Digital Poverty in the UK
A socio-economic assessment of the implications of digital poverty in the UK

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“13-19 million people aged 16+ in the UK (or 24-34% of this sub-population) are estimated to be in digital poverty.”
Executive summary

To support an improved understanding of digital poverty in the UK and highlight why it deserves attention, this study provides a high-level assessment of the scope and scale of digital poverty, and the potential socioeconomic impacts of resolving this issue.

Definition of digital poverty?

Digital Poverty is defined by the Digital Poverty Alliance (DPA) as: “the inability to interact with the online world fully, when, where, and how an individual needs”. This captures how those unable to interact online as needed are increasingly excluded from opportunities in the economy and society, with important consequences for government and private sector businesses. But this definition is normative and not ‘measurement oriented’.

This report develops a new ‘measurement oriented’ definition of digital poverty that is based on the DPA’s existing definition. This definition is set out below. This is intended to help identify who is in digital poverty and quantify the scale of the problem – by capturing the majority of individuals that fall within the DPA’s existing definition.

Box 1. What is digital poverty?

In this report, individuals are in digital poverty when they do not have digital skills, devices, connection and/or cannot get online regularly. Across four dimensions, this includes those who:

- lack access to an adequate connection at home (i.e., download speed less than 10mbps); or
- lack access to the appropriate devices to get online at home (i.e., both a smart phone and a personal computer/tablet); or
- lack appropriate skills to effectively engage online in different settings (i.e., do not have full foundation, life and work essential digital skills – as defined by the Department for Education); or
- fail to regularly get online (i.e., at least once per week) due to either physical/space barriers or a lack of confidence or motivation (e.g., no safe space in the case of a child, no supporting equipment in the case of someone with a disability).
Digital poverty impacts a significant number of UK citizens

Digital poverty is a widespread issue across the UK and is more significant than suggested by existing literature.¹

It is multifaceted, with many individuals deprived across multiple dimensions.

~13-19 million people aged 16+ (or 24-34% of this sub-population) are estimated to be in at least one dimension of digital poverty

~1 in 17 are deprived across all dimensions of digital poverty (i.e. severe digital poverty)

~1 in 7 are deprived across two or more dimensions

It is strongly associated with age...

~1 in 2 older adults are in digital poverty, and 1 in 5 are in severe digital poverty

Younger adults are more likely to be impacted than middle aged adults

...and gender...

Women are ~14-22% more likely to be in digital poverty than men

...and socio-economic circumstance...

~1 in 2 individuals living in DE households² are in digital poverty

The unemployed are ~2-3 times as likely to be in digital poverty than the employed

... and impacts children.

~1 in 5 children are estimated to be impacted by digital poverty

Digital poverty varies spatially too, but patterns differ for digital skills.

Northern Ireland and Scotland are most impacted when focusing only on digital connectivity, device and participation gaps

Northern Ireland and Wales appear most impacted when digital skills gaps are factored in

¹ The statistics in the infographic are based on the estimates of digital poverty as estimated in chapter 5. Where appropriate, this provides the range across lower and upper bound estimates of digital poverty. Unless otherwise specified, where a range of digital poverty estimates is not presented, the approximate midpoint of the range is presented. The exception to this is for severe digital poverty – as this is only defined within the upper bound estimates. As set out in Chapter 5, estimates for children are not based on a representative sample and are therefore more uncertain.

² A, B, C1, C2, D and E is a socio-economic classification for households, produced by the Office for National Statistics (ONS). DE households are those in the two lowest socio-economic classification categories – including households whose chief income earners are in semi-skilled occupations, unskilled manual occupations, casual occupations, the lowest grade occupations, unemployed with state benefits, or are state pensioners.
**Digital Poverty in the UK**

**Assessing the benefits of eliminating digital poverty**

It is estimated that interventions to eliminate digital poverty could be associated with a range of illustrative benefits – set out below. This suggests that billions of pounds in benefits for individuals, government and businesses could be unlocked each year by eliminating digital poverty and ensuring basic digital needs are met for all individuals. The most significant benefits appear likely to be realised through positive impacts on human capital and productivity. However, this high-level assessment focuses on providing only illustrative evidence to give a sense of the scale and scope of the issue. Further work to assess the full extent of the benefits associated with particular outcome categories or specific interventions will therefore be important.¹ ²

<table>
<thead>
<tr>
<th>Digital skills earnings premium</th>
<th>Improved personal finances</th>
<th>Reduced social exclusion</th>
<th>Personal time saved</th>
<th>NHS cost savings</th>
<th>Reduced unemployment</th>
<th>Central government cost savings</th>
<th>Improved health literacy among older adults</th>
<th>Improved telemedicine access for CHD patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 mn</td>
<td>17 bn in earnings</td>
<td>4-6 bn in disposable income</td>
<td>£2 bn in individual utility</td>
<td>£2 bn in time value</td>
<td>£1 bn savings in GP practices alone</td>
<td>£1 bn in earnings</td>
<td>Up to nearly £1bn in efficiency savings</td>
<td>18-24k lives saved</td>
</tr>
</tbody>
</table>

¹ These are static, illustrative estimates that do not account for broader equilibrium impacts across the economy. They are based predominantly on assumed supply side changes that rely on equivalent demand, and at this stage that demand is assumed, and impacts would vary with macroeconomic conditions. These estimates do not consider second order impacts, some of which may work in the opposite direction and thus offset some of the estimated potential benefits. For example, an increase in effective disposable income through lower online prices would mean more consumption for the individual but some product market displacement where purchases are substituted. In this example there could be a more efficient and equitable allocation of resources, but this would not translate 1:1 to increases in GDP. For these reasons, and because the estimates are not all measuring the same value, they should not be added together to produce an implied total figure.

² Eliminating digital poverty is a long-term goal that will be challenging to achieve. Despite this, it is useful to frame the analysis from this perspective for two reasons. First, because it aligns with the vision the DPA has set for eliminating digital poverty by 2030; and second, because it is a lens that helps to quantify the full scale of the potential benefits associated with addressing digital poverty.
Conclusions

Digital poverty is a pervasive issue that impacts not only the oldest in society who have been unable to keep pace with technological advancements, or those with acute affordability issues, but individuals of all ages and socio-economic backgrounds.

This assessment highlights eight key priority areas for action that could support the elimination of digital poverty and realisation of some of the key associated benefits, linked to stakeholders across all ages and sectors:

1. **Supporting affordable access to appropriate devices for all:** One way this is already being delivered is through private-charity sector device bank initiatives that encourage device donation and recycling – such as the Digital Poverty Alliance’s Tech4Families and Good Things Foundation’s National Device Bank.

2. **Ensuring quality connectivity for the most vulnerable:** Extending support for broadband investment into rural areas (such as continuing the Project Gigabit programme) will also remain important, as will public and private collaboration to support affordable broadband pricing (such as via a reform to the framework underpinning social tariffs).

3. **Providing upskilling and information sharing support to the adult population:** A lack of digital skills is the most prominent dimension of digital poverty – impacting roughly 22% of the 16+ population in the UK. There is thus value in designing digital literacy programs that enable all working-age individuals across society to learn and apply key digital capabilities, regardless of background or context. Targeted interventions to support older adults in maintaining these skills will also be important.

4. **Addressing existing gaps in the schooling system related to digital skills:** Given the potential human capital and productivity benefits to be unlocked, educational reforms that ensure all children are equipped with basic digital skills before leaving school could be associated with significant benefits. This will arguably be more important over the long-term than workforce initiatives and could include the design and implementation of a nation-wide ICT (information and communication technology) skills curriculum.

5. **Prioritising inclusive design and online safety:** Accessible and safe design that enables access but limits online harms is key to ensuring different segments of the population, including children, have their basic digital needs met. While government initiatives are paving the way and providing a supportive regulatory framework (e.g., the Online Safety Bill), continued effort and coordination across the private sector to apply appropriate protections will be important.

6. **Exploring novel solutions, such as incentivising digital adoption via trusted devices or tools:** Vulnerable groups experiencing digital poverty may be uninterested in engaging with the digital world due to obsolete skills, a lack of trust, or a poor understanding of the potential benefits of doing so. Exploring novel interventions, such as encouraging digital adoption through trusted sources (e.g. phasing out non-smart TVs to incentivise digital adoption among older adults) or introducing initiatives whereby children are incentivised to help their grandparents gain digital skills (e.g. by providing both the child and grandparent with a digital badge per digital skill acquired), may be a route to addressing this.

7. **Improving data and evidence:** There is an acute need for further data collection and research development to build on this report and further society’s understanding of digital poverty. For example, currently no publicly available survey or dataset exists which effectively captures all relevant dimensions of digital poverty.

8. **Addressing the underlying socio-economic issues that drive digital poverty:** Gaps in connectivity or skills are also often a function of underlying socio-economic issues such as income poverty or illiteracy. Initiatives to address such issues will support interventions targeted directly at alleviating digital poverty (and vice versa) and will require action across a range of private, public and third sector organisations.

Ensuring effective intervention will also require:

- **Collaborative action between various actors:** This will be important given the range of stakeholders across private sector, charities, community and social impact organisations, and the government and wider public sector.

- **Coordination and action by government:** To ensure effective and efficient communication and collaboration across such a broad set of stakeholders, a coordinating and convening role will need to be played by government – particularly given the welfare/distributional benefits of tackling digital poverty. In some circumstances, particularly where linked to government’s role in supporting social welfare, maintaining minimum living standards, and basic service access, there is also scope for more active government intervention — as seen to address related social issues of income, food and fuel poverty. In this context, a comprehensive policy strategy to address digital poverty and promote digital inclusion could help drive positive outcomes.
1. Introduction

Over the past three decades, the personal computing revolution and widespread internet access have transformed society – changing the digital world from a ‘place’ we visit to something that is a central part of the economy and everyday lives.\(^5\)

The pandemic led to an increase in the rate of digitalization across the economy and society; and this shift in individual behaviour and organisational operations has in many cases been sustained even as restrictions on movement disappeared. However, while the digital transition has delivered benefits for much of the population, it has also exacerbated the problem of Digital Poverty.

Digital Poverty is a complex concept that captures how those unable to interact with the online world as needed are increasingly excluded from opportunities in the economy and across society more broadly. This in turn has important consequences for government and private sector businesses.

There is a growing literature on this issue. Existing studies on the impacts of poor digital access, engagement, or skills (or the impacts of increased digital access, engagement, or skills) have captured:

- high-level discussions of the implications of people being unable to effectively engage online;\(^6\)
- quantitative assessments of the economic impacts of a single dimension of digital access (e.g., broadband speed);\(^7\)
- targeted quantitative and qualitative evidence on a specific negative outcome associated with digital deprivation;\(^8\)
- benefits assessments of specific interventions to improve digital inclusion;\(^9\)
- or more comprehensive assessments that are outdated or are for a different context.\(^10\)

Few impact assessment studies focus on the concept of digital poverty – instead covering related concepts like digital exclusion or the digital divide. To support an improved understanding of digital poverty in the UK and why it deserves attention, the aim of this study is therefore to build on the existing literature to develop a more holistic view of the range of impacts associated with digital poverty, by:

1. Developing a framework to articulate the definition, scope and impacts of digital poverty (or the benefits associated with eliminating digital poverty), which includes:
   a. An overview of a conceptual framework outlining the scope and impacts of digital poverty
   b. The measurement-oriented definition of digital poverty
   c. A mapping of key stakeholder groups and categories of impact
   d. A summary of the key enabling factors and dependencies (to support realising benefits associated with eliminating digital poverty) and key unintended consequences (that might result from interventions to eliminate digital poverty)

2. Developing a preliminary assessment of the key benefits associated with interventions to eliminate digital poverty;\(^11\)

3. Informing the identification of a set of intervention priorities to address digital poverty.

The report proceeds as follows.

- Chapter 2 sets out existing definitions relevant to the issue of digital poverty.
- This is followed by Chapter 3 providing background and context based on the existing evidence.
- Chapter 4 sets out the different elements of the framework developed to guide the assessment of digital poverty.
- A detailed assessment of digital poverty is then provided in Chapters 5 and 6.
- Chapter 7 leverages insights from the preceding chapters to set out key intervention priorities to address digital poverty.
- Chapter 8 summarises the key conclusions and implications for further work.

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\(^{5}\) UK Digital Poverty Evidence Review 2022, Digital Poverty Alliance

\(^{6}\) For example: Coronavirus has intensified the UK’s digital divide, University of Cambridge, 2020

\(^{7}\) For example: Broadband for all: charting a path to economic growth, Deloitte, 2021

\(^{8}\) For example: Inside the Digital Society: Digital (in)equality, David Souter for London School of Economics, 2022

\(^{9}\) For example: Digital technology and health inequalities: a scoping review, Public Health Wales, 2020

\(^{10}\) For example: Champion for Digital Inclusion: The economic case for digital inclusion, PwC, 2009

\(^{11}\) Eliminating digital poverty is a long-term goal that will be challenging to achieve. Despite this, it is useful to frame the analysis from this perspective for two reasons. First, because it aligns with the vision the DPA has set for eliminating digital poverty by 2030 (further detail in the DPA’s National Delivery Plan); and second, because it is a lens that helps to quantify the full scale of the potential benefits associated with addressing digital poverty.
2. Existing definitions

How is digital poverty currently defined?
The Digital Poverty Alliance (DPA), in its Poverty Evidence Review of 2022, has defined digital poverty as: “the inability to interact with the online world fully, when, where, and how an individual needs”. This concept has evolved over time as the digital landscape has changed. It has moved from a concept relating only to a lack of access to data, to its current form that considers various dimensions of an individual’s digital access and skills, along with their motivation to be ‘online’.

How are some related concepts defined?
• Digital exclusion: “Digital exclusion is where an individual lacks internet access and/or has low levels of digital skills or confidence.” (Ofcom)
• Digital divide: “Digital divide is a constellation of diverse and intersecting divides with salient gaps in access to connections and devices, skills, literacies and meaningful outcomes.” (Digital Poverty Alliance)
• Data poverty: “Data poverty means those individuals, households or communities who cannot afford sufficient, private and secure mobile/broadband data to meet their essential needs” (NESTA)

What are the key differences between these concepts?
• Data poverty can be seen as a subset of digital poverty. The former focuses only on digital deprivation due to a lack of mobile data or broadband access, while the latter is broader.
• The digital divide is a typology that categorises the spectrum of gaps in digital resources and outcomes into different ‘levels’ of deprivation – a lack of access (first level), a lack of skills (second level), and the inability to transform digital resources to tangible benefits (third level) – that has informed the development of the concepts of both digital exclusion and digital poverty.
• Both digital exclusion (alongside its inverse, digital inclusion) and digital poverty relate to the degree of deprivation experienced across the levels of the digital divide. However, the literature has yet to clearly define the key distinction between these two concepts, and the two terms are often used interchangeably.
• The terms digital exclusion and inclusion are often most useful to use when considering inequalities and the spectrum of digital resources/outcomes across the population – ranging from those that cannot interact adequately online (digitally excluded) to those that are fully digitally equipped (digitally included).

Why is it useful to focus on the concept of digital poverty specifically?
• The key reason for the development of and focus on ‘digital poverty’ as a concept across the literature is to broaden society’s understanding that safe, secure, and independent digital access is a need rather than a luxury or a ‘nice to have’.
• In this way, digital poverty can be compared to the concepts of food poverty and fuel poverty – which have similarly been used to shine a spotlight on resources deemed a necessity.

How does the report use these terms?
• For the purposes of this report, the term digital poverty is used to describe when individuals’ basic digital needs are not met.
• This report does not attempt to make any clear distinction between digital poverty and terms such as digital exclusion and the digital divide. As such, digital poverty in this context can be considered to include those impacted by data poverty, the digital divide and digital exclusion.
• Chapters 3 and 4 provides further detail on the how this report defines what it means to be in digital poverty, and thus how individuals in digital poverty are identified.
3. Background and context

Digital poverty is a complex issue, influenced by a diverse set of factors, and impacts a wide set of interconnected stakeholder groups. On certain measures, internet access in the UK appears to have continued to expand at a rapid rate and be near universal. But such trends mask significant gaps and inequalities that persist in individuals’ ability to effectively access and use the digital world. This has significant direct negative implications for outcomes from individual wellbeing to economic productivity.

3.1. The importance considering measurement and looking beyond simple ‘internet access’ statistics

With the rapid technological expansion and digitalisation experienced globally since the turn of the century, internet access and use have continued to increase and become centrally embedded across the economy and society.

Time series data for the UK shows that the share of the UK population who have not ‘accessed the internet in the past three months’ fell from over 90% in 1998 to approximately 6% in 2020. At an aggregate level, this implies not only significant progress in digital adoption and inclusion over the last two decades, but also movement towards near universal access across the UK.

However, there are several reasons why it is vital to look beyond such headline statistics of internet access or connectivity in assessing digital poverty.

1. There are other measures of internet connectivity in the UK that set a higher and arguably more appropriate bar for what can be defined as ‘internet access’.

2. It is important to consider the various other dimensions of digital deprivation that impact individuals’ ability to effectively engage and realise the benefits of being online, beyond simply having access to an internet connection.

3. There are significant changes that have occurred since the pandemic – including the rise in the centrality of digital interactions to individuals’ everyday lives, what this means for the definition and impact of digital deprivation, and the anticipated rate of change in these two factors moving forward.

Indeed, given the extent of digitalisation, having occasional access to an internet connection is not sufficient to meet an individual’s basic digital needs. Ofcom survey data shows that 11% of the population did not have access to any internet connection at home in 2020. This suggests lack of internet access was 5 percentage points (or ~80%) higher than when measuring the share of the population who fail to access the internet once every three months. While the share estimated to lack basic home internet access has since fallen – down to 7% in 2022 – this nonetheless highlights how important it is to carefully consider what dimensions and measures of digital deprivation one accounts for when assessing digital poverty.

In fact, the share of population estimated to be in digital poverty appears to climb with each additional dimension of digital deprivation one considers. For example, if one accounts for those without broadband access or with a poor-quality service in...
addition to those who simply lack any form of internet connection at home. This set of broader issues and their implications for the scope of digital poverty are set out in more detail immediately below, and in the rest of this report.

