Office for National Statistics

Article

Ethnicity pay gaps in Great Britain: 2018

Earnings and employment statistics for different ethnic groups in Great Britain, using regression analysis to provide more insight into factors that affect pay.

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1 . Main points

- This report presents the first analysis of ethnicity pay gaps in Great Britain using newly reweighted earnings data from the Annual Population Survey.

- This new analysis shows that employees of Chinese, Indian and Mixed or Multiple ethnicity all had higher median hourly pay than White British employees in 2018; while employees in the Pakistani and Bangladeshi ethnic groups had lowest median hourly pay.

- In 2018, on average, employees from the Chinese ethnic group earned 30.9% more than White British employees; while employees from the Bangladeshi ethnic group, on average, earned 20.2% less than White British employees.

- The percentage difference in median hourly pay between people of a White ethnicity and all those who belong to an ethnic minority group is largest in London at 21.7%.

- The existing pay gap between White British and other ethnic groups is generally smaller for younger employees than it is for older employees.

- The ethnicity pay gap between White British employees and most other ethnic groups narrows once other characteristics such as education and occupation are taken into account, however, some significant gaps still remain, particularly for those born outside of the UK.

2 . Introduction

In 2016 the government set out to examine the barriers faced by people from ethnic minority groups in the workplace and consider what could be done to address them. The 2017 report " Race in the Workplace " set out a range of actions for businesses and government to take forward to help improve employment and career prospects for those from ethnic minority backgrounds. According to the report, equal participation and progression across ethnicities could be worth an additional £24 billion to the UK's economy per year.

To be able to address any barriers that may cause these differences in labour market experiences among different ethnicities, we must first be able to measure the disadvantage that some ethnic minorities face.

For the first time, this report presents analysis of ethnicity pay gaps using a new earnings weight on the Annual Population Survey. This allows for more detailed analysis of ethnicity and pay than was previously possible. As this is the first presentation of such analysis by the ONS we would welcome feedback to Policy.Evidence. Analysis@ONS.gov.uk on how this analysis could be developed in future.

3 . Definition of ethnicity pay gap

In this study the headline measure for the ethnicity pay gap uses Annual Population Survey (APS) data and is calculated as the difference between the average hourly earnings of White British and other ethnic groups as a proportion of average hourly earnings of White British earnings. For example, a positive 5.0% ethnic pay gap between White British and Indian ethnic groups would denote that the median hourly earnings for employees of an Indian ethnicity are 5.0% less than median hourly earnings of White British employees. Conversely, a negative 5.0% pay gap would denote that employees of Indian ethnicity earn 5.0% more, on average, than White British employees. Using this terminology ensures consistency with existing analysis of the gender pay gap.

4 . Ethnicity breakdowns

The analysis in this report is based mostly around the 10-category ethnicity breakdown given in this section. This is because it allows us to observe differences between different ethnic groups that would otherwise be lost by using a more aggregated ethnicity classification.

The report does not use a more detailed breakdown than this due the sample sizes being too small and there being different categorisations for Scotland, than for England and Wales. However, some of the main statistics presented in this report have also been made available for comparison in a more aggregated format in the relevant datasets, using the five-category and two-category breakdowns, also detailed in this section.

The 10-category ethnicity breakdown includes:

- White British

- White Other

- Mixed or Multiple ethnic groups

- Indian

- Pakistani

- Bangladeshi

- Chinese

- Any other Asian

- Black African, Caribbean or Black British

- Other ethnic group

The five-category ethnicity breakdown includes:

- White (White British, White Other)

- Black African, Caribbean or Black British

- Mixed or Multiple ethnic groups

- Asian (Chinese, Indian, Bangladeshi, Pakistani, Other Asian)

- Other ethnic group (Arab, Other ethnic group)

The two-category ethnicity breakdown includes:

- White (White British and White Other)

- Ethnic minority group

For more information on the data and methods used in this analysis, please see the Quality and methodology section at the end of this article.

5 . Analysis of ethnicity pay gaps

Figure 1: White Other accounts for the second-largest proportion of employees at 7.9%

Proportion of employees by ethnic group excluding White British, aged 16 years and over, Great Britain, 2018

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Proportion of employees by ethnic group excluding White British, aged 16 years and over, Great Britain, 2018
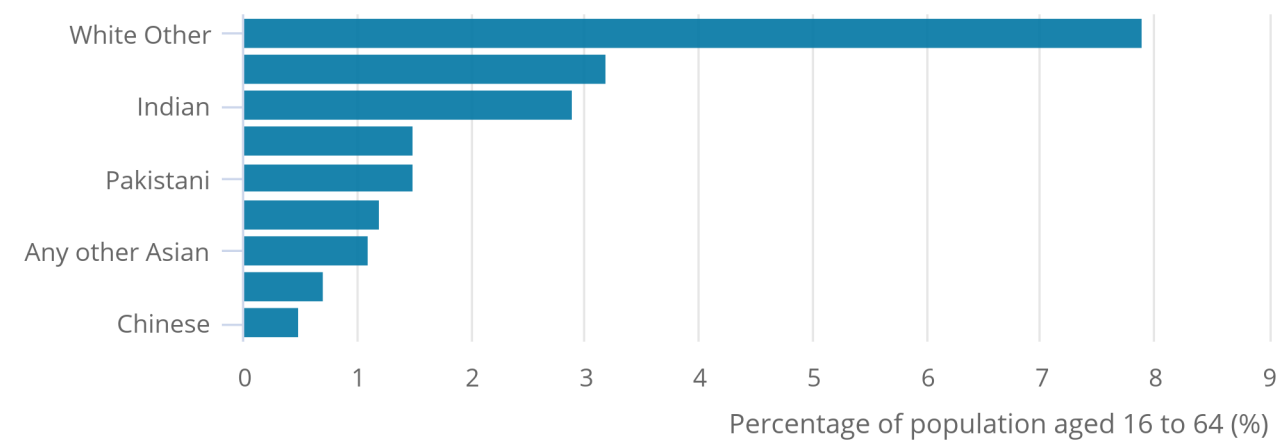
Source: Office for National Statistics - Annual Population Survey

Notes:

1. Employees refers to everyone employed in Great Britain between the ages of 16 and 64 years.

Great Britain's (England, Scotland, Wales) employee workforce includes people from a number of different ethnic groups. The most prominent ethnic group is White British, estimated to account for 79.5% of the working population, followed by White Other (7.9%) and Black African, Caribbean or Black British (3.2%).

