Office for National Statistics

Methodological developments to public service productivity: healthcare, 2020 update

This article outlines planned methodological changes to the measures published in public service productivity: healthcare, which we intend to incorporate in our release in January 2020.

Contact:
James Lewis
james.lewis@ons.gov.uk
+44 (0)1633 455323

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1 . Introduction

This article outlines planned methodological changes to the measures published in public service productivity: healthcare, which we intend to incorporate in our release for the first time in January 2020. These are:

- adjustment to output for the number of working days and total days per year
- changes to the deflators used in calculating inputs, including the introduction of the NHS Cost Inflation Index
- changes to capital consumption
- incorporation of NHS “bank staff” in the healthcare productivity inputs for England

We welcome user feedback on the proposed changes, which can be sent to james.lewis@ons.gov.uk.

A separate article is available covering developments to other service sectors in public service productivity.

2 . Brief review of public service healthcare productivity

The high-level methodology for the production of public service healthcare productivity statistics was set up in the Atkinson Review (PDF, 1.1MB). These statistics involve the calculation of inputs and output in volume terms:

$$Productivity = \frac{Output}{Inputs}$$

Volume output in public service sectors such as healthcare is mainly measured using a cost-weighted activity index (CWAI). This calculates the change in the number of activities undertaken, weighting each activity by its cost such that an increase of one unit of activity for a high-cost activity has a greater effect on the output than an increase of one unit of activity for a low-cost activity.

The volume output measure is produced using the Laspeyres approach:

$$I^t = I^{t-1} . \frac{\sum_i \left(a_i^t . u_i^{t-1}\right)}{\sum_i \left(a_i^{t-1} . u_i^{t-1}\right)}$$

where:

I = index value
a = activity count
u = unit cost
t = year
i = activity type

A quality adjustment is applied to the output. This adjusts individual healthcare activities by several factors:

- estimate for the health gain from hospital procedures
- survival rates for hospital procedures
- waiting times for elective hospital procedures
- patient experience scores
- GP incentive scheme achievement rates

Inputs are also calculated on a volume basis and consist of three main components:

- labour, which is mainly measured through a Laspeyres cost-weighted labour index (CWLI), which uses the growth in full-time equivalent staff numbers weighted by their cost, in a similar manner to quantity output
- intermediate consumption of goods and services used in the provision of healthcare, which is calculated using expenditure deflated by relevant deflators
- consumption of fixed capital, covering the cost of depreciation of capital goods (items that are anticipated to be in use over several years, such as buildings and vehicles) over time

Public service healthcare productivity measures are available on a UK calendar year basis and an England financial year basis. However, most data used in the publications, including that for the devolved administrations, are obtained and processed on a financial year basis; as such, periods in this article refer generally to financial years. The UK calendar year figure is created by combining financial year data for the four nations and then converting it into a calendar year format using a cubic spline function. [1]

For more information on the existing methodology, please see the methodological note for healthcare productivity (PDF, 328KB) and the methodological note for healthcare quality adjustment (PDF, 152KB).

Notes for: Brief review of public service healthcare productivity

1. Cubic splining involves the imputation of quarterly data based on trends in data over multiple financial years and constructs a calendar year figure based on these imputed quarterly figures.

3 . Output adjustment for days

Why do the number of working days and total days in a year matter to productivity?

The number of days in a year affects the number of service activities provided. For instance, the additional day available in a leap year increases the time available for providing services by 0.3%.

However, the number of working days in a year can vary by more than one from one year to the next, particularly in the case of financial years (April to March), which is the periodicity of the data used in measuring healthcare output.

While the total number of days in any year varies only by leap years, the number of working days in a financial year varies according to four factors:

- leap years
- how weekends fall in the annual calendar
- the timing of Easter
- special bank holidays, such as those held for the Queen’s Diamond Jubilee in 2012 or the 2011 Royal Wedding

Over the last 20 years, the number of working days in England and Wales has varied by up to 2%, from 250 working days in financial year ending (FYE) 2013 to 255 working days in FYE 2006, FYE 2009 and FYE 2017.

Healthcare services consist of a mixture of services that are predominantly only carried out on working days (such as outpatient consultations) and services that are carried out across the week, irrespective of weekends or bank holidays (such as ambulance services).