3.2. A broader view of the determinants (and dimensions) of digital poverty

The Digital Poverty Alliance (DPA) recently commissioned research to identify and assess the different elements of deprivation that constitute digital poverty. This culminated in the publication of the Digital Poverty Evidence Review (the ‘Evidence Review’) in 2022. This provided an assessment of the five key determinants of digital poverty. These are summarised below and supplemented with evidence from the broader literature to highlight why these determinants underpin this report. 15

<table>
<thead>
<tr>
<th>Determinant</th>
<th>Description</th>
<th>Detail and supporting evidence</th>
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| Devices and connectivity | Individuals without home internet access and/or an appropriate device to log on with cannot effectively engage with the online world and leverage the benefits it offers. | • This means accounting not just for whether a household has a connection, but the type and quality of that connection.  
• 3% of residential broadband lines do not meet Ofcom’s requirement for a ‘decent’ broadband connection (a download speed of 10mbps).  
• Deloitte’s 2022 Digital Consumer Trends Survey finds that 8% of those aged 16-75 do not own a smartphone and 22% do not own or have access to a laptop.  
• Nominet’s 2022 Digital Youth Index reports that 27% of children rely on ways to connect to the internet beyond home broadband. |
| Access               | Individuals are unable to effectively engage with the online world due to issues of accessibility, safety, privacy, and/or space. This means that access can look different to different people in different settings. | • Individuals with a disability require appropriate digital design and affordable assistive technology to ensure digital accessibility. ONS analysis suggests that 56% of adult (internet) non-users are disabled.  
• Individuals’ willingness and ability to participate online is impacted by their experiences of online safety and privacy, and by whether they have a safe and private space to go online. |
| Capability           | Individuals without certain basic digital skills are unable to effectively engage with the online world or access its benefits. These essential digital skills (EDS) are defined by the Department for Education’s (DfE) Digital Skills Framework. | • This includes both the core set of foundational digital skills that enable general digital participation – defined as Foundational EDS – alongside broader digital skills that are essential to certain life stages or contexts.  
• All individuals, including those that are retired or out of the workforce, require what has been termed Life EDS. Those in the labour force require the skills to effectively engage in the workplace – defined as Work EDS.  
• Lloyds Bank’s 2022 Digital Consumer Index found that 19% and 22% of the UK population do not possess foundational and work EDS respectively – i.e. are not able to perform all required tasks in the EDS framework. |
| Motivation           | Another important determinant of digital poverty is the lack of interest and/or motivation in getting online. | • Adults in the UK have noted a range of reasons for not wanting to get online, ranging from it being ‘too complicated’ to lacking ‘the need for it’.  
• Of all those offline, 65% were not interested in getting online within the next twelve months. |
| Support and Participation | It is also important to account for how a lack of social interaction and support inhibit individuals’ ability to get online. | • This includes understanding how a lack of guidance, appropriate learning material or isolation from community limits individuals’ ability to effectively get online and realise the associated benefits.  
• Lloyds Bank’s 2022 Consumer Digital Index finds that 26% of those offline would require formal support to get online, which could potentially involve community-based outreach and learning solutions. |


15 UK Digital Poverty Evidence Review 2022, Digital Poverty Alliance  
16 Ofcom UK Home Broadband Performance, 2022  
17 OfCOM Adult Media Literacy Tracker, 2022  
18 It is worth noting that those who do not own a smartphone may be choosing to do so as a lifestyle choice, or also may not be able to use one – it is not necessarily the case that they cannot afford one. Conversely people who have a smartphone may not have a useful one (e.g. an outdated one). It is also worth noting that in this case, those stating they do not own or have access to a laptop may have a desktop computer or a tablet.  
19 Exploring the UK’s digital divide, ONS, 2019  
20 Nominet Digital Youth Index, 2022  
21 Only a portion of this group of children are likely to rely on ways to connect to the internet other than home broadband because they a lack of a safe space. For example, some children might simply spend most of their time outside of their homes, while others might want to access the digital world outside of their homes due to wanting to engage in unsafe online practices they do not feel comfortable engaging in at home. The latter relates to another relevant concern about children digital access – i.e., how to ensure appropriate online safety.  
22 Lloyds Bank’s Essential Digital Skills Report 2021  
23 Ofcom Adult Media Literacy Tracker 2022  
24 2022 Lloyds Bank’s Digital Consumer Index 2022
This evidence highlights the need to look beyond basic internet access in considering the scale and scope of digital poverty; the assessment framework described and applied later in this report aims to reflect this. Throughout the remainder of this report, the determinants are referred to as the different dimensions of digital poverty (because they determine the type or nature of digital poverty experienced).

**Box 2. Other socio-economic issues that interact with digital poverty**

The determinants of digital poverty highlighted above impact and are impacted by a set of underlying socio-economic issues.

Perhaps the most important of these is income poverty, or the broader issue of affordability. Ofcom survey data suggests that 29% of individuals face communications affordability issues. This statistic has nearly doubled since 2021. Social tariffs are cheaper broadband and phone packages voluntarily offered by internet service providers (ISPs) for people claiming Universal Credit, Pension Credit, and some other benefits. These tariffs provide some support to those with affordability challenges, but many groups continue to struggle with affordability. Further, ISPs and other parties have raised concerns around the financial sustainability of these industry-funded social tariffs, in particular the implications it may have for network investment. Those on low incomes may also be more at risk in other areas – such as being less able to maintain their digital skills or the motivation to get online.

General literacy is another factor that impacts individuals’ ability to understand and process information online. Around 1 in 6 adults in England are described as having poor literacy skills, while just under a third of adults in Scotland experience challenges due to their lack of literacy skills. Given that the internet is largely a text-based platform, these individuals are at a considerable disadvantage in terms of being able to engage online effectively.

And as opportunities to improve one’s economic or educational prospects are increasingly found online, those in digital poverty are likely to see these same issues exacerbated, forming a viscous cycle of deprivation and exclusion.

### 3.2. Socio-economic factors associated with the determinants of digital poverty

There is a high degree of intersectionality between each of the determinants (or dimensions) of digital poverty and other vulnerable characteristics. The existing evidence on the association between the different dimensions of digital poverty and certain demographic and socio-economic characteristics is summarised below.

**Age:**

There is a significant positive relationship between age and the individual dimensions of digital poverty.

**Older adults (those aged 65 and over) are the most at-risk age category.** They are 2-3 times more likely to not have home internet access, lack foundation EDS,25 or not own or have access to a smartphone than the average member of the population.26,27

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25 Ofcom Adult Media Literacy Tracker 2022
26 Deloitte Digital Consumer Trends 2022
27 2022 Lloyds Bank’s Digital Consumer Index 2022

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*This second statistic focuses specifically on 65–75-year-olds.*
Employment type and status:

Unemployed and retired individuals are about 5-7 times more likely than employed individuals to lack work EDS.\textsuperscript{28}

Individuals in DE households\textsuperscript{29} (the lowest ‘social grade) are 3-4 times more likely to lack foundation and work EDS, respectively, than those in AB households (the highest social grade).\textsuperscript{30} They are also more likely to lack appropriate connections, devices, or the motivation to get online.\textsuperscript{31}

Impairments:

A lack of foundation level digital skills is a particular issue among those with an impacting/limiting condition (also defined as an impairment).\textsuperscript{32}

Individuals in this group are 2-3 times more likely to lack foundation EDS, to not have access to the internet at home, and not own a smartphone than those without impairment.\textsuperscript{33}\textsuperscript{34}

Rurality:

Individuals in rural households are more at risk of facing digital deprivation on certain margins, because increased deployment costs and low population densities reduce commercial returns.\textsuperscript{35}

For example, while home internet access rates appear similar across rural and urban areas, connection quality is not. In 2022, 14% of rural broadband lines had an average 8-10 PM peak-time speed of less than 10mbps compared to only 1% for urban broadband lines.\textsuperscript{36} This rural-urban divide is less apparent when focusing on digital skills,\textsuperscript{37} and falls the other way on device availability.\textsuperscript{38}
Income:

**Income poverty** demonstrates a strong negative association with connectivity and skills.

Those earning below £13,499 per year are about 1-2 times more likely to lack EDS than the average person in the UK. They are 3.4 and 4.9 times more likely to demonstrate deprivation on these dimensions relative to those earning over £75,000 per year.\(^{39,40}\)

But what this existing evidence does not do is account for the extent to which the different dimensions of digital poverty overlap for individuals. And this will have important implications for the magnitude of the overarching issue and how it varies across the population. In the subsequent chapters, particular attention is therefore given to assessing this.

### 3.3. Why does addressing digital poverty matter?

As alluded to above, digital poverty has wide-ranging social and economic implications for the UK.

There is a wealth of evidence demonstrating how the ability to access the digital world (or a lack thereof) is associated with a range of impacts across different dimensions of individual wellbeing, including social inclusion and health\(^ {41}\), financial inclusion\(^ {42}\), budget efficiency and cost savings\(^ {43}\), and education and human capital\(^ {44}\).

For example:

- A 2016 evaluation of the NHS’ Widening Digital Participation program found that respondents who accessed online health services for the first time experienced improved mental health and reduced loneliness.\(^ {45}\)
- A 2023 report on digital exclusion found that a significant proportion of individuals highlighted digital technologies as a necessity for starting or continuing their schooling.\(^ {46}\)
- There is also evidence to suggest that digital access positively impacts personal finances, including through providing access to online deals and discounts that can lead to significant increases in disposable income.\(^ {47}\)

And while digital poverty is a problem that most directly impacts individuals, it also has consequences for both the government and businesses. Indeed, various government departments could improve operating efficiency and save millions (if not billions) due to increased digital interaction.\(^ {48}\) Meanwhile, 49% of small businesses in the UK with internet speed of less than 10 Mbps reported lost opportunities for expanding their businesses or boosting sales;\(^ {49}\) and a survey of small and medium-term enterprises (SMEs) across Europe suggested businesses that use data-driven solutions had 8.9% greater productivity on average.\(^ {50}\)

The remainder of this report aims to build on the existing evidence base, by developing and applying a holistic assessment framework to set out how the elimination of digital poverty could reap benefits for different stakeholders.

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39 Deloitte Digital Consumer Trends, 2022  
40 Lloyds Bank’s Consumer Digital Index 2022  
41 Health and Digital: Reducing Inequalities, Improving Society, Good Things Foundation (formerly Tinder foundation), 2016  
42 Lloyds Bank’s Digital Consumer Index, 2022  
43 From online deals to job searches: How digital exclusion makes the cost of living even higher, Adele Walton for Big Issue, 2023  
44 Bridging the Gap, Digital Cooperation Organization, 2023  
45 Health and Digital: Reducing Inequalities, Improving Society, Good Things Foundation (formerly Tinder foundation), 2016  
46 Bridging the Gap, Digital Cooperation Organization, 2023  
47 From online deals to job searches: How digital exclusion makes the cost of living even higher, Adele Walton for Big Issue, 2023  
48 Transforming for a digital future: 2022 to 2025 roadmap for digital and data, Central Digital & Data Office  
49 Lost Connection, How Poor Broadband and Mobile Connectivity Hinders Small Firms, FSB, 2019  
50 SME Digitalisation – charting a course towards resilience and recovery, Deloitte on behalf of Vodafone, 2020
4. Framework and approach

To measure the scope and scale of the issue, digital poverty is defined to include all those who lack: an adequate broadband connection, appropriate digital devices, basic digital skills, and/or the ability or willingness to regularly participate online. Importantly, this extends beyond those unable to engage online due to affordability issues and covers all gaps in relevant dimensions of digital poverty. A holistic assessment framework to assess the potential benefits of interventions to eliminate digital poverty is also developed.

This chapter sets out the details of the Digital Poverty Assessment Framework applied in the rest of this report.

4.1. A digital poverty conceptual framework

The conceptual framework presented in Figure 4.1 is informed by available evidence on digital poverty, and digital deprivation more generally. This summarises the scope, impacts of digital poverty, and guides the development of the assessment framework and the impact assessment approach.

This conceptual framework highlights key components from the existing evidence on digital poverty with respect to:

- What digital poverty encompasses
- What the key determinants of digital poverty are
- Who the key stakeholder groups impacted by digital poverty are, as well as the vulnerable groups that are most at risk or likely face the highest costs due to digital poverty
- What key outcomes are most impacted by digital poverty (i.e. impact categories).
The subchapters that follow build on this conceptual framework to develop a holistic framework for assessing the impacts of digital poverty (the ‘Digital Poverty Assessment Framework’).

4.2 Stakeholder Groups

This report focuses on the impact of digital poverty on three key stakeholder groups.

• **Individuals**: A lack of digital access poses the most direct economic and social costs to individuals (and the households in which they live). This is because they are not able to leverage opportunities in an increasingly online world due to their basic digital needs not being met. This could range from not being able to make use of online shopping services to not having an appropriate device, to missing out on a job opportunity due to a lack of connectivity or skills.

• **Businesses**: Businesses are impacted by digital poverty directly – e.g. when small and medium enterprises (SMEs) lack appropriate internet connections or digital devices – or because a portion of their potential consumer base is offline.

• **Government**: Government is impacted by digital poverty not only because a portion of the population it serves is offline, but because digital poverty has indirect negative impacts on tax revenue while also increasing public spending pressures.

While beyond the scope of this report, the impacts will extend beyond these three groups, and it will be important in further work to consider how the impacts of digital poverty may impact other key stakeholder groups, such as:

• **Communities**: Digital poverty means missing out on positive externalities that extend beyond individuals or businesses and relate more directly to communities – such as the impacts of being online on social cohesion and broader social capital.

• **The third sector**: Digital poverty also has implications for charities, social enterprises, cooperatives, think tanks and research institutes. For example, it can increase demand for the services these organisations provide or make it more challenging and/or costly for them to engage with the people they support.

4.3 Setting out a ‘measurement’ definition of digital poverty

While the DPA’s existing definition of digital poverty captures the broad nature of digital poverty, it is too subjective to be used to measure the scale of digital poverty accurately and objectively.

To assess the impacts of digital poverty, or the benefits associated with eliminating digital poverty, a ‘measurement’ oriented definition of digital poverty has been developed. This is set out in Box 2 below. It is based on and aims to capture the majority of individuals that fall within, the DPA’s existing definition of digital poverty.51

This enables the analysis to explicitly identify who is in digital poverty and who is not. This definition is a necessary building block for the assessment framework that follows in the next chapter and supports the quantification of the scale of the problem.

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51 It is worth noting that this definition relates to the work currently under development by the [Minimum Digital Living Standard for Households with Children (MDLS) project](#). That work aims to define a minimum level of digital access according to the level of digital technology/services and skills/knowledge that individuals within a household possess. However, in some respects, the MDLS definition is broader than the definition of digital poverty set out here (e.g., it assumes a broader range of digital devices are necessary to satisfy a minimum digital living standard). The MDLS definition also focuses only on households with children. The MDLS definition is thus likely to capture a different sub-population to that captured in this report, though there will be significant overlaps.
The deprivation indicators proposed to define and measure digital poverty are set out in Table 4.1 below.

These cover three key categories of digital deprivation: (1) technology and infrastructure (i.e., access to an internet connection and appropriate devices); (2) capabilities (i.e., foundation, life and work essential digital skills); and (3) digital participation (i.e., the actualization of getting online regularly).

Unfortunately, there is a gap between what is a realistically achievable measurement definition in the future (i.e. with further data collection), and what is currently implementable.

This is because there is currently a lack of publicly available evidence or data that allows one to accurately identify the extent to which different digital deprivation outcomes overlap and intersect for individuals in the UK. For example, while some surveys cover (most of) the infrastructure and technology indicators (e.g. Ofcom’s Technology Tracker), but do not gather data on skills, others focus only on digital skills (e.g. the Essential Digital Skills survey).

Table 4.1 therefore sets out both the ideal proposed measures and thresholds (which could be used if data availability were improved) and the actual supporting measures that were used in this study to estimate digital poverty given the available data and evidence.

Table 4.1. Defining digital deprivation across the key digital deprivation categories

<table>
<thead>
<tr>
<th>Deprivation category</th>
<th>Deprivation sub-category</th>
<th>Primary indicator(s)</th>
<th>Ideal Threshold (Deprived if level&lt;threshold)</th>
<th>Ideal supporting measures</th>
<th>Actual supporting measures (and threshold) used</th>
<th>Data source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrastructure and Technology</td>
<td>Internet connection</td>
<td>Access to high-speed internet in home</td>
<td>Has an internet connection at home with a download speed of 10mbps or higher</td>
<td>Access to broadband internet at home; broadband has a download speed of 10mbps or higher</td>
<td>Access to a broadband internet connection at home&lt;sup&gt;52&lt;/sup&gt;</td>
<td>Ofcom Technology Tracker (TT) 2022</td>
</tr>
<tr>
<td>Devices</td>
<td>Access to appropriate devices in home</td>
<td>Have access to both a personal computer / tablet AND a smart phone per person in household</td>
<td>Access to a phone and a personal computer / tablet. Both devices are &lt;10 years old</td>
<td>Access to both a phone and personal computer / tablet</td>
<td></td>
<td>Ofcom TT 2022</td>
</tr>
<tr>
<td>Capabilities</td>
<td>Essential digital skills (EDS)</td>
<td>Foundation skills</td>
<td>8/8 on Foundation EDS</td>
<td>8/8 on EDS</td>
<td>For working age adults, the focus is on work EDS (a score of 5/5).</td>
<td>2022 Essential Digital Skills survey</td>
</tr>
<tr>
<td></td>
<td>Essential Life skills</td>
<td></td>
<td>5/5 on Life EDS</td>
<td>5/5 on Life EDS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>52</sup> This should not be interpreted to imply that a reliance on mobile data necessarily means one will struggle to engage effectively online. Rather, due to lack of comprehensive data, a broadband connection is deemed a good proxy for capturing the share of the population with a quality connection. In reality, some individuals with broadband connections may have poor quality connections, while some others that rely on mobile data alone may have sufficient quality connections (e.g., where there is sufficient 4G or 5G coverage).
4.4. Approach to estimating the extent of digital poverty in the UK

As noted in Table 4.1, Ofcom’s 2022 Technology Tracker is used to estimate the scope and scale of digital poverty. This is because at the time of writing, it was assessed as the most up-to-date publicly available dataset that was available at the respondent level, offered a sufficient sample size and covered most relevant indicators.54

Defining an upper and lower bound estimate of digital poverty

The Ofcom TT survey does not gather data on EDS. Indeed, a scan of the evidence for the UK suggests no publicly available dataset currently exists that captures information from respondents on all the dimensions of digital poverty outlined in Table 4.1.55

To address this gap, a lower bound and upper bound method for estimating the extent of digital poverty is defined.

- The lower bound estimate of digital poverty includes those individuals that lack a home broadband connection, appropriate device access, or regular digital participation. This is because these indicators are measured directly in the Ofcom TT survey. This estimate does not account for digital skills.

- The upper bound estimate of digital poverty includes those individuals captured in the lower bound estimate, but also aims to account for those that lack appropriate digital skills (EDS specifically) by imputing this information into the Ofcom TT sample. This imputation approach draws on available evidence from the Lloyds Bank’s EDS survey for 2022 on the association between digital skills and internet access, and digital skills and age. The approach is set out in more detail in Annex 1. The outcome of this approach is approximately equivalent to assuming half of the population lacking full EDS is already captured in the lower bound estimates.56

Limitations on estimates for children

This analysis is also limited in its analysis of digital poverty among children – since Ofcom’s technology tracker is technically a sample of individuals rather than a sample of households and focuses on respondents aged 16+. While information on the number and age of co-resident children is indirectly captured via these respondents, this does not ensure that this provides a representative sample of children, and outcomes for children are not directly measured. Therefore, children are classified to be impacted by digital poverty when living in a household with an adult who is in digital poverty but note there is a higher degree of uncertainty on this estimate and that it should therefore be interpreted with caution.

4.5 Impact assessment framework

Having defined digital poverty more clearly, a typical logic model is defined to enable the mapping out of the mechanisms of impact for digital poverty more clearly. This is set out in Figure 4.3 below, framed from the perspective of assessing the benefits that could be realised from eliminating digital poverty.

54 The respondent-level data from the Lloyds Bank Essential Digital Skills survey is not publicly available, and the published results do not enable one to identify those that lack EDS in more than one category. The analysis thus focuses on measuring a lack of EDS on those skills categories deemed to capture a broader population. On average, more working-age individuals lack work EDS than foundation or life EDS; and more older adults lack foundation EDS than life EDS.

55 Understanding Society offers an alternative dataset with a much larger sample; but at the time of preparing this report, this was only available until 2021. Understanding Society also does not measure individuals’ EDS.

