, a [paper](#) estimates the excess hospital admissions and costs due to the [H1N1](#) influenza pandemic in England between June 2009 and March 2011, and finds that, two waves of H1N1 admissions across 170 English hospitals (one during the pandemic outbreak and one following it) incurred admission costs of around GB£45.3 million (GB£20.5 million for admissions between June 2009 and March 2010 and GB£24.8 million for admissions between November 2010 and March 2011).

The above influenza outbreak concerned a disease that lasts for a limited period of time and usually requires short-term treatment. However, epidemics caused by diseases can also create the need for long-term treatment – sometimes, for the rest of patients' lives. In that sense, they [appear both](#) 'as a crisis and a systemic condition'. In this context, a [2017 report](#) from the United Nations Development Programme estimated that the [Zika virus](#) epidemic would cost about US\$7–18 billion in Latin

America and the Caribbean for 2015–2017, with the poorest countries (e.g. Haiti) facing the highest costs as a share of gross domestic product (GDP). Moreover, the report noted that, while in the short-term, the biggest impact would be felt in the tourism sector, in the long-term, the most substantial impact would relate to treatment and care for children. Similarly, the Centers for Disease Control and Prevention in the United States of America (USA) [estimated](#) that the average annual cost per patient of human immunodeficiency viruses (HIV) care through anti-retroviral therapy (ART) was estimated to be US\$23 000 (in 2010), which would bring the cost of lifetime HIV treatment to around US\$380 000.⁵

Another immediately observable effect of an outbreak is the actions and measures a country's authorities take to [contain](#) it: [closing schools](#) or reducing transportation and other public services. In addition, independently from the government, a population may proactively take precautionary measures, including people staying at home to avoid getting the disease or to care for a sick family member. In this context, a [paper](#) examined the impact of the 2009 H1N1 pandemic on missed days of work in Chile. The researchers estimated that the pandemic increased the mean days missed significantly, resulting in at least US\$16 million in labour productivity loss. They then extrapolated this finding to the United States and – with caveats – estimated that the pandemic led to approximately US\$2 billion in lost labour productivity.

Similarly, shops and companies might suspend their operations temporarily to avoid their workforce being affected by the disease. This can impact consumer spending (it was [noted](#), for example, that during the 2003 severe acute respiratory syndrome (SARS) [epidemic](#), consumer spending dropped in Hong Kong and Singapore), and have further implications by paralysing local or international [supply chains](#) (an important issue brought up in the current case of the novel coronavirus outbreak – see below).

Agricultural sector and trade costs

Given that around 60 % of emerging infectious diseases reported globally are [zoonoses](#) (i.e. naturally transmitted diseases between people and vertebrate animals), virus outbreaks may result in significant costs to a country's agricultural sector and trade.

The [incentive](#) for the agricultural sector (i.e., food and animal production) to invest in infectious disease prevention often correlates with its economic importance to overall GDP. For example, in the USA, where net meat exports approach 12 % of total production, investments in animal health infrastructure are prioritised. However, many developing countries that engage in agricultural trade face competing priorities, resulting in lower investment in animal health infrastructure and protection, and therefore may potentially omit to employ adequate biosecurity measures.

In Europe, an [audit](#) of the 1996 crisis caused by the numerous cases of [bovine spongiform encephalopathy](#) (BSE) in cattle in the United Kingdom and the possible existence of a link between BSE and [variant Creutzfeldt-Jakob Disease](#) in humans was estimated to have cost around GB£3.4 billion between 1996 and 2000. Related expenditure included containment measures, such as the slaughter of animals.

Another [article](#) examines the socio-economic impact of [Rift Valley fever](#). Focusing, among other countries, on Somalia, whose economy relies primarily on livestock production and trade (60-65 % of GDP), the paper finds that import bans imposed by Arabian countries following the 1997 Rift Valley fever outbreak in resulted in a drop of more than 75 % exports and a loss greater than US\$300 million.⁶ These numbers, however, do not indicate the extent of the damage to the Somali economy: as the paper further notes, in countries like Somalia, taxation on livestock exports is the main source of government revenue, and livestock exports play an important role as a source of employment.