The ethnic groups that make up the smallest proportions of those employed within Great Britain are the Bangladeshi and Chinese ethnic groups, at 0.7% and 0.5% respectively. The estimates of average hourly pay and subsequently the pay gaps are likely to be more volatile or inaccurate for the ethnic groups with smaller sample sizes such as these.

The White Other ethnic group (referring to any person who identifies ethnically as white but does not identify as British, for example, those who might identify as White Australian or White European) is the most prominent ethnic group other than White British. This is likely because of the UK being a part of the European Economic Area where the free movement of persons is one of the core rights of citizens of any member country. Other large groups such as the Indian ethnic group are members of the Commonwealth of Nations and formerly had rights to migrate to the UK.

Figure 2: The White Other ethnic group has the highest employment rate of all ethnic groups at 81.7%

Employment rate by ethnic group for all persons of working age (aged 16 to 64 years), Great Britain, 2018

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Employment rate by ethnic group for all persons of working age (aged 16 to 64 years), Great Britain, 2018
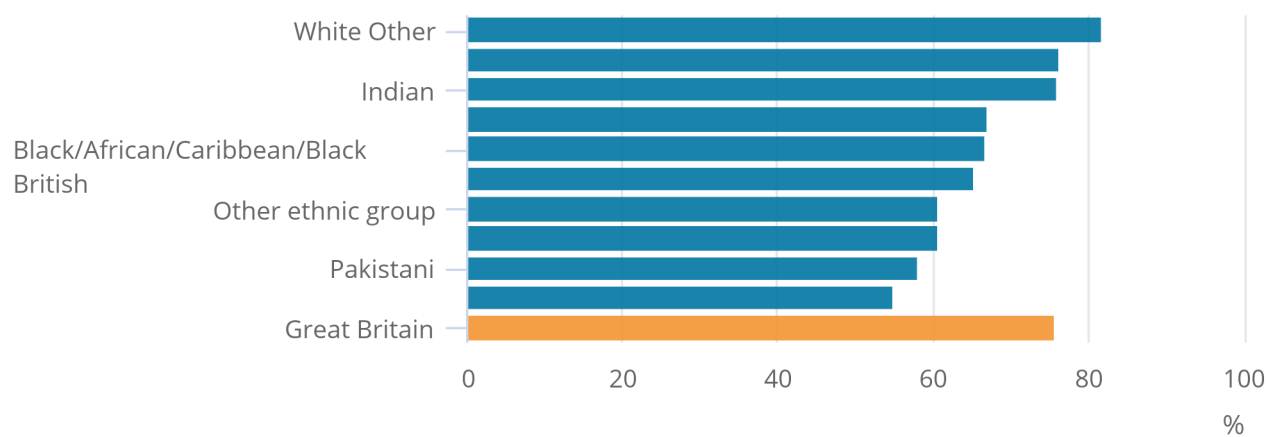
Source: Office for National Statistics - Annual Population Survey

Notes:

1. Working age is defined as aged 16 to 64 years.

Figure 2 shows the employment rate of each ethnic group in 2018. The ethnic group with the highest employment rate is White Other at 81.7%. The White British and Indian ethnic groups follow White Other with employment rates of 76.4% and 75.9% respectively.

The two ethnic groups with the lowest employment rates are Pakistani and Bangladeshi, with employment rates of 58.2% and 54.9% respectively.

Figure 3: Inactivity rates among women of the Pakistani and Bangladeshi ethnic groups are substantially higher than other ethnic groups

Inactivity rates by ethnic group and sex, all persons, working age (aged 16 to 64 years), Great Britain, 2018

Figure 3: Inactivity rates among women of the Pakistani and Bangladeshi ethnic groups are substantially higher than other ethnic groups

Inactivity rates by ethnic group and sex, all persons, working age (aged 16 to 64 years), Great Britain, 2018
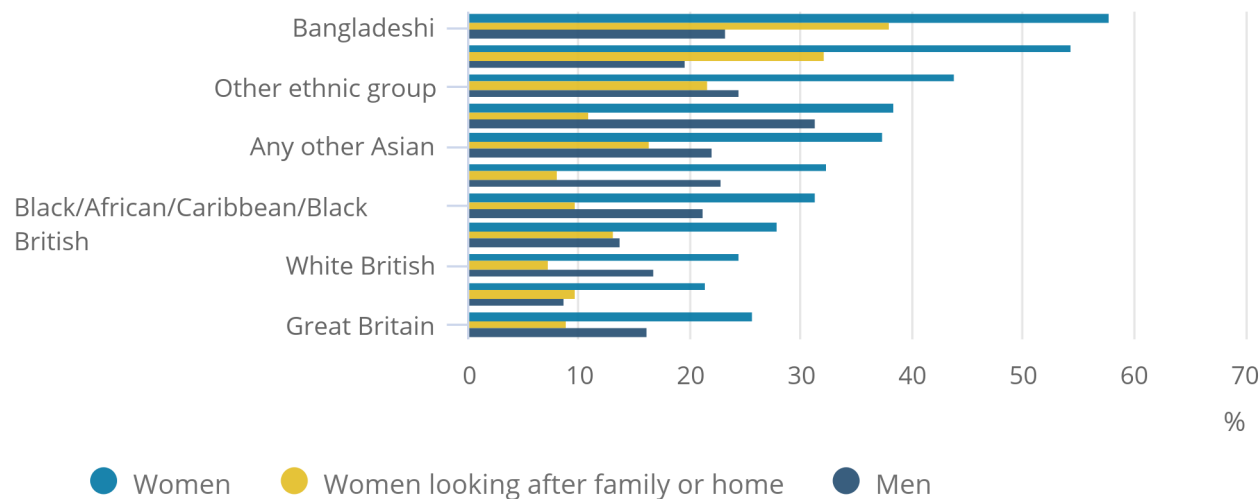
Source: Office for National Statistics - Annual Population Survey

Notes:

1. Inactivity rates refers to proportion of the population not in the labour force.

2. "Women- Looking after family/ home" refers to one of the reasons given for inactivity.