56 The Lloyds Bank’s EDS survey could possibly fill this gap if the raw respondent-level data were publicly available.

57 If the degree of overlap between those identified to be in digital poverty on the lower bound estimate and those without digital skills is significantly larger than 50%, then the upper bound estimates will be too high (due to double counting). Conversely, if the degree of overlap between those identified to be in digital poverty on the lower bound estimate and those without digital skills is significantly smaller than 50%, then the upper bound estimates will likely be too low.
This includes:

- **Defining the input** and activities driving change – in this case, the impact of initiatives to eliminate digital poverty (though the framework is agnostic here about what these are)
- **Identifying the anticipated outputs** – the direct impact or results of the input/activities assessed.
- **Mapping outputs to key outcomes** – the overall goals of the input (i.e. the impact categories)
- **Identifying possible indicators for measuring the identified outcomes**
- **Setting out the key enabling factors** (i.e., factors that would be critical to supporting the realisation of the benefits arising from input) and the negative consequences (i.e., the negative impacts that could inadvertently result from the input).

The chapters that follow aim to leverage the framework set out in this chapter to provide a high-level assessment of the possible benefits that could be realised from interventions aimed at eliminating digital poverty. This focuses largely on the direct benefits (or the direct costs to be avoided by) that could result from or be enabled by interventions to eliminate digital poverty – with the latter defined as interventions targeted at addressing the key determinants of digital poverty identified in Chapter 3 (and the underlying economic and social issues that drive them).

**Figure 4.3. Digital Poverty Impact Assessment Framework**

![Digital Poverty Impact Assessment Framework](image)

Source: Deloitte analysis
Alongside the direct benefits associated with eliminating digital poverty (or the direct costs associated with digital poverty that could be avoided), there are also many second- or third-round effects that likely need to be considered in a comprehensive assessment of digital poverty.

The first of these to consider are anticipated interactions between impact categories – where a change in one outcome may precipitate a change in an entirely separate outcome.

The second area of non-direct effects highlighted is the societal-level externalities not accounted for within the primary impact categories. For example, as individuals move out of digital poverty into the online world, a greater store of (more nationally representative) data will be generated online. Beyond the returns this can generate for businesses (e.g., due to improved marketing), or the additional direct utility it can generate for individuals (e.g., informing better quality product design), where it is non-excludable, this data could also be of value as a public good (e.g., to the extent it can be used to support decision-making within government through increased awareness of public views and perception).

The final realm of non-direct effects to consider is the indirect and induced effects likely to result from the increase in spending (which in turn may result from increases in earnings) generated by a decline in (or elimination of) digital poverty. For instance, some of the additional earnings resulting for individuals from greater employment or human capital will be spent across the UK economy, and that in turn will increase both revenues for businesses and wages for workers across impacted sectors (as well as greater gross value added (GVA) in the government and charity sector), with those additional earnings/wages themselves in turn generating further spending and investment across the economy. These knock-on effects are typically referred to as multiplier effects and can be estimated using input-output modelling.

While Chapter 6 focuses largely on the possible direct benefits of initiatives to eliminate digital poverty, it does briefly set out examples of the key non-direct impacts that might arise – according to the direct impact/effect that might generate them. However, the report does not aim to comprehensively note or assess all possible non-direct impacts that could result. Therefore, the analysis does not estimate the third category of non-direct effects – the additional gross-value added (GVA) likely to be generated across the economy due to direct increases in aggregate demand resulting from higher earnings or spending.
5. Estimating digital poverty

It is estimated that roughly 13-19 million (or 24-34% of) people in the UK aged 16+ were in digital poverty in 2022 due to being deprived on at least one dimension of digital deprivation – i.e., lacking either essential digital skills, appropriate devices, a home broadband connection, the regular actualisation of getting online, or a combination of these factors.

5.1 Overview

This chapter presents estimates of the number and proportion of the UK population in digital poverty in 2022, based on the definitions and methods set out in Chapter 4. Unless otherwise specified, the estimates below focus on the 16+ population.

It is estimated that ~13 million (or 24%) of people aged 16+ in the UK were in digital poverty in 2022 due to lacking a home broadband connection, appropriate device access or regular digital participation. As set out in Chapter 4.4, this is set as a conservative lower bound estimate of digital poverty.

It is estimated that the number of people aged 16+ in digital poverty increases to ~19 million (or 34% of that sub-population) once digital skills are accounted for. As set out in Chapter 4.4, this is set as the upper bound estimate of digital poverty.

*Figure 5.1. Digital poverty in 16+ population in the UK in 2022, lower bound and upper bound*

Segmenting these numbers further to consider the role of the various determinants of digital poverty, it is found that:

- **Broadband access:** ~14% of individuals lack a broadband connection.
- **Digital devices:** ~16% of individuals lack access to appropriate devices.
- **Digital participation:** ~10% of individuals fail to get online regularly.
- **Digital skills:** ~19% of individuals lack foundation EDS and 22% lack work EDS (as per Lloyds Bank’s 2022 EDS survey results).

Evidently the share of individuals deprived on each of these dimensions sums to more than the total of 24-34% estimated to be in digital poverty – highlighting that many are impacted across multiple dimensions of deprivation. For instance:

- **Severe digital poverty:** While it is estimated that approximately 6% of individuals are deprived across all indicators/dimensions, a much larger proportion (~15%) are deprived across two or more indicators/dimensions of digital deprivation.

*Box 5. How do these estimates compare to related estimates of digital deprivation and exclusion?*

- A 2022 study commissioned by EE and BT stated that 29% of adults have very low digital engagement – barely using internet devices, email or online shopping and banking).
- The latest Lloyds Bank’s Consumer Digital Index finds that 27% of UK adults report having low digital capability and remain digitally disadvantaged and underconfident.
- Ofcom data reports that as of January 2023 ~29% of UK households were reporting difficulty in affording communication services, up from ~15% in April 2021.
5.2. Which population groups are more likely to suffer from digital poverty, and to what extent?

As noted in Chapter 3, previous evidence identified strong associations between key demographic or socio-economic characteristics and certain of the key determinants, or dimensions of, digital poverty.

The analysis below confirms that these patterns hold when digital poverty is measured more holistically – i.e. when accounting for the extent to which the different dimensions of digital poverty overlap and intersect. It also highlights new patterns.

This analysis focuses in many cases on presenting the upper bound estimates of digital poverty, as these estimates aim to capture the additional impact of a lack of digital skills. However, where the patterns identified are particularly sensitive to whether the lower or upper bound estimates are used, this is highlighted.

Age

There is a significant negative relationship between age and digital poverty. This relationship is non-linear, and there is significant variation in the prevalence of digital poverty within age bands.

- The highest digital poverty rates are estimated among those aged 65 and older. 59% of this group are in digital poverty (or 45% based on the lower bound estimates), with approximately 20% in severe digital poverty.
- The lowest digital poverty rates are estimated among those between the ages of 25 and 54 years.
- Digital poverty rates are higher among the younger population segments (aged 16-24 years) than those aged 25-54.

**Figure 5.2 Digital poverty in the UK for 16+ population by age**

<table>
<thead>
<tr>
<th>Age bands</th>
<th>Share of 16+ population in digital poverty (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>65 &amp; over</td>
<td>100</td>
</tr>
<tr>
<td>55-64 years</td>
<td>90</td>
</tr>
<tr>
<td>45-54 years</td>
<td>80</td>
</tr>
<tr>
<td>35-44 years</td>
<td>70</td>
</tr>
<tr>
<td>25-34 years</td>
<td>60</td>
</tr>
<tr>
<td>18-24 years</td>
<td>50</td>
</tr>
<tr>
<td>16-17 years</td>
<td>40</td>
</tr>
</tbody>
</table>

Source: Deloitte analysis based on Ofcom, ONS, and Lloyds Bank’s EDS data

**Figure 5.3. Digital poverty in the UK for 16+ population, by single year age category (upper bound estimates)**

Gender

Women are more likely to be in digital poverty than men on average. 36% of women are estimated to be deprived on at least one dimension of digital poverty relative to 32% of men. 57

Women are more likely to be deprived on two or more dimensions of digital poverty than men. 16% of women demonstrate this degree of digital poverty relative to 14% of men.

While women also demonstrate higher levels of severe digital poverty than men (i.e. deprived across all dimensions of digital poverty), the differences are small.

**Figure 5.4. Digital poverty for 16+ population in the UK, by gender (upper bound estimates)**

~ 9 million (32%)
~ 10 million (36%)

Source: Deloitte analysis based on Ofcom and ONS data

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57 Or 26% vs 21% respectively based on the lower bound estimates.
Employment type and status

Unemployed and retired individuals are about twice as likely be in digital poverty than the employed or those out of the workforce (or about three times as likely based on the lower bound estimates).

- 47% and 55% of unemployed and retired individuals are in digital poverty compared to 24% of the employed.58
- Unemployed and retired individuals are also more likely to be in digital poverty than working-age adults out of the workforce – who have similar rates of digital poverty to those in employment.
- These two groups are also about 11 and 22 times as likely to be in severe digital poverty than employed individuals (at 9% and 19% respectively for unemployed and pensioners vs 1% for the employed).

Digital poverty is more prevalent among those living in households with lower ‘socio-economic’ classifications.

- Individuals in DE households (the lowest ‘social grade’) are twice as likely to be in digital poverty than individuals in AB households (the highest ‘social grade’) – or more than three times as likely based on the lower bound estimates.
- Those in DE households are also about 10 times as likely to be in severe digital poverty than their counterparts in AB households (at 15.9% vs 1.5%).

Regions and nations

There is also variation in digital poverty across different areas.

- The East Midlands (37%) and London (36%) were the regions of England with highest shares of digital poverty based on the upper bound estimates of digital poverty. But different patterns are evident when using the lower bound estimates.
- Northern Ireland is estimated to have the highest digital poverty rates across the nations of the UK.
- While Wales has the lowest digital poverty rate across the nations when focusing only on connectivity, devices, and participation alone (i.e. lower bound estimates), its digital poverty rate is nearly as high as Northern Ireland once gaps in digital skills are accounted for.
- Whether those in rural have higher digital poverty rates than those in urban areas is also sensitive to whether the lower or upper bound estimates are used.
These estimates shed new light on the scope and scale of digital poverty, and how it varies across the population, and inform Deloitte’s assessment of the potential benefits of eliminating digital poverty in Chapter 6.
6. Potential benefits of eliminating digital poverty

Eliminating digital poverty could generate significant economic and social benefits in employment, human capital and labour productivity, time savings, personal finances, health, organisational efficiency, and social outcomes.

6.1. Overview and summary of approach

This chapter provides a holistic but high-level assessment of the potential benefits associated with interventions to eliminate digital poverty. The aim of this assessment is to set out the potential scope and scale of benefits by addressing digital poverty. It does not aim to provide a comprehensive quantitative or qualitative assessment of all the benefits associated with eliminating digital poverty, either overall or within each impact category assessed. Certain categories – those assessed as being the ‘lowest hanging fruit’ – are therefore assessed in more detail than others. For ease and to avoid double-counting, we have simplified and isolated indicative impacts into discrete outcome categories, but these impacts are dynamic and interrelated. Further work to assess the full extent of the benefits associated with particular outcome categories or specific interventions will therefore be important.

Quantitative estimates are based on:

- the number of people affected by digital poverty within selected cohorts
- existing estimates of the impact of increased digital access, skills and engagement on key outcomes
- potential adoption rates of digital services.

All quantitative estimates are uncertain and reported as illustrative. All estimates are presented in 2022 £ terms.

6.2. Detailed logic model mapping

Figure 6.1 provides a detailed logic map of the anticipated benefits associated with initiatives to eliminate digital poverty. This builds on the framework set out in Chapter 4.5, and sets out an overview of the channels through which benefits are expected to be realised. It also provides an overview of other elements and supporting factors that will need to be considered (e.g. key enabling factors, wider spillovers, possible unintended consequences).

This analysis was informed by a consideration of the key dimensions of individual wellbeing outlined in HM Treasury’s Wellbeing Guidance for Appraisal (supplementary Green Book Guidance) and how these could be impacted by eliminating digital poverty, alongside a consideration of the evidence on how moving individuals online might impact outcomes for the two other key stakeholder groups focused on, businesses and government.

There are many mutual dependencies between key outcome categories. However, even without mapping these, the logic model mapping is complex. For ease, its representation has been simplified below by excluding any representation of the possible interactions between impact/outcome categories (which are likely to be important).

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59 Those for which possible impacts are assessed were likely to be more significant relative to the analytical investment required to effectively assess them.
60 This in turn draws on: UK Measures of National Well-being Dashboard, ONS, 2023
61 This included drawing on key existing evidence assessing the impact of digital exclusion or the possible benefits of digital inclusion and digitalisation, such as: The economic impact of digital inclusion in the UK, CEBR and Good Things Foundation, 2022; The economic and social impacts of enhanced digitalisation in Scotland, Scottish Futures Trust and Deloitte, 2015; Valuing Digital Inclusion, Just Economics and BT, 2014; and Champion for Digital Inclusion: The economic case for digital inclusion, PwC, 2009
Figure 6.1. Digital poverty assessment framework schematic

Enabling Factors:
- Adequate (non-digital) public service capacity and quality
- User-friendly digitalisation of government and business services
- Sufficient protection against online harms
- Broader support for vulnerable groups
- Continued upskilling and technology provision

Outputs and Mechanisms:
- Increased awareness and adoption of broader digital transactions/services
- Reduced social isolation
- Reduced anti-social behaviour
- Increased pro-social behaviour
- Social externalities

Key Outcomes:
- Improved health
- Improved human capital and productivity
- Improved personal finances
- Individual time savings
- Improved organisational efficiency and innovation
- Improved environmental outcomes
- Other improved personal outcomes (e.g., leisure quality)
- Improved social inclusion and related outcomes

Possible Outcome Measures:
- Jobs added and resulting household income from new jobs
- Reduced mortality and hospitalisations
- Improved quality of life and subjective well-being
- Direct increase in productivity and related earnings/output gains
- Increased educational attainment and broader skills development
- Additional household disposable income generated due to cost savings
- Value of time saved
- Greater revenues (businesses)
- Improved productivity and/or cost savings (government and business)
- Reduced CO2 emissions and local air pollution
- Improved subjective well-being/quality of life measures
- Additional time volunteering; increase in governance & social cohesion measures; decline in criminal justice costs

Spillovers and Other Impacts to Consider:
- Positive indirect and induced effects from additional household spending generated
- Positive impact on primary fiscal balance (increased tax revenue and reduced need for public spending)
- Possible societal externalities (such as the public good value of additional data)

Wider equities (e.g., reduced poverty and inequality, increased innovation, productivity growth)

Unintended negative impacts (e.g., due to online fraud and cyber bullying, enabling of crime networks, negative health impacts)

Source: Deloitte analysis
6.3. Summary of assessment

A summary of the outcomes of the assessment is presented in Figure 6.2 and Table 6.1 below. Figure 6.2 summarises the key illustrative benefits that are estimated and what further work could look to assess. Table 6.1 focuses on setting out more detail on the following elements for each key impact category.

- The key channels through which direct positive impacts (benefits) could be realised (or the key categories of benefits).
- A summary of the direct benefits that could be realised on each of these margins, including illustrative quantitative evidence on the likely scale of these benefits.
- The key indirect benefits that could be realised as knock-on impacts resulting from the key direct benefits.

The subchapters that follow provide an assessment of the key anticipated benefits associated with eliminating digital poverty, explored by impact (or outcome) category.

**Figure 6.2. Illustrative summary of the possible benefits associated with initiatives to eliminate digital poverty, by impact/outcome category**

<table>
<thead>
<tr>
<th>Key categories of benefits to consider in further work</th>
<th>Digital skills earnings premium</th>
<th>Improved personal finances</th>
<th>Reduced social exclusion</th>
<th>Personal time saved</th>
<th>NIS cost savings</th>
<th>Reduced unemployment</th>
<th>Central government cost savings</th>
<th>Improved health literacy among older adults</th>
<th>Improved telemedicine access for CHD patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>GVA to employers; benefits of broader human capital and education gains</td>
<td>6 mn</td>
<td>7-9 mn</td>
<td>1-2 mn</td>
<td>9-13 mn</td>
<td>N/A</td>
<td>46-56k</td>
<td>N/A</td>
<td>3-4mn</td>
<td>137-196k</td>
</tr>
<tr>
<td>Broader access to lower online prices</td>
<td>£17 bn in earnings</td>
<td>£4-6 bn in disposable income</td>
<td>£2 bn in individual utility</td>
<td>£2 bn in time value</td>
<td>£1 bn savings in GP practices alone</td>
<td>£1 bn in earnings</td>
<td>Up to nearly £3bn in efficiency savings</td>
<td>£18-24k lives saved</td>
<td>1-2k lives saved and 2-3k fewer in-patient visits</td>
</tr>
<tr>
<td>Adoption of other digital services and reduced travel time</td>
<td>Reduced GP costs due to increased uptake of digital health services by those moving out of digital poverty</td>
<td>Employment benefits gained from increased online job matching among employees</td>
<td>Cost savings from use of digital sector transactional services by those moving out of digital poverty</td>
<td>Reduced morbidity and mortality due to improved health literacy</td>
<td>Mobility and hospitalisation savings due to telemedicine access among less chronic treatment chronic patients</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Source: Deloitte analysis based on an evidence review drawing on a range of sources

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There is a high degree of uncertainty on all quantitative estimates presented in this table and the subchapters that follow, and all estimates are presented as illustrative. Estimates are presented in 2022 £ terms. These are static, illustrative estimates that do not account for broader equilibrium impacts across the economy. They are based predominantly on assumed supply side changes that rely on equivalent demand, and at this stage that demand is assumed, and impacts would vary with macroeconomic conditions. These estimates do not consider second order impacts, some of which may work in the opposite direction and thus offset some of the estimated potential benefits. For example, an increase in effective disposable income through lower online prices would mean more consumption for the individual but some product market displacement where purchases are substituted. In this example there could be a more efficient and equitable allocation of resources, but this would not translate 1:1 to increases in GDP. For these reasons, and because the estimates are not all measuring the same value, they should not be added together to produce an implied total figure.
## Table 6.1. Summary of the possible benefits associated with initiatives to eliminate digital poverty, by impact/outcome category

<table>
<thead>
<tr>
<th>Impact or outcome category</th>
<th>Key mechanisms</th>
<th>Description of direct positive impacts for key impacted stakeholder groups</th>
<th>Illustrative estimates or examples of key direct benefits[^63]</th>
</tr>
</thead>
</table>
| **Employment**                     | Improved ability and motivation to access to and use of online job markets (which results in reduced search frictions) | **Individual**: Increased employment and earnings
**Employers** (e.g., government, businesses, charities): Efficiency gains and economic value-added from filling vacant posts leads to increased output or service delivery, revenues and profits for businesses | Illustrative estimates by Deloitte suggest ~46-56k additional people moving into employment per year, which could be associated with ~£0.9-1.1bn in additional earnings per year for individuals. |
| **Human Capital and Labour Productivity** | Greater labour productivity resulting from both basic digital skills and technology access among the employed. Enables further learning (through e-learnings resources and improved access to offline education), leading to further educational attainment and human capital development among both adults and children. | **Individual**: Immediate increase in productivity is compensated with additional earnings in short-term; increased education and human capital development leads to greater productivity and earnings over the medium-to-long-term
**Employers** (e.g., government, businesses, charities): Some of the benefits from increases in worker human capital and productivity will take the form of greater cost savings and increased output/GVA per worker employed (including the form of greater revenues and profits for businesses). | Illustrative estimates by Deloitte suggest possible earnings increase equivalent to ~£16.9 billion per year due to the human capital gained through basic digital skills. This does not account for the direct benefits to be realised by employers from improved productivity.
A recent study suggests each 1% increase in school connectivity could be associated with a £282 million increase in the UK’s (annual) GDP. |
| **Individual time savings**         | Increased ability to reduce commuting through hybrid working. Increased adoption of online transactions and use of online tools – which reduces travel and improves ease/speed of transactions/tasks. | **Individual**: Increased utility from additional leisure time or wages (from extra hours worked) | Illustrative estimates by Deloitte suggest that the adoption of just two key categories of digital services – online banking and digital government services – among those moving out of digital poverty could be associated with aggregate monetary (time) savings worth ~£1.7-2.5 billion per year. |