The days adjustment method we intend to adopt is based on an approach already applied by NHS England and NHS Improvement in their internal productivity monitoring data. It employs separate adjustments for the number of working days and total days per year to the output of different services depending on when their activities predominantly take place.

The adjustment is applied to output as opposed to inputs, because the output data are broken down by detailed service type, enabling separate working days and total days adjustments for the appropriate services, which is not possible with inputs data.

Healthcare output

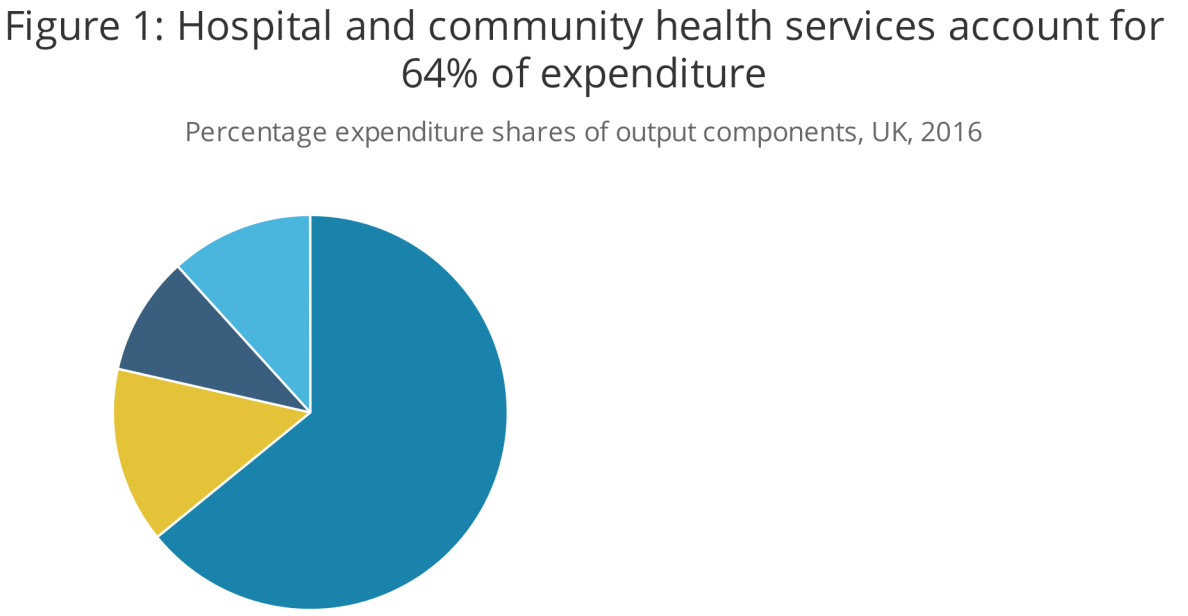
Public service healthcare output consists of four components:

- hospital and community health services (HCHS) – includes hospital services, community care, mental health and ambulance services
- family health services (FHS) – includes general practice, publicly-funded dental treatment and sight tests
- GP prescribing – includes prescription drugs dispensed in the community
- non-NHS provision – includes healthcare funded by the government but provided by the private or third sector

The first three components in this list (HCHS, FHS and GP prescribing) have output measures calculated by cost-weighted activity indices, while the output of non-NHS provision is calculated from deflated inputs expenditure. As the data from Public service productivity: healthcare, 2016 in Figure 1 show, HCHS is by far the largest element.

Figure 1: Hospital and community health services account for 64% of expenditure

Percentage expenditure shares of output components, UK, 2016



Source: Office for National Statistics

Notes:

1. HCHS - Hospital and Community Health Services.
2. FHS - Family Health Services.
3. Figures are shown on a calendar year basis although expenditure shares for the four components are produced in financial year data and used in the output processing on financial year basis.

The working or total days adjustment is applied to the HCHS and FHS components of healthcare output only. No adjustment is to be applied to the two remaining elements, GP-prescribed drugs and non-NHS provision, partly because of the lack of evidence on the effect of the number of working or total days on these services and partly as these two elements are both calculated on an “output-equals-inputs” basis. [1] This is where the volume of input and the volume of output are the same calculation and as a result these components do not drive changes in the healthcare productivity measure.

