Response to Science and Technology Committee 'Diversity in STEM' Consultation

January 2022

About the BHF

The British Heart Foundation (BHF) is the largest independent funder of cardiovascular research and the third largest charitable funder of medical research in the UK. Each year, thanks to the generosity of our supporters, we are able to fund around £100 million of new research across the UK and in all four nations. Our funding portfolio extends from laboratory science to clinical trials and population studies. We fund more than 1,700 people from PhDs to professors working on over 800 research projects at universities across the UK as well as investing in large programme and project grants.

As a major research funder, the BHF is committed to actively and openly supporting and promoting equality, diversity and inclusion (EDI), leading by example and using our influence to make cardiovascular research available to, and for the benefit of, everyone. This is embedded in our Strategy to 2030, which states our intention to "attract, nurture and support the brightest minds and the best ideas", which requires drawing from the widest pool of talent available beyond perceived or actual barriers to inclusion.[1]

Summary of response:

Our response focusses on racial/ethnic and gender inequalities in the STEM sector as this is where comprehensive data are available from organisations such as UKRI, NIHR, Higher Education Statistics Agency (HESA), Royal Society and the British Junior Cardiologists' Association.

While there has been an improvement in demographic data collection relating to diversity in the STEM workforce amongst large employers, professional bodies, and funders, most of these data collection and analysis efforts have focussed on gender, likely due to availability and usability of frameworks, awards, charters, and policies such as gender pay gap reporting. However, focus on single characteristics for much of the data prevents a full demographic overview of the workforce, with scarce intersectional data.

[1] The British Heart Foundation, *Our Strategy*, 2020

Key Points

- Ethnicity and gender disparities increase the more senior STEM roles become. In the UK, just 43% of the Higher Education academic SET workforce and 23% of full-time SET Professors are female; and of the more than 23,000 university Professors, only 155 (<1%) are Black.
- There is significant gender disparity in the cardiology field, which has implications for NHS clinical research workforce diversity; although half of all UK medical students are female, only 28% of cardiology trainees and 13% of cardiology consultants are women.
- Researchers who are women and researchers who are from Black and minority ethnic backgrounds experience substantially higher levels of bullying and harassment in research environments than other employees, which likely contributes to the reported underrepresentation in the STEM workforce. Bullying has also been found to be a systemic problem in UK cardiology, with female trainee doctors and non-UK medical school graduates being substantially more likely to report being bullied.
- There are gender and ethnic disparities in both the quantity of applicants and their success rates for research grants, with researchers who are women and ethnic minorities tending to apply for fewer awards, and then tending to win smaller awards when they are successful.
- The current research culture primarily evaluates researchers on a narrow set of criteria (i.e., academic publications quantity and prestige of publication venue) and does not take into account the many other ways that researchers can make meaningful contributions to the STEM sector. These factors compound to create a domino effect: researchers who are women and/or from a Black or minority ethnic background are discriminated against at the grant funding stages, therefore fewer of them are able to publish in high impact journals which leads to fewer of them being classified as 'high achievers' who are promoted to senior levels.
- A diverse workforce can lead to greater scientific innovation, creativity, and productivity. This includes through increased research participation; for example, international heart failure trials with a female first or senior author have been associated with better recruitment rates of women (39% enrolment of female participants compared with 26% for those with male authors).
- STEM organisations have addressed underrepresentation of particular groups in STEM roles in a number of ways, including:
    - Targeted funding for underrepresented groups
    - Analysis and publication of detailed diversity data
    - Creation of long-term strategies for tackling inequalities
- A priority for funders should be to gather and publish diversity data by individual ethnicity categories (rather than e.g., BAME or BME) as this allows for a clearer picture of where inequalities exist, and where intervention is most needed.
- Cultivating a STEM sector that tackles bullying and harassment, is inclusive and diverse will increase recruitment and retention for STEM roles, which will help to tackle the current UK STEM skills shortage. Government should:
    - Maintain momentum in realising the R&D People & Culture strategy by publishing concrete targets and guidance for the sector on how to tackle the issues that have been identified, e.g., bullying and harassment, and disparities in grant funding award rates.
    - Commit to leading a 'STEM Diversity Decade of Action', along with STEM organisations across the private, public and voluntary sectors, to tackle the historic and systemic underrepresentation of minoritised groups at all levels in the sector. This should involve setting a bold vision for a diverse and equitable STEM sector at the heart of their ambitions for the UK to become a 'global science superpower'.
    - Deliver a statutory workforce data strategy and drive forward changes in policy and legislation to support employers to improve equity.

1. We welcome the opportunity to contribute to the 'Diversity in STEM' inquiry by the House of Commons Science and Technology Committee. Our response draws on data pertaining to the academic STEM research workforce and focusses on evidence of ethnic/racial and gender inequalities. It is important to note that the focus on these protected characteristics is not a reflection of the relevant importance that the BHF places on them, but rather indicative of the quality and accessibility of currently available data. We also include recommendations aimed at achieving equality of opportunity and highlight relevant best practice from across the sector.

