Article

Ethnicity pay gaps, UK: 2012 to 2022

Earnings statistics for different ethnic groups, using regression analysis to provide more insight into factors that affect pay, using data from the Annual Population Survey over the time period 2012 to 2022. The 5-category ethnicity breakdown provides comparable estimates across the UK, while the more granular 18-category ethnicity breakdown is only available for England and Wales.

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1 . Main points

In the UK in 2022:

- Black, African, Caribbean or Black British employees earned less (£13.53) median gross hourly pay than White employees (£14.35), which has been consistent since 2012.

- Country of birth had an impact on how much employees earned: UK-born Black, African, Caribbean or Black British employees earned more (£15.18), while non-UK-born Black British employees earned less (£12.95) when compared with UK-born White employees (£14.26).

- After holding personal and work characteristics constant, to provide an adjusted pay gap based on a like-for-like comparison, we find that UK-born White employees earn more on average than most ethnic minority employees.

- When adjusting for pay-determining characteristics, we see the pay gap narrow and in some instances reverse: for example UK-born Black, African, Caribbean or Black British employees, move from earning 6.5% more to earning 5.6% less compared with White employees.

- When looking at the cumulative effect of pay-determining characteristics, the factors that had the greatest impact were occupation, qualifications, geography, age and sex.

Because of the declining sample of the Annual Population Survey (APS) and increased uncertainty since 2020, estimates covering the period 2020 to 2022 should be used with caution. This analysis predates the latest issues with the Labour Force Survey (LFS) data.

2 . Analysis of ethnicity pay gaps

Definition of ethnicity pay gap

Ethnicity pay gaps are the percentage difference between the median gross hourly earnings of the reference group (White or White British employees) and the comparative ethnic groups. This is referred to as the "raw" ethnicity pay gap. For more information on the pay gap definition see Section 8: Glossary.

Figure 1: Black, African, Caribbean or Black British employees have consistently earned less than White employees between 2012 and 2022

Raw pay gaps, 5-category ethnicity, UK, 2012 to 2022

Download the data

Between 2012 and 2022, Black, African, Caribbean or Black British employees were the only ethnicity group to be consistently earning less than White employees.

The biggest change can be seen among employees in the "Other" ethnic group. In 2019, they earned 6.7% less than White employees, and in 2020 the trend reversed, with this group earning 6.3% more, however, this was not statistically significant. This trend can be explained by the labour market composition, explored later in Section 5: Adjusted ethnicity pay gaps and Section 6: Factors that affect the ethnicity pay gap.

Detailed ethnicity pay gaps

The 5-category ethnicity breakdown provides comparable estimates across the UK, while the 18-category ethnicity breakdown is only available for England and Wales. Taking a more granular approach, using the 18-category ethnicity, reveals differences within groups.

Where the more detailed ethnic groups are referenced, we use the appropriate 5-category ethnic group name followed by the second level of more specific subgroups. Further information is included in Section 8: Glossary. In some instances, references to ethnic groups have been shortened, for example, White: English, Welsh, Scottish, Northern Irish or British employees are referred to as White British employees.

The Mixed or Multiple ethnic groups: White and Black Caribbean employees had the lowest median gross hourly earnings (£11.75) in 2022, compared with White British employees (£14.42). This was a pay gap of 18.5%, the opposite of what we have seen for the overall Mixed or Multiple ethnic employees in Figure 1.

Based on the 5-category ethnicity in the UK, Asian or Asian British employees in 2022 earned more than White employees, with a pay gap of negative 3.3% (see Figure 1). However, based on the more detailed ethnicity classification of Asian or Asian British employees in England and Wales (see Figure 2), Chinese and Indian employees had higher earnings compared with White British employees, while Bangladeshi and Pakistani employees earned less compared with White British employees.

Figure 2: White: Irish employees had the highest earnings compared with White British employees

Raw pay gaps, 18-category ethnicity, England and Wales, 2022

Notes:

1. Because of small sample sizes, the White: Gypsy and Irish Traveller employees have been excluded from the chart.

Download the data

White employees, based on the 5-category ethnicity in the UK, include ethnic minority groups, such as White: Irish, and White: Gypsy and Irish Traveller employees. Using the 18-category ethnicity for England and Wales reveals differences within this group, and provides a more specific estimate of ethnicity pay gaps by comparing pay of ethnic minority groups with White British employees.

The highest earnings were reported by White: Irish employees (£20.20 median gross hourly pay), which represents a pay gap of negative 40.1% relative to White British employees. This suggests that White: Irish employees are in higher-paid occupations, which is supported by the pay gaps decomposition analysis included in the accompanying datasets.

3 . Pay gaps by sex

The widest ethnicity pay gap for both men and women was among White: Irish employees, both sexes earning more than the White: English, Welsh, Scottish, Northern Irish or British reference group, at negative 50.7% and negative 37.7%, respectively. Estimates on the ethnicity pay gaps by sex are included in the accompanying datasets.

