Lost time

Productivity and the flu

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Summary

As part of its *Prevention in an ageing world* programme ILC-UK has been investigating the scale and future trends of selected non-communicable and communicable diseases (cardiovascular disease, type 2 diabetes, lung cancer, HIV and influenza) among people aged 50 and over.

Our focus is on reducing the impact of poor health. We have highlighted the growing impact of preventable disease:

- Across the world's better off countries 27.1 million years were lived with disability in 2017 due to largely preventable diseases.*

In this report we explore, in more detail, the case for action to prevent influenza (flu) among older people.

We have conservatively estimated that among people aged 50 and over in better off countries:

- Up to 91 million people get flu each year.

And among those aged 50-64:

- Flu cost around 159 million working days in 2018.
- The economic impact of flu in lost productivity is equivalent to USD 39 billion.

However, despite the very clear potential for economic and social benefits from preventing flu, and the strong evidence of the efficacy of vaccinations, these remain underutilised in many better off countries, with use even declining in some countries.

In an ageing world, and where comorbidities expose more people to the impact of flu, prioritising prevention across the life course is essential.

We need to ensure that the policy environment supports preventative interventions and creates consistent messaging around the need for, and value of, flu vaccination.

*Better off countries refer to those countries identified as 'High SDI' and 'High-mid SDI'. This refers to a social development index, which is a summary measure of socio-demographic development which allows for effective comparison between countries. It combines income per person, educational attainment and total fertility rate to reach a comparable index.

We also need to encourage innovation to support flu vaccination uptake, including to find new delivery mechanisms and more effective ways to promote the importance of flu vaccination to people across their life courses.

And we should recognise that flu is the tip of the iceberg in terms of vaccine-preventable conditions, with vaccinations for other diseases such as shingles and pneumococcal diseases also available.

Introduction

This report forms part of ILC-UK's global programme: *Prevention in an ageing world.*

This work demonstrates that the failure to prioritise prevention is associated with significant social and economic costs. Embedding prevention across the life course demands a concerted effort by governments, policy makers and healthcare systems to address sub-target uptake rates and vaccine hesitancy.

The Prevention in an ageing world programme

In this programme ILC-UK has been exploring the case for increasing the emphasis in prevention in health systems across the globe.

To understand the case for change we have been exploring the impact of selected preventable non-communicable and communicable diseases (cardiovascular disease, type 2 diabetes, lung cancer, HIV and influenza) among people aged 50 and over in better off countries.* We have also sought to estimate the impact of these diseases on productivity.

We have been working with leaders of health systems across the globe to consider how to ensure that we galvanise action to embed preventative approaches across the life course.

In this report we take an in depth look at one of the communicable diseases we have been considering as part of the *Prevention in an ageing* world programme - seasonal influenza (flu). It examines the scale of seasonal flu in better off countries among those aged 50 and over, and the economic impact of flu as a result of lost productivity. It also examines the case for action to improve uptake of flu vaccination.

* Better off countries refer to those countries identified as 'High SDI' and 'High-mid SDI'. This refers to a social development index, which is a summary measure of socio-demographic development which allows for effective comparison between countries. It combines income per person, educational attainment and total fertility rate to reach a comparable index.

The scale of the flu challenge

Seasonal flu is estimated to infect around one billion people globally each year. It is linked to as many as 500,000 deaths and costs of around USD 60 billion.[1] There are many groups at a high risk from flu: and these groups are more likely to suffer a longer and more severe illness, complications or even death.[2] Older adults (defined here as aged 65 and over) are among these at risk groups,[3] along with people with existing chronic health conditions including cardiovascular diseases, type 2 diabetes, lung cancer, and those at high-risk due to a weakened immune system, such as cancer patients following chemotherapy, and people with HIV. Others more prone to flu complications include pregnant women, children with underlying health conditions, people with asthma and some indigenous peoples.

Up to 91 million people aged 50 and over are affected by flu each year in better off countries. The impact varies depending on factors including the strain that is in circulation, therefore estimating the overall impact of flu can be challenging. However even among those who are less affected by flu, it typically takes 3-7 days for symptoms to resolve.[4] For those severely affected, flu can exacerbate other conditions, and lead to long-term ill health, or even kill.

As the population ages, the number of people susceptible to flu due to advanced age and the growth in the numbers of people living with long-term conditions, will grow.