2. To note, while the BHF strives to use language that is sensitive, accurate, and specific, and tries to avoid using general and aggregate terms, including Black, Asian, and Minority Ethnic (BAME) or Black and Minority Ethnic (BME), there are still times where we need to use these terms, as we have throughout this response, when we are quoting statistics that have defined ethnicity.

Topic 1: The nature or extent to which women, ethnic minorities, people with disabilities and those from disadvantaged socioeconomic backgrounds are underrepresented in STEM in academia and industry.

This section is focussed on evidence of racial/ethnic and gender inequalities and underrepresentation, within the STEM workforce. As noted in the introduction, the focus on these protected characteristics is due to the quality and accessibility of currently available data. The scarcity of widely reported consistent data against other protected characteristics and diversity identifiers is a major concern that hinders policy development and limits progress in tackling inequalities in the STEM workforce.

Racial/ethnic inequality

Within the 2011 Census,[2] the ethnicity breakdown of the working age population (age 16 to 64 years) across England and Wales was as follows: 8.1% identified as 'Asian', 3.4% as 'Black', 1.8% as 'Mixed', 85.6% as 'White' and 1.1% as 'Other'. While these data are 10 years old and do not include Scotland and Northern Ireland, they will be useful to contextualise the evidence presented within this section. By 2031, Black and minority ethnic populations are estimated to make up 15% of the population in England and 37% of the population in London.[3]

Representation in the academic STEM workforce

While there has been a focus on widening access for students in recent years, researchers from Black and minority ethnic backgrounds continue to be underrepresented at PhD and senior academic levels. 2021 student data from Advance HE[4] show that while BAME representation remains relatively high among first degree Science, Engineering and Technology (SET) undergraduates and taught postgraduates (28% [189,370 of 677,080] and 26% [33,200 of 128,815], respectively), at postgraduate research level (typically lab-based study), this falls to 19% BAME students (7,435 of 39,300) and 3.4% Black students (1,335 of 39,000).

[2] Gov.uk, *Working age population*, 2020
[3] The King's Fund, *Demography: future trends*, 2011
[4] Advance HE, *Equality in higher education: Statistical Report 2021 – Data Tables*, 2021

The Higher Education Statistics Agency (HESA) also published its annual report providing a breakdown of the UK's academic workforce.[5] Data for the 2019-20 academic year reveal that, of the more than 23,000 university Professors in the UK, only 155 (<1%) are Black. This figure has remained below 1% for the past 5 years and, even during that time, progress has been slow – the number of Black Professors only increased by 50 posts while the overall number of Professorships rose by almost 3,000 over the same period. Among the 223,525 members of academic staff in the UK, 4,725 (2%) are Black, 22,055 (10%) are Asian, 167,405 (75%) are White, with the remainder come under categories of "mixed", "other" or "not known".

In December 2021, The National Institute for Health Research (NIHR) published its first diversity data report[6] for its health and social care research funding programmes. The report found that 9.1% of Professors and senior investigators (the most senior positions) in receipt of NIHR funding had an ethnic minority background. Meanwhile, 16% of funded post-doctoral researchers (the most junior position) had an ethnic minority background.

Lack of diversity is also evident among elected STEM Fellowships (awards granted to individuals who have made a substantial contribution to their field). As of 2018-19, only one[7] of the Academy of Medical Sciences' (AMS) 1129 elected Fellows has been Black, since its formation in 1998. And despite recent commitments to increase diversity at the Royal Society, in 2018, its Diversity Data Report[8] highlighted that just 29 (5%) of its Fellows and 'Foreign Members' who completed the survey were Black and minority ethnic. The loss of Black and minority ethnic representation with academic progression has been dubbed the "Broken Pipeline".[9]

Individual accounts of discrimination against Black researchers are increasingly achieving mainstream media attention in the UK. In a 2021 report for the BBC, Dr Jazmin Scarlett, a student in volcanology who received a distinction in her masters and a prestigious President's medal from the Royal Geological Society, shared that she received more than 30 rejections for full-time research posts in the year after graduation. Feedback she received included being told that although she was academically qualified, she "would not fit in". In the interview, Dr Scarlett acknowledged that getting a job in academia was not easy, but suspected her race was a factor in the rejections. Christopher Jackson, a geoscience Professor at Manchester University, faced similar challenges during his career and told BBC News that he believed that publicly funded academic research in the UK, is "definitely institutionally racist".[10] These are two of many more accounts of racism and discrimination in academia which severely impact diversity in STEM by locking out key talent from the sector. It is important to listen to and actively involve people who are facing discrimination, in addition to analysing quantitative data – this is essential for gaining the broadest possible understanding of the issues at hand and for developing solutions that make a meaningful difference to those affected.