Ethnicity pay gaps by sex follow a similar trend to that seen among all adults (see Figure 2). So, to explore the compounding effects of ethnicity and sex, we consider the gender pay gap by ethnicity.

Figure 3: Men earned a higher hourly median wage than women in all but two ethnic groups in 2022

Median pay by sex, 18-category ethnicity, England and Wales, 2022

Notes:

1. Because of small sample sizes, the White: Gypsy and Irish Traveller employees have been excluded from the chart.

Download the data

Overall, [men tend to earn more than women](#) and for those ethnicities where women earn more, this was marginally more than men in the same ethnic group, and often less than men in the remaining ethnic groups.

There appears to be a lower gender pay gap for ethnic minority groups with lower median earnings, compared with those with higher median earnings.

4 . Pay gaps by country of birth

Figure 4: Non-UK Black, African, Caribbean or Black British employees earned the least compared with the UK-born White employees

Raw pay gaps by country of birth, 5-category ethnicity, UK, 2022

Notes:

1. UK-born White employees are the reference group for calculating the raw pay gaps for both UK-born and non-UK-born ethnic groups.

Download the data

Country of birth is an important pay-determining factor. Across all ethnicity groups, UK-born employees earn more than those born outside of the UK, except for White, and Mixed or Multiple ethnic employees.

For example, although Black, African, Caribbean or Black British employees earn less than White employees (see Figure 1), when we consider country of birth, UK-born Black British employees earn more (£15.18), while non-UK Black British employees earned the least (£12.95) compared with UK-born White employees (£14.26), a pay gap of negative 6.5%, and 9.2%, respectively. These differences are further explored in [Section 5: Adjusted ethnicity pay gaps](#).

Additional analysis of ethnicity pay gaps by country and English region (based on 5-category ethnicity in the UK), age, and country of birth (based on 18-category ethnicity in England and Wales) are provided in the [accompanying datasets](#). Please note that because of low sample size, most of these estimates have wide [confidence intervals](#) and therefore should be interpreted with caution.

5 . Adjusted ethnicity pay gaps

An employee's earnings can vary because of differences in their personal and work characteristics, such as their occupation or where their job is. The raw ethnicity pay gaps seen in Sections 2 to 4 are potentially affected by differences in these characteristics rather than differences between the ethnic groups.

We need to therefore isolate the effect that ethnic group has on pay from the effect that other factors have on pay. We do this by using a quantile regression. From this model we estimate "adjusted" pay gaps. This means that we can compare the median pay between groups on a like-for-like basis. More information on how the regression was done is found in Section 9: Data sources and quality.

We present the adjusted pay gaps by country of birth, as pay gaps vary by whether or not employees were born in the UK (see Section 4: Pay gap by country of birth). Adjusting for pay-determining characteristics narrows the pay gaps for most ethnicities with some seeing a reversal in the direction of the pay gap. UK-born White employees also earned more than most ethnic minority employees (see Figure 5). This suggests that differences in the characteristics between the groups contributed to the pay gap.

Figure 5: The pay gap for both the Asian or Asian British, and the Black, African, Caribbean or Black British UK-born employees reversed from earning more to earning less in the adjusted series

Raw and adjusted ethnicity pay gaps by country of birth, 5-category ethnicity, UK, 2012 to 2022

Notes:

1. UK-born White employees are the reference group for calculating the raw and adjusted pay gaps for both UK-born and non-UK-born ethnic groups.

Download the data

In 2022, among UK-born ethnic minority employees, the adjustment process narrowed and, in some cases, reversed the pay gap, from earning more to earning less than UK-born White employees.

- UK-born Asian or Asian British employees earned on average 11.9% more than UK-born White employees, but after adjustment it was estimated that they earned 1.9% less; the reversal of the direction was consistent since 2015.

- UK-born Black, African, Caribbean or Black British employees earned 6.5% more before adjustment, and then 5.6% less after adjustment, than UK-born White employees; the reversal of the direction happened for almost all years since 2012.

- UK-born Mixed or Multiple ethnic group employees earned 4.6% more before adjustment, but this narrowed to 0.6% more after adjustment.

- UK-born "Other" ethnic group employees earned 12.9% more before adjustment, but this narrowed to 3.8% more after adjustment.

For non-UK born employees compared with UK-born White employees, the adjustment process affected the pay gaps differently, with no consistent picture across ethnic groups.

- For non-UK-born Asian or Asian British employees, the adjusted pay gap was wider at 9.7% than the raw pay gap at 1.5%, in 2022; this was a consistent trend since 2012.

- There was no significant difference in the adjusted and raw pay gaps for non-UK-born Black, African, Caribbean or Black British employees.

- In 2022, the pay gap narrowed and reversed direction for non-UK-born Mixed or Multiple ethnic group employees, from earning 17.2% more to earning 2.8% less. However, it is difficult to see a trend over time as the data time series is more variable.

