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Life course immunisation in an ageing world

Beyond cost effectiveness



Life course immunisation in an ageing world: beyond cost effectiveness

Immunisation is one of the greatest triumphs of the twentieth century. It's known to have saved millions of lives and has allowed global populations to live millions of additional years free from disability. Unfortunately, immunisation for adults is chronically underused because the benefits aren't well understood by societies and their healthcare systems. Every year we collectively lose millions of years to death and disability from preventable diseases. These lost years tend to be unevenly distributed by region, nation, and socioeconomic background.

Demographic change and longevity are the two key trends that will change how we live and work over the coming years. ILC are conducting this programme of work to highlight the value of immunisation across our longer lives, and how immunisation is key to the shift from curative to preventative healthcare that will be invaluable in an ageing world.

This discussion paper and accompanying evidence pack will set out the most recent evidence for the cost effectiveness of adult immunisation and identify where non-market value is currently missing from discussions about it.

ILC has convened dozens of expert stakeholders at high-level events throughout this programme of work – their insights and expertise are also reflected in this document.

The key questions for discussion are:

- Why is adult immunisation lagging, given the socioeconomic benefits it brings?
- Why do we underestimate the value of immunisation?
- What are the opportunities to remedy low coverage and uptake?

As more of us are living longer, and countries are supporting larger populations than ever before, preventing ill health is more crucial than ever. Avoiding illness and disease allows us to continue working, spending, volunteering, caring, and doing the things that are important to us throughout our lives. Immunisation is a cost-effective and proactive tool to support this.

What do we lose when we're unwell with preventable conditions?

We all know that when we're unwell, we're unlikely to work, attend education, spend, care, volunteer and socialise as normal. Our ordinary health-promoting behaviours, such as exercise and maintaining a balanced diet, may also be interrupted. Periods of ill health can also have a financial cost: missed days of work can affect individual income; accessing healthcare and/or prescription medications can have associated costs; and family members may be called on to provide practical and financial support, which can affect their capacity to participate in paid employment and voluntary work.



For individuals, these disruptions are unwelcome but mostly manageable if we have good support networks. But at the population level, these interruptions represent huge losses of time, productivity, and income.

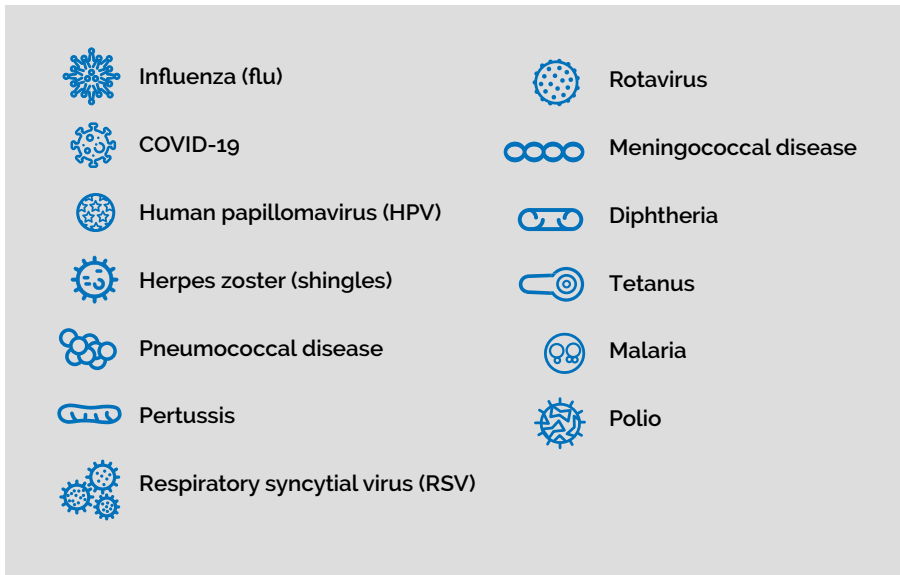


If a significant proportion of lost output and income is preventable, it's only right that we take action. However, evaluating the extent of this loss is extremely complex. The current failure to prioritise adult immunisation across the board also makes this evaluation a considerable task: we need an understanding of the burden of vaccine-preventable diseases (VPDs) across each health system, around the globe.

What is the global burden of vaccine-preventable disease across the life course?

Vaccine-preventable diseases account for a huge number of deaths and years lived with disability, every year, around the world. Older people account for most of the avoidable years lived with disability.