An epidemic does not only affect the outbreak country. Indeed, a [study](#) explored the link between the 2014 [West Africa ebola](#) outbreak in United States' exports to that region, as well as on exports-supported US jobs, 2005–2016. The study attempted to estimate whether epidemic outbreaks in

non-adjacent countries could impact unaffected countries through global trade. The study estimates that the year of peak transmission, 2014, the epidemic resulted in US\$1.08 billion relative reduction in US merchandise exports to ebola-affected countries, whereas estimated losses in exports-supported US jobs exceeded 1 200 in 2014 and 11 000 in 2015.

Tourism and travel

Another economic implication of an epidemic is that travel and tourism to regions affected by outbreaks are also likely to decline.

A 2013 [paper](#) estimates the economic impact to the Mexican tourism sector of the H1N1 influenza pandemic, by examining tourist arrivals. The authors find that due to the virus, Mexico lost almost one million overseas visitors, which is estimated to have resulted in losses of around US\$2.8 billion. This extended over a five-month period, mostly because of the slow return of European travellers to the country.

Similarly, a [paper](#) investigating the economic Impact of the 2015 Middle East respiratory syndrome coronavirus ([MERS-CoV](#)) [outbreak](#) on the Republic of Korea's tourism-related industries finds that the relatively brief outbreak was associated with 2.1 million fewer non-citizen visitors, which corresponds to about US\$2.6 billion in lost tourism revenue.

A [paper](#) estimates that the impact of [SARS](#) to domestic tourism earnings losses reached US\$3.5 billion in China and US\$1.7 billion in Malaysia. Another [paper](#) notes that, at the time of the outbreak, many provincial governments decided to close many natural attractions (e.g. nature reserves) temporarily, because, despite not being close to the outbreak centres, they had poor epidemic control systems. Given that the epidemic coincided with peak tourism season, tourism businesses suffered significant losses.

Similarly, a [paper](#) estimates that, in the case of malaria, dengue, yellow fever and ebola, the eradication of these diseases in affected countries in the Americas, Asia and Africa would result in an increase of around 10 million additional tourists worldwide, which would translate into a rise in tourism expenditure of US\$12 billion.

An additional sector usually impacted by an epidemic is air transport. A recent [bulletin](#) published by the International Air Transport Association (IATA) notes that, in recent history, SARS was the most serious epidemic to date in terms of impact on traffic volumes. The association estimates that in 2003, the epidemic resulted in Asia-Pacific airlines losing 8% of annual [revenue passenger kilometres](#) or miles and US\$6 billion of revenues overall. On the other hand, the bulletin notes, the 2005 and 2013 episodes of avian flu had a much milder and short-lived impact. Lastly, in the case of the South Korean MERS outbreak, the bulletin estimates that, while the initial impact (first month of the outbreak) was a 12% decline in monthly revenue passenger kilometres to, from and within South Korea, air travel recovered soon after (two months) and within half a year had returned to its pre-outbreak levels.

First estimates of the impact of the novel coronavirus outbreak

COVID-19: background and state of play

Coronaviruses are a family of viruses that circulate among animals, but can also be found in humans. At the end of 2019, a new virus strain that had not previously been identified in humans, was detected in the Chinese city of Wuhan (Hubei province). The [novel coronavirus](#) – now referred to as SARS-CoV-2 – can cause mild, non-specific symptoms, including fever, cough, shortness of breath, muscle pain and tiredness. More serious cases can develop severe pneumonia, acute respiratory distress syndrome, sepsis and septic shock that can lead to death. The virus is transmitted via respiratory droplets. The estimated incubation period is 2-14 days, but could be longer. There is [currently no vaccine](#) to prevent the 2019 coronavirus disease (COVID-19), and no cure has yet been found. Much is still unknown, but [researchers](#) are working intensively to [gain a better understanding](#) about the novel disease.