As healthcare is a devolved policy matter, the four components are calculated separately for the four UK nations. [3]

Application of adjustment

As discussed in Section 3, “Why do the number of working days and total days in a year matter to productivity?”, separate adjustments are created for the number of working days and total days, with these adjustments applied to separate healthcare services. Services where activity rates remain relatively constant across weekdays and weekends are allocated to be adjusted by the total annual number of days, while services that are usually provided only on weekdays (or have activity rates far lower at weekends than weekdays) are allocated to be adjusted for the number of working days.

Family Health Services (FHS) comprise a small number of different services, which are each allocated to either the total or working days adjustment, with the exception of the largest element, GP consultations. Because of the lack of data on GP consultations in England, GP consultations are forecast using a demographic model. As the demographic model does not produce results that vary by the number of total or working days in the year, no adjustment was applied to GP consultations in England.

Of the remaining elements of FHS, activity such as primary care dental services and sight tests were adjusted for the number of working days, and services such as the NHS111 phone line and its equivalent in Scotland, NHS24, were adjusted for the total annual number of days.

The output of Hospital and Community Health Services (HCHS) is calculated using data recording activity rates for thousands of different services. As it would be impractical to allocate each of the thousands of different HCHS activity types in each of the UK nations to either a working or total day adjustment, the allocation is done at a more aggregate level, with activity in England aggregated to around 200 categories and activity in each of the devolved administrations aggregated to around a dozen categories.

Typical services that are adjusted for the total annual number of days include:

- non-elective hospital procedures, including urgent or emergency care
- critical care stays
- accident and emergency department services
- ambulance services
- inpatient mental health services

Typical services that are adjusted for the number of working days include:

- elective hospital procedures, including elective inpatients, day cases and outpatient procedures
- outpatient consultations and clinics
- general dental and ophthalmic services
- community nursing and health visiting
- services provided by allied health professionals such as physiotherapists, speech therapists and podiatrists
- outpatient and day patient mental health services

The Office for National Statistics (ONS) created a provisional allocation of activity between that which was to be adjusted by working days and that to be adjusted for the total number of days. This allocation was then validated by the Department of Health and Social Care (DHSC), NHS England and NHS Improvement economics and costing teams, and NHS Wales. The revised allocations were agreed by all four UK health administrations.

To adjust activity for the change in the number of working days, the Laspeyres index formula is modified to divide the respective output volume in the reporting year (t) by the ratio of the number of working days in the reporting year to the number of working days in the previous year (t-1). For example, where the number of working days increases from 250 in year t-1 to 254 in year t, there is a 1.6% increase in the number of working days. In this case, the working days adjustment reduces the output in year t relative to year t-1 by an equivalent amount, to remove the effects of the additional working days on output. The same approach is taken for adjusting output for the total annual number of days.

The formula for the adjustment is as follows:

$$I^{t-1} = I^{t-1} . \left(\frac{\sum_i \left(a^t_{EL,\,i} . u^{t-1}_i . \frac{WD^{t-1}}{WD^t} \right) + \sum_i \left(a^t_{NEL,\,i} . u^{t-1}_i . \frac{TD^{t-1}}{TD^t} \right)}{\sum_i \left(a^{t-1}_{EL,\,i} . u^{t-1}_i \right) + \sum_i \left(a^{t-1}_{NEL,\,i} . u^{t-1}_i \right)} \right)$$

where:

I = index value
a = activity count
u = unit cost
WD = working days in year
TD = Total days in year
t = reporting year
i = activity type
EL = activity to be working day adjusted
NEL = activity to be total day adjusted

It should be noted that because the days adjustment is applied to year t output volumes, changing the relative proportions of total volume made up by different services, the days adjustment can have a small effect on the quality adjustment to output, which is processed using these output data.

Simplified adjustment for historical data

Because of the requirement to reprocess output to incorporate the working and total day adjustments, it is not practical to implement the previous method over the entire time series. Such an exercise would be time-consuming, and, as the days adjustments do not affect the long-term growth rate of output, it would not lead to a substantially improved understanding of the long-term trends in healthcare output and productivity.