Gender inequality

Representation in the STEM workforce

[5] Higher Education Standards Agency, *HE staff by HE provider 2014/15 to 2019/20*, 2020
[6] National Institute for Health Research, *Diversity Data Report*, 2021
[7] The Academy of Medical Sciences, *Annual Diversity Report 2018/19*, 2019
[8] Royal Society, *Diversity Data Report*, 2018
[9] Leading Routes, *The Broken Pipeline: Barriers to Black PhD Students Accessing Research Council Funding*, 2019
[10] BBC News, *Black scientists say UK research is institutionally racist*, 2021

As with race and ethnicity, there is evidence of gender disparity the more senior and experienced STEM roles become. 2021 Advance HE student data[11] show that across the UK, 52% of first-degree SET undergraduate students are female. Representation is also high among female SET postgraduate students (57%). However, this figure falls to 46% for research postgraduates, and even further for early year and senior academic roles; just 43% of the UK Higher Education academic SET workforce and 23% of full-time SET Professors are female (2021 Advance HE staff data).[12] Data for Fellows also follow this trend: only 20% of AMS Fellows are female[13] and, in 2019, The Royal Society reported that just 10% of its Fellows were women (170 of 1,686).[14]

The 2021 NIHR report also found that women are underrepresented at senior career levels, only making up 40.6% of NIHR senior investigators and 42.3% of Professors. By contrast, women made up 63.4% of the more junior post-doctoral level[15].

There is significant gender disparity in the cardiology field. Although half of all UK medical students are female, only 28% of cardiology trainees and 13% of cardiology consultants, who are essential for conducting NHS clinical research, are women,[16] a picture that has remained the same for 15 years. In academia, there are currently no cardiovascular research specific data, a gap that needs to be filled.

The gender inequalities in the research workforce have been reflected in authorship on research publications. According to *Nature*'s 2017 study of 1.5 million research papers, female first authorship (i.e., the researcher who contributed most to the work, typically the PI) was seen in just 40% of papers.[17] This value falls considerably for authorship in higher-impact journals (as measured by their impact factors). Across six high-impact medical journals (*Annals of Internal Medicine*, *Archives of Internal Medicine*, *The British Medical Journal*, the *Journal of the American Medical Association*, *The Lancet*, and the *New England Journal of Medicine*) over the past 20 years worldwide, only 34% of articles had a female first author.[18] Further, in two of the world's leading journals, *Nature* and *Science*, women accounted for just 25% of first authors and 15% of senior (last-author) spots in papers published between 2005 and 2017.[19] The same research highlighted a negative association between the number of female first and last authors and journal impact factor across the 15 journals observed.[20] In the UK, between 2014 and 2017, just 30% of publications from British universities listed women as authors, up slightly from 26% between 2006 and 2009.[21]

Racial and gender inequalities persist right across the STEM sector, and the examples presented in this section only provide a snapshot of the broader issue. The AMS, The Royal Society, UK Research & Innovation (UKRI), NIHR and others have made important commitments to gather and share this information. Doing so, and therefore highlighting the extent of the issue, is the only way for the sector, including the BHF, to understand where the problems lie and what actions need to be taken to address them.

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[11] Advance HE, *Equality in higher education: student data 2021*, 2021
[12] Advance HE, *Equality in higher education: Statistical Report 2021: staff data 2021*, 2021
[13] Academy of Medical Sciences, *Annual Diversity Report 2019/20*, 2020
[14] Royal Society, *Diversity Data Report 2019*, 2019
[15] National Institute for Health Research, *Diversity Data Report*, 2021
[16] European Heart Journal, *Women in Cardiology: The British Junior Cardiologists' Association identified challenges*, 2019
[17] Nature Human Behaviour, *One and a half million medical papers reveal a link between author gender and attention to gender and sex analysis*, 2017
[18] BMJ Global Health, *Where are the women? Gender inequalities in COVID-19 research authorship*, 2021
[19] Nature, *Women feature only rarely as first or last authors in leading journals*, 2018
[20] Shen et al, Persistent Underrepresentation of Women's Science in High-Profile Journals (Preprint), 2019
[21] The Guardian, *Female authors listed on just 30% of recent UK academic research*, 2019

Topic 2: The reasons why these groups are underrepresented

This section is focussed on evidence of racial/ethnic and gender inequalities in the grant funding process, issues surrounding research culture, as well as reported bullying and harassment.

Bullying and Harassment

Findings have shown that female researchers and researchers who have Black and minority ethnic backgrounds are experiencing substantially higher levels of bullying and harassment in research environments than their counterparts, which likely contributes to the inequalities in representation in the STEM workforce.

Over the past 5 years, the University and College Union (UCU) and Equality Challenge Unit (ECU) have published a series of reports looking into bullying and harassment among ethnic minority staff in the UK. The most recent of these, Staying Power, which was based on one-to-one interviews with 20 of the 25 Black British female Professors in UK universities, concluded that a "culture of explicit and passive bullying persists across higher education along with racial stereotyping and racial microaggressions".[22]

These disturbing findings were echoed in a survey on research culture published by Wellcome in 2020.[23] Survey findings highlighted that BAME researchers often felt their experiences of research were worse than those of their White colleagues, with around 29% of UK respondents reporting race or ethnicity-related discrimination or harassment. The same survey found that White respondents were more likely to feel comfortable speaking out about bullying and harassment than BAME respondents (38% versus 32%).