In addition, we need to be mindful of the significant risk of pandemic flu.[5] There have been four flu pandemics in the last century, responsible for the deaths of millions of people.

The challenges of estimating the flu burden

Data limitations can make estimating the flu burden challenging. Factors include variations between countries and seasonal fluctuations. It can also be difficult to access data.

As flu is a common illness, cases are rarely confirmed by laboratory testing. Typically, people stay at home and rest, rather than risk spreading infection. This means that seasonal data available for confirmed cases does not fully represent the burden.

Furthermore, where people have comorbidities, quantifying the number of cases is challenging; medical records often don't record flu, as it exacerbates the existing chronic conditions and these are recorded instead.

In relation to this study, in particular, there are challenges due to the way in which data is broken down by age. There is little evidence relating specifically to those aged 50 and over: the literature typically focuses on people aged 65 years or over, or other high-risk groups.

Many older people will, in reality, belong to more than one high-risk group, making the associated burden of flu, in terms of disease and death, higher than the estimates we have been able to make.

For the purposes of this report we have estimated the annual burden of flu as follows:

Number affected by influenza each year = total population aged 50+ × annual flu rate

We have used UN data on the number of people aged 50 or over to calculate this estimate.[6]

We have assumed that seasonal variation means that flu will affect 10% of the population aged 50 and over each year - we have based this assumption on data from the World Health Organization (WHO).[7]

We estimate that up to 91 million people aged 50 and over are affected by flu each year in better off countries.

Table 1: Cases of influenza each year in better off countries (at 10% annual flu rate)

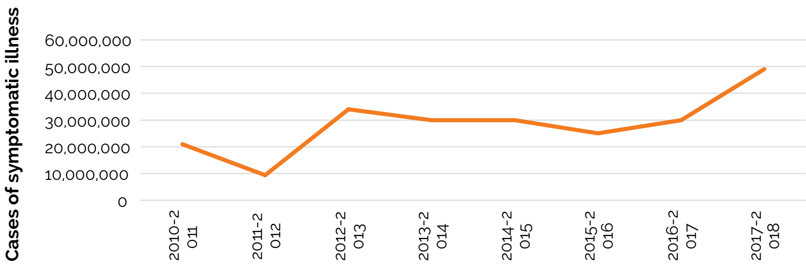
Age group	High SDI	High-mid SDI	Total
50-64	31,963,950	20,962,519	52,926,469
65+	18,413,889	19,761,384	38,175,273
Total	50,377,839	40,723,903	91,101,742

Due to the way data is collected we have reported High SDI and High-mid SDI countries separately. Appendix 1 presents figures at the WHO 5%, 10% and 15% seasonal annual flu rates.

Flu trends in the US and European Union

We have looked at data from the US and European Union in order to get a better understanding of how the rates and strains of flu vary from year to year. Figure 1 shows fluctuation rates for the US: from 2010 to 2017, with annual estimated cases of symptomatic infection ranging from 9.3 million to 49 million.[8] With such a significant difference in the potential number of cases, healthcare services must be prepared to cope with the worst-case scenario

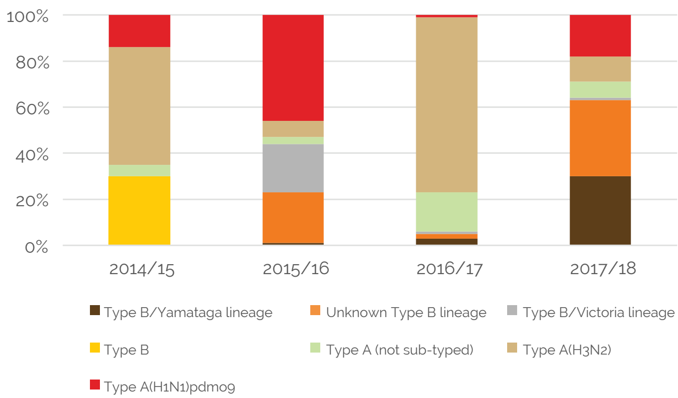
Figure 1: Estimated figures for cases of symptomatic influenza across the US



Source: CDC (2019) Disease Burden of Influenza (online) Available at: https://www.cdc.gov/flu/about/burden/index.html (Accessed 6 September 2019).

Figure 2 compares the confirmed strains of influenza in the European flu 'seasons' between 2014/15 and 2017/18. As can be seen the strains can vary significantly by season, which is an important factor for vaccination effectiveness.