For most services before financial year ending (FYE) 2016, we do not adjust individual activities for the number of working or total days. Instead output is split between a proportion to be adjusted for the total annual number of days and number of working days based on the relative proportion each component made up in the last three financial years of the series, FYE 2016 to FYE 2018.

This simplified days adjustment is applied separately to each of the following components:

- HCHS in England, excluding outpatient consultations
- HCHS in Scotland
- HCHS in Wales
- HCHS in Northern Ireland
- FHS in Scotland
- FHS in Northern Ireland

The formula for the simplified days adjustment for each of these six components is calculated as follows:

$$I^t = I^{t-1} . \left(\frac{\frac{\sum_i (a_i^t . u_i^{t-1})}{\sum_i (a_i^{t-1} . u_i^{t-1})} . P}{\left(\frac{WD^t}{WD^{t-1}} \right)} + \frac{\frac{\sum_i (a_i^t . u_i^{t-1})}{\sum_i (a_i^{t-1} . u_i^{t-1})} . (1 - P)}{\left(\frac{TD^t}{TD^{t-1}} \right)} \right)$$

where the notation is as in the full days adjustment formula, plus:

P = proportion of expenditure which is on services that are working days adjusted for the final three years of the series

The sensitivity of the adjustment to P being fixed based on the final three financial years of data was tested by re-running the days adjustment using a separate value of P based on data for selected historical years. The results showed that there was minimal difference in the results of the adjustment from using a proportion, P, specific to the year in question.

There are two cases where the simplified adjustment as described is not applied to the back series.

One is outpatient consultations in England, where a separate data source is used to the rest of HCHS, which makes outpatient consultations easy to separately identify for the entire time series. In this case the working day adjustment is applied to all of outpatient consultation activity for the entire time series. For the devolved administrations, outpatient consultations are not taken from a separate data source to the rest of HCHS and so are not treated separately.

The second is FHS in England, where each of the component parts of FHS can be separately adjusted for either the number of working days or total days per year after FYE 2003. For the years up to FYE 2003, nearly all FHS activity included in the measure related to that which took place predominantly on working days and so the working days adjustment was applied to all FHS activity up to this point.

In the case of GP consultations, activity has been estimated based on a demographic model for the years after FYE 2008, and so from this point on, no days adjustment needs to be applied to GP consultations. Before FYE 2008, GP consultation activity was estimated based on a sample survey and so the working days adjustment is applied to GP consultations before this point.

We intend to include analysis on the effect of the working days adjustment on output in the bulletin, Public service productivity: healthcare, to be released on 8 January 2020.

Notes for: Output adjustment for days

1. Both GP-prescribed drugs and non-NHS provision are calculated on an “output-equals-inputs” basis, but the methodology differs in each case, with the output of GP-prescribed drugs calculated using a Laspeyres index of drugs dispensed weighted by their unit costs and non-NHS provision calculated using deflated expenditure data.

2. Because of data limitations, no measure of FHS output is available for Wales and no measure of non-NHS provision is available for Northern Ireland.

4 . Developments to deflators

Introduction of the NHS Cost Inflation Index

In previous editions of Public service productivity: healthcare, the most important deflator, in terms of the proportion of inputs it was applied to, was the Health Service Cost Index (HSCI). The HSCI was produced by the Department of Health to provide a measure of inflation specific to the input costs faced by the NHS. It was used by the Office for National Statistics (ONS) to deflate much of intermediate consumption expenditure to produce volume inputs for productivity until it was discontinued in 2017.

To replace the HSCI, the NHS Cost Inflation Index (NHSCII) has been developed by the Department of Health and Social Care (DHSC) working in conjunction with NHS England and NHS Improvement, the Centre for Health Economics at the University of York and the ONS. The NHSCII will be produced by DHSC and is published by the Personal Social Services Research Unit at the University of Kent as part of their annual publication, Unit costs of health and social care.

Data sources for NHS Cost Inflation Index

As with all composite deflators, the NHS Cost Inflation Index (NHSCII) consists of a weighted basket of inputs, each element of which is deflated by an appropriate deflator. For the NHSCII, the weights used are proportional to the amount the NHS spends on each component.