The Wellcome report surveyed over 4,200 researchers (60% female, 37% male, 1% non-binary, 2% unreported) and found that women were more likely (49%) to have experienced bullying or harassment than men (34%). Additionally, 44% of surveyed women reported they had personally experienced discrimination in their workplace. In the survey, female respondents were less likely than their male counterparts to believe that their concerns relating to these issues would be acted on appropriately if they were to raise them (22% versus 30%, respectively).

A 2021 study found that bullying in the UK cardiology workforce is a 'systemic' problem, with 1 in 10 cardiology trainee doctors reporting that they have been bullied.[24] This study also found that women were 55% more likely to reporting being bullied, and those qualified in medicine outside the UK were most likely to report being subjected to bullying and racist language than those who qualified in the UK. This is a concern for clinical research as consultant cardiologists are key to NHS research into heart and circulatory diseases.

Disparities in grant funding

Ethnic and racial disparities have been documented within the research grant funding process, with regards to both applicant success rate and size of allocated award. These disparities received public attention in 2019, when a Freedom of Information request sent to UKRI revealed

[22] University and College Union, *Staying Power: The career experiences and strategies of UK Black female professors*, 2019
[23] Wellcome, *What researchers think about the culture they work in*, 2020
[24] Heart, Bullying in UK cardiology: a systemic problem requiring systemic solutions, 2021

that between 2016-17 and 2018-19, of the total 19,868 PhD Studentships awarded across the funder's seven research councils, only 245 (1%) had been awarded to Black or Black Mixed students.[25]

2021 UKRI diversity data have added to the evidence base, showing that across all UKRI research councils in 2018-19, White principal investigators (PIs), the lead investigators responsible for the research, had a 30% grant success rate, compared to 23% for ethnic minority candidates. Of the 2,405 grants awarded in 2018-19, just 10 were to Black researchers.[26] The UKRI analysis also indicated that researchers who are women and ethnic minorities tend to apply for fewer awards; further to this, ethnic minority awardees tended to win smaller awards, with a mean research grant amount of £564k versus £670k for White PIs.

NIHR data reflects the same issue; ethnic minority applicants were found to be less successful at securing research funding than white applicants. Only 16.5% of applications from ethnic minorities were successful, compared with 21.2% of White applicants.[27]

In March 2021, UKRI published harmonised diversity data on funding applicants and recipients of research council grants between 2019 and 2020[28]. This found that the proportion of female applicants has increased over the last six years by four percentage points and the proportion of co-investigator applications from ethnic minorities has increased by 11 percentage points to 23% over the last six years. However, despite increases in applications, the proportion of researchers from female and ethnic minority applicants who were successful in receiving funding awards did not increase at a similar pace. Applicants from ethnic minority backgrounds were less likely to be successful in receiving funds than white researchers.

The above issues are key to understanding why certain groups are underrepresented in STEM; inequalities in the grant funding process mean that fewer of these researchers receive funding in the first instance, therefore locking them out of the STEM workforce, while those underrepresented groups that do receive funding are more likely to experience bullying and harassment, therefore potentially putting them off a career in STEM and causing them to leave and not progress to leadership roles.[29]

Impacts of career breaks and part-time working

It is well documented that individuals who work part-time or take career breaks typically progress more slowly to senior positions.[30] As in other sectors, it is female academic staff who are more likely to work part-time than their male counterparts. Indeed, the latest Advance HE staff data show that 34% of all SET female academic staff work part-time, compared to 21% of males (54% of all part-time staff are female, despite only making up 43% of the workforce).[31] This disparity has been attributed in part to increased caring responsibilities faced by women in prevailing traditional family dynamics.[32] However, even with these different working patterns taken into account, significant gender inequalities remain between research salaries. Advance HE staff data show that 37% of full-time female academic staff earn over £50k per annum, compared with

[25] Leading Routes, *The Broken Pipeline: Barriers to Black PhD Students Accessing Research Council Funding*, 2019
[26] UK Research and Innovation, *Diversity Data*, 2021 (N.B. the dataset rounds figures to the nearest 5)
[27] National Institute of Health Research, *Diversity Data Report*, 2021
[28] UK Research and Innovation, *UKRI publishes latest diversity data for research funding*, 2021
[29] Wellcome, *What researchers think about the culture they work in*, 2020
[30] Journal of Career Development, *The Effects of Part-Time Employment and Gender on Organizational Career Growth*, 2017
[31] Advance HE, *Equality in higher education: Statistical Report 2021 - Data Tables*, 2021
[32] Times Higher Education, *Women in science are battling both Covid-19 and the patriarchy*, 2020

48% of males. Bringing this issue into stark focus, in 2019, the New Scientist published its annual salary survey, reporting that the gender pay gap for UK scientists had widened. While the average salary for a female scientist or engineer was £35,600, the average for men was £45,800.[33] The New Scientist data show that the absolute pay gap between men and women increases with length of time spent in the industry and, given the male over-representation in more senior positions, this likely accounts for the widening gap.