At global level, the WHO declared a public health emergency of international concern at the end of January 2020, as infections spread rapidly within China. The situation is evolving rapidly. An increasing number of cases have since been confirmed outside of the country, including Europe. For the first time (as of 25 February 2020), there have been more new cases reported from countries outside of China than from within China. The World Health Organization publishes daily [situation reports](#). On 27 February 2020, there were [81 109](#) cases confirmed worldwide. The European Centre for Disease Prevention and Control publishes daily situation updates for the EU/EEA and the United Kingdom. As of [26 February 2020](#), 477 cases of infection and 14 deaths have been reported, of which 400 and 12, respectively, occurred in Italy.

In its [strategic preparedness and response plan](#), the WHO outlines the measures required to deal with the crisis. At European level, EU health ministers held an [extraordinary Council meeting](#) on 13 February 2020 to exchange views on the outbreak. The Council [conclusions on COVID-19](#) welcome the effective EU response to the threat of a possible pandemic outbreak, and call for increased cooperation both at EU and international levels.

The EU's support for tackling the COVID-19 outbreak includes: ongoing coordination with Member States to share information, assess needs and ensure a coherent EU-wide response; offering support through the [EU Civil Protection Mechanism](#); and supporting China with emergency medical supplies. Moreover, the EU has committed [€10 million](#) to fund research into COVID-19, and announced an additional €90 million through the Innovative Medicines Initiative, the partnership between the EU and the pharmaceutical industry. The money mobilised by the EU complements the funds allocated by the Member States to fighting the outbreak.

Source: [Novel Coronavirus Outbreak - State of play with the epidemics; preparedness and response measures](#), Policy Department for Economic, Scientific and Quality of Life Policies, Directorate-General for Internal Policies, European Parliament, February 2020, and [The EU's response to COVID-19](#), European Commission.

At the moment, the novel coronavirus epidemic is ongoing, precluding a comprehensive study of its impact. As Commissioner Gentiloni [noted](#) on 26 February 2020, while China's increased weight in the world economy since the SARS outbreak in 2003 means that there will definitely be an impact, it is too soon to assess this and present forecasts for the EU economy at this stage.

However, there have been some first attempts to estimate the potential impact to the economy, by considering the containment measures taken by China and the preventive and containment measures taken by the rest of the world. As mentioned above, the first visible impact has been in the health sector, not least, the considerable number of patients or potential patients, which has stretched the capacity of many hospitals in Wuhan and the surrounding provinces and prompted authorities to build other hospitals at speed.

Another major impact is expected to come from the [significant disruptions](#) to travel during the Chinese New Year (a time where many Chinese return home for the holidays), as well as the containment measures around several Chinese cities, which are expected to deal a significant blow to the Chinese travel and transport sectors.

With fewer tourists, and lower consumption, the retail, hospitality and entertainment sectors are also expected suffer from the outbreak, perhaps even more than during the SARS epidemic, because the sectors have increased significantly in the meantime. Therefore, [despite the support](#) provided by Chinese authorities, these factors are expected to add downward pressure to Chinese growth, accentuating the decelerating trend that began a few years ago.

However, the damage will not be limited to China. Indeed, given that Wuhan – the epicentre of the crisis – is also one of the largest transportation hubs in the country, the impact is expected to extend to national and [international airlines](#). In addition, tour operators globally are expected to be impacted negatively, as many countries issue travel warnings for popular tourism destinations. Countries whose economies are dependent on tourism (e.g. [Greece](#), [France](#) or [Italy](#)) are already adjusting their forecasts.

Many international technology companies, or component providers for such companies (e.g. Apple or Samsung), have plants in the affected Chinese provinces and the virus, along with the preventive measures, are expected to hit international supply chains. According to assumptions and estimates from [rating agency S&P](#), COVID-19 could reduce the baseline GDP growth rate for 2020 for the world by 0.3 percentage point (ppt); for China by 0.7 ppt; for Asia-Pacific by 0.5 ppt; and for the USA and Europe by 0.1 to 0.2 ppt.

Outside China, depending on how the outbreak in northern Italy evolves, there is a [risk](#) that the supply chains for several automobile manufacturers, including Fiat, Renault, or BMW, will be disrupted. Furthermore, the fact that the Lombardy, Veneto and Milan regions have been impacted by the outbreak – and that [part of the response](#) included shutting down schools, offices and tourist attraction s– is expected to impact further Italy's economy, at a critical time for the country.