Separate data sources are used for producing deflators for the pay and non-pay costs in the four sectors. Table 1 shows the data sources used for deriving the expenditure weights for the individual items (such as staff groups) that are used to build the basket of inputs within each of the pay and non-pay components. Table 2 shows the measures of price change that are then applied to these baskets of inputs.

Table 1: Data sources for expenditure weights used for items within the components of the NHS Cost Inflation Index

	Pay	Non-pay
NHS providers	NHS Electronic Staff Record (ESR)	NHS Provider Consolidated Accounts and DHSC internal financial accounts data
General practice	NHS Digital Healthcare Workforce Statistics	Basket of input goods and services not disaggregated
Prescriptions dispensed in the community	Not applicable	NHS Digital Prescription Cost Analysis
Dentistry	NHS Digital Dental Statistics	Basket of input goods and services not disaggregated
Aggregation of four sectors	DHSC annual accounts and NHS Provider Consolidated Accounts	

Source: Office for National Statistics, Department of Health and Social Care

Notes

1. NHS-specific data such as the input weights, pay costs and data on prescriptions dispensed in the community relate to data for England, while ONS price indices relate to the UK. Back to table

Table 2: Data sources for price indices used in the NHS Cost Inflation Index

	Pay	Non-pay
NHS providers	NHS Electronic Staff Record (ESR)	Sub-components of the Producer Price Index (PPI), Services Producer Price Index (SPPI) and Consumer Price Index (CPI); Construction Output price indices; Average Weekly Earnings for professional, scientific and technical activities; Retail Price Index (RPI)
General practice	NHS Digital GP Earnings and Expenses Estimates for GPs, NHS Digital Staff Earnings estimates used as a proxy for earnings of other GP practice staff.	Consumer Price Index including owner occupiers' housing costs (CPIH)
Prescriptions dispensed in the community	Not applicable	NHS Digital Prescription Cost Analysis
Dentistry	NHS Digital Dental Earnings and Expenses Estimates	Consumer Price Index including owner occupiers' housing costs (CPIH)

Source: Office for National Statistics, Department of Health and Social Care

Notes

1. NHS-specific data such as the input weights, pay costs and data on prescriptions dispensed in the community relate to data for England, while ONS price indices relate to the UK. Back to table

The deflator for the NHS providers sector is the most complex in terms of its construction and the most important in terms of its weight in the overall NHSCII.

The pay cost inflation element for NHS providers is calculated using data from the NHS Electronic Staff Record on salary (including on-costs), which is used to derive a unit cost by staff group, and full-time equivalent staff numbers by staff group. These data are used to construct a Paasche index, [1] which is aggregated by weighting unit cost growth for each staff group by expenditure on staff in that group. The staff grouping used allocates staff to groups with reference to their pay band and the types of activities they undertake, such that staff on similar pay bands undertaking similar activities are grouped together. Because of data limitations, the pay cost deflator excludes the costs of NHS bank staff and agency staff.

The deflator for NHS providers' non-pay costs is created by using the NHS Provider Consolidated Accounts to disaggregate provider spending into a set of component parts. Each of these parts is then deflated by the most suitable available deflator. For example, the "Medical and dental instruments and supplies" sub-component of the Producer Price Index is used to deflate clinical supplies and services costs.

Because of the wide variety of expenditure items included in the NHS Provider Consolidated Accounts, the deflators used come from a range of sources, including:

- sub-components of the Producer Price Index (PPI) – used for various elements of spending, including clinical supplies, drug costs and parts of depreciation costs
- sub-components of the Services Producer Price Index (SPPI) – used for various elements of spending, including parts of general supplies and services
- sub-components of the Consumer Prices Index (CPI) – used for various elements of spending, including parts of premises costs
- sub-components of the Construction Output Price Indices – used for various elements of spending, including parts of premises costs and parts of depreciation costs
- Average Weekly Earnings for professional, scientific and technical activities – used for various predominantly non-employee staffing costs, such as research and development, and consultancy costs
- Retail Prices Index (RPI) – used for private finance initiative costs, which are typically uplifted by RPI as opposed to the alternative CPI

Simpler approaches are taken with general practice and dentistry. In both cases, pay cost inflation is calculated by using the most relevant available earnings data [2] weighted by staff numbers, while in the absence of more detailed data on the intermediate consumption inputs of these services, the Consumer Prices Index including owner occupiers' housing costs (CPIH) is used as the deflator.