The impact of Covid-19 has exacerbated gender disparities in STEM career progression and research outputs; data on the effects of the pandemic on scientific-publishing suggest that female researchers, particularly those at early-career stages, have been the hardest hit.[34] Submissions to preprint servers rose more quickly for male authors than for female authors as restrictions were introduced and between January and May 2020, female authors accounted for only a third of all authors on published COVID-19 papers.[35] The additional lockdown responsibilities that women are more likely to be responsible for, such as childcare, home-schooling and increased housework, on top of their regular academic work, is slowing female researchers' progress far more than their male counterparts, and there are major concerns that the impact of this will last for many years to come.[36]

Research culture

The Royal Society defines research culture as encompassing 'the behaviours, values, expectations, attitudes and norms of our research communities. It influences researchers' career paths and determines the way that research is conducted and communicated.'

There are issues surrounding research culture that lead to underrepresentation of certain groups in STEM. For example, the ways that researchers' career outputs are evaluated (e.g., when applying for researcher positions), have for many years focussed on the number of publications and the prestige of the journals those articles were published in. Such a narrow focus on publications does not take into account the many other ways that researchers can make meaningful contributions to the STEM sector, e.g., through science engagement, mentoring, policy and EDI work. This is part of a domino effect that links back to the issue of disparities in grant funding; when researchers who are women and/or from a Black or minority ethnic background are discriminated against at the grant funding stages, fewer of them are able to publish in high impact journals and therefore fewer of them are classified as 'high achievers' in the current research culture, despite many of them being involved in various other types of skilled and valuable STEM work.

To start to tackle this issue, the BHF and many other funders are signatories of the San Francisco Declaration on Research Assessment (DORA)[37] which recognises the need to improve the ways in which researchers and the outputs of scholarly research are evaluated. By becoming a signatory, the BHF has committed to the following DORA principles:

1. **Transparency in how applications and grants are assessed**
   Researchers should know how their proposed research will be assessed from the start of the application stage. Similarly, during the course of the grant, the evaluation criteria for scientific productivity should be made transparent.

[33] New Scientist Jobs, *Gender pay gap widens for UK scientists and engineers*, 2019
[34] BMJ Global Health, *Where are the women? Gender inequalities in COVID-19 research authorship*, 2020
[35] Nature, *Are women publishing less during the pandemic? Here's what the data say*, 2020
[36] British Science Association, *Missing voices: Lockdown and the female scientist*, 2021
[37] The Declaration on Research Assessment (DORA), 2021

2. **Responsible use of bibliometrics**
   Journal impact factor should not be used as a surrogate measure of the scientific quality of a research article. A research article should be judged by its own scientific merit, not that of the journal that it is published in.

3. **An appreciation of the value of all research outputs**
   The value of all research outputs, not just publications, should be recognised in the assessment of scientific productivity. In the evaluation of past research productivity, the consideration of wider research outputs such as the generation of intellectual property, influence on policy, or public engagement activities, gives a more complete indication of achievement.[38]

In July 2021, the BHF joined other leading funders in signing a joint letter[39] which commits to exploring a shared approach to developing a 'narrative CV' based on the Royal Society's Resume for Researchers.[40] Narrative CVs encourage researchers to demonstrate their achievements beyond traditional measures of success (i.e., publications) and allows more diverse skills to be included – this is a practical way to implement the DORA principle about 'an appreciation of the value of all research outputs', drive an inclusive research culture and, long-term, increase the diversity of senior researchers.

It is important to note that this is not an exhaustive list and there are many other systemic issues that lead to underrepresentation and discrimination; however, the above issues are those that we have the most accurate, STEM-specific data for.

Topic 3: The implications of these groups being underrepresented in STEM roles in academia and industry

The effect of diversity on research excellence

Aside from the moral imperative of creating environments that are inclusive and non-discriminatory, other advantages of having a diverse workforce have long been documented across other sectors.[41] Evidence is increasingly emerging that shows that diversity in STEM is critical to excellence. For example, in 2017, the University of Sheffield conducted a review alongside Wellcome to explore the relationship between a diverse health research community and the quality of research they undertake.[42] The review found that a diverse research workforce is more productive and creative, with progress often resulting from diverse perspectives. This echoing findings from a cross-sector literature review carried out by the UK Government in 2013.[43]

A shortage of staff in the STEM sector

As outlined in the Industrial Strategy (2017),[44] the UK Research and Development Roadmap (2020)[45] and Build Back Better Plan For Growth (2021)[46], this Government recognises the high

[38] The British Heart Foundation, *Fit for DORA*, 2021
[39] UKRI, *Funders joint statement: Exploring a shared approach towards a narrative CV*, 2021
[40] The Royal Society, *Résumé for Researchers*, 2021
[41] Procedia Economics and Finance, *Workforce Diversity: A Key to Improve Productivity*, 2014
[42] University of Sheffield in partnership with Wellcome, *Review of diversity and inclusion literature and an evaluation of methodologies and metrics relating to health research*, 2017
[43] Department for Business, Innovation & Skills, *The business case for equality and diversity: a survey of the academic literature*, 2013
[44] Department for Business, Energy & Industrial Strategy, *The UK's Industrial Strategy*, 2017
[45] Department for Business, Energy & Industrial Strategy, *UK Research and Development Roadmap*, 2020
[46] HM Treasury, *Build Back Better: our plan for growth*, 2021

value of STEM to the UK economy, and how having a fully staffed, skilled and diverse STEM sector will aid long-term economic growth and global competitiveness.