Health conditions that are preventable through vaccination include, but are not limited to:



One study¹ found that between 2000 and 2019, vaccination against ten of the most common pathogens averted 37 million deaths across 98 low- and middle-income countries (LMICs). The study estimated that a further 32 million could be averted by 2030 if current trends continue. The majority of these prevented deaths would have occurred in children aged less than five. So, thanks to various health interventions and improvements to our quality of life, as well as the immunity offered by childhood vaccination, more people around the world are surviving well into adulthood.

And while we can't quantify the burden of VPDs on adults as precisely, we know that it isn't insignificant. Data on the global burden of vaccine-preventable disease is more readily available for children than adults,

¹[https://doi.org/10.1016/S0140-6736\(20\)32657-X](https://doi.org/10.1016/S0140-6736(20)32657-X)

as childhood immunisation is more widely prioritised. But in the US, for example, nearly \$27 billion is spent on the treatment of VPDs in adults every year.² The economic burden of these diseases in the US is estimated at \$9 billion (but could be as high as \$15 billion) in a single year.³ Similar figures for other countries and regions are less widely available. Globally, 100 million adult vaccines were missed in 2021-22 as a result of the COVID-19 pandemic.

It is clear, however, that high-income countries (HICs) also have much to gain from expanding and improving adult immunisation. The median return on investment in preventative health interventions is approximately **\$34.2** for every dollar invested;⁴ vaccination being one of the key mechanisms for protecting the health of the public. This is increasingly urgent in the context of demographic change. At present, annual adult flu vaccinations would save European healthcare systems between €248 and €332 million by avoiding hospitalisations and GP visits.⁵ By 2050, there is projected to be two people aged over-65 for every person of working age in the European Union.⁶ The majority of adult vaccines are currently recommended for this age group and people in clinical risk groups. Growing cohorts of older people means increasing demand for preventative interventions, and a growing obligation for governments to pre-empt this need.

Data is required to demonstrate that investment in immunisation is necessary for public health and wellbeing. This evidence is often region- or country-specific and draws on unique data sets within that health system. For example, one study found that expanding annual flu vaccination in South Korea from the over-65 age group to include those aged between 50 and 64 would save approximately \$68 million within the healthcare system.⁷ Another study estimated that the direct medical costs of pneumococcal disease in older age groups in Taiwan totalled \$105 million.⁸ For some conditions, the value of keeping hospital beds free (by keeping patients with VPDs out of hospital) is approximately twice the direct costs saved.⁹

²<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4486398>

³<https://doi.org/10.1377/hlthaff.2016.0462>

⁴<https://doi.org/10.1136/jech-2016-208141>

⁵<https://www.vaccinesurope.eu/wp-content/uploads/2022/02/%E2%80%A2-3-VE-economic-impact-infographic.pdf>

⁶<https://doi.org/10.1016/j.lanepi.2023.100807>

⁷<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9228362/>

⁸<https://pubmed.ncbi.nlm.nih.gov/24575941/>

⁹<https://doi.org/10.1016/j.jval.2022.06.018>

What do we lose when we fail to vaccinate?

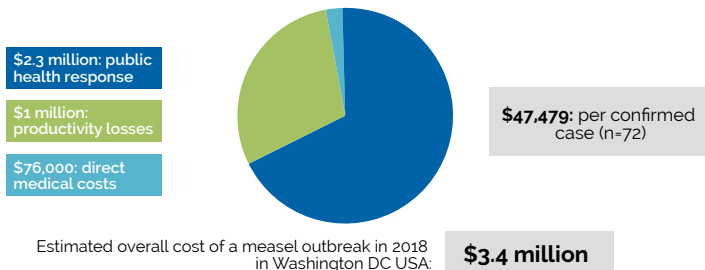
The key question for health leaders considering investment in adult immunisation is: why should I spend money investing in immunisation, when there are so many other competing priorities?

To answer this question, we need to fully understand what's lost when people are unwell with preventable diseases.

In some circumstances, direct medical costs only account for a small fraction of the overall cost of vaccine-preventable disease. One study of a 2018 measles outbreak in Washington DC, US, found that direct healthcare costs only accounted for around 2% of total expenditure following the outbreak.¹⁰ Around a third was attributable to loss of economic productivity, but two-thirds of the total was the public health response cost of containing and responding to the 72 confirmed cases of measles (see Figure 1).