[^63]: There is a high degree of uncertainty on all quantitative estimates presented in this table and the subchapters that follow, and all estimates are presented as illustrative. Estimates are presented in 2022 £ terms. These are static, illustrative estimates that do not account for broader equilibrium impacts across the economy. They are based predominantly on assumed supply side changes that rely on equivalent demand, and at this stage that demand is assumed, and impacts would vary with macroeconomic conditions. These estimates do not consider second order impacts, some of which may work in the opposite direction and thus offset some of the estimated potential benefits. For example, an increase in effective disposable income through lower online prices would mean more consumption for the individual but some product market displacement where purchases are substituted. In this example there could be a more efficient and equitable allocation of resources, but this would not translate 1:1 to increases in GDP. For these reasons, and because the estimates are not all measuring the same value, they should not be added together to produce an implied total figure.
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<tr>
<td>Personal finances</td>
<td>Improved ability to <strong>effectively open</strong> and/or <strong>manage bank accounts</strong> due to being able to leverage online applications and tools/resources. <strong>Improved access to the broader benefits of digital financial resources</strong> (e.g., online budgeting tools, insurance products, investment solutions). Enables access to a competitive online market, with <strong>lower prices and easier price comparisons</strong> (including through online deals/discounts).</td>
<td><strong>Individual</strong>: Increased disposable income (either realised as savings or the ability to generate increased utility from consumption). <strong>Government</strong>: Reduced healthcare costs from improved health outcomes; but this is partially offset by reduced mortality and increased awareness/use of certain preventative health services. <strong>Illustrative estimates by Deloitte suggest increases in annual aggregate disposable income of ~£4.4-6.3 billion (with ~£2.5-3.7 billion in disposable income to be realised from money saving websites alone).</strong></td>
<td></td>
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<tr>
<td>Health</td>
<td>Access to online health (and health service) information/resources <strong>boosts physical and mental health literacy</strong> – which improves healthy lifestyle choices, early detection, and the use of preventative care. Ability to get online improves access to and use of <strong>telemedicine services</strong>. Ability to get online improves access to <strong>communities and associated support</strong>, such as through social media and community websites.</td>
<td><strong>Individual</strong>: Fewer poor (mental and physical) health outcomes, reduced mortality, reduced hospitalisations, increased life years, improved quality of life. <strong>Government</strong>: Reduced healthcare costs from improved health outcomes; but this is partially offset by reduced mortality and increased awareness/use of certain preventative health services. <strong>Illustrative estimates by Deloitte suggest that ~18-24k older adult lives could be saved per year due to increases in health literacy among adults aged 65+.</strong></td>
<td></td>
</tr>
<tr>
<td>Other personal outcomes</td>
<td>Increased access to (and quality of) key public (and private) services. Increased <strong>variety and quality of broader consumption choices</strong>.</td>
<td><strong>Individuals</strong>: Increased consumption utility and broader subjective wellbeing. <strong>Related outcomes for government</strong>: Better achievement of core service delivery goals and related outcomes. <strong>Data from the 2014-15 UK Time Use Survey found that adults spent over a third of their overall weekly leisure time (14 hours a week) using a device.</strong></td>
<td></td>
</tr>
<tr>
<td>Social outcomes</td>
<td>Increased access to <strong>online communities and social networks</strong>. Increased access to, awareness of, and ease of use of <strong>social support services, and civic/political resources and opportunities</strong>.</td>
<td><strong>Individuals and communities</strong>: Reduced loneliness and social isolation, reduced anti-social behaviour and crime, increased pro-social behaviour (e.g., volunteering), increased social cohesion, and improved governance. <strong>Illustrative estimates by Deloitte suggest that reduced social isolation valued at ~£1.8-2.4 billion per year could be realised among older adults moving out of digital poverty.</strong></td>
<td></td>
</tr>
<tr>
<td>Environmental outcomes</td>
<td>Increased ability to reduce travel/commute through <strong>hybrid working and adoption of digital transactions</strong>.</td>
<td><strong>Individuals and communities</strong>: Reduced CO₂ emissions and pollution. <strong>A study of Vodafone teleworkers in the UK found that remote working led to a net increase in carbon savings of 889 CO₂e per worker per year.</strong></td>
<td></td>
</tr>
<tr>
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<td>Illustrative estimates or examples of key direct benefits[^1]</td>
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</tr>
<tr>
<td>Government outcomes</td>
<td>Population adoption of digital services improves transaction efficiency, and thus productivity; as well as improved targeting.</td>
<td>Government: Increased output (units of service delivery) and/or cost savings (due to reduction in staff and administrative costs per transaction)</td>
<td>Illustrative estimates by Deloitte suggest ~£0.5-0.7 billion saved per year because of improved uptake of digital (central) government services by those moving out of digital poverty; and ~£0.9-1.2 billion could be saved due to savings for the NHS from the uptake of digital GP services alone.</td>
</tr>
<tr>
<td>Business outcomes</td>
<td>Channel shift among SMEs leads to improved market access and greater organisational efficiency (including via increased innovation). Consumer adoption of digital services improves transaction service efficiency, and thus productivity; and consumer channel shift increases market size (e.g., consumers buying new products/services).</td>
<td>Businesses: Increased revenue and output, decreased costs and increased profits.</td>
<td>It is illustratively estimated that if all small businesses without appropriate internet access gained a broadband connection, each 1% increase in business revenue that resulted among those gaining access would translate into a £1.2 billion aggregate increase in SME revenues per year.</td>
</tr>
</tbody>
</table>
6.4. Employment

A rise in online job postings, virtual onboarding processes and social media networking has meant that those without digital access and/or skills face limited access to the job market. This impacts a significant portion of the population, with ~39-47% of the ~1.3 million unemployed individuals in the UK estimated to be in digital poverty.\(^{64}\)

Figure 6.1 below summarises the key channels through which initiatives to eliminate digital poverty are likely to generate increases in employment. For example:

- Studies have demonstrated a link between the ability to search for a job online and employment. For example, studies in Germany, South Korea and the US found that those with internet access were 7.1, 12.7 and 12 percentage points more likely to move into employment over a 12-month period than those without access.\(^{65,66}\)
- A lack of basic digital skills is also likely to limit the prospects of candidates meeting job requirements. A 2021 study in the Netherlands found that individuals with basic digital skills are 10% more likely to be employed than those who do not have basic digital skills.\(^{67}\)

Moving unemployed individuals out of digital poverty is therefore likely to increase their employment prospects.\(^{68}\) This in turn is expected to result in an increase in earnings and individual welfare.

**Figure 6.3. Mapping key employment-related benefits of eliminating digital poverty**

Based on this evidence, it is illustratively estimated that initiatives to eliminate digital poverty could help match ~46-56k additional people to jobs per year and generate ~£0.9-1.1 billion in additional individual earnings per year (in 2022 terms).\(^{69}\)

This estimate is based on:

- Estimates of the size of the unemployed population in the UK and the share of the unemployed population in digital poverty (from Chapter 5).

\(^{64}\) Based on OBR Q4 ’22 unemployment rate and ‘ONS 2020-based interim national population projections: year ending June 2022 estimated international migration variant’.

\(^{65}\) The digital divide and economic benefits of broadband access, Council of Economic Advisers Issue Brief, March 2016


\(^{67}\) Skill up or get left behind? Digital skills and labour market outcomes in the Netherlands, CPB Netherlands Bureau of Economic Policy Analysis, 2021

\(^{68}\) There is also evidence to suggest that those in employment could see improved employment prospects if moved out of individual poverty (e.g., due to being able to better use online job portals to transition into higher paying jobs). This is considered in the estimate of the ‘digital skills premium’ presented in Chapter 6.5, and thus is not included here to avoid double-counting.

\(^{69}\) It is assumed that because this increase in earnings is due to gains in employment specifically, it can be considered as additional to the benefits that might arise from the increase in productivity estimated among those that are employed – the latter is covered in more detail below.
Digital Poverty in the UK

• Existing evidence which suggests that 9.2% of this unemployed subpopulation would find employment every year if the entire sub-population moved out of digital poverty.\(^{70}\)
• The assumption that individuals matched to jobs would earn minimum wages and work average full-time hours.\(^{71}\)

The key caveats to note about these estimates are as follows:

• **This is not an estimate of the full GVA likely to be generated by increased employment.** This estimate focuses on the direct economic value of earnings attributable to newly employed individuals. Alongside this, there will be additional economic benefits realised by employers due to vacant positions being filled and a resulting increase in production and profits. As noted in Box 3 in Chapter 4, these direct impacts will also generate additional indirect benefits — see below.
• **This estimate of increased earnings will not translate directly into an equivalent increase in household income.** Many of the individuals that stand to benefit are likely on income support currently. Thus, the net increase in household income will be the difference between these additional (net of tax) earnings and the associated reduction in income from government transfers.
• **This estimate does not account for the potential benefits of improved access to online job markets and/or better job matching to individuals already in employment.** For example, one might also expect improved digital access and skills to help employed individuals match to (and transition into) higher paying jobs (see footnote 67). The potential wage-related benefits on this margin are captured within the digital skills premium estimate set out in Chapter 6.5.
• **There needs to be sufficient and appropriate labour demand within the economy** for these employment benefits to be fully realised (i.e. vacant jobs for unemployed individuals to match to).

**Examples of possible indirect and induced benefits**

**The direct increase in employment and earnings is likely to have positive knock-on economic and social impacts.** For example:

• Increased employment is associated with better physical and mental health outcomes (e.g., including due to the inherent health benefits of working, and due to having more resources to invest in one’s individual health).\(^{72}\)
• Mentally demanding activities at work are also associated with a delay in age-related cognitive decline.
• In addition, simply having a job can improve wellbeing — over and above the health impacts and the value reflected in the wage received. This may materialise through a greater purpose for life or wellbeing impacts from job satisfaction.\(^{73}\)
• Declines in unemployment are also associated with certain societal benefits, such as reduced crime\(^{74}\), and are likely to contribute to decreases in poverty and inequality.

As noted in Chapter 4, while additional net household income (alongside the GVA realised directly for employers and government) arising from the increase in employment will translate into knock-on increases in aggregate demand and associated GVA across the economy, this report does not assess these indirect impacts in detail. It is worth explicitly noting that any (direct and indirect) increases in income and wellbeing are likely to increase tax revenues and reduce demand for government income support and health/social services.

**However, there could also be certain indirect negative impacts that offset some of the benefits.** For example, those moving out of digital skills may displace certain workers currently in the labour force with lower non-digital skills. This could mean certain sections of the population are left behind relative to others.

\(^{70}\) 9.2% is the mid-point of a set of estimates and assumptions (ranging from 5.7% to 12.7%) drawn from across the literature on the likely impact of digital access on transitions into employment among the unemployed in high-income contexts. This ranges from the impact of studies assessing the impact of gains in digital skills and motivation, to those assessing simple gains in internet access. While UK studies on this issue have suggested that 3.5%-7.7% could be an appropriate range, the evidence underlying these UK-specific estimates is somewhat outdated. In contrast, more recent estimates in other high-income contexts find impacts ranging from 7.1-12.7%, with a recent UK study suggesting 5.7% is an appropriate estimate. Thus, the mid-point of these latter estimates is deemed a sensible estimate of the likely impacts.

\(^{71}\) As individuals in digital poverty tend to be on lower incomes, this assumption provides a conservative basis for the estimates. It should not be taken to imply that unemployed individuals that find work as a result of moving out of individual poverty will necessarily take on minimum wage jobs.


6.5. Human Capital and Labour Productivity

Human capital can be defined as the stock of knowledge, skills and personal characteristics that people have that enable them to be productive. This includes formal education but goes beyond it, with increased human capital associated with increases in labour productivity, earnings, and innovation. It is estimated that ~13-23% of the ~33.5 million currently in employment in the UK are not able to fully realize these associated benefits due to being in digital poverty.

Figure 6.3 summarises the key channels through which initiatives to eliminate digital poverty are likely to generate human capital and productivity related benefits.

**Figure 6.4. Mapping human capital and productivity related benefits of eliminating digital poverty**

![Diagram showing various benefits of eliminating digital poverty]

**Increased productivity from basic digital skills**

Digital skills are at the heart of upskilling conversations at the policy and society level. Multiple government programs are currently targeted at providing foundational digital skills to individuals. This is likely linked to the economic productivity and associated wage benefits they enable. For instance, there is a significant difference in salaries in the UK between jobs that require digital skills and those that do not – across all levels of non-digital skills. This aligns with economic theory which suggests differences in productivity are typically reflected in wages.

It is illustratively estimated that supporting all employed individuals to gain basic work EDS would generate earnings increases among workers of at least ~£16.9 billion per year (in 2022 terms). This estimate is based on:

- Existing evidence on the size of the employed population and the share of the employed population without work EDS (drawn from 2022 Consumer Digital Index), and estimates of those likely to gain employment due to moving out of digital poverty.

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76 Based on OBR Q4’22 unemployment and participation rate along with ONS 2020-based interim national population projections: year ending June 2022 estimated international migration variant
77 No Longer Optional: Employer Demand for Digital Skills, DCMS, June 2019
78 This estimate likely reflects the potential earnings benefits among the employed of differences in digital skills related productivity, as well as broader earning benefits linked to digital skills – such as how an improved ability to use online job markets could help employed individuals match to higher paying jobs.
79 Lloyds Bank’s Digital Consumer Index, 2022
80 Based on Lloyds Bank’s Digital Consumer Index (2022), we assume 18% of the population lack work EDS. While some of these group will have no digital skills and others may have partial digital skills, we assume that being unable to complete any essential digital tasks (as identified in the EDS framework) means that workers are not able to take on and realise earnings premiums from jobs that require digital skills.
The assumption these individuals earn minimum wage and work average full-time hours.\textsuperscript{81} Existing evidence a 14\% earnings premium is attached to digital skills for jobs with low skills levels.\textsuperscript{82} The key caveats to note about these estimates are as follows:

- **This is not an estimate of the full GVA likely to be generated by increased digital capability.** This estimate focuses on the direct economic value of additional earnings to individuals. In addition to this, there will be benefits realised by employers (e.g. increased output, revenue and profits) due to the increased productivity of their employees that gain digital skills.
- **There needs to be sufficient and appropriate labour demand** for these estimated productivity benefits to be fully realised (i.e. demand for labour with basic digital skills).

**Increased productivity from increased home internet and device access**

Economic theory assumes that technology augments the productivity of existing human capital, leading to increased output per worker, and this has been demonstrated and supported by a wealth of empirical evidence in different settings. For example, a 2018 Deloitte Survey looking at the UK workforce, found that using technology (such as a smartphone) helped improved the ease with which they accessed information or improved their ability to collaborate with colleagues.\textsuperscript{83} Increased internet connectivity and device access is therefore likely to directly increase worker productivity, particularly for those that engage in home-working – as outlined in Box 7 below.

**Box 7. The potential direct productivity benefits of improved home internet access**

- Recent analysis of the US labour force by Barrero et al. (2021) highlights the positive impact of home internet connections on labour productivity. 
- The study estimates that a move to universal high-quality home internet access is likely to increase aggregate labour productivity by 1.1\%, which in turn would lead to potential GDP gains of $160 billion per year (about 0.7\% of GDP).
- This estimate focuses on the productivity gains generated by workers earning $20,000 p.a. or more that do not have high-quality, fully reliable home internet. It also assumes all employed individuals are able to work from home in some capacity.
- This highlight the scale of the potential economic benefits that could be realised through moving towards universal home internet access in the UK.
- Further work could explore how this or similar analysis could be applied to estimate the impact of eliminating digital poverty in the UK, including extending this study to consider how improved device access may also impact productivity.

*Source: Internet access and its implications for economic productivity, inequality and resilience, Barrero et al., 2021*

**Increased human capital development among children**

The prominence of the digital world and e-learning tools and opportunities have expanded significantly over the past decade. As such, the potential human capital development benefits that could be realised from providing children with appropriate and safe digital access in their homes and schools are also expected to be significant.\textsuperscript{84} Indeed, digital learning methods and tools have become a mainstay of the education sector since the pandemic. And evidence suggests that children’s ability to effectively access the digital world can (contingent on supporting factors) improve their cognitive skills and educational outcomes, including on standardized test scores.\textsuperscript{85} In fact, resulting increases in children’s formal educational attainment are likely to be outmatched by increases in children’s broader human capital development (e.g. advanced digital skills, etc.).

\textsuperscript{81}This assumption should not be taken to imply that all individuals in digital poverty that are employed are in minimum wage jobs. Rather, as individuals in digital poverty tend to be on lower incomes, this assumption simply provides a conservative basis for the estimates.

\textsuperscript{82} No Longer Optional: Employer Demand for Digital Skills, DCMS, June 2019

\textsuperscript{83} Mobile Readiness for Work, Deloitte, 2018

\textsuperscript{84} This is despite earlier studies demonstrating mixed evidence on for example, see Woessmann, L., & Fucho, T. (2004). Computers and student learning: Bivariate and multivariate evidence on the availability and use of computers at home and at school. Available at SSRN 619101 and Malamud, O., & Pop-Eleches, C. (2011). Home computer use and the development of human capital. The Quarterly journal of economics, 126(2), 987-1027.

general cognitive skills). And these human capital development benefits will come on top of the direct productivity benefits children are likely to see due to having basic digital skills when they move into the workforce.

**Box 8. The potential economic benefits of increased school connectivity**

- A recent cross-country study analysing the impact of school connectivity (as measured by the Internet Access in Schools Index) found that improvements in school connectivity are positively associated with increases in effective years of schooling. It also finds that increases in schooling are in turn associated with direct increases in GDP per capita.
- Indeed, the study suggests a 1% improvement in school connectivity translates into a direct 0.01% increase in GDP per capita due to increased learning outcomes for children alone (i.e. separating this out from broader economic impacts associated with higher school connectivity, such as improved community connectivity).
- Applying these estimates directly to the UK would suggest that, all else being equal, each 1% increase in school connectivity could be associated with a £282 million increase in (annual) GDP (in 2022 terms) due to increases in learning outcomes.
- The study suggests this estimate likely captures only the short-term benefits of increased school connectivity, and that there could be additional benefits over the long-term.
- Further work could explore extending this analysis to assess the economic benefits improving children’s digital connectivity and device access at home, or their digital skills.

*Source: Connecting Learners: Narrowing the Educational Divide, The Economic Intelligence Unit, 2021*

**Increased human capital development among adults**

Increasing the number of people who can effectively engage online is also likely to have a positive impact on upskilling and associated human capital development among adults, which as above will have associated economic benefits. While these impacts are not assessed in detail here, it is worth noting that those shifted out of digital poverty will be:

- Granted access to affordable and accessible formal education opportunities in the digital world (e.g. ranging from e-learning opportunities offered by newer platforms such as GetSmarter or Coursera, to distance-learning degrees offered through established providers like Open University).
- Enabled to leverage the digital world to apply for (and better engage with) traditional routes of education and upskilling. Indeed, Statista reports that ~8.65 million downloads across 15 e-learning applications in the UK for 2022 – highlighting how prevalent these solutions have become and the scale of the opportunity those without digital access are missing out on.
- Support to investment in more informal human capital development opportunities, such as the development of more advanced digital skills or specific subject area knowledge through accessing and using digital information resources over time.