- For non-UK-born "Other" ethnic group employees, the adjusted pay gap was similar to the raw pay gap, between 2012 and 2019; however, between 2019 and 2020, while there was a large change in the raw pay gap, this was less pronounced for the adjusted pay gap, suggesting this change might be attributed by differences in characteristics.

Detailed adjusted ethnicity pay gaps

As referenced in Section 2: Analysis of ethnicity pay gaps, taking a more granular approach, using the 18-category ethnicity breakdown, reveals differences within groups. We specifically explore differences among Asian or Asian British, and Black or Black British ethnic minority groups in England and Wales. Additional analysis for the White, Mixed or Multiple ethnic groups, and "Other" ethnic groups can be found in the accompanying datasets.

Figure 6: For most years, the largest difference between the adjusted and raw pay gaps within the Asian or Asian British ethnic group occurs for Chinese employees

Asian or Asian British employees raw and adjusted pay gaps by country of birth, 18-category ethnicity, England and Wales, 2012 to 2022

Notes:

1. UK-born White British employees are the reference group for calculating the raw and adjusted pay gaps for both UK-born and non-UK-born Asian or Asian British sub-groups.

Download the data

When looking within Asian or Asian British employees using the 18-category ethnic breakdown in England and Wales, there were noticeable differences in the effect of the adjustment process by ethnic group. This suggests that there were different distributions of pay-determining characteristics for each of the Asian or Asian British sub-groups compared with the White British group. For most years, the largest difference between the raw and adjusted pay gaps was seen for Chinese employees, driven by differences in qualification, occupation, age and geography (see Section 6: Factors that affect the ethnicity pay gap for more information on this).

There was a reversal in the pay gap for non-UK-born Indian employees, from earning more than White British employees at a raw level, to earning less once adjusted. There was a smaller difference between the raw and adjusted pay gaps for Bangladeshi and Pakistani employees (regardless of country of birth).

Figure 7: UK-born Black Caribbean and Black African employees earned less than White British employees after adjustments for pay

Black or Black British employees raw and adjusted pay gaps by country of birth, 18-category ethnicity, England and Wales, 2012 to 2022

Notes:

1. UK-born White British employees are the reference group for calculating the raw and adjusted pay gaps for both UK-born and non-UK born Black or Black British sub-groups.

2. The confidence interval method requires a reliable pay distribution. In cases with lower sample sizes this is not always present, for example the 2021 estimates for UK-born Other Black employees.

Download the data

Within the Black, African, Caribbean or Black British group, the adjusted pay gaps for the UK-born Black African and Black Caribbean ethnic groups showed that they were consistently earning less than UK-born White British employees, while the raw pay gaps showed a mixed picture. The non-UK-born Black African group saw no tangible difference in the raw and adjusted pay gaps.

6 . Factors that affect the ethnicity pay gap

To understand the relationship between ethnicity and pay, and specifically the difference between the raw and adjusted pay gaps, we can look at the cumulative effect of each factor included in our statistical model. These factors are termed "confounders", as they may influence both pay and ethnicity, which would influence the relationship between ethnicity and pay. See Section 8: Glossary for more information.

The first step is to predict for all employees what their pay would be according to our model based on their characteristics. For each group a modelled median pay was predicted and from this a modelled pay gap estimated. The difference between the modelled pay gap and the raw pay gap is the modelling effect. It should be noted that the modelled pay gap is not the same as the adjusted pay gap. See Section 8: Glossary for more information.

To investigate the effect of each characteristic on the ethnicity pay gap, we control for each confounder in sequence to remove its effect on pay and recalculate the pay gap. This creates a set of pay gaps, to answer the following questions in turn: What is the pay gap if everyone worked in the same occupation? Then, what is the pay gap if everyone worked in the same occupation and had the same level of qualification? And so on, until all confounders in the model are controlled for, giving us the adjusted pay gap.

The process is affected by the order in which a confounder is controlled for, so an average effect over multiple orders of asking these questions is used to present the effect. Figure 8 shows the average effects of each characteristic on pay for UK-born employees, which in combination give the adjusted pay gap. Estimates for non-UK-born employees, as well as the 18-category ethnicity classification in England and Wales, are included in the accompanying datasets.

To show what this means in terms of the data, we look at UK-born Asian or Asian British employees, with the remaining ethnic groups shown in Figure 8. This group's raw pay gap was negative 11.9%, and their modelled pay gap was negative 16.9%, a modelling effect of 5.1 percentage points [note 1].

When we control for the different occupations, the pay gap narrows by 8.4 percentage points to negative 8.6%. Controlling for working pattern narrows the gap further by 0.8 percentage points and so on. Once all confounders have been controlled for, we get an adjusted pay gap of positive 1.9%. This shows that removing the effect of the confounders, UK-born Asian or Asian British employees go from earning more than UK-born White employees to earning less.