Figure 1: Estimated costs of 2018 measles outbreak by type

Healthcare costs are only a drop in the ocean when we look at the whole picture



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Source: Pike et al. 2021

It's easier to estimate the economic burden of vaccine-preventable diseases in terms of lost days of work and healthcare spending than to calculate the non-economic losses. But ill health brings about a much wider range of consequences than can be measured by these economic indices. It can affect our capacity to volunteer, care, spend, carry out our health-promoting behaviours, and our ability to progress at work. Poor health certainly has adverse consequences for the economy – but it also contributes to losses of non-market activity. Some of this activity is productive, such as volunteering that facilitates economic activity; informal childcare that enables a parent to work,

¹⁰<https://doi.org/10.1542/peds.2020-027037>

for example. Other activity is simply important to us regardless of the economic impact, such as attending special occasions with family and friends.

If we could calculate the total value of all of the economic and social activities we miss when unwell, we'd see that the total cost to society of vaccine-preventable diseases would be colossal. If we could go one step further and incorporate this information into our cost-effectiveness calculations, it would change our understanding of the value of immunisation in an ageing world.

How do we currently understand and calculate the value of immunisation?

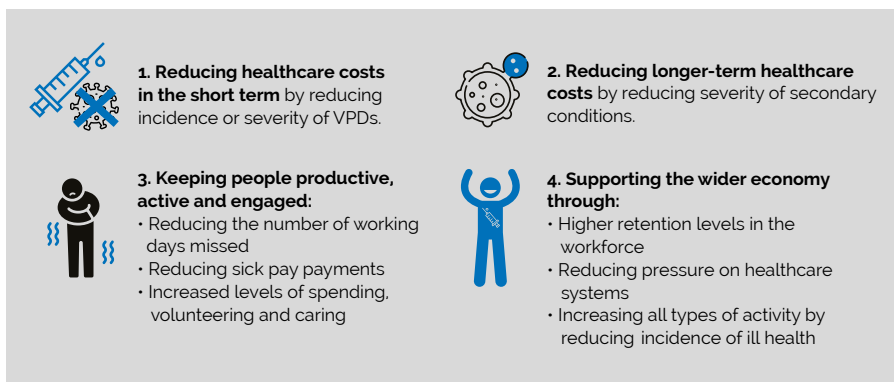
The transition to a post-COVID world has required us to re-evaluate the role that prevention plays in national public health strategies. In the current system, we need evidence of cost effectiveness and value for money to justify investment and allocation of money, resources, and clinical time for immunisation. This evidence can be difficult to find for vaccines that have been consistently offered for a long time, as population-level immunisation schedules can often result in a condition being broadly prevented or eradicated completely.

This programme of works seeks to explain how we currently value immunisation and highlight what else we need to consider, in order to understand immunisation's role in preventing poor health in an ageing world. Economic costs are one thing – they tend to be more measurable and are easily linked to the period of illness in question.

Social costs are disparate and reflect the impact of ill health across our lives. Missed voluntary work, caring responsibilities, and health-promoting behaviours may not register as economic losses, but they are extremely important to (and sorely missed by) families and communities.

ILC has conceptualised the economic benefits of immunisation in the following four ways.

Figure 2: the different economic benefits of life course immunisation



The economic and social contribution of people from older age groups in particular is substantial and still increasing due to demographic change. It's estimated that older people contributed **€2.2 trillion** to market activities and productive non-market activities (PNMA) in 2015, in

the EU and the US alone. That's equivalent to 8% of all productive non-market activities in the EU and 7% in the US.¹¹ As demographic change progresses, this overall contribution will increase, but progress could be hamstrung by preventable disease.

When we are clear on the consequences of failing to vaccinate, we can coordinate a response and deliver vaccination programmes effectively. For example, high polio immunisation coverage around the world meant that 2023 saw the fewest incidences of polio paralysis ever recorded.¹² The polio virus was previously endemic to three countries (Afghanistan, Pakistan, and Mozambique) and was also identified in New York, London, and Jerusalem in 2022,¹³ presumably caused by the interruption in vaccine schedules caused by the COVID-19 pandemic. This prompted urgent catch-up campaigns to limit the spread of the disease. Nonetheless, for most countries, funding and providing polio vaccination serves the singular purpose of preventing a resurgence, even though the risk of this is slight.

In other words: polio vaccination is an insurance policy that we continue to invest in because we understand the harm of polio and the value of its prevention.