**Examples of possible indirect benefits**

These direct increases in productivity and human capital (including via formal educational attainment) are also likely to have knock-on implications for individual wellbeing, and broader economic and social outcomes – similar to those outlined for employment.

- For instance, like employment, increased education, and human capital (and the related increases in earnings) are associated with better physical and mental health outcomes (e.g., due to related increases in health literacy and resources to invest in preventative care and healthy lifestyle choice), alongside delays in age-related cognitive decline.

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81 Leading educational mobile applications in the United Kingdom in 2022, by number of downloads via Statista.


• Increases in educational attainment are also associated with a range of social benefits, such as reduced crime and anti-social behaviour,\textsuperscript{90} improved social cohesion,\textsuperscript{91} and increased civic participation.\textsuperscript{92}

While all additional net household income (alongside additional GVA realised directly for employers and government) arising from the increases in productivity will translate into further knock-on increases in aggregate demand and associated GVA across the economy, this report does not assess these indirect impacts in detail. However, it is worth explicitly noting that the (direct and indirect) increases in income and wellbeing are likely to increase tax revenues and reduce demand for government income support and health/social services.

6.6 Personal time savings

The ongoing digitalisation of workplaces and consumer-facing services means that there are increasing opportunities for individuals to realise efficiency gains (i.e., time savings) in their personal lives. Figure 6.5 below summarises the key channels through which initiatives to eliminate digital poverty are likely to generate time savings for individuals and households.

\textit{Figure 6.5. Mapping key time savings benefits of eliminating digital poverty}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{fig6_5.png}
\caption{Mapping key time savings benefits of eliminating digital poverty}
\end{figure}

\textbf{Awareness and adoption of online services and tools}

There are several reasons why the adoption of digital tools and resources tend to generate personal time savings. First, there is evidence to show that transactical digital services demonstrate reduced processing times for online inputs compared to their more traditional offline counterparts.\textsuperscript{93} For example, online grocery shopping services allow individuals to re-order old shopping lists with the click of a button; HMRC digital services pre-populate a portion of individuals’ tax returns; and online banking services tend to be more efficient than interacting with a member of staff in a physical bank branch.

It is illustratively estimated that moving all individuals aged 16+ out of digital poverty could generate aggregate time savings of $\approx 280-400$ million hours in personal time savings per year, at a value of $\approx £1.7–2.5$ billion (in 2022 terms), due to the uptake of just two essential digital services (online banking and eGovernment services).


\textsuperscript{93}Digital Efficiency Report, Cabinet Office and Central Digital & Data Office, November 2012
This estimate is based on:

- Estimates of the size of the 16+ population in digital poverty (from Chapter 5) and the assumption of a 70% adoption rate of these two key digital services.  
- Existing evidence, from recent CEBR analysis, showing that individuals can save 60.9 hours per year on average from fully utilising the aforementioned online services, and the assumption that only half of transactions are conducted online.
- The hourly value of leisure time drawn from Department for Transport’s TAG framework.

The key caveats to note about these estimates are as follows:

- **The true value of the personal time saving enabled by initiatives to eliminate digital poverty is likely to be higher than this for two key reasons.** First, there are a range of other digital services and tools beyond the two core services focused on above that are likely to be adopted by those moving out of digital poverty (from online grocery shopping to submitting tax returns), and these will increase household task efficiency and generate further time savings. Second, this does not account for the reduced need for (non-work related) travel enabled by the adoption of such digital services.
- **This is not an estimate of the GVA likely to be generated by this time savings.** Instead, it focuses on estimating the direct monetary value of the utility individuals might gain due to having additional leisure time.

**Hybrid Working**

The adoption of digital technology such as video conferencing technologies has been on the rise for some time with the COVID-19 pandemic boosting the rate of adoption of hybrid work environments – enabling employees to work from home, office, or any other preferred location with appropriate connectivity. While this could generate timing saving through different channels, the key way in which this generates time savings for individuals in their personal capacity is via a reduction in the time employed individuals spend commuting (or the time that those interviewing for jobs spend travelling to job interviews). The evidence suggests these impacts could be substantial, with a recent study across 27 countries finding that workers are able to save 72 minutes a day due to a home-work set-up on average. This highlights a key channel through which the ~13-23% of the employed population currently in digital poverty stand to benefit should they be provided the skills and resources to get online effectively.

**Examples of possible indirect benefits**

The direct increase in leisure time is likely to have knock-on implications for economic and social outcomes across a range of stakeholders. Though these benefits are not assessed in detail, a few examples are provided below.

- Increased time savings could be associated with improved health outcomes (e.g., due to associated increases in the capacity to invest in healthy lifestyle choices, such as exercising) and broader increases in well-being (e.g., a greater sense of work-life balance).
- Increased wellbeing (alongside any increase in disposable income) are associated with broader social benefits, such as reduced crime and anti-social behaviour, and increased civic/political participation.
- Increased time savings could lead to a greater disposable income if the time freed up is used to work and generate additional income, which in turn will translate into knock-on increases in aggregate demand and associated GVA across the economy (including tax revenues).
- Increased time savings could increase the amount of time parents spend involved in shared leisure activities with their children, which aids family bonding and communication, and supports children’s intellectual, social and psychological development.

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94 This latter assumption is based on existing evidence of adoption rates of these types of services among those online, as reported in: Harvey, M., Hastings, D. P., & Chowdhury, G. (2021). Understanding the costs and challenges of the digital divide through UK council services. Journal of Information Science, 01655515211040664.
95 The economic impact of Digital Inclusion in the UK, CEBR and Good Things Foundation, 2018
96 OBR CPI estimates and DfT’s TAG framework – Values of travel time savings and reliability, Department for Transport, 2015
97 Time Savings when working from home, European Bank of Reconstruction and Development, May 2023
98 Deloitte analysis
99 For example, see Mannell, R. C. (2007). Leisure, health and well-being. World Leisure Journal, 49(3), 114-128; and Is hybrid working here to stay? ONS, 2022
Increased health and wellbeing (alongside any increase in disposable income) is also in turn likely to reduce demand for government income support and key social/health services.

### 6.7. Personal finances

Figure 6.6 below summarises the key direct channels through which initiatives to eliminate digital poverty are likely to improve personal finances – looking beyond the mechanisms of increased employment and wages. This highlights two key transmission channels: (a) opportunities for improved financial inclusion; and (b) a competitive marketplace with a multitude of online commerce websites and bargain hunting portals, affording greater price flexibility to those that are digitally connected. These are discussed in more detail below.

**Figure 6.6. Mapping key personal finance benefits of eliminating digital poverty**

Access to lower prices

- **Improved consumer savings and disposable income (e.g., due to lower online prices)**
- **Indirect benefits of improved household finances (e.g., improved health)**

Source: Deloitte analysis based on online evidence review

**Access to lower prices**

The internet is a rapidly evolving marketplace with e-commerce portals and social media platforms affording users greater choice and range of products at competitive prices as opposed to the stock available at brick-and-mortar stores. With the availability of bargain hunting websites, users are now able to find cheaper deals that offline information asymmetry inhibited. Indeed, amidst a cost-of-living crisis, recent evidence suggests that those digital poverty are being adversely impacted due to a lack of access to online deals and discounts which reduce the cost of goods online when compared to offline shopping.

It is illustratively estimated that moving all individuals aged 16+ out of digital poverty could lead to increases in aggregate disposable income of ~£4.4-6.3 billion per year (in 2022 terms) – with ~£2.5-3.7 billion in disposable income to be realised from money saving websites alone. This could translate into either increased savings or increased consumption of goods and services.

This estimate estimated follows a similar approach to recent CEBR analysis and is based on:

- Estimates of the size of the 16+ population in digital poverty (from Chapter 5) and the assumption that 50% of this subpopulation would take advantage of lower online prices and online deals if they gained appropriate digital access and skills.
- Existing evidence which shows that individuals save on average about £900 per year (in 2022 terms) from being online, due to shopping, discounts, saving on utility bills or reducing costs, and that about £526 of this (in 2022 terms) could be realised by making use of online deals and discounts on money saving websites alone.

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102 Digital Poverty in the UK, Institute for Development Studies, 2022
103 The economic impact of Digital Inclusion in the UK, CEBR and Good Things Foundation, 2018
104 Lloyds Bank’s Digital Consumer Index, 2017
105 Lloyds Bank’s Digital Consumer Index, 2017
106 Post adjusting weekly minimum wage with the average median age, the per household savings comes out to be ~£389.
Digital Poverty in the UK

• A scaling factor to account for the fact that individuals moving out of digital poverty will tend to be on lower incomes than the average individual in the population (using wages estimated in Chapter 6.5 as a proxy). This is therefore not an estimate of the potential GVA that could be generated because of any increased personal savings, but simply an estimate of the monetary value of the potential increase in personal savings.

Improved financial inclusion

Digital banking and online financial solutions are increasingly important to supporting financial inclusion and effective engagement with the financial system – particularly for vulnerable populations (e.g., those in rural areas without a nearby bank branch). Individuals in digital poverty therefore face an increased risk of being financially excluded (e.g., an inhibited ability to effectively open and/or manage bank accounts) and of missing out on the broader benefits of digital financial resources (e.g., online tools that can help individuals to better manage their own financial resources). Indeed, recent evidence suggests that users of e-banking and financial services can keep a better track of their finances and account balances as opposed to those still relying on paper-based bank statements. While these potential positive impacts are not monetised in this report, it is important to note that this impacts a sizeable portion of the population and thus stands to generate significant benefits – with a 2020-21 study finding that ~500,000 adults in the corresponding financial year had no access to bank accounts.

Box 9. Relationship between digital inclusion and financial inclusion

Online banking and financial services have become a mainstay of the current financial system, with 96% and 97% of those with high and very high digital capability using the internet for online banking/money management respectively. In addition, key services such as opening a bank account, checking bank statements and even universal credit disbursement are increasingly moving online. For these reasons, those in digital poverty are at a direct financial disadvantage compared to those currently online. This is highlighted in the 2022 Digital Consumer Index (Lloyds Bank), which notes that those who manage their money online (in comparison to those who don’t) are:

- **2.6 times more likely to check their balance**
- **Saving 5.1 times more money**
- **Saving 2.2 times more frequently**

Source: Lloyds Bank’s Digital Consumer Index, 2022

Examples of possible indirect benefits

The direct increase in financial inclusion and disposable income is expected to have knock-on implications for a range of economic and social outcomes. Though these impacts are not assessed in detail in this report, a few examples are provided below.

• Increased disposable income is associated with improved health outcomes (e.g., due to associated increases in resources invested in preventative care and healthy lifestyle choices).

• Increased disposable income is associated with broader societal benefits, such as reduced crime and anti-social behaviour, and increased civic participation.

• Increases in disposable income can also lead to a greater financially self-reliant population, which in turns decreases the burden on the government, reducing social security payments, and effectively contributing to greater fiscal capacity.

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107 A separate study commissioned by Vodafone and YouGov focused on a sample of 2,000 adults found that families stand to lose out on £3,432 per year if they lose access to online best prices and deals. Drawing on the estimates of the number of households (rather than individuals) in digital poverty as calculated in chapter 5 would suggest an alternative estimate of potential aggregate household savings of ~12.5-17.9billion.

108 Individuals without access to the internet miss out on a wide array of savings opportunities, from cheaper travel to discounts on food and clothes (Lloyds Bank’s Digital Consumer Index, 2022).

109 Lloyds Bank’s Digital Consumer Index, 2022

110 Financial Inclusion: Annual Monitoring Report 2022, University of Birmingham


6.8. Health

The digitalisation of healthcare resources and services continues to be a catalyst for improved health outcomes, including via improved access to quality healthcare and health/healthcare information. However, unlocking these health benefits requires individuals to have their basic digital needs met. Figure 6.7 below summarises the key channels through which initiatives to eliminate digital poverty are likely to enable improved health outcomes.

Figure 6.7. Mapping key health benefits of eliminating digital poverty

- Improved health outcomes (e.g., reduced prevalence of disease and mental health issues)
- Reduction in hospitalisations and mortality; increase in life years and quality of life (QALYs)
- Lower healthcare costs from improved health (but partially offset by lower mortality)
- Indirect effects (e.g., increased productivity)

Source: Deloitte analysis based on online evidence review

Improved health literacy

Being online tends to improve one’s health literacy,\(^1\) which in turn is associated with better health outcomes and reduced mortality. The evidence for the impacts via this channel appears to be strongest for adults aged 65 and over – of which ~45-64% (5.2-7.3 million) likely face poor health literacy development opportunities due to having at least one form of digital deprivation.\(^2\)

It is illustratively estimated that moving older adults out of digital poverty could result in increased levels of functional health literacy among this group, which in turn could potentially result in ~18-24,000 lives being saved per year among those aged 65 and over.

This estimate is based on:

- Estimates of the number of older adults (aged 65+) in the UK that are in digital poverty (as per Chapter 5).
- Existing evidence on share of this group that have low, medium and high health literacy levels.\(^3\)\(^4\)
- The weighted average of mortality rate in a counterfactual scenario.\(^5\)\(^6\)
- The external estimates of the share of individuals that move online that are likely to see increased health literacy levels.\(^7\)\(^8\)

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4. It is assumed that health literacy levels among the general population and the same as for those in digital poverty. Functional health literacy is chosen to maintain consistency across the literature referenced in this report.
5. Age-specific death rate per 1,000 population in the United Kingdom in 2021, by gender – access via Statista
7. 65% individuals reported improved health literacy due to digital access as per, Health and Digital: Reducing Inequalities, Improving Society, Good Things Foundation (formerly Tinder foundation), 2016
8. This improvement in health literacy is assumed to be a step change, i.e., those with low health literacy move to medium level and those with medium level move to high level health literacy.
• Existing evidence on the impact of increased health literacy on mortality rates.\textsuperscript{121}

The key caveats to note about these estimates are as follows:

• This estimate does not account for how improved health literacy may improve quality of life. Further work could look to consider conducting a comprehensive assessment of the likely increase in quality adjusted life years (QALYs) expected to result from improved health literacy among those in digital poverty.

• This estimate focuses only on the direct mortality reduction benefits of improved health literacy and does not cover reduced broader morbidity benefits that are likely to be realised. For example, the evaluation of the NHS Widening Digital Participation programme found that improvements in health literacy had a positive impact on mental health and loneliness, and decreased anxiety and depression.\textsuperscript{122} Inadequate health literacy is an independent risk factor for hospital admission,\textsuperscript{123} while higher levels of health literacy are associated with greater preventive health measures.\textsuperscript{124}

• This estimate focuses on older adults only. Further work could look to quantify the additional (albeit smaller per person) health benefits that could be realised due to increases in health literacy among other groups. For example, a systematic review of the health impacts of health literacy highlighted that low health literacy was a risk factor for hospitalisation and emergency care among a wider range of populations beyond just older adults – including children and those with chronic illnesses.\textsuperscript{125}

• This estimate does not account for the fact that if individuals live longer, they may experience other health problems. There could thus be some increases in poor health and morbidity that offset some of the health benefits, through individual and system wide outcomes – e.g., increased costs for the NHS.

This evidence suggests that improvements in healthy literacy resulting from shifting individuals out of digital poverty are likely to generate significant benefits in terms of improvements in health outcomes across the population.

### Improved access to telemedicine and e-health services

There is a range of evidence highlighting the positive impact of telemedicine access on individual health outcomes, particularly for those with chronic conditions. Indeed, a comprehensive systematic review from 2021 found that telemedicine interventions across different digital modalities consistently improved health outcomes across a range of medical disciplines, including: cardiovascular disease, dermatology, endocrinology, neurology, nephrology, obstetrics, ophthalmology, psychiatry and psychology, pulmonary and multidisciplinary care.\textsuperscript{126} Outcome assessed in such studies range from reductions in hospitalisations and mortality rates, to improvements in mental wellbeing.

While telemedicine services have traditionally been delivered via telephone alongside digital solutions, accelerating digitalisation appears to be driving a move toward a reliance on digital solutions – meaning those in digital poverty are increasingly unable to access the benefits of such services. In a recent systematic review of coronary heart disease, roughly one third of telehealth interventions assessed relied on digital solutions, and the 2021 systematic review mentioned above excluded telephone-based interventions due to it not being considered “a common mode of telehealth”.

Using chronic heart disease (CHD) as an example, it is illustratively estimated that “1.5k-2.1k lives could be saved and “2.0-2.8k fewer inpatient admissions seen per year due to improved telemedicine access resulting from elimination of digital poverty.

The estimate is based on:

• Estimates of the size of the 16+ population in digital poverty (from Chapter 5) and existing on inpatient admissions because of coronary heart disease (CHD), assuming one admission corresponds to one individual.\textsuperscript{127}

• Existing evidence on the number of deaths per year due to CHD in the UK.

\textsuperscript{121} 6.54% reduction in mortality on moving medium health literacy adults to high health literacy and a 20.63% reduction in mortality on moving low health literacy adults to low health literacy as per, Bostock, S., & Steptoe, A. (2012). Association between low functional health literacy and mortality in older adults: longitudinal cohort study. Bmj, 344.

\textsuperscript{122} Digital Inclusion in Health and Care: Lessons learned from the NHS Widening Digital Participation Programme, Good Things Foundation, 2020


\textsuperscript{127} Health and Circulatory Disease Statistics, British Heart Foundation, 2023
There is evidence that improved health can lead to healthier populations and communities, with potential indirect benefits such as increased economic productivity and reduced healthcare costs. However, there are key caveats to consider when assessing the potential benefits of improved health outcomes.

**Improved access to community and support**

While this category is not assessed in detail here, another channel through which health benefits may be realised from improved health outcomes is through the mediating impact of increased community development and support. Indeed, being online can increase peer-to-peer interactions in the form of online support groups and community forums, which in turn can support improved health outcomes. Therefore, online support services can help connect marginal groups at-risk with the healthcare system, thereby ensuring access to healthcare resources which might not otherwise have occurred.

**Examples of possible indirect benefits**

There is evidence that improved health can lead to a wide array of benefits for the society, some of which are listed below.

- There is also evidence to suggest that reductions in poor health are likely to increase economic productivity.
- Reductions in poor health and mortality are also likely to contribute to longer periods in the workforce and thus increases in earnings. This in turn will translate into knock-on increases in aggregate demand and associated GVA across the economy.

128 Health and Circulatory Disease Statistics, British Heart Foundation, 2023
130 Alternate analysis based on Inglis, S. C., Clark, R. A., McAlister, F. A., Ball, J., Lewinter, C., Cullington, D.,... & Cleland, J. G. (2010). Structured telephone support or telemonitoring programmes for patients with chronic heart failure. Cochrane database of systematic reviews, (8) - finds that moving CHD patients out of digital poverty could lead to ~4,300-6,500 reduced hospitalisations and ~908-1,360 lives saved due to uptake of telemedicine services.
131 UK health indicators: 2019 to 2020, ONS, 2022
133 Communities and health, The King’s Fund, 2021
• A healthier population could decrease the burden on the NHS by driving a reduction in appointments and procedures, thereby reducing government spending; however, this may be at least partially offset by the reduction in mortality – which will mean that individuals remain reliant on the NHS (and the broader social care system) for longer.

6.9. Government outcomes

The UK roadmap of 2022-25 for the transformation of data and digital for a digital future\textsuperscript{136} outlines a clear push towards digitizing the public services and civil government, with benefits being realised from efficiency gains due to shifting to paperless services and reduced offline interactions. However, for such efficiencies to be realised, citizens need to adopt digital services. This is assumed to be the key mechanism through which the elimination of digital poverty is likely to generate direct benefits for government. This is summarised in Figure 6.8.