Figure 8: For UK-born ethnic minority employees, geography and occupation contributed the most to adjusting their pay gap with UK-born White employees

Cumulative contributions to the difference in raw and adjusted pay gaps, UK-born employees, 5-category ethnicity, UK, 2022

Notes:

1. Contributions were individually rounded, as such they will not sum to the difference between the raw and adjusted pay gaps.

Download the data

From this analysis the main confounders that explain most differences between the groups were:

- occupation

- highest qualification level

- geography

- age

- sex

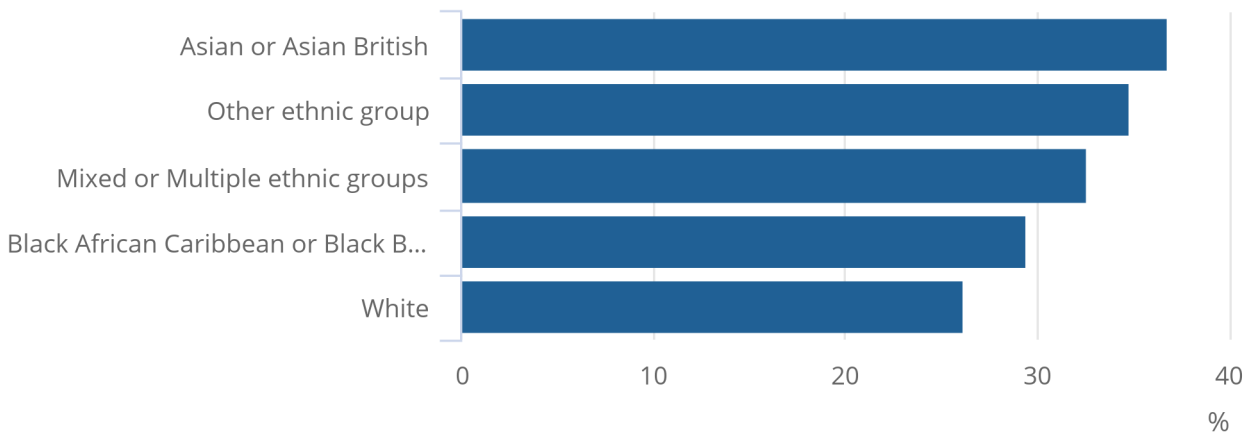The next section considers the impact of the main confounders on the pay gap.

Occupation

Figure 9: Asian or Asian British employees had the highest percentage working in the professional occupations

Percentage of employees working in the professional occupations, by 5-category ethnic group, UK, 2022

Figure 9: Asian or Asian British employees had the highest percentage working in the professional occupations

Percentage of employees working in the professional occupations, by 5-category ethnic group, UK, 2022

Source: Annual Population Survey from the Office for National Statistics

The model controls for occupation by adjusting pay levels to those working in professional occupations (jobs such as doctors, scientists, or teachers). This group is used as the reference group because it is the largest of the major occupation groupings and had the highest median hourly earnings in 2022 (£22.18) according to estimates from the Annual Survey of Hours and Earnings (ASHE).

Over a third (36.8%) of Asian or Asian British employees worked in the professional occupations, compared with over a quarter (26.2%) of White employees. This means that there would be a larger increase for White employees' median pay because of this control than for the remaining groups. Given that the percentage of Black employees working in these occupations (29.5%) is closer to White employees, this might explain why occupation has a smaller contribution to the difference compared with other groups.
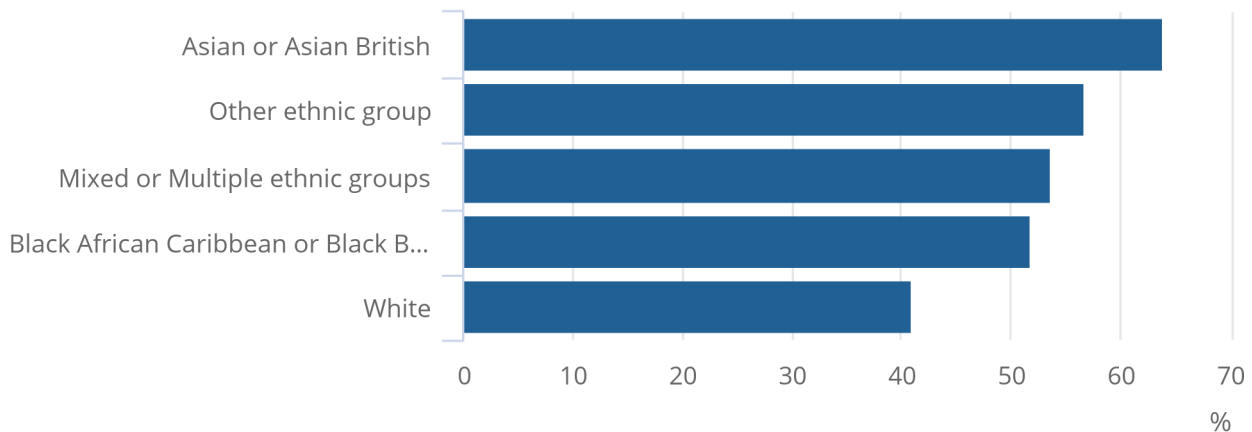
Highest qualification level