For community prescribing costs, which cover the costs of drugs prescribed by GPs, but not the cost of the associated pharmacy services, a bespoke deflator is produced by the Centre for Health Economics at the University of York[3] using the NHS Prescription Cost Analysis data. These data enable a deflator Paasche index to be constructed using the net ingredient cost and quantity dispensed for each drug type by chemical compound.

The overall NHSCII is created by weighting together the four component sectors using their relative spending. Other health service costs not included in these four sectors are then included in a residual, itself deflated by the overall NHSCII.

Caveats with the NHS Cost Inflation Index

The NHS Cost Inflation Index (NHSCII) provides a measure of input inflation specific to the experience of the health service, making it more suitable than general deflators, such as the gross domestic product (GDP) deflator, for understanding the cost pressures experienced by the NHS and for converting NHS expenditure into a volume input measure.

However, current limitations on data availability mean that the NHSCII should be regarded as an estimate rather than a precise representation of cost inflation in the NHS. There are a few caveats to which users should pay particular attention.

It should be noted that, except for pay, the deflator does not use data on the specific prices the NHS pays for inputs. The relevance of the index to healthcare is instead derived from looking at prices changes in the general economy for the sorts of goods and services that are used as inputs in healthcare.

This issue is of particular importance in the case of the inflation estimates for drugs consumed by NHS providers in providing care, because of the difficultly of sourcing these data. The measure of price change used for this element of the index is derived from the most specific PPI sub-component available.

However, this PPI sub-component is calculated from a basket of drugs, which is not limited to drugs used by NHS providers but also includes prescription drugs dispensed in the community and non-prescription drugs available to purchase over-the-counter. As a result, the drugs element of the NHSCII only includes a proxy for the actual inflation in drugs consumed in the provision of NHS services. For prescriptions dispensed in the community, the deflator is based on a list of drugs specific to the community prescribing sector, but the measure of price change is based on the list price of drugs, and so does not account for any discounts received by the NHS against the list price.

With respect to ONS public service productivity statistics, which are produced on a UK basis, a further limitation is that expenditure, staff and prescriptions dispensed in the community data used in the NHSCII is for the English NHS only and these data may not reflect the same pay inflation or basket of inputs experienced by the health service in the devolved administrations.

While data to completely solve these issues are not readily available, the methodology of the NHSCII will continue to be reviewed and developed to ensure the best possible deflator is produced from the data that are available.

Use of NHS Cost Inflation Index in healthcare productivity

It should be noted that the overall NHS Cost Inflation Index (NHSCII) will not be used to deflate the majority of inputs expenditure in the ONS public service healthcare productivity statistics. Instead, these statistics will also make use of a number of the sub-components of the NHSCII, alongside a number of other deflators.

For the years for which NHSCII data are available, several elements of the NHSCII have been incorporated into the calculation of inputs for public service healthcare productivity:

- the overall NHSCII will be used to deflate pharmaceutical services (the cost of pharmacies, excluding the cost of drugs dispensed) and general ophthalmic services
- the NHSCII dental services deflator will be used to deflate dentistry costs
- the NHSCII NHS providers' pay cost deflator will be used to deflate expenditure on agency staff and NHS bank staff
- the NHSCII NHS providers' deflator (including both pay and non-pay elements) will be used to deflate spending on non-NHS provided services
- an alternative version of the NHS providers' non-pay deflator will be used to deflate intermediate consumption costs not deflated by other deflators – this covers the largest element of intermediate consumption inputs, including the intermediate consumption costs of NHS providers and administrative bodies, such as clinical commissioning groups

More detail on the approach for deflation used in the inputs is available later in this section in “Further changes to deflators”.