As such, a lack of diversity represents a loss of critical contributors to the STEM sector, at a time when the sector is reporting a skills shortage. A 2021 report from the All Party Parliamentary Group (APPG) on Diversity and Inclusion in STEM reported the mismatch between the STEM skills needed and those available in the UK, and estimated the current gap is costing businesses £1.5 billion per year.[47]

The 2020 R&D People and Culture Strategy highlighted this skills gap and set out how attracting diverse domestic and international talent would be central to cementing the UK's position as a global leader in R&D.[48] Specifically, the strategy set a target for the UK to attract an additional 150,000 people to the UK R&D sector by 2030. However, this ambition is set against a backdrop of increasing international competition for talent, emphasising the need for the UK to cultivate a STEM sector that is welcoming, inclusive, and diverse. Indeed, the APPG on Diversity and Inclusion in STEM's report noted that 'as R&D becomes increasingly integral to the UK's future prosperity outside of the European Union, and against the backdrop of an economy slowed by the COVID-19 pandemic, a diverse STEM workforce is likely to give the UK an economic and social advantage'. In addition, such economic and social advantage could help the Government reach its aspirations to 'level up' regional opportunity across the UK.

The diversity and inclusivity of research outputs

Alongside the equity and fairness of ensuring that no group is excluded from the research workforce, the APPG report also highlighted that researchers from underrepresented groups are more likely to undertake research and ask questions that meet the needs of those groups. However, it is important to note that it should not be the sole responsibility of researchers from underrepresented groups to conduct such research – representative research should be a collective responsibility and priority for the whole STEM sector. Ensuring the right, representative research questions are asked by all researchers and including diverse perspectives and ideas helps to address otherwise unmet needs. This is key to reducing health inequalities experienced by underrepresented groups, e.g., tackling the heightened risk of cardiovascular disease and stroke which disproportionality impacts people from a Black and minority ethnic people, and those from a lower socioeconomic background.

The impact on research participation

Despite efforts at the national level to increase diversity in clinical research,[49] the issue of underrepresentation of women in clinical trials persists, including in cardiovascular medicine. In 2020, a review of 740 cardiovascular trials between 2010 and 2017 found that just 38.2% of clinical trial participants were women, with especially low participation among participants aged 61-65 years and in Government supported clinical trials.[50] Underrepresentation of women in cardiology, and therefore fewer women authoring cardiology trials, is likely a contributing factor to this; in 2020, researchers reported that international heart failure trials with a female first or senior author

[47] APPG on STEM, *Inquiry into Equity in the STEM Workforce*, 2021
[48] Department for Business, Energy & Industrial Strategy, *R&D People and Culture Strategy*, 2021
[49] National Institute for Health Research, *Improving inclusion of under-served groups in clinical research: Guidance from INCLUDE project*, 2020
[50] Circulation, *Women's Participation in Cardiovascular Clinical Trials From 2010 to 2017*, 2020

were associated with better recruitment rates of women (39% enrolment of female participants compared with 26% for those with male authors)[51].

The issue of underrepresentation in clinical research garnered significant attention during the Covid-19 pandemic, during which there was low recorded participation by Black and minority ethnic communities in Covid-19 research, despite the virus impacting ethnic minorities more severely.[52]

Topic 4: What has been done to address underrepresentation of particular groups in STEM roles

Data as a starting point for action

Collection, analysis and publication of diversity data is an essential first step for tackling EDI issues in STEM, as it provides benchmarks, accountability and an ability for the sector to see whether existing interventions are having an impact, as well as where additional efforts should be focussed.

As highlighted in the above sections, several large funders have provided invaluable data for the research sector to date. Key datasets include:

- UKRI harmonised diversity data for 2014-15 to 2018-19[53], and detailed ethnicity analysis of awards over the same five-year period[54]
- The National Institute for Health Research (NIHR) diversity data report[55] for its 2020/21 health and social care research funding programmes
- Wellcome Grant funding data report 2019/20[56] which features data on the diversity of funded researchers

However, not all funders have the resource or capacity to collect demographic data from their grant applicants and awardees. For example, the BHF only started collecting data on its principal grant applicants and co-investigators in January 2020. Without organisation or specialty specific data, deciding where to focus action can be difficult. As such, we welcomed the commitment made in the recently published UKRI EDI strategy to contribute to sector knowledge and understanding about 'what works' in measuring, evaluating and using EDI data.[57]

Targeted funding and support

Encouragingly, many funders are taking practical steps to tackle underrepresentation of particular groups in STEM roles. There are many examples of this, so here we are highlighting a

[51] Circulation: Heart Failure, *Representation of Women Authors in International Heart Failure Guidelines and Contemporary Clinical Trials*, 2020
[52] National Institute for Health Research, *People from Black, Asian and Minority Ethnic backgrounds and the elderly encouraged to participate in vital COVID-19 vaccine studies*, 2020
[53] UK Research and Innovation, *Diversity results for UKRI funding data 2014-15 to 2018-19*, 2020
[54] UK Research and Innovation, *Detailed ethnicity analysis of funding applicants and awardees 2014-15 to 2018-19*, 2020
[55] National Institute for Health Research, *Diversity Data Report*, 2021
[56] Wellcome, *Grant funding data report 2019/20*, 2021
[57] UKRI, *UKRI equality diversity and inclusion strategy: draft for consultation*, 2021

few recent case studies that refer to issues discussed in Topics 1,2 and 3 i.e., the broken pipeline effect and issues surrounding research culture.