Figure 10: Asian or Asian British employees had the highest percentage with a degree or equivalent

Percentage of employees with a degree or equivalent, by 5-category ethnic group, UK, 2022

Figure 10: Asian or Asian British employees had the highest percentage with a degree or equivalent

Percentage of employees with a degree or equivalent, by 5-category ethnic group, UK, 2022

Source: Annual Population Survey from the Office for National Statistics

Qualifications also contribute to the difference between the adjusted and raw pay gaps. The model adjusts the level of pay to those who have a degree or equivalent as their highest level of qualification, because employees with these qualifications tend to have higher pay.

Asian or Asian British employees had the highest percentage with a degree or equivalent (63.9%) while White employees had the lowest percentage at 40.9%. Like the occupations effect, the structural difference in the labour market for qualifications explains the large contributing effect seen in the model.
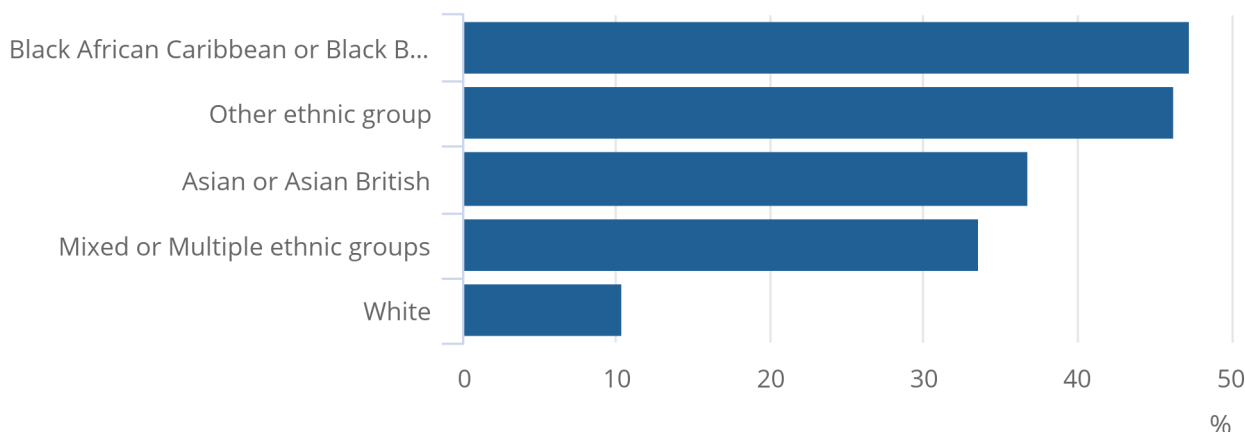
Geography

Figure 11: Black, African, Caribbean or Black British employees had the highest percentage living in London

Percentage of employees living in London, by 5-category ethnic group, UK, 2022

Source: Annual Population Survey from the Office for National Statistics

Pay varies spatially in the UK, with employees living in different parts of the country earning different wages, doing similar jobs. The model uses London as a reference group as it is the most populous region. Adjusting the model by geography increases the conditional median pay, as London has significantly higher pay compared with all other regions (Annual Survey of Hours and Earnings).

The ethnic group with the highest percentage living in London was the Black, African, Caribbean or Black British group at 47.3%, compared with 10.4% of White employees. This might explain why the effect of geography was most pronounced in the model for the Black, African, Caribbean or Black British, as the raw pay gap would likely be reflecting London's higher wages.
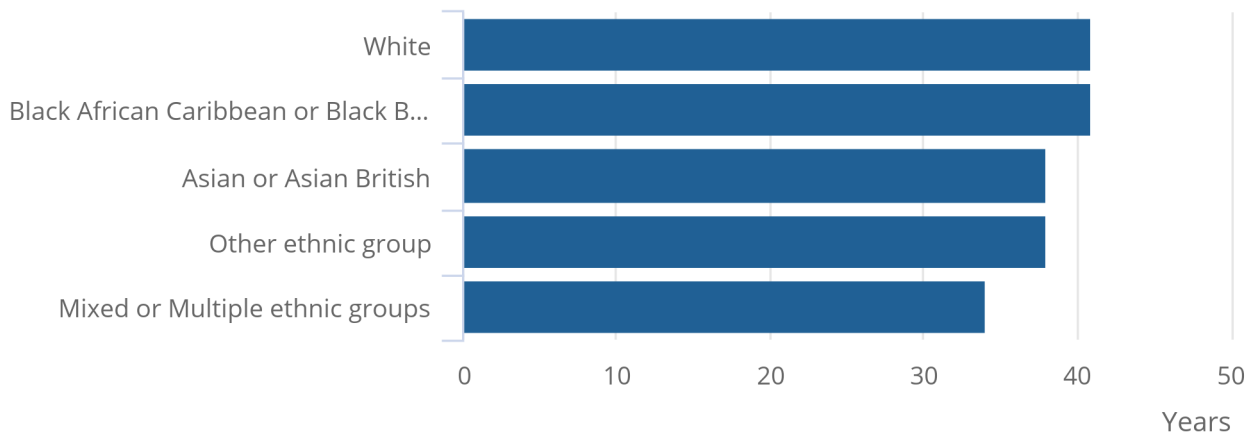
Age