The alternative version of the NHS providers’ non-pay deflator calculated by the ONS for use in public service healthcare productivity uses a modified basket of input goods and services, which aligns more closely to the measure of intermediate consumption it is used to deflate by removing:

- capital costs such as depreciation – as capital consumption is measured separately using national accounts data in the ONS healthcare productivity measure
- education and training costs – as these services are included in the education sector of the public service productivity statistics, as explained in the Atkinson Review (PDF, 1.1MB)

Further changes to deflators

In order to determine the most appropriate methodology for incorporating the NHS Cost Inflation Index (NHSCII) into the ONS public service healthcare productivity measure, we have conducted a review of all deflators used in the production of this measure. The review has resulted in several changes to the methodology, which are detailed in this section and in Table 3.

One obvious change is to replace the Health Service Cost Index (HSCI) with the most appropriate elements of the NHSCII, as described in “Use of NHS Cost Inflation Index in healthcare productivity”. However, this is not a simple replacement of one deflator with another as the NHSCII has been applied to several additional elements of inputs that were previously deflated by other deflators. Firstly, elements of the NHSCII have been applied to pharmaceutical, dental and ophthalmic services; and secondly, the pay cost elements of the NHSCII have been used to replace a previously used pay cost deflator produced by the ONS.

Pharmaceutical, dental and ophthalmic services funded by the NHS but provided independently have previously been deflated by the change in the cost of the output they provide on behalf of the NHS. This meant that the input and output of these services were converted from expenditure to volume terms on the same basis, and so these components were essentially “output-equals-input” components, which did not contribute to productivity.

However, as specified by the Atkinson Review (PDF 1.1MB), the coverage of ONS public service productivity statistics is defined as services funded through public expenditure. The ONS public service productivity statistics are therefore not only limited to public sector providers, but also include publicly-funded services provided by the independent sector. The change from deflating expenditure on these services with an output deflator to using an input deflator (the appropriate components of the NHSCII) is thus consistent with the Atkinson Review approach and reflects recent changes made to adult social care productivity statistics. For the years before the NHSCII is available, a non-NHS deflator, which combines the ONS version of the HSCI and an ONS pay cost deflator, is used for these services.

The ONS pay cost deflator is replaced by the NHS providers’ pay cost deflator from the NHSCII for the years that it is available, as the NHSCII uses a more detailed data source with more staff categories. The ONS pay cost deflator for earlier years has been brought into line with the NHS providers’ pay cost deflator from the NHSCII by removing general practice staff.

Finally, where the Retail Prices Index (RPI) was used, it has been replaced with the Consumer Prices Index including owner occupiers’ housing costs (CPIH), in line with ONS guidance.

Table 3: Deflators used in public service healthcare inputs

	Deflator used in previous healthcare productivity bulletins	Deflator to be used from healthcare productivity bulletins from January 2020
Intermediate consumption other than that specified below (including NHS providers), financial year ending 2015 (FYE 2015) to FYE 2018	ONS intermediate consumption-specific version of the Health Service Cost Index (HSCI)	ONS intermediate consumption-specific version of the NHS Cost Inflation Index (NHSCII) NHS providers non-pay deflator
Intermediate consumption other than that specified below (including NHS providers), FYE 1995 to FYE 2015	As above	Unchanged
Non-NHS provided services, FYE 2015 to FYE 2018	Non-NHS deflator combining ONS intermediate consumption-specific version of the HSCI and ONS pay index covering Hospital and Community Health Services (HCHS) and GP practice staff	NHSCII NHS providers deflator
Non-NHS provided services, FYE 2004 to FYE 2015	As above	Non-NHS deflator combining ONS intermediate consumption-specific version of the NHSCII and ONS pay cost index covering HCHS staff
Non-NHS provided services, FYE 1995 to FYE 2004	Non-NHS deflator combining ONS intermediate consumption-specific version of the HSCI and ONS pay cost index covering HCHS staff	Unchanged
NHS bank staff costs, FYE 2016 to FYE 2018	Not previously included	NHSCII pay cost deflator for NHS providers
Agency staff costs, FYE 2015 to FYE 2018	ONS pay cost index covering HCHS and GP practice staff	NHSCII pay cost deflator for NHS providers
Agency staff costs, FYE 2004 to FYE 2015	As above	ONS pay cost index covering HCHS staff
Agency staff costs, FYE 1995 to FYE 2004	ONS pay cost index covering HCHS staff	Unchanged
General practice intermediate consumption, FYE 1995 to FYE 2018	RPI	CPIH
Dental services, FYE 2008 to FYE 2018	Annual contract value adjustment in the General Dental Services Statements of Financial Entitlements	NHSCII dental cost deflator and ONS equivalent for earlier years
Dental services, FYE 1995 to FYE 2008	As above	Non-NHS deflator as above for FYE 1995 to FYE 2008
Pharmaceutical services (excluding drug costs), FYE 2015 to FYE 2018	Implied deflator for prescription costs	Overall NHSCII
Pharmaceutical services (excluding drug costs), FYE 1995 to FYE 2015	As above	Non-NHS deflator as above for FYE 1995 to FYE 2015
General ophthalmic services, FYE 2015 to FYE 2018	Increases in NHS sight test fees	Overall NHSCII
General ophthalmic services, FYE 1995 to FYE 2015	As above	Non-NHS deflator as above for FYE 1995 to FYE 2015