Figure 6.8. Mapping key government efficiency benefits of eliminating digital poverty

- Uptake of central government digital services
- Uptake of NHS digital services
- Uptake of local government digital services
- Uptake of other government digital services

Increased output (service delivery) and/or cost savings

Improved quality of service delivery

Indirect benefits of increased digital service uptake (e.g. improved civic engagement)

Source: Deloitte analysis based on online evidence review

Uptake of central government digital services

Analysis of the e-government services across the European Union highlights government savings of over €3 million due to e-procurement systems in Italy while electronic invoicing saves taxpayers €150 million a year in Denmark.\textsuperscript{137} In a similar vein, the UK Government’s Central Data and Digital Office for the period 2022-25 recently stated there could be potential savings of over £1 billion due to digital services replacing paper-based services and processes as part of the government’s 2022-25 roadmap for digital and data.\textsuperscript{138,139}

It is illustratively estimated that moving all individuals out of digital poverty could unlock ~£0.5-0.7 billion in cost savings per year (in 2022 terms) for the UK’s central government per year due to increased uptake of e-government transactional services.

This estimate is based on:

• Estimates of the size of the 16+ population in digital poverty (from Chapter 5) and the assumption of a 70% adoption rate of digital government services if this population moved out of digital poverty.\textsuperscript{140}

\textsuperscript{136} Transforming for a digital future: 2022 to 2025 roadmap for digital and data, Central Digital and Data Office, 2022

\textsuperscript{137} eGovernment and digital public services, European Commission, 2022

\textsuperscript{138} Transforming for a digital future: 2022 to 2025 roadmap for digital and data, Central Digital and Data Office, June 2022

\textsuperscript{139} These estimates appear to be based on current levels of digital access and participation.

\textsuperscript{140} This latter assumption is based on existing evidence of adoption rates of these types of services among those online, as reported in: Harvey, M., Hastings, D. P., & Chowdhury, G. (2021). Understanding the costs and challenges of the digital divide through UK council services. Journal of Information Science, 01655515211040664.
• Similar to recent CEBR analysis, estimates of the potential cost savings (per person) from the uptake of eGovernment services – based on the 2012 Government Digital Efficiency report but uprated to 2022 £ terms.

Uptake of local or other government services

Moving people out of digital poverty is also likely to increase the adoption of digital services that are being introduced more broadly across the public sector, which as above will translate into cost savings for government. While the above impact margin is not assessed in detail, below a set out illustrative evidence is laid out in brief.

• The Lloyds Bank’s Digital Consumer Index for 2022 highlights that 29% of those currently offline are unable to effectively interact with their local council, and that higher levels of digital capabilities are associated not just with increased use of central government digital services, but increased uptake of digital services offered by local councils and other government services (such as paying council tax bills, signing up for public libraries, applying for permits, etc.).

• Various local councils have realised cost savings through digital services – such as the £750,000 in annual savings realised by the London borough of Hillingdon because of its adoption of Google Apps, or the £1.55 million saved in contact costs from the deployment of an online self-service portal by the London borough of Harrow.

• More recently, the Digital Channel Shift Programme helped 23 local councils generate a total of more than £1.69 million in efficiency savings and increased income during their first year of operation – delivering an average return of £5.64 on every £1 of grant funding from digitalisation of local government transactions. An evaluation of the NHS Widening Digital Participation

Box 10. An illustrative snapshot of potential NHS savings per year due to elimination of digital poverty

Looking beyond central government cost savings, an assessment of the cost savings that the NHS could achieve from eliminating digital poverty is illustratively carried out within this report. NHS England has estimated that there are 7.2 million missed GP appointments annually costing the NHS £216 million (e.g. because ’Did Not Attends (DNAs)’ adversely impact clinical capacity). Existing evidence suggests individuals with digital access are more likely to attend appointments, cancel them on time, or not need to attend appointments in the first place (due to being able to access health information online). This highlights the potential cost savings that can be realised for government from the adoption of digital tools.

Focusing only on the benefits that could be achieved through increased uptake of digital GP services alongside the indirect benefits of the estimated reduction in hospitalisations due to the health improvements estimated in Chapter 6.8, it is estimated that the following illustrative annual cost savings benefits could be realised for the NHS per year (in 2022 £ terms):

- ~0.9-1.2 billion saved from reduced GP visits
- ~6-8 million saved from appointments booked online in 2030
- ~10-15 million saved from reduced hospitalisations among those with severe heart disease in 2030

Source: Deloitte analysis based on a range of sources.

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141 The economic impact of digital inclusion in the UK, CEBR and the Good Things Foundation, 2022
143 The 2012 Government Digital Efficiency (GDE) report is assessed to provides the most comprehensive available evidence on what the potential cost savings the UK government could realise due to the uptake of key digital transactional services, and related efficiency gains from reduced staff, estates, materials, and equipment costs. Institute for Government’s 2017 report ‘Making a success of digital government’ indirectly validates the cost savings estimates produced in the GDE report. This 2017 IfG analysis estimated that government aggregate cost savings from efficiency gains on transactional services could reach up to £2 billion by 2020 – a number which is roughly equivalent to the (inflation-adjusted) value of the mid-point of the cost saving estimates presented in the 2012 GDE report (of £1.75 billion).
144 Lloyds Bank’s Digital Consumer Index, 2022
145 Transforming local public services, Local Government Association, June 2014
146 The Digital Channel Shift Programme: An evaluation, Local Government Association, 2019
program from 2017-19 found that learners made fewer visits to GPs and A&E which in turn translated to cost savings.\textsuperscript{147} Further analysis of the potential benefits of cost savings generated for the NHS are set out in Box 10 below.\textsuperscript{148 149}

**Examples of possible indirect benefits**

Improvements in government efficiency can in turn lead to a wide array of indirect benefits for the society. For example:

- Central government cost savings would mean that the government would have greater fiscal capacity to boost economic investment, support employment, or improve quality and coverage of key services.
- Cost savings by the NHS could support increased investment in equipment and services, thereby increasing the quality of care provided to patients, which in turn could lead to improved health outcomes across the UK.
- Increased monetary power with the government could lead to better development of infrastructure, public institutions, support schemes etc. which would help to improve the standard of living and thereby boost social outcomes for the UK.

6.10. Business outcomes

A lack of digital access, skills and engagement also has direct implications for businesses beyond the potential employment and labour productivity benefits pointed to in Chapter 6.4 and 6.5. For example, this may be because a portion of businesses’ potential consumer base is offline; or because certain small and medium enterprises (SMEs) – which can often be based in homes – lack appropriate internet connections or digital devices.

Figure 6.9 accordingly sets out the key channels through which initiatives to eliminate digital poverty are likely to generate direct benefits for business (beyond those already covered above).

*Figure 6.9. Mapping key business efficiency benefits of eliminating digital poverty*

**Improved customer reach and opportunity targeting**

Small businesses stand to benefit from channels of growth opened by digital sources which otherwise would not have been accessible, including increased access to (export) opportunities abroad and improved consumer targeting. For example, with the use of social media platforms, small businesses can advertise their products more effectively thereby increasing their market reach.

However, small businesses (which can often be run out of households) are at a particular disadvantage and can be directly impacted by digital poverty when the business (as an entity) does not have appropriate access. Indeed, a 2018 study surveying small businesses within the UK found respondents without adequate broadband internet access be at a disadvantage when it comes to...

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\textsuperscript{147} Digital Inclusion in Health and Care, Good Things Foundation, September 2020

\textsuperscript{148} These include: The economic impact of digital inclusion in the UK, CEBR and Good Things Foundation, 2022; Digital Inclusion in Health and Care, Good Things Foundation, 2020; Key facts and figures about the NHS, The King’s Fund, 2023; NHS – GPPS National Results and Trends, NHS, 2022; The economic and social impacts of enhanced digitalisation in Scotland, Deloitte report for the Scottish Futures Trust, 2015; Heart & Circulatory Disease Statistics 2023 – BHF

\textsuperscript{149} The analysis in Box 10 is illustrative and does not comprehensively cover all the potential benefits that could be realised by the NHS through the elimination of digital poverty. For example, there could be additional savings on paper-based letters if there was confidence that patients were using online services.
business growth. In particular, the survey found that 30% of small businesses in the UK reported not having access to broadband connections with speeds of at least 10 mbps and out of this share 49% reported that a lack of a decent broadband connection had been a hindrance to their growth.  

This suggests that SMEs stand to benefit significantly from interventions to eliminate digital poverty. Indeed, it is illustratively estimated that if all small businesses without appropriate internet access gained a broadband connection, each 1% increase in business revenue that resulted among this group of SMEs (from increased access to opportunities) would translate into a £1.2 billion aggregate increase in SME revenues per year (in 2022 terms). This estimate focuses on estimating potential revenue benefits to small businesses from online access. This does not account for the potential market reach benefits that could be realised by larger business due to additional consumers moving online. This is not an estimate of the full GVA to be generated by increased digital access among small businesses. This estimate does not capture the potential productivity gains that could be seen due to employees having increased digital access at work.

Efficiency gains (and related cost savings) for small businesses

Moving small businesses out of digital poverty is also likely to reduce business costs through the adoption of digital services that help convert offline processes into digital ones, leading to efficiency gains and cost savings. While the above impact margin is not assessed in detail, illustrative evidence is set out below in brief.

- With small businesses pressed for resources, digital solutions offer an avenue for reduced administrative costs, with a study conducted by Deloitte Australia estimating that every time an e-invoice replaces a paper invoice, it can result in up to $20 in cost savings for the business. Hence, with a greater consumer base online, businesses can reduce their reliance on paper-based offline services in line of increased digital service participation among their consumers.
- Alongside a potential reduction in administrative costs, these businesses stand to benefit from productivity boosts that online solutions offer, with a report looking at SMEs within the European Union noting that SMEs using data-driven innovations were able to increase their productivity thereby reducing costs.

Efficiency gains (and related cost savings) for large businesses

While the gains for small businesses are largely due to proactive action on their part of getting digitally connected, large businesses have increased avenues to target customers who have moved out of digital poverty thereby increasing their profits while simultaneously reducing costs due to adoption of digital services (going paperless) for traditionally offline customers. While the above impact margin is not assessed in detail, illustrative evidence is set out below in brief.

- With customers moving online because of the elimination of digital poverty, large businesses can utilize digital services for advertising, market and customer targeting to boost revenue from traditionally offline customers, with an analysis of the Google Ads technology in the Australian market finding that online advertisement contributes significantly to business profits and jobs. Alongside potential gains from improved customer outreach, these businesses stand to benefit from reduced costs due to greater adoption of digital services by previously paper-based customers, with an analysis of the financial services industry in South Africa finding that reduction in paper-based record keeping within the financial services sector can lead to increased cost savings for businesses operating within the sector.

Examples of possible indirect benefits

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150 Lost Connection, The Federation of Small Businesses (FSB)
151 This illustrative estimates used ONS business population estimates, and the shares reported in the FSB 2019 report, and ONS data on average turnover (or revenue) of the smallest firms (0-9 employees) and assuming firms in digital poverty will be performing lower than the average business population.
152 Tax Insights, Introduction of electronic invoicing (e-invoicing) into the Australian market, Deloitte Australia, April 2021
153 SME Digitalisation – charting a course towards resilience and recovery, Vodafone and Deloitte, September 2020
154 Examination of the value created by the advertising technology industry in Australia, PwC Australia, September 2021

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The direct improvements in business outcomes are likely to have knock-on economic and social impacts across a range of areas. Though these are not assessed in detail, a few examples are provided below.

- Increased turnover within businesses is likely to lead directly to job creation and (if associated with profitability) could lead to an increase in average employee wages/benefits.\(^\text{156}\)
- Higher profits and employee earnings would increase households’ disposable income, which in turn contribute to improved health outcomes, including through greater investment by individuals in preventive and curative health.\(^\text{157}\)
- Small businesses are an integral part of local communities, and their growth could lead to greater social cohesion within the communities they are a part of.\(^\text{158}\)

As noted in Chapter 4, while increases in business output, revenues and profits will translate into knock-on increases in aggregate demand and associated GVA across the economy, this report does not assess these indirect impacts in detail.

### 6.11. Other key direct outcomes

The subchapter below sets out a few further impact categories and provides a brief overview of the mechanisms through which they impact key stakeholders identified as part of this analysis.

#### Other direct personal outcomes

The evidence for how digital access (or the lack thereof) might impact broader personal outcomes is more uncertain, given a lack of specific evidence. Two key channels through which initiatives to eliminate digital poverty are likely to improve broader personal outcomes (beyond the impacts already noted above) are set out below.

- **Improved access to (and quality of) key basic services:** The ability to effectively get online can increase the ease with which individuals, particularly vulnerable populations, are able to access key public and private sector services beyond those already assessed above – such as income support, housing, social services, or energy. This could also improve the breadth and quality of the basic services (and service providers) that individuals have access to.
- **Increased quality of consumption and leisure time:** The ability to effectively get online can increase the value that individuals derive from their leisure time – for example, due to the extent to which it provides access to a greater selection of leisure activities (e.g., social networking, online media content) which may be perceived to provide greater utility and thus improve individual well-being. It can also increase the breadth of consumption options available to individuals, which is likely to increase individual utility beyond the benefits realised through access to lower prices and discounts (e.g., due to the utility generated from the direct consumption of higher quality products, or the utility derived from having greater consumption flexibility).

#### Social outcomes

The evidence for how digital access might impact social inclusion and broader social outcomes is also more uncertain. Nonetheless, the key margins through which digital access is likely to impact broader social outcomes are set out below.

- **Positive relationships and reduced social isolation:** HM Treasury guidance indicates that positive relationships (such as having someone to rely on) have a significant impact on quality of life and wellbeing.\(^\text{159}\) Being online can support individuals in developing or maintaining active and healthy relationships with friends and family; and the benefits associated with this could extend beyond positive mental health impacts – e.g., the value of a reduction in loneliness or additional happiness that stems from increased contact and support.\(^\text{160}\) And a 2014 study found that granting digital access to those that do not go online leads to reduced social isolation among older adults.\(^\text{161}\)
- **Reducing anti-social behaviour:** Enabling youth and at-risk adults to get online could yield positive benefits through a reduction in anti-social and criminal behaviour (e.g., violence, alcohol abuse) – including through how it reduces risk factors (e.g., increasing the opportunity cost to spending time on such activities) or increasing protective factors (e.g., increased access to support services or community networking opportunities).\(^\text{162}\)

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158 Small Business, Big Heart: Bringing Communities Together, The Federation of Small Businesses, February 2019
159 Wellbeing Guidance for Appraisal: Supplementary Green Book Guidance, HM Treasury, 2021
160 Digital Inclusion in Health and Care in Wales, The Wales Co-operative Centre with Carnegie UK Trust, 2018
161 Valuing Digital Inclusion, Just Economics and BT, 2014
162 Effectiveness of Digital Platforms to Reduce VAW, VAWG Helpdesk Research Report, UKAID, 2019
• Increasing pro-social behaviour: Improved access to digital resources could result in an increase in pro-social behaviours such as altruism and volunteering/civic participation (e.g., due to positive learning through online communities and increased awareness of opportunities) and increased political participation (e.g., due to better awareness of, and access to, local and national government resources and platforms). 163

It is important to note that there could also be benefits to society from broader positive externalities (some of which may be public goods) generated by the consumption of online resources. The main areas to consider on this margin that relate to social outcomes are greater social cohesion and improved governance.

Box 11. The benefits of reduced social isolation among older adults

• A 2014 study by BT and Just Economics suggests that moving individuals online would lead to reduction in social isolation among older adults, resulting in aggregate cost savings to the economy.

• Drawing on this evidence, it is illustratively estimated that if all older adults were moved out of digital poverty, this could lead to a reduction in social isolation among this sub-population valued at ~£1.8-2.4 billion per year (in 2022 terms).

• To estimate this, BT’s estimate of the average value of reduced social isolation likely to be achieved (uprated to 2022 £ terms using OBR inflation estimates) – measured using a revealed preference approach – is applied to an estimate of the number of older adults in digital poverty (from Chapter 5). As per BT’s analysis, it is assumed that only 24% of this sub-population would realise these benefits. Adding the per person impacts across the impacted sub-population provides an aggregate estimate of the value of reduced social isolation that could be realised due to all older adults moving out of digital poverty.

Source: Deloitte analysis based on BT and Just Economics’ Valuing Digital Inclusion report (2014)

Environmental outcomes

On average, the inability to interact with the online world increases the reliance on transport options that generate greenhouse gas emissions and other air pollutants that impose a range of (environmental and health) costs on society – costs which are not reflected in market prices and thus must be accounted for separately. Increased hybrid working set-ups do this by reducing commute and office-related emissions, even after being offset by higher domestic energy consumption. For example, in a study on Vodafone teleworkers in the UK, it was found that remote working led to a net increase in carbon savings of 889 CO2e per worker per year. 164 Similarly, the use of online (rather than in-person) services could lead to reduction in personal and businesses travel (e.g. if online shopping reduces personal car journeys where the decline in CO2e is not offset by emissions generated through delivery).

6.12. Key Enabling Factors and Dependencies

In this assessment of the existing evidence on the impacts of (and costs imposed by) digital poverty, five key overarching factors were identified that would be crucial to ensuring that the potential benefits from eliminating digital poverty are realised.

These include:

1. User-friendly digitalisation of government, business, and broader social/community services: To actualise the benefits of eliminating digital poverty, it is important to ensure that (a) services across the UK economy (across business, government, etc.) are effectively digitalised; and (b) digital platforms of public and private services alike have an easy to navigate UI/UX interface which does not demotivate users from getting online.

2. Sufficient protection against online harms: Alongside accessible and user-friendly digital interfaces, it is important to ensure websites are protected against fraud, malware, viruses, and anti-social elements to safeguard users against fraud, identity theft and cyber bullying.

3. Adequate (non-digital) public and private sector capacity and quality: For possible benefits to be fully realised, digital services also need to be backed by adequate server capacity, cloud infrastructure and a sufficiently large and quality workforce. For instance, to fully realise possible health and human capital benefits of getting individuals online, the health and education sectors will still need adequate quantity and quality of doctors and teachers to deliver the services required.

163 Publics in Emerging Economies Worry Social Media Sow Division, Even as They Offer New Chances for Political Engagement, Pew Research Center, 2019

164 Homeworking Report, Vodafone and Carbon Trust, 2021
4. **Broader support for vulnerable groups to supplement basic technology:** The need for the digital ecosystem (supported by both private and public sector stakeholders) to account for the varied needs across vulnerable groups is also paramount. This could be in the form of local digital champions, social tariffs for broadband connections, or tailored support for individuals with disabilities – such as affordable access to quality assistive technology and equipment.

**Continued upskilling and technology upgrading (that keeps pace with accelerating obsoletism):** To achieve sustained digital inclusion, continuous learning programs and technological updates for those most at-risk of being left behind due to the evolving digital space will also be vital.

### 6.13. Key Collateral Effects and Unintended Consequences

Finally, alongside the possible benefits likely to arise when moving individuals out of digital poverty, it is important to consider the possible collateral effects – or unintended negative consequences – that could result from interventions to address digital poverty. These could include:

1. **Increased exposure to online harms:** Individuals moved out of digital poverty could face greater risks of online fraud or cyberbullying. This risk could be mitigated through effective regulation (e.g. the implementation of the Online Safety Bill) and action by business to implement the appropriate protections (such as appropriately monitoring behaviour and content on social media platforms without invading privacy).