There were large differences in inactivity rates between males and females for certain ethnic groups in 2018. For example, the inactivity rate of men in the Pakistani ethnic group was 19.6%, while the inactivity rate for Pakistani women was 54.5%.
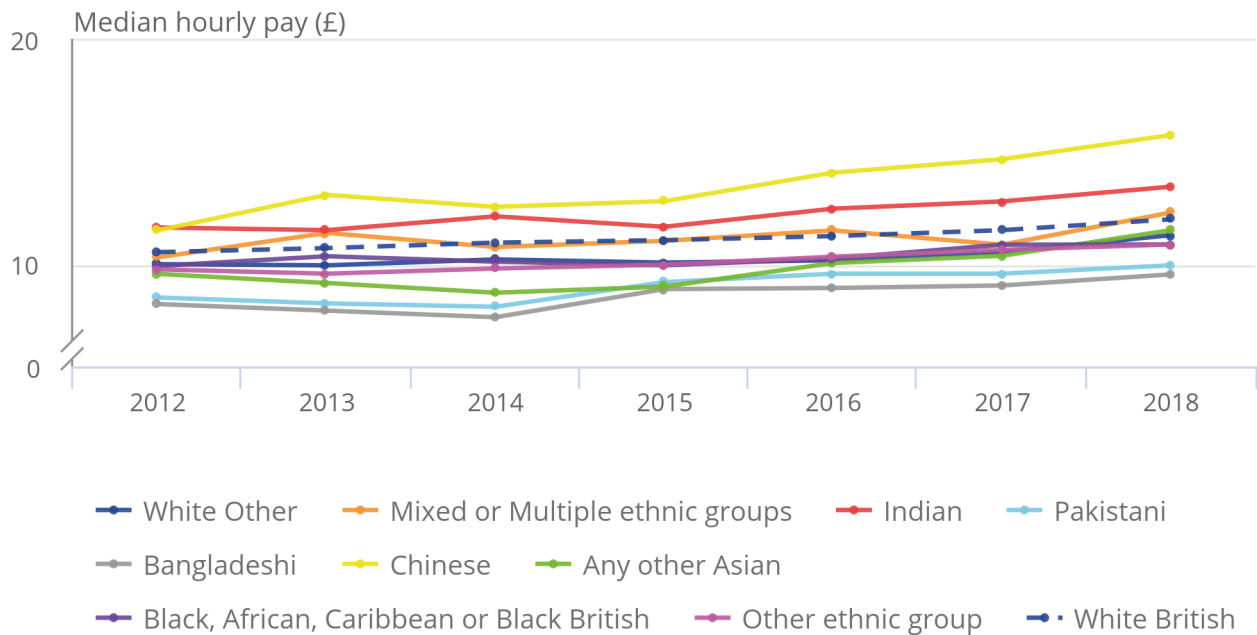
Figure 3 also shows that the inactivity rates of women in the Pakistani and Bangladeshi ethnic groups are substantially higher than that of any other ethnic group. This may be because of cultural differences in the dynamics of the family unit. For example, 38.1% of women from a Bangladeshi ethnic group and 32.1% of women from a Pakistani ethnic group are inactive because of looking after the family or home. In comparison the next highest are women from Other ethnic groups at 21.6%.

Figure 4: Employees in the Chinese ethnic group had the highest median hourly pay of any ethnic group in 2018

Median gross hourly earnings (including overtime) for all employees aged 16 years and over, Great Britain, 2012 to 2018

Figure 4: Employees in the Chinese ethnic group had the highest median hourly pay of any ethnic group in 2018

Median gross hourly earnings (including overtime) for all employees aged 16 years and over, Great Britain, 2012 to 2018

Median hourly pay (£)

Legend:
- White Other
- Mixed or Multiple ethnic groups
- Indian
- Pakistani
- Bangladeshi
- Chinese
- Any other Asian
- Black, African, Caribbean or Black British
- Other ethnic group
- White British

Source: Office for National Statistics - Annual Population Survey

Notes:

1. Median gross hourly earnings refer to both full-time and part-time employees.

Figure 4 shows the median gross hourly pay for employees from 2012 to 2018 for all ethnic groups. There were three ethnic groups which were shown to have a higher median hourly pay than White British in 2018. These being Chinese, Indian and Mixed/Multiple ethnic groups with hourly earnings of £15.75, £13.47 and £12.33 respectively, in comparison to White British whose median pay was £12.03. The ethnic group that had the lowest median hourly pay in 2018 was Bangladeshi at £9.60 followed by Pakistani at £10.00.
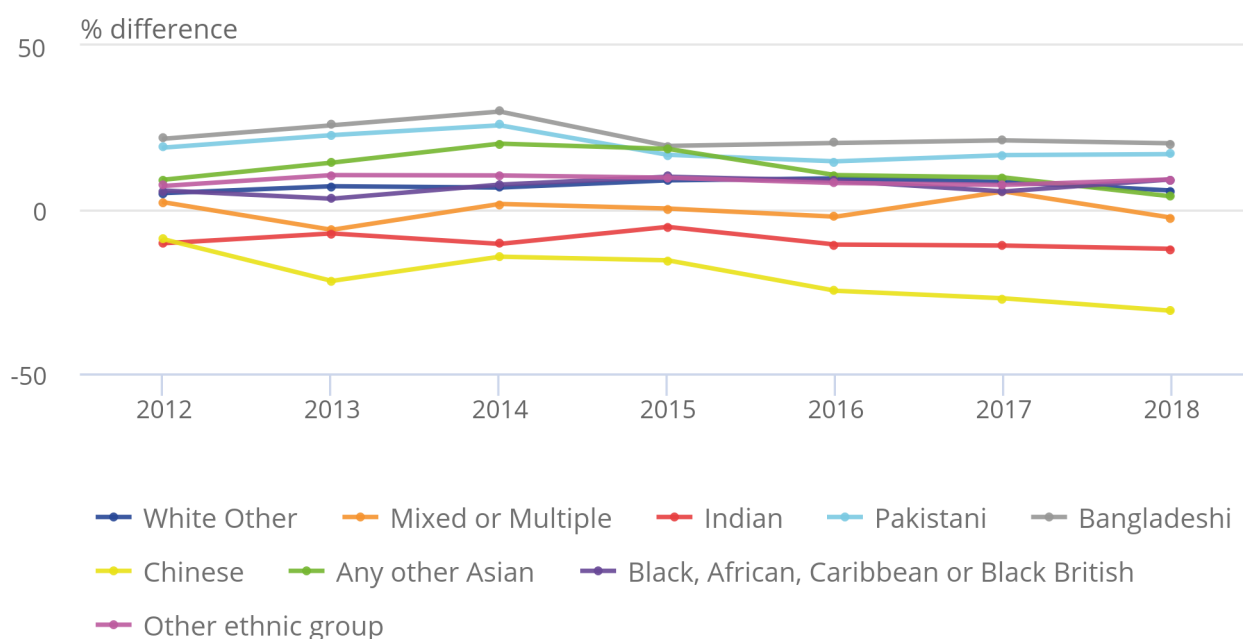
All ethnic groups experienced a rise in their median hourly pay between 2012 and 2018 (not adjusted for inflation). All ethnicities experienced an annual growth rates 1.5% and 3.1%, except for those from the Chinese ethnic group which experienced a growth rate of 5.3% annually. It must be noted however, that the Chinese and Bangladeshi ethnic groups have a smaller sample size[1] than the other ethnic groups and are therefore more susceptible to volatility and inaccuracy than estimates from larger ethnic groups. Although they have smaller sample sizes the Chinese are shown to consistently earn more than White British.

Figure 5: There is a mixed picture when looking at pay gaps between ethnic minority employees and White British employees

Percentage difference between gross hourly earnings (including overtime) for ethnic minority employees and White British employees, Great Britain, 2012 to 2018

Figure 5: There is a mixed picture when looking at pay gaps between ethnic minority employees and White British employees

Percentage difference between gross hourly earnings (including overtime) for ethnic minority employees and White British employees, Great Britain, 2012 to 2018

% difference

- White Other
- Mixed or Multiple
- Indian
- Pakistani
- Bangladeshi
- Chinese
- Any other Asian
- Black, African, Caribbean or Black British
- Other ethnic group

Source: Office for National Statistics - Annual Population Survey

Notes:

1. Median gross hourly earnings refer to both full time and part time employees.

2. Pay gap figures represent the difference between White British and ethnic minority groups hourly earnings as a percentage of White British earnings.

Figure 5 shows how different ethnic groups compare with White British in average hourly pay where the 0% line represents White British. The average employees from the Chinese and Indian ethnic groups have consistently earned more than the average White British employee since 2012. For the Indian ethnic group, the gap has stayed relatively consistent since 2012 and in 2018 stood at negative 12%. The pay gap for Chinese employees stood at negative 30.9% in 2018.

For those of mixed or multiple ethnic groups, the pay gap has switched between positive and negative, suggesting the average earnings for employees from this ethnic group are similar to those of White British employees.

Employees in the remaining ethnic groups consistently earned less, on average, than White British employees. Employees in the Black African, Caribbean or Black British, Other and White Other ethnic groups on average earned 5% to 10% less than their White British counterparts between 2012 and 2018. Employees in the Other Asian ethnic groups' pay gap with White British peaked in 2014 but has since narrowed to 4% in 2018.

Finally, Pakistani and Bangladeshi ethnic groups have experienced the largest positive pay gaps. In 2012, Pakistani and Bangladeshi ethnic groups had pay gaps of 18.9% and 21.6%, respectively. Similar to the Other Asian ethnic group, the pay gap for these groups has narrowed somewhat since 2014, however, in 2018 it remains little improved from its level in 2012. In 2018, the pay gaps for Pakistani and Bangladeshi ethnic groups stood at 16.9% and 20.2% respectively.

Figure 6: The Bangladeshi ethnic group has the lowest proportion of employees in the highest quartile of median hourly pay

Proportion of ethnicities within each gross hourly pay quartile using the 10-category ethnicity breakdown, Great Britain, 2018