Similarly, the virus created a shock for oil demand: over the past years, [China](#) has grown to account for around 50 % of world oil demand, so when [demand in the country dropped](#) by around 25 % as a result of the quarantine measures, the impact on the price of oil was significant.

Importance of investment and preparedness

As seen above, an outbreak of disease has the potential to impact several sectors of a country's economy and as a result, inflict considerable damage. Furthermore, rapid [urbanisation](#), ever-increasing [travel](#) between countries and [climate change](#) all render epidemic outbreaks a global and not simply a local phenomenon.

Therefore, there is a pressing need for national and international preparedness measures – i.e. 'health and non-health interventions, capabilities and capacities at regional, national and international level'. In this context, a [report](#) from the international working group on financing preparedness, notes that the first step for countries seeking to enhance their preparedness is to use the World Health Organization's Joint External Evaluation mechanism to identify their current state and possible needs. The [mechanism](#) evaluates each country's overall preparedness in four main areas, i.e. **prevention** (which includes national legislation, policy and financing; international health regulation coordination, communication and advocacy, antimicrobial resistance, zoonotic diseases food safety, biosafety and biosecurity and immunisation); **detection** (through national laboratory systems, real-time surveillance, reporting and workforce development); **response** (including emergency response operations, linking public health and security authorities, medical countermeasures and personnel deployment as well as risk communication); and **other** related hazards and points of entry.

Collaboration between countries and investments in critical infrastructures are also important to counter this type of threat. In this context, an International Monetary Fund [paper](#) emphasises the importance of (i) investing in improved sanitation, provision of clean water and improved urban infrastructure; (ii) building strong health systems and supporting proper nutrition; (iii) investing in reliable disease surveillance; (iv) collaborating between countries to improve monitoring of

epidemic outbreaks and increase response readiness. Indeed, a 2012 World Bank [study](#) estimated that system improvements in public health and animal health to meet the minimum standards of the World Health Organization and the World Organization for Animal Health, would cost between US\$1.9 and US\$3.4 billion per year. On the other hand, zoonotic outbreaks occurring between 1997 and 2009 – that **did not** become pandemics – cost US\$80 billion (US\$6.7 billion/year). Apart from the apparent benefit explained above, the World Bank [notes](#) that investment in that context, would help alleviate poverty (given that, as mentioned above, epidemic outbreaks affect poor people disproportionately more than others).

Another [paper](#) advocates further investment in antibiotics. It starts by noting that over 95 % of post-mortem samples from the 1918 pandemic showed bacterial infection complications. While the introduction of antibiotics in the 1940s has reduced the risk of bacterial infections, the recent trend of growing [anti-microbial resistance](#) could increase the death toll from future pandemics through secondary bacterial infections. In that context, the authors propose to invest in both the development of antibiotics and restrictions on their use until the next severe epidemic/pandemic, to maximise their effectiveness.

European level initiatives

In the European Union, healthcare organisation and provision is a [Member State prerogative](#) and responsibility. The EU's [actions in this area](#) therefore aim at complementing national policies to help Member States face common challenges, such as epidemics.

In this context, the EU (i) coordinates and facilitates the exchange of best practices between EU countries and health experts; (ii) provides financial support, under instruments for co-financing, including the Health Programme, the Horizon 2020 research programme, EU cohesion policy and the European Fund for Strategic Investments,⁷ and (iii) proposes and adopts relevant legislation, in line with Articles 114 (approximation of laws), 153 (social policy) and 168 ([protection of public health](#)) of the Treaty on the Functioning of the European Union (TFEU).