Ringfenced funding

In November 2021, UKRI launched 13 new projects worth nearly £8 million to tackle inequalities and enable more Black, Asian and minority ethnic students to access and take part in postgraduate research (PGR).[58] The projects will be delivered over the next four years and aim to improve access into research, enhance research culture and the experience for Black, Asian and minority ethnic PGR students, and diversify and enhance routes into a range of careers. The projects include the following:

- **Developing fair selection models for historically marginalised postgraduate research students at University of Oxford and University of Cambridge** – This project aims to reimagine traditional admissions practices which have historically focused on past experience over future potential. The project aims to generate new admissions practices that are equitable and reflective of wider society – a 'benefits-led' rather than 'deficit-led' approach to applicant selection. The project aims to halve the 'offer gap' in pilot sites by 2025 and eliminate the gap by 2035.
- **12-month mentoring and development programmes and an eight-week paid research placement for 300 Black, Asian and minority ethnic students in London** – This project aims to strengthen the students' applications to postgraduate programmes, increase networking opportunities, and extend support through an alumni community. It will also promote institutional culture change through training for staff who supervise, train, or support Black, Asian and minority ethnic PGR students.

To tackle disparities in grant funding for researchers from a Black and minority ethnic background, some funders are creating new funding opportunities specifically for these groups. For example, in December 2021, The Wellcome Sanger Institute launched a three-year Fellowship that is open exclusively to 'early-stage Black heritage researchers' who studied at a UK institution and offers a fully salary, research expenses and training.[59]

Targeted support and awards

Other examples of targeted support include:

- Health Data Research UK's Black Internship Programme, which started in Summer 2021 and provides paid work experience to aspiring Black data scientists; a group currently underrepresented within the health data research community.[60]
- Funding opportunities directed at those who have taken career breaks for caring responsibilities,[61] including the BHF Career Re-Entry Research Fellowships.[62]
- Providing funding for professional development and network programmes. For example, in 2021 the BHF provided funding through our Small Meetings funding scheme to support the costs of this year's Black in Cardio week. This was a series of events which celebrated

[58] UK Research and Innovation, *Improving minority ethnic groups' access to postgraduate research*, 2021
[59] Wellcome Sanger Institute, *Launch of Fellowship programme to support next generation of Black scientists*, 2021
[60] Health Data Research UK, *Health Data Research UK Announces Black Internship Programme Starting Summer 2021*, 2020
[61] University of Oxford Medical Sciences Division, *Targeted Funding Oppertunities*
[62] The British Heart Foundation, *Career Re-entry Research Fellowships*

the contributions of Black researchers, provided career advice and networking oppertunities, and raised awareness on cardiovascular diseases in the Black community.

To promote healthy research culture, the Royal Society is investing in rewarding researchers for achievement beyond academic publications (as discussed in Topic 2) with the launch of the Royal Society Research Culture Award.[63] Examples of people who will be recognised via this new award includes those who have supported others in their scientific careers; those who have made significant contributions to improving the culture, environment and working conditions for researchers; and those who produce technological innovations that enable a more open culture.

EDI strategy publications

Many research funders have developed publicly available strategies which outline their efforts and vision for realising Equality, Diversity and Inclusion (EDI). For example, Wellcome launched an EDI strategy in March 2021, which set out tangible measures with set short-, medium- and long-term deadlines[64]. The initiatives are wide ranging, and include PIs and Centre Directors having to demonstrate inclusive leadership behaviours by 2026, and addressing disparities in funding rates. Cancer Research UK also launched an EDI strategy in January 2021[65] This is a comprehensive set of goals and initiatives, covering all aspects related to medical research, including representation in trials. Initiatives include policy reviews, targeted career support for ethnic minority researchers and publishing of diversity data.

The BHF is committed to actively and openly supporting and promoting EDI, leading by example as a major research funder and using our influence to make cardiovascular research available to, and for the benefit of, everyone. This is reflected in our Strategy to 2030, which states our intention to "attract, nurture and support the brightest minds and the best ideas", which requires drawing from the widest pool of talent available beyond perceived or actual barriers to inclusion.[66] We are currently drafting an organisation-wide EDI strategy, which we plan to publish in Spring 2022. This will set out our view of where we want to instigate change over the next three years. In the research space, we have already taken several actions, including:

- **Diversity data collection** – In January 2020, we started to collect data on gender identity, age, disability status, nationality and ethnicity from principal grant applicants and co-investigators through our Flexi-Grant system in order to understand and monitor who we are funding.
- **Diversity in clinical trials** – In June 2021, we updated our guidance for researchers conducting clinical trials; investigators now have to explain how they aim to recruit a diverse group of participants that represent the population needing the healthcare intervention, and how their recruitment and retention methods will engage with underserved groups.
- **Grant award requirements** – For selected large grant initiatives (e.g., Centres of Research Excellence and Accelerator Awards), we require universities to tell us their plans and actions to enhance diversity and equal opportunity for their research staff in their grant award letters.