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Proportion of ethnicities within each gross hourly pay quartile using the 10-category ethnicity breakdown, Great Britain, 2018
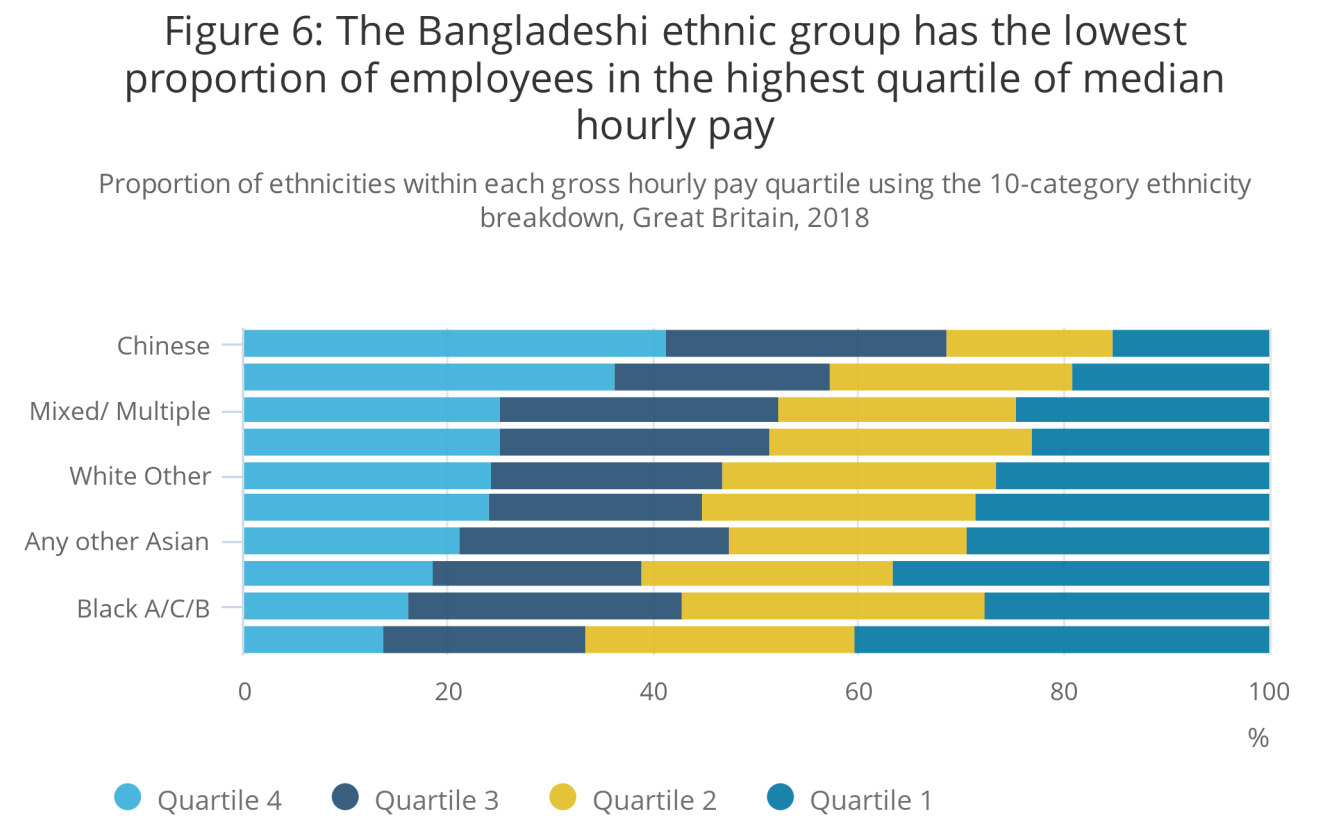
Source: Office for National Statistics - Annual Population Survey

Notes:

1. The quartiles of the median pay are as follows Quartile 1: 0-8.5, Quartile 2: 8.51 - 11.83, Quartile 3: 11.84 - 17.80, Quartile 4: 17.81 - 1212.00.

Another way of understanding ethnicity pay gaps is to look at representation for different ethnic groups across the earnings distribution. Pay quartiles split employees into four equal parts based on their earnings.

The first quartile contains the quarter of the employee population with the lowest earnings, while the fourth quartile contains those employees with the highest earnings. Figure 6 shows the proportion of ethnicities within each gross hourly pay quartile in 2018.

The two ethnic groups with the highest proportion of employees in the highest quartile were Chinese (41.3%) and Indian (36.3%). This reflects the pay gaps shown previously where Chinese and Indian employees had positive pay gaps when compared with White British employees. Conversely, the two ethnic groups that had the largest negative gaps, Pakistani and Bangladeshi, also had the largest proportions of employees in the first quartile.

Figure 7: The largest pay difference between males and females in 2018 was for the Indian ethnic group

Median gross hourly earnings for all employees by sex, Great Britain, 2018

Notes:

1. Median gross hourly earnings refer to both full time and part time employees.

When looking at males and females separately, the difference in hourly pay between men and women differs among ethnic groups. For example, women in the Bangladeshi ethnic group earned more per hour on average than their male counterparts, showing a gender pay gap of negative 10.5%. Black African, Caribbean or Black British men and women also have similar median hourly earnings, with men earning 3.3% more on average. However, it must be noted that the Bangladeshi ethnic group has a smaller sample size and so these estimates are more susceptible to volatility and inaccuracy than some of the other ethnic groups. For example, the pay gap estimates for Bangladeshi and Chinese women show greater volatility over time.

Comparatively, the two ethnic groups with the highest median hourly pay, Chinese and Indian, had a larger difference in hourly earnings between men and women. Chinese men on average earned 19.1% more per hour than Chinese women, and Indian men earned 23.3% more per hour than Indian women. Similar to the Bangladeshi ethnic group, the Chinese ethnic group has a smaller sample size than the other ethnic groups.

Figure 8: 16 to 30-year-olds from ethnic minority groups tend to have narrower pay gaps than older ethnic minority groups

Ethnicity pay gap for median gross hourly earnings (including overtime) by age group, Great Britain, 2018

Figure 8: 16 to 30-year-olds from ethnic minority groups tend to have narrower pay gaps than older ethnic minority groups