Important legislative initiatives relative to epidemics include:

- [Regulation \(EC\) No 851/2004](#), which established the European Centre for Disease Prevention and Control. The Centre's mission includes identifying, assessing and communicating current and emerging threats to human health from communicable diseases. In this context, the Centre currently monitors the situation regarding COVID-19 epidemic, as well as the [ebola outbreak](#) in the Democratic Republic of the Congo.
- [Article 12 of Decision No 1082/2013/EU](#) on serious cross-border threats to health, which provides that the European Commission may recognise a public health emergency situation in relation to influenza epidemics with pandemic potential. This recognition enables the use of Article 2 of [Regulation \(EC\) No 507/2006](#) on the conditional marketing authorisation for medicinal products for human use, which allows for the accelerated marketing of certain medicinal products in the case of urgent need, by means, of a conditional marketing authorisation and of the temporary option of granting a variation to the terms of a marketing authorisation for a human influenza vaccine, even where certain non-clinical or clinical data are missing'.
- [Regulation \(EU\) No 282/2014](#) on the establishment of a third Programme for the Union's action in the field of health (2014-2020), which states that, in order to minimise the public health consequences of cross-border threats to health as set out in the aforementioned Decision (No 1082), 'the Programme should support coordinated public health measures at Union level to address different aspects of cross-border health threats, building on [preparedness and response](#) planning, robust and reliable risk assessment and a strong risk and crisis management framework'.

European Parliament resolutions

In its 2011 [decision](#) on the discharge for the European Centre for Disease Prevention and Control for the financial year 2009, Parliament pointed to the important contributions made by the Centre to the measures to fight the 2009 H1N1 pandemic and took the view that Centre's powers must be strengthened to increase the EU's capacity to independently assess the severity of the risk of infection should a pandemic occur and to improve coordination between its Member States.

In its March 2011 [resolution](#) on the evaluation of the management of the 2009-2010 H1N1 influenza outbreak in the EU, Parliament, among other things, called for 'the prevention plans established in the EU and its Member States for future influenza pandemics to be revised in order to gain in effectiveness and coherence and to make them sufficiently autonomous and flexible to be adapted as swiftly as possible and on a case-by-case basis to the actual risk, based on up-to date relevant information'. In addition, it urged the EU to 'allocate more resources to research and development regarding preventive measures in the field of public health care' – more specifically, 'in the investments dedicated to a better evaluation and anticipation of the impact of an influenza virus both between pandemics and at the beginning of a pandemic'. Lastly, it called for 'continued investment in national epidemiological, serological and virological surveillance centres'.

In its October 2015 own-initiative [resolution](#) on the ebola crisis, the European Parliament called on all parties concerned, to learn from this crisis and to develop effective means of dealing with international health crises. It noted that 'the EU's long-term response should focus first on development assistance, which will need to include investment in the health sector to promote resilience, [...] and then focus on the assistance that is essential in order to get the three countries' economies back on their feet'.

In its July 2017 [resolution](#) on the EU's response to HIV/AIDS, tuberculosis and hepatitis C, Parliament called on the Commission and the Council to play a strong political role in dialogue with neighbouring countries in Eastern Europe and Central Asia, ensuring that plans for sustainable transitions to domestic funding are in place. It stressed, among other things, that prevention remains the main tool for combating HIV/AIDS, but that two out of three EU/EEA countries reported that the funds available for prevention were insufficient to reduce the number of new HIV infections. Regarding tuberculosis, it highlighted that the financial involvement of all actors in subsidising treatment for the disease is essential, as treatments can be prohibitively expensive. Furthermore, Parliament called on the Commission and the Member States to ensure sustainable funding of national viral hepatitis elimination plans.

Recent developments related to the novel coronavirus outbreak

In the context of Decision No 1082/2013/EU, the European Commission [coordinates](#) with Member States through the Early Warning and Response System and the Health Security Committee, to exchange information, monitor and coordinate preparedness and response measures to COVID-19. It is further collaborating with the ECDC, the European Medicines Agency and the European Union Aviation Safety Agency, for the provision of relevant technical guidance.

In addition to the above, the Commission coordinates the delivery of assistance to China, and plans to allocate funding worth €232 million to several recipients linked to research, diagnosis, surveillance, preparedness and response to the virus.

On 3 February 2020, the European Parliament's Committee on Environment, Public Health and Food Safety [discussed](#) the outbreak of the novel coronavirus with Andrea Ammon, Executive Director of the European Centre for Disease Prevention and Control (ECDC).

On 13 February 2020, in the context of the Employment, Social Policy, Health and Consumer Affairs Council, ministers [exchanged views](#) on the implications of the outbreak of human cases of COVID-19, and discussed measures and activities being undertaken by way of response, as well as how to strengthen their cooperation in the area of public health.