Beyond the immediate benefits of preventing disease, vaccination can prevent a number of secondary conditions linked to the VPD in question. For example, patients with flu or pneumonia are six times more likely to suffer from a heart attack or stroke in the days after infection.¹⁴ Around 65 million people around the world are suffering with long COVID,¹⁵ with its adverse effects on productivity and quality of life; and since reports of measles reached near zero in the US in 2000, incidents of the brain disorder subacute sclerosing panencephalitis (SSPE) are very rarely reported there.¹⁶

As above, the median return on investment in preventative health interventions is **\$34.2** for every dollar invested. Some vaccinations generate a similar rate of return (RoR) in patients who are immunosuppressed or have underlying conditions – this is reflected

¹¹<https://doi.org/10.1007/s10645-020-09362-1>

¹²<https://polioeradication.org/news-post/gpei-a-brief-review-of-2023-and-full-focus-on-2024/>

¹³<https://www.reuters.com/business/healthcare-pharmaceuticals/why-has-polio-been-found-london-new-york-jerusalem-how-dangerous-is-it-2022-08-15/>

¹⁴<https://doi.org/10.1183%2F13993003.01794-2017>

¹⁵<https://doi.org/10.1038/s41579-022-00846-2>

¹⁶ <https://www.ncbi.nlm.nih.gov/books/NBK560673/>

in many existing vaccination schedules, which prioritise patients with preexisting conditions. One study found that pneumococcal vaccinations can generate a RoR of 144% among older people (meaning every €1 generates a return of €2.44). Another study found an RoR of 1,186% for those with diabetes: every €1 invested in pneumococcal vaccination for this group generated a €20 return overall.¹⁷ Another study projected that pneumococcal vaccines for newborns would generate an average return of £4.45 for every £1 spent by the UK government, without accounting for the herd immunity which is known to offer some protection to unvaccinated groups.¹⁸

The key takeaway is this: the current cost-effectiveness paradigm may not always be appropriate for immunisation. It is not possible to measure and include many of the relevant factors that should be factored into the economic and social value of a specific vaccine. Cost-effectiveness analyses are useful to inform decision-making, but policy makers should look more broadly than the evidence that is currently available to understand the value of immunisation.

¹⁷<https://doi.org/10.1016/j.jjeoa.2019.100203>

¹⁸https://www.ohe.org/wp-content/uploads/2020/08/OHE-Vaccines-Report_2_finalv3.pdf

What are the barriers to expanding adult immunisation?

One factor preventing clear and comprehensive evaluation of the benefits of immunisation is lack of data, and poor-quality data. Evidence of immunisation's cost effectiveness is too often siloed by condition and country and calculated using different data and metrics.¹⁹

There are plenty of academic papers telling us that in country A, vaccine X was cost effective in a specific age group, but not many that gather these together to give an overview of immunisation (see the accompanying **evidence pack**, which synthesises some of the most recent evidence). This evidence is invaluable for measuring the impact of existing programmes. However, when investing public funds, health leaders understandably want data to support that decision. Where this data exists, it may not be applicable or transferable to other countries facing different public health challenges.

To a large degree this is inevitable: each country will collect different data sets from different groups according to their own priorities and infrastructure. For example, there's a wealth of information available about American healthcare costs and economic burdens, likely as a result of the US system of private health insurance. But healthcare systems that use paper-based record systems, such as Japan, will face more challenges when pulling together country-wide data.

We should instead consider some types of vaccination as insurance against future pandemics, resurgence of communicable and non-communicable diseases, and the existence of associated secondary conditions. If we can't be sure how many incidences of a disease were prevented, and what the long-term impact of these *would* have been, it becomes more difficult to gather evidence to support immunisation.

¹⁹The Office for Health Economics (OHE) has recently published a [literature review](#) of ten countries, including heat maps to illustrate where evidence is present and missing with regards to vaccine cost-effectiveness.

What needs to happen now?

Our programme of work thus far makes it clear that the world has made significant progress on immunisation – but that we still have a long way to go.

Our recommendations are:

We need to change public and healthcare worker **perceptions** of who immunisation is for, what it's for, and how to understand its value.

This starts with policy makers, medical educators, and healthcare professionals. Expert stakeholders at our events raised the issue that even medical schools still teach that immunisation is an intervention primarily for children, and occasionally for older and immunocompromised people. We need to create understanding the value of immunisation across the life course at all levels of each healthcare system.

Health policy makers must: ensure that immunisation across the life course (along with other preventative interventions) is high on the agenda at all levels of the healthcare system, with named individuals responsible for promoting and implementing vaccination infrastructure.