Figure 12: Mixed or Multiple ethnic groups have the lowest median age at 34 years

Median age, by 5-category ethnic group, UK, 2022

Figure 12: Mixed or Multiple ethnic groups have the lowest median age at 34 years

Median age, by 5-category ethnic group, UK, 2022

Source: Annual Population Survey from the Office for National Statistics

Pay typically increases as an employee ages, because of more experience within the labour market. This is shown by the age coefficient in our model, which estimates that when holding all other factors constant, ethnic groups' median pay increases by 2.9% for each year older a person gets. Therefore any difference between age will explain the differences between the raw and and adjusted pay gap. This trend was also seen in Annual Survey of Hours and Earnings data.

There is a seven-year age gap between the median age for White employees at 41 years and the Mixed or Multiple ethnic group employees at 34 years. This contributes to £1.30 difference in the earnings for an employee of median age between groups (after controlling for other factors).
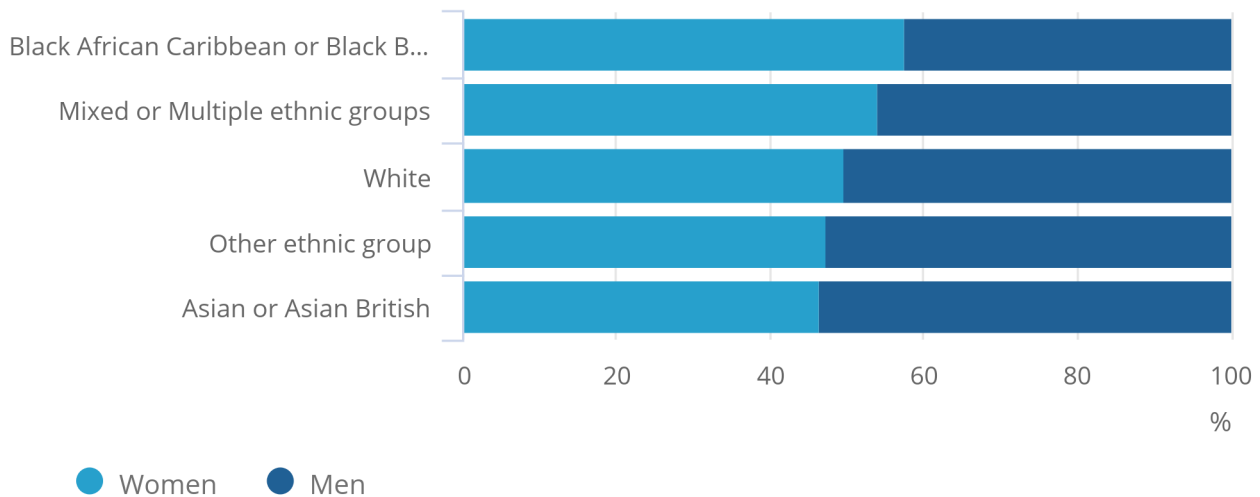
Sex

Figure 13: Black employees have the highest proportion of women compared with men

Percentage of employees by sex, by 5-category ethnic group, UK, 2022

Figure 13: Black employees have the highest proportion of women compared with men

Percentage of employees by sex, by 5-category ethnic group, UK, 2022

The gender pay gap has been extensively studied, for further information see our article Gender pay gap in the UK: 2023. Differences in the sex split impacts the ethnicity pay gap.

For the White, Asian or Asian British, and "Other" ethnic groups, among employees there were more men than women, whereas for Mixed or Multiple ethnic groups and Black, African, Caribbean or Black British employees, the reverse was true.

The widest split was among the Black, African, Caribbean or Black British group (57.7% women, 42.3% men). Removing the effect of sex on the pay gap normally narrows the pay gap, however, for this group it widens the pay gap. This is likely as when looking at the more detailed ethnic group classification, for Black Caribbean employees and Other Black employees the median pay for women was higher than for men (see Figure 3).

7 . Ethnicity pay gaps data

Ethnicity pay gaps: raw pay gaps, UK, 2012 to 2022
Dataset | Released 29 November 2023
Median pay and raw ethnicity pay gap estimates for 2012 to 2022 across different ethnicity breakdowns using the Annual Population Survey.