Ethnicity pay gap for median gross hourly earnings (including overtime) by age group, Great Britain, 2018
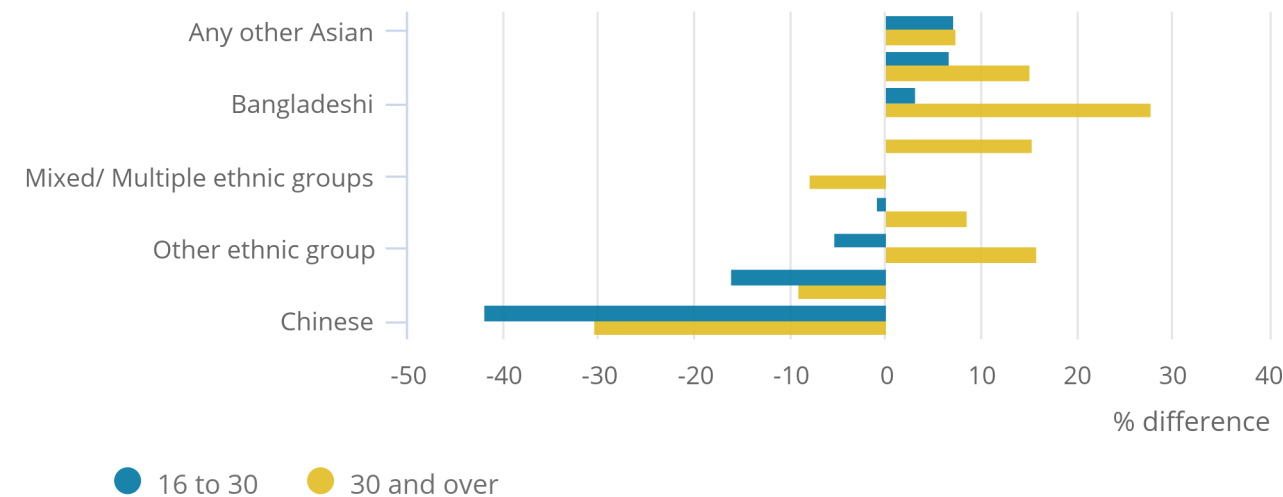
Source: Office for National Statistics - Annual Population Survey

Notes:

1.Pay gap figures represent the difference between all ethnic groups and White British hourly earnings as a percentage of White British earnings.

Figure 8 compares the earnings of those aged 16 to 30 years from an ethnic minority group, with the earnings of those who are White British and aged 16 to 30 years, alongside the same comparison for those aged 30 years and over. In broad terms, it can be seen that the earnings for younger ethnic minority employees tend to be closer to their White British counterparts compared with older ethnic minority employees.

All ethnic groups apart from the Mixed or Multiple ethnic group experience a smaller positive pay gap or, a larger negative pay gap for those aged 16 to 30 years compared with those aged 30 years. This has been consistent between 2012 and 2018. The biggest difference is seen for the Bangladeshi ethnic group, where 16- to 30-year-olds earn 3.1% per hour less than White British employees on average, while those aged 30 years and over earn 27.9% less.
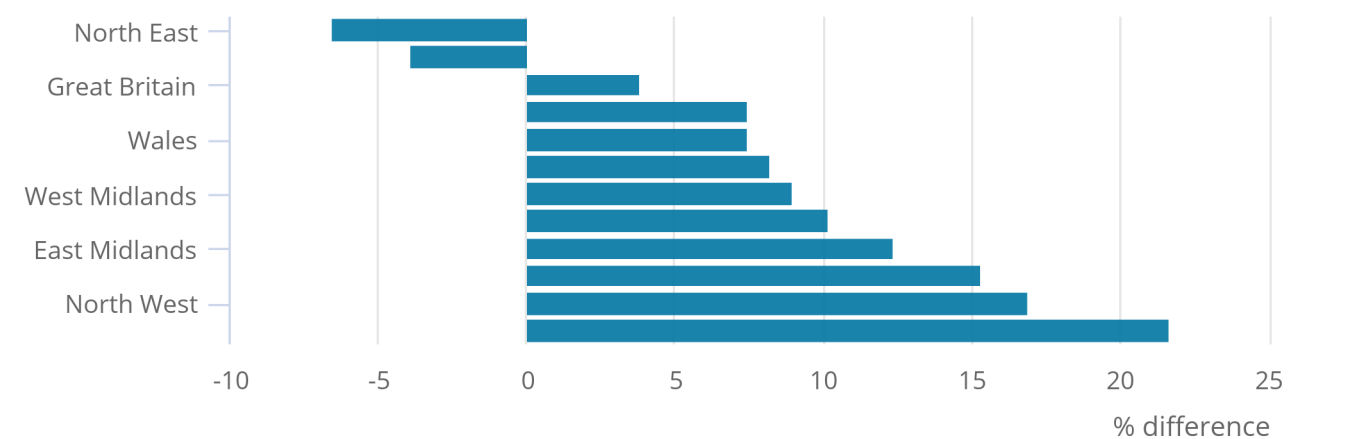
Additionally, Other ethnic group and White Other are shown to have negative pay gaps for those aged 16 to 30 years and positive pay gaps for those aged 30 years and over. For example, those aged 30 years and over in the Other ethnic group are shown to earn 15.8% less, while those aged 16 to 30 years are shown to earn 5.2% more than White British employees. There are a variety of reasons why this might be the case. For example, second-generation migrants are performing better than their parents in terms of pay, another possibility is that earnings progression could differ between different ethnic groups.

Figure 9: London has the largest pay gap, with ethnic minority groups earning 21.7% less than White employees on average

Regional ethnicity pay gap for median gross hourly earnings between White and ethnic minority groups, Great Britain, 2018

Source: Office for National Statistics - Annual Population Survey

Notes:

1. White refers to White British and White Other employees, Ethnic minority groups refers to all other ethnic groups.

2. Pay gap figures represent the difference between White and Ethnic minority groups hourly earnings as a percentage of White earnings.

Figure 9 shows the pay gap between White and ethnic minority groups in different regions of Great Britain. Here we use a more aggregated ethnicity breakdown to improve sample sizes. London, the region that has the highest proportion of its population classified in an ethnic minority group, also has the largest pay gap of 21.7%. The East and the North East both have negative pay gaps with the North East having the largest at 6.5%. Employees from an ethnic minority group in the region therefore had average earnings that were 6.5% more than average earnings of White employees.

Notes for: Analysis of ethnicity pay gaps

1. The sample sizes are smaller than the other ethnic groups but are still above the minimum threshold used when analysing data.