Figure 2: Confirmed strains of influenza in European flu seasons



Sources: European Centre for Disease Control Seasonal Influenza Summaries:https://www.ecdc.europa.eu/en/seasonal-influenza/season-2016-17, https://www.ecdc.europa.eu/en/seasonal-influenza/season-2017-18, https://www.ecdc.europa.eu/en/publications-data/summary-influenza-2015-2016-season-europe https://www.ecdc.europa.eu/en/publications-data/summary-influenza-2014-2015-season-europe

In the context of an expanding global population, and an ageing one, and with trends suggesting increases in non-communicable diseases, we are likely to see the number of flu cases rising over time. There are simply more people to be infected, but importantly there are also increasing numbers of high-risk individuals in the population:

- As populations age, more people aged 50 or over will catch flu, leading to a higher burden of complications.
- As those aged 50 or over live longer with long-term conditions such as cardiovascular disease, diabetes, lung cancer and HIV, they are likely to suffer a higher burden of complications from flu.

Flu complications

A 2013 meta-analysis found that flu puts people aged 65 and over at a significantly higher risk of death and/or hospitalisation than younger people (aged under 65).[9] There was a significant link between the presence of "any risk factor" (such as age, chronic conditions or reduced immune functioning) and outcomes such as pneumonia, hospitalisation, admission to an intensive care unit, or death.[10] Another review into the impact of flu-like illness among older people[11] (aged 65 and over), found that:

- Lower respiratory tract infection occurs in up to 1.3% of patients.
- Up to 8.8% of patients are hospitalised:
    - Length of hospital stay ranges from 7.8 to 10.8 days.
    - Of those admitted to hospital, up to 17.1% are subsequently admitted to an intensive care unit.
- Mortality rates ranged from 3.1% to 13.5%.

Recent data from the US indicates that older people are more often hospitalised with flu; with the highest hospitalisation rate among adults aged 65 and over, and the next highest among those aged 50-64.[12]

Other diseases worsen the impact of flu

There is a significant body of evidence that demonstrates that people who have other long-term conditions are affected more severely by flu:

- A 2013 review and meta-analysis that focused on flu patients of all ages with cardiovascular disease, demonstrated that these patients were more likely to need ventilator support, as well as being at higher risk of death, pneumonia and hospitalisation.[13]
- The same 2013 meta-analysis showed that immunocompromised people with flu (e.g. cancer patients following chemotherapy, and people with HIV) of all ages had a greater risk of death, but a lower risk of developing pneumonia.[14]
- Another recent analysis found that studies suggest diabetes increases the severity of flu: evidence from Canada (albeit with a sample with a mean age of 29) links diabetes to a tripled risk of hospitalisation.[15] However, it noted that there are surprisingly few studies on how flu affects people with diabetes, and patients with diabetes may have other risk factors that are linked to higher flu severity; for instance, they are more likely to be overweight.[16]
- A publication focusing on cancer sufferers noted that this group had a higher risk of respiratory complications (which increased further for those aged 65 and over), while associated pneumonia in patients of all ages was linked to risk of longer hospital stays, mechanical ventilation and death.[17]
- Another review identified that severely immunosuppressed HIV patients were more likely to be infected and to suffer complications from flu, compared to those with non-severe immunosuppression.[18] This analysis was a synthesis of several studies and was not restricted by age.
- Flu may also cause inflammation that exacerbates chronic health conditions like diabetes, cardiovascular disease and lung diseases. In patients with heart disease, inflammation may result in arterial blockage, which is linked to heart attack and stroke.[19] One study by Public Health England showed that people suffering from cardiovascular disease are 10 times more at-risk of dying from influenza complications.[20] US data from 2017 to 2018 found that 92% of people aged 50 and over hospitalised with flu reported an underlying condition.[21] But often in these cases, flu will not be recorded as the cause of hospitalisation, making it likely that the burden has been underestimated.

Productivity losses due to flu

There are few studies looking at the productivity loss* associated with flu.[22] This may be because flu is taken less seriously because it is often of short duration and low impact, and because the groups who suffer more from it are less likely to work, due to their age or existing chronic health conditions. However, in an ageing society we cannot afford to write off a condition that impacts a population who make up an increasingly significant economic force in our societies.[23]

One review of the international literature determined that the working days lost per flu case ranged from <1 to 4.3 days for self-reported cases, 3.7 to 5.9 days for physician-confirmed cases, and 1.5 to 4.9 for laboratory-confirmed cases.[24] We found no studies on the interaction between working days lost and age or existing health conditions, but productivity loss is likely greater for older people or those with existing conditions (if employed) as they are more susceptible to complications related to influenza and therefore will be ill for a longer period.