Ethnicity pay gaps: regression models, UK, 2022
Dataset | Released 29 November 2023
Regression results from pay regression model and the factors which affect it for 2022 across different ethnicity breakdowns using the Annual Population Survey.

Ethnicity pay gaps: adjusted pay gaps and decomposition, UK, 2012 to 2022
Dataset | Released 29 November 2023
Ethnicity adjusted pay gap estimates for 2012 to 2022 across different ethnicity breakdowns using the Annual Population Survey.

Ethnicity pay gaps: employee characteristics by ethnic group, UK, 2022
Dataset | Released 29 November 2023
Analysis of employee characteristics by ethnicity for 2022 using the Annual Population Survey.

8 . Glossary

Ethnicity breakdowns used in this article and accompanying datasets

Ethnicity questions differ between England and Wales, Scotland, and Northern Ireland. While the questions are not completely aligned with the Government Statistical Service Harmonised Standard, the reporting of the 5- and 18-category ethnicity groups is aligned with this guidance.

We have used the 5-category level of disaggregation to allow for comparable estimates across the UK.

It should be noted that the White group, based on the 5-category ethnicity in the UK, includes White ethnic minority groups, such as the White Irish, and Gypsy and Irish Traveller groups. Therefore, using this as the "reference group" in calculating the pay gap does not account for differences in pay experienced by White ethnic minority groups.

We have also used the 18-category level of disaggregation to provide more detail, but this is only consistent across England and Wales. The greater level of detail coupled with more restricted geographic coverage may result in some small sample sizes for certain ethnic groups and may result in greater volatility and uncertainty of some estimates. We have included confidence intervals and statistical robustness statements to help manage this.

Where the more detailed ethnic groups are referenced, we use the appropriate 5-category ethnic group name followed by the second level of more specific subgroups. In some instances when reporting estimates, references to ethnic groups have been shortened, for example, White: English, Welsh, Scottish, Northern Irish or British employees are referred to as White British employees.

These are the 5-category ethnicity groups used in UK analysis, each followed by their relevant 18-category ethnicity subgroups used in England and Wales analysis.

5-category: UK

- White

- Asian or Asian British

- Black, African, Caribbean or Black British

- Mixed or Multiple ethnic groups

- Other ethnic groups

18-category: England and Wales

- White: English, Welsh, Scottish, Northern Irish or British

- White: Gypsy or Irish Traveller

- White: Irish

- White: Other White

- Asian or Asian British: Bangladeshi

- Asian or Asian British: Chinese

- Asian or Asian British: Indian

- Asian or Asian British: Pakistani

- Asian or Asian British: Other Asian

- Black, African, Caribbean or Black British: African

- Black African, Caribbean or Black British: Caribbean

- Black African, Caribbean or Black British: Other Black

- Mixed or Multiple ethnic groups: White and Asian

- Mixed or Multiple ethnic groups: White and Black African

- Mixed or Multiple ethnic groups: White and Black Caribbean

- Mixed or Multiple ethnic groups: Other Mixed or Multiple groups

- Other ethnic group: Arab

- Other ethnic group: Other ethnic group

Adjusted pay gap

An adjusted pay gap is a pay gap that is estimated from the predicted pay after controlling for all confounders according to the statistical model.

Confidence intervals

Confidence intervals are included in the figures reported and in the accompanying datasets. This is a measure of statistical precision of an estimate and shows the range of uncertainty around the calculated estimates. As a general rule, the estimated pay gap is not significant if the confidence interval crosses through zero, meaning the interval ranges from a negative value to a positive value.

Confounder

A confounder is a variable that affects both the dependent and independent variables causing a non-genuine relationship between these variables.

Modelled pay gap

A modelled pay gap is estimated from pay that is predicted from the characteristics of the respondents according to the statistical model.

Modelling effect

The difference between the raw pay gaps and modelled pay gap, is the modelling effect.

Some reasons for the modelling effect are:

- the predicted pay assumes that pay is only determined by the variables in the model

- the random error in pay

- the model predicts the median pay for an employee, but there will be people earning above or below this estimate in the economy

Raw pay gap

A raw pay gap is a pay gap that is estimated from observed pay data collected from respondents.

9 . Data sources and quality

This release contains estimates based on the Annual Population Survey (APS).

More quality and methodology information is available in the Annual Population Survey Quality and Methodology I nformation.

Coverage

Estimates reported are based on employees aged 16 years and over. The UK geographic coverage uses the 5-category ethnicity breakdown. While the 18-category ethnicity breakdowns are based on employees in England and Wales.

As a form of outlier treatment, we have removed the top 1% and bottom 2% of the pay distribution from our data. This is because the earnings data collected from the APS are known to be subject to greater recall error than data collected from the Annual Survey of Hours and Earnings (ASHE), a business survey.