6 . Modelling the factors that affect pay

Comparing the median pay differentials between different ethnic groups as a measure of the ethnic pay gap, as shown in Figure 5, only provides a partial picture. Ethnic groups may have differing characteristics that ultimately affect their respective pay. For example, certain ethnic groups may be more inclined to settle in certain areas of the country and pay may differ between regions. In this section, the analysis is developed using linear regression modelling to further illustrate the differences in pay between White British employees and other ethnic groups.

Linear regression is a statistical technique that models a linear relationship between a dependent variable, and one or more explanatory variables (characteristics). In this model the log of hourly earnings is treated as the dependent variable and the explanatory variables are:

- ethnicity

- country of birth (UK born or non-UK born)

- age

- sex

- region

- urban or rural

- highest qualification

- work pattern

- sector

- occupation

- disability status

The advantage of modelling ethnic groups pay using this technique is it enables the inclusion of multiple factors, holding these constant and observing the specific effect that each factor has. For example, the effect belonging to a specific ethnic group has on pay can be analysed while holding the other factors constant.

In this analysis the regression model is estimated using ordinary least squares (OLS). Note that because of the method of estimation used by OLS, data in this section are in mean and not median terms, which must be taken into account when comparisons between the two are made. As the mean is more susceptible to influence by outliers than the median, we have excluded the top 1% and bottom 2% of the employee earnings distribution.

In this article we have opted to use linear regression to model ethnicity pay gaps, however there are alternative methods used in the estimation of pay gaps such as using the Oaxaca Blinder decomposition technique. These have not been used in this article, though we will look to explore other methods for estimating pay gaps later in the year.

Figure 10: Pay gaps between ethnic groups and White British employees vary according to country of birth, after factors such as education and occupation have been accounted for

Percentage difference in mean gross hourly pay when controlling for other factors by ethnic group and country of birth, Great Britain, 2018

Figure 10: Pay gaps between ethnic groups and White British employees vary according to country of birth, after factors such as education and occupation have been accounted for

Percentage difference in mean gross hourly pay when controlling for other factors by ethnic group and country of birth, Great Britain, 2018

UK-born   Non-UK Born
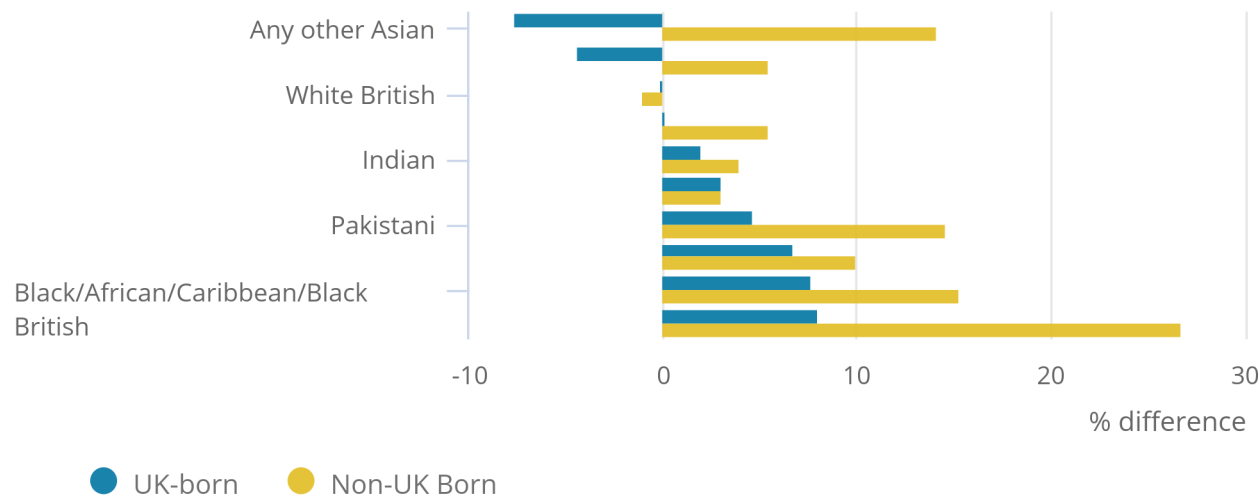
Source: Office for National Statistics - Annual Population Survey

Notes:

1. Pay gap figures represent the difference between all ethnic groups and White British hourly earnings as a percentage of White British earnings.

Figure 10 shows estimates of the effect ethnicity and country of birth have on mean hourly pay when other factors that affect pay are held constant. All comparisons are made against UK-born, White British employees. By comparing those who were born in the UK and those who were not, it may give us an idea of what sort of effect having a UK education and the higher likelihood of speaking English as a first language may have on those from an ethnic minority background.

All ethnic minority groups apart from the Mixed or Multiple ethnic group (although this is shown not to be statistically significant) are estimated to have smaller pay gaps for UK-born employees compared with employees born outside of the UK.

For example, those in the Bangladeshi ethnic group who are UK-born were estimated to earn 8.0% less than UK-born White British employees. However, when looking at those born outside of the UK, those in the Bangladeshi ethnic group earn 26.8% less on average. Across many of these ethnic groups this could be further evidence to suggest that there is a generational aspect to differences in pay for different ethnic groups, as highlighted in Figure 8.

For the Bangladeshi, Black African, Caribbean or Black British, Pakistani, Other and Asian Other ethnic groups, we estimate the largest differences between the pay gaps for UK-born and non-UK born employees. Some of the non-UK born pay gaps are larger than the raw pay gaps presented in Figure 5 would suggest. Also, though many of the UK-born pay gaps estimated are smaller than their respective raw pay gaps, statistically significant differences in average pay remain. For instance, UK-born employees in the Black African, Caribbean or Black British ethnic group are estimated to earn 7.7% less than their UK-born White British counterparts.