We therefore estimated the number of working days potentially lost to flu each year, among people aged 50 to 64 in better off countries as follows:

Working days lost = total infected × employment rate × working days lost per case

We used data from the World Bank to estimate the employment rate by country: [25]

Labour force participation rate × (1 – unemployment rate)

Drawing on the literature noted above we assumed that that 3 to 5 working days were lost per case.[26]

We estimate that flu costs around 159 million working days in 2018 in better off countries.

These figures demonstrate why prioritising flu prevention through effective vaccination programmes could yield significant economic, as well as health, benefits.

*Productivity loss refers to a reduction in work output caused by ill health, such as through time missed from work or reduced efficiency when present at work.

Table 2: Potential working days lost due to flu each year for those aged 50-64 (at 10% annual flu rate)

Days lost	High SDI	High-mid SDI	Total
3 days	59,568,752	35,927,551	95,496,302
5 days	99,281,253	59,879,252	159,160,504

Due to the way data is collected we have reported High SDI and High-mid SDI countries separately. Appendix 2 presents figures at the WHO 5%, 10% and 15% seasonal annual flu rates.

The estimates in Table 2 show a sizable potential loss, of an estimated 159 million working days. This represents a considerable burden to both employers and wider society. And these are likely to be underestimates, as they don't consider those aged over 65 who are working and who are at higher risk of developing severe complications.

We estimated the potential cost of this productivity loss, using World Bank data for the Gross Domestic Product (GDP) per person employed, as follows:[27]

Productivity cost = total infected × employment rate × GDP (PPE) × proportion of working time lost

We assumed that there are approximately 237.5 working days each year; for 2019 we assumed 260 working days minus an average of 22.5 days of leave per country.[28] We estimated time lost as the working days lost due to flu (3 or 5) divided by annual working days (237.5).

We calculate that the economic impact of flu among people aged 50 to 64 is equivalent to USD 39 billion per year.

The estimates in Table 3 show substantial potential costs associated with productivity loss, with an estimated total of up to USD 39 billion (USD 2018) lost each year.

Table 3: Potential productivity loss each year due to flu in those aged 50 to 64 in better off countries (at 10% annual flu rate)

Days lost	High SDI	High-mid SDI	Total
3 days	USD 9,157,755,370	USD 14,295,754,090	USD 23,453,509,460
5 days	USD 15,262,925,617	USD 23,826,256,816	USD 39,089,182,433

Due to the way data is collected we have reported High SDI and High-mid SDI countries separately. Appendix 3 presents figures at the WHO 5%, 10% and 15% seasonal annual flu rates

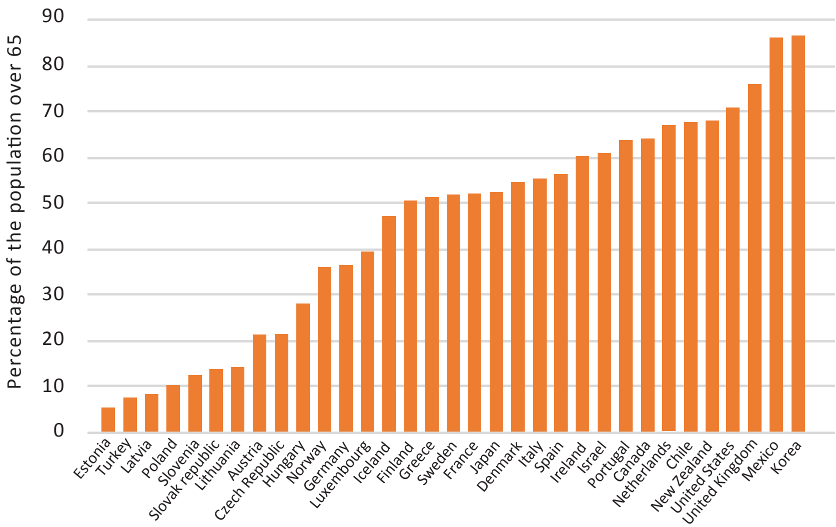
As the estimate for days missed from work due to flu is not specific to those aged 50 or over, who are more likely to have existing conditions that increase the burden of flu, the actual productivity loss may be even greater. Furthermore, in any given year, the impact of flu will vary hugely depending on the proportion of the population infected, as well as other factors such as the severity of the strain.