In response to the Council conclusions of this meeting, the key actions on which the European Commission is in the process of following up include continued risk assessment and guidance on travel advice; increased preparedness should the outbreak escalate to the next phase; and activation of existing funding mechanisms to support Member States on preparedness and response to COVID-19. Other key actions include examining joint procurement for potential needs of protective equipment and strengthened support for the Health Security Committee in providing aligned information across the EU on the virus, detection, use of equipment, and other measures.

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ENDNOTES

- ¹ The US [Centers for Disease Control and Prevention](#) (CDC) uses the following definitions: (i) **endemic** refers to the constant presence of a disease or infectious agent in a population within a geographic area; (ii) **epidemic** refers to an increase, often sudden, in the number of cases of a disease above levels normally expected in that population in that area; (iii) **pandemic** refers to an epidemic that has spread over several countries or continents, usually affecting a large number of people.
- ² According to the September 2019 update of the World Bank Group's '[Pandemic Preparedness Financing](#)' report, it is estimated that the 1918 'Spanish Flu' killed more than 50 million people. The 2003 SARS epidemic killed 774, while MERS has claimed 823 lives since 2012. The 2013-2016 ebola epidemic caused 11 310 deaths in Guinea, Liberia, and Sierra Leone, while the ongoing ebola outbreak in the Democratic Republic of Congo has accounted for more than 2 000 deaths. The 2009 H1N1 influenza pandemic resulted in more than 18 000 deaths. Finally, the [World Health Organization](#) estimates that about 32 million people have died of HIV since the beginning of the epidemic.
- ³ The paper specifies that income losses in this context take place through reductions in the size of the labour force and productivity, increases in absenteeism and, importantly, as the result of individual and social measures that interrupt transmission, but disrupt economic activity.
- ⁴ The World Bank estimated that from 2013 to 2014, 'Gross Domestic Product (GDP) growth in Liberia decreased from 8.7 % to 0.7 %, due to ebola and lowering commodity prices, and GDP growth in Sierra Leone (excluding iron ore) decreased from 5.3 % to 0.8 %. GDP growth in Guinea in 2015, predicted at 4 %, fell to 0.1 %.' Moreover, government revenues from direct taxes on companies, VAT receipts, and indirect taxes, declined in all three countries. Lastly, the fall in private and foreign investors' confidence 'led to financing gaps of more than US\$600 million over the two years'.
- ⁵ ART has an important financial impact on the individual and social security, but this is far from being the only cost of HIV. Indeed, a [paper](#) notes that HIV impacts human capital formation and as such impairs growth through: (i) as a disease of young adults, reducing their productivity by making them sick and weak, and in many cases killing them in their prime, destroying the human capital progressively built-up in them through child-rearing, formal education, and learning on the job; (ii) weakening the mechanisms that generate human capital formation, by depriving children of their parents (through disability/death), and by reducing income for their education. These impacts further translate as a macroeconomic cost, as the death of many young adults weakens the tax base and reduces the resources available to meet the demands for public expenditure.
- ⁶ A different [study](#) of the same case estimated, through modelling methods, that the impact of the trade bans on Somali GDP may have reached 36 %.
- ⁷ The current [Health Programme](#) aims, among other things, at protecting EU citizens from serious [cross-border health threats](#). The [Horizon 2020](#) research programme supports projects in areas such as medical technologies. Recent relevant initiatives figuring in its 2018-2020 [work programme](#), include 'Towards a next generation influenza vaccine to protect citizens worldwide' and 'Creation of a European wide sustainable network for harmonised large-scale clinical research studies for infectious diseases'. The EU cohesion policy in this area aims to reduce economic and social inequalities between regions in Europe – mainly through the [European Structural and Investment Funds](#). Lastly, investments in the context of the European Fund for Strategic Investments [include](#) investments in new health solutions, medicines, and social infrastructure.

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eprs@ep.europa.eu (contact)

www.eprs.ep.parl.union.eu (intranet)

www.europarl.europa.eu/thinktank (internet)

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