Conversely, while the Indian and Chinese ethnic groups are estimated to have quite large negative raw pay gaps, when controlling for other factors we see that differences in mean earnings for UK-born employees from these ethnic groups are not statistically significantly different from UK-born White British employees. However, positive pay gaps are still estimated for non-UK born employees from these groups. This means that non-UK born employees from the Indian and Chinese ethnic groups are estimated to earn 4.0% and 5.5% less than their UK-born White British counterparts respectively.

The reasoning behind why the regression analysis produces different estimates of the pay gap between ethnic groups and White British is due to a number of characteristics being held constant across all groups. Factors that affect pay such as age, occupation, region etc. vary amongst the different ethnicities. For example, White British employees have the joint highest average age of 41 and we know that pay generally increases as age increases, this could explain why when age is accounted for we see a narrowing of the pay gap between White British and those from ethnic minority groups which have younger average ages. Additionally, if we look at a factor such as occupation, when compared with other ethnic groups we see a large proportion of those from the Indian ethnic group work in professional occupations (33%). Therefore, when this is accounted for we might see the differences according to ethnicity fall.

7 . Quality and methodology

Data sources

Though this analysis makes use of the Annual Population Survey (APS) it should be noted that the primary source of data for earnings analysis in the UK is the Annual Survey of Hours and Earnings (ASHE). This business survey collects detailed information on the composition and distribution of earnings among employees, however, as a business survey, ASHE collects only a limited range of personal characteristics regarding individual employees. This limits its usefulness in analysing earnings for instance by education and/or by different protected characteristics including ethnicity.

As a result, the Labour Force Survey (LFS) is still heavily used as a source of data on earnings. Though it is accepted that the accuracy and detail of earnings information captured by the LFS falls short of that obtained by ASHE, the greater range of personal and household characteristics broaden its potential uses. However, one drawback of earnings analysis on the LFS is that the achieved sample is relatively small. This is because earnings questions are asked only to employees and only in 40% of the interviews carried out in each quarter.

Furthermore, earnings questions on the LFS are known to have particularly poor response rates. The achieved sample for the LFS earnings questions is usually around 9,000, compared with approximately 150,000 respondents on ASHE. This limited sample size then restricts the extent to which you can perform multivariate analysis of earnings on the LFS, particularly where the variables of interest have many categories.

Therefore, for the analysis of earnings presented in this article, a new income weight has been calculated for the APS. The APS combines responses from the quarterly LFS and Annual Local Labour Force Surveys for England, Wales and Scotland. Though the APS has always collected information on earnings, until now there has never been an appropriate weight included for earnings analysis.

The income weight is calculated in a similar way to the LFS income weight. More information on this can be found in the volume 1 LFS user guide. The main differences are that there are six calibration groups used to calculate the APS income weight, while for the LFS income weight there are four.

Finally, it should also be noted that, though the APS has a much-improved sample size compared with the LFS, it still suffers from some shortcomings when compared with ASHE. For instance, as a survey of businesses, ASHE is thought to capture more accurate earnings information as employers can consult payroll records when responding to the survey. In comparison, earnings information collected in the LFS and APS is self-reported and is such is likely to be subject to a higher degree of recall error.

Methodology

Model specification (variable name in datasets)

The dependent variables are:

- Log of hourly earnings including overtime (hourpay)

- Age (age)

- Age2 (age2)

- Sex (sex)

- Region (govtof)

- Country of birth (cryox7)

- Ethnicity (ethgbeul)

- Urban/Rural (ru11ind)

- Highest qualification (hiqul15d)

- Working pattern (ftpt)

- Sector (publicr)

- Occupation (sc10mmj)

- Disability status (disea)

As a majority of the variables in the model are discrete, these have to be included as dummy variables. To avoid the issue of perfect multi-collinearity, we must omit one factor from each characteristic group that we can compare our analysis to. This omitted characteristic is known as the base category.

The base categories selected for each variable are:

- Sex – Male

- Region – London

- Country of Birth – UK

- Ethnicity – White British

- Urban/Rural – Urban

- Highest Qualification – Degree or equivalent

- Work pattern – Full time

- Sector – Private

- Occupation – Professional occupations

- Disability status – Disabled

The dependent variable is the log of hourly wages (including overtime). As the distribution of pay has a positive skew (earnings are distributed towards the lower end of distribution), taking the log of the variable helps normalise the distribution.

When accounting for the age of employees in the regression model, we have incorporated a variable for both age and age squared to help estimate the coefficients for the approximation for a known or unknown non-linear function of , or in this case age.

As well as the suite of independent variables observed in the model, interaction terms are included. These are added to account for a significant interaction indicates that the effect of the first independent variable (x1) on the dependent variable (Y) is different at different values of a second independent variable (x2). It is tested by adding a term to the model in which the two independent variables are multiplied. This is calculated as follows:

Y= 0 + 1*x1 + 2*x2 + 3*x1*x2

Adding interaction terms to a model drastically changes the interpretation of all the coefficients. If there were no interaction term, 1 would be interpreted as the unique effect on the Y (in this case pay). But the interaction means that the effect of x1 on Y is different for different values of x2. So, the unique effect of x1 is not limited to 1, but also depends on the values of 3 and x2.

The unique effect of x1 is represented by everything that is multiplied by x1 in the model. This is calculated as follows:

1 + 3* x2

1 is now interpreted as the unique effect of x1 on Y only when x2= 0.

The interaction terms we use in this model are:

- Ethnicity: Country of birth

- Age: Sex

When interpreting the outputs of the model, care needs to be taken with the coefficients of variables. While the independent variables are in their original state, the dependent variable is in its log-transformed state, therefore, the coefficient () for the independent variables does not simply reflect the percentage change but (100*)% for a one unit increase in the independent variable, with all other variables in the model held constant.

However, there are caveats that must be taken into account when interpreting estimates using the OLS method. For example, predictor variables will have been excluded from the model due to them not being available in the data, for example, family background. These variables being excluded will have an effect on the explanatory power of the model. It is also possible that the functional form of the regression model could be improved, which would improve the accuracy of our estimates.