These findings should act as a wake-up call for policy makers and healthcare systems. Flu has a significant economic impact on productivity; an impact that could be reduced through effective prevention programmes.

Reducing the burden of flu: the value of vaccination

Vaccination is the most effective way to prevent flu.[29] A target of 75% of people aged 65 or over being vaccinated each year, by 2010 was agreed by the World Health Assembly, WHO's decision making body, in 2003, for those countries with a vaccination policy.[30] Reported 2017 data (Figure 3) from Organisation for Economic Co-operation and Development (OECD) member states highlights the significant variability in vaccination rates, with Korea being the only country to consistently report exceeding the 75% WHO target (since 2010).

Figure 3: OECD member states reported 2017 flu vaccination rates (65 and over)



Source: OECD (2019) *Influenza vaccination rates* (indicator). doi: 10.1787/e452582e-en (Accessed 19 November 2019)
Note: OECD member countries not reporting data for 2017 are not included in this figure.

However, vaccination rates do not remain consistent. For example, in 2003 the rate in the Netherlands stood at 77% but fell to 64% in 2017, in Germany it declined from its highest rate of 63% in 2005 to its lowest rate of 35.3% (2017). In the UK, the vaccination rate hit 75.1% in 2006 and has hovered between 70.5% (2017) and 74% (2011), but has not since met the 75% WHO target.[31]

Across the OECD there was been a decline in the average rate of flu vaccination among people aged 65 and over from 49% to 43% between 2005 and 2015.[32] In 2018 it was reported that flu vaccination coverage across Europe for high-risk groups had fallen over the previous seven years.[33]

In the US, Centers for Disease Control and Prevention data demonstrates that the 2017 flu vaccination uptake rate was 59.6%, down from 65.3% in 2016.[34] A survey of EU/EEA member states found that although all members recommend vaccination for older people, none met the 75% target, while half of the countries reported less than a third of older people vaccinated.[35]

All of this suggests that more concerted action is needed to encourage uptake of this and other recommended vaccinations.

Despite vaccination being an effective way of preventing and reducing the impact of flu, particularly on older people and those with comorbidities, in the majority of better off countries vaccination rates need improvement – and the failure to make this improvement will have ongoing social and economic consequences.

The benefits of vaccination

Because the flu virus is always evolving, vaccines must be reformulated each season and vaccines' effectiveness depends on matching the vaccine to the viral strain. However, looking across the piece vaccines tend to be effective - in a pooled analysis across 12 seasons, the effectiveness of vaccination (defined by the relative reduction of the risk of flu) in the adult population was reported to be 59%.[36]

Effectiveness for older people

For some time the received wisdom has been that as individuals get older, vaccination becomes less effective, as the immune system can become compromised and respond less well.[37] However, recent evidence suggests that vaccination effectiveness may be similar across older (aged 65 and above) and younger age groups.[38]

In a 2018 review by The Cochrane Collaboration, with analysis restricted to randomised controlled trials, the authors found that vaccination reduces the number of cases of flu.[39] However, the authors concluded that there was insufficient data to assess how vaccination affected flu-related complications (e.g. pneumonia, hospitalisation and death). A further review identified a need for higher quality studies of vaccination in older people and ways to eliminate bias from estimating vaccine effectiveness.[40]

Vaccination can reduce risks for those with other conditions

There is also evidence that vaccination is particularly useful for other high-risk groups. Evidence suggests that vaccination is effective at preventing flu in adults (aged 18 and over) with HIV, though the same study showed no significant effects on flu-related complications (pneumonia, hospitalisation and mortality).[41]

A review of vaccination in immunosuppressed patients with cancer, of all ages, found evidence that vaccination produces similar or lower rates of infection to those of non-vaccinated groups.[42]

Another review identified links between vaccination and reduced cases of hospitalisation in adults (aged 18 and over) with diabetes, as well as reduced death and hospitalisation in those aged 65 and over.[43]

Vaccinating the whole population brings benefits

Vaccination doesn't only benefit the recipient: herd immunity provides indirect protection for a wider population. Vaccinating older people therefore helps to protect the wider population. There is also evidence to suggest that vaccinating younger age groups can be effective in protecting older people.[44] Overall, evidence suggests that vaccination has a positive impact, as it prevents infection and/or the complications associated with it. This not only applies to older people, who are the subject of this report, but also younger people.