[63] The Royal Society, *Royal Society Research Culture Award*, 2021
[64] Wellcome, *Diversity, equity and inclusion strategy*, 2021
[65] Cancer Research UK, *Our EDI commitment*, 2021
[66] The British Heart Foundation, *Our Strategy*, 2020

- **Clear policies on research culture** – We have policies in place to tackle bullying and harassment in research, and became a founding member of a cross-sector Forum for Tackling Bullying and Harassment in Research and Innovation in November 2020.[67] In April 2021, we signed the San Francisco Declaration on Research Assessment (DORA).[68] And in July 2021, we joined other funders in agreeing to explore a shared approach to adopting a narrative CV based on Royal Society's the Résumé for Researchers.[69]
- **Working with others**: In 2021, the BHF joined the cross-sector Equality, Diversity and Inclusion in Science and Health (EDIS) group, a coalition of organisations working to improve EDI within the science and health research sector.[70]

Topic 5: What could and should be done by the UK Government, UK Research and Innovation, other funding bodies, industry and academia to address the issues identified

Deliver on commitments made in the R&D People & Culture strategy by developing, testing and evaluating new ideas with the sector

Government has an important opportunity to capitalise on the momentum that exists around tackling issues surrounding inequalities in STEM and should provide robust leadership to create a more unified approach across the sector. Small charities are key players in improving diversity in STEM, however limited resource means that guidance from Government on how they can best support their research communities is essential. This would help UK R&D to be as strong and successful as it possibly can be – an investment in tackling EDI issues in STEM is an investment in the success of UK R&D, which in turn will help to cement the UK's status as a global science superpower.

The Government's R&D People & Culture strategy was welcomed by the sector as a first step in acknowledging and outlining numerous issues in the research sector. It committed to tackle the issues of 'a research culture which is not seen as open and inclusive', 'incentives, particularly in academia, that value too narrow a range of contributions' and bullying and harassment. We were pleased to see the UKRI's EDI strategy commitment to catalysing sector-wide change by delivering on ambitions set out in the strategy, through co-design with stakeholders and piloting experimental approaches. We suggest that UKRI work with existing groups such as cross-sector Equality, Diversity and Inclusion in Science and Health (EDIS) group and the Researcher Development Concordat Strategy Group.

Recommendations from the APPG on Diversity and Inclusion in STEM

On 20 July 2021, the All-Party Parliamentary Group (APPG) on Diversity and Inclusion in Science, Technology, Engineering and Maths (STEM) published the 'Equity in the STEM workforce' report following an eight-month inquiry.[71]

[67] UK Research and Innovation, *New forum for tackling bullying and harassment*, 2020
[68] The British Heart Foundation, *Fit for DORA*, 2021
[69] *Funders joint statement: Exploring a shared approach towards a narrative CV*, 2021
[70] Equality, Diversity and Inclusion in Science and Health
[71] APPG on Diversity and Inclusion in STEM, *Inquiry into Equity in the STEM Workforce*, 2021

This report outlined three recommendations for the Government to address the issues of representation and equity in STEM. The BHF supports these recommendations, and joins the APPG in calling for the Government to:

- Commit to leading a 'STEM Diversity Decade of Action', along with STEM organisations across the private, public and voluntary sectors, to tackle the historic and systemic underrepresentation of minoritised groups at all levels in the sector. This should involve setting a bold vision for a diverse and equitable STEM sector at the heart of their ambitions for the UK to become a 'global science superpower'.

- Deliver a statutory workforce data strategy and drive forward changes in policy and legislation to support employers to improve equity. This should involve working with the Office for National Statistics and the UK Statistics Authority's Inclusive Data Taskforce to increase the scale and level of detail in demographic workforce data collection, including within the categories of ethnicity, disability, sexual orientation and identity, and socio-economic status, to allow for improved mapping of the workforce.

- Quickly look to address and reverse worsening inequity within the STEM workforce as a result of the pandemic.

Learning from charities

For charity funders, the Association of Medical Research Charities (AMRC) has published an EDI resource hub[72] which collates EDI materials for its members. Open access and easily accessible EDI resources are very valuable, particularly for smaller research charities who do not have the necessary resources to develop a robust EDI strategy from scratch, but who are critical to supporting EDI efforts across the research ecosystem. This is a useful resource not just for charities, but for all STEM organisations, including Government.

For further information, please contact Monica Dahiya via dahiyam@bhf.org.uk

[72] Association of Medical Research Charities, *Equity, Diversity and Inclusion Resource Hub*