Finance policy makers must: take account of the overall social and economic value of immunisation and its high return on investment. Every €1 spent on preventative interventions generates a median return of €34.20. Increasing stable investment in immunisation (and ringfencing this funding) will enable progress in this area.

We need to prioritise **investment** in immunisation infrastructure to reflect the long-term value and cost-effectiveness of this preventative intervention.

When health budgets are stretched, with many existing health conditions that require funding, preventative interventions that deliver long-term returns aren't always high priority for health or finance ministers. ILC's body of work on immunisation demonstrates that investment in immunisation generates substantial economic and social returns, some of which is directly measurable, and some of which isn't. Investment in vaccination against some communicable diseases should be understood as insurance against future pandemics; **investment in comprehensive life course vaccination should be part of the transition from a curative to a preventative**

vision of healthcare. Building a society committed to preventing ill health, as opposed to facilitating and then remedying it, should be the immediate long-term ambition of all governments. Preventing ill health is better for individuals, families, communities, employers, economies, and overall quality of life.

Health leaders must: take a long-term approach to health system funding and infrastructure. The current post-COVID context makes it too easy to focus on the next season or quarter, particularly as winter approaches. The infrastructure built for delivering COVID-19 vaccines could be utilised for other immunisation programmes moving forward.

Finance leaders must: think of investment in immunisation as insurance against future pandemics and lost productivity, to avoid a short-term commitment that doesn't support progress towards increased uptake.

More broadly, **we must move away from the zero-sum approach to healthcare funding, where spending on issue X means not spending on issue Y.** The alternative to this is a rights-based model where we prioritise spending on maintaining good quality of life: individuals should have the right to vaccination, clean air, and nutritious food, to name a few.

We need to build **consensus** around the need for more comprehensive coverage, increased uptake²⁰, and improved data sharing.

The next challenge will be building a comprehensive picture of how each country and health system is currently performing with regard to adult vaccination coverage, and where the gaps are. This is a complex undertaking – health needs and appropriate vaccination schedules may vary from one country to another. Making data available and accessible is a crucial part of this objective; efforts to expand vaccination programmes must be evidence- and data-led.

Health policy makers must: dedicate time and resources to embedding immunisation into care pathways for all patients. Developing the appropriate infrastructure for comprehensive adult immunisation programmes will make vaccination more accessible and make it clear to patients that this is a priority.

²⁰ILC have made a distinction between coverage and uptake. Coverage is the availability of vaccines in the health system, and uptake is the decision for individuals to present themselves for vaccination.

Finance policy makers must: provide consistent investment for vaccine research and development, and to facilitate public-private partnerships to this end. High-quality data and analysis is necessary to develop comprehensive life course immunisation programmes, and sufficient resourcing is required to make this happen.

ILC's work so far

To gain a clear understanding of how immunisation is valued around the world, we've held several high-level events this year, alongside international gatherings of policy makers and high-level stakeholders. We've sought a range of perspectives from experts around the globe on the barriers and opportunities for life course immunisation, and benefited from some fascinating discussions about barriers, opportunities, and solutions for life course immunisation. We held events alongside:

[The G7 Finance Minister's Meeting in Niigata, Japan](#): we raised the issue of life course immunisation from a finance perspective, setting out the value of vaccination in an ageing world for economies and employers.

[The World Health Assembly in Geneva, Switzerland](#): we convened a high-level roundtable discussion with IFPMA members, gathering some of the key advocates and stakeholders for adult immunisation. Attendees addressed the issues in this space from the perspective of different professions and sectors within healthcare and health policy.

[The G20 Health Minister's Meeting in Gandhinagar, India](#): we brought the conversations to the G20 with an emphasis on the opportunities for life course immunisation in low- and middle-income countries.

[The UN High-Level Meetings on Pandemic Preparedness and Universal Health Coverage in New York City, USA](#): we brought together a range of high-level stakeholders from academia, industry, and non-governmental organisations to address the challenges to adult immunisation at the UN level, and to identify practical solutions.

About ILC

The International Longevity Centre UK (ILC) is the UK's specialist think tank on the impact of longevity on society. The ILC was established in 1997, as one of the founder members of the International Longevity Centre Global Alliance, an international network on longevity. We have unrivalled expertise in demographic change, ageing and longevity. We use this expertise to highlight the impact of ageing on society, working with experts, policy makers and practitioners to provoke conversations and pioneer solutions for a society where everyone can thrive, regardless of age.



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