Vaccination is cost effective

Evidence shows that flu vaccination is cost effective, including for high-risk groups such as older adults (aged 65 and over) and groups with existing health conditions (cardiovascular disease, diabetes and cancer).[45]

Assessing the cost effectiveness of vaccination is not easy. A 2013 review noted a number of key issues:[46]

- Cases are not typically tested in laboratories (diagnosis may be self-reported, physician-diagnosed or laboratory-confirmed
- Cases with non-specific symptoms are rarely reported to surveillance systems.

- Proxies (such as 'flu-like illness') are difficult to match to treatment costs.
- The burden varies with strain transmissibility, virulence and prior immunity.
- Methods to estimate productivity loss vary.
- Efficacy estimates vary due to variation in subtype prevalence, vaccine match and case ascertainment.
- Indirect (herd) protection is very difficult to measure and highly dependent on population and setting.

However, despite these challenges, most studies of older people (aged 60, or 65, and over depending on country recommendations) conclude that vaccination is cost effective.[47] Some studies found that vaccination strategies for this age group in Europe saved money, as vaccination costs were offset by savings from reduced complications, such as those associated with hospitalisation.[48]

Several studies have evaluated the cost effectiveness of vaccinating the healthy population (i.e. those without risk factors) aged 50-64 across Europe, the USA and Australia. The evidence is generally favourable, but it varies more when compared with older people (those aged 65 and over).[49] Cost effectiveness varied with changes in the viral strain, vaccination type and strategy.[50] Differences in how the studies approached the topic also had an impact. Studies that included indirect costs to society, such as lost productivity, were more likely to conclude that vaccination was cost effective than those that did not.[51]

Improving vaccination uptake

With rates of vaccination low, and the social and economic costs of flu among older people and those with comorbidities substantial, there is a clear case for action to increase the uptake of flu vaccination.

Childhood vaccination target rates are commonly set at 90%, so it is not clear why targets for those aged 65 and over are so much lower. However, as long as targets are not being met, the focus must be on action not rhetoric.

Action is needed across health systems to prioritise adult immunisation as part of a wider approach to taking prevention seriously right across the life course – this will require a shift in mindset among policy makers, healthcare systems and individuals themselves.

We need consistent messaging on the risks associated with flu and the potential for action to prevent ill-health and associated disability and dependency across the life course – we need to act on the evidence that it's never too late to take action to stay well.

Accompanying this is the need to identify new and effective ways to promote flu vaccination, from reducing barriers to promoting innovative delivery mechanisms.

Improving access and convenience is an important way to increase uptake; especially for people who need to arrange vaccination outside of working hours, and for those who struggle to travel – an issue which increasingly affects people as they age.

Some countries already allow a wide range of professionals to provide flu vaccinations – meaning that older adults do not have to access doctors or nurses. Although evidence is mixed on whether enabling a wide-range of healthcare professionals to provide flu vaccination increases over all uptake,[52] interviewees in recent ILC-UK research into attitudes to flu vaccination said that they valued being able to access flu vaccinations at a convenient time and place.[53]

A 2019 report by ILC-UK investigated the attitudes of older people (aged 65 and over) in Japan, Canada, Australia and the United Kingdom towards flu vaccination.[54] It showed that attitudes can significantly affect uptake rates, and that a significant proportion of older people have doubts about the flu vaccine's importance, safety and efficacy. Hesitancy emanated from a number of different areas, including vaccination being associated with young people or travel, concern at the effectiveness of vaccinations (strain selection), and a perception of flu vaccine being for 'older' or less well people. An effective way to address vaccine hesitancy may be to engage with positive attitudes towards having a healthy lifestyle rather than focusing on the impact of flu.

ILC-UK research into flu, infectious disease and vaccination has highlighted the importance of ensuring that there is a policy environment that supports prevention and innovation in the promotion and implementation of prevention. A recent ILC-UK report focused on whether new technology can overcome some of the barriers to adult vaccination uptake.[55] It showcased a range of ways in which new technology can improve uptake including by providing a deeper understanding of the current situation (e.g. weekly data on vaccination rates), enhancing medical reports with wearable tech, supporting ride-sharing as a means of providing patient transport, and offering vaccination delivery without needles. A policy environment that is open to innovation, and the meaningful evaluation of such innovation to assess whether they can provide effective and cost effective interventions will be important.