Source: Office for National Statistics

Notes

1. The inputs for hospital and community health service employees (other than bank staff) staff working in General practice and GP-prescribed drugs are not deflated as these inputs are directly measured using a cost-weighted labour index or cost-weighted drug index. Back to table

2. Capital consumption inputs are obtained from the national accounts in volume terms and so need no further deflation. Back to table

It should be noted that changes to the deflator for non-NHS provided services will affect output as well as input, as non-NHS provided services are included in output on an “output-equals-inputs” basis. A further change has been made to the processing of non-NHS provided services in output so that future revisions to this element in inputs will always be reflected in the output.

Notes for: Developments to deflators

1. A Paasche index is one where weights used are taken from the second of two linked years which growth is being measured between.

2. GP and dental earnings includes the taxable income of GP and dental practice partners, while NHS staff salaries are used to proxy for the salaries of general practice employees.

3. For more information on this deflator, please see the University of York publication: Castelli and others (2018) Productivity of the English National Health Service: 2016 to 2017 update .

5 . Other developments to healthcare inputs

Capital consumption

Estimates for the consumption of fixed capital used in the public service healthcare productivity measure come from UK National Accounts, The Blue Book. The 2019 edition of the Blue Book includes improvements to the measurement of capital consumption, which will be incorporated into public service productivity statistics. The improvements include revised asset life estimates, which have generally led to shorter estimated asset lives and by extension higher capital consumption. A methodology article and impact analysis provide more information on these changes in the national accounts.

These improved estimates are due to be adopted across all sectors included in public service productivity as discussed in Improved methods for total public service productivity: total, UK, 2017.

NHS bank staff

In the NHS, bank staff work variable hours in response to demand, similar to agency staff. However, bank staff are NHS employees, providing services either through an in-house bank or an outsourced bank.

Previously, NHS bank staff have only been included in healthcare inputs for Wales and Scotland. However, NHS England and NHS Improvement have begun measuring total expenditure on NHS bank staff in the NHS in England, starting from financial year ending (FYE) 2016. This enables us to include indirect measures of bank staff inputs in England by deflating this expenditure by the NHS providers pay cost deflator available from the NHS Cost Inflation Index.

This is a similar approach to that used for agency staff, which are included in inputs using deflated expenditure data. As discussed in Section 3, agency staff will change from being deflated by the pay cost deflator previously produced by the Office for National Statistics (ONS) for productivity inputs, to being deflated by the NHS providers' pay cost deflator available from the NHS Cost Inflation Index, to bring the approaches to NHS bank and agency staff into line. However, it should be noted that agency staff are included in intermediate consumption inputs because they are not employed by the NHS, while NHS bank staff are included in labour inputs, because they are NHS employees.

As estimates of NHS bank staff are only available for the last three years of our series, the introduction of these NHS bank staff will only affect inputs growth between FYE 2016 and FYE 2018.

NHS England and NHS Improvement now collect data on the number of agency and NHS bank staff shifts worked, which we intend to investigate using to construct direct measures of these staff inputs in future.