2. **Enabling of criminal activity:** Criminal networks newly connected to the online world could use digital access to expand their criminal network and enable offline crime. As above, this could be mitigated through efforts to ensure effective digital protections, by ensuring the police force has the appropriate digital skills to monitor and tackle illicit activity, or through information campaigns.

3. **Negative health, wellbeing and social impacts:** There is a wealth of evidence to suggest that overexposure to the digital world – such as social media platforms – can have negative impacts on health and wellbeing, particularly mental health. Evidence also suggests that internet use can have distortionary effects on social interactions and in some cases exacerbate social isolation as a result in educational contexts.\(^{165}\) This could be mitigated through effective education on how to manage time spent in the digital world, as well as broader information campaigns to support healthy lifestyle choices.

4. **Displacement effects:** Other groups in the population that are vulnerable for reasons other than digital poverty might be displaced (e.g. lose jobs) or face new socio-economic hardships due to being ‘overtaken’ by the newly enabled digital adopters among those moving out of digital poverty.

5. **Negative productivity impacts that offset some of the human capital and productivity gains:** Access to new leisure options – such as social media platforms – and an information/choice overload could reduce productivity. This could be mitigated through effective education on how to manage time spent in the digital world.

6. **Negative impacts on small and medium enterprises (SMEs) that offset some of the benefits of increased productivity:** Consumers’ adoption of digital services could increase competition for the services and goods sold by SMEs (e.g., online grocery shopping vs. corner store purchases), as well as simply decreasing demand for the services some SMEs offer (e.g., more home working may mean less demand for cafes in city centres). This can be mitigated by encouraging SME digital adoption.

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7. Considerations for intervention

Addressing digital poverty will require targeted intervention strategies that account for the diverse needs across the population impacted, and active collaboration and coordination across a range of stakeholders in the public, private and third sector.

7.1. Overview

A key finding from this report is that **digital poverty is a pervasive issue.**

- It impacts not only the oldest in society who have been unable to keep pace with technological advancements, or those with acute affordability issues, but individuals of all ages and socio-economic backgrounds.
- This includes the youngest in society, many of whom do not have safe and appropriate access, lack the skills to get online effectively, and/or have had significant negative experiences online. The extent and impacts of digital poverty are heightened among a range of other vulnerable groups – such as the unemployed, those on low incomes, and those with impairments.

Deloitte analysis also finds that a **lack of digital skills and appropriate devices are the two key deprivation dimensions** that contribute most to digital poverty (in terms of the number of people impacted).

- Intervention strategies aimed at digital upskilling as well as providing universal access to laptops/tablets and smartphones have the potential to unlock benefits – particularly related to human capital development and enhanced productivity.\(^{166}\)
- With appropriate support provided along these lines, there also exists a possibility of motivating those offline to interact with the digital world more actively and reap the benefits it offers.

Informed by these findings, eight key priority areas for action to help address digital poverty are outlined below. Whilst this sub-section focuses on the role of the private and third sectors, when considering intervention priorities, it is important to note that action from a wide range of actors will be essential to addressing this issue. These actors will include stakeholders across private sector, charities, community, and social impact organisations, as well as government and the wider public sector. To ensure effective and efficient communication and collaboration across such a broad set of stakeholders, a coordinating and convening role will need to be played by government – particularly given the welfare/distributional benefits of tackling digital poverty. Beyond this, in some circumstances, particularly where linked to government’s role in supporting social welfare, maintaining minimum living standards, and access to basic services, there is scope for more active government intervention – as seen to address related social issues of income, food and fuel poverty. In this context, a comprehensive policy strategy to address digital poverty and promote digital inclusion could help drive positive outcomes.

7.2. Possible priority intervention options

**Affordable device access**

A lack of digital devices is the second most prominent dimension of digital poverty – impacting roughly 16% of the 16+ population in the UK.\(^{167}\) One way inadequate device access is already being addressed is through private-charity sector device bank initiatives – such as the Digital Poverty Alliance’s [Tech4Families](#) and Good Things Foundation’s [National Device Bank](#) – which encourage device donation and recycling. Public sector support in the form of awareness and marketing campaigns can help broaden the reach of these initiatives.\(^{168}\) However, such activities will not provide a simple, one-off solution for individuals struggling to afford devices – as while recycling old devices is both economical and sustainable, there is also a need to ensure devices are up-to-date and do not run the risk of becoming obsolete given the pace of change within the electronic industry.

**Affordable internet access**

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\(^{166}\) Deloitte analysis
\(^{167}\) Deloitte analysis
\(^{168}\) Further detail on broader IT recycling initiatives and the value they provide is set out in the recent report [Circular electronic for social good, Deloitte and Good Things Foundation, 2023](#)
Alongside this, efforts to extend broadband infrastructure and achieve universal affordable connectivity will remain important but might be best focused on certain key issues or segments of the market, such as: (a) the commercial challenge in the hardest-to-reach areas, and (b) ensuring quality and access for those on the lowest incomes.

**Box 12. Initiatives to support access to affordable and quality broadband**

**Supporting broadband investment**

Initiatives could be targeted through (or work alongside and supplement) the continuation of Project Gigabit. This project is investing £5 billion in phased contracts to support the rollout of high-speed internet connections to hard-to-reach areas and ensure people are not left behind, and includes a demand-led element (the Gigabit Broadband Voucher Scheme). Moving forward, effective solutions will need to consider not just the provision of quality connectivity but maintaining and upgrading infrastructure over time as needed as technology evolves (e.g., the development of new generations of technology standards for broadband networks). This will require effective collaboration and partnerships between private and public sector.

**Supporting broadband pricing**

Social tariffs are cheaper broadband and phone packages voluntarily offered by internet service providers (ISPs) for people claiming Universal Credit, Pension Credit, and some other benefits. These tariffs provide some support to those with affordability challenges, but many groups continue to struggle with affordability. Further, ISPs and other parties have raised concerns around the financial sustainability of these industry-funded social tariffs, in particular the implications it may have for network investment.

Public and private sector collaboration to explore options to address the affordability challenge, for example alternatives to the voluntary social tariffs, will be important. This could include exploring the potential for government price subsidy schemes, tax exemptions, or targeted vouchers or discounts for broadband (such as those implemented in the US).

**Digital upskilling among the working-age population and older adults**

A lack of digital skills is the most prominent dimension of digital poverty – impacting about 19-22% of the 16+ population in the UK. This ranges from a lack of foundation level EDS within the older population, to a lack of work EDS among working-age adults, to a lack of life EDS among key vulnerable sub-populations. It will therefore be important to design literacy programs that are carefully targeted and designed to meet these varied needs.

This will require action from a broad range of stakeholders. Key public sector initiatives such as the Digital Strategy 2022-25 and the Digital Skills Council are a step in the right direction to ensure both private and public sector employees are digitally literate. Private sector interventions, such as Microsoft’s Digital Skills Hub and Google’s free digital skill training, will also continue to play a key role. These activities could be supplemented by community based upskilling programs targeted towards particular vulnerable groups (such as older adults, those with impairments, or those currently in unemployment). However, to ensure such initiatives reach those most in need of support, there will likely also be a need for supporting frameworks – such as the creation of local digital champions or community learning stations within schools and libraries.

**Digital skills programs will also need to be dynamic and updated over time** – to ensure continuous learning across individuals’ lifetimes that keeps pace with rapid technological advancement and broader changes across the economy and society.

**Addressing existing gaps in the education sector related to digital skills and safe use**

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169 It is worth noting that very few no households currently need Gbit/s speeds. In some cases, connectivity could be provided via fixed wireless access (i.e. connecting via a cellular mobile connection of sufficient quality/speed).

170 Lloyds Bank’s Essential Digital Skills Report 2022

171 It will, however, also be important for there to be a balance between ensuring individuals have required digital skills you and ensuring digital applications and devices are well designed and easy to use.

172 In this context, it is important to note that FutureDotNow has recently released a roadmap setting out the best next steps for government, business and civil society to boost the digital capability and confidence of the UK’s workforce and ensure everyone has the Essential Digital Skills needed for work.

173 As per mission five of the HM Government’s to upskill civil servants and fill data and digital vacancies – Transforming for a digital future: 2022 to 2025 roadmap for digital and data, Central Digital & Data Office, 2022

174 Digital Skills Council – GOV.UK (www.gov.uk)
Conservative estimates suggest that about 1 in 5 children are impacted by digital poverty. And the evidence in Chapter 6 suggests that there are significant human capital and productivity benefits that could be unlocked by addressing this.

Therefore, it will be important to ensure the education sector is fit for purpose in an increasingly digital world. This will mean ensuring all children are equipped with basic digital skills before leaving school could generate significant economic and social value in the UK. This could include the design and implementation of a nation-wide ICT skills curriculum within schools and colleges to ensure digital literacy among children and young school-leavers that are most ‘at-risk’. Over the long-term, such action could arguably be more important than workforce upskilling initiatives – in that it may reduce the need for the latter.

Prioritising inclusive design and online safety

Accessible and safe digital design that enables access but limits online harms is key to ensuring vulnerable groups maintain appropriate access. Already, the UK government is ensuring that public sector websites are built in line with the principles of inclusive design, thus upholding the legal duty outlined by the Equality Act of 2010. However, consideration will need to be given to how the private sector service websites can be held accountable in a similar manner (e.g., through information outreach campaigns). While certain government initiatives are paving the way and providing a regulatory framework to ensure online safety (most notably, the Online Safety Bill), continued coordination across the private sector to ensure the appropriate protections will be important. Thought will need to be given to how this can be effectively implemented and policed in a dynamic digital environment. This can be supplemented by learning initiatives to train those offline to recognise and report online harms and educate vulnerable groups on navigating online safety methods such as multi-factor authentication that can be exclusionary.

Exploring novel solutions to incentivise channel switching

Vulnerable groups experiencing digital poverty may be uninterested in (or face challenges to) engaging with the digital world due to obsolete skills, a lack of trust, a poor understanding of the potential benefits of doing so, or the familiarity of using outdated technology or non-digital practices. In tackling this problem of motivation, it is therefore important for interventions to ensure the drive towards digital adoption is tailored according to the needs of the individual. Exploring less utilised solutions such as channel switching, which involves the displacement of old devices in favour of new ones through trusted sources (e.g. phasing out non-smart TVs to incentivise digital adoption among older adults) is one of the ways in which these needs could be met. Another option could be to introduce an initiative whereby children are incentivised to help their grandparents gain digital skills – such as by providing both the child and grandparent with a digital badge per digital skill acquired.

Addressing the underlying factors impacting the determinants of digital poverty

As noted in Chapter 3, gaps in connectivity, access, skills, or digital participation are often themselves a function of underlying socio-economic issues such as income poverty or illiteracy. Initiatives to address issues such poverty, inequality, and poor literacy will support broader interventions targeted directly at alleviating digital poverty (as initiatives aimed at reducing digital deprivation will help address these broader issues).

Improving data and evidence

There is also an acute need for further data collection/compilation, and research development, to build on this report and further society’s understanding of the issue of digital poverty. For example, currently there is no publicly available survey or dataset that exists that captures sufficient information to effectively measure outcomes on all the key dimensions of digital poverty in a single nationally representative sample – which increases the degree of uncertainty around any estimates of digital poverty and limits the conclusions that can be drawn from these. Ofcom, ONS or Understanding Society could potentially play a key role in gathering, collating, and curating such a dedicated survey/dataset.

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175 Deloitte analysis

176 This is presented as a conservative estimate because, as set out in Chapter 5, the underlying analysis does not account for child-specific access factors. Further, it should be noted that this estimate is not based on a representative sample of children.

177 Principles of safer online platform design, Department for Science, Innovation and Technology and Department for Digital, Culture, Media & Sport, 2021
8. Conclusions

Digital poverty in the UK, impacts people from all socio-economic backgrounds. In an increasingly digital world, it is vital to tackle this problem to ensure those currently deprived are not locked out of future gains.

This report has set out:

- A framework to define and measure the scope and scale of digital poverty in the UK; and
- An assessment of the impacts of digital poverty, as defined by the DPA, across key identified outcome or impact categories

This highlights not just the breadth and depth of the issue, but how it disproportionately impacts different segments of the population, including certain already-vulnerable groups.

Evidently billions of pounds in benefits for individuals, government and businesses could be unlocked each year by making substantive progress towards eliminating digital poverty and ensuring individuals’ basic digital needs are met. The benefits of action to address digital poverty are only likely to increase over time as the pace of digitalisation increases and digital technology and skills become more quickly obsolete.

Based on the evidence presented in this report, the most significant benefits appear likely to be realised through the positive human capital and productivity impacts of digital access and engagement. However, given this high-level assessment focuses on providing only illustrative evidence to give a sense of the scale and scope of the issue, further work to validate and assess the specific benefits associated with interventions will be important.

There is also significant scope for intervention to help realise these benefits. Interventions should be targeted to achieve maximum impact and should not only account for where and in what ways digital needs are not met currently, but how these gaps are likely to evolve over time. This will mean developing intervention frameworks that are dynamic and can be tailored over time to the varying needs of different sections of society. Effective intervention will require active communication and collaboration between a wide range of stakeholders. As part of this, coordination by a central actor (such as the government) will be crucial to ensure a cohesive and holistic approach that avoids duplication of efforts and maximises potential synergies across different actors.

As noted in Chapter 7, this work has also highlighted the need for further research and data collection to build on the work presented in this report (alongside previous work) and develop an improved understanding of digital poverty – including the linkages and interactions between different determinants and dimensions of digital poverty, the socio-economic factors driving these, and the possible impacts or benefits (across the key impact categories) of initiatives targeted at addressing digital poverty. In expanding the evidence base, there is a specific need to invest in creating a single survey or dataset that holistically measures the various determinants and dimensions of digital deprivation for a single, nationally representative sample. This can help improve society’s understanding of the scope and scale of digital poverty and its socio-economic implications.
Annex 1

Method used to impute digital skills information into the Ofcom sample

EDS information for individuals is **imputed into the Ofcom sample based on the probability of having digital skills (by age band) reported in the** data tables from the Lloyds Bank’s EDS survey. To do this, the following is done:

- First, assume all individuals without any form of home internet access also lack digital skills (given that ~90% of this group is reported to lack digital skills in the Lloyds Bank’s EDS survey results).
- Then, separate all individuals with home internet access into 12 finite groups according to whether they are already identified to be in digital poverty or not and their respective age band (16-24 years, 25-34 years, 35-44 years, 45-54 years, and 65 and older).
- Next, randomly assign all individuals in each group a number between 0 and 1 and use the randomly assigned numbers to impute whether individuals have EDS or not.\(^{178}\) This was done separately for Foundation EDS and Work EDS.
  - As a baseline, this is based on the share of individuals in each group that are reported to have digital skills in the Lloyds Bank’s EDS data. For example, if the Lloyds Bank’s EDS survey suggests 20% of individuals within an age band do not have digital skills, it is assumed all individuals with values on this new variable from 0.0-0.8 have digital skills, and those with values from 0.8-1.0 do not.
  - However, among those not already assigned to be in digital poverty under the lower bound estimates, the share in each age band group that is assumed to not have digital skills is iteratively adjusted down by a uniform factor to ensure that the final within-sample estimates of the prevalence of digital skills across the entire 16+ population is in line with the estimates reported within the summary results of the Lloyds Bank’s EDS survey.\(^{179}\)
  - For example, among those not yet identified to be in digital poverty under the lower bound estimates, if the baseline share of those without digital skills is set at 20%, then this share is adjusted down to 12% when imputing Foundation EDS. This is done because it is assumed that those not demonstrating other dimensions of digital deprivation are less likely to lack digital skills than those that do demonstrate digital deprivation on other margins.

\(^{178}\) This is done using the “runiform[]” function in Stata, with the numbers generated to 13 decimal places.

\(^{179}\) The share assumed to be without digital skills is adjusted downward by 40-50% (from the baseline of the age band average) among those not yet identified to be in digital poverty under the lower bound estimates. This adjustment was closer to 40% for the imputation of Foundation EDS and closer to 50% for the imputation of Work EDS. This implies within each of the relevant groups, individuals that have device access and regular digital participation are 40-50% less likely to lack digital skills.
Annex 2

Method for estimating illustrative annual employment benefits of eliminating digital poverty

It is illustratively estimated that initiatives to eliminate digital poverty could help match ~46-56k additional people to jobs per year and generate ~£0.9-1.1 billion in additional individual earnings per year (in 2022 terms).\textsuperscript{180,181}

The following method is used to estimate this:

- The size of the unemployed UK population is estimated by applying the OBR unemployment rate for Q4 2022 to ONS population estimates of the 16+ population. To this, the estimates of the share of the unemployed population in digital poverty (from Chapter 5) are applied to estimate to total number of unemployed people currently in digital poverty.
- Drawing on a range of estimates on how being able to get online improves unemployed individuals’ job matching prospects, it is assumed that an additional 9.2% of this unemployed subpopulation would find employment every year if the entire subpopulation moved out of digital poverty.\textsuperscript{182,183} This provides an estimate of the number of additional people that would be matched to jobs in a year.
- It is then assumed that all additional individuals matched to jobs would earn minimum wages and work average full-time hours. Combining this with the estimate of the number of additional people gaining employment allows for the estimation of the value of aggregate earnings that would be generated in a year.

The key caveats to note about these estimates are as follows:

- This is not an estimate of the full GVA likely to be generated by increased employment. This estimate focuses on the direct economic value of earnings attributable to newly employed individuals. Alongside this, there will be additional economic benefits realised by employers due to vacant positions being filled and a resulting increase in production and profits. As noted in Box 3 in Chapter 4, these direct impacts will also generate additional indirect benefits — see below.
- This estimate of increased earnings will not translate directly into an equivalent increase in household income. Many of the individuals that stand to benefit are likely on income support currently. Thus, the net increase in household income will be the difference between these additional (net of tax) earnings and the associated reduction in income from government transfers.
- There needs to be sufficient and appropriate labour demand within the economy for these employment benefits to be fully realised (i.e., vacant jobs for unemployed individuals to match to).

\textsuperscript{180} The assumption is that newly employed individuals earn minimum wages and work average full-time hours.

\textsuperscript{181} It is assumed that because this increase in earnings is due to gains in employment specifically, it can be considered as additional to the benefits that might arise from the increase in productivity estimated among those that are employed — the latter is covered in more detail below.

\textsuperscript{182} 9.2% is the mid-point of a set of estimates and assumptions (ranging from 5.7% to 12.7%) drawn from across the literature on the likely impact digital access on transitions into employment among the unemployed in high-income contexts. This ranges from the impact of studies assessing the impact of gains in digital skills and motivation, to those assessing simple gains in internet access. While earlier UK studies on this issue suggested that 3.5%-7.7% could be an appropriate range, the evidence underlying these UK-specific estimates is somewhat outdated. In contrast, more recent estimates in other high-income contexts find impacts ranging from 7.1-12.7%, with a recent UK study suggesting 5.7% is an approximate estimate. Thus, the mid-point of the latter estimates is deemed a sensible estimate of the likely impacts.