Vaccination is an effective and cost effective preventative intervention for older people. However, targets remain unmet and in some countries coverage is falling. The burden of flu, on people, healthcare systems and in terms of lost productivity, makes it imperative for decision makers to focus on methods to increase vaccination uptake.

Conclusion

Governments have repeatedly stated their commitment to prevention across the life course – from support for the WHO's Decade of Healthy Ageing to G20 statements affirming the importance of prevention. And, as the example of flu demonstrates, the cost of failing to support prevention across the life course is associated with significant social and economic costs. In an ageing world, people need to be supported to live well for longer.

The example of flu also shows us that there is a gulf between rhetoric and reality. The flu vaccination is effective in reducing or preventing infections and the complications associated with flu. However, few better off countries consistently meet the vaccination rate target of 75% among those aged 65 and over, despite long standing commitments to do so, and oft-stated affirmations as to the importance of prioritising prevention across the life course.

Improving vaccination uptake rates requires governments and policy makers to move beyond such rhetoric to acting to prioritise prevention.

As ILC-UK work has demonstrated, in the case of flu, this will include:

- Ensuring adult vaccination is accessible to as many people as possible, including insuring that there are no cost barriers.
- Ensuring adult vaccination is available in a place which works for older people.
- Learning from older people what might be the best way to communicate the value of vaccination across the life course to deliver increased uptake.
- Making the most of new technology to increase uptake of adult vaccination.
- Putting in place new ways of working and new mechanisms for vaccine delivery that facilitate increased uptake.
- Ensuring that there is greater understanding among people of the role flu vaccination plays in helping them to live well for longer.

And these recommendations are relevant to other vaccine-preventable diseases, such as shingles and pneumococcal.

The economic and social costs of failing to act are substantial. Inaction should not be an option.

Appendices

Appendix 1

Cases of influenza each year (annual flu rates of 5%, 10% and 15%)

Age group	High SDI	High-mid SDI	Total
	10% [5 - 15%]	**10% [5 - 15%]**	**10% [5 - 15%]**
50-64	31,963,950 [15,981,975 - 47,945,925]	20,962,519 [10,481,260 - 31,443,779]	52,926,469 [26,463,234 - 79,389,703]
65+	18,413,889 [9,206,944 - 27,620,833]	19,761,384 [9,880,692 - 29,642,077]	38,175,273 [19,087,637 - 57,262,910]
Total	50,377,839 [25,188,919 - 75,566,758]	40,723,903 [20,361,952 - 61,085,855]	91,101,742 [45,550,871 - 136,652,613]

Appendix 2

Potential working days lost due to flu each year for those aged 50-64 (annual flu rates of 5%, 10% and 15%)

Days lost	High SDI	High-mid SDI	Total
	10% [5 - 15%]	**10% [5 - 15%]**	**10% [5 - 15%]**
3 days	59,568,752 [29,784,376 – 89,353,127]	35,927,551 [17,963,775 – 53,891,326]	95,496,302 [47,748,151 – 143,244,454]
5 days	99,281,253 [49,640,626 – 148,921,879]	59,879,252 [29,939,626 – 89,818,877]	159,160,504 [79,580,252 – 238,740,756]

Appendix 3

Potential productivity loss each year due to flu in those aged 50 to 64 in better off countries (annual flu rates of 5%, 10% and 15%)

Days lost	High SDI	High-mid SDI	Total
	10% [5 - 15%]	**10% [5 - 15%]**	**10% [5 - 15%]**
3 days	USD 9,157,755,370 [USD 4,578,877,685 - 13,736,633,056]	USD 14,295,754,090 [USD 7,147,877,045 - 21,443,631,134]	USD 23,453,509,460 [USD 11,726,754,730 - 35,180,264,190]
5 days	USD 15,262,925,617 [USD 7,631,462,809 - 22,894,388,426]	USD 23,826,256,816 [USD 11,913,128,408 - 35,739,385,224]	USD 39,089,182,433 [USD 19,544,591,217 - 58,633,773,650]

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International
Longevity Centre UK

11 Tufton Street
London
SW1P 3QB
Tel : +44 (0) 20 7340 0440
www.ilcuk.org.uk