Strengths and limitations of data

Earnings analysis is primarily done using ASHE data. As a business survey ASHE captures more accurate earnings information as businesses can consult their payroll. Earnings information collected on the APS is self-reported and therefore subject to greater recall error. However, APS collects a broader range of personal and household characteristics than ASHE, which potentially broadens its uses.

It should be noted that during and following the coronavirus (COVID-19) pandemic period, ASHE (and by proxy APS) showed some divergence compared with other earnings data sources (Average Weekly Earnings, and Earnings and employment from Pay As You Earn, Real Time Information). Please see the Comparison of labour market data sources methodology for reasons why we expect to see differences in the data sources.

Earnings information from the APS is only collected from a subset of employees, see Volume 3 of the Labour Force Survey user guide for more information. It therefore has a lower total sample for earnings analysis than ASHE, at approximately a third of respondents.

Weighting

The income weight for the APS is based on six calibration groups. Standard Occupational Classification (SOC) is used as a calibration group in the income weights; since 2020 it has been updated from SOC 2010 to SOC 2020. More information on this can be found in [Volume 6 of the Labour Force Survey user guide.](#)

Weights for estimates from 2012 to 2019 are based on Office for National Statistics (ONS) population projections, while for 2020 onwards, changes to the weighting have been introduced in response to the impacts of [the coronavirus (COVID-19) pandemic on APS data collection](#). The weighting methodology for the APS has been updated to overcome any biases introduced, with new populations using growth rates from HM Revenue and Customs' (HMRC's) Real Time Information (RTI). We also introduced non-response bias adjustment to better reflect the socio-economic make-up of the population. For more information see the [Labour Force Survey weighting methodology](#).

Regression model methodology

We have used a quantile regression (QR) as the model estimation methodology.

For our analysis we model the logarithm of a respondent's pay against ethnicity and the confounders. We have done this to improve the interpretation of the coefficients as QR is a distribution-free methodology. The coefficients represent a change in the log (pay); when we take an exponential of the coefficient, this is the percentage change in the level of the median pay.

For example, if the estimate of the coefficient of x1 is 0.1 then the effect on pay is:

$$\exp 0.1 = 1.105$$

which shows that each additional unit of x1 increases pay by 10.5% with all other variables held constant.

It is not possible to explain all the variation in pay using our model, so caution needs to be made in interpreting the data. Some of this unexplained variation can be down to:

- confounders not measured in our dataset (for example, socio-economic background)

- assumptions around the relationship between the dependent variable and the confounders

The outputs for each regression model, including the variables included in the model, are reported in the [accompanying datasets](#).

Most of the variables are categorical variables, as such we choose a reference level to compare against.

Reference levels were selected if they satisfy one of two criteria. Either they had the highest proportion of respondents in that category, for example, disability status and occupation, or they are natural choice that would aid interpretation, for example, marital status and qualification status. The categories chosen as reference levels are indicated by the notation of "No data, reference level" in the [accompanying datasets](#).

We have interacted sex and working pattern together (because of the effect of working pattern on the gender pay gap), and ethnicity and country of birth (to account for any differential differences between migrants and non-migrants within each ethnic group). This changes the interpretation of the coefficients, as we need to look across all the coefficients to see the impact of these variables.

While median pay generally increases with age, this relationship is not linear. In the APS data the median pay increases with age, and then decreases from the mid 50s the closer to State Pension age a person gets. To try to estimate this non-linear relationship, both age and age squared are used in the model to approximate for a non-linear relationship between age and log (pay).

Pay gaps methodology

Raw pay gaps

Raw pay gaps are calculated as follows:

$$\text{RawPayGap} = \frac{\text{median(White ethnicity)} - \text{median(EthnicGroup)}}{\text{median (White ethnicity)}} \text{X}100$$

Adjusted pay gap

Adjusted pay gaps are calculated as follows:

$$\text{AdjustedPayGap} = 100(1 - \exp(\beta_{\text{eth}} + \beta_{COB} + \beta_{eth\,x\,COB)})$$

 is the coefficient from the model.

10 . Related links

Gender pay gap in the UK: 2023
Bulletin | Released 1 November 2023
Differences in pay between women and men by age, region, full-time and part-time, and occupation.

Disability pay gaps in the UK: 2021
Article | Released 25 April 2022
Earnings statistics for disabled and non-disabled employees in the UK, using regression analysis to provide more insight into factors that affect pay.

Religion, education and work in England and Wales: February 2020
Article | Released 26 February 2020
Statistics and analysis of education and employment outcomes of people of different religious identities in England and Wales.

Diversity in the labour market, England and Wales: Census 2021
Article | Released 25 September 2023
How labour market outcomes differ across various subgroup populations in England and Wales.

11 . Cite this article

Office for National Statistics (ONS), released 29 November 2023, ONS website, article, Ethnicity pay gaps, UK: 2012 to 2022