\textsuperscript{183} Relevant studies referenced in footnote 175 include:

- The paper, Suvankulov, F., Chi Keung Lau, M., & Ho Chi Chau, F. (2012). Job search on the internet and its outcome. Internet Research, 22(3), 298-317, estimates the impact of ‘job search on the internet’ on the probability of re-employment and the duration of unemployment spells in Germany and South Korea – using panel data and a Hausman-Taylor IV model to address endogeneity and identify the causal impact. They find that job seekers in Germany and South Korea job seekers who used the internet had a 7.1 and 12.7 percentage point higher percentage point higher probability, respectively, of being re-employed in the next 12 months.
- Analysis from the 2016 Council Of Economic Advisors Issue Brief titled ‘The Digital Divide and Economic Benefits of Broadband Access’ uses data from the US Population Surveys to estimate employment differentials between those that have internet access and those that do not – and finds that that unemployed individuals in households with internet were 12 percentage points more likely to find employment than unemployed individuals in households without internet access over a 12 month period.
- Recent analysis by CEBR (2022) used data from an earlier PwC study to estimate that 5.7% of those gaining basic digital skills are likely to gain employment as a direct result.
- As reported in the 2009 PwC study titled ‘Champion for Digital Inclusion: The Economic Case for Digital Inclusion’ finds that the UK CALL centres were estimated to have assisted up to 34% of users into employment, of which 9-12% were helped ‘a lot’ (Hall Aitken, 2005, Community Access to Lifelong Learning (CALL) Evaluation – Final Report, October 2005). The same PwC study suggested that analysis from the UK Online Centres study showed that 3.5-7.5% of the unemployed could be helped into work if they became digitally included – but this could not be validated against the underlying study.
Method for estimating illustrative annual productivity benefits from digital skills gained by eliminating digital poverty

It is illustratively estimate that supporting all employed individuals to gain basic work EDS would generate direct productivity-related earnings increases among workers of at least £16.9 billion per year.

The following method is used to estimate this:

- The size of the employed population in 2022 is estimated by applying OBR participation and employment rates for Q4 2022 to ONS population estimates of the 16+ population. To this sub-population, external estimates of the share the employed population without work EDS (drawn from Lloyds Bank’s Digital Consumer Index, 2022) are applied, providing an estimate the total number of employed people that currently lack basic digital skills. To this, the portion of the unemployed sub-population estimated as likely to gain employment due to gaining digital access is added.
- To produce a conservative estimate of the potential benefits on this margin, it is assumed that all of this employed sub-population earn minimum wage, work average full-time hours and are in low skilled jobs in a counterfactual scenario.
- It is then assumed that were these individuals to gain basic digital skills, they would see an average 14% increase in earnings. This is based on a 2019 DCMS report which estimates earnings premium attached to digital skills for jobs with low skills levels.
- This provides estimate of the additional earnings generated by this employed sub-population due to them gaining work EDS.

The key caveats to note about these estimates are as follows:

- This is not an estimate of the full GVA likely to be generated by increased digital capability. This estimate focuses on the direct economic value of additional earnings to individuals. In addition to this, there will be benefits realised by employers (e.g., increased output, revenue and profits) due to the increased productivity of their employees that gain digital skills.
- There needs to be sufficient and appropriate labour demand for these estimated productivity benefits to be fully realised.

Method for estimating illustrative annual time savings benefits of eliminating digital poverty

It is illustratively estimated that moving all individuals aged 16+ out of digital poverty could generate aggregate time savings of ~280-400 million hours in personal time savings per year, at a value of £1.7-2.5 billion (in 2022 terms), due to the uptake of just two essential digital services (online banking and eGovernment services).

The following method is used to estimate this:

- The size of the 16+ population in digital poverty is estimated using the digital poverty shares calculated in Chapter 5 and it is assumed one would see a 70% adoption rate of these two digital services if this population gained appropriate digital access and skills.
- The analysis then leverages ‘time savings’ estimates from recent CEBR analysis, which finds that individuals can save 60.9 hours per year on average from fully utilising the aforementioned online services. In line with recent CEBR analysis, it is assumed only half of these individuals’ government and banking transactions will ultimately be conducted online once they are moved out of digital poverty. Thus, it is assumed only 30.5 hours are saved per year per person that adopts these digital services.
- To calculate the monetary value of the time saved, the hourly value of leisure time drawn from ONS population estimates of the 16+ population due to them gaining work EDS.
- The portion of the unemployed sub-population due to them gaining work EDS.

184 Lloyds Bank’s Digital Consumer Index, 2022
185 No Longer Optional: Employer Demand for Digital Skills, DCMS, June 2019
186 In our alternate analysis, it is assumed that the working population without basic EDS to be distributed along the lines of the Department for Education’s analysis of the educational qualification RQF levels) wise split of the UK labour. Following the same approach outlined in the text, it is found that increased earnings from basic digital skills to be £44.7 billion.
187 Online services such as e-banking and e-government portals can reduce the time taken to complete similar tasks offline, leading to time savings for individuals. In a study conducted by the Centre for Economics and Business Research (CEBR) it was found that an individual who has recently learnt Basic Digital Skills is able to save up to 30.4 hours could be saved from using these two key digital services. A monetary value of time saved is applied using DfT’s TAG framework and adjust for inflation to 2022 prices. This monetary value of time saved is applied to the population moving out of digital poverty to estimate the time savings impact.
188 This adoption rate assumption is based on evidence of adoption rates among those online, as reported in: Harvey, M., Hastings, D. P., & Chowdhury, G. (2021). Understanding the costs and challenges of the digital divide through UK council services. Journal of Information Science, 01655515211040664.
189 The economic impact of Digital Inclusion in the UK, CEBR and Good Things Foundation, 2018
190 OBR CPI estimates and DfT’s TAG framework – Values of travel time savings and reliability, Department for Transport, 2015
• The estimate of the impacted population is then combined with the estimates of average per person time savings and the monetary value of leisure time to estimate the value of aggregate time savings per year across the population of interest.

The key caveats to note about these estimates are as follows:

• The true value of the personal time saving enabled by initiatives to eliminate digital poverty is likely to be higher than this for two key reasons. First, there are a range of other digital services and tools beyond the two core services focused on above that are likely to be adopted by those moving out of digital poverty (from online grocery shopping to submitting tax returns), and these will increase household task efficiency and generate further time savings. Second, this does not account for the reduced need for (non-work related) travel enabled by the adoption of such digital services.

• This is not an estimate of the GVA likely to be generated by this time savings. Instead, it focuses on estimating the direct monetary value of the utility individuals might gain due to having additional leisure time.

Method for estimating illustrative annual personal finance benefits of eliminating digital poverty

It is illustratively estimated that moving all individuals aged 16+ out of digital poverty could lead to increases in aggregate disposable income of ~£4.4-6.2 billion per year (with ~£2.5-3.7 billion in disposable income per year to be realised from money saving websites alone). This could translate into either increased savings or increased consumption of goods and services.

The following method is used to estimate this:

• The shares of digital poverty calculated in chapter 5 are used to estimate the size of the 16+ population in digital poverty (from Chapter 5) and it is assumed that 50% of this sub-population would take advantage of lower online prices and online deals if they gained appropriate digital access and skills. 191

• Along similar lines to recent CEBR analysis, 192 we use existing evidence which shows that individuals could save about £900 per year (in 2022 terms) from being online, due to shopping, discounts, saving on utility bills or reducing costs is leveraged for the analysis. It is assumed that those moving out of digital poverty will be on minimum wages and work average weekly hours and hence an adjustment factor is applied to these external estimates as these refer to average levels in the population. 193 It was suggested that £526 of this (in 2022 terms) could be realised by make use of online deals and discounts on money saving websites alone. 194 195

• These estimates of potential per person costs savings are applied to the sub-population of interest to estimate the aggregate value of the potential increase in disposable income per year that might result directly from moving individuals out of digital poverty. 196

• This is therefore not an estimate of the potential GVA that could be generated because of any increased disposable income, but simply an estimate of the monetary value of the potential increase in personal savings.

Method for estimating illustrative annual health literacy benefits due to eliminating digital poverty

It is illustratively estimated that moving all older adults out of digital poverty could result in increased levels of functional health literacy among this group, which in turn could potentially result in ~18-24,000 lives being saved per year among those aged 65 and over.

The following methodology is used to estimate the above:

• The number of older adults (aged 65 and over) in the UK is estimated based on 2022 ONS population estimates. To this, estimates of the share of older adults in digital poverty (see Chapter 5) are applied to estimate the total number of older adults in digital poverty. To this sub-population, external estimates of the share of this group that have low, medium and high health

191 Lloyds Bank’s Consumer Digital Index, 2017
192 The economic impact of digital inclusion in the UK, CEBR and Good Things Foundation, 2022
193 Post adjusting weekly minimum wage with the average median age, the per household savings come out to be ~£670.
194 Deloitte analysis based on the per person cost saving figures reported in the 2017 Lloyds Bank Consumer Digital Index report, converted into 2022 £ terms by adjusting for inflation using OBR CPI estimates.
195 Post adjusting weekly minimum wage with the average median age, the per household savings come out to be ~£389.
196 A separate study commissioned by Vodafone and YouGov focused on a sample of 2,000 adults found that families stand to lose out on £3,432 per year if they lose access to online best prices and deals. Drawing on the estimates of the number of households (rather than individuals) in digital poverty as calculated in chapter 5 would suggest an alternative estimate of potential aggregate household savings of ~12.5-17.9 billion.
a study by Simpson et al. (2020)197 – are applied to arrive at the classification of this sub-population by health literacy level.198

- The weighted average of the annual mortality rate across those aged 65+ is then applied to the sub-populations of interest to estimate the number of deaths among these groups in a counterfactual scenario.199,200

- To these sub-populations, external estimates of the share of individuals that are likely to see increased health literacy levels are applied.201,202

- External estimates of the impact of increased health literacy on mortality are then applied to the estimates of older adults expected to see increased health literacy levels. This allows for the estimation of the likely reduction in deaths per year among the relevant sub-populations relative to the counterfactual scenario.203

The key caveats to note about these estimates are as follows:

- **This estimate does not account for how improved health literacy may improve quality of life.** Further work could look to consider conducting a comprehensive assessment of the likely increase in quality adjusted life years (QALYs) expected to result from improved health literacy among those in digital poverty.

- **This estimate focuses only on the direct mortality reduction benefits of improved health literacy and does not cover reduced broader morbidity benefits that are likely to be realised.** For example, the evaluation of the NHS Widening Digital Participation programme found that improvements in health literacy had a positive impact on mental health and loneliness, and decreased anxiety and depression.204 Inadequate health literacy is an independent risk factor for hospital admission,205 while higher levels health literacy are associated with greater preventive health measures.206

- **This estimate focuses on older adults only.** Further work could look to quantify the additional (albeit smaller per person) health benefits that could be realised due to increases in health literacy among other groups. For example, a systematic review of the health impacts of health literacy highlighted that low health literacy was a risk factor for hospitalisation and emergency care among a wider range of populations beyond just older adults – including children and those with chronic illnesses.207

- **This estimate does not account for the fact that if individuals live longer, they may experience other health problems.** There could thus be some increases in poor health and morbidity that offset some of the health benefits, through individual and system wide outcomes – e.g. other costs to the NHS.

### Method for estimating illustrative annual telemedicine benefits due to eliminating digital poverty

Using chronic heart disease as an example, it is illustratively estimated that 1.5k-2.1k lives could be saved and 2.0-2.8k fewer inpatient admissions seen per year due to improved telemedicine access resulting from elimination of digital poverty.

The following methodology is used to estimate the above:

- Estimates of the share of the 16+ population in digital poverty (from Chapter 5) are applied to British Heart Foundation (BHF) data on the number of inpatient admissions in 2021/22208 due to coronary heart disease (CHD) – assuming one admission

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198 It is assumed that health literacy levels are constant among the general population and those in digital poverty. Functional health literacy is chosen to maintain consistency across the literature referenced in this report.

199 Age-specific death rate per 1,000 population in the United Kingdom in 2021, by gender – access via Statista

200 National population projections, mortality assumptions: 2020-based interim, ONS, 2022

201 65% individuals reported improved health literacy due to digital access as per, Health and Digital: Reducing Inequalities, Improving Society, Good Things Foundation (formerly Tinder foundation), 2016

202 This improvement in health literacy is assumed to be a step change, i.e., those with low health literacy move to medium level and those with medium level move to high level health literacy.

203 6.54% reduction in mortality on moving medium health literacy adults to high health literacy and a 20.63% reduction in mortality on moving low health literacy adults to low health literacy as per, Bostock, Sophie, and Andrew Steptoe. “Association between low functional health literacy and mortality in older adults: longitudinal cohort study.” Bmj 344 (2012).

204 Digital Inclusion in Health and Care: Lessons learned from the NHS Widening Digital Participation Programme, Good Things Foundation, 2020


208 Heart & Circulatory Disease Statistics, British Heart Foundation, 2023
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corresponds to one individual. This provides an estimate of the counterfactual number of hospitalisations among due to CHD per year those in digital poverty.

- Estimates of the share of the 16+ population in digital poverty (from Chapter 5) are applied to estimates of deaths per year due to CHD (based on further BHF statistics). This provides an estimate of the counterfactual number of deaths per year among those in digital poverty due to CHD.

- As per a Cochrane database review conducted by Inglis et al (2010),

210 it is assumed that access to telemedicine services leads to a 9% reduction in hospitalisations and 34% reduction in mortality rates among patients with chronic heart failure. In a separate 2019 study, it was found that digital telemedicine interventions accounted for 33% of observed CHD telemedicine interventions.

Applying these statistics to the counterfactual estimates of hospitalisations and deaths per year, the number of hospitalisations and deaths that could be avoided per year by eliminating digital poverty (and improving digital telemedicine access) is estimated.

211 The key caveats to note about these estimates are as follows:

- This estimate assumes that one third of the population with CHD in digital poverty would gain access to telemedicine services upon moving out of digital poverty. In a scenario where telemedicine access not readily available, or uptake is poor, the estimated impacts would be lower. In a scenario where moving individuals out of digital poverty increases telemedicine access by more than this, the estimated impacts would be higher.

- This estimate is likely to rise over time due to health services increasingly relying on digital solutions.

- This estimate does not account for how improved health literacy may improve quality of life. Further work could look to consider conducting a comprehensive assessment of the likely increase in quality adjusted life years (QALYs) expected to result from improved health literacy among those in digital poverty.

- This estimate focuses on some of the benefits expected among those with CHD only. It will be important for further work to consider broader benefits that could be realised the scale of the potential benefits across other chronic conditions – given. ONS data for 2019-20 suggests that almost half of the UK population (46% of men and 50% of women) report having a long-standing health problem,

212 a number that has likely to be risen since the COVID-19 pandemic. This highlights the substantial population base that stands to benefit from improved health outcomes via increased access to telemedicine – with those with cardiovascular disease accounting for less than 1% of this group.

- This estimate does not account for the fact that if individuals live longer, they may experience other health problems. There could thus be some increases in poor health and morbidity that offset some of the health benefits.

Method for estimating illustrative annual government cost savings due to eliminating digital poverty

It is illustratively estimated that moving all individuals out of digital poverty could unlock ~£0.5-0.7 billion per year in cost savings for the UK’s central government per year due to increased uptake of e-government transactional services.

The following methodology is used to estimate the above:

- The analysis draws on the estimate of the size of the 16+ population in digital poverty (from Chapter 5) and assumes one would see a 70% adoption rate of digital government services if this population gained appropriate digital access and skills.

213 In line with recent CEBR analysis, an exercise is carried to back out the estimates of the potential cost savings (per person) per year that could be generated by increasing uptake of eGovernment services – based on the aggregate annual cost savings


212 Alternate analysis based on Inglis, S. C., Clark, R. A., McAlister, F. A., Ball, J., Lewinter, C., Cullington, D., ... & Cleland, J. G. (2010). Structured telephone support or telemonitoring programmes for patients with chronic heart failure. Cochrane database of systematic reviews, (8) – finds that moving CHD patients out of digital poverty could lead to ~4,300-6,500 reduced hospitalisations and ~908-1,360 lives saved due to uptake of telemedicine services.

213 UK health indicators: 2019 to 2020, ONS, 2022

214 This latter adoption rate assumption is based on existing evidence of adoption rates of these types of services among those online, as reported in: Harvey, M., Hastings, D. P., & Chowdhury, G. (2021). Understanding the costs and challenges of the digital divide through UK council services. Journal of Information Science, 01655515211040664.

215 The economic impact of digital inclusion in the UK, CEBR and the Good Things Foundation, 2022
and target uptake rate reported in the 2012 Government Digital Efficiency report. This is uprated to 2022 terms using OBR CPI estimates, to arrive at an estimate of cost saving to government of £52.25 per year per additional person using digital government services.

- This is then applied to the sub-population of interest to arrive at an estimate of the aggregate cost savings per year that could be realised by central government due to the adoption of core e-government services among people shifted out of digital poverty.

### Method for estimating illustrative annual NHS cost savings due to eliminating digital poverty

The following method is used to estimates the potential cost savings for the NHS, as presented in Chapter 6.7:

- GP appointment data from the Kings Fund is combined with ONS estimates of the adult population (16+) to estimate the number of GP appointments per person per year. For ease, it is assumed that the number of GP appointments per person is uniform across the population. Applying estimates of the number of those aged 16+ in digital poverty (see Chapter 5), the counterfactual number of GP appointments per year among this sub-population in digital poverty is then calculated.

- Following the approach outlined within a recent CEBR report, estimates based on analysis from the Good Things Foundation—that suggest that 33% of individuals that gain digital access experience a reduction in GP appointments (of 4.8 fewer appointments per person per year) due to more effectively using online NHS services—are leveraged. These estimates are applied to estimates of the number of people (aged 16+) in digital poverty (from Chapter 5). This provides an estimate of the possible reduction in GP appointments per year that could be realised by shifting all individuals aged 16+ out of digital poverty. To this, existing evidence on how much each face-to-face GP appointment costs the NHS (£42) is applied. This provides an estimate of the aggregate cost savings per year that could be realised due to reduced GP appointments.

- NHS data, which suggests about one-fifth of GP appointments are booked online, is then applied to earlier estimates of the number of GP appointments among those in digital poverty (accounting for the reduction estimated above). This provides an estimate of the number of GP appointment bookings that are likely to be made online per year once all those in digital poverty gain access. This assumes that once these individuals move online, the share of booking they make online will match the population average. This is combined with an estimate from a previous Deloitte study, which suggests that each GP appointment booked online (rather than via non-digital means) saves the health service £0.43. This provides an estimate of the aggregate cost savings that could be realised per year due to more GP appointments being booked online rather than offline.

- Finally, the total inpatient cost per admission from a CHD episode is estimated and combined with estimates of reduced hospitalisations among CHD patients from Chapter 6.8, to arrive at estimates of potential cost savings per year from reduced hospitalisations among CHD patients.

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216 The 2012 Government Digital Efficiency (GDE) report is assessed to provides the most comprehensive available evidence on what the potential cost savings the UK government could realise due to the uptake of key digital transactional services, and related efficiency gains from reduced staff, estates, materials, and equipment costs. Institute for Government’s 2017 report ‘Making a success of digital government’ indirectly validates the cost savings estimates produced in the GDE report. This 2017 IFG analysis estimated that government aggregate cost savings from efficiency gains on transactional services could reach up to £2 billion by 2020—a number which is roughly equivalent to the (inflation-adjusted) value of the mid-point of the cost saving estimates presented in the 2012 GDE report (of £1.75 billion).
217 Key facts and figures about the NHS, The King’s Fund, 2023
218 The economic impact of digital inclusion, CEBR and Good Things Foundation, 2022
219 Digital Inclusion in Health and Care, the Good Things Foundation, 2020
220 A face-to-face GP appointment costs the NHS £42 in 2022 as per Key facts and figures about the NHS, The King’s Fund, 2023
221 21.15% of GP appointments are booked online as per data provided by the NHS – GPPS National Results and Trends, NHS, 2022
222 The economic and social impacts of enhanced digitalisation in Scotland, Deloitte report for the Scottish Futures Trust, 2015
223 Based on data from Heart & Circulatory Disease Statistics, British Heart Foundation, 2023